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STRATEGY

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ABSTRACT

This paper provides insight into identifying areas that help or hinder business-IT alignment. Alignment focuses on the activities that management performs to achieve cohesive goals across the organization. The aim of this paper is to determine the most important enablers and inhibitors to alignment.

The paper presents and analyzes the results of a multi-year study of strategic alignment. Data were obtained from business and information technology executives from over 500 firms representing 15 industries who attended classes addressing alignment at IBM's Advanced Business Institute. The executives were asked to describe those activities that assist in achieving alignment and those which seem to hinder it. These enablers and inhibitors to alignment were then analyzed with respect to industry, to time, and executive position.

The results indicate that certain activities can assist in the achievement of this state of alignment while others are clearly barriers. Achieving alignment is evolutionary and dynamic. It requires strong support from senior management, good working relationships, strong leadership, appropriate prioritization, trust, and effective communication, as well as a thorough understanding of the

business environment. Achieving alignment demands focusing on maximizing the enablers and minimizing the inhibitors. The data show these factors to be constant over time and to be nearly identical for business executives and for IT executives. Furthermore, the data validate published anecdotal descriptions of enablers and inhibitors.

Keywords: Alignment of IT plans with business plans, IT strategic planning, IT management, information technology impact, organizational strategies, enabling and inhibiting activities.

I. INTRODUCTION

Decades have passed. Billions of dollars have been invested on information technology (IT). Yet, alignment which is defined as applying IT in an appropriate and timely way, in harmony with business strategies, goals and needs -- remains a key concern of business executives (Papp, 1998; King, 1995; Henderson and Venkatraman, 1990 and 1996; Earl, 1983 and 1993; Luftman, Lewis and Oldach, 1993; Luftman 1996; Goff, 1993; Liebs, 1992; Watson and Brancheau, 1991). This definition addresses both how IT is aligned with business and how the business should/could be aligned with IT. Frustratingly, organizations seem to find it difficult or impossible to harness the power of information technology (IT) for their own long-term benefit, even though there is worldwide evidence (Earl, 1983 and 1993; Robson, 1994; King, 1995; Papp, 1995) that IT has the power to transform whole industries and markets.

How can companies achieve alignment? This paper describes the activities consistently identified over the five years from 1992 to 1997 by both business and IT executives that enable or facilitate alignment and those that inhibit or hinder it. Anecdotal publications have described them (Wang, 1997). Our research studies, underway since 1992 (Luftman, Papp, Brier, 1995), identify these activities and establish benchmarks for exemplar organizations.

The survey data on which our findings rest were obtained from executives from over 500 firms representing 15 industries (see Table 1 for demographics) attending classes at IBM's Advanced Business Institute. In addition to these surveys, we used interviews and the observations from consulting engagements. Analysis of the survey data shows that the six most important enablers and inhibitors, in rank order are:

ENABLERS	INHIBITORS
Senior executive support for IT	IT/business lack close relationships
IT involved in strategy development	IT does not prioritize well
IT understands the business	IT fails to meet its commitments
Business - IT partnership	IT does not understand business
Well-prioritized IT projects	Senior executives do not support IT
IT demonstrates leadership	IT management lacks leadership

What is striking about these lists is that the same set of topics (executive support, understanding the business, IT-business relations, and leadership) show up in both. In this paper we present the detailed findings of our study and then discuss the reasons for these findings.

Alignment's importance is well known. IT's importance has been documented since the late 1970's (McLean and Soden, 1977; IBM, 1981; Mills, 1986; Parker and Benson, 1988; Brancheau and Wetherbe, 1987; Dixon and John, 1991; Niederman, et. al., 1991; Earl, 1983 and 1993). Alignment continues in importance today as companies strive to link technology and business (Papp, 1995, Luftman, 1996). Alignment addresses both doing the right things (effectiveness), and doing things right (efficiency).

Throughout the five-year research project reported here, the authors applied the strategic alignment model presented by Henderson and Venkatraman (1990). The components of our modifications of their model are shown in Figure 1. It is the relationships that exist among the twelve components of this model that define business-IT alignment.

I. BUSINESS STRATEGY

1. **Business Scope** – Includes the markets, products, services, groups of customers/clients, and locations where an enterprise competes as well as the competitors, suppliers and potential competitors that affect the competitive business environment.
2. Distinctive Competencies – The critical success factors and core competencies that provide a firm with a potential competitive edge. This includes brand, research, manufacturing and product development, cost and pricing structure, and sales and distribution channels.
3.Business Governance – How companies set the relationship between management stockholders and the board of directors. Also included are how the company is affected by government regulations, and how the firm manages its relationships and alliances with strategic partners.

II. ORGANIZATION INFRASTRUCTURE & PROCESSES

4.Administrative Structure – The way the firm organizes its businesses. Examples include central, decentral, matrix, horizontal, vertical, geographic, federal, and functional.
5.Processes - How the firm's business activities (the work performed by employees) operate or flow. Major issues include value added activities and process improvement.
6.Skills – H/R considerations such as how to hire/fire, motivate, train/educate, and culture.

III. IT STRATEGY

7.Technology Scope - The important information applications and technologies.
8.Systemic Competencies - Those capabilities (e.g., access to information that is important to the creation/achievement of a company's strategies) that distinguishes the IT services.
9.IT Governance - How the authority for resources, risk, and responsibility for IT is shared among business partners, IT management, and service providers. Project selection and prioritization issues are included here (See Section IV).

IV. IT INFRASTRUCTURE AND PROCESSES

10.Architecture -The technology priorities, policies, and choices that allow applications, software, networks, hardware, and data management to be integrated into a cohesive platform.
11.Processes - Those practices and activities carried out to develop and maintain applications and manage IT infrastructure.
12. Skills - IT human resource considerations such as how to hire/fire, motivate, train/educate, and culture.

Figure 1. The Twelve Components of Alignment (Luftman 1996)

In recent years, a great deal of research and analysis focused on the linkages between Business and IT (Chan and Huff, 1993; Luftman, 1996; Earl, 1993; Henderson, Thomas and Venkatraman, 1992), the role of partnerships between IT and business management (Keen, 1996; Ives, Jarvenpaa, and Mason, 1993), and the need to understand the transformation of business strategies resulting from the competitive use of IT (Boynton, Victor, and Pine, 1996; Davidson, 1996). Firms changed not only their business scope, but also their infrastructure as a result of IT innovation (Keen, 1991; Foster, 1986).

Much of this research, however, was conceptual. Empirical studies of alignment (Henderson and Thomas, 1992; Broadbent and Weill, 1993; Chan and Huff, 1993; Baets, 1996) examined a single industry and/or firm. Conclusions from such empirical studies are potentially biased and may not be applicable to other industries. It was the lack of consistent results across industries, across functional position and across time that was the impetus for our study.

II. STUDY DESIGN

The objective of our research was to determine (over time, regardless of industry or executive position) the enablers and inhibitors to aligning business and IT strategies. A study was conducted from 1992-1997 using responses from 1,051 executives representing over 500 US Fortune 1,000 organizations who attended seminars addressing alignment at IBM's Advanced Business Institute in Palisades, NY.

The objectives of the seminars were to assist executives in assessing the positioning and contribution of IT in their organizations, and to identify their personal role in aligning their organizations. The seminars were addressed to senior business executives from various functional areas (e.g., finance, marketing, H/R) of private and public sector organizations. Representative titles included President, Chief Operating Officer, Chief Financial Officer, Chief Information Officer, General Manager, Director of Human Resources, General Manager, Senior Vice President of Sales and Marketing, Physician in Chief, Provost, and State Senator. A cross-section of industries was represented,

including insurance, health, finance, education, government, utilities, transportation, and manufacturing. Table 1 describes the demographics of the research population.

Industry Classification	Survey Percentage
Finance/Banking	8.5%
Health/Health Services	4.4%
Insurance/Real Estate	10.8%
Manufacturing	23.4%
Refining	1.6%
Pharmaceuticals	1.6%
Public Administration	8.5%
Educational Inst.	9.5%
Government/Defense	2.2%
Business/Consulting	3.5%
Agriculture/Forestry	1.3%
Utilities	6.0%
Transportation	3.8%
Commerce	5.7%
Misc. Services	9.2%

Table1. Study Demographics

While they attended the seminar, the participants were asked to fill out a questionnaire, which was a modified form of that developed by Henderson and Thomas (1992). This questionnaire was based on the strategic alignment model described in Figure 1. The questions were originally written for executives in the health services industry. They were adapted by two of the authors (Luftman and Brier) so that they are applicable to executives from any industry. The following procedure was used to validate the questions:

- After the questions were modified, their universal applicability was reviewed with other consultants and academics familiar with alignment.

- Structured interviews were held with executives attending the seminars in 1992 to ensure the appropriateness of the questions.
- The questions were reviewed during consulting engagements that focused on issues of aligning IT and business strategies.
- To minimize the potential bias that might be inherent with the survey taken after the seminar, the study was repeated with a group of executives not taking the alignment seminar and the results were the same.

After teaching the seminars in which the tool was applied in 1993, we conducted additional executive interviews to ensure that our conclusions for the respective enablers and inhibitors were valid and understandable.

Many of the questions were revised based on the feedback from this pilot study. Several iterations were necessary to identify and modify ambiguous and troublesome questions. As a result of these assessments, we are confident in the results obtained. The results presented in Section III are based on data taken between 1993 and 1997.

The questionnaire asked the respondents to identify the three top enablers and the three top inhibitors to achieving alignment between business and IT. The questions were open-ended. As a result, the executives could give a free expression of their opinions on factors from their own experience within their firms rather than being limited to ideas generated by the researchers.

Before responding, each executive had spent a day in the seminar discussing strategic alignment within the twelve-component alignment framework presented in Figure 1. The purpose of the discussions was to establish a common understanding of each component of the model. Practical examples of each component were discussed to help in developing a working definition that could be used by each individual to apply the model in their own organization. Thus, each had a frame of reference from which to respond to the survey questions.

The executives in this study were first asked to enter demographic information such as name, title, organization, and industry. They were next asked

to rate (using a 7 point Likert scale) the perceived strength of alignment within their companies.

The executives were then asked, within the context of their function (business or IT), to identify the three key enablers and inhibitors to achieving alignment in their organization. This subjective assessment was used to determine which specific considerations the executives believed aided and hindered alignment. Separating the responses between business and IT respondents tested the hypothesis that the respondent's functional area influences the enablers and inhibitors described.

In all, 1,232 questionnaires were filled out, of which 1,051 proved usable. Of these, 527 came from IT executives and 524 came from non-IT executives. The respondents listed a total of 3,153 enablers and 3,153 inhibitors

As in any open-ended questionnaire, it is necessary to group the responses so they fall into recognizable categories. The responses were analyzed for similar keywords or phrases that would aid in the grouping process. For example, references by respondents to effective or non-effective dialogue between IT professionals and their business partners were sorted into "Good IT/business communication" or "IT does not communicate well" in the final list of categories. This was done with the answers obtained. The categories, which are listed in Tables 2 and 3, had been established over a number of years. Once all the questions had been categorized, the percentage in each category was determined.

In addition, the executives categorized their firm into a specific industry. This classification was checked against the organization's SIC code to place it into an appropriate industry.

Table 2. Enabler Categories

Senior executive support
IT involved in strategy development
IT understands business
IT, non-IT have close relationship
IT shows strong leadership
IT efforts are well prioritized
IT meets commitments
IT plans linked to business plans
IT achieves its strategic goals
IT resources shared
Goals/vision are defined
IT applied for competitive advantage
Good IT/business communication
Partnerships/alliances
Other

Table 3. Inhibitor Categories

IT/non-IT lack close relationship
IT does not prioritize well
IT fails to meet its commitments
IT does not understand business
Senior executives do not support IT
IT management lacks leadership
IT fails to meet strategic goals
Budget and staffing problems
Antiquated IT infrastructure
Goals/vision are vague
IT does not communicate well
Resistance from senior executives
IT, non-It plans are not linked
Other

III. STUDY RESULTS

OVERALL ALIGNMENT

In response to the overall question as to whether their own companies are aligned:

- Half believed that their business and IT strategies were properly aligned.
- Forty-two percent said they were not aligned, and
- 8% were unsure or had no opinion

This result indicates that only half of the firms believe they have a synergistic, cooperative business-IT relationship. The perceived lack of alignment was the impetus for the next part of the study, the identification of factors that aid or hinder alignment.

ENABLERS AND INHIBITORS

The results of the analysis of enablers and inhibitors are shown in Figures 2 through 5. Figures 2 and 3 distinguish between business and IT executives and Figures 4 and 5 examine the effect of time. Visual examination of Figures 2 and 3 indicates that there is little difference between the rankings by business executives and IT executives for both the enablers and inhibitors. To test whether this observation is correct, t-tests and an analysis of variance (anova) were performed on the enablers and the inhibitors. The results, presented in Appendix A, indicate no significant difference between the IT and non-IT participants' perceptions of enablers and inhibitors in terms of mean scores and variances. This suggests that each group viewed the enablers and inhibitors in the same way and hence the relative ranking of the enablers and inhibitors is the area of primary importance. This finding underscores the importance of each group's collective assessment of the specific factors that aid or hinder the alignment of business and IT strategy development.

Over the five-year span of the study, the ranking of importance for the enablers and inhibitors remained relatively consistent (Figures 4 and 5). That is, the factors are constants, rather than changing with fashion.

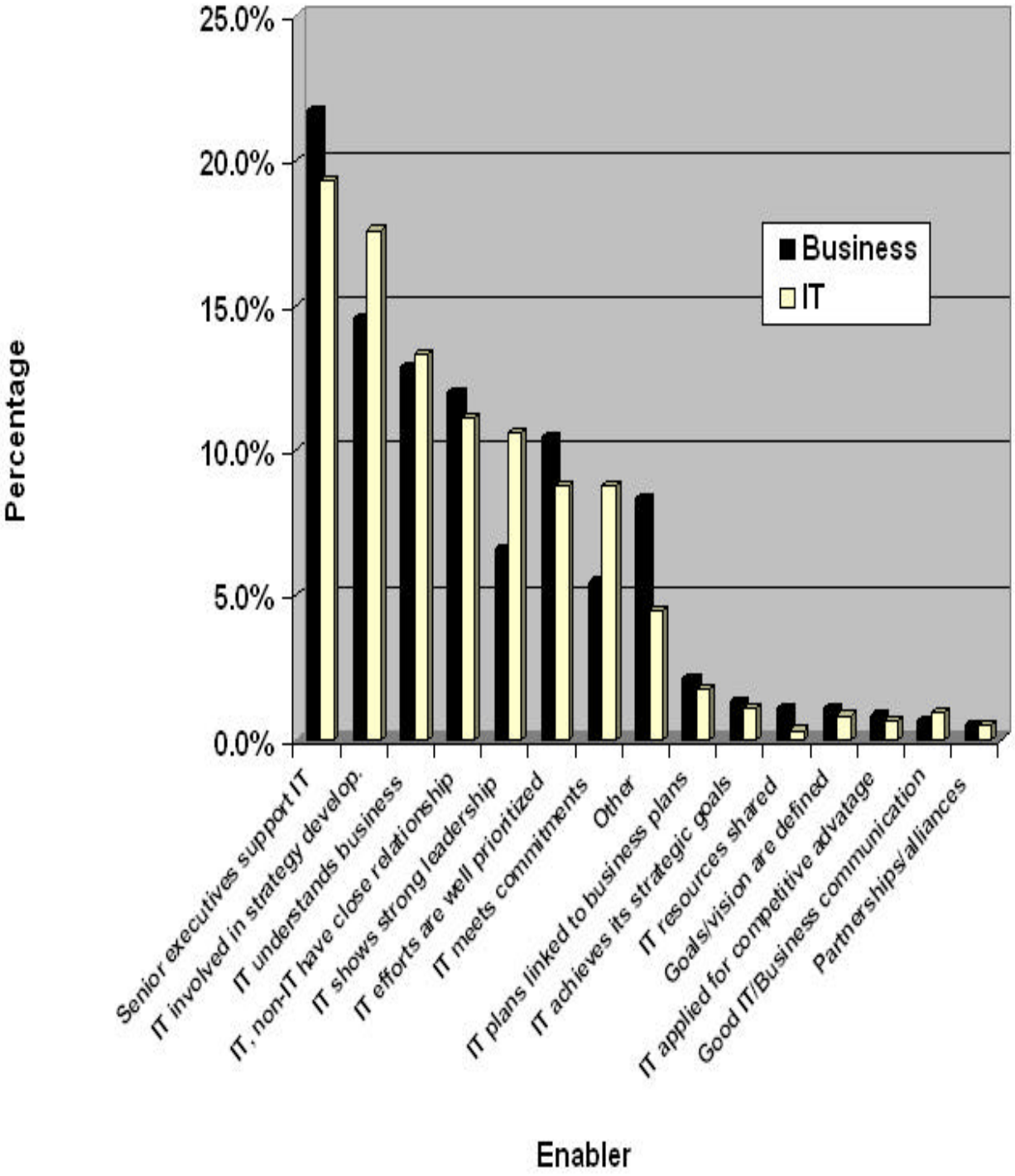

Figure 2. Enablers to Alignment; Business vs. IT Executives 1993-1997

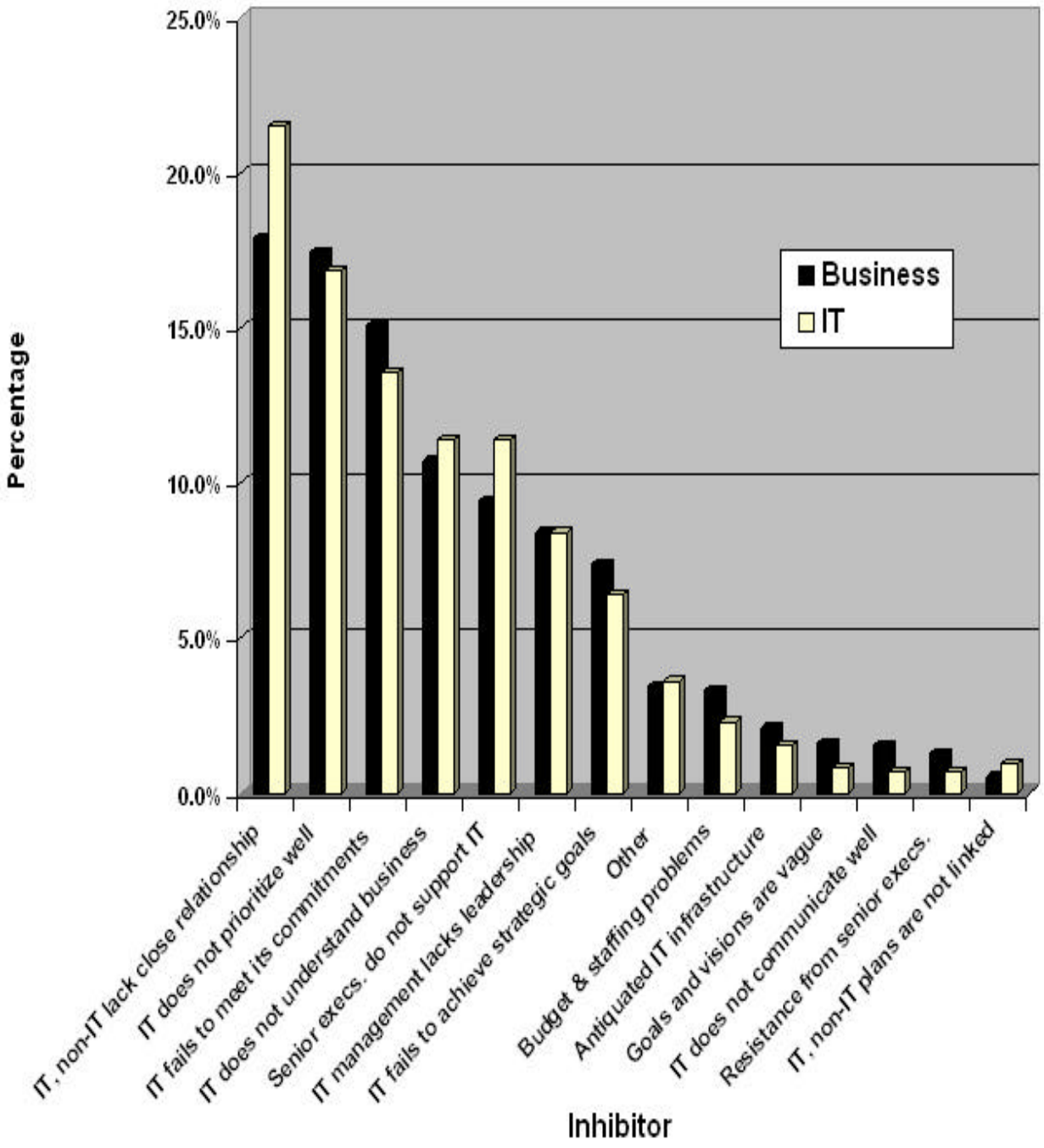

Figure 3. Inhibitors to Alignment; Business vs. IT Executive 1993-1997

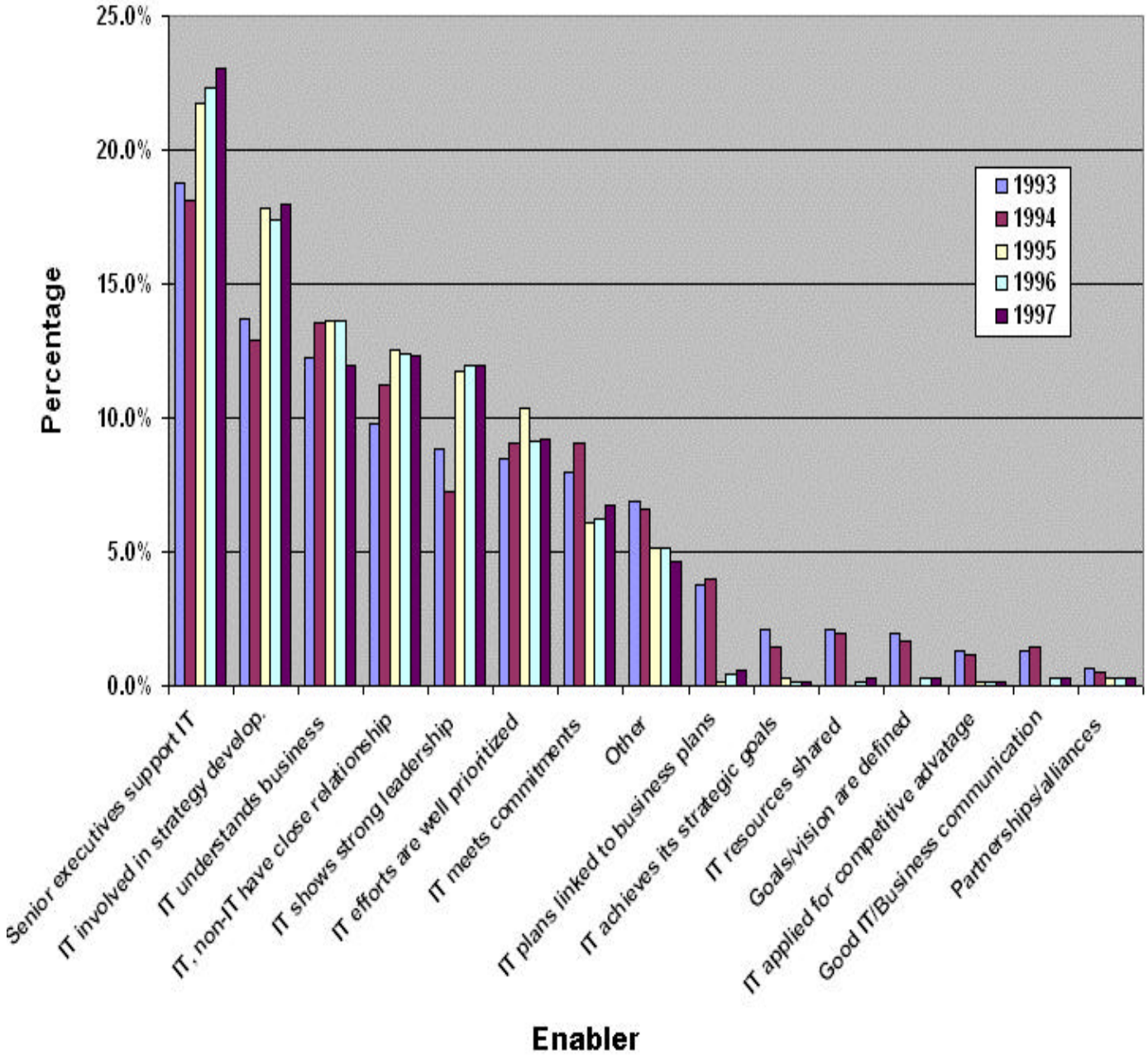

Figure 4. Enablers of Alignment by Year

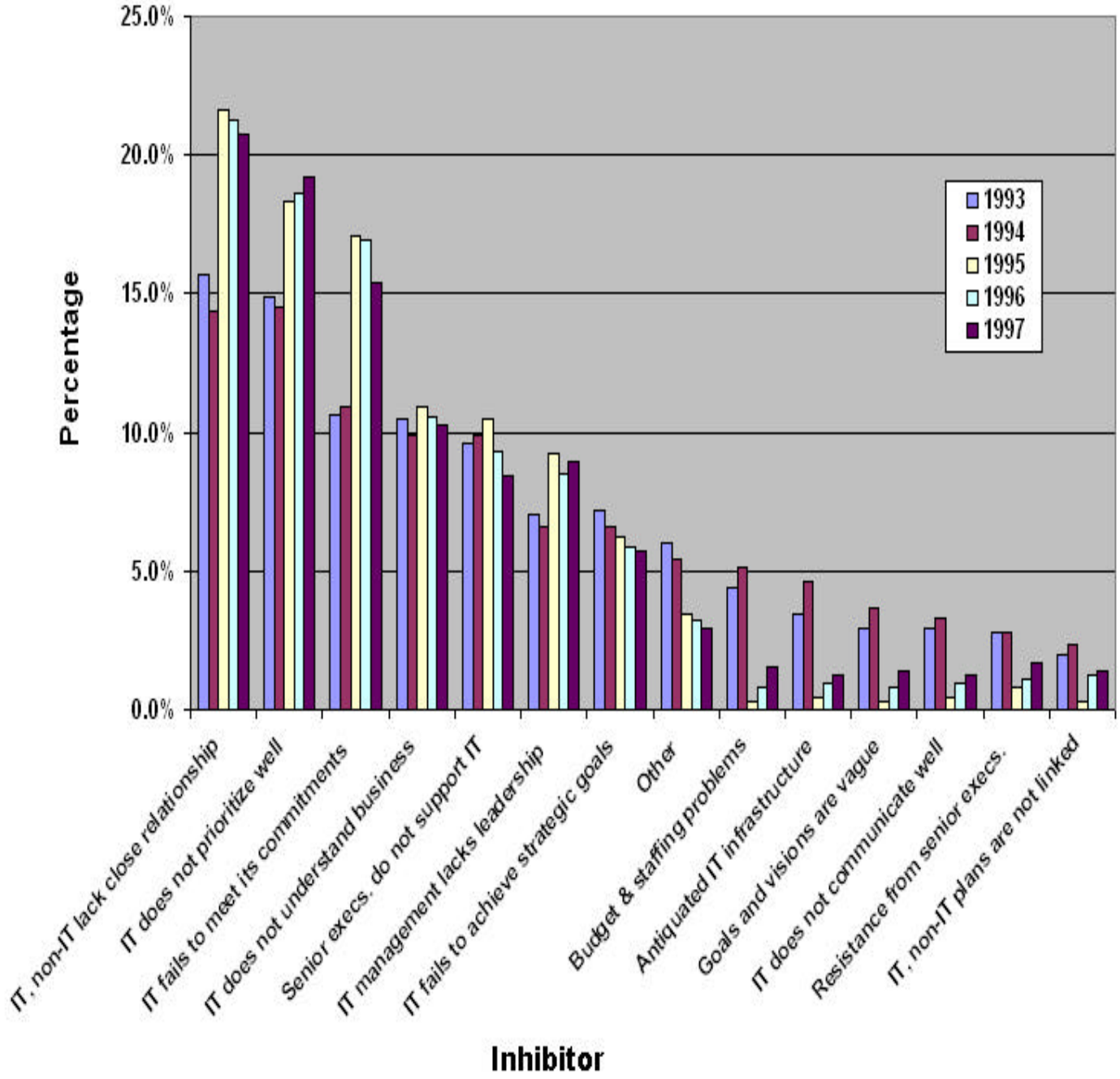

Figure 5. Inhibitors of Alignment by Year

IV. DISCUSSION AND INSIGHTS

Our experience in consulting, researching, and teaching IT-business alignment suggests that to improve IT-business alignment, organizations need to focus on the activities management *does* (or does not do) to achieve its goals. Consistently, over the five years of this research, the respondents indicated that certain activities assist in achieving alignment while others are clearly barriers. As shown in Figures 2 through 5, the activities identified as enablers and inhibitors were comparable across industry, across business function, and across time.

In this section, we discuss the six most frequently identified enablers and inhibitors that were listed in Section 1. For convenience, they are repeated below.

ENABLERS	INHIBITORS
Senior executive support for IT	IT/business lack close relationships
IT involved in strategy development	IT does not prioritize well
IT understands the business	IT fails to meet its commitments
Business - IT partnership	IT does not understand business
Well-prioritized IT projects	Senior executives do not support IT
IT demonstrates leadership	IT management lacks leadership

For each enabler and inhibitor, we describe the importance of the factor and provide illustrative examples from a variety of industries that show successful ways of handling the situation. Except as noted by references, the anecdotes come from companies participating in our research.

ENABLERS TO ALIGNMENT

Support from senior non-IT executives was ranked as the top enabler by both IT and non-IT executives. Non-IT executives ranked this enabler even higher than IT executives. This important finding highlights the need for business

to be aware and supportive of technology innovations. Important considerations include having business executives:

- recognize the value of information technology
- define and communicate vision and strategies that include the role of IT
- sponsor IT projects (e.g., provide leadership, funding).

Lack of support may translate into lack of funding and missed opportunities for innovative application of information technologies. Insurance giant CIGNA, for example, migrated their entire enterprise to a PC-based Windows NT system running Microsoft's Office 97 Suite. The IT team saw this investment in technology as paramount to the success of the firm. CIGNA lost over half a million dollars in 1993 whereas its 1997 profit was around $100 million. CIGNA management's financial support and recognition of the strategic value of such technologies resulted, at least in the short-term, in increased efficiency and productivity of end-users, faster development of in-house applications, and increased understanding among employees.

IT's participation in creating business strategies and achieving its own strategic goals was the second most important enabler. Both IT and non-IT executives see the need for mutual cooperation and a close working relationship in the strategy formulation process. They recognize that it is easier to achieve alignment when cross-functional teams, including IT, create enterprise strategies. Participation at this level should be frequent. Both IT and business need to listen to one another, communicate effectively, and learn to leverage IT resources to build competitive advantage. Each of the factors to achieve alignment are important, but none of the others matter if there is not an atmosphere of open and honest communications.

Some important considerations (based on our experiences) include:

- IT participating in the creation of business strategies
- defining and supporting effective IT governance processes (Figure 1)

- establishing binding IT-business partnership, relationship, trust
- effective marketing of the value of IT

Firms that successfully used cross-functional teams for strategy development include Bristol-Myers Squibb and C-Cube Microsystems. At Bristol-Myers Squibb an IT Review Board composed of IT and non-IT executives leads the strategy and planning processes, identifies opportunities, and defines priorities for IT. It also tracks projects and uses the concept of an IT–business liaison to maintain and ensure service in the field for its customers (Luftman, 1997).

C-Cube, which designs and markets digital compression hardware and software, used a cross-functional team to derive their client/server strategy. Senior representatives from functional departments including sales, marketing, and finance were chosen to participate in the evaluation process. The team narrowed the list of vendors and chose the one that met the needs of the firm as a whole. C-Cube's CIO believes this participation allowed the firm to obtain buy-in from all the groups using the system. The firm created a specialized, functional system that meets everyone's needs. The CIO also maintains a good relationship with the CEO, which helps gain the needed senior executive support for IT.

Both IT and business executives contend that *IT needs to understand the firm's business environment* (customers and competitors). Important considerations include:

- IT understands the business
- Business understands IT
- IT communicates in business terms
- IT focuses on applying technical understanding to identify business opportunities

In the last decade IT understanding of the business has been crucial to firms in the trucking industry. The Motor Carrier Act (1980) changed the face of

competition. This act was designed to enhance the transportation of goods and property by promoting an efficient and competitive transportation industry. The industry that previously had relied on regulated income had to compete in a market of falling demand and competitive pricing. C.R. England and Sons Trucking Company responded by using information technology to manage these efforts. Based in Salt Lake City, Utah, the company's IT organization commits itself to enhancing the ability of the business to deliver leading customer service. One such application, their Quick Trace Program, allows customers to dial directly into C.R. England's system and review the status and locations for any delivery. Satellite technology enables the company to pinpoint truck locations, allowing information to be collected to provide this service to customers while supporting business process measurements. This data is continually analyzed to enhance results. "If we can measure it, we can manage it" is the motto at C.R. England, and is a reflection of their success in alignment.

McGraw-Hill is another example of an IT organization that understands its business. At McGraw-Hill, custom publishing for the college textbook marketplace is focused on materials compiled in their PRIMIS application. PRIMIS lets college instructors create a customized textbook tailored to the specific needs of a course. Developed under the direction of McGraw-Hill editors, the PRIMIS database contains core chapters and sections from existing textbooks, journals, and articles. The professor selects and determines the sequence of the material. Professors can also add their own material and notes. The database of information and the supporting technologies represent an IT-based business strategy. PRIMIS facilitated McGraw-Hill's strategy of building a product tailored to specific requirements. In the context of strategic alignment, there are important considerations for integrating the infrastructure. The traditional "assembly-line" processes for textbook publishing (acquisition, writing, editing, manufacturing, selling, and distributing) have been replaced by processes designed to take advantage of the opportunity to build a customized book electronically and produce it on paper where needed. The IT infrastructure

identifies standards, processes, and skills that support this new "book-building" infrastructure for the college textbook business.

Prioritization implies firms are able to incorporate technology into their strategies in a timely manner so that they do not fall behind competitors. Prioritization defines and supports effective IT governance processes (see Figure 1). A highly publicized example is the growth of the Internet. Many Internet service providers did not anticipate its growth and, consequently, failed to prioritize technology acquisitions and build appropriate infrastructures.

A company that has done this successfully is Delta Airlines, who applied IT to develop a mission-critical system. Because of a strong IT-business relationship, the project was given top priority and financial backing by top management at Delta. This led, in turn, to effective project prioritization and resulted in a strong competitive position for the airline and a saving of more than $20 million. The system allows Delta to receive updates on weather conditions, forecast traffic delays, and reroute passengers from problem areas. The system has become such a vital part of the airline's operation that it is the single most important strategic IT investment at Delta. 'If the operations center went offline, the entire airline would shut down,' according to the Delta project manager.

Frequently the important *leadership* role that IT can play is only recognized after a competitor has applied IT innovatively. IT innovation is occurring at an increasing pace across all industries. Examples include automated teller machines, airline reservation systems, leveraging data mining point of sale information, and using the web to become an overnight success (e.g., Amazon.Com).

INHIBITORS TO ALIGNMENT

Many of the key inhibitors are the inverse of the enablers. The order of importance of the inhibitors is clearly different from the order of the enablers. The most frequently cited inhibitors, by both IT and non-IT executives, are IT activities. IT executives overwhelmingly rated the *lack of a close working*

relationship as the number one inhibitor. This result is not surprising, given that in most organizations IT executives do not participate in strategy formulation.

Business executives have to provide direction for IT initiatives. They have to set policies for the acquisition, use, and retirement of company information assets. Business priorities are set where value is expected to be realized. Only business executives (as sponsors or champions) can drive the realization of value from IT related projects. IT unto itself cannot provide the value. Therefore, business policies must translate into priorities and projects for the IT organization. It is critical to have this partnership to ensure that the correct IT priorities are set. The vehicles for this governance process include steering committees, IT-business liaisons, budget and human resource allocation processes, IT organization, and value assessments.

IT executives, however, need to do their part to *effectively prioritize* their workload, which was ranked as a top inhibitor by non-IT executives.

Bristol-Myers Squibb's use of IT-business liaisons, described earlier, exemplifies an effective implementation of one aspect of IT governance. Our experience suggests that there is no one silver bullet for addressing this important inhibitor. However, it is the effective use of all of the vehicles for governance that lead to success. One should note that as difficult as it is to establish these vehicles, it is even more difficult to maintain their effectiveness.

The problem of IT's *inability to meet its commitments* has plagued businesses since the introduction of the modern computer. Too often, IT is overwhelmed by all it has to do. Business executives and end-users become increasingly upset that projects are late and over budget. Recent studies suggest 30% of IT projects are cancelled before completion, 50 – 100% are over budget, and 6 – 12 months late (Yourdon 1997). Most of these problems are not technical but still have a significant impact on the credibility of IT. They are the result of not adhering to basic project management disciplines, and not having a business–IT relationship that facilitates business participation in all aspects of the project. Some important considerations (and possible solutions) include:

- defining change management processes
- delivering smaller projects (breaking larger projects into smaller projects)
- IT sharing project risk with the business

Business understanding information technology and *IT not understanding business* can have negative effects for IT. Organizations are providing sufficient training and support to create growing ranks of empowered, computer-literate knowledge workers. As a result, in some firms IT's role as the primary systems developer is being supplanted by end-user development using new, sophisticated application tools. Telecommunications giant BellSouth is experiencing this shift. Tired of large backlogs and missed deadlines, it implemented a client/server system that stores electronic images of company documents. The $3.45 million dollar project saves BellSouth approximately $17.5 million every year. They also cut the time required to create a new form down to 24 hours instead of 10 weeks. Such innovative use of IT is only possible when senior business management understands and supports IT endeavors**.** Also, IT did not understand the business until they were forced to do so.

The inability to *understand the changing business environment* is another barrier to alignment for both IT and non-IT executives. Firms that do not keep their customers happy by investing in technological enhancements to increase customer satisfaction fall behind their competitors. An example of a firm that has successfully used IT to improve customer service in a dynamic environment is Charles Schwab Corporation, the discount brokerage firm. Schwab relies on marketing and innovative uses of IT to offer investment programs to its clients. Schwab's strategy involves the use of IT to lower costs and to provide superior service at lower prices. Therefore, the IT strategy creates a distinctive competency that positions Schwab in their market. All of their IT initiatives have been driven toward customer service, including Telebroker (1989), a fully automated telephone system for real-time stock quotes and order placement, and StreetSmart (1993), software that lets clients trade through Schwab via a

PC. In 1996 Schwab began to let customers trade mutual funds on its Web site, becoming the first major brokerage firm to offer the service.

Schwab has to continually revisit and revise their strategy. Through the Internet, the dynamics of the brokerage industry (and all industries for that matter) are rapidly changing. E*Trade is an Internet based brokerage firm that is competing with Schwab and others on pricing and service. Since costs are more variable then they were in the past and industry entry can be achieved with far less trading volume, competition is growing and innovative. Schwab has responded with its investing website, the latest in a list of technology initiatives. For Schwab, the IT strategy is integrated with the strategy for the business.

Finally, inhibitors are not independent. For example, if IT does not prioritize well in the eyes of business executives, there is a strong connection, in our experience, to a lack of close relationship between IT and business. The implication, once again, is that addressing both enablers and inhibitors is not a simplistic, one-answer solution. It is complex and ongoing. Organizations are constantly looking for the one silver bullet to address their needs. Unfortunately it takes many silver bullets to succeed but it takes but one silver bullet to kill.

VI. CONCLUSIONS

Business-IT alignment remains a major issue. Over a thousand executives from different industries identified similar enablers and inhibitors to alignment consistently over the five years studied.

Executives need to work toward minimizing activities that inhibit alignment and maximize activities that bolster it. The results show that they should:

- concentrate on improving the relationships between the business and IT functional areas,
- work toward mutual cooperation and participation in strategy development,
- effectively communicate in terms that their business partners understand and appreciate
- maintain executive support, and

- prioritize projects more effectively.

IT executives *can* be successful business leaders and keep their organizations in constant alignment by continual focus on the enablers and inhibitors described in this paper.

Editor's Note: This paper was received on September 5, 1998 and published on March 3, 1999. It was with the authors for revisions for approximately three months.

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NOTE: This paper contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
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3. the authors of the Web pages, not CAIS, are responsible for the accuracy of their content.
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APPENDIX A
T-TESTS AND ANOVA BY IT AND NON-IT PARTICIPANTS

This appendix presents the results of t-tests and Anova calculations performed for enablers and inhibitors. Table A-1 shows the results of a t-test for determining whether the observed means for the distributions for the enablers and the inhibitors are the same. Tables A-2 and A-3, respectively, present the results of the ANOVA tests for business and IT participants and for enablers and inhibitors to alignment.

Table A-1. T-test for Enablers And Inhibitors By IT And Non-IT Participants

	Business	**IT**
Mean	112	112.6428571
Variance	9683.407407	10891.34921
Observations	28	28
Pearson Correlation	0.962239975	
Hypothesized Mean Difference	0	
df	27	
t Stat	-0.119445253	
P(T<=t) one-tail	0.452903469	
t Critical one-tail	1.703288035	
P(T<=t) two-tail	0.905806938	
t Critical two-tail	2.051829142	
The t-test performs a paired two-sample t-test to determine whether a sample's means are distinct. This t-test form does not assume that the variances of both populations are equal.		

Table A-2. ANOVA of Business and IT Participants

Enabler	Count	Sum	Average	Variance
Senior executives support IT	2	648	324	722
IT involved in strategy development	2	508	254	1152
IT understands business	2	413	206.5	24.5
IT, non-IT have close relationship	2	366	183	98
IT shows strong leadership	2	272	136	2048
IT efforts are well prioritized	2	304	152	338
IT meets commitments	2	225	112.5	1404.5
Other	2	202	101	1922
IT plans linked to business plans	2	61	30.5	12.5
IT achieves its strategic goals	2	38	19	8
IT resources shared	2	22	11	72
Goals/vision are defined	2	30	15	8
IT applied for competitive advantage	2	23	11.5	4.5
Good IT/Business communication	2	25	12.5	12.5
Inhibitor				
IT, non-IT lack close relationship	2	621	310.5	1740.5
IT does not prioritize well	2	540	270	32
IT fails to meet its commitments	2	451	225.5	264.5
IT does not understand business	2	348	174	72
Senior execs. do not support IT	2	328	164	512
IT management lacks leadership	2	265	132.5	0.5
IT fails to achieve strategic goals	2	217	108.5	112.5
Other	2	111	55.5	4.5
Budget & staffing problems	2	88	44	128
Antiquated IT infrastructure	2	57	28.5	40.5
Goals and visions are vague	2	38	19	72
IT does not communicate well	2	35	17.5	84.5
Resistance from senior execs.	2	31	15.5	40.5
IT, non-IT plans are not linked	2	23	11.5	24.5
Business	28	3136	112	9683.407
IT	28	3154	112.642	10891.35

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	544569.2	27	20169.2	49.7359	7.7E-17	1.904823
Columns	5.785714	1	5.78571	0.01426	0.90580	4.210008
Error	10949.21	27	405.526			
Total	555524.2	55				

The two-factor analysis of variance (ANOVA) does not include more than one sampling per group, testing the hypothesis that means from two or more samples are equal (drawn from populations with the same mean). This technique expands on tests for two means, such as the t-test.

Table A-3. ANOVA of Enablers and Inhibitors to Alignment

ENABLER	Count	Sum	Ave-rage	*Variance*
Senior executives support IT	2	648	324	722
IT involved in strategy develop.	2	508	254	1152
IT understands business	2	413	206.5	24.5
IT, non-IT have close relationship	2	366	183	98
IT shows strong leadership	2	272	136	2048
IT efforts are well prioritized	2	304	152	338
IT meets commitments	2	225	112.5	1404.5
Other	2	202	101	1922
IT plans linked to business plans	2	61	30.5	12.5
IT achieves its strategic goals	2	38	19	8
IT resources shared	2	22	11	72
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Inhibitor				
IT, non-IT lack close relationship	2	621	310.5	1740.5
IT does not prioritize well	2	540	270	32
IT fails to meet its commitments	2	451	225.5	264.5
IT does not understand business	2	348	174	72
Senior execs. do not support IT	2	328	164	512
IT management lacks leadership	2	265	132.5	0.5
IT fails to achieve strategic goals	2	217	108.5	112.5
Other	2	111	55.5	4.5
Budget & staffing problems	2	88	44	128
Antiquated IT infrastructure	2	57	28.5	40.5
Goals and visions are vague	2	38	19	72
IT does not communicate well	2	35	17.5	84.5
Resistance from senior execs.	2	31	15.5	40.5
IT, non-IT plans are not linked	2	23	11.5	24.5

Source of Variation	SS	f	MS	F	P-value	F crit
Between Groups	544569.2	27	20169.23	51.55	1.49E-17	1.889426
Within Groups	10955	8	391.25			
Total	5555					

The analysis of variance (ANOVA) is used to test the hypothesis that means from two or more samples are equal (drawn from populations with the same mean). This technique expands on the tests for two means, such as the t-test.

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