Role of University in the Partnership for IT innovations of Community Development: Utilizing Universities' Assets for 'Neighborhood Information System' Development

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ABSTRACT

This paper explores the role of universities in the partnership for developing a Neighborhood Information System (NIS), which aims to help community development. NIS is a hybrid application of Geographical Information System (GIS) and web technologies that provides demographic, social and economic information to community stakeholders. Government agencies, non profit organizations, and community organizations engage in decision making process for community development and NISs are designed to help information sharing, and effective and participatory decision makings for community development stakeholders. The use of partnerships has emerged as a dominant strategy to develop an NIS. This paper studies partnership issues in Public-Nonprofit-Private Partnerships with a focus on the role of universities and illustrates potential contributions of universities in the partnership ventures. While this paper looks mainly at the role of a university in the partnership network, further research is being conducted to investigate partnership dynamics as a whole.

INTRODUCTION

Community Development typically involves multiple actors. From grassroots Community Based Organizations (CBOs), and Community Development Corporations (CDCs) to many different levels of government agencies, non governmental agencies, research

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organizations (universities), and funding foundations, multiple organizations work together, and at times compete, to achieve the goal of community growth.

Yet, in the process of decision making for community development, there is a lack of sharing of information and knowledge. This is because capacity of community organizations to process and analyze the data is limited and government agencies' ability to disseminate data in a useful manner is limited by budget and other constraints.
To bridge this gap between availability of data that government agencies hold and nonprofit's information needs, nonprofit organizations, universities, foundations and government agencies have worked together to provide Neighborhood Information Systems (NISs) over the last decade in efforts to help community organizations. There have been many cases across the U.S.

In building Neighborhood Information System (This also refers to neighborhood indicator system, community information system, and online community mapping system), universities are involved in many cases across the nation, working with government agencies and community organizations.

The purpose of this article is to explore the roles of a university engaged in IT innovation projects for community development. It aims to illustrate what universities can offer as Institutions of Higher Education (IHE) for community outreach and what they can add to IT innovations projects for the community development.

BACKGROUND

What is NIS? NIS is a Geographical Information System (GIS)[1]-enabled technology system which provides interactive mapping tools combined with a conventional database system. GIS is usually referred to desktop software, which displays spatial data. In an over-simplified version, author calls it 'visual display of database.' NIS is an economic development tool powered by modern technology such as Web, GIS, and Database system.

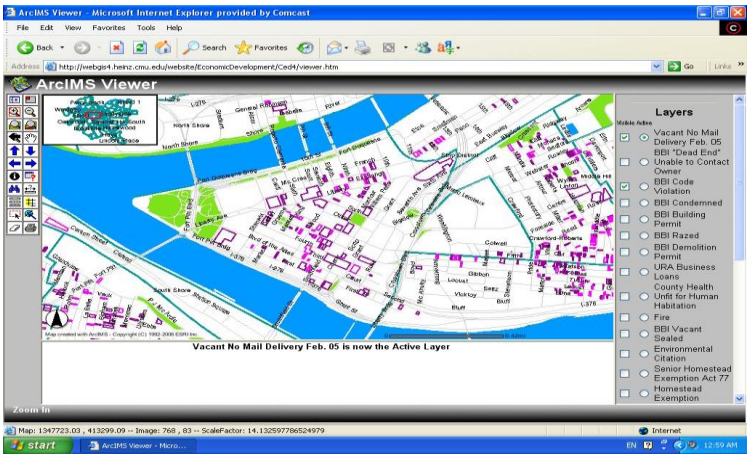

Figure 1: An Example of NIS: Pittsburgh Community Information System beta-version (http://www.ppnd.org/CIS.asp, May 2006)

The main objective of NIS is to help local organizations develop electronically-compiled, technically sound, and content-rich indicators of a neighborhood's situation, so that CDCs, CBOs and residents can better plan

[1] GIS is a collection of computer hardware, software, and geographic data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. A definition by Environmental Systems Research Institute, Inc. (ESRI) , http://www.gis.com/whatisgis/index.html (Accessed May 2006)

for the revitalization of the neighborhood. Officials, government agencies, intermediary non-profits and research institutions can help community development by performing their own functions at any or all stages from planning to research (Hoffman & Faber, 2004; Sawicki & Flynn, 1996).

Stakeholders are government agencies, nonprofits, universities and private organizations. They participate in development and use of the system. Community organizations are end users who provide feedback in building processes.

Technologies are the 'Web' and a mapping system for spatial information. The information system takes conventional and spatial databases and makes data retrieval and mapping easy on the web. This kind of information system can be found across the nation.

History of NIS

Since the early 1980's, some cities in the U.S. have developed computer-based neighborhood indicators systems. However, technology advancement, particularly web and GIS in a past decade brought a tremendous change in neighborhood indicators systems. In the early 1990s, NISs in Oakland, Boston, Providence and Denver began distributing neighborhood socio-economic information to community-based groups.
Ghose and Huxhold (2002) argue that GIS-based neighborhood indicators studies can assist in bridging the crucial data gap to the benefit of citizens and planners alike.

Ease of visualizing and analyzing neighborhood-based spatial data makes GIS especially useful. GIS enables storage, analysis, and mapping of geographic data

such as demographic, housing, land-use, police, or environment data in a multiple scale. Stakeholders in community development are now realizing the need for collaborative efforts to create a Neighborhood Information System (NIS) (Rina Ghose & Elwood, 2003; R. Ghose & Huxhold, 2002).

There have recently been many successful cases across the nation. The most evident ones are National Neighborhood Indicator Partnership (NNIP)[2] cases (See Figure 2 –a map of NIS sites across the U.S.). The Urban Institute launched an NNIP project in 1996, and so far, 22 cities have partnered as members (Table 1-List of NNIP Partners).[3] NNIP is a multi-year initiative to develop a system which can measure changing social, physical, and economic conditions of neighborhoods in cities throughout the United States (See Table 2: Types of Spatial Data Most Useful to Community Organizations, (R. Ghose, 2003)). One of the principles underlying the NNIP project is that indicators must be capable of serving as a base for citizen action and public policymaking (Sawicki & Flynn, 1996). Success of these project illustrates that NIS should be designed to increase information sharing between government and the public. Some others are partnered with

[2] The National Neighborhood Indicators Partnership (NNIP) is a collaborative effort by the Urban Institute and local partners to further the development and use of neighborhood-level information systems in local policymaking and community building.
http://www.urban.org/nnip/about.html (Accessed November 2005)
NNIP Concept: In recent years all NNIP partners have built advanced information systems with integrated and recurrently updated information on neighborhood conditions in their cities. The creation of this capacity, which did not exist in any U.S. city a decade ago, represents an important technical and institutional breakthrough
http://www.urban.org/nnip/concept.html (Accessed November 2005)

[3] Partner list of NNIP at Urban Institute web site
http://www.urban.org/nnip/partners.html (Accessed November 2005)

National Infrastructure for Community Statistics (NICS), a project of the Urban Markets Initiative of the Brookings Institution.[4] A few other neighborhood information cases have been developed across the nation as well in a similar framework. All of them can be examples for an IT innovation for local community and governance. This represents most of NIS population.

Figure 2: A Map of NIS sites in the U.S.

Table 1: List of NNIP Partners Organizations

Atlanta	Chattanooga	Hartford	Miami	Oakland	Seattle
Baltimore	Cleveland	Indianapolis	Milwaukee	Philadelphia	Washington
Boston	Denver	Los Angeles	Nashville	Providence	
Camden	Des Moines	Louisville	New Orleans	Sacramento	

In many cases, universities have been key actors in a partnership for NISs development. As an example, the University Center for Social and Urban Research (UCSUR)

[4] NICS, Urban Markets Initiative, Brookings http://www.brookings.edu/metro/umi.htm (Accessed December 2005)

at University of Pittsburgh is establishing a community database website (Pittsburgh Community Information System) for information on Pittsburgh neighborhoods.[5] UCSUR is working together with a number of partners in the region to develop an 'Information Warehouse[6]'. Partner organizations include Pittsburgh Partnership for Neighborhood Development (PPND), the Carnegie Mellon University Center for Economic Development (CMU-CED), Community Technical Assistance Center (CTAC), 3 Rivers Connect (3RC) and Maya Design.[7] These are research institutions, intermediary non profit and for profit organizations coming from different sectors.

UCSUR has a longstanding presence in developing a neighborhood information system. For the previous two decades, UCSUR was able to put census data and other neighborhood indicators into the database system (See Appendix 4 –screenshots of old neighborhood information system in 1970 and 1980's and screenshots of today's GIS-enabled NIS). However, technology advancements in the past decade, specifically in the area of the Geographical Information System and Web applications, have enabled NISs to work on different levels.

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[5] Project Marketing Website of UCSUR http://infopitt.ucsur.pitt.edu/ (Accessed October 2005)

[6] Where computer hardware such as computers and servers are physically located and store large data sets: This usually connects with others through networking.

[7] Pittsburgh Partnership for Neighborhood Development website http://www.ppnd.org Carnegie Mellon Center for Economic Development website http://www.smartpolicy.org/history.shtml Community Technical Assistance Center website http://www.ctaconline.org Maya Design Company website http://www.maya.com/web/who/who.mtml 3 Rivers Connect website http://www.3rc.org (All accessed October 2005)

Today, by examining an easy visualization and analyzing neighborhood-based spatial data, organizations dedicated to community development are able to more efficiently and effectively engage in the dialogue of community development. This makes GIS a very useful tool to neighborhood planners, community groups, and professionals.

Table 2: Types of Data Most Useful to Community Organizations (Ghose 2003)

Neighborhood Issue	*Spatial Data*
Housing	Ownership Zoning, Land use, Assessed land/structure value Tax exemption status of land/structure Structural information on buildings Year of change of assessment code Property transfer information Tax delinquency status Building code violations Raze status, Vacant lots, Boarded-up homes
Economic Development	Employment opportunities List of neighborhood businesses Membership in business associations Small business lending data Job training programs, Youth leadership
Crime	Incidents listed by dates, locations, types Parole data
Health/Environment	Health statistics, Lead contamination data Hazardous material storage sites
Property Investment	Private mortgage data, Public lending data
School Data	Public school data
Client Data	Contact data about members, participants Date of participation, Participation activities

Context- Why partnership?

Many models of IT development including e-government, Public Management Information System (PMIS), Knowledge Management System (KMS) stress the need for Public-Private Partnership. Rising demand from public and declining budgets are classic driver for PPP. Unlike other areas of public administration, governments cannot be self-sufficient in their adoption and use of electronic technologies and, of necessity, they have developed a variety of partnerships with the private sector (HDR, 2005; Holden & Fletcher, 2005; International Trade Centre UNCTAD/WTO., 2003; Roy, 2003; Sedjari, 2004; Snellen, 2002).

CBOs have shown increasing interest in working with GIS in order to address issues of concern in their neighborhood (Craig & Elwood, 1998; Rhina Ghose, 2001; R. Ghose, 2003; R. Ghose & Huxhold, 2001; Nunn, 1999; Ramasubramanian, 1999). However; many of them are small size organizations with limited resources. According to Green and Haines[8], most (65%) local development corporations (LDCs) indicate they are nonprofit, nontaxable organizations (501c3, c4, and c6). Most LDCs are relatively small, with a median budget of about $150,000. The average LDC has one full-time equivalent paid professional and a half-time paid support staff position. A recent survey and report[9] from 'Seedco' also confirms this. Almost half to two-thirds of respondent groups do not have a staff member or department specifically devoted to

[8] Green & Haines, Asset Building and Community Development 2002 Sage Publication p.69

[9] Seedco, 2002. 'The Evolving Role of Information Technology in Community Development Organizations' New York: Structured Employment Economic Development Corporation www.seedco.org , March, 2002 p. 41.

Information Technology. This report also shows that more than half of CDC's and CBOs are small size organizations, consisting of less than ten full-time employees (Seedco, 2002). In the larger group, most nonprofit organizations themselves are quite small. In 2003, it is 42% of the nonprofits that reported to the IRS on Forms 990[10] had annual expenses less than $100,000 according to the National Center for Charitable Statistics at the Urban Institute. It is 47.5% for January 2006.[11] Most community organizations usually don't have resources to collect and analyze neighborhood data they need, although they acknowledge the benefit of GIS.

Therefore, a collaborative effort is a must in developing community information systems, due to the lack of resources that CDCs' have today.[12] . Multiple organizations work together to pull the resources like funding, data, and technology together (Table 3: Stakeholder in NIS development, Figure 3: A Graphic Display of a Partnership Network). Then, here is where universities play an important role, along with local nonprofits.

[10] They are required to report if they have gross revenues of $25,000 or more. (www.nccs.urban.org, accessed March 2006)

[11] However, these organizations in the aggregate accounted for 0.4% of the total gross revenue of the sector.

[12] Seedco, March 2002: one CDC director says, 'We know the power of GIS… but to be practical, GIS is a sophisticated software tool that needs a certain expertise to use and maintain. It is also expensive. I don't think it's cost-effective for a CDC of our size to invest in GIS software.' … past experience suggests that they should partner with universities or city planning departments. Results from the survey confirm the values of these partnerships: there is a significant correlation (r=.14>.002) between use of GIS by organizations in the sample and a technical assistance relationship with a university.

Table 3: Stakeholders in NIS Development

Sector	***stakeholder***	***Competence***	***Challenges***
Public	Local government	Data collection (ownership)	Poor access and thus perceived trust issue
Non Profit	Local Intermediaries Foundations	Quick turnaround, local network and knowledge, funding	Not a IT powerhouse
	CBOs/CDCs	Unique local knowledge and data Local presence and relationships with residents	Limited IT (GIS), data collecting, analysis resources Small geographic focus
	Universities and research institutions	Access to profs. And grad students GIS and IT infrastructure Local data collection and analysis	Is it part of university-wide vision? Perceived relationship with community
Private	IT (GIS) provider	Efficient development of technology project, technology	Cost Trust issue among collaborators Difficult to do long term commitment

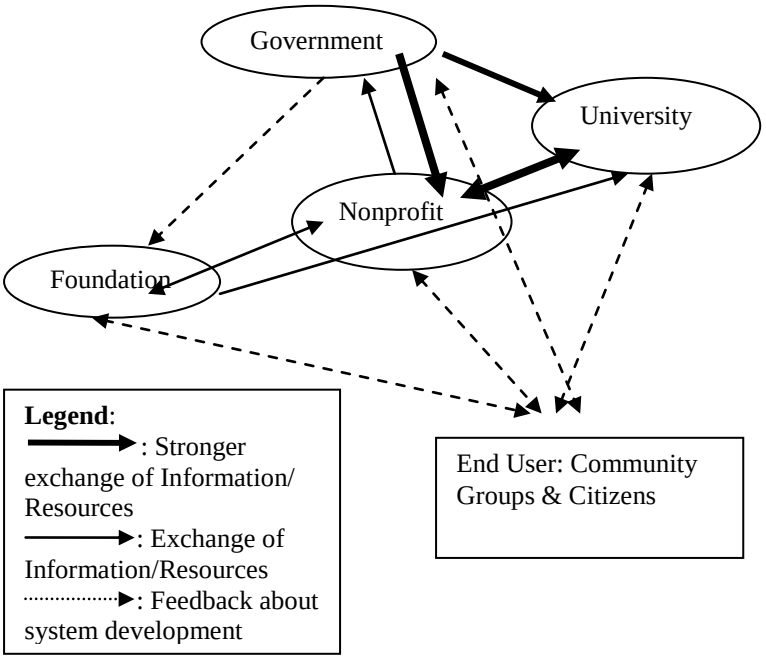

Figure 3: A Graphical Display of a Partnership Network for NIS Development

Resource sharing in the Network

Flow of resources is drawn above. Data, technology and funding are essential elements for the project. Government agencies mostly are data owners. Sometimes universities and nonprofits collect data as well. Mostly universities provide technical expertise with private industry organizations. Foundations and governments usually fund the project.

Defining Partnership

In building NIS, there are three components in the partnership networks drawing from partnership literature.

First, there is 'Public-Private Partnership', in which governments work with private or nonprofit organizations, particularly in sharing data in NIS development efforts. Public-Private partnership may be defined as an arrangement of roles and relationships in which two or more public and private entities coordinate/combine complementary resources to achieve their separate objectives through join pursuit of one or more common objectives (Vigoda-Gadot, 2003). This public-nonprofit partnership is most prevalent in NIS sites across the nation.

Second, there is 'University-Community Partnership', for instance, institutional efforts such as Community Outreach Partnership Programs to engage with the community. University community partnership also refers to Institutions of Higher Education (IHE) – community partnerships. University-Community Partnerships involve communities and higher educational institutions as partners, and may address such areas as health care delivery, community service, and community/economic development. Rubin (1998) illustrates the importance of contributions that universities can make to community building. Cox (2000) suggests a basis for a framework to understand university-community partnerships, asking key concepts questions regarding activities, parties and interests of participants. Universities are engaged in most NIS cases across the nation as partners, although this is perhaps not as imperative as the public-nonprofit partnership described above.

Third, there is 'Strategic Alliance' among non profits. A Strategic Alliance is a partnership between two or more organizations to pursue a set of agreed upon goals while remaining independent organizations. Strategic alliances come in all shapes and sizes, and include a wide range of cooperation, from contractual to equity forms.

Gulati (1999) states that a strategic alliance is commonly defined as any voluntarily initiated cooperative agreement between firms that involves exchange, sharing, or co-development, and it can include contributions by partners of capital, technology, or firm-specific assets. This is visible but less essential or widespread than the two mentioned above in NIS developments.

Partnership is a must to develop a Neighborhood Information System due to the complicated nature of data collection and the scarcity of resources for technology building.

Research Methods

In addition to a literature review, this study used stakeholder analysis and qualitative analysis such as semi-structured interviews and participant observation. As this was a pilot study with a single case for a forthcoming larger study, it lacks the rigorous aspects of social science research. Yet, this paper brings out certain key highlights and implications as an explorative study.

According to Yin (2003a; , 2003b), case study can be a very appropriate method for an exploratory investigation. He points out that 'generalization of case study results is made to theory not to populations.' Case study is not a sampling research but selecting cases must be done carefully to maximize the learning. This case study serves as an exploratory, pilot study as a prelude to an upcoming larger partnership research. This research attempts to follow Yin's triangulation guideline to increase validity by using multiple sources of evidence.

As a multiple sources of evidence, different types of data are collected: archives of documents, interviews and

participant observation. The rational for choosing qualitative methods for the pilot study is their strength in making us pay attentions to processes. This often enables researchers to hear of stories behind and get more information from inside at times. Based on this pilot study, a larger study, using both of multiple case study method and quantitative method (statistical analyses), is being conducted.

The issue of generalization is regularly debated regarding the method of case study. Case study is often criticized on account that the findings are not robust enough for generalization. Yin refutes the criticism by distinguishing analytic generalization from statistical generalization, and claims that the logic of inquiry used in case study is analytic generalization, not statistical generalization (Yin, 2003b, pp. 32-33).

Grounded theory, 'a general methodology for developing theory that is grounded in data systematically gathered and analyze,' is utilized particularly for its strategy of systematic coding (Denzin & Lincoln, 1994, pp. 204-205) As using semi-structured interviews, the author has tried to keep the balance having neither too open nor too leading questions for the interviews (Kvale, 1996, pp. 133-135).

Regarding interviewees, the author has included an expert on the field, who has served a national headquarter of similar projects. There were three project managers of information systems development from three cities in the northeastern US. Two were affiliated with universities and one with a nonprofit organization. Then I have added a couple of community organization members in Pittsburgh, PA in an effort to increase the reliability of data as well as to bring multiple perspectives.

This paper explores the question of the 'role of universities' in the NIS development partnerships. The proposition of this paper is that Universities can act as contributing partners with their assets for the IT innovation projects of the community development.

Assets of University

Human Resources: Universities have professors and graduate students with expertise available for system development and training of user groups.

Technology & Technical Assistance: Universities have GIS and other IT infrastructures such as servers, and computers.

Data: Often research centers in universities have collections of national (Census) data, local data, and analyses of those data.

Existing relationships with the community (e.g. COPC): A trusting relationship does not develop overnight but some universities have established successful community outreach increasingly through service learning and community development assistance

Roles Universities Play

Universities engage in a partnership with community organizations, addressing community development issues such as housing, economic development, and workforce development. It is believed that technology can contribute to these efforts in significant ways. In 25 out of 26 (22 NNIP's) NIS sites, universities engaged as a partner. In 6 out of 26 cases, universities acted

as a leading organization and in 19 out of 26 cases, universities worked as data partners in a partnership. Universities engaged mostly as a technology house and community outreach partner.
In many IT innovation cases, private industry acts as a technology partner. There are examples of business sector organization involvement as technology houses even in NIS development cases. However, those were minimal compared to other conventional IT outsourcing or system implementation. Many of them are university spin-offs in NIS cases. As Gray (1985) puts it in her three conditions facilitating collaboration, 'coincidence in values among stakeholders' is stronger between university and public organizations.

Cultures of universities and their visions that are engaged in community outreach are very close to the public compared to private business organizations. With relevant sets of technology competence, universities have emerged as a new technology powerhouse partner in IT innovation projects with the public sector. This perhaps suggests a new model for Public Private Partnership for IT innovations. [13]

[13] In a report by CED, 'PPPs are a source of energy and vitality for America's urban communities. Over the years, the public sector in the United States has taken increasing responsibility for addressing the needs of the nation's urban areas.' 'PPP means cooperation among individuals and organizations in the public and private sectors for mutual benefit. The purpose of PPP is to link policy dimension-goals of community and operational dimension-in which those goals are pursued in such a way that the participants contribute to the benefit of the broader community while promoting their own individual or organizational interests. (Committee for Economic Development, 1982)

Table 4: Types of Roles Universities Play

Type	Cases	Note
University as a leading organization	6 NIS sites: Atlanta, Cleveland, Indianapolis, Los Angeles, Philadelphia, Minneapolis (NonNNIP)	Champion of the project, multiple roles
As a key data partner	19 NIS sites: Baltimore, Boston, Camden, Chattanooga, Denver, Des Moines, Hartford, Louisville, Miami, Milwaukee, Nashville, New Orleans, Oakland, Providence, Sacramento, Washington, New York (Pratt Institute-NonNNIP), Chicago (Center for Neighborhood Technology-NonNNIP) Pittsburgh (NonNNIP)	As a Data Warehouse /Collect, update, manage and storage of data As a Technology consultant As a Training center
No involvement	1 NIS site: Seattle	Government-led

Universities generally play the following roles in implementing technology applications to help community development goals. These roles are not always exclusive to universities.

Also, these roles are not mutually exclusive. At times, a university may play multiple roles on a different stage of development.

Consultant: Universities may serve as consultants to community organizations and organizations in the partnership, providing technology expertise or other conventional community development tools such as research and analysis.

Technology House: In many cases, an NIS takes the form of online mapping systems delivered via the Web. Taking advantage of technological advancement, universities can eliminate full-time technical (GIS) staff and lower the cost of system

development and maintenance by centralizing the data, application and associated technical support on campus where these resources are already existing or easy to add. Universities also can be data ware houses, hosting servers.

Community Outreach/ Training Center: Universities can serve as a training center, utilizing existing relationships with community organizations. In Pittsburgh and other cases, the Community Outreach Partnership Center (COPC) program funded by HUD has provided opportunities to enhance the relationship between the university and community.

Catalyst/Coordinator: Universities can sometimes initiate and bring multiple stakeholders to the table to develop a NIS to help community development goals. This is perhaps the most difficult role to manage.

Stages of NIS Development and University's Engagement

Start up (pre-development) Stage: Universities participate in consensus building, contributing with studies about system building. Universities can talk of building an NIS in existing meetings with community groups and deliver feedback to the NIS partners.

Growth (Development) Stage: Universities participate in implementing interface/server/database. Working with other data providers and technology partners, universities can utilize their technology infrastructure.

Mature (Maintaining/sustaining) Stage: Universities can provide training to users (particularly

community organization staff and group members), and maintenance of database system.

Key Issues of Partnership

Although issues of partnership are critical to discuss in detail and a study is being conducted, key issues of overall partnership are illustrated briefly here to see the bigger picture in which a university is engaged.

Community support-consensus building is imperative.

It is important to develop a trusting relationship through common interest and clear agendas. A clear understanding among stakeholders of the respective goals and agendas of the other participants is essential.

Personal dynamics among key members of partnership organizations play a big part in partnership.

Collaborative work and spirit is required. Data sharing agreements and funding sharing are binding forces that can drive partnership.

'Coincidence in values' among stakeholders such as believing in community assistance and public value is important, when different organizations from different sectors/cultures come to the table.

Degree of ongoing interdependence with complementary resources among partner organizations is a factor.

Strategic Incrementalism: starting small but solid with a small focus of information system will have a successful implementation.

Conclusion

Proposition of 'Universities can act as contributing partners with their assets for the IT innovation projects of the community development' is supported by the findings. Multiple informants and documents confirm that universities can offer much to the community information system building.

In summary, a university's catalytic involvement, with relevant technical expertise, helps partnership. Universities can be seen by partners and communities as organizations pursuing public values with a clear agenda of research and community engagement (not private interest) if there is any existing relationship (COPC or other community engagement activities) with the communities.

Having a wealth of assets, universities should have the ability to engage in IT innovation projects for the communities. Universities can and should utilize its service-learning programs and courses in pursuit of this goal. Training has been identified as one of the most important variables in IT utilization, and universities can utilize their computer infrastructure and human resources to offer training. Service learning can then bring the benefit of educational attainment through the engagement of students in these projects.

This paper came from a pilot study for a research, 'Public-Private-Nonprofit Partnership for NIS development'. This particular paper only discusses the role of universities. As it is vital to investigate the whole picture of partnership dynamics in the network empirically, research of partnership dynamics as a whole in an NIS development network is presently being conducted.

Limitations and Further Research

Although the perspective that universities are seen as technology house does not vary across the informants, there was a slight variation in trusting universities as community partners. It seems that training can be one of many factors associated with this. All in all, this should be further examined in detail in a next study.

Shulman (2005, pp. 10-11) claims that multiple coders and multiple rounds of coding would enhance inter-rater reliability of observations. Unfortunately, however, due to the limitations of budget, the author could not succeed in employing additional coders for the qualitative analysis part.

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