Innovation Diffusion and Broadband Deployment in East St. Louis, Illinois, USA

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Abstract. The US Broadband Technology Opportunity Program (BTOP) is designed to stimulate the economy with broadband access and adoption through a comprehensive community infrastructure design, especially targeting underserved areas such as East St. Louis, Illinois (ESL). The assumption has been that ICT usage in ESL is limited and not well understood, and that other less disadvantaged communities, like Champaign-Urbana (C-U), are more readily able to adopt ICT. However, parallel BTOP application processes revealed that both communities faced similar challenges. Everett Rogers' Diffusion Of Innovation theory emerged as a framework to describe differences, and ultimately to design a program of widespread adoption for ESL. One key finding is that both C-U and ESL have innovators; the difference is that ESL innovators often go unnoticed and their appropriation of technology does not effectively transfer to the community. Strategies previously employed in ESL targeted outreach and training of the late majority without development of early adopters and early majority. However, diffusion is an ongoing process that requires diffusion from innovators to early adopters to early majority, and so on. The difference between C-U and ESL is not the size of the late majority, but the presence of early adopters to enable ongoing transfer of emerging technologies. Accordingly, the ESL BTOP proposal stressed empowering existing local innovators; developing early adopters by providing the necessary infrastructure to access and appropriate emerging technologies, and cultivating an Internet culture to build an early majority and enable sustained technology transfer to the late majority through a multi-tiered approach of training and outreach.

Keywords: early adopters, late majority, underserved, diffusion of innovation theory

Background

The American Recovery and Reinvestment Act (U.S. Government, 2009) set aside $4.7 billion USD to establish the Broadband Technology Opportunities Program (BTOP) to advance President Obama's national broadband strategy. This newly created program is designed to promote five core purposes:

- To provide **access** to broadband service to consumers residing in unserved areas of the country;
- To provide **improved access** to broadband service to consumers residing in underserved areas of the country;
- To provide broadband education, awareness, training, access, equipment, and support to: (1) schools, libraries, medical and healthcare providers, community colleges and other institutions of higher learning, and other community support organizations; (2) organizations and agencies that provide outreach, access, equipment, and support services to facilitate greater use of broadband services by vulnerable populations (e.g., low-income, unemployed, aged); or (3) job-creating strategic facilities located in state- or federally-designated economic development zones;
- To improve access to, and use of, broadband service by **public safety** agencies; and

- To stimulate the demand for broadband, **economic growth**, and **job creation** (NTIA, 2010).

Metro East St. Louis (pop. 70,000, including the cities of Centreville, Madison and Venice and the villages of Alorton, Brooklyn, Cahokia and Washington Park) represents the most economically disadvantaged area in the state of Illinois, USA. Created as industrial suburbs and located across the Mississippi River and state lines from St. Louis, Missouri to avoid risk of annexation, the governments in these communities developed lax zoning and tax policies that assured maximum profits for the industries they were formed to serve (Theising, 2003). Once known as an All American City (Look Magazine, 1960; Wikipedia, 2010), East St. Louis has become "the most distressed small city in America" (Kozol, 1991; Reardon, 2003) following the departure of all major anchor industries. The population of East St. Louis alone plummeted from nearly 83,000 (~ 50% Black) in the 50s to less than 30,000 (98% Black) in 2008 (U.S. Census Bureau, 2010). The number of businesses went from 1,527 (mainly large industrial) in 1967 (Reardon, 2003) to 202 (mainly small) in 2008. Median household income is $21,324 USD (compared to $46,590 for the state of Illinois); and has been declining in both real and inflationary dollars. 35% of the population is in poverty (compared to 10.7% for Illinois), including over half of all children. Unemployment is over 20%, by some estimates as high as 50%. One third of the population over 25 does not have a high school diploma or equivalency (compared to 19% for Illinois). Neighboring cities and villages share similar devastation, some with nearly 50% poverty, median income as low as $16,630 USD, and over 40% of the population without a high school education (U.S. Census Bureau, 2010).

Broadband access is scattered throughout pockets in the region. Both DSL and Cable are available in many neighborhoods, although some villages like Brooklyn and much of Venice and Madison still have no broadband access available. Schools and libraries often still depend on phone-based T1 lines that provide full-duplex, synchronous data transfer at 1.5 Mb/s. Even this service is only affordable because of significant government subsidies of up to 90% of costs. In a recent random survey of households in the Metro East region undertaken as part of the BTOP application process, it was found that while 54% of households have a computer at home, only 35% of households with computers have broadband Internet access. Of those without broadband Internet access, 85% say it's because the cost is too high. Almost half (49%) of households have at least one member who goes outside the home to use the Internet, with the most popular places being the Library (53%), a friend/neighbor/relative's home (48%), school (41%), and workplace (31%; Bievenue and Wolske, unpublished). By BTOP definitions, this is an underserved community with unserved neighborhoods.

It was for this reason that efforts were directed at creating a set of proposals seeking BTOP funding within each of the three program tracks: comprehensive community broadband infrastructure development; public computing center development; and sustainable broadband adoption programs. These grant funds would allow the author's decade-long work addressing the Metro East digital divide to scale by one and even two orders of magnitude along multiple fronts of education, community health, public safety, and economic development using partnerships that span a quarter century or more.

Tales of the Unexpected

The digital divide, that is, lack of access to and effective use of necessary information and communications technology (ICT) has been demonstrated to negatively impact the ability for communities to fully achieve educational and economic development goals (NTIA, 1999, 2000a, b, 2002). For the past 20 years the authors have been involved in various efforts to narrow the digital divide in two communities in the United States: the Metro East area described above, and Champaign-Urbana. Champaign-Urbana is a small urban community that is home to the University of Illinois. Overall the Champaign-Urbana community has significantly higher levels of education and income, and benefits from a more stable economy and one third the unemployment rate when compared to the Metro East region. But like many urban areas, Champaign-Urbana has several marginalized neighborhoods throughout the

community. The digital divide in Champaign-Urbana is evident primarily in quality of participation, and is a divide within the region that falls mainly along socio-economic divisions. That is, although there is a significant minority who lags behind in quality ICT participation, there is a significant majority of the Champaign-Urbana population who does have high quality access and exhibits high quality participation. The digital divide in the Metro East region, however, is evident in both access and quality of participation, and the divide is between the entire region and the rest of the world. That is, although there are isolated cases of high-level applications of technology and innovation, there are no sub-communities of high quality access nor participation in the entire Metro East region.

In the efforts to bridge the digital divide in Champaign-Urbana and in the Metro East region, considerable effort was expended to enable the disadvantaged communities and populations by installing better ICTs than had been available, and training interested individuals and groups to use those ICTs. While each of the individual efforts was quite successful regardless of location, we noted that the efforts in Champaign-Urbana have enjoyed long-term success and continuity. We have attributed the difference in length and degree of success to disparities in levels of education, economic conditions, and a sense of fatalism inherent in impoverished communities such as East St. Louis. However, while developing the BTOP proposal mentioned above we began to suspect there may be other factors at play. At the same time the authors were deeply engaged in developing the BTOP grant proposals for the Metro East region, they were also tangentially involved in the development of BTOP grant proposals for underserved neighborhoods in the Champaign-Urbana community. This provided a unique opportunity to observe some of the similarities and differences that exist between these two communities.

Based on these differences, the authors expected a higher level of participation and support for development of the BTOP proposals in Champaign-Urbana. It was expected it to be easier and more straightforward to obtain support (measured in terms of political, ideological or financial support, available community resources, and letters of commitment) from government and community organizations in Champaign-Urbana. Further, one might expect greater human capital and more help with idea development, proposal writing, and budget development. However, it was [unexpectedly] equally troublesome in both locations to formulate the vision, garner political support, obtain matching funds, write the proposal, and finally deliver a proposal with all the accompanying requirements to the NTIA. The specific circumstances were of course different, but the outcomes, and even underlying causes, were often the same. For example, consider the development of, and consensus on, vision and goals. In Champaign-Urbana, where human capital and community leaders have discretionary time, many individuals came forward to support the proposals and to offer ideas. In the Metro East region, where human capital and community leaders are often overburdened meeting primary and secondary human needs and in many cases are bi-vocational, holding a full time job to provide family income and then serving full time as mayor or pastor or other community leader as a volunteer, few individuals came forward. In the process of defining and agreeing on a vision it became apparent, however, that only a few individuals in each community were able to contribute in significant ways. In both regions it was the people who were both innovators and community leaders who were able to formulate a vision both appropriate in scope and based in the realities of the community. Another expectation was that organizational support and matching funds would be easier to obtain in Champaign-Urbana. Being a university town with a population of more than 100,000, Champaign-Urbana is laden with public and non-profit agencies. There was an expectation that administrators in these agencies would require little or no convincing regarding connection to a public high-speed network. However, in some cases administrators could not readily see relevant applications for their organization, and in other cases administrators were wary of the "gift horse." Even one of the city governments, that had *already* budgeted funds for a fiber-optic installation, weathered political and media debates over whether this plan (which would deliver a considerably faster and more extensive network for less money) was "too high-end" (Wade, 2010). At the same time, where one might anticipate traditionalist thinking in the

Metro East region, there are administrators who are predisposed to be innovators or early adopters but who are forced to be more conservative only because of financial limitations. In the end, it was necessary to overcome similar attitudinal organizational barriers in both communities.

Theoretical Framework

As a result of these revelations of similarities between the two communities, the authors began to formulate how best to direct the Metro East broadband project design in order to maximize long-term development and build an infrastructure as a "game-changer" that the community is so desperately seeking. While reviewing papers on Internet adoption, a paper proposing the use of Rogers' Diffusion of Innovation theory as a theoretical framework for telecentre research came to light (Romans, 2004). Rogers' theory encompasses a number of aspects of diffusion, including the categorization and characterization of levels of innovativeness of adopters; the decision processes that lead to adoption or non-adoption; and the characteristics of an innovation that contribute to its adoptability or lack thereof. In seeking a theoretical lens for telecentre research, Romans especially focuses on the perceived attributes of innovations that contribute to its adoption. In developing the grant, this became a valuable insight that led to the inclusion of funding requests for space renovation as well as equipment purchases for proposed public computing centers.

Another aspect of Rogers' theory, that of the categorization and characterization of levels of innovativeness of adopters, became a valuable lens for considering the many different strategies that are necessary to bridge the digital divide sustainably in a place like the Metro East, where the entire region has been marginalized. First proposed by Everett Rogers in his text *Diffusion of Innovation*, now in its 5th edition (2003), the theory divides a standard bell shaped curve into five categories of adopters: the innovators, the early adopters, the early majority, the late majority, and the laggards (see Figure 1).
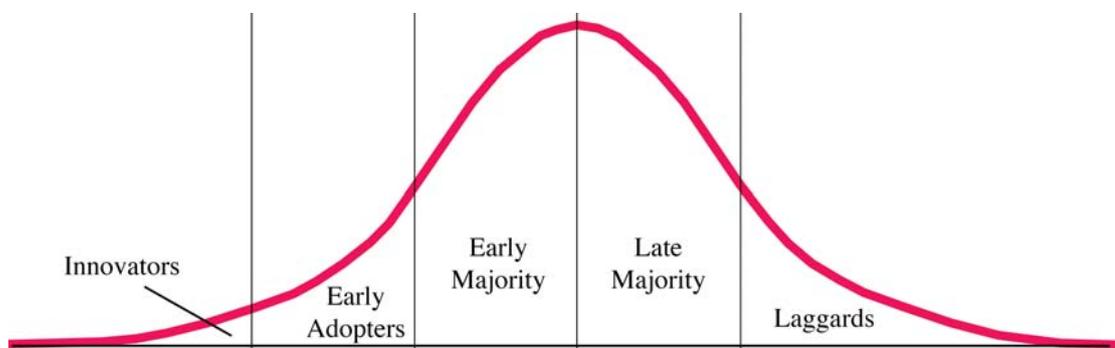

Figure 1. Rogers' Diffusion of Innovation Curve

Innovators are educated, receive information from multiple sources, are risk tolerant, and in general appreciate technology for its own sake. The early adopters are educated community leaders who are able to use high-risk, high-return projects to achieve major breakthroughs for their social group by appropriating and adapting innovations to meet the needs of their community. The early majority is more deliberate in their implementations and are able to harness their many informal social contacts to widely impact change throughout their social group by developing a sustainable implementation. The late majority typically represent a more traditional, and often a lower socio-economic group, that adopt change slowly and out of necessity to avoid falling behind once the price, both in real dollars and also in effort to implement, reach an acceptable level. The laggards are highly risk-averse traditionalists and are either very skeptical of the value of new innovations or simply do not have the ability to adopt the technology.

As indicated in the Diffusion of Innovation (DoI) theory, education, risk tolerance, and socio-economic status are each determinants in the ability to fully participate as innovators, early adopters and early majority within the diffusion cycle. As a result, the diffusion curve is skewed heavily to the right for innovations that require considerable disposable income (e.g., computers and broadband access) in marginalized communities. This skewed diffusion curve assumes very few innovators, early adopters and early majority, and categorizes the bulk of the community as late majority or laggards (Figure 2).
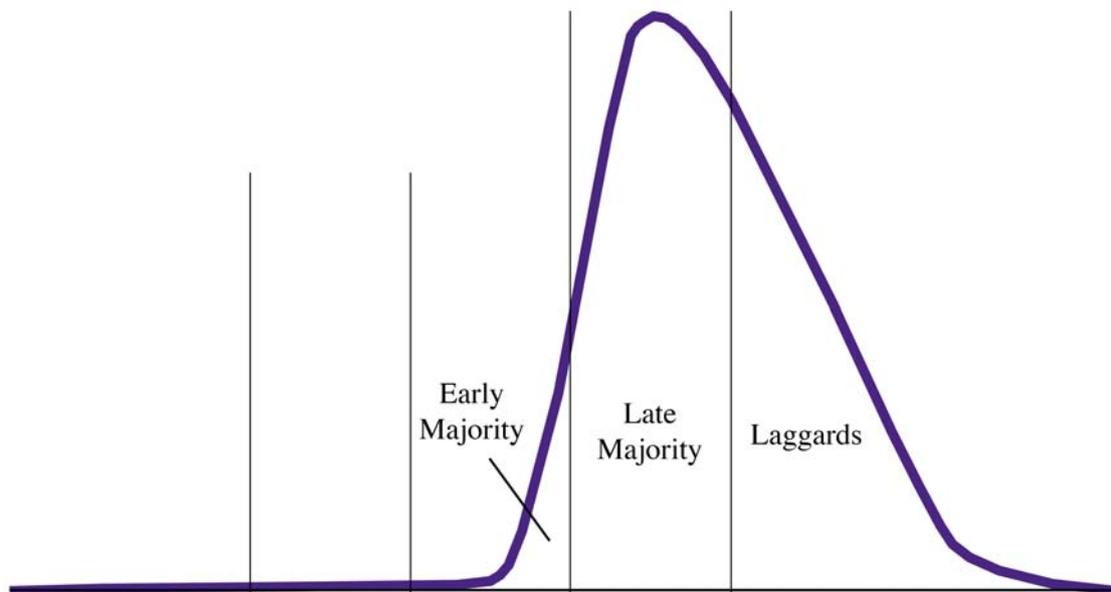

Figure 2. Suggested Diffusion of Innovation in economically depressed communities

This is not to say that no innovation happens in marginalized communities. Indeed, several examples of ICT appropriation occurring from within the Metro East region are highlighted below. But as a whole the community tends to perpetually fall within the late majority/laggards categories of the adoption curve. In reviewing past work aimed at bridging the digital divide in the Metro East community, the authors recognized that much of it had focused on those who fall on the right side of the adoption curve. Computer labs are established to provide basic computer and software access such as word processors and web browsing as a transitional step to the preferred personal computer ownership (Viseu, et. al., 2006). They are configured to emphasize individual use doing "important" work as defined by the host organization. Often the definition is restricted to job searching and applications, targeted factual research, and traditional report writing on a word processor. Density of computers and timed access also define these traditional public computing centers. However, in preparing the BTOP proposals we discovered more innovators than we first realized, and several strong innovative ICT-related projects, which indicated that perhaps the innovators depicted in a normalized bell-shaped diffusion curve were indeed present.

Where are the Early Adopters?

The subsequent realization was that perhaps the DoI curve was not merely shifted to the right but that there was a missing component in terms of early adopters and the early majority. Due to a breakdown in infrastructural and institutional continuity, innovators were relatively isolated and thus, they, who might otherwise become early adopters and early majority, are relegated to what we consider to be the late majority, as illustrated in Figure 3. Figure 4 compares this curve to Rogers' original distributed curve and the skewed curve described earlier.
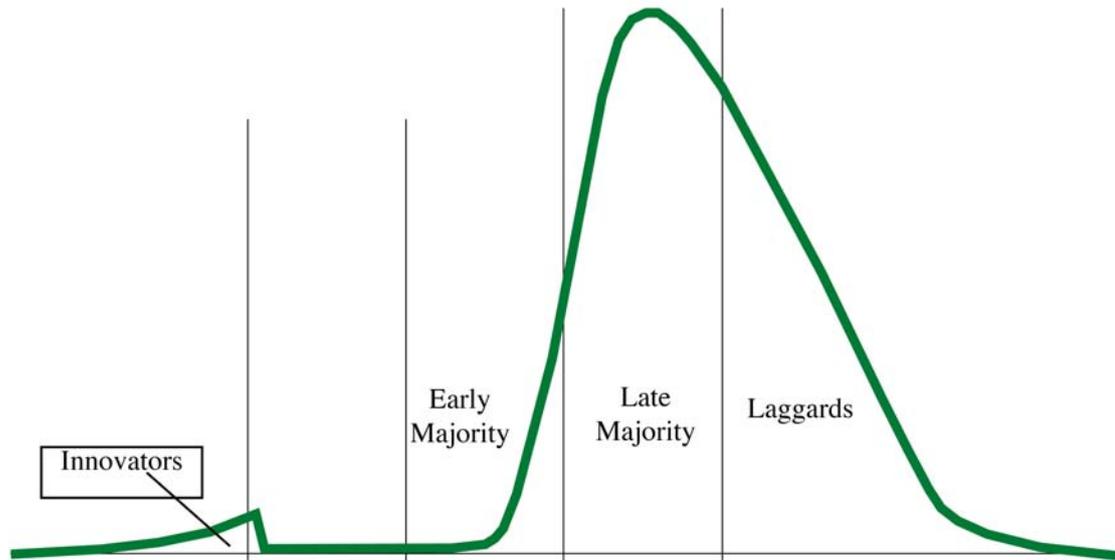
Figure 3. Possible Diffusion of Innovation in socio-economically disadvantaged communities
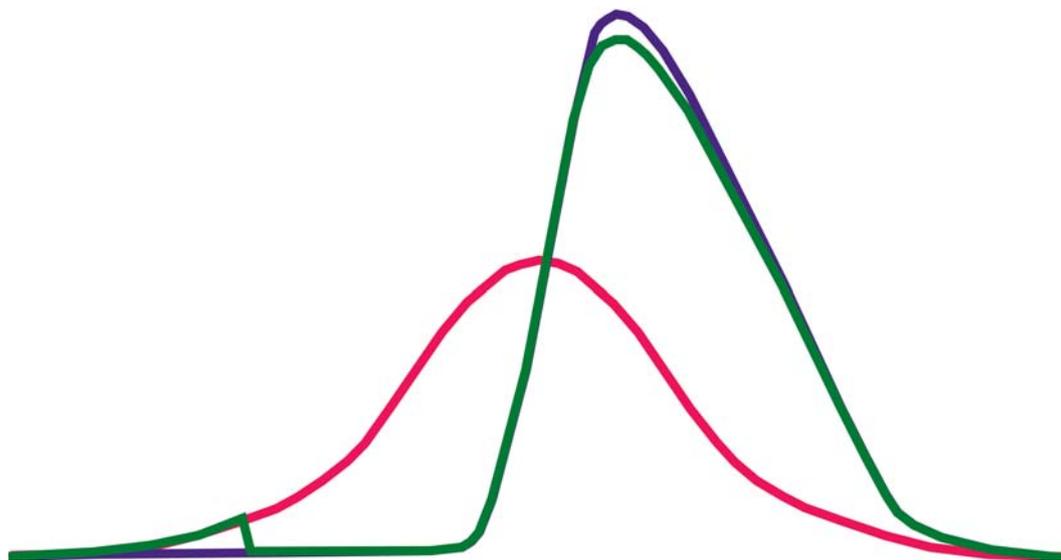

Figure 4. Diffusion of Innovation Comparison

This realization is different than Moore's concept of "Crossing the Chasm" (Moore, 2002), which is also based on Rogers' diffusion curve. Moore hypothesizes that for disruptive technologies there exists a chasm between innovators/early adopters and the rest of the adoption curve, whom he labels the mainstream. His perspective comes from marketing, and the key consideration is that marketers must recognize that they need to target these two populations differently; such marketing must first begin with the innovators and early adopters. In so doing, the successful firm can create a bandwagon effect that leads to a critical mass adopting the disruptive technology. Moore emphasizes the role external forces can play in helping to facilitate movement of the technology through the marketplace. The authors, on the other hand, hypothesize that in the Metro East region there is a lack of individuals in the community who have the resources to participate as early adopters and who can therefore shepherd a technology into the mainstream from *within* the community. This is the hypothesis the authors plan to test as an assessment component of the implementation outcomes of BTOP-funded projects.

Sustainably Bridging the Digital Divide

Efforts to bridge the digital divide in Metro East St. Louis go back to 1999, when Metro East community members formed a grassroots movement to enlist the help of non-profits and University of Illinois faculty, staff, and students. At the time, there were no free computer access points connected to the Internet, even within schools; nor was there computer training provided for students or adults. It was hypothesized that by setting up computer labs in those public places where residents most often congregated, such as libraries, schools, community centers, and churches, individuals would find a familiar place in which they could ease into the global information society. Over the last 11 years nearly 100 organizations have opened public computing centers. Train-the-trainer programs have helped build capacity within the local hosting organizations to provide direct support to their user base. A federal community-service program called AmeriCorps has been used to provide critical workers to provide technical support within schools and community organizations (Adams and Wolske, 2009).

Examples of innovative appropriation of ICT in the Metro East region

Community Concepts, founded in 1998 by actress Christina Fisher and her late husband guitarist Eddie Fisher, trains youth in videography and the how-tos of stage productions, resulting in a monthly production of the award winning talent show Star Showcase. In 2006 the teen program produced two public service announcements (Listen Up!, 2006) through a Learning Matters, Inc., grant (funded by the W.K. Kellogg Foundation). In 2007 the program partnered with the University of Illinois to take two youth to the African island nation of São Tomé and Príncípe to train teens there on computers and videography. In 2008 the program branched out through a Paul Simon Public Policy Institute grant in partnership with Southern Illinois University Carbondale to train 20 youth to build hovercrafts. In 2009 Community Concepts, along with the Barat Foundation and Our American Voice, sponsored 19 African American males who grappled with the negative attitudes and behaviors of young adults and brought their ideas before the Illinois State Senate. This program continues to find creative ways to mentor youth (a full three generations of teens now have come back to participate as volunteer mentors) to foster community engagement, improved grades, and economic development among an age group that often is lost to the streets.

Vincent Gray Academy was founded in 1980 to provide free, private education for students who live on the margins of poverty in the East St. Louis area. This community school uses self-paced problem-based learning to engage students who have struggled with and dropped out of the traditional school system. The school has worked aggressively to find methods for integrating ICT to further facilitate self-paced learning, and most recently has turned to open source software and online resources combined with grounding in inquiry pedagogy to empower students to take control of their own circumstances. Over half of these high school drop outs, many of whom are over 18 years old, go on to earn high school diplomas through this program.

In the process of completing the International Society for Technology in Education (ISTE) National Educational Technology Standards (NETS) certification, Mrs. Campbell's students at Lovejoy High School in Brooklyn, Illinois, collaborate with students from CECR-Escola Parque in Salvador, Bahia, Brazil, using the video-conferencing tool Skype, the educational collaboration tool TappedIn, and the online community Orkut. In 2009 these two classes partnered to publish the book "Facing the Future: Our Hopes and Our Fears" using the online book publishing site LuLu (2010).

These are but a few of the many innovations by Metro East residents to meet educational goals. Yet limited resources hamper even these creative activities. The programs often rely on donated equipment and software, limiting their access and full use of creativity tools. Until just recently, affordable broadband was not even available at Community Concepts, while Mrs. Campbell's class must schedule time on the single limited bandwidth T1 (1.5 Mb/s) broadband connection shared by all of the 13 grades in the school system.

The assumption regarding communities like the Metro East over the past decade is that resources for Information and Community Technology (ICT) are limited and, where available, are not well understood. Metro East St. Louis stands in stark contrast to communities such as Champaign-Urbana, home of the University of Illinois, and its abundance of ICT resources and an overall broader appreciation of its import and operations, but also limits. The Metro East community is de facto "late majority," whereas the whole of the Champaign-Urbana community follows a normalized DoI curve, perhaps even skewed to the left. Neither situation is satisfactory since the divide in Champaign-Urbana, which falls along socio-economic divisions, represents systemic discrimination within the community and the divide in the Metro East region represents wholesale exclusion of an entire community. The efforts to bridge the digital divide in the Metro East region have historically focused on providing access and essential skills training that address the needs of the late majority. Still, as the statistics reported above demonstrate, the digital divide remains a fact of life in the Metro East region as existing programs are often underfunded and depend largely on small grants, donations of equipment, and volunteer support. The efforts thus far have failed to plant a sustainable infrastructure capable of developing and supporting early adopters and an early majority.

Through work developing parallel BTOP grant proposals for Urbana-Champaign and Metro East St. Louis, and through the lens of the DoI theory, several startling concepts came to light regarding the digital divide.

ICT is a **class** of tools, not a specific item. While the digital divide refers to the gap between those with and those without access to ICT, bridging the digital divide can only focus on a subset of those tools, not the whole class. When the focus is on the current technologies that are necessary for participation in society there is no development of early adopters and early majority, simply a reaction to the needs of the late majority.

Early efforts to bridge the digital divide must of necessity emphasize basic ICT access and training. However, this only keeps a marginalized community from falling further behind in the adoption curve for those specific tools introduced into the community. It does not in and of itself lead toward a standardized distribution curve for diffusion of future innovations. Many digital divide projects, such as those in the Metro East St. Louis area, respond to the immediate needs of the late majority, without much attention on innovation or support for developing community leaders as early adopters.

The digital divide is ultimately a breakdown in diffusion of innovation. Innovation is an ongoing activity and thus diffusion is an ongoing process. Sustainably bridging the digital divide therefore requires the building of the needed infrastructures to support ongoing diffusion of innovations **from within** the community, not simply an introduction of ICT **to** the community.

Many of the factors that skew Rogers' distribution curve for diffusion of innovation are non-technical. For instance, early adopters generally have higher levels of education, have a greater ability to deal with uncertainty and risk, and have less fatalism, characteristics that are difficult to incubate and nurture in marginalized communities where poor quality school systems, high unemployment, and high crime encourage fatalism and traditionalism.

Shaping the Adoption Curve in Urbana-Champaign

Through the parallel grant development processes in Metro East St. Louis and Urbana-Champaign, and by adopting the lens of DoI theory, a new perspective was gained and the proposal development team recognized that a new approach was necessary. The team looked for answers in the successful history of Internet-based technology diffusion in Urbana-Champaign. This in turn also contributed to the shaping of the proposed scope of the project that was included in the Metro East Digital (MED) BTOP proposal.

In 1993 Ann Bishop and Greg Newby, faculty at the Graduate School of Library and Information Science, University of Illinois, joined with community members from Urbana-

Champaign to create Prairienet. Over the course of its history, this community network provided the first Internet access available to the community outside of the University; 1000 computers to households; a range of computer and Internet classes directly to residents as well as train-the-trainer classes to personnel from community organizations; web hosting for residents and community organizations along with web development support to key information providers throughout the community; and newsgroups and mailing lists to support community dialogue. In turn, these services became a baseline of entry for the local Internet Service Providers (ISPs) that began to emerge in the community. Indeed, the ISPs looked to Prairienet as their business loss-leader as it provided the greatly reduced pricing and extensive training needed to entice new users to the Internet before graduating to the services provided by the ISPs. Combined, each of these services provided a critical foundation for the residents of Urbana-Champaign to not only participate in a digital society, but also to participate as innovators and early adopters to employ ICT on behalf of their various communities.

In addition, the staff of Prairienet was active in many community-based associations to provide awareness and support for adoption of innovations to opinion leaders in the community. This in turn enabled these opinion leaders to shape the activities of their communities to take advantage of emerging digital tools. For example, Prairienet staff participated in ongoing meetings of major health care and social service providers. One outcome of that was that when the major hospitals in the area wanted to find a better way to distribute community health information, they sought out Prairienet. From this, a multi-agency collaboration of online and CD resources was created called Helpsource. Because Prairienet staff lived in the community, personal contacts with friends and neighbors also led to opportunities. One such example was Prairienet's collaboration with the League of Women Voters. Stemming from an informal conversation at a social gathering, the Prairienet connection led to a website over a decade ago that put local candidate position papers, debates and other election resources online. Other organizations including the University of Illinois' Illinois Public Media group and the community-based Independent Media Center were also engaged in similar ways, serving as change agents within the community by working with opinion leaders to help them become early adopters of technology and shepherd those technologies into the mainstream.

Harnessing BTOP to Impact Diffusion of Technology Innovations

Prairienet's history demonstrates the value of having an organization champion ICT as tools for community development. The MED BTOP project would play a similar role to bring users online; each of the three grant proposals, Comprehensive Community Infrastructure, Public Computing Centers, and Sustainable Broadband Adoption, address this aspect (see Metro East Digital Website, 2010). The infrastructure grant will provide 19.95 USD/month fiber optics or WiMAX broadband to residents, non-governmental organizations, and economically disadvantaged small businesses throughout the entire Metro East region, a significant population who currently have no affordable broadband services available. MED will partner with the public service television station to sponsor a web-based community TV station. In turn this station will be used to provide various awareness and training programs to the community in addition to hosting a wealth of community-produced, community-oriented content. Community mailing lists and social networking sites also will be sponsored. Existing computer labs will be upgraded with new equipment, and new computer labs will be created to facilitate multimedia content creation as well as information access. Households will receive discounted personal computers and Internet access through grant funding. Extensive training will be provided to residents and train-the-trainer sessions to personnel from community organizations. This includes basic computer and Internet skills, but also includes multimedia creation to support capture of oral histories and participation as citizen journalists. It will also include other advanced skills such as participatory Geographic Information Systems for citizen planners, using social media for community organizing and for business

development, etc. In other words, all the essential activities traditionally provided through digital divide efforts are included in the grant proposal.

The experiences of Prairienet also demonstrate the value of having an educational or not-for-profit organization serve as a loss-leader for emerging business by enticing new users to adopt innovative technology. Through grant funding, the initial management team will be comprised of a mix of community-based ICT businesses, social service program leaders, fine arts and technology program directors, and University researchers specializing in participatory action research and community inquiry. The management team will be charged with project and staff management to implement the above programs. Equally important is their interconnectedness with a breadth of social networks throughout the community. Through formal and informal networking, the MED team will work to provide awareness and support for adoption of innovations to opinion leaders in local businesses, governments, public safety and health services, social services, religious institutions, etc. More directly, the grant proposes to use a community health worker model (Hinton, et al., 2005; Mossberger, et al., 2008) to recruit natural helpers, people whom neighbors identify as those they turn to for help and advice, who demonstrate a basic level of computer and Internet navigation skills. These natural helpers will be equipped with a computer and broadband access, along with additional training to find, retrieve, analyze, and use health and other essential information. As opinion leaders, these natural helpers would then serve as an additional bridge, bringing innovations to their broader communities. As another example, the grant will provide funds for both lead teachers and administrators to attend International Society for Technology in Education certification training related to the National Educational Technology Standards (ISTE, 2010). By bringing forward those teachers and administrators who serve as opinion leaders within school systems, new cultures of technology adoption will be fostered throughout the school systems.

Already the process of grant development has brought together innovators active in the community, raising awareness of the many diverse activities already harnessing the tools of ICT in the Metro East region. Through such conversations, new collaborations are forming, and new mechanisms for diffusion of innovation are developing. These connections will be supported through events at public computing centers, and through blog and social networking sites. MED will also strategically serve as a home for communities of inquiry and practice to come together to share ideas and provide mutual support. Ultimately diffusion is a social process and strong social networks already exist within the community. As a community-based organization staffed primarily with community residents, MED will be well positioned to maximize sustainable adoption rates by situating innovations within existing cultural contexts, by making observable the relative advantages that come from adoption, and by providing the means for incremental trialability (Romans, 2010).

All communities are engaged in ongoing diffusion of innovation. All communities have innovators, early adopters, early majority, late majority, and laggards. Rogers' book, *Diffusion of Innovation*, is replete with examples of communities from all socio-economic levels adopting innovations. But a community that will adopt new agricultural practices, new educational practices, or even new trends in dress may not be able or willing to participate in adoption of other innovations. This is particularly true when adoption requires a significant investment of time and money. The basic presupposition for the MED BTOP proposal is that Metro East residents do have innovators, early adopters, early majority, late majority, and laggards in similar percentages for at least some types of innovations.

While the grant endeavors to take direct steps to change the shape of the adoption curve by supporting innovators and early adopters through an awareness and provisioning of emerging technologies, there are other factors that require provision of non-technical resources. For instance, a number of the mayors in the Metro East are bi-vocational, working full time to support their families, then leaving work to serve as mayor for their community. When added to family obligations and the need for personal time, it becomes very difficult for even the most committed individual to find time to serve as an early adopter on behalf of the community. When quality housing and safe neighborhoods are not available, it is difficult to

retain young innovators and early adopters in the community even if they are able to secure quality employment nearby. The MED BTOP proposal includes a number of mechanisms to provide tools to help those working towards addressing these otherwise non-technical issues. The fiber optics and WiMAX network will be used to create an extensive public safety virtual network to interconnect public safety officials and to facilitate remote monitoring tools such as linked IP-based Closed Circuit TV cameras. Two additional virtual networks will be created, one for public health service agencies, and a second to connect educational networks. MED will partner with a hotel redevelopment to create fully networked apartments, cyber lounges on various floors, a centrally located cyber café, high tech meeting rooms, and a small business incubator to support young professionals from the community, encouraging them to stay within the community. Job training will be enhanced to include technical skills such as multimedia creation, game and application development, and other skills that can be used to seek additional training and employment in living-wage positions. Small business training will focus on ways to harness social networks and multimedia within their businesses, and small business incubators will support those with innovative ideas to start broadband-based businesses. Combined, the job and business training will position residents so that they can increase their incomes, and ultimately provide a competitive advantage to further support their families.

No one program can be everything

As Michael Gurstein points out in his article on "effective use," the digital divide is about much more than equal access to ICT, but also it is about having the capacity and opportunity to effectively use ICT as a tool to meet self- or collaboratively-identified goals. The concept of effective use implies that ICT can support information retrieval and production, that ICT tools can be harnessed to be a source of wealth creation, and that they can support transactional and other processes to attain those goals. Achieving effective use requires appropriate facilities, devices, and tools, as well as content services, appropriate social and organizational infrastructures, social facilitation, and governance (Gurstein, 2003). The effective use approach has been a valuable framework for much of the past 11 years of work in Metro East St. Louis.

This paper has described the unexpected discovery of the well-established Diffusion of Innovation theory (Rogers, 2003) as a complementary lens for understanding past work to harness the tools of ICT to achieve individual and community goals. This discovery also offered a useful lens for expanded programming in a Broadband Technology Opportunity Program grant application to the U.S. National Telecommunication Infrastructure Administration. The DoI theory highlighted the importance of social and economic infrastructure that supports a normalized adoption curve within every community regardless of socioeconomic factors. Reflection of past ICT research in the Metro East region, when compared to parallel research in the Urbana-Champaign region, identified a gap in the curve specifically at the point where early adopters and early majority typically are represented. According to DoI theory, early adoption of innovations by opinion leaders is a necessary social validation for others in the community to also begin using technology, building a critical mass that leads toward sustainable, ongoing diffusion of the rapidly increasing number of innovations within the community. Thus, there is a critical need to understand how to best build a social infrastructure that provides targeted support of the innovators and early adopters.

While the test of this approach is most readily achieved through the funding of the comprehensive programs that are included in the MED BTOP proposals, we expect that even modest gains can be made through efforts to intentionally foster the early adopters within the Metro East region. This segment seems to be absent in the diffusion process within the community. Even with full funding of all parts of the BTOP proposals, certain factors hindering participation of opinion leaders as early adopters cannot be addressed through a technology-based grant. Issues of economic, social, and educational injustice that make it

difficult or impossible for individuals to participate in high risk projects with novel technologies will require a much broader approach requiring a range of societal changes beyond the marginalized community. Still, it is expected that this paper will serve as the first chapter in the next phase of work within Metro East St. Louis.

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