



# Flexible Workforce for a Mobile Nation: Best Practices for State and Local Government PC Usage

Written for IT decision makers and practitioners in state and local government agencies in the US, this whitepaper describes the results of a Wipro study on PC usage models and best practices in meeting the current and future needs of the state and local government workforce.

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## EXECUTIVE SUMMARY

The social-cultural climate of the U.S. is changing. Working parents, crowded cities, environmental awareness, and the proliferation of home internet access and mobility are shaping our expectations for how we live and work today. Within IT organizations, technology trends and innovations also drive constant change and evolving user expectations. Compounding these factors is the global economic crisis and the resultant drop in government revenue and budgets. In 2009 Wipro interviewed 58 IT practitioners working in state and local government (SLG) agencies throughout the U.S. to assess the impact of these social, financial and technology trends on IT priorities and the use of PCs and PC-related infrastructure. Results from this study indicate that although SLG has taken some early steps to respond to these trends, **SLG is inhibited by the fact that it remains largely tethered to the desktop**: 84% of the average SLG PC fleet today is comprised of desktop PCs. Based on the results of this study, the most effective way for SLG to respond to these trends is to equip the SLG workforce with full-featured laptop PCs. By migrating PC fleets from primarily desktops today to primarily laptops during the next PC refresh cycle, SLG would realize the following benefits:

- **Improve Productivity:** Use laptop PCs to give workers anytime, anywhere access to information and databases, which boosts productivity in the field and enables after hours work. Use full-featured laptop PCs to allow workers to benefit from the full suite of PC-based communication and collaboration tools and improve collaboration both in the office and outside the office.
- **Accommodate Changing Citizen Demands:** Embrace the transition to open government and online self-service, and use it as an opportunity to free up knowledge workers to provide service to the growing pool of high need constituents. Make the knowledge worker workforce mobile, flexible, and available.
- **Become More Energy Efficient:** Reduce energy consumption and minimize CO<sub>2</sub> emissions by switching from desktops to energy efficient laptops and allowing employees to work remotely. Maximize energy savings with full-featured laptops equipped with Intel® vPro™ technology.
- **Bridge the Talent Gap:** Attract young talent with flexibility and mobility. Retain organizational knowledge by enabling retirees to work remotely, part-time. This will help counter the fact that the SLG workforce is disproportionately older than the general US workforce, and will be impacted by the coming retirement wave.

No matter how SLG requirements evolve, by migrating to a fleet of full-featured laptop PCs organizations can be sure that they have the tools to remain flexible and agile and adapt to these changes. Through the past 25 years of changing technologies and innovation in IT delivery, PCs have adapted and remained the key compute device for SLG. Our SLG study shows that PCs remain central and a fully featured laptop PC is the best tool to meet current and emerging user demands.

## INTRODUCTION: SOCIO-CULTURAL TRENDS ARE DRIVING CHANGE IN STATE AND LOCAL GOVERNMENT

Rapid advancements in technology over the last decade have made global connectivity and mobility an essential element of our culture and our lifestyle. Today, approximately 70% of American homes have internet connectivity<sup>1</sup>, and 89% of the population uses mobile phones<sup>2</sup>, compared to just around 36%<sup>3</sup> and 34%<sup>4</sup> respectively in 1999. As a result of this rapid increase in connectivity and mobility, we have come to expect anytime, anywhere access to people and information in both personal and professional settings.

Government organizations are beginning to feel the impact of this trend, the effects of which will only increase as younger generations begin using government services and entering the government workforce. In November, 2009 Wipro interviewed 58 IT decision makers and practitioners working in U.S. state and local government to assess SLG IT priorities and trends in the use of PCs and PC-related infrastructure. Results indicated that SLG is becoming increasingly:

- **Wireless:** 92% of SLG agencies offer external wireless access to their applications and databases, and 70% have wireless-enabled offices
- **Automated:** 82% of agencies are working to offer more self-service tools and information online
- **Web-based:** Use of web-based applications is expected to grow from 37% today to 58% in 3-5 years
- **PC-dependent:** 70% of agencies expect PCs to become more important to SLG core job functions in the next 3-5 years, with 54% expecting PCs to become “much more critical”

These results suggest that SLG is evolving in line with the changing expectations of their workforce and the public and is responding to meet the new requirements and demands.

In addition to the task of responding to demands for anytime, anywhere access to information, SLG is also in the midst of responding to greater expectations for energy efficiency. Results from the Wipro SLG study indicated that 48% of SLG already has energy efficiency initiatives in place. As energy efficiency climbs the priority lists of public sector leaders, organizations are crafting plans to consume fewer resources and minimize their environmental footprint. Wipro SLG study findings indicate that IT stands to play a critical role in these efforts as many of the current SLG initiatives are IT-led.

Another key element of our current socio-cultural climate that has caught the attention of SLG decision-makers is the rapidly aging and retiring workforce. According to Census data from 2006, 48% of the private sector workforce is over age 40, whereas in the public sector 60% of state and 63.5% of local government employees are over age 40<sup>5</sup>. With such a large percentage of the workforce nearing retirement, SLG is tasked with finding ways to both attract young talent and leverage the knowledge and experience of the retiring workforce to bring the new talent up to speed. The Wipro SLG study found that SLG is not adequately prepared to handle this challenge:

SLG Attribute	Percentage
Has policies in place to recruit young talent	32%
Indicated concern about knowledge loss due to retirement	58%
[Of those indicating concern about knowledge loss] Has policy in place to retain and transfer the knowledge of retirees	53%

Table 1. Source: 2009 Wipro SLG Study

IT has the opportunity to greatly impact SLG’s ability to attract talent and retain institutional knowledge by equipping young, technologically-savvy workers with the best available technology and providing technology tools and infrastructure to capture and share the know-how of older workers.

In the face of these changes – new public and workforce expectations, the increasing emphasis on energy efficiency, and the aging public sector workforce – SLG also has to ensure that their workers remain productive and effective and continue to provide great service. Though SLG has without question taken steps to adapt to the changing socio-cultural climate of its internal and external stakeholders, the Wipro SLG study identified several counterproductive tendencies common today that are making it difficult for SLG to do so with maximum efficiency and effectiveness:

- **Desktop Dependence:** 84% of the average SLG PC fleet today is comprised of desktop PCs, with just 13% and 3% on laptops and netbooks, respectively
- **Workforce Inflexibility:** Only 24% of SLG agencies have laws or policies that prevent them from implementing telework, but among the rest, just 8% have a general telework policy

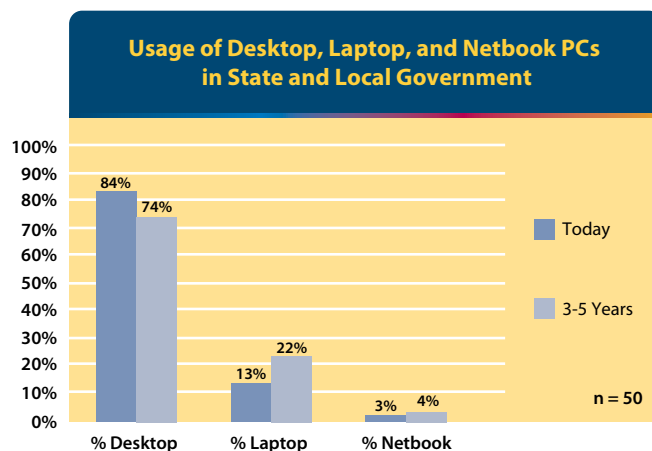


Figure 1. Source: 2009 Wipro SLG Study

Providing the SLG workforce with a fleet of full-featured laptop PCs can contribute to meeting the demands of the public, attracting a young and capable workforce, retaining the knowledge of retirees, and achieve new levels of energy efficiency and productivity. The benefits of a full-featured mobile PC fleet are numerous:

- **Improve Productivity:** Use laptop PCs to give workers anytime, anywhere access to information and databases, which boosts productivity in the field and enables after hours work. Use full-featured laptop PCs to allow workers to benefit from the full suite of PC-based communication and collaboration tools and improve collaboration both in the office and outside the office.
- **Accommodate Changing Citizen Demands:** Embrace the transition to open government and online self-service, and use it as an opportunity to free up knowledge workers to provide service to the growing pool of high need constituents. Make the knowledge worker workforce mobile, flexible, and available by equipping them with laptop PCs.
- **Become More Energy Efficient:** Reduce energy consumption and minimize CO<sub>2</sub> emissions by switching from desktops to energy efficient laptops while allowing employees to work remotely. Maximize energy savings with full-featured laptops equipped with Intel vPro technology.
- **Bridge the Talent Gap:** Attract young talent with flexibility and mobility. Enable retirees to work remotely part-time with laptops.

No matter how SLG evolves – be it changes to the connectivity model, the way applications are delivered, or the requirements of the workforce and citizens – full-featured laptop PCs ensure that organizations can adapt to accommodate these changes.

## IMPROVE PRODUCTIVITY

Seventy percent of Wipro SLG study participants expect PCs to become more important to SLG core job functions in the next 3-5 years, with 54% expecting PCs to become “much more critical” (See Figure 2). The key driver is the shift from data entry tasks to knowledge work where SLG employees are measured based on output of work rather than time spent on work. As more and more SLGs move towards knowledge work, they will need knowledge worker tools that enable collaboration and sharing of files and applications. The result of this trend is that IT will play an increasingly important role in enabling worker productivity in the years to come.

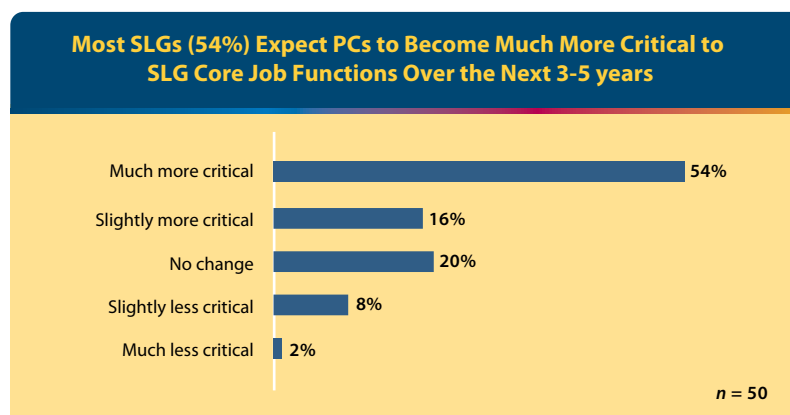


Figure 2. Source: 2009 Wipro SLG Study

Currently, 84% of the SLG workforce is tethered to desktop PCs. By migrating from desktop PCs to laptop PCs, SLG will give its workforce the tools to be more productive. Ninety-six percent of the Wipro SLG study participants that expected to see a change in productivity when switching from desktops to laptops expected productivity levels to increase, by anywhere from 5-30%. Recent research shows that on average, laptops increase productivity by 51 minutes per week<sup>10</sup>. The potential for productivity improvements comes from the following:

1. **Most SLG organizations today are wireless-enabled.** Ninety-two percent of SLG agencies offer external wireless access to their databases, and 70% have wireless-enabled offices (See Figure 3). With laptops, workers can take full advantage of external connectivity capabilities and log in after hours or from the field to access and process information. For example, field workers can file reports from the field at the time a task is performed, rather than waiting to return to the office to document their day's work. For those workers who primarily work in the office, laptops would grant them the flexibility to easily collaborate with colleagues in meetings and conference rooms rather than being tethered to their desks. This would allow workers to make notes directly into their laptops during meetings rather than having to transcribe handwritten meeting minutes afterwards.

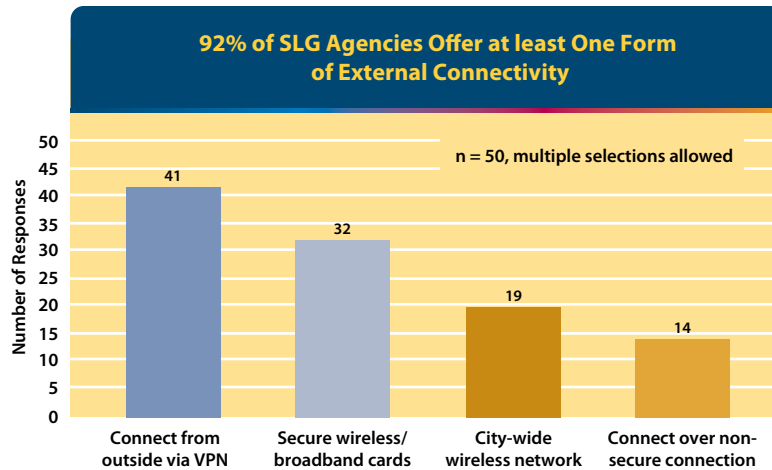


Figure 3. Source: 2009 Wipro SLG Study

2. **Applications are increasingly web-based**, which makes them easier to access and use from a mobile device. Wipro SLG study participants expect 58% of their applications to be web-based in 3-5 years time, an increase of 21% from the amount today (See Figure 4). With only a desktop PC, the workforce foregoes the opportunity to capitalize on the added flexibility and mobility that web-based applications offer. By equipping the workforce with laptop PCs, workers access their applications from anywhere and at any time.



Figure 4. Source: 2009 Wipro SLG Study

3. **PCs are becoming the center of communication for SLG employees.** Wipro SLG study participants expect growth in the use of PC-based communication and collaboration tools in the next 3-5 years, particularly Unified Communications technology and the use of softphones (See Figure 5). These communication and collaboration tools go hand-in-hand with mobility; their benefits can only be realized in part when workers are limited to using the tools via desktop PCs.



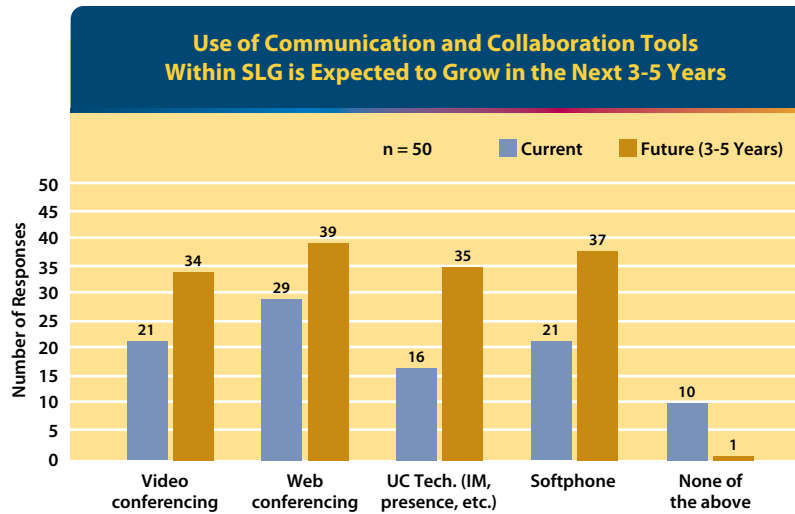


Figure 5. Source: 2009 Wipro SLG Study

One additional benefit of widespread wireless connectivity, Web-based applications, and laptop PCs being central to SLG workforce is the continuity of government operations. If government workers are accustomed to working from home and accessing SLG data from laptop PCs remotely, they are better equipped to cope with terrorist incidents, health scares such as the H1N1 virus, natural disasters such as hurricanes, floods and earthquakes, and man-made incidents such as power blackouts.

**Best practice recommendation:** Enable anytime, anywhere secure wireless access to web-based applications via laptop PCs equipped with PC-based communication and collaboration tools.

## The Use of Thin Clients in SLG

The Wipro 2009 SLG survey showed that around 14% of clients under management are thin clients. Growth in thin client use is most prevalent in internal-facing data entry functions such as record keeping and documentation. For most user types, departments, and environments in state and local government, full-featured Intel PCs offer greater flexibility and performance than thin clients. Given trends such as increasing mobility, more government services being offered outside of office locations, and the increasing need for knowledge worker roles, rich clients will continue to be a better fit for SLG (See Table2).

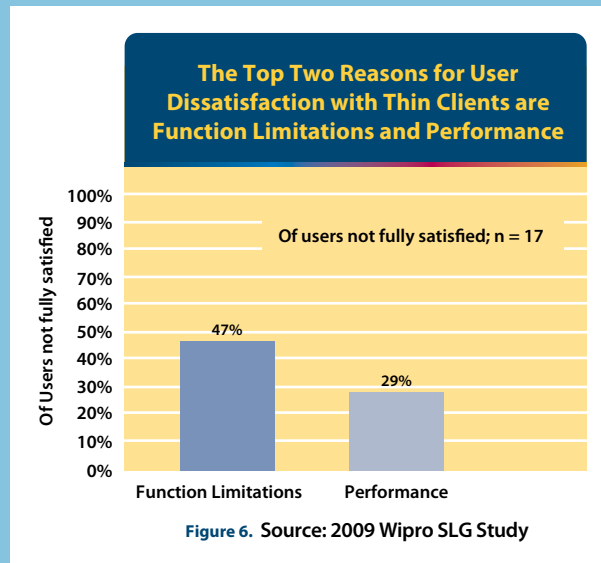
	Suitable for Thin Clients	Unsuitable for Thin Clients
<b>Function</b>	<ul style="list-style-type: none"> <li>• “Green screen” applications</li> <li>• Browser based data entry</li> <li>• Individual work</li> </ul>	<ul style="list-style-type: none"> <li>• Graphic, peripheral, or file sharing intensive tasks</li> <li>• Collaborative work</li> </ul>
<b>User Type</b>	<ul style="list-style-type: none"> <li>• Data entry workers</li> </ul>	<ul style="list-style-type: none"> <li>• Structured task workers</li> <li>• Knowledge workers</li> <li>• Field workers</li> </ul>
<b>Departments</b>	<ul style="list-style-type: none"> <li>• Record documentation</li> <li>• Certain City Hall departments</li> </ul>	<ul style="list-style-type: none"> <li>• Public works</li> <li>• Emergency response, hospitals, health care</li> <li>• Law enforcement, court, corrections</li> <li>• Utilities</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>• Office based</li> <li>• Few locations</li> <li>• Good connectivity</li> </ul>	<ul style="list-style-type: none"> <li>• Field and office work</li> <li>• Multi-location</li> <li>• Connectionless computing</li> </ul>

Table 2. Source: 2009 Wipro SLG Study

There are several reasons why SLG have not adopted thin clients more aggressively:

1. **Lack of Certified Applications:** Only 34% of applications used by the Wipro SLG survey participants are certified for use on thin clients today. This number should increase in time, but for the moment this increases the support burden on IT teams should they decide to deploy un-certified applications.
2. **Additional Cost of Support** - Moving support from inexpensive PC technicians to more expensive data center operations personnel negates some of the client hardware savings. This was particularly pronounced for SLGs with fewer than 1,000 employees, where we found that just 4% of clients were thin.

3. **User Satisfaction Issues:** The Wipro SLG Survey showed that the most common complaint from thin client users concerned limited functionality and performance (See Figure 6).



#### Dynamic Virtual Client -- A Flexible Alternative to Thin Clients

Dynamic Virtual Client (DVC) offers many of the hardware cost and management benefits of thin client computing without the performance and flexibility restraints. DVC is a family of application delivery methods that centralize management and data security without sacrificing a rich user experience and mobility of rich clients. Consisting of application streaming and virtualization, OS streaming, and virtual containers, DVC allows centralized image management, secure network storage, client side computation, and off-network mobility.

PCs with Intel vPro technology uniquely support Intel® Virtualization Technology (Intel® VT-x and Intel® VT-d) as well as Intel® Trusted Execution Technology (Intel® TXT). Intel® AMT can provide hardware and software inventories of Dynamic Virtual Clients and the clients can be accessed for remote management. The hardware supports the creation of a hardware layer hypervisor that enables the creation of virtual containers where applications and even the OS can be streamed to the PC for local execution. These images have an added measure of trust through the use of Intel TXT to create a measured execution and protect against root kit attacks. Intel VT-d allows the virtual containers to gain access to the PC's graphics processing unit or GPU allowing video intensive applications to function as they were intended to. Additionally, the hardware virtualization support only in Intel vPro technology means that the virtual containers can be more cleanly wiped from memory.

With PCs supporting Intel vPro technology, SLG can be prepared for the next wave of virtualization and reap the benefits of have in built in manageability, built in security, and great performing PCs today.

## ACCOMMODATE CHANGING CITIZEN REQUIREMENTS AND DEMANDS

As internet access has proliferated over the last decade, so has the amount of information available on the web. Accordingly, the expectation of access to information pertaining to SLG has also increased: 72% of Wipro SLG study participants indicated that they are currently working to offer more information and services online. Drivers of this trend are “open government” initiatives, and the desire to encourage self-service amongst citizens.

As online self-service becomes more popular, more and more of the simple tasks the SLG workforce carries out will be automated on the web, which frees the SLG workforce to focus their time and effort on more complex tasks. This is especially important to SLG today because of another trend which stands to alter the way SLG services its constituents: The rapid aging and diversification of the population. According to the U.S. Census Bureau, in 1970 approximately 47 million people (23% of the US population) were over the age of 50. The Bureau estimates that by 2050 there will be greater than 156 million people (36% of the U.S. population) over the age of 50<sup>iii</sup>. In addition to aging, the demographic makeup of SLG constituents is becoming increasingly diverse. In 2007 the International Public Management Association for Human Resources conducted a survey of 350 U.S. public sector professionals to assess the impact of the changing demographic makeup on public sector organizations. Results from their survey indicated that public sector organizations expect the communities they serve to become older, more diverse, and more varied in terms of ethnicity and income. Fifty-three percent of respondents expected these trends to lead to an increase in demand for services<sup>iv</sup>.

Together these trends are likely to force changes in service delivery within SLG, as organizations will be required to make adjustments to accommodate the growing body of constituents that have a higher need for service, such as foreign and elderly citizens. These two trends converge to make a very compelling case for laptop PCs in state and local government -- As the body of constituents with high need for government services grows, so does the number of employees required to provide these interactive services. At the same time, the percentage of the SLG workforce required to do simple data entry and document processing tasks is declining thanks to the growth in online self-service (See Figure 7).

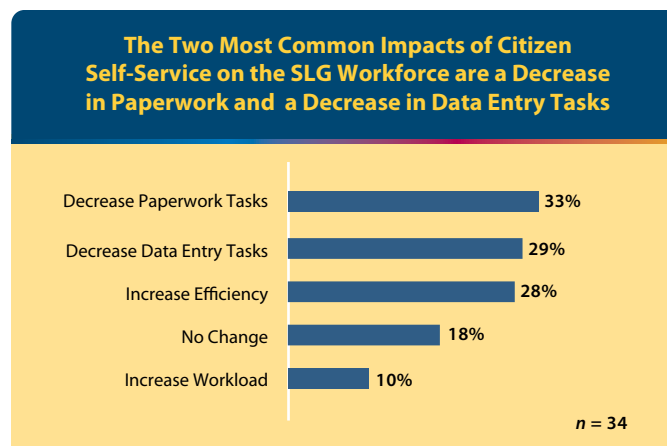


Figure 7. Source: 2009 Wipro SLG Study

The impact to the SLG workforce is an increase in the proportion of employees executing complex tasks, including field work and interacting with citizens to provide assistance. These job roles are the types of roles that typically necessitate laptop PCs rather than desktops. When Wipro SLG respondents that expected the use of laptops to increase over the next 3-5 years were asked to qualify the reason for this increase, 77% of respondents indicated that “more job roles will become eligible for laptop PCs” (See Figure 8).

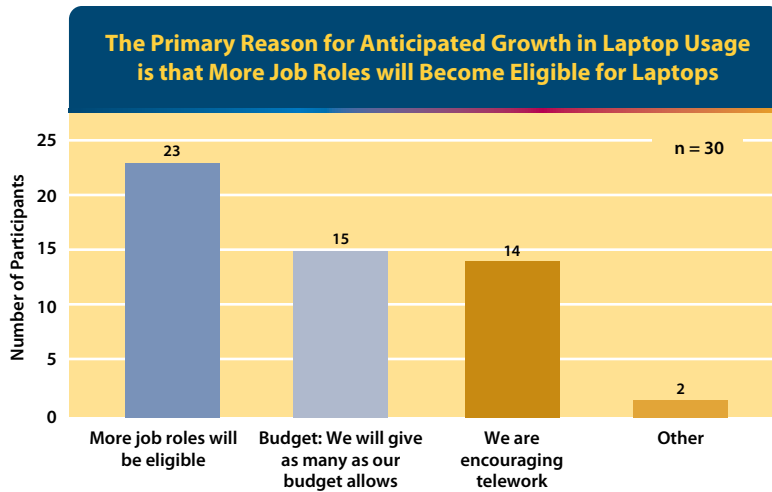


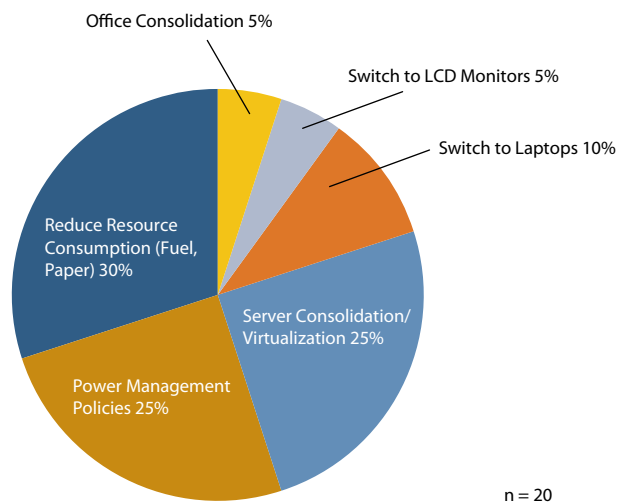
Figure 8. Source: 2009 Wipro SLG Study

**Best practice recommendation:** Embrace the transition to open government and online self-service, and use it as an opportunity to ramp up knowledge workers to provide service to the growing pool of high need constituents. Make the knowledge worker workforce mobile, flexible, and available by equipping them with laptop PCs.

## BECOME MORE ENERGY EFFICIENT

More and more organizations in the public and private sectors are prioritizing energy efficiency initiatives and adopting sustainability and commuter reduction measures in order to reduce their carbon footprints and improve the environment. The Wipro SLG study found that many SLG agencies are taking steps towards making their organizations more energy efficient today and preparing for future environmental regulations. Forty-eight percent of SLGs surveyed already have initiatives in place, with 65% of these initiatives being primarily IT-led (See Figure 9).

### 65% of SLG Energy Efficiency Initiatives are IT-led



**Figure 9. Source: 2009 Wipro SLG Study**

The adoption and implementation of energy efficiency initiatives can help SLG reduce the cost of power and lessen the impact of employee travel on the environment. To illustrate the potential energy conservation and annual savings, consider the following model SLG organization (Model SLG). The Model SLG was created by averaging the firmographic data from all of the participants in the Wipro SLG study. If this Model SLG were to migrate from today's 82% desktop (90% on LCD Monitors and 10% on CRT Monitors) and 18% laptop PCs to 75% laptop and 25% desktop PCs (all with LCD monitors) in its next refresh cycle, and if this organization were to implement a 2-day per week telework policy, the Model SLG could realize the following annual savings and environmental impact (See Table 3).

Attributes of Model SLG	Model SLG Before Implementing Energy Efficiency Measures	Model SLG After Implementing Energy Efficiency Measures	Model SLG Savings/ Impact	Model SLG Per Employee Savings/ Impact
# of PC Users	4700	4700		
PC Environment Type	82% Desktops with 10% on CRT / 90% on LCD Monitors 18% Laptops	75% Laptops 25% Desktops with 100% on LCD Monitors		
Telework Policy	Exception Based	2 Days Work From Home		
% of Workers Driving	80 %	80 %		
Carbon Dioxide Emmissions from Driving to Work (Pounds on Annual Basis)	35,605,044	21,363,027	14,242,018	3,030
Annual Fuel Consumption for Employees Driving to Work (Number of Gallons)	1,817,295	1,090,375	726,917	155
Annual Cost of Powering PCs	\$ 128,526	\$ 59,014	\$ 69,512	

Table 3. Source: 2009 Wipro SLG Study

### **Best Practice Recommendation**

In order to achieve the savings and energy reduction benefits detailed above in Table 3, SLGs would need to implement the following best practices:

1. Switch from a mostly desktop environment to a mostly laptop environment as illustrated in the above Model SLG example.
  - Desktops consume about 3.6 times more kilowatts of energy per day compared to laptops<sup>vi</sup>.
2. Switch from CRT monitors to LCD monitors
  - On a daily basis CRT monitors in active use consume more than 1.5 times the amount of energy to run an LCD monitor<sup>vii</sup>.
3. Establish a general (two days per week) telework policy to reduce emissions and fuel costs by approximately 40% annually.
  - As noted in Table 3, the Model SLG after implementing a telework policy reduced carbon dioxide emissions by 14,242,018 pounds, which is the equivalent of taking 1,513 cars off the road per year<sup>viii</sup>.



## BRIDGE THE TALENT GAP

### Attract Younger Workers into Government Service

The public sector is on the verge of a mass exodus of institutional knowledge. According to Census data from 2006, 48% of the private sector workforce is over age 40, whereas in the public sector 60% of state and 63.5% of local government employees are over age 40<sup>iv</sup>. With such a large percentage of the workforce nearing retirement, the pressure is on for SLG to find ways to both attract young talent and capture the knowledge of the retiring workforce so that it can be transferred to new recruits. According to the Wipro SLG study, very little energy is being dedicated to attracting new recruits within SLG; just 32% of respondents have strategies in place to recruit college graduate-level candidates. The vast majority of these strategies (75%) are focused on building ties with universities (See Figure 10).

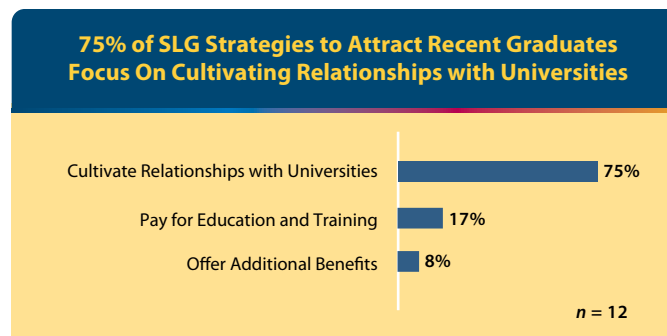


Figure 10. Source: 2009 Wipro SLG Study

Although these efforts are constructive, they are not sufficient to fill the gap that is widening as more and more of the SLG workforce nears retirement. Undoubtedly, attracting young talent is no simple task for SLG: knowledge workers in state and local government agencies earn 20 and 25 percent less, respectively, than knowledge workers in the private sector<sup>xv</sup>. This means that in order to remain competitive with the private sector, SLG has to be able to offer prospective employees additional non-monetary benefits such as flexible working conditions, education, and training. IT has the opportunity to play a role in attracting new talent by providing young technologically-oriented workers with the tools and applications to support flexible working environments. The expected toolset includes smart phones, and wireless access to data on more secure, full featured laptops. With laptops, workers would be able to pick up their work more easily outside of the traditional 9-5 workday, a tradition that is rapidly eroding with new communications tools and expectations of accessibility.

Laptops also enable organizations to offer prospective employees the opportunity to work from home one or more days per week. The Wipro SLG study found that 76% of SLG agencies have no policies or laws preventing telework such as this, but among those only 8% have a general telework policy (See Figure 11). Given the lack of adoption of general telework policies in SLG today, telework represents a major opportunity for SLG to become highly competitive with the private sector.

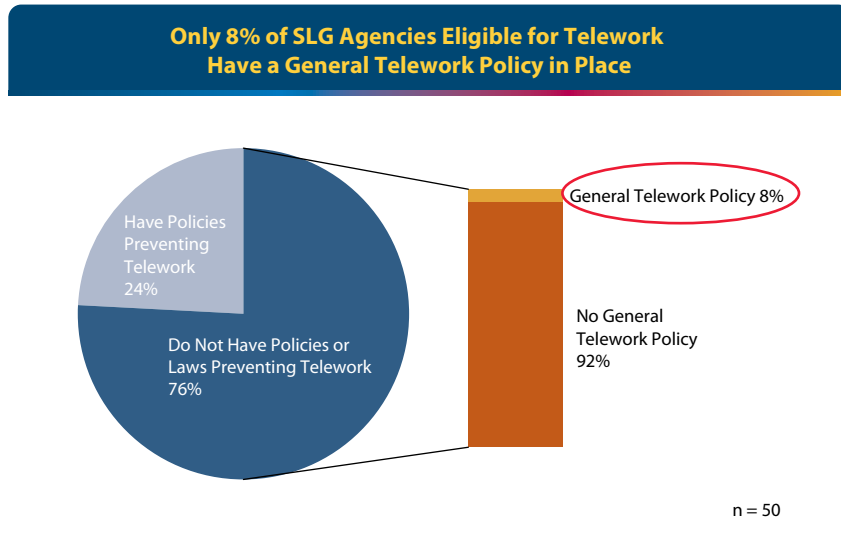


Figure 11. Source: 2009 Wipro SLG Study

**Retain Institutional Knowledge**

Attracting young talent is only half of the battle to bridging the talent gap in SLG; organizations also must find ways to harness the institutional knowledge of the retiring workforce before it is lost. According to the Wipro SLG study, 58% of SLG agencies are concerned about knowledge loss due to retirement, but of those concerned only 53% have a policy in place to retain and transfer the knowledge of retirees (See Figure 12).

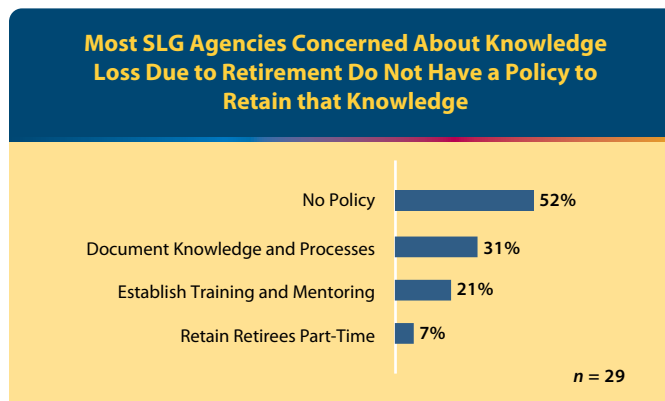


Figure 12. Source: 2009 Wipro SLG Study

As displayed in Figure 12, for those organizations that do have policies in place to capture the knowledge of retiring workers, documentation of knowledge and processes is the most common, with training, mentoring, and part-time work for retirees happening less frequently. Although documentation is good, the information gathered is static and limited in its context, which often leaves gaps for the new employee. Having retirees participate in training and mentoring are much more dynamic methods of passing on institutional knowledge; several Wipro SLG study participants keep their retirees on part-time to act as mentors and pass on their knowledge. One way SLG can entice more retiring workers to participate in training, mentoring, and part-time advising is to equip the retiring workers with PCs they can take home. If given laptops, retirees would be able to stay connected to the organization remotely to provide guidance and support as new employees are brought up to speed. Without the flexibility to participate remotely with laptop PCs, SLG will likely have a more difficult time incenting retirees to come into the office to carry out their roles as advisors and mentors.

**Best practice recommendation:** Attract young talent by offering a flexible work environment and other soft benefits such as education and training. Remove obstacles to retirees working remotely, on a part-time basis as mentors and advisors by equipping them with laptop PCs to securely connect with their colleagues. come into the office to carry out their roles as advisors and mentors.

## INTEL® HAS THE TECHNOLOGY TO ENABLE A MOBILE WORKFORCE

Wipro SLG study participants regard laptop PCs positively, and on average expect the use of laptop PCs to grow by 9% in the next 3-5 years. Hesitation around migrating from desktop to laptop PCs comes from the perception that security and manageability are diminished with laptop PCs (See Figure 13), and that laptops are most costly. Wipro analysis conducted in 2009 shows that on average, the total cost of ownership of a laptop is 38% higher than a desktop, but the additional productivity benefits of laptops quickly outweighs the cost<sup>iv</sup>.

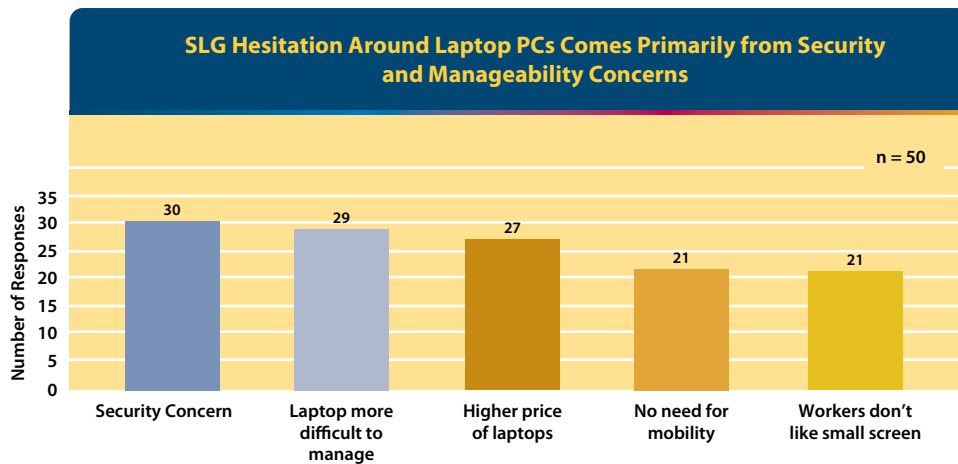


Figure 13. Source: 2009 Wipro SLG Study

PC security is a general concern for SLG; and the concern extends to both desktops and laptops. When asked what keeps them up at night with regards to their PC fleet, an overwhelming number of SLG IT practitioners cited security concerns (see Figure 14).

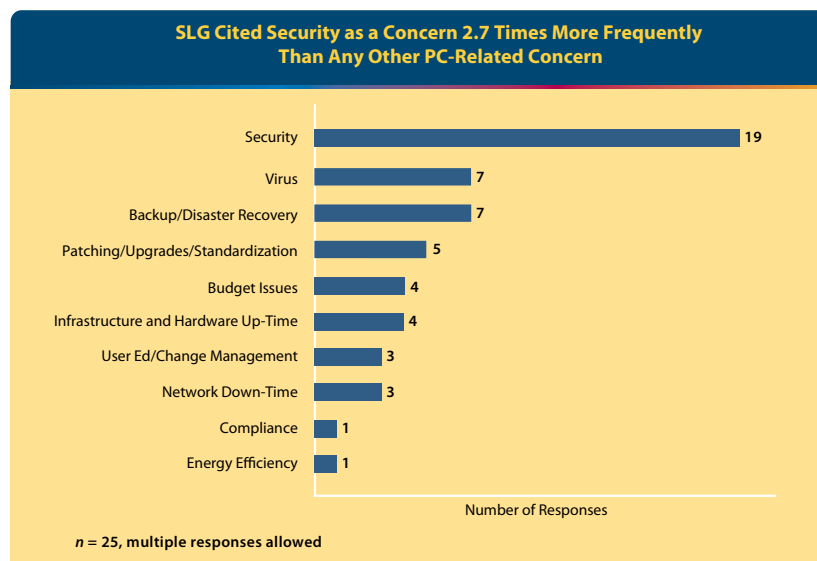


Figure 14. Source: 2009 Wipro SLG Study

Intel vPro technology can help to alleviate some of these security and manageability concerns. A fleet of full-featured PCs equipped with Intel vPro technology's hardware assisted security and manageability capabilities would allow SLG IT to take control of remote systems, even if the PC is powered off or if the operating system is unresponsive. Intel vPro technology is optimized to work with a wide variety of common management consoles. The Wipro 2009 SLG survey revealed that 72% of SLG IT departments were managing PCs centrally using remote software management and distribution tools, and 91% of the tools in use had native Intel vPro technology support (See Figure 15).

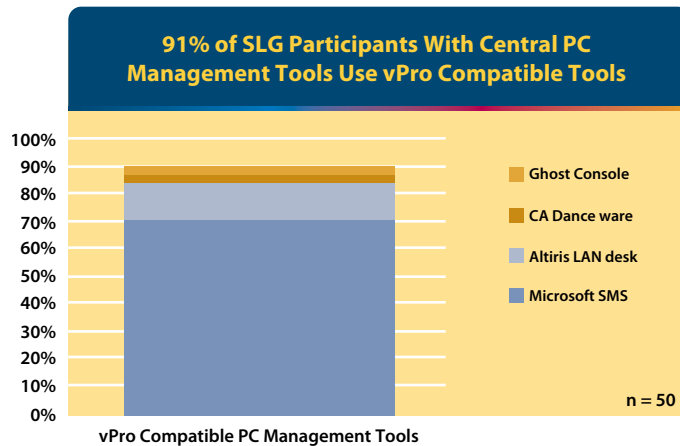


Figure 15. Source: 2009 Wipro SLG Study

Specific benefits of Intel vPro technology to SLG include:

**Intel vPro Technology for Better Security:** Intel vPro technology is used to improve network traffic filtering and to isolate PCs under attack. Automated security agent verification means that systems that are not compliant with SLG IT policies can be rapidly flagged and brought back into compliance. Additionally, the hardware-assisted antivirus protection of Execute Disable Bit protects your PCs from certain viruses that use buffer overflow attacks. Additionally, Intel® Anti-Theft Technology (Intel® AT) allows laptops to be disabled if they are lost or stolen, rendering the lost data harmless and the stolen laptop useless. Intel AT can block the OS from loading, even if the hard drive is replaced or reformatted. Intel AT can also be used to disable access to data encryption keys and block access to valuable data on the hard drive, even if the drive is moved to a different system.

**Intel vPro Technology for Improved Manageability:** Intel vPro technology significantly increase IT's ability to track, manage, and repair mobile PCs over a wired or SLG wireless network, or even outside the corporate firewall through a wired LAN connection. This technology allows IT organizations to:

- Discover, identify, and proactively update software on laptops that are wired into the network and plugged into the wall, even if they are powered off
- Remotely diagnose and take remedial action on laptops even when there are problems with the operating system or some hardware components have failed

These actions are enabled by the use of an out-of-band communication channel that allows IT staff to reach laptops even when ordinary communications channels have ceased functioning.

**Intel vPro Technology for Remote Power**

**Management:** Only 38% of organizations in the Wipro 2009 SLG study had a policy of switching PCs off at night in place, and even those with policies did not succeed in full enforcement. Intel vPro technology can be used as part of an energy efficiency effort. IT technicians can remotely power up or power down PCs, and it is no longer necessary for users to leave their systems on for patching and maintenance at night.

## Optimal PC Refresh Cycles

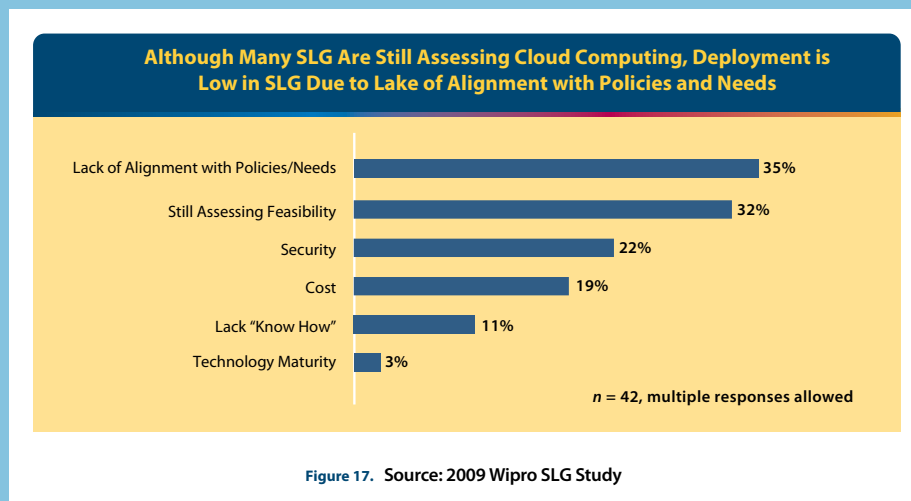
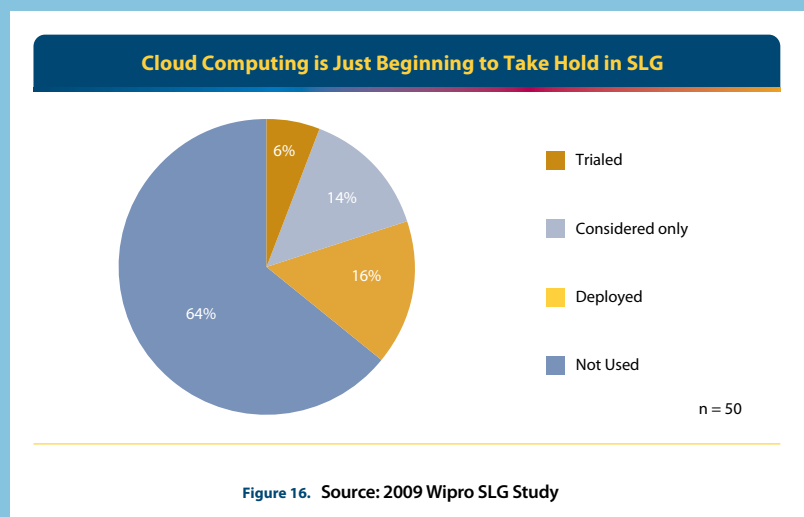
The Wipro 2009 SLG study showed that the average PC refresh cycle in SLG is 3.84 years for desktops and 3.71 years for laptops. This is in line with cost optimal ownership of three years given prevailing IT labor costs and PC failure rates by age of machine<sup>xxii</sup>. 74% of SLG IT departments interviewed have experienced budget cuts in the past year, by an average of 17%. Faced with budget shortfalls, it can be tempting to extend PC lifecycles to conserve cash. Wipro analysis shows that delaying refresh can be a false saving – savings on PC acquisition costs in years 4 and 5 are outweighed by the increased support and out of warranty repair costs. When making an assessment of cost savings and PC refresh cycles, SLG IT decision makers should take the entire cost of PC ownership into consideration, rather than focusing purely on the acquisition cost.

## Adoption of Cloud Computing in SLG

It is still early days for cloud computing in state and local governments. The Wipro SLG 2009 survey showed that only 36% of agencies surveyed had considered, trialed or deployed applications in a cloud environment (See Figure 16).

Cloud computing may enable SLG IT teams to meet the increasing demands for remote services and access and for lower IT budgets. However, many of the Wipro SLG study participants expressed uncertainty and hesitation about cloud computing and its fit with policies and user needs. Overall, 62% believed these barriers will be overcome, but 38% felt that they would not (See Figure 17).

The consensus view from Wipro SLG study participants is that cloud computing itself will have a limited impact on client PC computing. However, SLG IT teams need to ensure that whatever form the cloud takes, or however an application is designed to run on it, the client devices can effectively access and run the applications. A full featured mobile PC platform is the best guarantee for compatibility, whatever the future of cloud computing.



## CONCLUSIONS AND RECOMMENDATIONS

Wipro recommends that SLG IT departments assess current and future workforce PC requirements and make the necessary investments to ensure that the agency is meeting the demands of citizens and government employees. Specifically, SLG should consider implementing the following best practices:

- 1) Enable anytime, anywhere secure wireless access to web-based applications via full-featured laptop PCs equipped with PC-based communication and collaboration tools.
- 2) Embrace the transition to open government and online self-service, and use it as an opportunity to free up knowledge workers to provide service to the growing pool of high need constituents. Make the knowledge worker workforce mobile, flexible, and available by equipping them with full-featured laptop PCs.
- 3) Drive energy efficiency by switching from power hungry older desktop PC models to an environment that is 75% laptop. Move entirely to LCD monitors, and consider work from home for many job roles to reduce commute costs and office space.
- 4) Consider investing in PCs with Intel vPro Technology-enabled processors. For laptops, the added security and manageability allows SLG IT to confidently manage systems even if they are outside of the agency LAN. For desktops, Intel vPro Technology reduces the number of desk-side visits and associated costs.

By embracing these best practices, SLG IT teams can lead their organizations in meeting the challenges posed by socio-economic trends such as a culture of mobility, increased citizen expectations for service accessibility, energy efficiency, and demographic shifts.



## APPENDIX

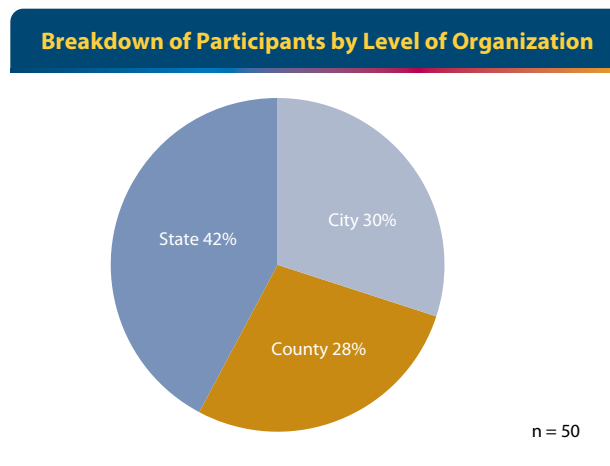
### Methodology

From October through November 2009, Wipro PSA interviewed and gathered data from CIOs, IT directors, and senior IT managers at 58 state and local government organizations on the current and emerging PC requirements of their workforce and their IT infrastructure requirements. The average participating government organization had approximately 4700 PC users primarily working from desktop PC stations and represented a range of government agency types across the United States.

The data from this paper comes from detailed in-depth interviews with eight state and local government organizations (SLGs) and follow-up and validation surveys with 50 SLGs. All research participants were directly responsible for PC support and management activities or served as key decision makers for PC investments at their organization (see Firmographics section for more detail).

### Firmographics

By government organization level, the largest participation came from state level government agencies and offices followed by city offices and organizations. The chart below provides an overview of the breakdown of survey participants by level of organization.



**Figure 18.** Source: 2009 Wipro SLG Study

The largest segment of SLG participants came from public works and utilities followed by city hall offices across the United States. The chart below provides an overview of the SLG organization types.

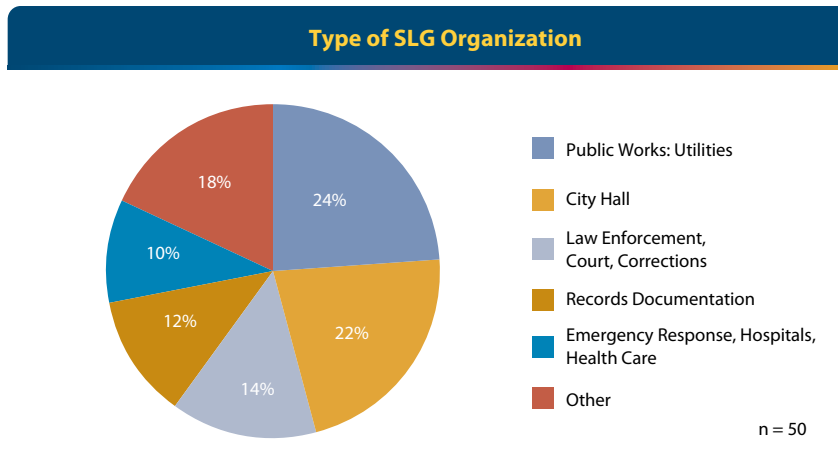


Figure 19. Source: 2009 Wipro SLG Study

Thirty-eight percent of participants managed organizations with fewer than 1000 PC users. The majority, over 50% of survey participants came from SLGs with the number of PC users ranging from 1,000 to 10,000. A small minority represented the larger end of SLGs with over 10,000 PC users. The chart below gives an overview of the distribution of PC users across all SLGs participants.

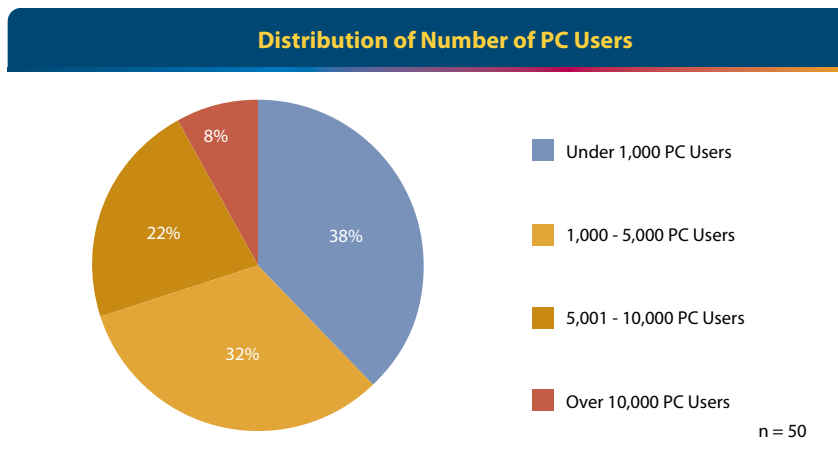


Figure 20. Source: 2009 Wipro SLG Study

### Assumptions Used to Model Representative Government Agencies

The data listed in the table below models three representative government agencies:

1. All SLGs – This overall model government agencies represents the average size in terms of number of employees, satellite offices and PC users. Other key attributes include PC client environment type and refresh cycle. This model takes the entire data set from the 2009 Wipro SLG Survey.
2. Under 1000 Employees – This model government agency represents the attributes of the smaller state and local government agencies.
3. 1000 Plus Employees – This model government agency represents the attributes of the larger state and local government agencies.

Model SLG	All SLGs	Under 1000 Employees N = 18	1000 Plus Employees N = 32
Total Number of Employees in Organization	5581	304	9330
Average Number of Satellite Offices	65	16	83
Number of Employees Who Use PCs	4693	260	7841
Percentage of Workers Using Laptops	13%	12%	15%
Percentage of Workers Using Desktops	84%	88%	81%
Average Cost of Powering All Laptops Per Year	\$ 3,822	\$ 189	\$ 7,553
Average Cost of Powering All Desktops Per Year (Without Monitors)	\$ 88,091	\$ 5,119	\$ 141,068
Percentage of Workers Using Thick Client	86%	96%	82%
Percentage of Workers Using Thin Client	14%	4%	18%
Average Laptop Refresh Cycle (Years)	3.71	4.00	3.50
Average Desktop Refresh Cycle (Years)	3.84	4.00	3.72

Table 4. Source: 2009 Wipro SLG Study

The three model companies are similar and only diverge on the following:

1. The 1000 plus agencies have slightly more PC users on laptops versus desktops
2. The under 1000 agencies only have 4% of workers using Thin Client versus the larger agencies with 18%

### Power Use and Savings of Model Government Agencies

The data listed below details out the averages for the three model government agencies in terms of power consumption and potential savings.

The key differences between the smaller (under 1000 employees) versus the larger (1000 plus employees) model government agencies are the following:

1. Ninety one percent of smaller government agencies use LCD monitors with desktops versus only 87% of larger government agencies.
2. The commute time and distance of the larger government agency employees is nearly double that of the smaller agencies.
3. Eighty two percent of smaller agency employees drive to work in comparison to 78% of larger agencies.

Model SLG	All SLGs	Under 1000 Employees N = 18	1000 Plus Employees N = 32
Percentage (%) of Desktops with CRT (Cathode Ray Tube) Monitors	11%	9%	13%
Percentage (%) of Desktops with LCD (Liquid Crystal Display) Monitors	89%	91%	87%
Average Annual Cost of Powering All Desktops with CRT (Cathode Ray Tube) Monitors	\$ 7,522	\$325	14,443
Average Annual Cost of Powering All Desktops with LCD (Liquid Crystal Display) Monitors	\$ 38,182	\$ 2,174	\$ 62,589
Average Commute Time of Employees (Minutes) Per Day	58	38	72
Average Commute Distance of Employees (Miles) Per Day	34	26	42
Percentage of Employees Driving to Work	80%	82%	78%
Total Fuel Cost for All Employees Driving to Work Per Year	\$ 5,681,565	\$ 233,547	\$ 11,108,151
Carbon Dioxide Emission Per Employee Driving to Work Per Year (Total Pounds)	9,415	6,976	11,338
Total Annual Carbon Emission for All Employees Driving to Work (Total Pounds Per Year for All Employees)	42,280,005	1,737,968	82,662,561
Carbon Emission Reduction Per Year (With Two Days a Week at Home Policy)	16,912,002	695,187	33,065,025
Fuel Costs Reduction Per Year (In Gallons) (With Two Days a Week at Home Policy for Those Driving to Work)	864,445	35,534	1,690,095
Annual Fuel Cost Savings Per Employees (With Two Days a Week at Home Policy)	\$ 484	\$ 359	\$ 567

Table 5. Source: 2009 Wipro SLG Study

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- <sup>i</sup> See Appendix for complete methodology.
- <sup>ii</sup> Pew Internet & American Life Project. February 15 – March 7, 2007 Tracking Survey. (website)
- <sup>iii</sup> Cellular Telephone Industries Association ([http://www.ctia.org/media/industry\\_info/index.cfm/AID/10323](http://www.ctia.org/media/industry_info/index.cfm/AID/10323)).
- <sup>iv</sup> World Bank, World Development Indicators, Internet Usage for United States in 1999
- <sup>v</sup> Cellular Telephone Industries Association ([http://www.ctia.org/media/industry\\_info/index.cfm/AID/10323](http://www.ctia.org/media/industry_info/index.cfm/AID/10323))
- <sup>vi</sup> Center for State and Local Government Excellence, Public Sector Employment: The Current Situation.
- <sup>vii</sup> Forrester Consulting, Increase Productivity By Providing Notebooks Beyond The Road Warriors, October 2008
- <sup>viii</sup> <http://www.census.gov/popest/national/national.html>
- <sup>ix</sup> Davidson, Glenn; Lepeak, Stan; Newman, Elizabeth. The Impact of the Aging Workforce on Public Sector Organizations and Mission. International Public Management Association for Human Resources. 2007.
- <sup>x</sup> A knowledge worker works in an unstructured, free-form way with ideas that are built on collaboratively to develop new documents, forms and processes. Types of workers falling into this category include middle/senior managers. This is in contrast with structured task workers, who work with information rather than ideas, creating and consuming reports. Types of jobs falling into this category include bank clerks, call centre operators, nurses and people in supervisory roles such as store managers, bank managers, and nursing supervisors.
- <sup>xi</sup> Wipro SLG Study 2009 Power Savings Calculations. Power consumption of PCs based on Lenovo models T60 and T500.
- <sup>xii</sup> [www.energystar.gov](http://www.energystar.gov) Assumptions for CRT and LCD Monitor power consumption and costs.
- <sup>xiii</sup> Source: Energy Information Administration Fuel and Energy Source Codes and Emissions Coefficients for Carbon Dioxide Emission in pounds per gallon of gas. Calculation is based on Annual Emissions Savings for Model SLG / Average Emissions Per Car Per Year= Equivalent number of cars taken off the road per year by the Model SLG adopting a 2 day work at home policy.
- <sup>xiv</sup> Center for State and Local Government Excellence, Public Sector Employment: The Current Situation
- <sup>xv</sup> Center for State and Local Government Excellence, Public Sector Employment: The Current Situation
- <sup>xvi</sup> See Wipro whitepaper, *Using Total Cost of Ownership to Determine Optimal PC Refresh Lifecycles*, May 2009 for detailed analysis on Desktop and Laptop costs
- <sup>xvii</sup> See Wipro analysis on Equivalent Annual Cost for cost optimal PC refresh cycles, contained in the whitepaper, *Using Total Cost of Ownership to Determine Optimal PC Refresh Lifecycles*