

This project revealed a variety of practices that project managers and participants can use to develop successful state-local information systems. It also uncovered issues that constrain success, but that cannot be addressed by single project teams acting on their own. These constraints are the result of environmental factors that combine to reduce the effectiveness and increase the cost of all state-local systems. This chapter discusses these systemic constraints on effective systems and offers three sets of recommendations for mitigating their effects.

Environmental factors that shape state-local systems

Every information system operates in a larger context that includes the policy, legal, and economic environment; program rules; business processes; management techniques; and human and organizational limitations. Our review of the goals, methods, and problems encountered across the eleven projects revealed several environmental factors that made all systems more difficult and costly than they might have been. Figure 2 shows how these factors combine to produce these undesirable consequences.

Figure 2. Systemic Constraints on Effective State-local Systems

State and local roles and relationships

This is a period of cultural change in which much responsibility for public services is being “devolved” from the federal government to the states; states are trying to avoid placing “unfunded mandates” on local governments; and local officials are trying to serve citizens at lower cost but with greater attention to customer service and convenience. The interdependent nature of most new program initiatives means complexity beyond anything we have experienced in any one organization, no matter how large. These shifts in public policy must rely on effective links between state and local levels of government. Yet, the state-local context for information systems is complicated and often poorly understood. State agency staff tend to think of local governments as more or less similar operations. Local officials tend to view state agencies as organizations with independent authority to make decisions and act. Neither view is accurate. Not long ago, local government participation in state initiatives was often mandated by state law. Today that participation is more likely to be voluntary. Once, state agency regional offices were stepping stones on the career ladder for both state and local officials. Today, state agency presence in localities is greatly reduced as is the likelihood that a person will have job experience at both the state and local levels of government.

In terms of mission, it is simplistic, but useful, to think of local government agencies as falling into three categories: general purpose public service agencies (e.g. County, Town, Village, and City Clerks) offering well-defined routine transactions initiated by citizens; specialized program agencies (e.g. County Health Departments, City Assessors, Highway Departments, Local Social Services Districts) carrying out a dynamic set of related services that often involve ongoing relationships with customers; and administrative support offices (e.g. County Data Processing Departments, City Purchasing Offices) conducting a variety of centralized support and oversight functions.

In addition, local agencies respond to an array of elected officials, some of whom are department heads (such as the Clerks) and others who are responsible for overall executive and legislative functions (such as Mayors, County Executives, County Legislators, and Town Council Members). New York’s strong traditions of local autonomy and “home rule” mean that these officials take seriously their authority to act independently of the State or to exercise the options that state programs provide.

In general, state agencies specialize in single policy areas such as education, public health or transportation. Their programs are strongly influenced, if not wholly defined, by federal laws and regulations. They turn federal requirements into statewide policies, programs and procedures that have to work in all corners of the state—urban, rural; affluent and poor; industrial and agricultural. They usually manage statewide implementation through local governments as their agents. Each state agency tends to deal with one or very few kinds of local counterparts throughout the state (e.g., the State Health Department deals mostly with County Health Departments, the Office of Real Property Services deals mostly with City and Town Assessors and County Real Property Directors). State agencies rarely deal with local jurisdictions in their totality.

State agency staff tend to be highly specialized in their professions. Although all agencies have a cadre of general administrators and support staff, they are mostly made up of people with specialized skills and training, who are responsible for the statewide policy implications of single programs. By contrast, local officials often handle a variety of programs and issues. They are well-versed in the “street level” implications of programs.

Enormous variation in local conditions

It is easy to think of local government as a uniform public entity operating in our communities. Nothing could be further from the truth. There are many different kinds of general purpose local jurisdictions. New York has 57 counties stretched from Lake Erie on the Canadian border, to the isolated tip of Long Island; 62 cities ranging from little Sherrill with a population of 2,864 to mammoth New York City, and 932 towns that are home to as few as 47 and as many as 725,605 New Yorkers. There are also thousands of special districts that manage schools, fire protection, sewers and water systems, transportation services, and other specialized activities. Within each kind of local jurisdiction there is an infinite variety of specific conditions:

- physical size and geography
- population size, density and demographic characteristics
- degree of and trends in urbanization
- types of businesses and educational institutions
- economic conditions
- volume of service transactions
- mix of state and local services offered
- kind, number, and specialization of staff
- kind, amount, and sophistication of information technology
- degree of formalization in organizational structure and functions
- the way these characteristics combine and interact to produce specific local conditions

Diverse missions of government agencies and programs

Every level of government tries to carry out a large number of missions that often have little to do with one another: build roads, educate children, protect the environment, fight crime, create jobs. Each mission is usually associated with at least one agency that is organized, staffed, and funded to carry it out, usually in well-defined programs authorized in law. As a result, program boundaries become a major defining factor in government operations. Programs are authorized by statute, funded by specific appropriations, and assigned to a lead agency. Rules, regulations, procedures, and information requirements are defined. Often, computer systems are developed to help manage the flow of information that keeps the program in operation. There are very few incentives for staff to look outside their program boundaries to share responsibility or information or to integrate their operations with related programs. Even in the same agency, programs usually serve to divide rather than connect groups of people with similar responsibilities. Systems that support service programs reflect this “stove pipe” way of organizing work.

Nature and pace of technological change

The decade of the 1980s introduced powerful new computing and communications technologies to government operations. Today at the end of the 1990s, the old, rigidly structured, inflexible technologies and systems of earlier decades are beginning to be joined or replaced by more flexible systems that rely on networks, new methods of electronic communication, industry and international standards, and very powerful hardware and software tools. Technologies such as electronic imaging, electronic work flow, e-mail, electronic data interchange, and the World Wide Web make it possible to share and transport information in ways that could not be imagined in the 1970s. These tools now make integrated programs technically feasible, although by no means easy to design, implement, and operate. However, the electronic revolution has not reached into every corner of our society or every government office that serves local communities. Wide discrepancies in technical capacity from one place to another severely limit the degree to which these new tools can be applied to program management and information sharing goals.

In addition, these technologies demand significant human and organizational change. Consider these examples: A computer on the desktop is meaningless unless a worker is trained to use it effectively. Networks change the flow, location, and accessibility of information and therefore change working relationships. Imaging and work flow tools allow work to be conducted simultaneously on different parts of a problem, rather than through a series of sequential handoffs.

Limitations on public sector ability to adapt to change

The American political system is inherently resistant to change. The very structure of our government allows change only when there is agreement among a number of individuals and institutions. By codifying governmental activities in law and regulation, we ensure stability in operations, but also make change difficult to achieve. The budgetary process, civil service requirements, and procurement and ethics laws all act as brakes on the ability of any one actor to make and implement decisions. Moreover, federal, state, and local electoral, budgetary, and legislative cycles may not coincide, making intergovernmental initiatives even more difficult to define and implement.

In addition, sheer complexity makes change difficult. The state-local environment is extraordinarily complex on a number of dimensions: organizational size, number of organizations, number and skills of staff, size of budget, financial practices, legal authority, programmatic focus, and geographic dispersion. Existing systems are an additional limiting factor. Only so much change is possible in an environment that depends on information systems already in place # especially ones that were designed and implemented using older technologies.

Finally, in some cases, new state-local initiatives threaten a comfortable status quo. They promise big changes that not every participant is eager to see. Fear and resistance to change exist even in the best planned and managed projects. A new way of doing business threatens existing personal, organizational, programmatic, and political conditions by rearranging authority, influence, power, resources, and information.

Consequences for government-wide information infrastructure

The environmental factors described above have specific consequences for the nature and effectiveness of the State's information infrastructure. We use the term "information infrastructure" here to mean more than hardware and software. A complete government information infrastructure comprises policies, people, organizations, information, and technology.

Technological capacity (hardware, software, networking) that varies widely from place to place

Computing and communications capabilities around the state mostly reflect local or agency-specific decisions and investments. This makes it difficult or impossible to operate technology-supported programs in a consistent way from place to place and organization to organization. It also slows and complicates communication among state and local staff involved in the development of joint programs.

These variations are a challenge to project teams trying to develop and integrate information systems across a substantial range of participants. The range across New York State's 932 towns is especially notable. North Hempstead on Long Island with a population of about 225,000 and Lebanon in the center of the state, with a population of about 1,265, illustrate the extremes. Lebanon hopes to add a fax machine to its technology infrastructure in the coming year while North Hempstead contemplates upgrades and substantial redesigns in its already sophisticated set of administrative and service systems. The implications of these variations are daunting. In general, each locality is responsible for its own technology investments. For many, advanced technology is beyond both their budgets and their specific local needs. As a result, most projects in this study were committed to developing new systems for use in some locations while maintaining older automated and manual systems in others. Total operating costs therefore remain high and initiatives that could take good advantage of a ubiquitous, consistent level of technology across the state remain out of reach.

- The NYS Office of Real Property Services Real Property System (RPS V 4.0) project team addressed this reality by forming a number of subcommittees to focus on the range of existing infrastructure and platforms most likely to be found in the localities. Development considerations for each level of infrastructure and each platform had to be accounted for in the overall system design. This makes both the design and the ongoing system support needs more complex and expensive.
- The Department of Environmental Conservation took a different approach early in its deliberations for a new Hunting and Fishing License system. Their solution was to provide the necessary equipment for each locality thereby eliminating the concern of local technical variation. However, this was problematic as well. The Hunting and Fishing License system, as initially proposed, would create a stand-alone system that local governments would have to work with along with all the other systems they had in place to serve customers. Further, the quantity of licenses sold in some localities did not, in the opinions of the local governments, warrant the use of an automated system at all. Political support for such a significant statewide expenditure was also a major concern in light of overall state cut-backs in spending.
- The NYS Department of Agriculture and Markets is responsible for dog licensing. As in the case of fishing licenses, the quantity of licenses issued across local governments varies widely. Ag and Markets faced the

same range of local technical infrastructure, including the fact that more than half of New York's Town Clerks are not "computerized" at all. In addition, many, but not all, of the Town Clerks who do use computers use one of several proprietary "Town Clerk Software Packages" to support their day to day work. These factors together prompted Ag and Markets to focus only on the towns with computer capability by working closely with software vendors to include a standardized dog license feature in their packages.

Clearly, neither "one size fits all" nor custom tailoring makes optimal use of resources. Both result in difficult and costly efforts to build and maintain information systems to meet program needs and statewide information requirements. With the variety of local conditions a one-size-fits-all effort may result in mismatches between the "problem" and the "solution." In custom tailoring efforts, the level of resources required to address the range of possible conditions results in costly, non-standard, solutions.

Fragmented and duplicate development efforts

In our study, we identified several common technologies being explored by more than one project. We found, however, that the project teams had little or no knowledge that others were conducting similar investigations and therefore little or no information was shared among them. These unconnected, redundant efforts cost both time and money.

- Telecommunications mechanisms. Many of the systems we looked at were relying on Internet connections to transmit information and transact business, but were independently exploring telecommunications mechanisms and standards to use for these purposes. The Aging Service Network, the Electronic Voter Registration System, the Electronic Dog License project, and Electronic Death Certificates, for example, all need to make effective use of the Internet as a communications channel.
- Security issues. System and data security concerns had to be investigated by a number of project teams including the Death Certificate and Immunization Projects. Each project stressed the need to ensure confidentiality of personal information and record integrity since these documents often are required for legal purposes or to access state services, but the projects were tackling these issues independent of one another.
- Central data repositories. Many of the projects were exploring the use of a central repository of data to be accessible by many users. These can provide users with easy local access to information that is maintained in a single, well-managed central source. This approach to data management is one that should be explored collectively since it has so many commonly useful applications and data management considerations, but these concerns were addressed independently in the Real Property, Hunting and Fishing License, and Voter Registration projects, among others..
- Electronic signatures. Many documents are not legally binding or admissible in court unless signed. Doing business electronically requires some form of legally binding authentication and a number of agencies were separately exploring the use and limitations of electronic signatures for this purpose. The Electronic Death Certificate and Voter Registration Projects are examples of systems that required this feature..

Stand-alone, single-purpose systems

Many localities voiced frustration and concern that state agencies generally develop new applications that operate without regard to related systems and processes. This is especially problematic for local governments that deal with multiple state programs whether these programs are administered by one or several state agencies. Local officials opposed the use of stand-alone applications to solve state agency-specific problems because these "solutions" ignore the multi-purpose and cross-functional nature of most local operations. From a state agency point of view, these systems are dedicated to a clear mission, but from a government-wide point of view, they prevent useful data sharing that could reduce the cost of related systems and improve the ability of the state to understand program dynamics and policy outcomes.

- Town Clerks offices tend to experience this problem most dramatically. Since the Clerk's public service counter is the access point for a number of state-sponsored and local services, it is congested with information systems and forms that emanate from separate state agencies plus those that are related to entirely local programs. Each system or process makes sense on its own, but seldom takes into account the fact that they may, and often do, conflict or confuse other systems and ongoing business processes that operate in the Clerk's office.

Uneven local participation in new systems

State agencies depend upon information from local program offices to support the planning, implementation, and evaluation of statewide efforts. There was a time when state agencies could depend on full participation of all local jurisdictions in these typically paper-based systems. This situation has changed dramatically for two reasons. First, local governments have convinced their representatives that state-imposed local mandates must be accompanied by state funding for their implementation. Second, the increasing shift to automated systems has not been accompanied by a consistent level of local capability or willingness to participate in an automated solution. In recent years, state elected leaders have made a conscious policy decision to allow a considerable amount of local latitude in systems participation. The resulting uneven participation in new systems often means parallel operations at the state level to accommodate automated, manual, and hybrid approaches at the local level. While local choice is a significant local benefit, it comes at the cost of projects that are more difficult to manage, systems that are more expensive to build and maintain, and results that are less uniform than they would otherwise be.

- The Aging Services Network, and Automated Financial Reporting projects are just two that will require the sponsoring state agency to support both paper-based and electronic systems for the foreseeable future. These projects redesigned business processes and identified common information requirements to be shared between the state and the localities. They then developed parallel operations to support these redesigned processes in both paper and electronic systems. Ideally, the non-automated localities will make a transition to the electronic system over time, but years of parallel program management lie between then and now.

Inadequate development and retention of a technical workforce

As technology has rapidly permeated our society and most of our institutions, government organizations often lag behind others. Due to minimal staff development budgets, government staff are often ill-informed and poorly trained in how to use information technology effectively. This is particularly true of the newest technical tools and platforms. Public employees, both users and technicians, seldom have ready access to skills training or professional development that continuously upgrades their knowledge and skills. Conversely, technical staff typically have few opportunities or incentives to learn the goals and operational realities of service programs and therefore tend to focus too much on the technical tools and too little on the programmatic reasons for new systems.

Providing a stable and reliable computing environment that supports day to day program operations requires a technical workforce that is expert in the functions of existing information systems and their supporting infrastructure. While maintaining these legacy systems, staff also need to acquire new skills to adopt emerging technologies. In an employment market that highly values the newest technical skills, public employment is becoming less and less attractive. Agencies find that they either cannot attract people with the new skills or they lose well-skilled people shortly after making significant training investments.

- The opportunity cost of insufficient technical resources must be considered along side the gamble of investing in the development of technical staff. The experience of the Office of Real Property Services SALESNET project is instructive. ORPS invested in its own staff by securing training that would give them in-house expertise in the use of the Internet. Unfortunately, the result was the loss of those staff to higher paying private sector positions, setting the project back by months since the needed skills were no longer available.
- The Immunization project found that all the technical staff in the Health Department were devoted to other priorities at the time their project was underway. As a result, they contracted with private companies for all or nearly all the system design and development work. This can be a good solution, but it requires sufficient funding (the Immunization project has a sizable federal grant) and strong contract and vendor management skills.

Recommendations for increasing government-wide system effectiveness

State and local government officials, as individuals, cannot change the environmental factors that make public sector work so complicated. They can however, try to mitigate their negative consequences. The principles and practices described in **Tying a sensible knot** can help government managers avoid or reduce many problems. The additional recommendations which follow are designed to capitalize on both the findings of this study and the infrastructure-building work already underway in New York State.

Figure 3, an expansion of figure 2, shows several classes of recommendations for counteracting the

consequences of the systemic and environmental conditions outlined earlier. While no single government manager can change these systemic and environmental conditions, their consequences can be ameliorated by well-targeted actions that focus on technical infrastructure building, information sharing, and human resource development and support.

Figure 3. Recommendations for Mitigating Systemic Problems

1. Expand existing efforts to build a statewide information infrastructure encompassing technology, data, and human resources.

NYT. The Governor's Task Force commitment to create a statewide Intranet, the NYT, is the essential foundation for a truly government-wide technical infrastructure. This statewide network can provide both state and local agencies with a secure, standardized system from which to operate a variety of applications. To promote its use and benefits, we recommend the implementation of the NYT be accompanied by:

- extensive outreach and education to local government decision makers about its benefits, costs, and uses
- formal training programs for local users and technical staff
- a purchasing program that encourages local governments to acquire the hardware and software needed to connect to and take advantage of the NYT and the applications that will run on it
- demonstration applications that illustrate to small jurisdictions the benefits of participating in a standard statewide technical infrastructure

Technology and data standards. With technology standards agencies can feel more secure in their procurement decisions and be better prepared to upgrade or integrate their systems with other agencies if the opportunities arise. The continuing efforts by the Task Force to establish and maintain technology standards should include more local government participation, efforts to promote the use of the standards, and education and peer consulting to help organizations adopt the standards as they acquire new systems. The goal is not to impose rigid technology standards on agencies or local government, but rather to establish "preferred standards" to promote interoperability and cost savings.

Technical workforce assessment. A Governor's Task Force work group recently released a report outlining a broad IT workforce strategy for NYS which states "NYS needs to develop an 'enterprise-wide' approach to IT workforce planning, elevate it as a state priority and develop an investment strategy for our workforce which is commensurate with our investment in technology." The findings of this project strongly support that recommendation. A problem that continually surfaced as we talked with agencies was the difficulty of acquiring, and the high risk of losing, expert technical staff. New York State should conduct a technical workforce assessment that documents the current situation, projects future needs, recommends actions that will lead to better recruitment, development, and retention of technical staff, as well as more effective use of contracts.

2. Establish formal linkages and communications mechanisms that encourage awareness of other models and experiences.

Throughout our research we were struck by the lack of cross communication among the projects, even though many were dealing with the same local governments or exploring similar technical solutions. Any project could benefit from easy access to information about systems projects in other agencies and other parts of the country. In addition, local participants often pointed out the need for more complete and frequent basic information about projects that would affect them. These recommendations address both kinds of communication needs:

Current practice and peer reviews. The Task Force has already initiated peer review of major systems initiatives and conducts best practice information sessions for selected application types. We recommend both of these efforts be expanded by:

- sponsoring periodic voluntary peer review sessions designed to help project managers identify and take advantage of the experience of others as they define and design new systems.
- sponsoring a Web site that contains up to date descriptions and contact information about current state-local systems projects.

Ongoing communications and information exchange with local governments. A special effort was undertaken by the Special Work Group to understand and recommend improvements in communications between

state and local governments. These recommendations include:

- **Use local government associations to communicate with their members.** There are at least 50 different organizations and associations for local government, all of which communicate with their memberships on a routine basis. Since these associations and organizations regularly communicate with their members, it makes sense for the State to take advantage of that existing communication network by providing associations with specific information for inclusion in their newsletters or bulletins, and participating in professional workshops and conferences sponsored by associations.
- **Develop an electronic directory that directs users to the appropriate locations for specific mailing lists.** State and local agencies and associations maintain and update mailing lists of their employees or members. An electronic directory that links users to agency and/or association Web sites, mailing lists or contacts within an agency or association would help users reach their intended audiences without requiring them to reinvent or duplicate existing mailing lists. Such a centralized electronic directory would also help users determine what organizations they should contact regarding specific projects or information without requiring them to recompile specific mailing lists for each topic.
- **Consider developing a hierarchical system to communicate information at the highest technical level that users can accept, with an eye toward adopting an electronic communication standard in the future.** Currently, the majority of local governments are not accessible through the Internet, with some of them still inaccessible by fax. However, New York State is moving toward use of the Internet or a statewide intranet to do business with local governments. Development of a hierarchical system, that would communicate with local governments and/or associations at the highest technological level that they are capable of accepting (i.e., first by e-mail, then fax, and finally paper), would progressively reduce production and mailing costs. Such a system could be housed on the NYT and funded in the same manner. Finally, adoption of a date after which communications will become electronic would inform localities of State government's direction and would provide localities and associations with an eventuality for which to plan. This recommendation requires further study as it may require significant planning and resources to fully implement.

3. Establish and support a project management “academy” for both state and local managers.

The world of public management is dramatically changing. Traditional government services provided by a single agency are giving way to complex service programs that require many exchanges of information involving not only public agencies but often private and nonprofit organizations as well. Most of these rely on sophisticated information systems as well as new policies. The best practices guidelines produced by this project amply illustrate the importance of partnerships, collaboration, and entrepreneurship in bringing state-local system initiatives to successful implementation. In addition, public managers now face the complexity of negotiating and then managing contracts for functions and services they traditionally operated themselves. All of this calls for new management skills that take advantage of information as the key resource that ties all these parties together.

Public managers would greatly benefit from a well-organized program of training and development that prepares them to guide projects from inception to evaluation in this complex new environment. We discovered several “natural” managers in the projects we studied, along with creative tools and techniques that were being invented by project teams. We have tried to capture as much of this as possible in the guidelines. However, reading a handbook is a poor substitute for engaging in formal education that conveys concepts, teaches skills, and offers opportunities to apply and refine them. A formal project management program could be incorporated into existing management development programs at the Governor's Office of Employee Relations, or could take other forms. A number of resources already exist in New York State that could be drawn upon to create and sustain this program. These include GOER, the NYS Forum for Information Resource Management, SUNY campuses, state agency training offices, and the Center for Technology in Government.