

FIRM MANAGEMENT, STRATEGY, RESOURCES,
AND PRESENCE ON THE WEB

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Abstract

This paper examines the variables associated with a firm having a site on the World Wide Web and with the site's characteristics. We predict that company leadership and strategy, firm resources and the need to communicate with the public are associated with the presence of Web sites and their characteristics. To test the predictions, we use data from the *Business Week* 1000 largest firms in the U.S., two year's of chairmans' annual report letters, and a survey of Web sites. The results show that firm leadership and strategy is the strongest predictor of having a Web site and its characteristics. Firm resources and the need to communicate are also positively associated with Web sites. The presence of a Web site and its evaluation appear to be independent of industry classification. We explore the implications of the results for firm strategy toward the adoption of technological innovations.

Firm Management, Strategy, Resources and Presence on the Web

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INTRODUCTION

The World Wide Web is one of the most highly-publicized and significant technological innovations of the 1990s. During the past two years firms have rapidly adopted the Internet by developing Web sites. Firm sites vary significantly in size and content. Some companies like IBM have thousands of pages of information available on their sites. Federal Express and UPS use the Web to let customers track the status of packages. Electronic commerce is emerging as a viable way of doing business.

Many firms have not set up home pages while their competitors have. What factors distinguish those who establish a Web presence from those who have not yet done so? The purpose of this research is to understand why some companies embrace and adopt the Web while comparable firms do not consider the Internet to be important. A second objective of our research is to evaluate the offerings of firms that have Web sites. What factors are associated with the characteristics of a Web site?

PREDICTIONS

What variables are likely to be important in predicting the existence and evaluating the contents of a Web site? First, we believe that senior management in a firm provides both leadership and strategic direction. Management knowledge of information technology has been found to be associated with the use of technology (Boynton, Zmud and Jacob, 1974). A consistent finding in early research on system implementation is that management support is related to success (see Lucas, Schultz and Ginzberg, 1990, for a summary of these studies). A firm that emphasizes technology as a part of its strategy is likely to have noticed the potential strategic importance of the Internet and the World Wide Web and to have established a site.

Second, drawing on resource-based theories of strategy (Barney, 1991; Conner and Prahalad, 1996) we believe that all other things equal, firms with more resources are likely to invest in a Web presence than firms with fewer resources. Knowledge is a major resource and we believe resource-rich firms are more likely to have personnel knowledgeable about technology and interested in innovation compared to resource-poor firms. Resource-rich firms can also afford to experiment with new technology.

Past research has found that firm resources influence network use (Streeter, et al., 1996); firms with more resources were found to make greater use of networks both in the U.S. and in France. (Interestingly, a public network infrastructure, the Minitel system in France, made it possible for firms to use networks regardless of their resources.)

Firms need to communicate with the public, especially the investment community and shareholders. We predict that companies with a greater need to communicate information to outside parties such as shareholders will be more likely to have a Web site.

Finally, there are significant differences among industries in their adoption of information technology. For example, Jarvenpaa and Ives (1990) found differences in information technology (IT) strategy among industries, with information intensive industries such as retailing, banking and publishing which display more awareness of technology. We expect there to be significant differences in the presence and content of Web sites based on industry.

Our reasoning leads to the following three predictions:

Prediction 1: Senior management support and a strategy that includes information technology are positively related to the presence and characteristics of a Web site.

Prediction 2: Firm resources will be positively related to the presence and characteristics of a Web site.

Prediction 3: The need to communicate with investors and shareholders will be positively related to the presence and characteristics of a Web site.

Prediction 4: Information intensive industries will have a greater presence and more highly evaluated Web sites than less information intensive industries.

RESEARCH DESIGN

Our basic research model is that management leadership and strategy, firm resources, the need to communicate, and industry type lead to the presence of a Web site and have a role in determining its contents. To test these predictions and learn about adoption of the Web, we need a sample of firms, information about their technological leadership and strategy, data on firm resources, their need to communicate, and information about their Web sites if they exist. Fortunately, it is possible to obtain all of these data from publicly available sources, including the Web itself.

Sample and Variables

Based on our belief that firm resources are important, we sampled from the *Business Week* 1000, a roster of the largest firms in the U.S. based on 1995 market values. We scanned the 1000 company names from the March 27, 1995 *Business Week* issue into a spreadsheet. The next step was to assign a random number to each firm, and select a sample of 100 companies at random from the 1000. We entered 1994 financial data for these 100 companies from the copy of *Business Week*.

Sometimes it is difficult to discover a firm's strategy. Jarvenpaa and Ives (1990) used chairman letters from annual reports to provide an indication of company strategy. Others have used the chairman's letter and "management discussion" section of annual reports to study how senior management explains performance outcomes (Bettman and Weitz, 1983, and Salancik and Meindl, 1984). Based on this past research, two of the authors read the chairman's letters from 1994 and 1995 annual reports for the firms in the sample, and marked statements related to information technology and the Internet in the reports. Both authors compared their findings (there was almost complete agreement), creating a count for each firm of the number of technology statements in each firm's 1994 and 1995 chairman's letter. The side bar contains examples of some chairman's' letters statements about information technology.

To determine if there is a Web site and to evaluate its contents, we developed a survey instrument to be used when visiting sites. Two authors conducted a pretest on 25 companies not in the sample to develop an algorithm for searching for Web sites (which search engines to use and in what order) and to determine their interrater reliability in completing the evaluation form. From May through August of 1996 these two authors searched for and evaluated the Web sites in the study.

Table 1 shows the variables in the study and how they were measured.

The variable ANNREP represents the sum of information technology mentions in chairman's annual report letters for each firm for 1994 and 1995. We use these ratings as an indicator of senior management leadership and company strategy for information technology.

All of the data in the firm resources class come from the 1995 *Business Week* 1000 report. Some of these indicators are indirect measures of resources. In general, a firm with high market value, sales, profits, return on assets, asset base and share price either has or can more easily obtain resources than firms that do not score as highly on these variables.

We believe that a company with actively traded stock (high turnover) has a need to communicate with the public and will do so more than a firm with less active stock. Therefore, we measure the need for a firm to communicate with shareholders and investors indirectly through the variable TURNOVER. There is some evidence that higher stock turnover is associated with formal disclosure. The researchers involved have

Variable Class	Variable	Definition	No Items
Leadership/strategy	ANNREP	Annual report IT statements (94-95)	1
Firm resources	BWRANK	1995 Business Week rank in top 1000	1
	MARKET	Market Value (millions)	1
	SALES94	1994 Sales (millions)	1
	LOGSAL94	Common log of 1994 sales	1
	PROFITS94	1994 Profits (millions)	1
	ROE	Return on equity	1
	ASSETS	Assets (millions)	1
	SHARE	Share price	1
Communications	TURNOVER	Stock turnover 1994	1
Web site	WEBSITE	Presence of a Web site (1 = yes, 0 = no)	1
Site characteristics	INTERACT	Interactive rating of Web site	8
	BUSINESS	Can conduct business on Web site	4
	EVAL	Evaluation of web site (alpha = .93)	2
Industry	INDUSTRY	<i>Business Week</i> classification	1

Variables in the Study

Table 1

hypothesized that greater disclosure encourages more turnover while we use TURNOVER as an indicator of a need to communicate (Bartov and Bodnar, 1995; Healy, Palepu and Sweeney, 1994). Companies also communicate with shareholders and the public beyond legally required disclosure.

The variable WEBSITE is a 1 if one or both authors searching for Web sites located a site for the company following the agreed upon search algorithm.

The variables INTERACT and BUSINESS were derived from the survey form for Web sites. Each evaluator indicated by a Y or N whether a feature, like the ability to download information, was available for a site. If either evaluator found the feature, it was assumed to exist and the site was given a score of 1 on this variable. The variables were then added to form a score for interactivity and the ability to conduct business through the firm's Web site.

Both evaluators also rated two characteristics of the Web sites on a 1 to 7 scale, the quality of graphics and overall attractiveness of the site. To check for interrater reliability, we took the absolute difference between raters and examined the resulting frequency distributions. In over 50% of the ratings, the evaluators had identical scores or were within one number of each other, and in over 70% they were within two. Given this degree of reliability, which is similar to that found by Miller and Friesen (1978), we

Sidebar

“Communication with agencies regarding policy information has improved substantially through greater use of on-line agency management systems, which downloads policy information directly to agency offices...Our challenge is to balance investments in technology with expense management, an area of focus for 1995...We expect to begin to realize cost savings from our investments in technology and process reengineering programs, and to see the overall expense ratio beginning to improve in 1995.” Allmerica Property & Casualty Cos, Inc. 1994

“...we will continue to seek further operating economics, and to advance technology solutions wherever feasible. For example, we will invest in Corporate Risk Management Services business as it continues to pursue growth opportunities in nontraditional markets, but we will also leverage this unit’s expertise to manage health care costs better....” Allmerica 1995.

“We are highly competent at large-scale, efficient high-volume processing to support customer transactions. We clear approximately 20 million checks nightly-nearly ten percent of the national total cost-effectively. Cumulatively, we are the largest bank processor of ATM, credit and debit card and automated clearing house transactions in the western United States. Altogether, approximately 40 percent of the GDP in the West is processed through Bank America....In retail banking we continued....opening experimental self-service branches, expanding our in-store branch network, and creating a Bank America presence on the Internet.” BankAmerica 1994.

“We have established an interactive presence on the Internet’s World Wide Web and opened an electronic branch on America Online.” BankAmerica 1995.

“During 1995 we affirmed in many ways our belief in technology as an important competitive tool. We invested in improved technology for consumer and business banking services and also in our third party processing businesses. We initiated a project, Workplace 21, to develop the internal information supports for further progress in empowering employees to make decisions on behalf of customers. Late in the year we launched a broad strategic review of future technology needs.” Corestates Financial 1995.

“A second and related byproduct of Fleet Focus was the realization that we had to make a much heavier capital commitment to technology. Perhaps the single greatest challenge our industry faces today is to harness technological advances to help customer access, move, and manage their money.” Fleet Financial 1994.

“Our investment in technology will also continue in 1995. The development of a major system to reorder merchandise for the stores and distribution centers, and a manager’s

workstation to facilitate more efficiencies at the store level, are high priority projects.”
Revco DS 1994

“ Revco invested approximately \$140 million this past year to upgrade technology and improve the condition of our store base and distributor systems...Also Revco must invest in technology to improve productivity, and leverage costs against pressured prescription margins, to respond effectively in a consolidating industry.” Revco DS 1995

“We are building a single, integrated computer network that accepts orders, assigns inventory, forecasts future requirements, schedules plant production, replenishes stocks and keeps track of costs. This system allows a person sitting in our French office to take a phone call from a U.K. customer and-while the customer is still on the phone-arrange for product to be shipped from a plant or warehouse anywhere in Europe...We began to see cost savings from this system in 1994 and expect even greater savings over the next few years-perhaps as much as \$75 million per year by the end of the decade.” Rohm and Haas 1994

All companies above except Allmerica had a Web site as of August 1996.

combined the two raters' scores to form two variables which we averaged to create the scale EVAL.

We used the *Business Week* classification for each firm's industry. Finally, for use in the regression equations which follow, we took the common log of 1994 sales in order to create a more normal distribution.

Causality

Since the data in this study are cross-sectional; they cannot demonstrate causality. The predictions imply that management leadership and strategy, firm resources, need to communicate and type of industry lead to a Web site and partially determine its contents. If we find a relationship as predicted, it means that a causal relationship is possible. Often in cross-sectional research, causality is hypothesized to be in both directions. In this case, because we measured management leadership and strategy in 1994-5, firm resources for 1994 and evaluated Web sites in 1996, the direction of causality suggested in the predictions seems most likely. It would also be hard to argue that the presence of a Web site in 1996 could be responsible for a firm's market value in 1994 (or even 1996).

RESULTS

Web Site Companies

Table 2 describes the characteristics of companies in our sample with and without Web sites. First, we had to eliminate one company in our sample which was purchased by

another firm and appeared to go out of business. We eliminated a second firm whose identity in the sample was ambiguous, reducing the final sample to 98 companies. Of these, we located a Web site for 47 companies, leaving 51 without Web sites.

Variable	Web Site Mean (n = 47)	No Web Site Mean (n = 51)	t statistic
BWRANK	434	588	2.85***
MARKET (millions)	4,874	2,435	2.15**
SALES94 (millions)	4,367	2,003	2.48**
PROFITS94 (millions)	402	106	2.21**
ROE	23	11	2.71***
ASSETS (millions)	15,745	3,851	2.01**
SHARE	39.5	33.4	1.91*
TURNOVER	108	75	1.84*
ANNREP	2.57	0.73	4.37***

* $p \leq .10$, ** $p \leq .05$, *** $p \leq .01$

Difference Between Companies
With and Without Web Sites
Table 2

Table 2 shows a comparison of the means for each group of companies; it strongly supports our belief that firms with greater resource and a greater need to communicate are more likely to have a Web site. Companies with a Web site rank higher on average in the *Business Week* ratings (a lower number), have a higher market value, higher 1994 sales and profits, higher return on equity, a larger asset base, higher share price, and greater stock turnover. Firms with a Web site also have much more frequent mention of technology in their chairman's letters. All differences are significant at least at the .10 level, and most are significant at the .05 level or better.

Predicting a Web Site

We used multiple regression to test our predictions in order to show the relative contribution of the variables. The regressions tested different dependent variables (WEBSITE and the characteristics of sites) against annual report, resource and communications variables. We chose ANNREP, ROE, LOGSAL94 and TURNOVER after analyzing the variables and checking for collinearity. For example, sales and profits are highly correlated and both variables cannot be included in the same equation. Since profits are sometimes affected by accounting decisions, the timing of asset sales or acquisition and other factors, the regressions include sales rather than profits.

Equations 1 and 2 below predict the presence of a Web site. We used two equations because the dependent variable, Web site, is either a 0 or a 1. A logistic model is tested in Equation 1 which explicitly takes into account the binary dependent variable in

predicting the odds of having a Web site. Equation 2 is an ordinary least squares model predicting the probability of having a WEBSITE. Greene (1990) suggests that the two models may in some cases produce similar results. The OLS model in Equation 2 is easier to explain and produces the familiar goodness of fit measure, R^2 . In this equation, the beta weights indicate the change in the dependent variable in standard deviation units that results from a change of one standard deviation unit in an independent variable.¹

Equation 1 (logistic)

$$\text{WEBSITE} = -5.90 + .43 \text{ ANNREP}^{***} + 1.14 \text{ LOGSAL94}^{**} + .06 \text{ ROE}^{**} + .01 \text{ TURNOVER}^{**}$$

n=92, Classification percentage 71 p-value = .22
 * p<= .10, ** p<= .05, *** p<= .01

Equation 2 (ordinary least squares)

$$\text{WEBSITE} = .31 \text{ ANNREP} + .19 \text{ LOGSAL94} + .23 \text{ ROE} + .21 \text{ TURNOVER}$$

(3.19)*** (1.90)* (2.42)*** (2.14)**

n= 92, adjusted $R^2 = .22$, F= 7.33***
 t values: * p<= .10, ** p<= .05, *** p<= .01

In both equations, ANNREP is highly significant; 1994 sales, ROE and TURNOVER also predict a Web site. The variables are significant in both equations to almost the same level. Two measures of goodness of fit, the p-value and R^2 , both indicate that the equations explain more than 20% of the variance in the presence of a Web site. It appears that management support and strategy as indicated through chairman's letters in annual reports is significantly associated with the presence of a Web site, as are firm resources and a need to communicate. These findings support the first three predictions.

Evaluating Sites

Our predictions also assert that the same factors will influence the characteristics of a Web site. Equations 3 through 5 show the results, using ordinary least squares and beta weights as the coefficients.

¹ Positive coefficients in the logistic equation increase the predicted probability of a firm having a Web site, but do so in a nonlinear fashion. If $g(x)$ = the right hand side of Equation 1, we would predict the probability that a company has a Web Site using $e^{g(x)}/(1+e^{g(x)})$. The simpler coefficients of the OLS version in Equation 2 are easier to interpret.

Equation 3

$$\text{INTERACT} = .32 \text{ ANNREP} + .07 \text{ LOGSAL94} - .10 \text{ ROE} + .29 \text{ TURNOVER}$$

(2.25)** (.50) (-.73) (1.81)*

n= 44, adjusted R² = .13, F= 2.58 **
* p<= .10, ** p<= .05, *** p<= .01

The degree of interactivity of the site is predicted by ANNREP and TURNOVER. The management leadership/strategy variable has the strongest relationship with an interactive site, followed by the need to communicate with shareholders and others.

Equation 4

$$\text{BUSINESS} = .19 \text{ ANNREP} + .18 \text{ LOGSAL94} - .21 \text{ ROE} + .40 \text{ TURNOVER}$$

(1.36) (1.14) (-1.52) (2.52)**

n= 44, adjusted R² = .16, F= 3.07 **
* p<= .10, ** p<= .05, *** p<= .01

Only TURNOVER is significantly related to doing business on the Web. It may be too early to predict this characteristic of Web sites as very few sites in the sample allowed one to conduct business with the firm.

Equation 5

$$\text{EVAL} = .28 \text{ ANNREP} + .31 \text{ LOGSAL94} - .07 \text{ ROE} + .09 \text{ TURNOVER}$$

(1.94)* (1.96)* (-.52) (.55)

n= 46, adjusted R² = .10, F = 2.29 *
* p<= .10, ** p<= .05, *** p<= .01

ANNREP and LOGSAL94 are weakly significant in predicting our raters' evaluation of the appeal of a site. We found it difficult to make fine distinctions among the sites as all generally had some interesting and appealing features. The sidebar contains examples of some of the best sites evaluated.

Overall, the first three predictions receive weak support in predicting the characteristics of Web sites. Management leadership/strategy, the need to communicate and firm resource are associated with the characteristics of Web sites, though the amount of variance explained is small. The small R² values indicate that other factors have a strong influence on the characteristics of Web sites, factors which are not included in the model.

Examples of these variables might be the length of time the Web site has existed, the number of versions of the site, and the background of the site designers.

The impressions of the research team ranking the sites were that the most exciting sites showed a sense of company commitment to a presence on the Web. The sites reflected whether or not the developers were caught up in the excitement of the technology. While our quantitative data do not support this conclusion, our impressions are that firms interacting with the public, e.g. financial, insurance and service companies, had the best sites. We also would guess that the developers of the best sites were not from an IS group alone, but included employees from other areas like marketing, customer service, investor relations, etc.

Industry Differences

To test for industry differences, we tried a number of partitions of the data. First, we used categories based on industry classifications applied by *Business Week*. Second we categorized companies from their sites as consumer products, industrial products or services firms. These categories were not mutually exclusive, so we formed combined categories. In each instance, we looked for significant differences in the presence and characteristics of Web sites based on industry. None of the results was significant, and prediction 4 is not supported.

At least for this sample, we conclude that industry does not make a difference. Web technology appeals to all types of firms, and there does not appear to be a single industry or group of industries that have adopted the Net to the exclusion of others.

CONCLUSIONS

The data show an association between management, resource variables and communications and the presence of a Web site and its characteristics. If one is willing to attribute any causality to the models, what are the implications?

We believe the results show the importance of senior management support and the inclusion of technology in strategy in adopting a major technological innovation. Senior managers can make a change in the direction and emphasis of a firm. Consider the recent conversion of Microsoft to a company that embraces the Internet for all of its products. This change, while championed by middle managers, caught the chairman's attention. He had the ability to change the direction of the firm and establish a new division with over 2000 employees to make and adapt products for the Internet.

The need to communicate with shareholders and investors is associated with a Web site and some of its characteristics. Most of the sites we visited had information for current and prospective shareholders including an annual report and summaries of financial

performance. The Web is extremely well-suited to communicating with shareholders and others.

The results also show the importance of firm resources in network adoption, similar to the findings by Streeter et al. (1996). In some respects, this finding might seem surprising as each firm in our sample came from the 1000 most highly valued firms in the U.S. stock market. All of these firms could easily afford to make or buy a high quality Web site. We feel that resources alone are not enough to explain the existence and quality of a Web site: one also needs management leadership to allocate resources to technology.

What can we say about the firms that have not adopted the Web yet? These firms may pay a high price as they fall behind on the learning curve. The first Web sites were static and for the most part, only provided information; the most advanced technology was a form the user could complete. Today's more sophisticated Web sites feature Java applets, ActiveX programs and Shockwaved animation. Firms that currently have Web sites will be better able to keep up with these new developments. Experience with the Internet will also help firms implement Intranets which offer tremendous opportunities for providing new information and access to legacy information systems. Web experience also prepares firms for Internet commerce, a market of increasing importance.

Based on this research, our recommendation to senior management is to stay abreast of technology, integrate IT with corporate strategy and apply resources to innovation. Those who delay adoption or never innovate run the risk of being left behind in a period of rapidly advancing Web technology.

Side Bar

Some highly rated Web sites in our evaluation: See Figures 1 and 2 for sample home pages.	ANN- REP	INTE- RACT	BUSI- NESS	EVAL
First American offers (or plans to offer) various on-line services with electronic ordering. (3, 6, 3, 6.8) http://www.firstam.com/faf/html/online/forms/1150.html	3	6	3	6.8
Pacific Telesis has a section called "Voices for the Future" where they use technologies such as RealAudio to describe their innovative uses of networking and the Web in areas such as education. http://www.pactel.com/voices/index.html	5	6	4	6.2
Lowe's uses the web site to administer a survey on home improvement needs and their web site. They have a drawing for prizes if one completes the survey. http://www.lowes.com/feedback/survey.html	7	7	4	6.5

Lowe's also features "how-to" pages such as this fully illustrated page on how to build a bird house

<http://www.lowes.com/howto/bird.html>

Bank of America has site where one can create his or her own bank, check your balance, get money tips, and so on	9	8	4	6.8
--	---	---	---	-----

<http://www.bankamerica.com/>.

You are greeted at Oklahoma Gas and Electric with a sound clip and a shockwave banner.	1	3	3	6.2
--	---	---	---	-----

<http://www.oge.com/>

See the shockwave game on safety from OE&G
<http://www.oge.com/game.htm>

Delta Airlines has a comprehensive website that features everything from flight schedules to weather and also some contests and games.	2	6	3	5.7
--	---	---	---	-----

<http://www.delta-air.com/index.html>

Ceridian has great content and excerpts from visionary speeches by the CEO.	8	5	3	7
---	---	---	---	---

<http://www.ceridian.com>

Cadence design features customer support and targeted audiences.	2	8	4	7
--	---	---	---	---

<http://www.cadence.com>

Sprint offers customer support, free foncards and targeted audiences. (4, 6, 4, 7)	4	6	4	7
--	---	---	---	---

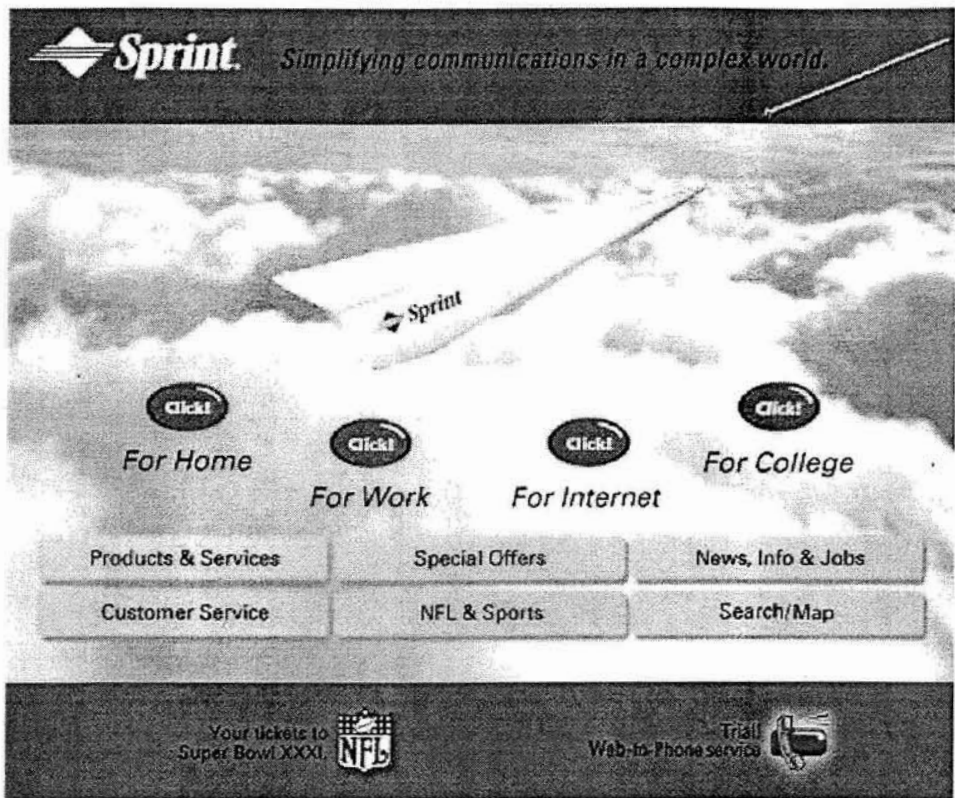
<http://www.sprint.com>

Ranges: ANNREP (0, any); INTERACT (0,8); BUSINESS (0,4); EVAL (1,7)

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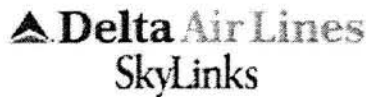


Build your own plane with our animated homepage.

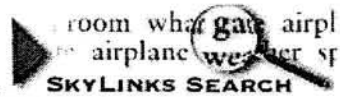
[For Home](#)	[For Work](#)	[For Internet](#)	[For College](#)
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[Customer Service](#)	[NFL & Sports](#)	[Search/Map](#)	

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Sprint Home Page
 Figure 1



YOU'RE JUST ONE
CLICK AWAY FROM
ANYWHERE IN THE
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Delta Airlines Home Page
Figure 2

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APPENDIX

Companies in the study

With Web Site

AFLAC
AUTOZONE
AVON PRODUCTS
BANKAMERICA
BMC SOFTWARE
BROWNFORMAN
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