

**Techno-Social Infrastructure: Poverty, Inequality and Broadband Adoption in
Urban America**

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Part I - Executive Summary

Philadelphia, and cities across the United States are caught in a paradox. On one hand there has been a profound transformation in the life of cities. With the rise of new information and communication technologies and the resultant impact these tools have had on urban economies, as well as the social and political life of urban inhabitants, we see the possibility for new patterns and trends that can dramatically alter the 21st century metropolis. At the same time however, urban America has been devastated by a long-standing crisis, which is epitomized by high levels of inequality, growing poverty, historic levels of unemployment, a shrinking public sector and the social and political isolation and demobilization of the vast poor and working class living in the city. While the circumstances of the economic crisis are not new, in the wake of the Great Recession of 2008, the situation has worsened and for many, everyday life has become a struggle to survive. KEYSPOT and other urban broadband adoption programs are situated at the heart of this paradox, and thus offer important lessons for how urban communities will combat poverty and inequality through the use of technology in the decades to come.

It is important to note that this report is not an evaluation of the different projects and programs involved in KEYSPOT. The aim of this report is to offer specific, at times actionable knowledge on the intersection of poverty, technology and the digital divide. Moreover, in this report we focus on offering a broad discussion of some of the critical

themes and issues that have emerged across KEYSPOt instead of offering a more focused and specific argument as we believe this will be of the most interest and use. In the report we focus on the following themes:

- Philadelphia's *KEYSPOT Program* exists within the context of an urban crisis that has engulfed Philadelphia over the last forty years. In particular, high rates of poverty and unemployment, an underfunded public education system, and a community of poor and working people that are socially isolated and politically demobilized frames the urban experience in the twenty-first century. These characteristics are compounded by a massive digital divide in Philadelphia (approximately 41% of the population), which is entwined with other forms of social, economic and political exclusion. This fact suggests that researchers and policy makers devising approaches to the digital divide engage more concretely with the broader problems of poverty and inequality and the ways in which they intersect with broadband connectivity.
- Philadelphia's KEYSPOt Program is a meaningful response to Philadelphia's urban crisis. In particular, KEYSPOt has evolved into what we call a *techno-social infrastructure* that aims to address many of Philadelphia's social and economic problems from unemployment to truancy and social isolation. We use the term *techno-social infrastructure* to illuminate the critical interrelationship between technological systems and social relationships. The critical elements of this infrastructure are as follows:
 - Technological— The KEYSPOt program offers points of access to broadband Internet and other new technologies, as well as training programs that enable individuals to use these technologies.
 - Social— Human relationships, both online and offline, play a critical role in organizing and powering the KEYSPOt infrastructure through building trust, social networks and a flexible engaged program.
 - Material—The KEYSPOt program is based in real physical spaces—most clearly evidenced by the 77 computer centers across the city— where people come to get their basic needs met on a daily basis, while creating alternative visions for their life and community
 - Embedded—This new digital infrastructure exists within the broader infrastructure of welfare state and is thus embedded in social service practices around homelessness, healthcare provision and organizing, youth educational

programs, prisoner re-entry programs, drug rehabilitation programs and many other aspects of the urban social welfare and support system

- The KEYSPOt program exemplifies an innovative urban technological infrastructure, and yields different forms of digitally mediated capital. In this report we look at three forms of digitally mediated capital:
 - Economic— Building the tools, skill sets and networks to directly change one’s economic standing
 - Educational—Building or enhancing education skills and capacity in a broad array of settings
 - Political— Building the tools and capacity to establish relationships and knowledge in order to politically or civically engage

- While our initial analysis confirms that the outcomes of the KEYSPOt are encouraging, it is vital to mark that Philadelphia’s novel techno-social infrastructure cannot solve the urban crisis. In an attempt to find a simple and cost efficient answer to an exceedingly complex problem of urban America, many pin their hopes on broadband connectivity and new innovative programs like KEYSPOt. Through our initial analysis, we contend that Keyspots is a critical component of a novel Philadelphia, helping forge new spaces and practices that speak to the problems of poverty, un/underemployment, truancy and social isolation. However, this infrastructure alone cannot replace –or substitute for –a robust welfare state infrastructure.

Part II—KEYSPOT and the Freedom Rings Partnership

We recognized in BTOP a real opportunity to put a plan for the digitally connected Philadelphia we were discussing into effect.

- Bryan Mercer, Media Mobilizing Project

A. Introduction

In the fall of 2010, a broad consortium of organizations across Philadelphia joined forces to form the Freedom Rings Partnership (FRP) with the goal of developing programming and infrastructure to combat the digital divide and build a digitally connected city. These programs were made possible by two Broadband Technology Opportunity Project (BTOP) grants. The specific objectives of the partnership were to build or enhance 77 computer centers, train 15,000 Philadelphians in digital and computer literacy training that leads to broadband adoption, and increase awareness of the digital divide. Since the launch, FRP—which is a joint venture between the City of Philadelphia, the Urban Affairs Coalition, local universities and dozens of community-based organizations—has transformed the digital ecology of Philadelphia with training courses and computer labs that target the 41% of Philadelphians without consistent broadband Internet access.

The following report is based on research focused on the Freedom Rings Partnership's principal program, KEYSPOT. Through the lens of this program we aim to offer a detailed understanding of the intersection of poverty, inequality and the digital divide in urban America. It is important to note that this report does not aim to evaluate the programs or organizations involved in FRP or KEYSPOT. Instead, the objective is to offer a richer understanding of the tangible effects of broadband adoption in low-income communities and urban environments.

At the outset of this research our aim was to collect qualitative and ethnographic data that helped us to understand the relationship between Internet access and lack thereof, and some of the core social and economic problems that the city of Philadelphia faces today and increasingly in the future. The foundational research question for this project was as follows:

- What are the tangible social, political and economic effects of broadband adoption in low-income urban communities?

More specifically, the research was guided by a dynamic subset of the following broad questions:

- Does Internet adoption in low-income communities positively affect our public education system (gauging by factors such as truancy, college access, and high school graduation rates)?
- How does Internet adoption affect small business in distressed neighborhoods?
- Does Internet adoption in low-income communities lead to higher employment rates? Does it help catalyze economic development and local entrepreneurialism in distressed neighborhoods?
- Is there a positive correlation between Internet adoption and civic engagement amongst low-income Philadelphians? If so, what does this look like in practical terms?
- What practical skills and technology access should Philadelphians have in order to create a 21st-century workforce?
- What are the different models for community broadband adoption in the FRP program (such as community organizing, service provision, and community development)? Which models are more effective and why?

In this report, we look closely at the above questions to offer a nuanced understanding of the relationship between technology, poverty and the digital divide. First, we look at the history of broadband adoption efforts in the last decade, which set the stage for the Freedom Rings Partnership. Following this, we discuss the context of broadband

adoption in Philadelphia and, more broadly, across urban America. Then we discuss the KEYSPOt program as a new form of urban *techno-social* infrastructure and examine the ways in which this new form of urban infrastructure enables people and communities to enhance their economic, educational and civic possibilities. Finally, we discuss some of the limitations of this new techno-social infrastructure.

B. Basic Facts of Freedom Rings Partnership

In 2010, Philadelphia's Freedom Rings Partnership (FRP) received an \$18.1-million grant from the National Telecommunications and Information Administration (NTIA) to bolster Internet access, job training, and technology enhancements in low-income communities across the city. FRP subsequently established the KEYSPOt program, a joint venture between the City of Philadelphia, the Urban Affairs Coalition, Drexel University and approximately 50 community-based organizations. It is important to note that the community-based organizations associated with KEYSPOt were working under a pre-existing mandate to address issues of homelessness, health care access, drug addiction, youth education, community organizing and media production. The diversity of organizations and missions within KEYSPOt has given the program a broad focus and grounded it in different communities and neighborhoods throughout the city.

The underlying strategy of the KEYSPOt program was to embed public computer centers and broadband training programs into the significant and diverse social-service infrastructure of the city. Accordingly, the public computer centers were located throughout Philadelphia, in city-run recreation centers, hospitals and health centers, public-housing units, community-development corporations, local labor-union halls, churches, community centers and community-based organizations. Working in tandem with the KEYSPOt sites, the training programs are similarly diverse, with classes on basic computer and web literacy, job opportunities and career development, computer repair, social media, online tax submission, video production and journalism, and digital music production, among others. Its varied array of social settings and class offerings enables the KEYSPOt program to engage a broad swathe of Philadelphians while creating a flexible and dynamic environment for this urban broadband adoption initiative.

In conjunction with this strategy, the programmatic goals of the KEYSPOt program were threefold:

1. Create or refurbish 77 public computer centers throughout Philadelphia.
2. Develop an awareness campaign around the digital divide and broadband adoption across the city.
3. Train 15,000 Philadelphians in educational programs that build digital literacy and increase broadband adoption.

With the ambitious goals of building infrastructure and reaching thousands of Philadelphians—along with the diverse and embedded vision of the KEYSPOt program—the initiative aimed to connect with the experiences of everyday Philadelphians. Moreover, because the project was embedded in existing social services, the centers and trainings were directly linked to the social, economic and political problems that frame the contemporary urban environment.

C. Research Methods

This ethnographic research study included participant observation across multiple sites, semi-structured interviews with participants and staff, and document collection. Data was obtained in the period between August 2011 and July 2013. The research team completed approximately 400 hours of participant observation in the public computer centers and broadband adoption training programs and 20 semi-structured interviews with participants and staff and collected 150 documents pertaining to the FRP. The primary sites of research included:

- *Critical Path*. Affiliated with Philadelphia FIGHT, a health services and advocacy organization. The public computing center was observed.
- *The Community College of Philadelphia Center for Business and Industry*. Affiliated with the Philadelphia Housing Authority (PHA) and Drexel University. Novice and intermediate computer training classes for PHA residents were observed.
- *Families First*. Affiliated with the People's Emergency Center, a community development organization that focuses on homeless families. GED classes for young mothers were observed.
- *The Media and Communications Institute*. Affiliated with the Media Mobilizing Project, an organization supporting media, education and organizing infrastructure. Digital content creation workshops were observed.

- *Mercy Neighborhood Ministries, a faith based non-profit offering adult and childcare programs.* Affiliated with the Free Library of Philadelphia. The public computing center (called the “Hotspot”) was observed.
- *The Village of Arts and Humanities, an organization offering arts and culture classes to youth.* Affiliated with the People’s Emergency Center, a community development organization that focuses on homeless families. Digital music production classes for youth were observed.
- *Waterview Public Recreation Center.* Affiliated with the Philadelphia Department of Parks and Recreation. The public computing center was observed.

In addition to these primary research sites, where applicable, the research team conducted participant observation at affiliated program activities such as conferences, presentations, workshops and open roundtable discussions. When possible, the research team also observed local events of interest, such as church gatherings or community meetings. In adherence to Rutgers Institutional Review Board (IRB) protocols, participant names and identifying details have been changed to preserve confidentiality.

The Ethnographic Research Process

Ethnographic research seeks to study people within their environments (Emerson, Fretz & Shaw, 2011). This method does not encourage detachment on the part of researchers; the goal, rather, is to achieve deeper immersion and social interaction. Incontestably, the social, economic and political issues facing urban Philadelphians are very complex. This method allows time and space to attempt to address this complexity.

First, the research team entered FRP sites—in research terminology, “fieldsites”—and established relationships with participants. Developing a good rapport with participants was critical for a few reasons (Blumer, 1967). Many FRP visitors are members of marginalized groups, such as former prisoners or homeless persons, and are understandably wary of new people who have not earned their trust. Furthermore, through building rapport the researcher is often permitted more nuanced insights into participants’ lives.

During this initial participant-observation phase, the research team carefully recorded notes or “fieldnotes” to depict physical spaces, interactions with participants and participants’ interactions with one another. Researchers utilized “thick description,” or detailed descriptions, to represent the micro-processes of everyday life (Geertz, 1973). While broader research questions provided the underlying structure for the study, above all, the researchers attempted to discern local meanings: the ways in which the participants themselves understand and make sense of their social world (Garfinkel & Sacks, 1970; Geertz, 1983).

However, it is important to note that “immersion is not merging” (Emerson, Fretz & Shaw, 2011, p. 43). The researcher unavoidably brings her or his own life experience or “stance” into the social process and thus the research process. In other words, the ethnographer is not—and cannot be—an impartial observer. Thus, in the writing process (and the analysis phase), the researcher is sensitive to her own position in the social world she studies and attempts to use this position as a tool for developing complex reflections and understandings (Wolfinger, 2002). This is especially important to note in the FRP study of urban Philadelphia, as the participants and researchers often had access to very different economic, educational or racial privileges (Liebow, 1967).

Second, the research team revisited the initial research questions and used both acquired knowledge of the fieldsites and social relationships developed in the field to identify the best candidates to interview. In doing so, the researchers also considered how particular participants could enhance or complicate the research questions. While draft interview questions were developed¹, the research team utilized a semi-structured interview approach. Semi-structured interviewing is more open-ended and allows the researcher greater flexibility in the interaction (Bernard, 2002). For example, in the course of an interview, the researcher might receive an unanticipated answer from a participant. Rather than ignoring this response or moving to the next question, the researcher can follow the detour by asking probing follow-up questions, which can permit greater context or enrich understanding of local meanings (Bernard, 2002).

¹ See Appendix A, draft interview questions.

Third, the research team collected any documents available within the research fieldsites. Documents collected included meeting agendas, program reports, marketing materials, course materials, informational flyers, sample resumes, job postings, handouts, creative materials (e.g., digital music produced at the site), website screenshots and other materials. These documents were dated and the site origin noted. When useful, fieldnotes also incorporated descriptions of the documents collected.

Ethnographic Research Analysis

Following data collection, the researchers entered their fieldnotes from participant observation, transcribed semi-structured interviews and scanned documents into NVivo 10 qualitative research software. All data was then coded using NVivo 10 for themes or categories. This coding process followed two stages. First, data were reviewed line by line for any general themes or ideas, or “open-coded.” In this phase, all meanings were considered, “no matter how varied or disparate” (Emerson, Fretz & Shaw, 2011, p. 172). In the second, “focused coding” stage, data were analyzed for themes directly connected to the initial research questions. Drawing on both open and focused codes, the team wrote individual research memos to analyze and synthesize research findings (Strauss & Corbin, 1990). They then revised, edited and integrated these individual memos into a single thematic narrative. When possible, excerpts from fieldnotes, interview quotes and primary documents have been included to reinforce particular analytic points (Emerson, Fretz & Shaw, 2011).

Part II—History, Context and the Techno-Social Infrastructure

Forget cheesesteaks, cream cheese and brotherly love. Philadelphia wants to be known as the city of laptops.

—*New York Times*, September 27, 2004

A. The Great Recession, Stimulus and Broadband Adoption in Philadelphia

On February 17, 2009, President Obama signed the American Recovery and Reinvestment Act (ARRA) into law. ARRA's aim was to counteract the Great Recession by creating jobs and investing in U.S. infrastructure. A small but critical element of the \$700-billion stimulus act was approximately \$7 billion assigned for the development of broadband Internet infrastructure and associated programs. This money was allocated through two partner projects: the Broadband Technology Opportunity Program (BTOP), administered by the NTIA in urban areas, and the Broadband Initiatives Program (BIP), administered by the Rural Utilities Service (RUS) in rural areas. BTOP and BIP both emerged out of a consensus among researchers, policy makers and advocates on the importance of providing access to new communication technologies to communities trapped on the other side of the digital divide. In the summer of 2009, following the programs' launch, the NTIA and RUS issued a Notice of Funds Available and communities across the country began the process of applying for funding for broadband development.

Philadelphia was prepared for the opportunity ARRA offered because the digital divide and affordable Internet had emerged as an important local issue a few years earlier. The citywide discussion around the digital divide began when Mayor John Street declared that Philadelphia would be the first "wireless city." Mayor Street's vision was to take advantage of new technology to build a free municipal wireless network to promote broadband adoption and spur economic growth, while branding Philadelphia as a technologically savvy metropolis and thus a good place for tech startups. Following Mayor Street's announcement, the City of Philadelphia partnered with Earthlink to build a municipal wi-fi network. While this public/private partnership ultimately failed,² the issue of the digital divide became a pivotal issue across the city.

In 2008, following the failure of the municipal wireless network, twenty to thirty organizations came together to form the Digital Justice Coalition. According to a

² For more on the history of Wireless Philadelphia, Philadelphia's wireless initiative, see *The Philadelphia Story: Learning from a Municipal Wireless Pioneer* (2005).

pamphlet the coalition produced, its goal was to “ensure that there is a plan in place to provide the public of Philadelphia with affordable and reliable Internet access.” The principal groups that made up this coalition, including the Media Mobilizing Project, Philadelphia FIGHT, the People’s Emergency Center, and Digital Impact Group (formerly Wireless Philadelphia), quickly pivoted in 2009 when the BTOP program was announced. As Bryan Mercer, one of the directors of the Media Mobilizing Project, explained, “We recognized in BTOP a real opportunity to put a plan for the digitally connected Philadelphia we were discussing into effect.”

Once BTOP was announced, this existing coalition began working with the City of Philadelphia’s Office of Innovation and Technology (OIT) to forge a vision and plan to apply for the federal grants. This process included creating a BTOP planning team, developing an all-day public forum on broadband adoption in Philadelphia, supporting a baseline study on broadband adoption in Philadelphia to be undertaken by a national foundation, and developing an organizational questionnaire to ascertain community and organizational needs around broadband technology.

Ultimately the City of Philadelphia and this confluence of organizations applied for three grants—Sustainable Broadband Adoption (SBA), Broadband Infrastructure and Public Computer Centers (PCC). The Free Library of Philadelphia and the OIT were the anchor organizations for the first round of BTOP funding. Ultimately, the three first-round proposals were not successful. However, the organizations reconvened to apply for the second window of BTOP funding later that year. This time, the core of existing groups partnered with the Urban Affairs Coalition and Drexel University to apply for the SBA grant, anchored by the Urban Affairs Coalition, and the PCC grant, anchored by the OIT. These grants were successful and became the basis of the Freedom Rings Partnership and the KEYSPOt program.

Thanks to its work during the first BTOP window and its history of organizing on this issue, the FRP had a strategic vision for Philadelphia’s broadband adoption program. There were three central planks to this plan. First, recognizing the problems with isolated

technology centers, program developers wanted KEYSPOt to be embedded in the city's already existing, robust social welfare system. The aim was to get people to adopt technology through already existing social practices in which they were already engaged, from health care to homeless services. Second, organizers recognized the intersection between poverty and the digital divide and formed a broad program that spoke to this intersection by both placing computer centers in impoverished communities and tailoring programs to the needs of low-income Philadelphians. Third, many of the participants recognized that media production leads to meaningful forms of broadband adoption. Therefore many of the programs focused on training people to create media and engage as critical Internet users, with the belief that this more consequential interaction with the Internet would lead to long-term adoption as well as creative forms of political and social engagement.

In order to understand FRP's KEYSPOt program, it is critical to take into account recent history around the issue of broadband adoption and the digital divide in Philadelphia. This history, as well as the vision of an engaged program, formed the basis of the Freedom Rings Partnership. Along these lines, program developers were also working within the context of urban America and the long-entrenched poverty and inequality that frame life in the American city, an issue we now turn to discuss.

B. The Urban Crisis: Context for Broadband Adoption in Philadelphia

The confluence of deindustrialization, suburbanization and retrenchment of the welfare state led to a deepening problem of poverty and inequality throughout urban America (Sugrue, 1996; Katz, 1989; Harvey, 1973 and 2005; Massey & Denton, 1993; Castells, 1989). Across the latter half of the 20th century, cities have seen dwindling budgets because of a weakening tax base, less state and federal funding and the disappearance of stable blue-collar jobs (Wilson, 1997). The intersection between these converging endemic problems frames the urban crisis. We contend that in order to understand the work of the KEYSPOt program specifically—and urban broadband adoption more generally—it is important to situate broadband adoption initiatives within this social, economic and political landscape.

This crisis is exemplified by Philadelphia, which today has the highest rate of poverty of any of the top ten U.S. cities: 28.4% of its population lives below the poverty line (Pew, 2013). Moreover, Philadelphia also has the highest rate of deep poverty—people living below half of the poverty line—of any of the country’s most populous cities. The average annual income for someone living in deep poverty is \$5,700 or \$11,700 for a family of four. Philadelphia’s deep-poverty rate is 12.9%, which means around 200,000 people are living in deep poverty (Lubrano, 2013). Looking more closely at the statistics around poverty in Philadelphia, it is clear that the problem adversely affects children in the region: 31% of families with children under the age of 18 live in poverty and 47% of families with children are headed by women living in poverty (Pew, 2012). Alongside high rates of poverty, following the 2009 economic crisis, unemployment has also risen steadily. In 2012, approximately 11.5% of Philadelphians were unemployed (Bureau of Labor Statistics, 2012),³ and a much larger number of Philadelphians are underemployed. The median annual income in Philadelphia is at approximately \$34,000, which is \$16,000 below the national average (Pew, 2012).

Poverty, income inequality, unemployment and underemployment are compounded by the trend toward retrenching the welfare state, which in practice has meant cutting support for social provisions, from education to public assistance (Harvey, 2006; Katz, 2008). This is exemplified by the complex challenges facing Philadelphia’s underfunded public education system. In the 2009–10 school year, Philadelphia spent \$13,272 per child, whereas the suburban Lower Merion schools spent twice that per child, at \$26,570. This gross disparity has led to serious educational deficiencies. In 2012, for instance, approximately 40% of Philadelphia’s eligible students did not graduate from high school (Socolar, 2012). Moreover, college access rates are low, with approximately 34% of Philadelphia’s high-school graduates planning to attend college in 2010 (Socolar, 2010). The Philadelphia School District has also been in a fiscal crisis since 2011. In an effort to close a budget gap of more than \$200 million, the city’s School Reform Commission

³ Unemployment numbers do not count individuals who no longer receive unemployment benefits and are not “actively” looking for work. If we were to include this part of the population, Philadelphia’s unemployment numbers would be considerably higher, at an estimated 20%.

voted to close 23 schools in 2013 and plans to close 64 more by 2017 (Herold, 2012). While closing schools may help address immediate budget problems, as a recent study by Research for Action illustrates, closures disproportionately affect low-income children, communities of color and second-language English speakers, exacerbating problems of inequality (Research for Action, 2013).

While Philadelphia's economic problems are hurting a significant portion of the population, the urban crisis extends beyond financial concerns, affecting the ability of poor and working people to build political power and engage in civic affairs (Goode & Maskovsky, 2002). This is demonstrated by scholarship in the field of New Poverty Studies, which explores the changing character of poverty in the urban United States in relationship to broader transformations in the national and global economies. Scholars of urban poverty push back against the presumption that poverty persists because of a "tangle of pathology" (Moynihan, 1965) or because of welfare-state dependency on the part of the poor. Instead, they argue, urban poverty results from economic and social policies that promote the primacy of the market (Harvey, 2005).

Building on this understanding of the causes of poverty, historian Thomas Sugrue offers an analysis of the specific characteristics of contemporary urban poverty. He asserts that while poverty and unemployment have been endemic in other periods of American history, today's "forms and distribution of postindustrial urban poverty are novel" because, historically, the poor "did not experience the same degree of segregation and isolation that exist today." According to Sugrue, large sectors of the population—especially young African Americans—are "detached from the mainstream economy [and] often outside of the labor market altogether" (Sugrue, 2005, p. 4). Corroborating this argument, Goode and Maskovsky argue that social isolation and political demobilization are defining features of urban poverty in the 21st century. In other words, Philadelphia's urban crisis affects not only the economic well-being but also the educational opportunities, social relationships and political engagement of the poor (Goode & Maskovsky, 2002).

Philadelphia's digital divide both runs parallel to and compounds the urban crisis. According to recent research, approximately 41% of Philadelphians live without consistent, quality access to broadband Internet. And as Powell, Byrne and Dailey (2010) contend in their FCC-sponsored study of broadband adoption, the digital divide, or "digital exclusion," *intersects with and exacerbates* long-held social and economic exclusions like poverty and unemployment. The authors conclude that "the social function of the Internet has changed dramatically in recent years. . . . What was, until recently, a supplement to other channels of information and communication has become increasingly a basic requirement of social and economic inclusion." Powell, Byrne and Dailey also echo what other scholars before them have noted: access and the ability to utilize broadband Internet is not only necessary to navigate and take advantage of educational systems, the health care industry, and employment agencies, but also crucial to social and civil engagement.

These factors—high rates of poverty and unemployment, a retrenching welfare state that has led to a failing public education system, lack of broadband Internet access, and the social isolation and political demobilization of the poor and the working class—are the core dynamics within which Philadelphia's Freedom Rings Partnership exists. Thus, we argue that in order to understand the work of the KEYSPOt program specifically—and urban broadband adoption more generally—it is important to situate broadband adoption initiatives within this social, economic and political landscape. Moreover, it is critical to understand how these initiatives directly intersect with the problems of poverty, a failing education system and the social and political isolation of the poor. This context offers a frame for our research, which focused specifically on the vectors of economic, educational and civic/political opportunities related to KEYSPOt, as we discuss below.

C. Techno-Social Infrastructure

The KEYSPOt program was forged as an implicit response to the crisis that has engulfed Philadelphia and other major urban centers across the United States. This is exemplified by the manner in which KEYSPOt is interwoven into the city's established social-service sector, which attempts to resolve certain aspects of the urban crisis. Thus a

cornerstone of our argument is that KEYSPOOT presents a unique response to this urban crisis by attempting to establish a *techno-social* infrastructure that addresses many of Philadelphia's social and economic problems, from un- and underemployment to truancy to civic engagement, as they intersect with new information and communication technologies (Castells, 1996; Qui, 2010).

It is important to note that we identify KEYSPOOT as an *infrastructure* to mark the foundational role that computer centers and training program play in a 21st-century city. Infrastructure is commonly meant to connote the roads, buildings, sewage systems, bridges and power grids that enable a city or society to thrive. Recently however Lievrouw and Livingstone (2004) defined infrastructure as having three components: “the *artefacts or devices* used to communicate or convey information; the *activities and practices* in which people engage to communicate or share information; and the *social arrangements or organizational forms* that develop around those devices and practices.” (p.2) Recognizing these three dimensions in KEYSPOOT, we argue that the program typifies a new and critical form of infrastructure that merges social programs with technology access and training. While KEYSPOOT is new, we believe something akin to it will become increasingly necessary as life continues to intersect with the Internet.

Accordingly, we describe this infrastructure as *techno-social* to highlight the critical interrelationship between technological systems and social relationships. In this sense, we place a primacy on the social nature of this infrastructure. This again pushes against the prevailing logic, as most discussions of computer centers and broadband adoption prioritize the technological aspects of these systems. In this study, however, we foreground the critical ways in which social relationships, community practices and collective visions shape and, in fact, enable this infrastructure to operate. In this sense, we believe this techno-social infrastructure has multiple layers and dynamics that enable it to operate effectively. Specifically, we contend that KEYSPOOT's techno-social infrastructure has four significant dimensions that allow it to successfully operate in Philadelphia. It is *technological, social, material* and *embedded*.

Technological. First and most obviously, the KEYSPOt infrastructure is *technological*. By this we mean that it offers points of access to broadband Internet and other new technologies, as well as training programs that enable individuals to use the Internet. This is the central attribute of KEYSPOt: the program consists of almost 1,000 computer workstations across the city housed in at least 77 physical KEYSPOt centers. In addition to the workstations and public computer centers, 5,000 netbook computers were distributed to program participants residing in Philadelphia Housing Authority (PHA) properties. The program is marketed and mediated by a large online network, www.PhillyKEYSPOT.org. This portal is a place for participants to locate a public computer center or training course or to obtain more information about the KEYSPOt program. Taken together, the centers and workstations, along with the online portal, have established a novel set of digitally connected spaces where people can be trained and get online. This networked online infrastructure is unique for Philadelphia, connecting communities and offering access in places and for communities that were previously offline.

Social. While the KEYSPOt infrastructure has a clear technological basis, it is also, importantly, a *social* infrastructure. We believe it is useful to highlight the social aspect of KEYSPOt because throughout our field research, one of the most compelling aspects of the program was the relationships that developed, both online and offline. These social relationships not only played a pivotal role in organizing and powering the KEYSPOt infrastructure itself, but were also brought to life by both the face-to-face training programs and the computer assistants and site facilitators who helped to run the 77 centers. The relationships established on site enabled clients and patrons to build trust while learning how to use a computer or the Internet. Moreover, it allowed KEYSPOt's work to go beyond digital access, connecting to other critical aspects of everyday life. For many of the urban poor served through the KEYSPOt program, the issue of trust is particularly significant, as daily life often means navigating complex access to social services. Program facilitators or trainers who could leverage both online and offline resources—while offering respect and emotional support—were often best equipped to meet participants' information needs.

Material. Third, the KEYSPOt infrastructure is *material* in that it is based in real physical

spaces—most clearly evidenced by the 77 computer centers across the city— where people regularly come to get their basic needs met. The importance of the physical nature of KEYSPOt was highlighted throughout the research: it offers participants a safe, clean place to meet and to interact socially with other participants as well as KEYSPOt staff. While the KEYSPOt centers were primarily used for Internet access and training, the centers were also used as ad hoc rooms for students to collaborate on homework; places for young children to nap before lab hours; locations for community message boards; quiet spaces for reading books; meeting rooms where organizations screened documentaries or held public meetings; and, in some cases, a simple refuge for members of Philadelphia’s homeless population. Thus, the social and material characteristics of KEYSPOt offered safe, reliable spaces to utilize technology, facilitating diverse modes of information exchange—all necessary components of establishing community.

Embedded. Finally, as previously noted, the KEYSPOt infrastructure is *embedded*. By this we mean that the techno-social infrastructure functions within the broader state welfare infrastructure and is thus embedded in social-service practices around homelessness, healthcare provision and organizing, youth educational programs, prisoner reentry programs, drug rehabilitation programs and many other aspects of the urban social-support system. Therefore, the training and practices that emerge from KEYSPOt are closely linked to the existing practices, both good and bad, of the already established social-service system of Philadelphia. This final aspect of KEYSPOt is meaningful because it situates the program within social-service practices geared at helping people deal with their everyday problems. Often technological training is seen as abstracted from these concerns, but the embedded approach lifts up the importance of broadband adoption by connecting technology to other critical needs. Further, by embedding programs within established organizations, the physical computer space for KEYSPOt can be maximized in off-lab hours to support important activities, furthering community.

These characteristics of KEYSPOt program enable it to create an organic, meaningful, stable and integrated response to the urban crisis. As we discuss in the following section, this techno-social infrastructure, with its multiple dimensions, enables the program to help forge different forms of digitally mediated capital that improve the life circumstances of Philadelphians. Moreover, it is precisely because KEYSPOt acts as a stable cornerstone of a digital Philadelphia that it is able to operate effectively. In this

sense, it is critical to pay attention to the social, material and embedded aspects of this technological system that enable it to have an impact on Philadelphia.