

# Part 1

## Technological Capacity of Nonprofits

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Part 1 addresses the current capacity of nonprofits to use new information and communication technologies. Research in this section features analysis of large datasets to generate hypotheses about the capacity of nonprofits to use new information and communication technology. The three chapters in part 1 show that capacity is associated with organizational size, kinds of activities, and patterns of financial support, among other factors. Because those findings are largely based on cross-sectional data collected by surveys, we cannot be sure what determines technological capacity. Part 1 suggests reasons for those associations and potential hypotheses to be tested by future research.



## Chapter 1

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# Infrastructure and Activities: Relating IT to the Work of Nonprofit Organizations

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WHAT FACTORS AFFECT THE TYPES OF INFORMATION TECHNOLOGY IT components that nonprofit organizations adopt? Do nonprofits with different missions adopt a certain technology perhaps because they face particular pressures or have special operational needs? Or is it more a matter of size, source of revenue, geographic location, tax status, or activities that nonprofits engage in that drive the types of IT they have? In this chapter, we draw on a survey of Indiana nonprofits to explore these basic questions about which nonprofits have which type of IT. In doing so, we hope to provide a rudimentary map of the IT capacities and deficiencies of the nonprofit sector for those who seek to develop and support the IT infrastructure of nonprofits, as well as add to the academic literature on the topic.

Addressing these apparently straightforward questions requires fairly complex statistical analyses of several models in order to determine the net effect of the various factors involved in understanding variations in IT capacities. However, given the broad audience for this book, we have sought to minimize the technical presentation and suggest that nontechnical readers focus on the first two sections, which provide a context for understanding the conclusions we draw from our findings, as well as the fourth and final section of the chapter, where we highlight key findings and policy implications.

The introduction provides a brief overview of how our analysis relates to previous studies of information technology in nonprofits. The data and methodology section discusses the Indiana Nonprofit Survey, our data source for this chapter, and how this survey provides us with a unique opportunity to examine information technology among an unusually broad range of nonprofits. We also discuss the portion of the survey that relates to organizations and IT and how we analyze the data. In the data analysis section, we undertake a statistical analysis of our data. We

first examine whether the type of IT nonprofits possess is related to basic organizational structures such as mission size source of funding etc. by looking at both how each organizational feature is related to different types of IT bivariate analysis and how these features jointly affect nonprofit IT multivariate analysis. We then broaden the multivariate analysis to include indicators of what nonprofits do e.g. engage in advocacy or get involved in networks collaborations to see whether these activities help us further understand overall nonprofit IT capacity. Although this third section provides the basis for our conclusions in the final section the intricacies of linear and logistic regression may be of limited interest to some readers. In the conclusion we summarize our key findings and discuss future research needs. Generally size is the most important factor in determining the IT capacity of nonprofits this is not surprising given the costs of adopting and maintaining IT but other organizational features and certain types of activities are also important. We hope these findings will guide those interested in developing and supporting the IT capacity of nonprofits so that they can direct their resources effectively and that other scholars will find ideas for developing their own work.

## INTRODUCTION

Information technologies have the capacity to transform organizations at multiple levels whether internally in terms of the types and processes of work undertaken or externally in how organizations relate to one another. The existence of this capacity is evident from a broad based review of the organizational literature conducted by O Mahony and Farley 1999 which examined the impact of information technologies at four levels: individual workers work groups organizations and the interorganizational level. At the level of individual workers they found that studies tend to look at the role that IT plays where work is done but not at how technology affects the content of work while studies at the level of work groups look at how IT affects interpersonal communications. Organizational level studies tend to look at the relationship between organizational design and IT while studies at the interorganizational level tend to focus on how IT leads to coordination and collaboration between organizations. Most studies focus on the impact on individuals or work groups although there are studies at all four levels of analysis.

The nonprofit literature on the use and impact of information technologies has paid less attention to the IT impact on individuals or work groups than the studies reviewed by O Mahony and Farley 1999 in that most tend to focus on the organizational level of analysis. Sidel Cours 2003 study of how IT changes nonprofit workplace processes and tasks is a notable exception to this pattern. In this chapter we also examine IT at the organizational level of analysis. However while most of the existing nonprofit IT focuses on particular subsectors or industries within the sector e.g. community development organizations Nunn 1999 human services agencies Corder 2001 or hospitals Watcharasriroj Tang 2004 we move beyond a narrow focus on a single nonprofit field or ethnographic studies of a few organizations. We examine the presence of IT among nonprofits

and the relationship between IT and organizational features and activities across a diverse range of nonprofit organizations.

## DATA AND METHODOLOGY

We draw the data for our analysis from a survey of 2,206 Indiana nonprofits that was completed in the winter and early spring of 2002. The sample was drawn from a master database of all types of Indiana nonprofits developed from IRS registrations under all 501(c)(3) subsections and supplemented by the list of state nonprofit incorporations, yellow page listings of congregations, a variety of local listings, and a hypernet work sample (Grønbjerg 2002). The sampling design involved the use of a stratified sample to allow for comparisons among communities and database listings. The analysis presented here is based on the weighted sample for the state of Indiana. The 2,206 organizations that responded to the survey represent a response rate of 29 percent (Grønbjerg & Clerkin 2005). For a description of the Indiana Nonprofit Sector Project, please see [www.indiana.edu/~nonprof/](http://www.indiana.edu/~nonprof/).

Due to the broad scope of the survey, it included relatively few questions relating to IT, which constrains us to a fairly coarse level of analysis. Specifically, respondents were asked to indicate the presence or absence of six types of information technologies for the organization: 1) computers for key staff/volunteers; 2) computerized client/member program records; 3) computerized financial records; 4) direct Internet access for key staff/volunteers; 5) an organization e-mail address; and 6) an organization Web site.

Obviously, finer grained data about the type of computers (e.g., a 286 vs. Pentium 4 processor), Internet connections (e.g., dial up modem vs. a continuous ISDN/DSL or cable modem connection), or applications used to maintain electronic records could have allowed for a richer analysis of the technological savvy of Indiana nonprofits. However, such details may be of limited utility. As neo-institutional theory predicts, and as O'Mahony and Arley (1999) confirm based on their review of sociological and organization studies, IT is often adopted for symbolic rather than rational reasons. Thus, possession of current rather than obsolete but still functioning equipment may reflect institutional pressures on organizations to adopt the latest technologies so as to demonstrate their legitimacy to key stakeholders rather than a rational need for new information technology to meet operational or programmatic needs. As Nunn (1999) concludes, organizations do not necessarily need the latest IT to be effective in pursuing their missions; any access is helpful.

In keeping with Nunn's (1999) discussion of internal uses of IT to improve administrative and managerial work versus external uses to facilitate networks and collaborations with other organizations, we have divided our six IT components into these two groups. We categorize having computers available for key staff or volunteers, computerized financial records, and computerized client/member program records as internal IT components because these items are typically geared toward administrative and managerial work. The external IT components

category includes having a Web site for the organization an e mail address and direct Internet access for key staff volunteers because these components help connect the organization to external information and actors.

Although this categorization has analytical convenience it isn't necessarily conceptually or empirically clean. One can easily develop scenarios of using external components for internal purposes and vice versa. Indeed when we do a factor analysis of these six components to explore whether they group into any underlying clusters two factors emerge with most of the IT components loading on both factors. However consistent with our categorization we find that having a Web site an e mail address and Internet access primarily loads on one external IT factor while having computerized financial records and computerized client member program records primarily loads on another internal IT factor. The availability of computers for key staff and volunteers loads more heavily on the external than the internal factor but we include it as an internal IT component because it is a precondition for having computerized records.

## DATA ANALYSIS

Our analysis of the data proceeds in two phases. In the first part of the analysis we undertake a descriptive analysis of which nonprofits have what types of IT. To do so we begin by examining how the presence of six IT components vary by nonprofit field of activity mission before considering such other key organizational features as the age size funding mixture tax status and geographic location of nonprofits. We also use a multivariate analysis to explore whether controlling for these other features affects the original relationship between nonprofit field and the likelihood of having a particular IT component. In the second part of the analysis we shift to a focus on overall nonprofit IT capacity and examine whether including data on nonprofit involvement in particular types of activities i.e. being involved in collaborations engaged in advocacy or targeting low income groups is related to an organization's overall level of IT capacity once we control for the types of organizational features considered in the first part of the analysis.

### Types of IT Components and Nonprofit Organizational Features

We begin our analysis by examining the presence of each of the six IT components by major field of activity mission. We use an open ended question on the responding organization's primary purpose or mission to classify it into one of twenty six major NTEE CC National Taxonomy of Exempt Entities Core Codes fields. When this open ended question did not provide enough information we also examined a description of the organization's three most important programs and activities and or the organizational Web site if available. To simplify our analysis we recoded the twenty six NTEE CC fields into nine major categories we grouped international relations nonprofits with other unknown because of their small number.

As expected we found important differences in the presence of different IT components by nonprofit fields. Although this finding may help funders and IT professionals target their support to particular segments of the nonprofit sector and may also help nonprofit managers to benchmark their organization's IT to nonprofits in similar fields we urge readers to approach these results with caution. Pursuing a certain mission is not necessarily the primary reason that a given nonprofit adopts particular types of IT rather there may well be structural features such as the size of the organization that indicate the organization's ability to purchase and maintain these technologies. To increase the IT capacity of nonprofits therefore funders and support providers must also work to increase the overall organizational capacities of nonprofits to use IT in a sustainable manner.

Internal IT components by field. As table 1.1 shows roughly three fifths of Indiana nonprofits report having computers available for key staff or volunteers computerized financial records or computerized program member client records. Generally health and religion nonprofits are most likely to have these types of IT components while mutual benefit nonprofits are least likely to have them. Overall arts culture and humanities nonprofits lag in having computerized financial records while human services nonprofits lag in having computerized program member client records. We explore these results in more detail below.

Table 1.1 Presence of IT components by field of activity

Field	Percent with IT component					
	Internal			External		
	Computers	Financial	Program	Internet	E mail	Web site
Health <b>n 132</b>	83%	71%	75%	79%	81%	54%
Religion <b>n 528</b>	79%	74%	67%	58%	57%	33%
Education <b>n 127</b>	58%	72%	69%	60%	46%	52%
Environment animals <b>n 55</b>	67%	48%	62%	63%	50%	43%
Public societal benefit <b>n 330</b>	60%	53%	62%	50%	42%	37%
Human services <b>n 652</b>	59%	57%	51%	52%	42%	25%
Arts culture humanities <b>n 125</b>	55%	42%	49%	42%	41%	42%
Other <b>n 13</b>	43%	48%	47%	43%	48%	38%
Mutual benefit <b>n 109</b>	36%	27%	33%	26%	15%	9%
<b>Total n 2 071</b>	<b>63%</b>	<b>59%</b>	<b>58%</b>	<b>53%</b>	<b>46%</b>	<b>33%</b>

Note: The numbers in bold for the percent of organizations in the field with a particular IT component indicate a statistically significant difference between the value for the nonprofits in the particular field and those not in the field for p values less than 0.05 this means that each cell represents one cross tabular analysis. The number of cases in each field is indicated in the parentheses following each field name. Organizations that reported having any one IT component but that failed to answer questions about other components were assumed to not have or use those other components.

Almost two thirds 63 percent of Indiana nonprofits have computers available for their key staff and volunteers. This is the case for more than four fifths of nonprofits in the health 83 percent and religion 79 percent fields suggesting that they are better positioned than nonprofits in other fields to make use of other IT components as the data in table 1.1 confirms. By contrast only 36 percent of mutual benefit nonprofits have a computer available for key staff and volunteers thus dramatically lagging behind the rest of the sector. They are therefore most likely to be constrained in their access to other information technology as table 1.1 confirms.

Three fifths of Indiana nonprofits report having computerized financial records 59 percent and or computerized program member client records 58 percent. Some what surprisingly given the complexities of health care financing the percent of health nonprofits that report having computerized financial records is not statistically significantly different than for non health nonprofits. Only religion nonprofits are significantly more likely to have computerized financial records 74 percent while mutual benefit nonprofits again have a lower than average percent with computerized financial records 27 percent as do arts culture and humanities nonprofits 42 percent. When it comes to computerized program member client records health 75 percent and religion 67 percent nonprofits are more likely to have such components while human services 51 percent and mutual benefit 33 percent nonprofits are less likely to have them.

External IT components by field. As seen in table 1.1 nonprofits are less likely to have external than internal IT components. Roughly half of Indiana nonprofits have direct Internet connections available for key staff and volunteers 53 percent or an e mail address for their organizations 46 percent. Even fewer report having a Web site 33 percent. Health nonprofits consistently have more external IT components than other fields while the mutual benefit field again lags behind other fields across the board. We explore these findings in more detail below.

The health field is the most wired among Indiana nonprofits with roughly four fifths having direct Internet access for key staff volunteers allowing them to easily retrieve the vast amount of health related information now contained on the World Wide Web. At the opposite extreme the mutual benefit field is the least wired nonprofit field with only one quarter having direct Internet access for their key staff volunteers.

We find a similar pattern with regard to having an organizational e mail address and Web site. The health field is saturated with nonprofits that have e mail addresses 81 percent followed by religion nonprofits 57 percent but very few in the mutual benefit field 15 percent do. Slightly more than half of health 54 percent and education 52 percent nonprofits report having a Web site for their organization while only one fourth of the human services and 9 percent of the mutual benefit nonprofits do.

Computers as a gateway to other IT components. As suggested having computers for key staff or volunteers is likely to serve as a gateway for other IT components. We examine this assertion explicitly here. In table 1.2 we look at only those

Table 1.2 Proportion of organizations that have computers with IT components by field of activity

Field	Percent with IT component for those with computers				
	Financial	Program	Internet	E mail	Web site
Health n 99	78%	79%	88%	90%	64%
Religion n 439	84%	81%	72%	69%	40%
Education n 80	81%	87%	91%	69%	80%
Environment animals n 29	63%	82%	93%	73%	60%
Public societal benefit n 182	63%	81%	80%	64%	50%
Human services n 401	76%	68%	86%	64%	36%
Arts culture humanities n 68	60%	77%	70%	73%	68%
Other n 6	97%	95%	99%	95%	66%
Mutual benefit n 43	64%	62%	71%	39%	25%
Total n 1 347	75%	77%	80%	67%	46%

Note: The numbers in bold for the percent of organizations that have computers in the field with a particular IT component indicate a statistically significant difference between the value for the nonprofits in the field and those not in the field for p values less than 0.05 level this means that each cell represents one cross tabular analysis. The number of cases in each field is indicated in the parentheses following each field name.

nonprofits that have a computer and report the percent of these that have the other five IT components.

As table 1.2 shows when nonprofits have computers for key staff and volunteers they are notably more likely to have each of the other IT components compare corresponding percent values in tables 1.1 and 1.2. Most dramatically and perhaps indicating the pervasiveness of the World Wide Web and the use of the Internet as a basic computing tool the availability of computers for key staff volunteers greatly increases the proportion of nonprofits that report having direct access to the Internet from 53 percent to 80 percent of all Indiana nonprofits. Of course those nonprofits without computers may still have Web sites created and hosted by third parties or use the Internet e mail or programs for managing finances or service records via computers owned privately by staff or volunteers or via publicly accessible computers at libraries or the like.

IT components and other organizational features. As we suggested above the presence of IT may also be a function of other organizational features not just field of activity. We expect older and larger nonprofits as measured by the number of full time equivalent paid staff members FTEs to be more likely to have obtained access to IT because they have had more time or resources to secure the technology. We expect those that rely primarily on government funding to have more need for IT because of the high communication demands such funding imposes. We also expect nonprofits that are located in rural areas to have greater need for IT because IT helps shrink the distance between them and other organizations Nunn 1999. Finally we expect nonprofits that are registered under section 501 c 3 of the IRS

code (e.g., charities) to have more IT components because they are eligible to receive tax-deductible donations of used IT equipment.

Because of space limitations, we do not present the initial bivariate relationships between these organizational features and each of the six types of IT components; the tables are available at <http://www.indiana.edu/~nonprof/results/paperabstracts.html>. However, our analysis shows that larger nonprofits (those that depend on government or donations for more than half of their revenues), those located in metropolitan areas (not rural areas) as we had expected, and those that are IRS-recognized charities are more likely to have IT components than their counterparts. We found no statistically significant difference by age of organization.

**Multivariate analysis of IT components.** So far, we have examined the presence of individual IT components primarily by major nonprofit field, but we have also considered the bivariate relationship between IT components and size, funding profile, age, tax status, and metropolitan location. Of course, nonprofit fields themselves differ along all of these dimensions. We therefore undertake multivariate logistic regressions to control for these other characteristics in order to assess whether nonprofit field has an independent effect on the likelihood of having a particular IT component, apart from these other characteristics.

The results from the logistic regressions (here, we use nonprofit field as well as these other key features) to predict whether nonprofits have a particular IT component are reported in table 1.3. To simplify the presentation, we report only coefficients that are at least borderline significant; full details are available upon request from second author; see *About the Contributors* for contact information. Controlling for size, funding source, age, metropolitan location, and IRS status, we find significant differences among nonprofit fields only in the likelihood of having a Web site, e-mail, and computerized program records, and perhaps in having computers for key staff and volunteers. Overall, education and public and societal benefit nonprofits tend to be more likely than human services nonprofits (the reference category) to have several of these IT components.

Nonprofit field appears to be particularly important in predicting whether nonprofits have Web sites. Controlling for all other factors, the likelihood of having a Web site is significantly high for nonprofits in the fields of education (7.8 times higher than human service nonprofits), arts, culture, and humanities (5.8 times higher), public and societal benefit (4.6 times higher), and environment and animals (4.3 times higher). There are also differences among nonprofit fields in whether nonprofits have an e-mail address or computerized program records. Compared to human service nonprofits (the reference category), nonprofits in the health and the public and societal benefit fields are more likely (4.4 times and 2.2 times, respectively) to have an e-mail address, while those in the education and public and societal benefit fields are more likely (3 times and 3.2 times, respectively) to have computerized program records. Public and societal benefit nonprofits are also marginally more likely to have computers than human services nonprofits.

However, it appears that size (and being small, in particular) has the greatest impact on whether nonprofits have a particular IT component. Nonprofits with no

Table 1.3 Odds ratios for logistic regressions predicting presence of IT components

Dimension	Web site	E mail	Computers	Internet	Financial	Program
<b>Nonprofit field</b>						
Arts culture humanities	5.84					
Education	7.77					2.97
Environment animals	4.33					
Health		4.38				
Public societal benefit	4.62	2.16	<u>1.82</u>			3.23
Religion						<u>2.03</u>
Mutual benefit						
Other						
<b>Number of FTE</b>						
No employees	0.15	0.07	0.05	0.15	0.14	0.17
0.5–2 FTEs	0.39	0.32	0.25	0.45	0.32	0.34
5.5–15 FTEs	2.61					<u>2.68</u>
15.5–50 FTEs	<u>2.47</u>					
More than 50 FTEs	9.21	17.20	Excluded		110.62	
<b>Major source of revenues</b>						
Primarily government			5.53	4.37		
Primarily donations						
Primarily dues fees		0.43	0.44		<u>0.52</u>	
Primarily special events						
Primarily sales		<u>0.39</u>	0.28		<u>0.38</u>	
No revenues	0.19		<u>0.37</u>		0.13	0.15
<b>Year established</b>						
1930–1959						
1960–1969						<u>1.94</u>
1970–1979						
1980–1989						
1990–2002						<u>1.94</u>
Metropolitan location	3.12	1.59				
<b>IRS 501 c 3 status</b>						
Number of cases	1 736	1 736	1 636	1 736	1 736	1 736
McFadden's R <sup>2</sup> :	0.28	0.28	0.29	0.21	0.23	0.18

Note: Odds ratios indicate how much more likely (if greater than 1.0) or less likely (if less than 1.0) a given category of nonprofits is to have a particular IT component characteristic compared to the reference category (1.0) for that particular dimension, controlling for all other characteristics included in the analysis. Only coefficients that are borderline significant or better are reported in the table; full details are available upon request. Coefficients in bold are statistically significant (p values less than 0.05); coefficients that are underlined are borderline statistically significant (p values less than 0.10). The n for the logistic regression on computers is 100 less than those for other regressions because we excluded nonprofits with more than 50 FTEs because all have computers. Human services is the reference category for nonprofit field; 2.5–5 FTEs is the reference category for FTEs; no single source accounting for more than half of revenues is the reference category for funding mixture; and nonprofits founded prior to 1930 is the reference category for age.

employees and two or fewer full time employees (FTEs) are consistently less likely to report having IT components than mid sized nonprofits (those with two and a half to five FTEs) the comparison group. Similarly large nonprofits (with more than fifty FTEs) are more likely to have a Web site, e-mail, and computerized financial records 9, 17, and 111 times respectively compared to mid sized nonprofits the comparison group.

We also find some statistically significant relationships between the presence of some IT components and funding profile holding all else constant. As expected nonprofits that rely on government sources for more than half of their revenue are more likely than those with mixed funding profiles (the reference group) to have computers 5.5 times more likely and access to the Internet for key staff/volunteers 4.4 times more likely perhaps reflecting the administrative demands of government funding. On the other hand nonprofits that rely on dues or fees for more than half of their revenue are less likely than those not dependent upon a single type of revenue to report having e-mail 57 percent less likely and computers 56 percent less likely. A similar pattern holds for those that rely primarily on sales revenues. Not surprisingly nonprofits with no revenue are less likely than those not dependent upon a single type of revenue to have a Web site 81 percent less likely, computerized financial records 87 percent less likely, or computerized program records 85 percent less likely.

Nonprofits located in metropolitan areas are more likely than those located in nonmetropolitan areas to have a Web site 3.1 times more likely or an e-mail address 1.6 times more likely precisely those technologies that could assist nonmetropolitan organizations to shrink the spatial distances between themselves and clients/members as well as other organizations. However holding all else constant age and tax status do not have independent statistically significant impacts on the likelihood of nonprofits having any of these six IT components.

### Overall IT Capacity and Nonprofit Features and Activities

We turn now to an exploration of the overall IT capacities of Indiana nonprofits. The nature of our IT data (a series of six dichotomous variables) makes it inappropriate to treat a simple count of these components as the dependent variable in multivariate analyses. That is because these components are neither continuous and therefore not appropriate as a dependent variable in OLS (ordinary least squares) regression analysis nor true count data because the presence of components cannot be assumed to be independent of each other and therefore fail to meet requirements for Poisson or negative binomial analyses.

Instead we use an indirect approach to reducing the data by arguing that the six IT components are indicators of an underlying level of IT capacity. To measure this capacity we performed a principal component factor analysis of the six indicators. We then used the generated factor scores (eights) for the six components to develop a continuous measure of IT capacity (this score has a mean of 0 and ranges

from  $-2.60$  to  $2.38$  for the nonprofits in our sample which becomes our dependent variable in an OLS regression analysis to examine the relationship between nonprofit field and the IT capacity of Indiana nonprofits. We include the same organizational features used in the logistic analysis above to test for the impact of structural and nonprofit field variables on the overall level of IT capacity. We use this model model A as our base model for examining whether and how particular types of organizational activities help predict IT capacity. Models through G in table 1.4 report the regression results from adding various types of organizational activities to this base model.

Use model model A. The results for this examination of overall IT capacity follow a pattern similar to the ones described above when looking at each IT component individually IT capacity is mostly a function of size and geographic location rather than nonprofit field. Relative to nonprofits that are not reliant upon a single source of revenue having no revenue reduces the IT capacity score by  $1.09$ . Having no employees or fewer than two FTEs reduces the IT capacity score  $-2.09$  and  $-0.92$  respectively relative to nonprofits with two and a half to five FTEs. Being an extremely large nonprofit i.e. more than fifty FTEs is associated with a  $0.72$  increase in the IT capacity score. Being located in a metropolitan county increases the IT capacity score by  $0.39$  relative to nonprofits located in nonmetropolitan counties perhaps suggesting that metropolitan location increases both the pressures to adopt IT components as well as resources available to purchase and implement these tools.

Consistent with our analysis of individual IT components nonprofits in the education and the public and societal benefits fields have higher levels of IT capacity than human services nonprofits. On average the IT capacity for education nonprofits is  $0.59$  higher and that of public and societal benefit nonprofits  $0.67$  higher than for human services nonprofits. These findings suggest that compared to human services nonprofits those in the education and public and societal benefits fields either experience greater need for IT to manage their activities are under greater pressures to adopt IT by external actors or have more opportunities to do so.

Nonprofit activities and IT capacities: model through model G. Having examined the relationships between key organizational characteristics of Indiana nonprofits and their IT capacity we now broaden the scope by building on this analysis to examine whether nonprofit involvement in particular organizational activities helps us understand variations in IT capacity. If nonprofits are to pursue their missions they must 1 be aware of their ever changing environments including the needs of their communities and the regulatory environment within which they operate 2 participate in networks and collaborations with other organizations to coordinate services so as to meet the diverse and complex needs of individuals and communities 3 target their activities and programs to those who need them most and 4 advocate for the interests of their various stakeholders. We test whether engaging in these activities is associated with greater IT capacity.

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Table 1.4 Regression coefficients from OLS regression on IT capacity

Dimension	Model A	Model B	Model C	Model D	Model E	Model F	Model G
Arts culture humanities							
Education	0.59	0.68	0.68	0.70	0.54	0.58	0.64
Environment animals							
Health							
Public societal benefit	0.67	0.69	0.71	0.71	0.65	0.70	0.67
Religion							
Mutual benefit							
Other							
No employees	-2.09	-2.06	-2.02	-2.02	-2.05	-2.22	-2.02
0.5–2 FTEs	-0.92	-0.93	-0.92	-0.92	-0.88	-0.87	-0.91
5.5–15 FTEs	<u>0.39</u>	<u>0.41</u>	<u>0.39</u>	0.42	0.41	0.46	0.47
15.5–50 FTEs	<u>0.46</u>	<u>0.43</u>	<u>0.44</u>	<u>0.44</u>	<u>0.43</u>	<u>0.45</u>	0.56
More than 50 FTEs	<u>0.72</u>	<u>0.74</u>	<u>0.81</u>	<u>0.78</u>	<u>0.68</u>	<u>0.65</u>	0.74
Primarily government	<u>0.42</u>	0.54	0.54	0.54		0.44	
Primarily donation							
Primarily dues fees						-0.43	-0.41
Primarily special events							
Primarily sales	-0.55				-0.56	-0.55	-0.67
No revenues	-1.09	-0.73	-0.68	-0.68	-0.95	-0.88	-1.07
Established 1930–1959							
Established 1960–1969							
Established 1970–1979							
Established 1980–1989							
Established 1990–2002							
Metropolitan location	0.39	0.34	0.34	0.33	0.38	0.35	0.42
IRS 501 c 3							
of community changes		not sign					
Impacted by any community changes			0.28				
times impacted by community changes				0.08			
Any collaboration					0.36		
Targets low income						-0.45	
Targets minorities						not sign	
Targets local area						0.39	
Involved in advocacy							0.48
Constant	0.61					0.80	
Number of observations	1 736	1 582	1 592	1 592	1 657	1 575	1 627
R squared	0.45	0.44	0.45	0.45	0.46	0.47	0.47

Note: OLS regression coefficients indicate whether a given category is more (if positive) or less (if negative) likely to have high IT capacity, controlling for all other dimensions included in the analysis. Only coefficients that are borderline significant or better are included (full details are available upon request). Coefficients in bold are statistically significant (p values less than 0.05); underlined coefficients are borderline statistically significant (p values less than 0.10). For all variables with multiple categories, we include a reference category: nonprofit field human services nonprofit employment .5–5 FTEs funding mixture no single source accounts for half or more of revenues and age founded before 1930.

Community model C and D.<sup>1</sup> Organizational environments can be turbulent. The economic status and demographic composition of surrounding communities constantly changes. Almost three fourths (72 percent) of Indiana nonprofits report at least one change in the condition of their community and slightly less than half (49 percent) report being affected by these community changes. To examine the relationship between community level environmental change and IT capacity we use the data from a series of questions that asked the respondent to indicate if the communities in which their organizations are located experienced any changes in 1 employment/business opportunities 2 household income 3 racial/ethnic diversity 4 crime/violence 5 tensions within and/or between community groups and 6 size of the population. Respondents were also asked whether the change affected their organization.

We present three models designed to capture the level of turbulence nonprofits encounter from their surrounding community: model A the number of community changes reported range from 0 to 6 model B if they were affected by any one of these changes and model C the number of impacts reported. We note first that the relationship between the control variables nonprofit field and organizational features and the IT capacity of Indiana nonprofits is relatively robust. The addition of community changes to the model produces no substantive changes in the magnitude or direction of the impact of the control variables on IT capacity and only marginal changes in the statistical significance of some coefficients compare the coefficients in model A to those in models B C and D. This robustness holds for each of our subsequent analyses of the impact of other types of organizational activities on IT capacity.

Second and of substantive importance in model B we find that the relationship between the number of community changes that nonprofits identify and IT capacity is not statistically significant while being affected by at least one condition model C and the scope of community changes that affect nonprofits model D are both statistically significant. Taken together these findings suggest that nonprofits may use IT capacity to buffer themselves against a turbulent community environment but only when the turbulence directly affects the organization. Following Thompson's (1967) contingency approach to organizational adaptation we believe that opportunities and threats presented by these community impacts encourage nonprofits to adopt IT to protect their core technology.

When we apply these models to each of the six IT components (tables not included here because of space limitations) but available upon request we find a positive relationship between the number of community changes that affect nonprofits and having computers direct Internet access for key staff volunteers and an e-mail address for the organization. Indeed the probability of having such

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1. Nonprofits also need to track and adjust to changes in their legal and regulatory environments. However because we find no statistically significant relationship between the number of legal/regulatory changes or impacts an organization reports and the overall level of IT capacity or the likelihood of having any of the six individual IT components we do not present those findings here.

components increases by roughly 20 percent for each additional community impact. Having Internet access and an e-mail address increases access to information and can help nonprofits understand the nature of community changes that affect them so that they can begin to develop strategies to address these changes. Of course we do not know whether nonprofits seek to enhance their IT components when they encounter turbulent community conditions in order to manage the impact more effectively or if having these components simply makes them more aware of the turbulence and how it affects them.

Networks and collaborations model E. IT tools may also make it easier for nonprofits to enter into networks and collaborations with other organizations so as to more effectively address the complex needs and interests of individuals and communities which otherwise are likely to be beyond the ability of a single nonprofit operating in isolation from other organizations. By entering into collaborations and networks with other organizations whether governmental for-profit or other nonprofit organizations nonprofits may increase their ability to meet client member needs obtain funding recruit and keep staff board members and volunteers and enhance the visibility reputation of their organization. We expect nonprofits that are involved in these types of relationships to have greater IT capacity than those not involved in networks and collaborations because IT facilitates the communication and information sharing that is necessary for networks and collaborations to operate efficiently and effectively.

More than half (56 percent) of Indiana nonprofit organizations are involved in networks and collaborations. To examine the impact of involvement in networks and collaborations on an organization's IT capacity we developed a number of measures of these relationships: 1) a dichotomous variable that indicates if the organization is involved in any network or collaboration 2) a measure of the size of the network or collaboration self-reported count of the number of other organizations in the most important network or collaboration and 3) a measure of the diversity of an organization's network or collaboration a count of the different types of organizations e.g. congregation other faith-based organization secular service organization nonprofit advocacy group mutual benefit association government business etc. in an organization's most important network or collaboration that ranges from 0 to 7.

Holding all else constant being involved in a network or collaboration increases an organization's IT capacity model E. However measures of network size and diversity are not related to IT capacity and therefore we do not report those results here. Taken together the lack of impact of network size or diversity tends to indicate the economies of scale that IT makes possible. Thus once nonprofits enter a network or collaboration and invest in IT to support or reinforce these relationships they can navigate smaller and more homogeneous networks as well as larger and more complex ones.

When examining the relationship between being involved in any network or collaboration and individual IT components details available upon request we find that the likelihood of having externally focused IT components is greatly increased nonprofits involved in networks or collaborations are about 75 percent

more likely to have a direct connection to the Internet for key staff volunteers an organizational Web site and an organizational e mail address than those not involved in such relationships. We find no statistically significant relationship between involvement in networks or collaborations and internally focused IT components presence of computers computerized financial records and computerized program client member records . This finding suggests that organizational networks and collaborative relationships are reinforced and supported by access to the virtual network of the internet.

Targeting programs activities to marginalized groups model F. Nonprofits relieve the burden of government by providing important services that government could otherwise have to provide. Indeed this argument serves as one of the major rationales for a charitable exempt status to nonprofits and for granting eligibility to receive tax deductible contributions to charities Hopkins 1998 . Other types of tax privileges serve to subsidize nonprofit activities and are most easily recognized when nonprofits deliver services to those in need and other marginalized groups. Of course nonprofits serve other important community benefit functions when they help generate social capital by providing the location and activities for community members to come together to network socialize or address community issues. In this section we explore the relationship between nonprofits performing these important activities and their IT capacity.

On average relatively few of Indiana's nonprofits target their programs activities to low income groups 8 percent or racial ethnic minorities 4 percent . Part of the reason for these low percentages is that our sample includes a broad scope of nonprofit organizations including member and mutual benefit organizations and religious congregations not just charitable nonprofits. Hence many nonprofits in our sample focus on meeting member needs rather than the needs of the general public or marginalized groups. Also Indiana is a relatively homogeneous state with 87 percent of the population white U.S. Bureau of the Census 2001 so the niche for nonprofits that target racial ethnic minorities is relatively small. A slightly larger proportion of Indiana nonprofits 18 percent report that they target the local communities in which they are located.

Nonprofits that target racial ethnic minorities do not differ in their level of IT capacity relative to those that do not target these groups see model F . However targeting low income groups is associated with a reduction in an organization's IT capacity potentially reflecting evidence of a digital divide in Indiana. If low income individuals and households are less likely to have access to computers and the internet than middle and higher income individuals and households are nonprofits that serve them may face less pressure to adopt these technologies. However while targeting low income communities is associated with a decrease in IT capacity and thus a potential reduction in an organization's ability to use IT to communicate with various other stakeholders targeting programs to local communities is associated with an increase in an organization's IT capacity see model F .

When looking at the relationship between each of the six IT components and targeting programs to low income individuals and households or to local communities we find some interesting differences details available upon request .

Nonprofits that target their programs or services to low income individuals and households are much less likely by about two thirds to have computerized program client member records than those that do not target in this way. However these nonprofits are not significantly less likely to have computers than other organizations i.e. they are equally likely to have this gateway component suggesting that those that target programs to low income individuals and groups either may deliver their services in a less structured or less formalized manner and therefore have less need for such records or do not have the organizational capacity to develop computerized records.

Nonprofits that target their programs services to local communities are almost twice as likely to have direct Internet access for key staff/volunteers 87 percent more likely an e mail address for the organization 73 percent more likely or computerized program client member records 96 percent more likely than organizations that do not target programs to local communities. The increased presence of Internet and e mail access for these nonprofits combined with the higher likelihood of having computerized program client member records allows them to increase communication and information flows to and from the community as well as track these and other activities internally through the use of computerized program records.

Engaging in advocacy model G. Finally we examine the relationship between nonprofit IT capacity and involvement in advocacy. We define advocacy nonprofits as those that indicate they seek to promote 1 positions on certain policy issues 2 positions relevant to the interests of certain groups or 3 certain political groups. Roughly one fourth 26 percent of Indiana nonprofits report that they engage in at least one of these three activities. We expect nonprofits that engage in such activities will benefit from using IT to organize and activate their stakeholders raise awareness about the concerns of their constituency groups and convey positions to policy makers. As indicated in the results reported in model G engaging in advocacy is indeed associated with an increase in IT capacity.

When looking at the relationship between involvement in advocacy and the presence of individual IT components we find a widespread impact results available upon request. Nonprofits that engage in advocacy are more than twice as likely as those that do not to have computers available for key staff and volunteers 2.4 times more likely and an e mail address for the organization 2.8 times more likely. They are also more likely to have Internet access for key staff and volunteers 68 percent more likely computerized financial records 74 percent more likely and computerized program client member records 74 percent more likely.

These findings show that engaging in advocacy is associated with increases in the probability of having both internally and externally focused IT components indicating a fairly high level of IT sophistication for nonprofits that advocate. We suspect that advocacy nonprofits use their IT components of Internet e mail and computerized program client records to proactively organize their stakeholders around the issues they advocate for as well as to convey key messages to policy makers. The increased probability of having computerized financial records may reflect

the need for charitable organizations i.e. those with 501 c 3 status to adhere to the lobbying restrictions by tracking how they allocate their resources between advocacy lobbying activities on the one hand and administrative and programmatic service activities on the other hand.

## CONCLUSION

We have explored how a variety of nonprofit organizational characteristics field size funding profile age location tax status and activities awareness of community and policy changes networking or collaboration and involvement in advocacy are related to whether nonprofits adopt different types of information technologies as well as their overall IT capacity. We find evidence that all these factors have a role to play but not necessarily across the board. The relationships vary according to the models we use e.g. whether we control for other factors and which factors we control for and the types of IT components we consider.

Overall however size number of FTE paid staff stands out as one of the most robust and significant predictors of IT capacity among Indiana nonprofits. Smaller nonprofits those with two or fewer FTEs have much lower levels of IT capacity than medium sized nonprofits those with two and a half to five FTEs. In turn medium sized nonprofits have lower IT capacities than the largest nonprofits those with more than fifty FTEs. These patterns are not surprising. Adopting and using IT is expensive. There are initial outlays of meeting the capital costs of purchasing software and equipment and start up costs to train staff and volunteers. There are also ongoing outlays to meet operational expenses e.g. monthly Internet and phone bills and to maintain and upgrade equipment and software. Presumably some or all of these costs are offset by greater staff efficiencies and the delivery of more effective programs.

Other variables are also related to the IT capacity of Indiana nonprofits. Nonprofits located in metropolitan regions have more IT capacity than those located in nonmetropolitan regions even though rural nonprofits can reap major benefits from using IT to link themselves more tightly to members clients and other organizations Nunn 1999. However rural nonmetropolitan nonprofits appear to face persistent deficits in the types of basic IT tools that could help shrink the distance between themselves and their stakeholders. This finding indicates the need for support organizations to develop programs to assist rural nonprofits to increase and then maintain their IT capacity.

We also find differences by major nonprofit fields. Controlling for other factors nonprofits in the education and the public and societal benefit fields have more IT capacity than human services nonprofits. Whether these differences reflect the technical tasks that nonprofits in these fields face or are a byproduct of their different funding opportunities for developing IT capacities should be explored in future research. However such findings remind us of the importance that researchers must place on the context within which a nonprofit operates. By comparing the IT capacity of nonprofits across a range of contexts we have begun the

process of distinguishing the impact of common factors from those that are specific to a particular context.

Even after controlling for basic organizational features we find that nonprofit activities also have at least a marginal impact on IT capacity. Nonprofits that are affected by community changes involved in network or collaborations target local communities or engage in advocacy have higher levels of IT capacity than their counterparts that are not so involved. Nonprofits that target their programs services to low income groups have lower levels of IT capacity.

In the future we would like to reverse the flow of our analysis. Rather than examining the relationship between engaging in these activities and overall IT capacity or the probability of having individual IT components we need to consider how IT tools are used to carry out these types of activities. Do IT tools help nonprofits be more effective and/or efficient in their efforts to monitor their environments participate in networks and other collaborative relationships target their programs to disadvantaged groups and local communities and give voice to the interests of clients members and other stakeholders in advocating for policies and other interests. Although our data do not permit us to address this type of question the findings we presented above begin to lay out a map of some of the basic relationships that are key to understanding the role of IT in the nonprofit setting. Issues of organizational size geographic location and field of activity must be taken into account not only by researchers studying these relationships but also by nonprofit support organizations and practitioners that seek to improve the IT capacity of nonprofits so that they can fulfill their missions more effectively.

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