Question 5

CASE STUDY 10

Introduction

From the standpoint of modern public managers, the demands of running government organizations are heavy, complicated, and certainly not as neat, tidy, or simple as many management theorists suggest or have us believe. Indeed, today the reality of much of government sector activities is accomplished in partnership with a maze of for-profit, nonprofit, and other government entities. There is little left of "solo in-house" public management enterprise. To do the public's work requires instead that chief executives cooperatively manage numerous complicated systems involving multiple organizations, often crossing national borders, even spanning the globe, relying upon sophisticated technologies and professional expertise to make them operate, as well as on numerous other organizations for support to achieve their mission(s).

The following case study, "Government as Catalyst," Professors Abhijit Jain, Munir Mandviwalla, and Rajiv D. Banker illustrates the important public management dimensions involving local government efforts to promote technological innovation for its citizens. During the last two decades, the Internet has become increasingly indispensable for achieving individual as well as corporate success in the global economy. For American cities in particular, the Internet is considered an essential prerequisite in order for its residents to exploit global opportunities in the economic marketplace. Urban growth (and stagnation, for that matter) often turn decisively on whether or not communities and their citizens have easy access to the Internet. The application of municipal wireless networks (MWNs), which allow for wireless Internet access, has thus become a vital, necessary instrument for urban development.

Practically how can this new technology be employed to serve the public sector needs? This case explores how Philadelphia—the largest American city to date to attempt this model—effectively planned and implemented a community-wide MWN. It demonstrates, as its title suggests, that municipal government can act as a catalyst by carefully managing diverse stakeholder involvement, technological change, funding support, and public/private sector cooperation. Threaded throughout Philadelphia's complicated endeavor to develop its MWN was a critical collaborative public management dimension that effectively integrated state and federal entities. Collaborative public management, as this case emphasizes, was essential in order to accomplish this significant project and turn it into a "win-win" for all concerned. To be sure, as you will discover, how and why this became a reality relates directly to Professors Thomson and Perry's central thesis that twenty-first century government must embrace collaborative processes in order to make things happen for the communities and public that administrators serve.

As you read this case study, give thought to the following:

How did Philadelphia officials identify the problems, subsequently frame the options for solution, and finally fashion a workable plan of action to implement an MWN?

Why did public administrators require collaborative processes to create a workable MWN for Philadelphia? Which key actors were involved in this collaborative process? Why was their specific participation necessary?

Can you identify the essential dimensions of collaborative management in this story? Did it follow the five dimensions as defined by Thomson and Perry's foregoing essay? Or, would you suggest altering their model in order to explain adequately what occurred in this case study?

Why was collaboration so vital to turn MWN into a reality for Philadelphia? Why was it so complicated to practice in reality?

In general, what does this case tell us about the importance of public administrators' leadership roles within any effective, collaborative public management activity?

Government as Catalyst: Can It Work Again with Wireless Internet Access?

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In our global information society, the centrality and importance of the Internet cannot be overemphasized. For individuals and institutions alike, it is a critically important platform for communication and interaction. It has the potential to be a leveling agent for existing economic systems and the inspiration for the development of new systems. In the city of Philadelphia, 40 percent of the population identify themselves as nonusers of the Internet. If 40 percent of the population of a large American city cannot participate in the Internet revolution—no matter what the reason—there can be serious repercussions for the economic, political, educational, and social future of that city. In the face of considerable opposition from political and commercial entities, the city government of Philadelphia decided to address the access problem and create a municipal wireless network (MWN) to provide affordable, reliable, and high-speed Internet access.[1] Eventually the city was able to close a deal with a private contractor who would fund the entire cost of building the network and provide sustainable funding and tools to address the city's digital divide.

The essay is organized as follows: We first discuss the emergence of MWNs as a prominent new information technology (IT) infrastructure concept, as well as the drivers and inhibitors of MWNs. Next, we provide a detailed analysis of the Philadelphia wireless project using a stage-based framework to delineate key milestones. The essay concludes with a summary of key lessons learned and relevant research issues.

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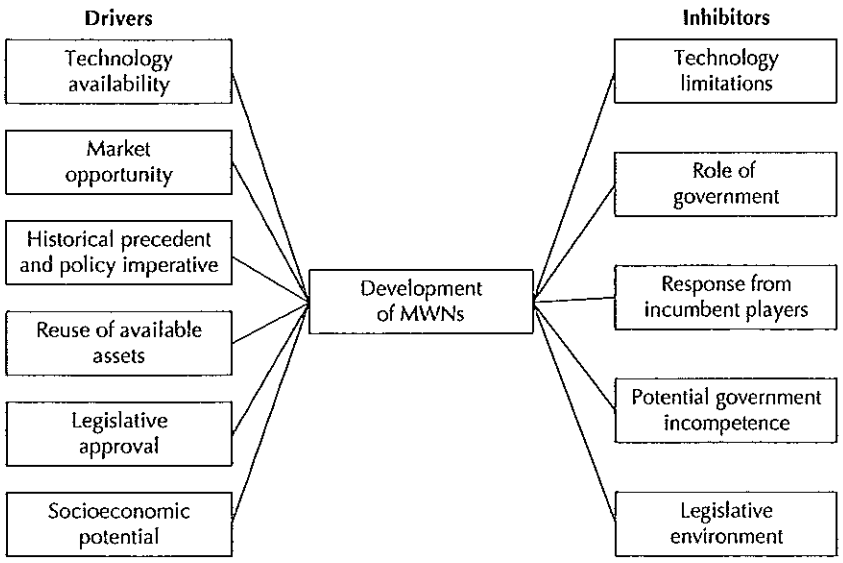
This essay is based on a detailed analysis of 12 focus groups involving 120 stakeholders relevant to MWNs in Philadelphia, intensive work with the city task force on the project, work helping the city write the business case for the wireless initiative, interviews with vendors and leaders of other MWN projects in the United States, and a detailed usage analysis of the initial city wireless pilot in "Love Park" in Philadelphia. Although the work presented here is based on a single case, we believe the breadth and depth of our analysis will be of general interest.

The Emergence of Municipal Wireless Networks

Through there has been impressive growth in the number of people accessing the Internet over the past decade, this growth has not been uniform. A confluence of factors has recently made MWNs an increasingly feasible and attractive option for municipal governments that seek to act as catalysts in promoting more equitable and universal access to the Internet within their communities. An MWN is defined as a wireless Internet access network that is created with active local government leadership and involvement. MWNs are currently among the most talked about innovations involving Internet access. In the United States, sales of wireless Internet access–related hardware are expected to grow from under $100 million in 2004 to around $1 billion by 2009 (Lawinski 2005), driven in substantial part by investments related to MWNs. There are more than 300 MWN projects currently

Figure 10.3 Drivers and Inhibitors of Municipal Wireless Networks



under way in the United States and at least another 100 worldwide. To better understand the nature of the interest, we discuss the drivers and inhibitors of MWNs (see Figure 10.3).

Drivers of Municipal Wireless Networks

Technology availability. Recent developments in broadband wireless standards and technology, coupled with steep declines in prices, have made the deployment of broadband MWNs more convenient and cost-effective than ever before and a viable alternative to cable, DSL, and other wired technologies. The concept of MWNs emerged in a bottom-up manner through the efforts of end users and communities. In the United States, certain bands in the radio frequency spectrum, such as the 900 MHz, 2.4 GHz, and 5.8 GHz bands, are available for unlicensed usage by the general public. These radio frequency bands are used for applications such as cordless telephones and remote-controlled car keys. In the late 1990s, home and office Internet users started creating wireless local area networks (WLANs) using these unlicensed radio frequency bands. The coverage area of such a network, typically a few hundred feet, is called a "hotspot." It is estimated that there are now more than 10 million WLANs in homes across the United States and at least an equal number in commercial locations (Fleishman 2006).

Users realized that it was possible to connect proximate hotspots to create larger wireless networks spanning the areas covered by individual hotspots. Such networks are called "mesh" networks, and certain low-cost and off-the-shelf devices called "meshing" devices are needed to link the hotspots together. Because no license fees are required and there is no need to install fiber or wires, mesh networks can be deployed quickly and cheaply to provide large areas with wireless Internet access. These meshed networks have the potential to offer a radical departure from existing capabilities. For example, wireless, ubiquitous broadband Internet access could inexpensively support interactive television broadcasts and Voice-over-Internet Protocol mobile telephony or new kinds of applications such as handheld wireless devices that provide tourists in a city with rich and interactive information.

Market opportunity. In the United States, telecommunications firms have traditionally ignored or underserved poorer urban and rural communities. Other firms see this as an opportunity. For example, Internet service providers (e.g., Earthlink) are creating business units to service municipalities that are interested in creating wireless networks. Several major hardware vendors have created units to promote and support wireless networks (e.g., Intel and Cisco). More recently, Internet aggregators such as Google have announced plans to create such networks for their local constituencies.

Historical precedent and policy imperative. Historically, municipalities have often provided services and utilities for citizens and local businesses (e.g., electricity, water, health clinics, and education). An MWN, then, seems like no more than a high-tech extension of an already existing portfolio of services provided by the municipality's local government. Moreover, according to economic theory, it is appropriate for governments to intervene in the provision of goods and services that are considered public goods or that utilize public goods (Cornes and Sandler 1986). It has thus been argued that wireless Internet access fulfills the requirements for government intervention because it utilizes the publicly owned radio frequency spectrum, and such intervention can increase the potential for new innovations and societal benefits as more and more individuals have access to the Internet and become Internet literate. Furthermore, U.S. government intervention in the area of telecommunication provision and, more recently, Internet access is not a new concept (e.g., schemes such as E-Rate and the No Child Left Behind Act). At the state level, Pennsylvania has officially declared its intention to achieve universal broadband Internet penetration by 2015 (State of Pennsylvania 2004). Gillett, Lehr, and Osorio (2004) summarize the policy options by suggesting that governments can act as a catalyst by taking on one or more of the following roles: (1) consumer of Internet services, (2) regulator, (3) financier, and (4) infrastructure developer.

Reuse of available assets. A major strategic advantage that municipalities have with regard to wireless infrastructure deployment is that they usually own or control public facilities such as traffic lamps and street lights. Wireless Internet networks need the installation of antennae and nodes that are geographically dispersed and proximate to points from which the network will be accessed. Assets such as traffic lamps and street lights are considered highly appropriate for installing such network components because they are usually spread out across most communities. There is thus an expectation that municipalities will find it especially easy to set up the underlying network infrastructure because they have ready and free access to the properties needed for such installations.

Legislative approval. In the United States, MWNs received a significant boost in March 2004 when the U.S. Supreme Court issued a ruling in the case *Nixon & Missouri Municipal League* (541 U.S. 125). A group of municipalities in Missouri were sued by the state government and several telecommunications companies, which argued that municipalities should not be allowed to behave like telecommunications companies by selling access to such networks. According to the Supreme Court decision, municipalities could indeed set up and sell access to these networks; however, state governments could bar them from doing so. The Supreme Court judgment encouraged larger municipalities to start considering MWN projects.

Socioeconomic potential. There is increasing anecdotal and research evidence that broadband Internet access has a nontrivial positive impact on socioeconomic growth in local communities (Gillett, Lehr, and Osorio 2006). Therefore, civic leaders and politicians see such networks (1) as catalysts to address the digital divide in their communities, (2) as tools to improve the image of their communities, and (3) as tools to attract new businesses to their areas. In addition, by embracing such networks for their own administrative processes, municipalities could save on internal communications costs and improve the capabilities and efficiency of their staff and operations.

Inhibitors of Municipal Wireless Networks Technology risks. It can be a risky prospect for municipalities to get involved with high-technology ventures such as MWNs. Over the last three decades, 217 municipalities in 37 states have built fiber-optic networks (Barthold 2005). Ostensibly, these networks were built because the private sector was not taking the initiative to do so. As of today, not a single one of these networks is profitable, and municipalities have begun the process of selling them off to the private sector at a loss (Rockwell 2006).

MWN technology may not be ready for sustained large-scale deployment. The technology was originally developed for small independent hotspots, and it is not clear how well it will perform in large mesh network conditions. So far, only small mesh networks have been deployed, and they have not always performed well. Currently, municipalities only have the option to use proprietary technologies, which can make them overly dependent on particular vendors. In addition, MWNs could interfere with other products that use unlicensed radio frequency bands, such as home WLANs and cordless phones. Wireless Internet access points need to broadcast radio frequency signals at relatively high power, which could drown out other signals on similar frequencies.

Rapid obsolescence is also a concern. Wireless networking is a hotbed of research and development activity, and a flurry of new innovations and standards is expected every few years. Governments are not used to

handling such cycles of change. For example, in France, the Minitel system achieved widespread use before the Internet became popular and was internationally acknowledged as a government intervention success story. However, the same Minitel system caused delays in the adoption of the Internet in France because the Internet was perceived as a threat.

Role of government. Incumbent Internet service providers (ISPs) argue that MWNs will result in the formation of government-owned quasi monopolies that will compete unfairly against commercial ISPs. Local governments pay no taxes, have access to tax-exempt bonds, and lack clear accounting practices. Thus, not only would MWNs be indirectly subsidized by taxpayers, but also it would be difficult to gauge MWN costs and expenses within municipal government budgets. Furthermore, MWNs would result in the reappropriation of a freely available public asset—unlicensed radio frequency bands—by the government. Commercial ISPs contend that all of this is unfair to companies that have invested in radio frequency spectrum licenses in order to provide wireless services. Finally, they argue that there are potential long-term economic consequences, such as damage to competitive practices, a slowdown in the development of new innovations, and the possibility of commercial ISPs going out of business.

Supporters of MWNs argue that government health clinics and public libraries have not put private hospitals or book publishers out of business. Others suggest that municipalities should make it easier for commercial ISPs to build and operate such networks. For example, by reducing or eliminating barriers to entry such as licensing fees and by giving easier access to right-of-way assets such as city-owned lampposts. Furthermore, telecommunications is one of the most heavily taxed industries (King 2005), and municipalities can easily create strong incentives by providing corporations tax relief for building wireless infrastructure.

Potential government incompetence. Other critics are less concerned with the policy and philosophical objections of government intervention but instead point to a long history of failures that have resulted from governmental involvement. Whereas in the short run, MWNs may accelerate the penetration of wireless Internet access, over the long term, the potential economic negatives associated with monopolistic practices may outweigh the short-term gains. In Macedonia, for example, a state-run monopoly was given the rights to provide Internet access across the entire nation. Although this ISP was initially appreciated because it built access in all areas of the nation, it is quickly losing support because the quality of service is poor and it is reacting slowly to upgrade service levels. There are now calls to open up the market to competition from other ISPs (Wood 2006).

Legislative environment. The U.S. federal government has initiated an overhaul of the Telecommunications Act of 1996 to address MWNs and similar local-level broadband Internet access efforts. Among federal legislators, there are proponents on both sides of the fence. There are proposals to altogether ban municipalities from building MWNs, and there are also proposals that would grant all municipalities the right to build MWNs regardless of whether their state government allows them to do so. Such legislative wrangling adds to the uncertainty surrounding MWNs.

Response from incumbent players. For incumbent telecommunications and broadcast corporations, MWNs are a disruptive technology. The Internet has multiapplication, multipurpose capabilities and can support all traditional communication needs such as text, voice, and video. A wireless, high-speed, and high-performance Internet has the potential to replace traditional channels of cellular telephony, television, and radio broadcast delivery. It is highly likely that at some point in the future, traditional forms of communication (e.g., telephone, cellular phones, and television) will eventually converge on the Internet. For instance, it is expected that traditional cellular telephony systems will be replaced by wireless Internet-based telephones using Voice-over-Internet Protocol. Thus, incumbent telecommunications and broadcast corporations have compelling reasons to be concerned about tax-exempt and tax-payer-subsidized competition emanating from the government. As a result, some firms have come out strongly to reduce the potential threat through actions such as lobbying, legal challenges, funding of studies that dispute the potential advantages of MWNs, and, more recently, pricing incentives to gain market share.

Overall, the last three years have seen tremendous growth in the concept of MWNs. Yet these are still early days. It may take a few years before there is clarity on issues such as whether and to what extent municipalities should own or build MWNs and who should be responsible for addressing service, pricing, reliability, security, and training. The case of Philadelphia provides a detailed illustration of the challenges and opportunities presented by MWNs.

The Development of Philadelphia's Municipal Wireless Network

The city of Philadelphia is the fifth-largest city in the United States and prides itself on being a city of firsts. It was the site of the signing of the Declaration of Independence and the drafting of the U.S. Constitution. Philadelphia covers an area of about 135 square miles and comprises about 660,000 households. The city government has a budget of about $3.5 billion, encompasses 52 departments and agencies, and employs 25,000 workers. Philadelphia has been one of the nation's leading cities in terms of economic, political, and cultural influence. In the last three decades, Philadelphia has experienced a reversal of fortunes. The economy performed poorly and its population declined. Socioeconomic indicators such as education, crime, and quality of life measure well below the U.S. average. However, there has been some improvement relative to previous years. For example, during the 1990s, various initiatives were implemented to improve tourism and housing, including the construction of a convention center, leading to a mini–housing boom, new restaurants, and cultural attractions.

How It All Started

In January 2000, the city elected a new mayor, John Street. At that time, the city was going through a positive period, with new residents moving in and several new visible construction projects under way, such as the new National Constitution Center. In May 2000, the mayor appointed a new chief information officer, Dianah Neff, to serve in the Mayor's Office of Information Services. This office was an important department of the city, with a budget of about $80 million and approximately 450 employees. Neff was given a strong mandate to apply IT to improve the government. By the middle of 2002, Philadelphia had begun to gain national attention for making local government services such as permits accessible through the Internet. However, internal analyses showed that a significant proportion of the population could not benefit from e-government because they lacked access to or knowledge about computers and the Internet. A study conducted by the city in 2003 found that approximately 40 percent of the city's population identified themselves as nonusers of the Internet. Moreover, only 45 percent of population had Internet access at home, compared with a national rate of more than 70 percent. Of these Internet users, 72 percent had slow dial-up connections, compared with a national rate of less than 50 percent (Fleishman 2006). The city was seriously lacking in Internet usage, and something drastic had to be done to ameliorate the situation. Around that time, a few small communities had begun to draw attention for setting up community-wide wireless networks for Internet access. For Philadelphia, this was an increasingly attractive option.

Initial Steps

Figure 10.4 presents a timeline of the key milestones. In January 2004, the city installed free wireless hotspots in a few test locations. There was considerable favorable media coverage of this development, and there ensued intense media speculation and interest in the city's future plans vis-à-vis such hotspots.

In August 2004, the mayor announced that a new nonprofit organization, Wireless Philadelphia, would oversee the creation of the wireless network (see http://www.wirelessphiladelphia.org). Wireless Philadelphia had an executive committee that was composed of several eminent and influential Philadelphians, including the chief information officer. The project planning process and eventual implementation are described using the framework outlined in Figure 10.5.

The overall project plan was carried out in three stages. In stage 1, goals and stakeholder requirements were identified and key policy issues were addressed. In stage 2, the MWN application was identified, the underlying infrastructure technology was selected, and the management and funding model to build and operate the network was specified. In the final stage, the actual network was built. The stages are rough milestones and serve to retrospectively illustrate activities that were often carried out in parallel and with considerable overlap.

Stage 1: Goals, Stakeholders, and Policy

Goals. In August 2004, Wireless Philadelphia announced its mission as follows:

> Wireless Philadelphia aims to strengthen the economy and transform Philadelphia's neighborhoods by providing wireless Internet access throughout the city. Wireless Philadelphia will create a digital infrastructure to help citizens, businesses, schools and community organizations make effective use of this technology to achieve their goals while providing a greater experience for visitors to the City.

Figure 10.4 Timeline of the Wireless Philadelphia Initiative

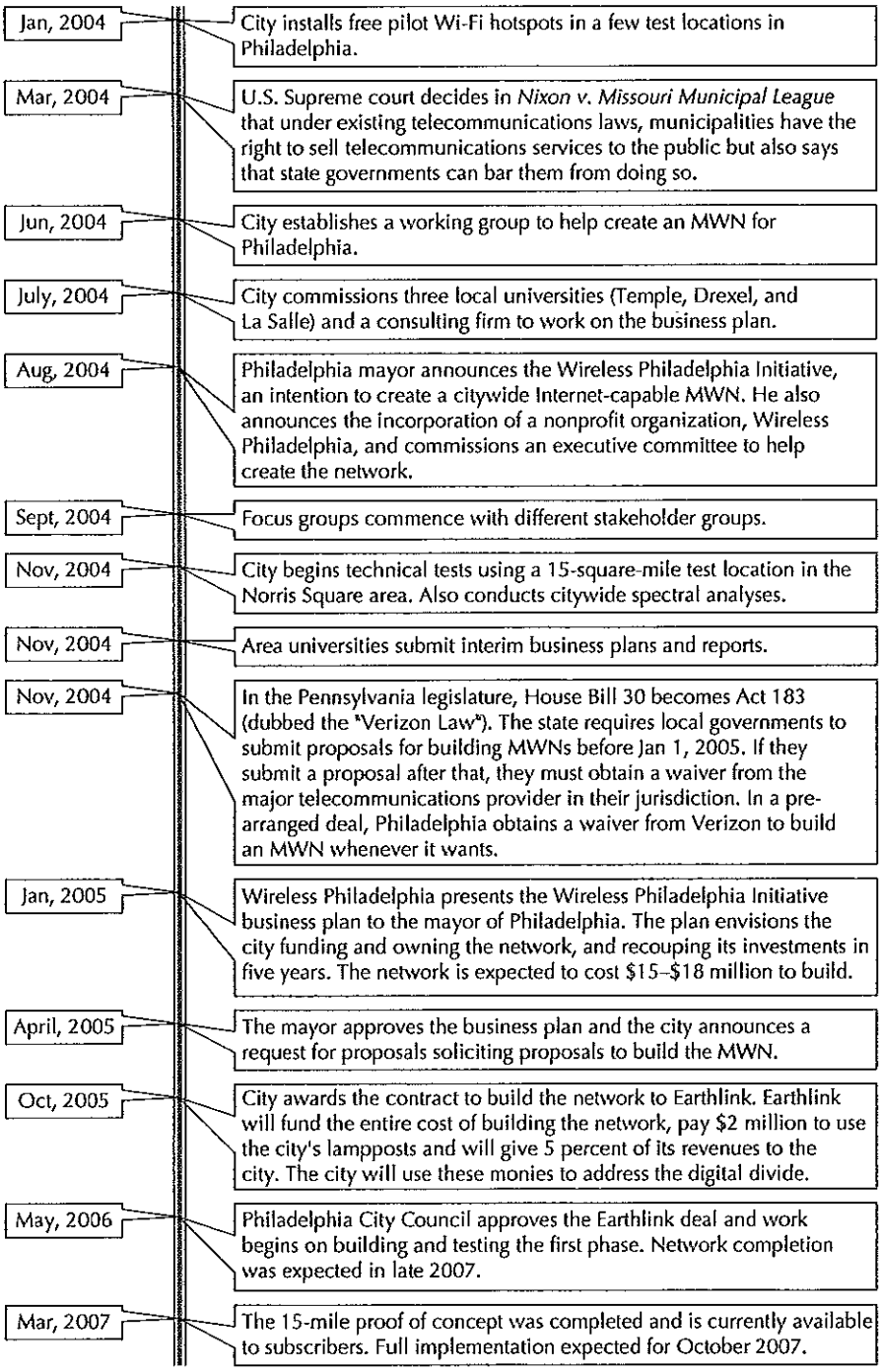
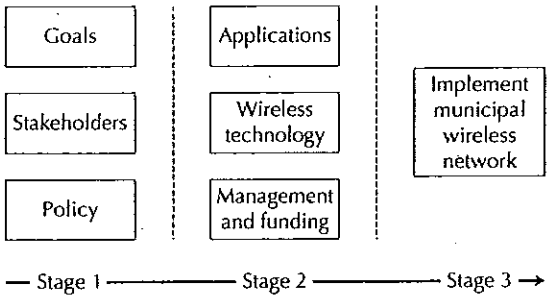


Figure 10.5 Municipal Wireless Network Framework



It was assumed that the MWN would spur improvement in the overall socioeconomic scenario, in turn leading to urban renewal. There was a cost-savings goal so that the municipality could save on internal communication costs by using its own network. Several secondary goals were also discussed by the city in its interactions with citizens and the media:

- Provide business and government users with ubiquitous Internet access
- Expand the potential market for e-government services
- Improve the attractiveness of the community for business visitors and tourists
- Give local entrepreneurs a chance to participate in building the network
- Empower citizens to participate electronically in the political process

Stakeholders. The executive committee identified the key stakeholders of the project as follows:

- City residents with access to and knowledge of Internet and computers
- City residents without access to and knowledge of Internet and computers
- City government of Philadelphia
- Business community (large and small)
- Nongovernmental organizations and nonprofit organizations
- Health care community
- Academic community (higher education and public schools)
- Business visitors and tourists

More than a dozen focus groups were conducted with more than 120 participants from the list of stakeholders. It became evident that the stakeholders had contrary expectations and interests. For instance, some stakeholders believed that the city government should own the network, whereas others believed that it should be owned by the private sector. Some stakeholders believed that lower-income users should be allowed to use the service for free, whereas others believed that everyone should be made to pay for it. Understanding the needs of stakeholders was very helpful. These discussions elicited important issues and requirements from many different local groups and helped create a positive and inclusive atmosphere for the project in the city.

Policy. In parallel with goal setting and stakeholder analysis, Wireless Philadelphia was also grappling with state policy. In March 2004, the Supreme Court reached its decision in *Nixon v. Missouri Municipal League* supporting municipal involvement in MWNs and allowing states to decide whether municipalities in their jurisdiction could offer MWNs. In the state of Pennsylvania, Verizon was the predominant telecommunications company. According to media reports, Verizon exerted heavy lobbying pressure on the state government to bar MWNs in the state. Meanwhile, Dianah Neff, with help from the mayor, championed the cause of Philadelphia's MWN to state legislators and to the governor. At the same time, it was also reported that Neff Negotiated with Verizon to change the terms of their demands.

During stage 1, Neff was very visible in the community as a strong champion of the MWN. There had been considerable concern about city government budget shortfalls, and there was a view that instead of focusing on a risky new project, the city should instead focus on restoring funds to programs. Neff assuaged these fears by asserting that the city was not interested in acquiring monopoly rights and would welcome private sector participation. She avowed that the MWN would be built at no cost to the city.

Stage 2: Applications, Technology, Management, and Funding

Applications. At the time of the project, an number of communities around the country were experimenting with new kinds of applications to run on MWNs, such as providing police squad cars with Internet-connected laptops and installing utility meters with wireless technology to enable remote reading. It was decided that the initial focus of Philadelphia's MWN would be to provide reliable, quality Internet access to the city's population, with a particular emphasis on underserved low-income residents. Furthermore, the city

government would become an anchor tenant. That is, the MWN would be assured of support and use from the city government. It was decided that radical applications—if any—would be considered at a later stage. Given the time frame of the project and the unique demographics and politics of Philadelphia, the initial focus on low-cost Internet access allowed the project to focus on a concept that was relatively easy to explain, defend, promote, and implement. However, as the technology matures and the cost of Internet service continues to decline, it may become progressively harder to focus only on "digital inclusion."

Wireless Technology. Given the available options, the most suitable technical infrastructure for the city was Wi-Fi mesh technology, with WiMAX backhaul. There were some problems with this technology: (1) It had not been tested in such a large network, (2) it was likely to be outdated soon, and (3) mesh technology was available only in proprietary form, with many different vendors offering incompatible solutions. However, the technology was available at a low enough cost that it could be replaced if it became outdated or replaced with new standards. Between November 2004 and January 2005, the city conducted extensive technical feasibility tests. The results showed that it was feasible to use the 2.4 GHz and 5.8 GHz unlicensed radio frequency for the MWN. This was an important step in ensuring the technical feasibility of the project because the unlicensed radio frequency spectrum is subject to interference from many different devices, including cordless phones and microwaves. Further tests showed that signal-strength parameters were within acceptable ranges and Internet access speeds ranged from 1 Mbps to 11 Mbps. The results of such testing can significantly impact the actual cost of implementation and the feasibility of certain applications. For example, a different topography of buildings and natural structures may require significantly more or less nodes.

By March 2007, Philadelphia began testing and rolling out a pilot proof-of-concept implementation covering 15 square miles, which is a very large area for a densely populated northeast city. The eventual goal is 135 square miles. The results of the pilot will likely be very useful to other cities that are interested in creating an MWN. The early indications are that the pilot will be successful and the technology is sufficiently mature to continue scaling upward.

Management and Funding. This part of the planning process included determining responsibility for funding the network and managing the implementation and operations. This process is inherently controversial. For example, this project included a social consciousness dimension to address the city's digital divide. It is difficult to gauge how and to what extent such social aims can be adequately addressed by the private sector and therefore to estimate how much government sector involvement is desirable or necessary. There are many different kinds of funding and management models that are possible for MWNs:

- Public community: The city would fund the deployment and operation of the MWN and provide free access to all subscribers.
- Private consortium: Private telecommunications companies would fund the deployment and operation of the MWN. The city would provide access to assets such as lampposts for a fee and would act as an anchor tenant. However, the city would also regulate the service in favor of economically disadvantaged subscribers.
- Wholesale cooperative: The city would fund the deployment and operation of the MWN. Furthermore, the city would sell network capacity to private ISPs to resell on a value-added basis.
- Public utility: A public utility would fund the deployment and operation of the MWN and sell access like any utility.
- Nonprofit: Nonprofit organizations would fund the deployment and operation of the MWN through grants and donations. Access to the network would be sold on a nonprofit basis.

The foregoing discussion of models is generic. There were several important contextual considerations in Philadelphia. First, the concept of public access television in Philadelphia had been disastrously executed during the 1980s and 1990s, and for the most part this was blamed on city government interference in policy and infrastructure creation. There was considerable concern that Philadelphia could have a similar management failure with the MWN. Second, the city government had been running budget deficits for a while, and Philadelphia was already considered one of the most highly taxed cities in the nation. There was concern that unanticipated cost overruns in building the MWN would lead to increased taxes. Third, most of Philadelphia already had potential broadband Internet access. Comcast had the capability to supply cable Internet to 75 percent of the city's population, and Verizon had the capability to supply DSL over telephone lines to 95 percent of the city's population. There

was already preexisting underutilized capacity. What if the MWN were built and nobody came to use it?

In response to these concerns, it was argued that, beyond the simple availability of broadband Internet, the issue was future potential. The city was trying to lay a foundation for basic wireless infrastructure that could be as important as paved roads had been a century earlier. The MWN was not an end in itself but a means to an end—a universally Internet literate population that could take advantage of the digital economy and contribute to the city's future. The technology and installation costs were low enough that it would be negligent of the city government not to invest in the network. Moreover, current broadband Internet access was expensive, and there were no associated services or products offered by commercial providers to help people use the Internet. Wireless Philadelphia contended that the city government was not interested in the business of providing Internet access and was more interested in acting as a catalyst to build capacity in a way that would be managed by the private sector. Finally, Pennsylvania had a goal to ensure universal broadband access by 2015, and Wireless Philadelphia and its champions argued that this would be impossible to achieve unless radical and drastic new techniques were attempted to increase Internet access.

In November 2004, interim business plans were submitted by partner universities, and Wireless Philadelphia started the process of finalizing the business plan. At the end of November, House Bill 30 became Act 183 in the Pennsylvania legislature. The state government now required all municipalities in the state to submit proposals for MWNs for approval before January 1, 2005. If they submitted proposals on or after that date, the municipalities would first have to get a waiver from the major local telecommunications provider. However, because Philadelphia's chief information officer and mayor had negotiated with state legislators as well as with Verizon, there was an understanding that Philadelphia would be exempt from this act. Soon after Act 183 was passed, Verizon officially granted Philadelphia a waiver.

Stage 3: Implementation

In February 2005, Wireless Philadelphia submitted its final business plan to the mayor. A hybrid business model was proposed after evaluating the candidate business models on their ability to support the following criteria:

- Free service in parks and public spaces
- Low cost or free for disadvantaged citizens
- Cost neutral for city
- Generate return or profit for city
- Universal access and coverage
- Ability to revitalize communities
- Ability to respond to technology change
- Wide range of service offerings

The hybrid model, a cross between the nonprofit model and the cooperative wholesale model, required a $10 million investment. The network would be built by a private sector entity and would be owned by a nonprofit organization, namely, Wireless Philadelphia. The city would guarantee a line of cheap credit to Wireless Philadelphia toward operational costs, and network capacity would be sold on a wholesale basis to private sector ISPs. The ISPs would resell network access on a retail basis to end consumers. Based on what it considered conservative subscription estimates, the business plan predicted that the city government would recover its investments in less than five years.

In April 2005, the mayor approved the business plan and announced a request for proposals to build the MWN. The request, which attracted 12 complete proposals, included detailed technical, coverage, service level, and network management specifications. The network was to support a diverse set of users, including low-income residents (see Table 10.1). The request was a watershed in that it clearly established that the network would be built by a professional private contractor. By requiring discounted service for low-income subscribers and coverage in specific low-income areas, the city was staying true to its original vision of digital inclusion, and by requiring support for different types of users, the city was creating room to realize the economic development aspects of its vision.

In October 2005, Philadelphia announced an agreement with Earthlink to build the MWN. The final agreement, which became effective on February 21, 2006, included the following key elements:

- Earthlink would undertake the entire cost of building and operating the network over the 135 square mile radius of the city. Upon completion in about two years, the network was expected to require more than 4,000 nodes and 24 towers to cover the city and to provide access using industry standard 802.11b and 802.11g technologies.

Table 10.1 Proposed Services and Subscribers

Service Types	Definition	Examples
Residential and Low Income Fixed & Nomadic Service	Access for a single device, provisioned for primary use at a residence, with access throughout the City. Service features include basic Internet access to support service provider applications such as e-mail and Web access.	Residential user with single desktop or single laptop, with support for roaming throughout the City, discounted service for low-income subscribers.
Standard Business Fixed Service	Access for multiple devices, provisioned for primary use at a business location. Service features include basic Internet access to support service provider applications such as e-mail, Web access, VPN, etc.	Businesses with fewer than 20 employees are target customers
Educational Institution Fixed & Nomadic Service	Same as Residential Fixed & Nomadic service	Bulk purchase resident and non-resident student access, with comparable features as Residential Fixed & Nomadic
Premium Business Service	Same as Standard Business service plus optional service provider services such as VPN, firewall, etc.	Businesses with more than 20 employees are target customers
Occasional Use Nomadic Service	Basic internet access for a daily or weekly fee	Tourists, business travelers
Secure Private Business Portable	Roaming access across city w/service features such as VPN & firewall	Business customer employees, field workers
Secure Government Portable	Mobile access by City agency users using mobile computing devices	Inspectors, public safety officers, meter readers, surveyors, etc.
Secure Government Fixed	Fixed access for City agency locations (T-1 like service alternative)	Municipal office locations

Source: Wireless Philadelphia request for proposals (2005).

- The network would be owned by Earthlink, and the agreement allowed Earthlink to directly sell retail access to end consumers, as well as to sell capacity on a wholesale basis to other potential service providers.
- A key element of the final network would be the provision of full-service Internet access accounts subsidized by Earthlink. These accounts would be made available to qualified low-income and disadvantaged persons in the city for $9.95 per month.
- Earthlink would also provide a complete set of network management, maintenance, support, and upgrade services. In parallel, the city empowered Wireless Philadelphia to manage the agreement with Earthlink, oversee the build-out of the network, and assume responsibility for championing the digital divide goal.
- Earthlink would initially pay $2 million over two years for the right to build the network and use city light poles to install its equipment. The $2 million would be paid in installments tied to the proof of concept, with the largest payment

to be made in the second year. After the second year, Earthlink would pay 5 percent of its revenues to Wireless Philadelphia, in addition to a per-pole usage fee.
- Wireless Philadelphia would use the funds paid by Earthlink to serve the needs of low-income residents by providing personal computers to both low-income residents and nonprofit organizations, conducting training programs, providing Web site development and online marketing assistance to small businesses, and raising awareness.

These arrangements required no investment from the city (contrary to the earlier assumption) and, on the surface, seemed like a win–win for all. The city created an entity—Wireless Philadelphia—to lead the social consciousness elements of its vision—and with the Earthlink agreement provided Wireless Philadelphia with the continuing funding and authority to have a chance at realizing this vision. By outsourcing all of the key technical, service, and management elements of the project, the city stayed away from activities that are typically outside its scope of expertise. Essentially, what the city government did was to monetize its passive assets such as lampposts and other rights-of-way properties. It had created a new source of income without investing anything.

The agreement generated considerable goodwill in various quarters, including the media. Nevertheless, the agreement still needed to be approved by the Philadelphia City Council. After considerable debate, and—according to media reports—pressure on both sides of the fence, the Philadelphia City Council eventually approved the Earthlink deal in March 2006. Work on building the network started immediately afterward. Wireless Philadelphia hired key staff during the spring and summer of 2006, including Greg Goldman, the first permanent chief executive officer. Goldman's background included experience with both the private and nonprofit sectors. Goldman's initial focus was to oversee the deployment of the 15 square mile proof of concept, which was completed by March 2007. In the summer and fall of 2006, Goldman also worked on creating the relationships and infrastructure needed to market the $9.95 "digital inclusion" accounts. One key element was establishing relationships with existing community and nonprofit groups that could both market the accounts and handle payments. As of May 2007, the proof-of-concept deployment was completed and rolled out to subscribers. Citywide implementation was expected by October 2007.

Lessons Learned

The Philadelphia initiative is one of the largest and most ambitious wireless projects in the world, and the city was one of the first to announce and start working on an MWN. The city government of Philadelphia intervened to accelerate the availability of low-cost, reliable wireless Internet access throughout the city. This may be considered a low-level goal, a means to an end. But there was also a much higher-level goal. The city government's intervention can be framed as the use of technology by government to promote social change and reduce disparity. To achieve this goal, the city played the role of a catalyst by taking on a variety of roles, such as champion, facilitators, steering committee, policy maker, partner, coordinator, consultant, project manager, referee, regulator, and capacity builder. It removed barriers to resources and provided incentives and a legislative framework to give stability to the new infrastructure. The key lessons of the Philadelphia wireless project are discussed further here.

First, a strong champion is required. From 2004 to about the middle of 2006, the original champion of the project was Dianah Neff, chief information officer in Philadelphia. Since the summer of 2006, Greg Goldman, chief executive officer of Wireless Philadelphia, has taken on a leadership role. Both Neff and Goldman championed the MWN in the media and in the community, and when necessary, they mounted a vigorous defense of the project. They had to work extremely hard to rationalize competing visions and maintain public interest while simultaneously staying current with technological developments. The champion of a project of this nature is subject to a large number of external and internal forces and competing claims; he or she must handle pressure from different constituents while remaining conscious of the sociopolitical context and complexity.

Second, diverse stakeholder interests must be managed. The city government had to manage the demands and challenges of different stakeholders, including telecommunications companies, civic leaders, community groups, the media, state government, city politicians, and the public. For instance, when both Verizon and state legislators appeared to be against the creation of MWNs, the city government coordinated a solution whereby Philadelphia could be excluded from anti-MWN legislation. To put pressure on legislators to exclude Philadelphia, the city government facilitated communications by activist groups and nongovernmental organizations to communicate the message that

the digital divide in Philadelphia could not be addressed solely through private sector efforts.

From a different perspective, to unite Philadelphians around the project, the city tapped into their civic pride and nostalgia about the city's past greatness. It told stakeholder groups what they wanted and needed to hear. When dealing with corporate leaders, the city emphasized how the MWN would enhance the city's image, whereas it emphasized to community groups how the network would address the digital divide. To further increase community support, the project leaders started discussions with the powerful Philadelphia school district about how the network could address problems facing the district. The leaders of future projects will need to play different roles and wear multiple hats to respond to the demands and challenges from extremely diverse and often powerful stakeholders. These pressures led to some difficult compromises. The time taken for approval was very long, and there were some stipulations that may prove difficult to implement. For example, according to the agreement with the city, Wireless Philadelphia should also "improve parental involvement in student education."

Third, private and public interests need to be balanced. With planning and creative thinking, it is possible to create structures that can optimize the interests of both the public and private sectors. In Philadelphia, a nonprofit organization, Wireless Philadelphia, led the social consciousness goals of the project, while a large, well-known for-profit organization, Earthlink, led the technical and management aspects of the project. By creating a nonprofit organization with a mission to lead the digital divide elements of the city's vision—and by providing the nonprofit with the authority and sustainable funding to take action—Philadelphia seems, at least in the short term, to have created a viable structure for realizing its social consciousness goals. By partnering with Earthlink to build the network, the city avoided involvement in activities in which it had little experience and credibility. It also made moot, to some extent, the philosophical and political challenges to the role of government in building MWNs. In addition, by actively working with local small businesses to deliver other services such as training and Web site development to the community, the city created a sense of opportunity for the private sector.

However, it is still too early to say whether the optimization of public and private interests in Philadelphia will be sustainable. For example, if the expected higher-paying retail customers do not materialize in the long term, it would not be unusual for a for-profit firm such as Earthlink to try to restructure the agreement or back out completely.

Fourth, the "application" of the MWN must be identified. A question that has been asked of MWNs is, "If you build them, will they come?" Setting up the infrastructure will not guarantee success, and enabling access is not synonymous with adoption or with an effective application. In Philadelphia, a decision was made to focus on Internet access as the main "application"; other cities have focused on more tangible applications, such as wireless meter reading. Yet even with simple Internet access, Philadelphia will face challenges in ensuring adoption and effective use. The current efforts of Wireless Philadelphia to connect with and use existing community groups to distribute the $9.95 digital inclusion accounts are a positive first step to ensure adoption. However, MWNs may be unadvisable when a community has preexisting Internet access options and there are no specific compelling applications. As Internet access becomes more and more easily available, newer MWN projects will likely face a higher bar for success and will need to include formal social programs, such as training, or tangible cost-effective applications, such as wireless meter reading, to ensure adoption and eventual success.

The digital divide is a tenable justification over the short term but faces long-term challenges. The principal method by which Philadelphia was able to draw concessions from opponents of the MWN project was to call attention to Philadelphia's considerable digital divide. This indicates that government involvement with MWNs may not be advisable in the absence of a compelling social rationale, such as the existence of a persistent digital divide. The existence of such a rationale gives government the moral confidence to pursue radical measures and encourages stakeholders to support these measures. However, the danger is that projects based on a digital divide may not be able to deliver measurable success. The digital divide cannot be resolved overnight. Digital divides arise from deep-seated socioeconomic causes that are related to education, income, culture, and attitudes toward technology. Simply providing low-cost access to the Internet is not going to make much of a difference in the short term. However, this is a "chicken and egg" argument. Take the case of a village in the third world that has no access to electricity. Providing this village with access to electricity will not transform its economy overnight. However, it will lay the basic foundation to enable it exploit this resource in the future. Moreover, without electricity, it has no hope of competing and participating in the

global economy. Similarly, ubiquitous Internet access will not transform a digitally divided city—such as Philadelphia—overnight. Nevertheless, it will lay a foundation that may enable the city to make strides toward eliminating the digital divide. Even if projects such as Wireless Philadelphia are successful at providing low-cost Internet access and even if they follow up with training, low-cost or free computers, community support and involvement, it will take a long time to show discernable change. This problem is further exacerbated because there are no reliable measures for gauging the true social and economic impacts of MWNs.

MWNs need insulation from unpredictable large-scale external forces. MWN projects are subject to unpredictable and large-scale social and political forces. For instance, in the United States, most projects are vulnerable to the four-year election cycle. What is acceptable at the community level may not be so at the state or national level. For instance, 10 MWN projects in the Netherlands were investigated by European Union commissioners for receiving "illegal state subsidies" (Taaffe, Dux, and Monegan 2005). In Philadelphia, the insulation from external forces was partly achieved by creating Wireless Philadelphia as a nonprofit that has its own funding source and management and is separate yet accountable to the city. However, according to its management agreement with the city, Wireless Philadelphia still has to submit its budget to the city for approval and comment.

The technology of MWNs will change. A recent new development, called broadband over power lines, allows Internet access to be supplied through power connections. Because buildings are already wired for power, this technology could remove the cost advantages of deploying wireless networks. In addition, approximately 90 percent of the telephone lines in the United States are currently DSL capable (Hearn 2006). DSL prices are falling rapidly and currently, with connections now available for around $15 per month. Lower-income consumers are typically more price conscious, and if the cost of DSL falls below the cost of wireless connectivity, consumers will likely go with the cheaper solution. A change in technology does not necessarily remove the underlying rationale for MWNs. Future projects will need to plan around such developments and create structures that are focused on the underlying need of the municipality rather than the capabilities of the specific technology. It is unclear whether the structures created in Philadelphia would survive a change in technology and whether Wi-Fi technologies will still be in use 10 years from today.

Conclusions and Future Research

Throughout history, there has been an ongoing debate about the appropriate role and scope of government. In the past, governments have often acted as catalysts to usher in new innovations. The demonstration of the first telegraph was funded by the U.S. government, and the Internet was created under a U.S. government program. Many high-technology and medical advances are derived from government-funded basic research. In each of these cases, government intervention has led to significant economic and human capital growth and resulted in large-scale transformations in society. However, such interventions are increasingly being questioned because of renewed faith in market-based mechanisms, the failure of some government-originated initiatives, and the burden of substantial government fiscal debt. It is increasingly difficult for governments to play the role of a catalyst in achieving technological and social objectives.

When the city government of Philadelphia announced its wireless initiative, it faced strong opposition from stakeholders who objected on the grounds that the city was in poor financial condition and that such a project would be better addressed by the private sector. Nevertheless, the city was undeterred and succeeded in facilitating collaboration among stakeholders and engaging citizen support to start the project. The city variously played the role of a champion, policy maker, partner, consultant, project manager, referee, and capacity builder. It removed barriers and provided incentives and a legislative framework to help target funding, ensure resources, and provide stability to the new infrastructure. Although it is fair to say that the Philadelphia wireless project is a success story that illustrates how governments can act as catalysts to initiate change and follow through on implementation, it is still too early to say whether the project has met its objectives. Even if the project is fully implemented and is able to attract sufficient subscribers, two major challenges remain.

The first challenge is how to measure success. There are no reliable social and economic measures of the digital divide that can be easily applied to the Philadelphia context. Simply counting subscribers will not necessarily show success. It will not necessarily show that those subscribers are now bridging the divide or that the health of the region is improving. There is a need for basic research to carefully delineate and validate appropriate social and economic measures of success. The second challenge is identifying the most

appropriate governance structure. We do not yet fully understand the implications and efficacy of the different public, private, and combinatory governance models that have been discussed. It is unclear whether the hybrid model in Philadelphia will ultimately be superior to another arrangement. There is a need for research to test and evaluate the different models based on metrics such as cost, social impact, effectiveness, and other measures. We believe that addressing these two challenges represents an important next step in fully understanding the evolution and impact of MWNs.

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Note

1. MWNs are based on a point-to-multipoint link between a base station and a subscriber's equipment. A base station is an outdoor antenna connected to the Internet that sends data wirelessly to subscriber equipment, such as laptops. Typical use of an MWN employs the built-in wireless card that is included in most laptops to connect to the Internet.

Chapter 10 Review Questions

1. Briefly, how do Thomson and Perry define the concept of collaborative public management? What do they describe as the essential five dimensions? In your view, do they make their case? Why or why not?
2. Does the case, "Government as a Catalyst" ultimately support or contradict the Thomson and Perry argument? Why or why not? On the other hand, does the case offer a different, even more convincing model?
3. What lessons are drawn at the end for this case study for practitioners? In your opinion, are they useful for public managers on the firing line? Why or why not?
4. There is a repeated public assertion—evidenced in the popular press and in political campaigns—that government is ineffective, inefficient, and uneconomical, and thus needs to become more businesslike. In your opinion, what are the sources and causes of this repeated public outcry? According to the authors, why is it an inaccurate perception? Or, why is it only partly correct?

Key Terms

collaborative public management
process-oriented definition
negotiations
commitment
assessments
implementation
multidimensional model
governance dimension
administrative dimension
autonomy dimension
mutuality dimension
trust and reciprocity dimension
costs of collaboration
stakeholders
policy vs. management

Suggestions for Further Reading

Much of the earliest literature on management in this century focused on the role of line managers in business—for example, Henri Fayol, *General and Industrial Management,* translated by Constance Storrs (London: Pitman, 1949); or Frederick W. Taylor, *Scientific Management* (New York: Harper & Row, 1911). Their emphasis on the values of efficiency, rationality, and clear lines of hierarchy was carried over into the public sector by such authors as Henry Bruere, W. F. Willoughby, Frederick Cleveland, Luther Gulick, and others, who pioneered the development of management techniques in the public sector prior to World War II. For a good collection of the works of these writers, see Frederick C. Mosher, *Basic Literature of American Public Administration, 1787–1950* (New York: Holmes and Meier, 1981); and for several excellent summary essays on the lives of key management theorists, read Brian R. Fry, *Mastering Public Administration* (Chatham, N.J.: Chatham House, 1989).

A book that should be read in its entirety is Chester I. Barnard, *The Functions of the Executive* (Cambridge, Mass.: Harvard University Press, 1938), because Barnard stands in marked contrast to the pre–World War II scientific management theorists and because he made an enormous impact on other postwar writers, like Herbert Simon, who decisively reshaped our whole view of this field. William B. Wolf, *The Basic Barnard* (Ithaca, N.Y.: Institute of Labor Relations, Cornell University, 1974) offers the best available commentary on Barnard's life and work. A good summary of the work of another important figure, Henry Mintzberg, can be found in Henry Mintzberg, *Mintzberg on Management: Inside Our Strange World of Organizations* (New York: Free Press, 1989).

Post–World War Two management thought was aptly described by Harold Koontz as "the management theory jungle," i.e., it is divided into multiple schools and perspectives. To sample some of these diverse points of view, read C. West Churchman, *The Systems Approach* (New York: Dell Publishing, 1968), or Bertram M. Gross, *The Managing of Organizations* (New York: Free Press, 1964), for the *systems approach;* read Harry Levinson, *The Exceptional Executive: A Psychological Conception* (Cambridge, Mass.: Harvard University Press, 1968), or Rensis Likert, *The Human Organization: Its Management and Value* (New York: McGraw-Hill, 1967), for the *human behavioral school;* refer to the several hundred cases available through the Harvard Business School that were instrumental in pioneering the methodology of the *case method;* for the *policy emphasis,* see Paul Appleby, *Policy and Administration* (Tuscaloosa: University of Alabama Press, 1949); and the *decision school* of management is well represented in books by Charles E. Lindblom and Herbert A. Simon (discussed in "Further Readings" at the end of chapters 8 and 9).

Where are we today in public management thought? Again, no consensus prevails, as described in the excellent overview essays by Hal G. Rainey, "Public Management: Recent Developments and Current Prospects," in Naomi B. Lynn and Aaron Wildavsky, eds., *Public Administration: The State of the Discipline* (Chatham, N.J.: Chatham House, 1990); as well as Eugene B. McGregor Jr., "Public Management," *JPAM,* 16, no. 1, 153–61 (1997). The older schools are still very influential, but unquestionably economic pressures have brought about a new outpouring of ideas on economy, efficiency and effectiveness, which are reflected in various "how to" *practical efficiency-oriented managerial writings,* such as Stephen Cohen, *The Effective Public Manager,* 3rd ed. (New York: Wiley, 2002), and his *Tools for Innovators* (New York: Wiley, 1998). For the best