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The Technological Development of Congressional Candidate Web Sites

How and Why Candidates Use Web Innovations

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The Internet offers political candidates a new way to campaign. Part of the Internet's novelty comes from technological options not available in most other media. Candidates, however, must weigh various benefits and costs in using a given technological innovation. For example, technology that allows for increased user interactivity may lead to a more stimulating web site but might distract users from the campaign's central message. In this article, the authors use data from 444 congressional campaign web sites, over two elections, to examine how candidates approach web technology. They investigate the factors that lead candidates to utilize or avoid particular technological features. They show that technological adoption is determined by both practical and strategic political considerations. Of particular interest, the competitiveness of a candidate's race leads the candidate to use more sophisticated presentation technologies but less advanced interactive innovations because these latter options interfere with the candidate's message.

Keywords: campaigns; candidate strategy; web technology; new media; Internet campaigning

The Internet has become a vital resource in American political campaigns. It provides candidates with unmediated and inexpensive access to voters while also offering new technological options for communication and information presentation. Candidates now have the opportunity to create web sites with features such as multiple media, personalized information, and even two-way communication. Although these innovations seem promising, the decision to use them is far from automatic. Candidates must carefully weigh practical and political considerations before incorporating new technologies into their web sites because each innovation has advantages and drawbacks.

In this article, we investigate how and why political candidates use a host of emerging web technologies. Prior research focuses on a single campaign and either offers a rich description of the technologies used on a small group of sites (e.g., Bimber & Davis, 2003; Cornfield, 2004; King, 1999) or focuses on a specific feature found across a wider sample of online campaigns (e.g., Dulio, Goff, & Thurber, 1999; Schneider & Foot, 2002).[1] We take a more comprehensive approach by exploring multiple technological features found across a large and representative sample of congressional campaign web sites over two elections. Specifically, we analyze 444 U.S. House and Senate candidate web sites from the 2002 and 2004 campaigns. We focus on the extent to which candidates have moved beyond the electronic brochure format by incorporating various presentation (e.g., video, audio) and interactive (e.g., personalized information, two-way communication) features.[2] This provides insight into how candidates approach technology and balance the various costs and benefits associated with each innovation.

We then examine the conditions that motivate candidates to use emerging technologies by supplementing our web data with detailed information on candidates, races, and constituencies. We investigate how the decision to use certain features is affected by such things as available resources (e.g., campaign funds), increased ease of using technologies (e.g., developments over time), demand effects (e.g., voter constituency), and strategic dynamics (e.g., race competitiveness). Considering both practical and political motivations provides a clearer picture of when candidates will use certain technologies and when they will avoid them.[3]

We start in the next section with an overview of campaigning on the web. We then discuss how and why candidates might use web technology before describing our data collection and reporting the results of our analysis. We end with a brief conclusion that highlights our principal findings.

Campaigning on the Web

In less than a decade, it has become virtually mandatory for candidates to have a campaign web site. In 1998, only 35% of major-party House candidates and 72% of major-party Senate candidates posted campaign web sites (Kamarck, 1999, p. 100). By 2004, these numbers had jumped to 81% and 92%, respectively (Goldsmith, 2004; also see Foot & Schneider, 2006, pp. 7-11), leading some to suggest that "the question is no longer whether candidates for major office will have a web site, but what the web site will look like and how it will be used" (Williams, Aylesworth, & Chapman, 2002, p. 43; also see Williams, 2003).

Campaign web sites have attracted an increasing number of users, and there is some evidence to suggest that they influence voters and, thus, election outcomes. Williams (2003, p. 4) calculates that individual Senate candidate web sites, for example, received between 1,000 and 800,000 visits in 2000, whereas just 2 years later, the number of hits ranged from 6,854 to 1,615,819.[4] Multiplying these visitation statistics by the number of candidate web sites that now exist, and noting that web site visitors tend to be quite politically active (e.g., Norris, 2004), one gets the sense that online campaigns may have notable political influence that is sure to grow. Moreover, candidate web sites undoubtedly affect many more voters indirectly through activists who disseminate information (see Foot & Schneider, 2006,

pp. 86, 129-155; Gordon, 2006) and, perhaps most important, journalists who frequently visit these sites to gather material (see Ireland & Nash, 2001, pp. 14-15; Schneider & Foot, 2002).

The web's growing prominence in American political campaigns affects candidates who must decide how to use this relatively new medium and the emerging technologies it offers. It is important to understand how candidates make these decisions because the technologies they select will ultimately affect how voters and journalists receive and process campaign information.[5] Indeed, online campaigns provide an intriguing venue for analyzing the interaction between candidates and observers.[6] In the next section, we draw on campaign and information processing research to explain some of the reasons that candidates might have for using or avoiding technologies given their presumed effect on web site visitors.

Web Site Technology

To gauge the extent to which candidate web sites utilize emerging technology, we examine if they incorporate features that would be impossible to include in a single, static paper brochure. This approach has been used by others (e.g., Foot, Schneider, Xenos, & Dougherty, 2003; Kamarck, 1999), although we clarify the electronic brochure standard by investigating whether candidates are using particular presentation and interactive features. The specific presentation features include multimedia content and display options, whereas the interactive features include personalization functions, external links, and two-way communication. In constructing their web sites, candidates make strategic choices on each of these dimensions, which will be based, in large part, on each innovation's perceived costs and benefits.

Presentation

The Internet offers a platform to bring together multiple forms of media that help to present information vibrantly. Audio clips, for example, enable candidates to personalize and highlight certain information. Similarly, candidates who opt to include dynamic visuals, such as videos, likely do so to draw the audience's attention to the display (Graber, 2001) and possibly to accentuate perceptions of the candidate's personal qualities (Druckman, 2003; Keeter, 1987). Multimedia features can make a candidate's web site more engaging, but they also require some technological skill and available resources, albeit not much. Moreover, audio and video have the potential drawback of distracting visitors from important information found in the text. In this way, moving beyond an electronic brochure may work against ensuring that key messages are clearly received.

Candidates also must decide how much information to provide and how often to update information. The Internet is virtually limitless in terms of providing information, and a frequently updated web site allows candidates to get their message across and keep visitors interested so that they might return. In fact, Davis (1999) notes, "A website that never (or only infrequently) changes will be visited once or twice and then abandoned. Voters will not return unless they believe that something new has happened" (p. 116; also see Bimber & Davis, 2003, pp. 127-130; Cornfield, 2004, pp. 26-27). However, providing too much information can clutter the web site and make it hard to navigate, and candidates must also

consider the effort and expense associated with updating multiple pages of information (see, e.g., Cornfield, 2004, p. 25).

Interactivity

The Internet provides for interactivity, which enables users to actively engage the campaign and/or other users online. Stewart, Pavlou, and Ward (2002) state that "perhaps the most interesting and novel attribute of the new media is their capability for interactivity, which is becoming increasingly more pronounced with the infusion of more-advanced communication media" (p. 368; also see Tedesco, 2004). Interactive features can engage users by granting them control, which stimulates attention and learning (e.g., Southwell & Lee, 2004, p. 645), although the attention may not be focused on the exact information the candidate prefers (Eveland & Dunwoody, 2002).

Personalization is a form of interactivity in which the user can personalize his or her engagement with the campaign through the web site. Users may be given the opportunity to take a quiz, provide information, or move information around to suit their personal preferences. Candidate web sites can also engage users through targeted marketing. Specifically, the web site can solicit personal information from the user (e.g., zip code, political leanings, attitudinal measures) and then send crafted messages designed for specific segments of the population. For example, if a user enters that he or she views education as the most important campaign issue, then the web site could automatically produce messages about education (see, e.g., Cornfield, 2004, p. 42; Stewart et al., 2002, pp. 368-369). All of these personalization features allow users to customize their interaction with the candidate's web site. Although personalization often enhances the persuasiveness of the candidate's message (O'Keefe, 2002, pp. 245-246), it can also create segments of incompletely informed voters who learn less about other aspects of the candidate's message (Chadwick, 2006, p. 8). Personalization features can also be challenging to incorporate as the technology is relatively new. Ultimately, personalization goes well beyond an electronic brochure by actively engaging users, but it may also lead to a less coherent understanding of the candidate's overall goals and intentions (Stromer-Galley, 2000).

The tradeoff between information control and interactive engagement arises to an even greater extent when it comes to providing external links. Users who enjoy freedom to explore will likely be more engaged with the site, although links also allow for more selectivity and limit control over what specific information the audience accesses (see Foot, Schneider, Dougherty, Xenos, & Larsen, 2003; Tewksbury & Althaus, 2000, p. 458). Of course, this also depends on exactly where the links lead. For example, links to voter registration web sites and news articles that the campaign carefully selects are relatively safe in that the content is predictable and visitors are likely to return to the candidate's site (Foot & Schneider, 2006, p. 59). However, links to a political party or presidential candidate are riskier because the campaign has no control over the information presented there, and it may not be entirely consistent with the candidate's message (see Davis, 1999, p. 101). External links are easy to incorporate, but candidates will have to think carefully about each individual link and its potential effect on web site visitors.

Web interactivity involves not only content but also the possibility of communication between the web site and its users, and/or between users themselves (what Bucy, 2004, and

Kaye & Johnson, 2006, p. 149, call interpersonal interactivity). Communication through features such as message boards, forums, and live chats can certainly stimulate attention and enhance the likelihood of forming "online communities," which, as Howard Dean's presidential campaign showed, can have numerous benefits (see Tedesco, 2004, p. 515; Trippi, 2004; on persuasion and interactivity, see O'Keefe, 2002, p. 257; Stewart et al., 2002; Stromer-Galley, 2000). However, these features, again, allow less control over the flow of information, require strong logistical capabilities, and may, in fact, be more technologically interesting than politically useful (see Davis, 1999, p. 115).

New presentation and interactive technologies continue to develop, and many of them seem to have exciting political applications that enable candidates to move beyond the static electronic brochure format. However, each new innovation has tradeoffs that the candidate must weigh. In some cases, the innovation may still be rather complicated so that only certain candidates can think about using it. In other cases, the tension is between retaining control over the message that visitors receive and the desire to develop an engaging web site that stimulates interest and support. All of these are important considerations for any campaign, although, as we will discuss in the next section, there are factors that likely motivate candidates one way or the other.

Explaining Technological Choices

There are various possible determinants of the technological choices that candidates make for their web sites. Indeed, candidates must consider both practical and political issues in making these decisions. For example, candidates need to think about the technical ease of using certain technologies as well as their cost, their demand, and the political price they may exact. In this section, we elaborate on these considerations and discuss how they might affect choices to use emerging technologies.

Technology generally becomes easier to use with time. Improvements and advancements allow candidates to at least consider incorporating features that may have once been too complex. Therefore, time itself may be a determinant of using particular tools that were once considered complicated, such as multimedia, personalization features, and two-way communication. For those elements that have always been quite simple (e.g., external links, display options), time ought not to be much of a factor (e.g., Foot & Schneider, 2006, p. 158). A number of candidate-level variables also might affect decisions about technology. To begin with, well-funded candidates may be more likely to use certain technologies—particularly complicated ones—because they can afford to pay for developing a sophisticated web site. Conversely, candidates with limited campaign funds may wish to spend their money on things other than web site technology (Bimber & Davis, 2003, p. 27; Herrnson, Stokes-Brown, & Hindman, 2007, p. 32). The candidate's party and gender may also influence technology decisions, although expectations for each are not entirely obvious. It may be the case that one party is more technologically savvy than the other (Ireland & Nash, 2001; Puopolo, 2001, p. 2034)[7] and that gender matters in the sense that it generates different approaches to campaigning (on gender, see, e.g., Gulati & Treul, 2003; Kahn, 1996; Puopolo, 2001, p. 2039). Incumbency status may also affect these decisions in that challengers may have a stronger inclination to use technology as a way of gaining ground

on established incumbents (see, e.g., Fenno, 1996; Herrnson, 2004; Herrnson et al., 2007, pp. 33, 35).

Differences in the office level being contested may factor into the extent to which candidate web sites go beyond the electronic brochure standard. Compared to House candidates, Senate candidates typically have larger constituencies and staffs, which could, all else equal, incline them toward more technologically sophisticated sites (see, e.g., Bimber & Davis, 2003, pp. 26-27; Dulio et al., 1999; Herrnson, 2004). In fact, a larger staff may be particularly helpful with some of the more intricate features, whereas a more diverse constituency may encourage Senate candidates to pay greater attention to personalization features.

At the district level, demand effects may influence candidates' decisions about technology. Income and education could be particularly important as wealthy and well-educated districts tend to have more access to the Internet and thus greater familiarity with certain technologies (see Bimber & Davis, 2003, pp. 104-107; Foot & Schneider, 2006, p. 171).[8] Candidates from districts with presumably less Internet acumen may not feel obligated to have complex sites or may, in fact, try to present simple sites to ensure their message reaches the intended audience (see Herrnson et al., 2007, p. 33). Partisanship in the district (e.g., percentage of Republicans/Democrats) is an obvious political consideration that might affect decisions about technology in that Republicans tend to be slightly more active online (Pew, 2000).[9]

In terms of strategic political considerations, race competitiveness could have an important role to play in decisions about web site technology. As races tighten, candidates must think more about the consequences of their decisions and try to stimulate voters while retaining control over their message. Technologies that do not severely compromise message control (e.g., multimedia, display options) should be most commonly used in tight races where candidates have an incentive to employ features that make their web sites more vibrant and engaging. Conversely, technologies that sacrifice message control (e.g., personalization, external links, two-way communication) ought to be negatively associated with race competitiveness because candidates in tight races need to ensure that their messages are clearly articulated and understood. For candidates in close races, message clarity may trump the extra stimulation that these features provide (see Foot & Schneider, 2006, p. 172). Ultimately, race competitiveness may be a key factor in determining which technologies candidates use and which they avoid.

Data

To test these expectations about how and when candidates use web technology, we examine data from an extensive content analysis of congressional candidate web sites from the 2002 and 2004 campaigns. In each year, we identified every major-party Senate candidate web site and took a random sample of major-party House candidate web sites, stratified by region. A team of trained content analyzers then coded the sites, rendering a total sample of 444 candidate web sites—59 Senate and 116 House web sites for 2002, and 67 Senate and 202 House web sites for 2004.[10] Coders analyzed the entirety of each individual web site and identified a series of political and technological indicators.[11] We then supplemented these web data with information about the candidates, races, and districts.

Our five dependent variables, which capture the key presentation and interactive dimensions previously discussed, come from the web coding data. To measure presentation features, we created a "multimedia" variable that indicates whether the candidate's web site included a video and/or audio file. We also measured display features. In particular, whether the site had more than one page ("pages") and if there was information on the site that appeared to be updated ("new info"). Our variable for "personalization" features measures whether the site included any of the following options to personalize the visitor's interaction with the site: to take a quiz, personalize information for targeted marketing,[12] arrange information, add quantitative data, and/or add qualitative information. Our second interactive feature measures the use of external "links" to one of the following: the candidate's political party, a presidential campaign web site (2004 only), a news outlet (2004 only), a registration web site, and/or any other external site. We focus specifically on the "party link" in parts of our analysis as the particular target of this link may be quite consequential, and it was measured over both campaigns. Our final dependent variable measures the use of "two-way communication" features as the existence of a live chat function, a candidate chat function, and/or a forum (i.e., message board).[13]

Our analysis relies on 10 independent variables. Measures for "2004" (i.e., year), "Senate" (i.e., office level), "Democrat" (i.e., candidate's party), and "female" (i.e., candidate gender) are all straightforward dichotomous variables taken from *The Almanac of American Politics* (Barone & Cohen, 2003, 2005; Barone, Cohen, & Cook, 2001) where necessary. "Incumbency" is measured with dummy variables for "challenger," "open seat candidate," and "incumbent" (we exclude the challenger category in our multivariate analyses). Our first district-level variable is "district partisanship," which is based on the percentage of votes in the district (or state) cast for George W. Bush in 2004 as reported in *The Almanac of American Politics*. The district-level measures for "income" and "education" come from the 2000 Census. "District income" is the average household income (in tens of thousands of dollars) in the district (or state), and "district education" is the percentage of people in the district (or state) with at least a high school education. We measured each candidate's available resources with data from the Federal Election Commission on the amount of money each raised in millions of dollars. Finally, we used data from *The Almanac of American Politics* to create a race competitiveness measure. We took the difference in the vote totals from the winner and loser and then, following convention (Foot & Schneider, 2006, p. 173; Jacobson, 1992, p. 33), broke the races into thirds: "highly competitive," "mildly competitive," and "noncompetitive."[14]

Table 1 provides descriptive information on the independent variables. Our sample includes 175 candidate web sites from 2002 (39.4%) and 269 from 2004 (60.6%). Slightly more than 28% of the sites were from Senate candidates, 46.4% came from Democrats, and 15.1% were from female candidates. In terms of candidate status, 43.7% of our sample were incumbents, 41.2% were challengers, and 14.9% were candidates involved in open seat races. The district-level percentage of Bush voters in 2004 ranged from 13% to 86%, with an average score of 53.57%. Average district-level income ranged from $34,962 to $109,760, with a mean of $54,054, whereas the percentage of the population in each district (or state) with at least a high school education ranged from 50.4% to 92.5%, with a mean of 81.43%. Finally, the average candidate in our sample raised slightly more than $2 million ($2.03 million), and the average margin of victory was 29.42 points.

Table 1
Descriptive Data on the Independent Variables

Variable	n	Datum
Year	444	2002 = 39.4%
		2004 = 60.6%
Office	444	House = 71.6%
		Senate = 28.4%
Party	444	Democrat = 46.4%
		Republican = 53.4%
		Third Party = 0.2%[a]
Incumbency status	443	Incumbent = 43.8%
		Challenger = 41.3%
		Open Seat = 14.9%
Gender	444	Male = 84.9%
		Female = 15.1%
Average district partisanship (percentage for Bush in 2004)	444	53.57%
		SD = 10.80
Average district income	444	$54,053.90
		SD = 11,678.07
Average district education (percentage with more than high school)	444	81.43%
		SD = 5.98
Average funds raised (millions of dollars)	426	$2.03
		SD = 2.87
Average race competitiveness (margin of victory)	444	29.42%
		SD = 19.66

a. The data set includes Bernard Sanders (I-Vermont), who was the incumbent member of the House of Representatives for Vermont's at-large seat, making him a major-party candidate for his district.

The Prevalence of Web Technology

To what extent have candidates moved beyond the electronic brochure standard by using emerging web technologies? Table 2 reports the percentage of congressional candidate web sites in our sample that utilized individual technological features. The results are broken into year and office level to provide further insight into possible trends.

Table 2 shows that in terms of multimedia features, 43.7% of candidate web sites went beyond static presentations (i.e., only text, pictures, or graphics) to include dynamic content such as audio and/or video.[15] Although nearly all candidate web sites include pictures (97.3%) or graphics (87.2%) (data not in table), less than half of the candidates in our sample made their sites more stimulating and vibrant with video and/or audio files. This is somewhat surprising given the relative ease of using these features; however, the marginally significant increase between years (39% in 2002 and 47.6% in 2004; $z = 1.79$, $p = .0728$) and the robust difference between office levels (36.8% for House and 63.5% for Senate; $z = 5.25$, $p < .01$) suggests that usability and resources may be a factor in deciding whether to use multimedia technology. Moreover, the fact that well-funded Senate candidates are more likely to have ready-made audio and video clips for other venues might help explain why they use this technology more than their House counterparts.

Table 2
Percentage of Sites with Dynamic Features

Feature	2002		2004		Average
	House	Senate	House	Senate	
Multimedia	30.2	57.6	40.4	69.2	43.7
Pages	92.2	93.2	99.5	100.0	96.8
New information	—	—	76.1	92.5	80.2
Personalization	19.0	16.9	23.8	46.3	25.0
Links	66.4	62.7	77.2	79.1	72.7
Two-way communication	9.5	3.4	9.4	13.4	9.2
N	116	59	202	67	444

Note: Dashes indicate that no data were coded.

In terms of display options, we find that virtually all candidates have taken advantage of the Internet's limitless potential to provide information over multiple pages. In fact, 92.6% of all candidates in 2002 had multiple pages, and by 2004, there was only one candidate (for the House) who offered a single-page web site that would be virtually identical to a paper brochure (92.6% in 2002 and 99.75% in 2004; $z = 3.65$, $p < .01$). We also find that in 2004 (we did not code this in 2002) the majority of candidates (80.2%) made the effort to update information on their sites. The fact that Senate candidates (92.5%) were significantly more likely to do this than House candidates (76.1%, $z = 3.71$, $p < .01$) suggests that available resources may play a role in the decision to use this capability.

The results in Table 2 also show that on average, one quarter of congressional candidates incorporated some sort of personalized interaction feature on their web sites (e.g., quiz, moving content, targeted marketing). However, there are significant differences over time and across office level. Whereas only 18.3% of House and Senate candidates in 2002 used personalization features, 29.4% used them in 2004 ($z = 2.75$, $p < .01$)—a sign that they are getting more popular with time. Also, 32.5% of Senate candidates across the two campaigns used these features compared to 22% at the House level ($z = 2.19$, $p = .03$). Overall, the relatively low adoption rate could be primary evidence that most candidates want to shape the possible range of experiences that individuals have on their sites and preserve the integrity of information they provide, in the context that was intended. However, the differences over time and across office levels could suggest that the use of personalized interaction features is being influenced by the increasing ease with which they can be used and the resources and objectives of Senate candidates who may want to offer a more customized experience to visitors from their larger and more diverse constituencies.

A clearer dynamic that offers users more choice and thus offers the candidate less control over what users see is the availability of external links. Our results show that 72.7% of candidates provided external links. Moreover, there has been a statistically significant increase across congressional candidate web sites from 2002 (65.1%) to 2004 (77.7%, $z = 3.61$, $p < .01$). Differences between House and Senate candidates are statistically insignificant (73.3% for House candidates, 71.4% for Senate candidates; $z = .40$, $p = .69$). Although the general evidence suggests that candidates are fairly comfortable with providing

external links, further analysis indicates key differences based on where the links lead. Across 2002 and 2004, 44.2% of our House and Senate candidates provided links to relatively safe voter registration web sites. Candidates in 2004 were equally likely (45.4%) to provide links to news sources, including links to specific articles or reports about the candidate. However, when it comes to the riskier links to party and presidential candidate sites, congressional candidates are much more hesitant. In 2004, only 15.2% of campaign web sites linked to a presidential candidate site, whereas 27.6% linked to their party's web site in 2002 and 2004. This suggests that candidates take a calculated approach toward external links by providing safe links more frequently than potentially risky links.

Our results also show that congressional candidates have yet to fully utilize the Internet's potential for two-way communication. In the aggregate, only 9.2% of candidate web sites had at least one two-way communication feature (i.e., live chat, forum, candidate chat). Although there was virtually no difference between levels of office (9.4% for House candidates and 8.7% for Senate candidates; $z = .233$, $p = .816$), there has been a slight, albeit statistically marginal, increase from 2002 (7.4%) to 2004 (10.4%; $z = 1.10$, $p = .27$). Still, approximately 90% of all candidates have avoided any use of two-way communication features on their web sites. By not utilizing the web's potential for two-way communication, candidates retain control over the messages found on their web sites although they miss an opportunity to engage visitors in dialogue about the candidate and the campaign. Admittedly, two-way communication technology may have been difficult to implement in 2002, although by 2004, it would have been relatively easy for candidates to provide some sort of forum for two-way communication and/or discussion (e.g., forum, message board). The fact that this technology is still relatively underutilized suggests that the desire to control the message may be quite important for candidates (see Stromer-Galley, 2000; Stromer-Galley & Foot, 2002).

There are certainly signs that by and large, congressional candidates are moving beyond the static electronic brochure standard, albeit with some hesitation. In terms of presenting information, a strong majority of Senate candidates and a growing segment of House candidates are incorporating multimedia features that make their sites more vibrant and engaging. Virtually all candidate sites have multiple pages, and a very large proportion keep their sites fresh with updated information—something that would be impossible with a brochure. In terms of interactivity, there has been somewhat less progress with only a quarter of candidate web sites' utilizing personalized interaction features and less than 10% of sites' offering venues for two-way communication. As for external links, candidates seem more willing to provide links to sources that may potentially help them (e.g., voter registration, news stories about the candidate) than to web sites where the candidate relinquishes control over the message (e.g., party, presidential candidate). This overall pattern of results suggests that candidates are indeed quite calculating when deciding about web technology and tend to prefer features that make their sites more compelling without sufficient costs or potential for message distortion.

Explaining the Use of Web Technology

We have alluded to some of the factors (i.e., year and office level) that may affect the way candidates use web technology. However, we now conduct a more robust test of the

Table 3
Determinants of Web Technology Use

	Multimedia	New Information	Personalization	Party Link	Two-Way Communication
2004	.559** (.228)		.765*** (.255)	−.039 (.235)	.303 (.374)
Senate	.264 (.312)	1.211* (.706)	.480 (.320)	−.166 (.341)	−.722 (.546)
Democrat	.338 (.217)	.429 (.351)	.691*** (.236)	.329 (.230)	.928*** (.361)
Open seat	−.358 (.357)	−.722 (.689)	.279 (.375)	.456 (.393)	.696 (.503)
Incumbent	−.698*** (.254)	−.951** (.403)	−.175 (.270)	.556** (.267)	−.633 (.415)
Female	−.130 (.307)	.960 (.652)	−.144 (.340)	.613** (.309)	−.968 (.641)
District partisanship	−.004 (.011)	.011 (.016)	.002 (.012)	.009 (.011)	.001 (.017)
District income	−.125 (.119)	.071 (.187)	−.184 (.139)	−.017 (.117)	−.040 (.190)
District education	.046** (.023)	.007 (.036)	.009 (.025)	.050* (.026)	.005 (.037)
Funds raised	.249*** (.074)	.094 (.139)	.057 (.053)	−.079 (.070)	.158** (.071)
Race competitiveness	.354** (.157)	.446* (.252)	−.258 (.168)	−.434*** (.164)	−.562** (.248)
Constant	−4.450** (1.752)	−1.010 (2.540)	−1.487 (1.898)	−4.949** (1.942)	−1.958 (2.682)
Log likelihood	−503.763	−221.256	−449.357	−471.397	−241.543
n	420	256	426	424	426

Note: Entries are Logit coefficients with standard errors in parentheses.
*p ≤ .10 **p ≤ .05 ***p ≤ .01 (two-tailed tests).

considerations that motivate candidates to embrace or avoid particular innovations. Table 3 presents the results of logistic regressions for the use of five key technological features mentioned above. We have excluded "pages" from this analysis due to a lack of variation on that measure (96.8% of candidate web sites had more than one page). In addition, Table 3 reports the results for "party link" instead of all external links because the analysis above shows important differences between links based on where they go on the World Wide Web.

The first column in Table 3 shows that using multimedia to present information—namely, with audio and/or video—is a function of both practical feasibility (e.g., time, available resources) and political motivations (e.g., race competitiveness). The fact that multimedia use increased from 2002 to 2004 reflects the growing availability of this technology, and its positive association with funds raised further suggests that feasibility issues are at play. The results also show that incumbents are less likely than challengers (the excluded base) to use audio and/or video.

In Table 4, we report the changes in the relative odds of using the different features for one-unit changes in the significant independent variables. For example, the odds of using multimedia are 50.2% less for incumbents than they are for challengers.[16] We also find that multimedia use is positively associated with district-level education, which is a demand feature that presumably reflects the need to appeal to a more sophisticated electorate that is likely to be online. In terms of purely political motivations, we find that the odds of using multimedia increase by 42.5% for every one-unit increase in race competitiveness (e.g., from uncompetitive to moderately competitive races), which is a clear indication that as races get closer, candidates look to utilize technologies that can make their sites more vibrant without exacting large resources or message distortion costs.

To understand how candidates think about displaying information, we analyzed the factors associated with updating candidate web sites in 2004 (updating was not measured in 2002). Here, again, we find both practical feasibility and political motivations at work.

Table 4
Percentage Change in Odds of Web Technology Use

	Multimedia	New Information	Personalization	Party Link	Two-Way Communication
2004	74.9	—	114.8	—	—
Senate	—	235.7	61.7 ($p = .133$)	—	—
Democrat	—	—	99.6	—	152.9
Open seat	—	—	—	—	—
Incumbent	–50.2	–61.3	—	74.3	—
Female	—	—	—	84.5	—
District partisanship	—	—	—	—	—
District income	—	—	—	—	—
District education	4.7	—	—	5.2	—
Funds raised	28.3	—	—	—	17.1
Race competitiveness	42.5	56.2	–22.7 ($p = .124$)	–35.2	–43.0
n	420	256	426	424	426

Note: Entries represent the percentage change in the odds for each one-unit increase in the independent variable based on the equation $100 \times (\text{Exp}(B) - 1)$. Dashes indicate that the variables were not statistically significant.

Specifically, the decision to keep a candidate's web site fresh and dynamic is driven by office level, incumbency status, and race competitiveness. The fact that Senate candidates are more likely to update than House candidates suggests that large staffs can better handle this time-consuming chore and that Senate candidates may feel a stronger need to provide current information to their larger and more heterogeneous constituencies. The fact that incumbents are 61.3% less likely to update their sites than challengers speaks to the idea that incumbents typically feel more secure and less pressured to gain repeat visitors. Although other candidate characteristics and demand effects are insignificant predictors, we again find that race competitiveness plays an expected role in the decision to update information (odds of updating increase by 56.2% for every one-unit increase in race competitiveness). As races get tighter, candidates are more inclined to enhance their web sites with features such as updated information that make their sites more interesting without jeopardizing message clarity.

Overall, then, in terms of presenting information on their web sites, we find that candidates are influenced by both practical and political considerations. Feasibility issues (e.g., ease of using technology, staff size, and financial resources) are naturally important, although we also find consistent political incentives to provide vibrant and fresh information that come from incumbency status and race competitiveness. Ultimately, the inclusion of presentation features that go beyond the electronic brochure standard seems to be a function of both practicality and strategic motivations.

What determines the extent to which candidates use interactive technologies on their web sites? In terms of offering personalized interactive features, we find that feasibility is a major consideration, although race competitiveness seems to play a role as well. Our results show that personalized interaction features grew more popular over time—the odds increased by 114.8% between 2002 and 2004. This clearly indicates that candidates

warmed up to this technology as it improved and became easier to use. We also find some marginally significant evidence that Senate candidates used features such as quizzes, moving information, and targeted marketing more than House candidates ($p = .133$), presumably because their larger staffs were better equipped to incorporate this technology and because of the fact that there might be a greater incentive to offer personalization features to a more diverse constituency. The fact that Democratic candidates used this technology significantly more than Republicans is somewhat difficult to explain given that Republican strategists have gained a reputation for effective targeted marketing. Perhaps it stems from the Democrats' minority status. It is also important to note that we find a negative, albeit marginally significant ($p = .124$), relationship between race competitiveness and personalized interaction features, which suggests that as races tighten, candidates are less likely to offer technologies that could interfere with the campaign's message. It seems that candidates in close races would have an incentive to avoid features that allow visitors to personalize their interaction with the site—these candidates need, more than others, to ensure that visitors get a clear and uniform understanding of their positions and campaign themes even if that means that the site is less engaging.

External links are another feature that can stimulate attention but also have potential political drawbacks. To get a sense of what motivates candidates to use or avoid external links, we focused on the determinants of providing a link to the candidate's political party web site because it provides a clear example of the tension that external links cause.[17] Table 3 shows that the decision to provide a party link is driven by race competitiveness, candidate status and gender, and district-level education. Party links are provided fairly uniformly across elections, office levels, and party affiliations, although the odds that an incumbent will use them are 74.3% higher than they are for challengers. Moreover, female candidates are 84.5% more likely than male candidates to link to the party's web site, which speaks to their possible need to define themselves clearly to the electorate. Although district partisanship and average income are insignificant, we find that district-level education is positively associated with party links, which is consistent with a growing sentiment that more sophisticated constituents tend to be stronger partisans (see Wilson, 2006). Again, however, we find that as races tighten, candidates shy away from features that jeopardize their control over the information that visitors will receive (the odds decrease by 35.2% for each level of race competitiveness). Candidates in tight races have a greater need to ensure that visitors stay on their sites and are not distracted by visiting a party web site, where the candidate has no control over what the visitor will encounter.

Finally, our analysis of the reasons candidates might use or avoid two-way communication features again highlights the importance of political considerations when deciding about web technology. Results in the final column of Table 3 show that the use of two-way communication features such as chats and message boards is driven by party affiliation, funds raised, and race competitiveness. The fact that Democrats are more likely to offer two-way communication features may be the result of Howard Dean's success with these technologies in the 2004 presidential election. (It also may relate to their minority party status because they may attract users likely to criticize the majority Republican Party; see Druckman, Kifer, & Parkin, 2007). In terms of funds raised, the odds of using two-way communication increase by 17.1% for every million dollars raised, which suggests that resources play a role in determining whether this technology is used. We also find, once again, that race competitiveness is an important

factor in determining the use of technology. In this case, the odds of using two-way communication drop by 43% for every one-level increase in race competitiveness, which confirms the hesitancy that candidates in tight races have for relinquishing control over their web site's central message, even if it means that the site will be less engaging.

The pattern of results reported in Tables 3 and 4 is quite clear in that decisions about using web technology have both practical and political components. Feasibility is a necessary precondition for using technology, and the results show that the use of particular features tends to increase with enhanced feasibility whether by improved technology over time (i.e., 2004), having larger office staffs (i.e., Senate), or having more available resources (i.e., funds raised). In terms of demand effects from the district, we find that the partisanship and average income in the district never matter, although higher levels of education tend to be associated with more sophisticated web sites. Whereas demand effects generally play a secondary role in decisions about technology, strategic political considerations are consistently consequential. Incumbents typically created less dynamic web sites than challengers, and for each technology, race competitiveness was either a significant or a nearly significant predictor. In fact, race competitiveness was positively associated with using presentation technologies that exacted few political costs while being negatively associated with using interactive technologies that jeopardized control over the campaign's message. Clearly, being able to include a technology is not enough; candidates must also have political motivations for going beyond the electronic brochure standard.

Conclusion

The emergence of the Internet has provided political candidates with a new way to campaign, and technological innovations continually provide opportunities for candidates to connect with web site visitors. Although each new feature has its own potential benefits, it also has its own unique drawbacks that candidates must consider before using it. By analyzing both presentation and interactive features on a large and representative sample of congressional campaign web sites, we have shown that candidates have generally moved beyond an electronic brochure standard, although they have had some trepidation in doing so. Moreover, our results show that their hesitancy in using these technologies is based not only on practical considerations of feasibility but also on critical political considerations that force candidates to weigh the strategic benefits and costs of each feature.

Research on how and why candidates use web technology will undoubtedly continue. However, the results reported here make it clear that there is a need to understand the adoption of web technology as much more than a simple case of viability and comfort with innovations; it is, in fact, also very much a serious political question in which strategic campaign considerations play a large role.

Notes

1. However, see Foot and Schneider (2006) and Herrnson, Stokes-Brown, and Hindman (2007).
2. The concept of an electronic brochure has been used in other studies including Kamarck (1999), Foot, Schneider, Xenos, and Dougherty (2003), and Herrnson et al. (2007).

3. Although there are some similarities, our approach is sufficiently different from that of Foot and Schneider (2006, pp. 157-186). Most notably, we conceptualize technological features more specifically and focus our analyses on them, which differs from Foot and Schneider's broader examination of "informing, involving, connecting, and mobilizing" practices. Moreover, we examine the motivations for using distinct technological features rather than broad categories of features such as "informing" or "involving" practices.

4. Williams's (2003) numbers include both major-party and third-party Senate candidates.

5. For example, Lupia and Philpot (2005) show that visitors are most affected by web sites that present information in a way that is consistent with the visitors' tastes.

6. Studying candidate web sites also enables researchers to gain a better understanding of campaigning more generally because campaign web sites are unlike debates or ads in that they are used by nearly all candidates and offer an unmediated composite of a campaign, thus giving a complete view of the campaign's messages.

7. After analyzing Senate candidate web sites in 2000, Puopolo (2001, p. 2038) claimed that "Republicans win the title of 'Most Web Savvy.'"

8. Foot and Schneider (2006) suggested, "To the extent that political campaigns gauge their Web campaigning strategy on the basis of their target electorate's use of the internet, both family income and level of education serve as reasonable proxies for these factors" (p. 171).

9. According to Pew (2000),

> More Republicans than Democrats went online for election news (37% of Republican online users vs. 34% of Democrats). . . . Republicans hold a clear advantage in online activism over Democrats, measured in terms of interactive participation. More GOP consumers of online election news reported sending or receiving e-mail supporting or opposing a candidate (29% to 20% among Democrats); Republicans were also more likely to participate in online polls (39% to 31%) and more likely to contribute money through candidate websites (6% to 3%).

10. Details about the entire coding project are available from the authors. In addition to introducing new elements from literature on political campaigns and information processing, we build on Paul and Fiebich's (2002) "elements of digital storytelling." Our framework differs from other content analyses (e.g., Bimber & Davis, 2003; Gulati & Treul, 2003; Xenos & Foot, 2005) in that it is more systematic, includes multiple years and office levels, and examines the entire candidate web site rather than just the front page.

11. To assess the reliability of the coding, we randomly sampled approximately 30% of the web sites and had one of two reliability coders code these sites. Specific reliability statistics are available from the authors; in general, we found high levels of reliability, nearly always exceeding the .80 threshold (see Neuendorf, 2002, p. 143; Riffe, Lacy, & Fico, 1998, p. 131).

12. Our specific coding instructions for "personal" were,

> On *any* part of the site that you examined, could you personalize the information, such that you would receive information *that* may *differ from what another web visitor would receive* (even if this would lead you to some other page; you don't need to examine this other page, but note its presence)? For example, you might enter your zip code and receive voting information, or something else specific to you (or people like you) such as information about an issue you care about. (Note this does *not* apply to information for general groups such as senior citizens.) The codes are: 0 = *no personalized information at all*; 1 = *personalized information*.

13. Again, our web coding covered a host of other variables, including some technological measures such as one-way communication (e.g., e-mail subscriptions, voter contact) and structural features (e.g., blinking, scrolling, graphic movement). However, we focus only on those technological features, with sufficient variances, that indicate the extent to which candidates are moving beyond the electronic brochure standard. Also, we do not include blogs as part of two-way communication because they had yet to really develop this capability by 2004.

14. We do not use a continuous measure for race competitiveness because we do not expect slight differences to be meaningful. Dividing the measure into thirds follows convention (Jacobson, 1992, p. 33) and facilitates interpretation. Highly competitive races have an average margin of victory of 10.6% (with a maximum of 20%), whereas mildly competitive races are between 21% and 35% (average is 29.1%) and noncompetitive races have margins of victory larger than 36% (average is 52.4%).

15. Six cases were excluded from this part of the analysis because coders were not using computers with audio capabilities and thus could not accurately measure the existence of audio features.

16. We calculate the percentage change in odds with the formula $100 \times (Exp(B) - 1)$.

17. Our logistic regression for "external links" more generally found positive and significant associations with year ($p = .004$) and Democratic candidates ($p = .017$) whereas none of the other factors reached statistical significance. These somewhat inconclusive results are likely the result of the differences between external links in terms of where they take the visitor.

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