

Appendix A: GILS: Government Information Locator Service

I. WHY GILS?

People, who first “surf” the Web, are often amazed at the information available, how creatively it is presented, and the ease with which it can be accessed. But for those people who come to the web looking for specific information, the experience is often disappointing. They often find something close to what they wanted, but not exactly. In fact, this abundance of information actually gets in the way because of the amount of time that it takes to sift through irrelevant material.

II. WHAT IS GILS?

The *Government Information Locator Service* (GILS) is a standard that makes it easy for people to locate information and evaluate its utility. Like the library card catalog we learned to use in elementary school, GILS collects important “meta-data” about all of the information that is catalogued. In this way, GILS simultaneously, documents the existence of the information, provides important information on the utility and relevancy of the information and finally, tells users how they can obtain that information. In the GILS world, the term “information” is used very broadly and can include “...not only books and datasets but people, events, meetings, artifacts, rocks.... For networked information, GILS supports ‘hyperlinks’ for network access to the resource described or related resources.”¹

As more open standards are adopted and it becomes easier to access information through hardware and software, the real constraint has now shifted from accessibility to usability. A consumer or citizen can access all of this information, but what do they do with it? Which information is timely and relevant to their particular needs? Who can they talk to about this data to make sure that it would be useful? How much will the information cost? Can they access it? Interoperability, in large measure, therefore turns on gaining access to good meta-data.

GILS is formally adopted in federal law as the method by which federal agencies should make this meta-data available.² It “tags” or “labels” government information with the answers to these questions. GILS is therefore, very important to understand if we want to encourage interoperability in government information system; first, because it is important to make sure that GILS provides this meta-data and second, because GILS, is itself, an exercise in interoperability since agencies have to conform to an interoperable standard for sharing information.

¹ http://www.usgs.gov/gils/faq.html#q_1_4

² The Paperwork Reduction Act of 1995

In a networked world, “authority” and “responsibility” is distributed across the many network nodes. GILS provides an elegant solution to the problem of how to distribute the authority and responsibility for maintaining meta-data. There is a centrally-mandated GILS standard that requires certain kinds of information to be made available, but it does not centrally command what kind of terms are used to describe the information. Each information community can decide which descriptors work best in their community. The GILS standard only requires that the information be described so that the information is accessible. In addition, each information community is responsible for maintaining its own information and the meta-data about that information. This approach insures that each agency becomes an attentive steward of the public information under its care.

III. CASE STUDY FOCUS

This case study focuses on exploration of how the policy architecture anticipates and makes provisions for these implementation questions – thereby identifying both problems and solutions. GILS was mandated by legislation - The Paperwork Reduction Act. What has happened in the interim? Does GILS actually help with interoperability? What are the problems in making GILS interoperable? What light can the understanding of implementing GILS shed on interoperability in general? Are there workable solutions to these problems? Workable solutions need not wait for yet another round of surveys – our interviews with GILS experts indicate that there is a range of success in implementing GILS and therefore much that could be done to improve the implementation of GILS as an important element supporting interoperability.

IV. GILS DOES BENEFIT INTEROPERABILITY

GILS is known to the public as a way to make government information available to the citizen. But information resource managers have recognized the potential for using GILS as a way to induce interoperability. They have championed the use of GILS to both reduce costs and to make government information systems more interoperable. Our interviewees substantiated this: even when the motivation was public access to information, they often saw an increased number of interoperability projects that would be realized as a windfall benefit.

Finally, the process of identifying information also forced a clarification of information policy – why is this information collected? Who uses it? What information don't we have? Conducting an information inventory surfaces important information resource management questions.

V. PROBLEMS AND SOLUTIONS TO THE IMPLEMENTATION OF GILS

With these identified benefits, what have been the problems? GILS does not have a high profile at the state level. Some state agencies had not even heard about GILS, or knew very little about it. Our interviews with several states generated questions like - What is GILS? How do you start it? What factors must be considered in maintaining it? Who should I talk to if I were to implement this good idea? These questions were even raised by individuals in organizations that had national reputations for their efforts in providing electronic information to the public. Our efforts to locate a formal, central repository of information to answer these most basic questions proved fruitless.

Paradoxically, while the authority establishing GILS rose to the level of a clear statutory directive, no formal institutions were established to support its implementation.³ Instead, the early implementation of GILS benefited from the pioneering vision of a small dedicated group of prophets. At some point the effort of supporting the implementation should be delegated from the charismatic leaders to a more formal institution. If there is to be interoperability among the federal and state information systems, this sharing of best practices ought to commence and have institutional representation. Our conclusion is that some kind of sharing of best practices would help establish GILS more thoroughly.

Another concern among states is the perceived and real costs to become GILS-compatible. We found a diversity of opinions. Some early “adopters” worked towards establishing a GILS service but never received the necessary resources. Some met with resistance in that the cost to comply was not worth the benefits to the agency. Other interviewees indicated that depending on how the GILS was designed and implemented that the costs could be kept low. The State of Washington required that all of the meta-data describing web page information be included as part of the web page. Once the agency does this, the WAGILS “spider” would then search through each web page and collect the meta-data that was posted. Clearly, there are better ways to implement GILS that ought to be more broadly disseminated, such as making the provisions of meta-data about a document a natural part of the work routine. It may even be possible to automate much of the “skimming” off of this meta-data as part of the creation of the information. In conclusion, there seemed to be a wide diversity of opinion on the ways to implement GILS. A more systematic evaluation of best practices and different approaches would go far in providing guidance on the different ways to implement GILS and the attendant costs.

³ Curiously, Washington has been able to establish a reputation in the GILS community (WAGILS) despite the fact that there is no such legal mandate to implement GILS. Instead, the WAGILS effort has focused on providing the support and training to state agencies. But when posed with the question of what the next steps should be in implementing GILS, the answer was that statutory authority would help with implementing GILS in a few reluctant agencies.

Our interviews with all agencies providing information services to other agencies, whether they were GILS compatible or not, stressed the importance of showing agencies that the costs could be minimized and that the investment in time would yield large dividends in terms of cost-savings. These interviews stressed the importance of working as equal partners and providing tools and methods to make it as easy as possible to implement these services.

Another problem identified in previous research is the general disincentive to share government information – the belief by agencies, both state and local, that too freely providing information would expose them to all kinds of misuse of information. Our interviews suggested that this was a perception held widely by agencies. But for those agencies that actually developed interoperable system, the issue diminished in importance. Some interviewees indicated that the use of meta-data could supply context to information and therefore reduce the chances for its misuse.

There is an ongoing discussion at the state level about the suitability of GILS vis-à-vis other meta-data standards. The concern is that they may buy into a standard that the market later ignores. When asked how agencies deal with this uncertainty, they indicated that they discuss their needs on a one-on-one basis with the vendors who are providing these technologies. Clearly, standards will be better served by accumulating and representing their interests to vendors and to the standards-setting organizations. States are skeptical that this is an appropriate role for the Federal government. Overall, the impression is that the federal government is not responsive, too directive and that it is always thinking about the next big idea but not paying attention to the very plain, but very real implementation issues. In fact, an early visionary attempted to sell the “federal” GILS approach to the local government but found that this actually generated a marketing problem rather than solving it.

There was receptivity to the idea of providing funding for those state and local government agencies that could not, unlike the Federal government, afford to send representatives to standards discussions. It was also stressed that while standards need to be promulgated, it is sometimes hard for states to proceed with a standard if they do not know what the cost implications of complying with that standard would be. Although the timing may be difficult to synchronize, standards should follow empirically-demonstrated best practices.

Despite the successful GILS projects we identified, problems remain. “WAGILS”, the State of Washington GILS service, generally considered a successful GILS implementation, conceded that only a relatively small amount of material has been indexed. However, the greater benefit is that Washington agencies have now bought into the principle of indexing, and over time, the indexed material will grow.

Our focus on GILS as an important case study in interoperability yielded several insights:

- 1) GILS is an important building block for interoperability;

- 2) While GILS is formally required by federal law to be implemented, providing resources, experiential knowledge, and partners are also necessary to its successful implementation;
- 3) Currently there is no centralized repository or clearinghouse for expertise in how to implement GILS specifically or pursue interoperability in general.

In addition to providing funding for this centralized collection and distribution of “know-how”, funding should also be provided for research and development on best practices and the development of “tools” to streamline implementation.

Appendix B: Framework of Information System Acquisition, Management and Utilization by USEPA

I. BACKGROUND ON FEDERAL INFORMATION TECHNOLOGY ACQUISITION AS IMPLEMENTED BY USEPA: DOCUMENTARY FOUNDATIONS

A starting point for any analysis of EPA information technology policies is the Information Resources Management ("IRM") Strategic Plan.^{4 5} EPA's IRM mission is to provide information to decision makers and to protect human health and the environment. This mission is supported by eight "vision elements":

- (1) providing for public access;
- (2) building upon a solid IRM foundation;
- (3) providing EPA access to information;
- (4) reducing reporting burdens on the regulated parties;
- (5) providing improved data integration,
- (6) fostering electronic management of information;
- (7) improving environmental information; and
- (8) improving communications.

USEPA's IRM is further refined by its "operating principles": customer focus, facilitation of data standards, information as a strategic asset, balanced approach to IRM, use of designated information stewards and "staying the course" – namely, persisting in rational plan implementation despite financial or political disruptions. USEPA's core IRM implementation strategies include: developing a public access strategy, public access methods, information locator, key identifier standards, spatial analysis systems, targeted training, desktop capabilities, data requirements, external connectivity, integrated planning, performance measures, senior management attention, appropriate staffing for IRM, electronic data collection, paperless processes, and a sound IRM structure. Numerous performance measurement areas are also described in this plan.

The USEPA has long been striving to make information technology more "user friendly" for its stakeholders as well as more accessible and understandable to the

⁴ <http://www.epa.gov/irmpoli8/strplan>

⁵ "EPA Information Resources Management (IRM) Policy, Standards, Guidance & Planning Documents" (<http://www.epa.gov/irmpoli8>); "US EPA: National Performance Measures Strategy: 12/22/97." (<http://es.epa.gov/oeca/perfmeas>)

regulated community, the regulators and the public at large. Information relating such efforts by USEPA may be found in several places.^{6 7}

The USEPA has also expended considerable effort at making environmental information accessible including an Environmental Data Registry⁸ containing information about data elements in selected USEPA information systems which allows retrieval of information about data elements and the data element concepts.

EPA has also not overlooked private efforts at bringing uniform information designations and retrieval to environmentally-relevant data. In particular, Chemical Abstracts Service (a division of the American Chemical Society) has long been collecting, analyzing and making available to interested parties chemical information of considerable breadth. EPA makes use of these efforts in (among other places) Chemical Abstracts Service Registry Number Data Standard.

USEPA has also solicited input from broad-based advisory groups as to appropriate management strategies and techniques for managing information, and information technology. NACEPT is a public advisory committee originally chartered 7/7/88 to provide recommendations and advice to Commissioner of EPA on specific topics. Some recommendations include:

If EPA is to succeed in going beyond its current pollution control-oriented approach to environmental protection, to place-based cooperative approaches with its stakeholders [it should]: formalize the use of information as a strategic mission tool; establish information policy leadership and coordination on an agency-wide basis; integrate information across current media and program divisions; provide broader, more effective public access to information; assure ongoing stakeholder involvement in information policy and management.⁹

⁶ The USEPA report found at <http://www.epa.gov/docs/edi> entitled "Policy on Electronic Reporting FRL-3815-4"

⁷ The report found at <http://www.epa.gov/eimd/policy>: entitled "EPA Policy Guidelines IRM Policy Manual 2100" gives an extensive list of policies and standards that should be used in the development of EPA information systems.

⁸ Additionally, user assistance in accessing EPA data may be found at : EPA National Geographic Information System ("GIS") Program at <http://www.epa.gov/ngispr/prmover>; EPA Spatial Data Library System; EPA National Geospatial Data Clearinghouse; EPA Locational Data Improvement Project; Envirofacts Warehouse.

⁹ EPA 100-R-98-002 "Managing Information as a Strategic Resource: Final Report and Recommendations of the Information Impacts Committee by The National Advisory Council for Environmental Policy and Technology. NACEPT."

The recommendations liken information resources management to the seat and three legs of a stool. The seat is analogized to the information management mission -- use information strategically to protect human health and the environment--manage information as an agency asset--manage information as an essential element of programs. The three legs supporting the seat are:

- 1) Partnerships
 - aggressively provide information to the public on environmental issues
 - aggressively pursue information-based partnerships with co-implementers and stakeholders
- 2) Infrastructure
 - develop, immediately implement and enforce data standards
 - develop data integration policies and tools
 - define data requirements and identify gaps in the data inventory
 - reduce the burden on providers of information
- 3) Organization
 - establish a CIO with mission critical responsibilities maintain an executive level steering committee
 - integrate the IRM planning process with the agency's budget
 - resolve the organizational fragmentation
 - strengthen program IRM implementation efforts.

In summary, there seems to be no shortage of IRM planning documentation from within and external to EPA.

II. FEDERAL-STATE COOPERATIVE PROGRAMS IN CONNECTION WITH ENVIRONMENTAL INFORMATION AND INFORMATION SYSTEMS

The USEPA has instituted several programs for integrating state environmental data collection, storage and management systems with those of the USEPA, generally under the auspices of reinventing environmental protection. Two of these programs are the Performance Partnership with state environmental protection agencies and the One-Stop Reporting Initiative. The One-Stop Reporting Initiative has resulted in grants of \$500,000 to each of several states for the purpose of leveraging the states own information management strategies more rapidly to fruition.

In keeping with the effort of reinventing government, the EPA has declared its policy to reduce industry burden and streamlining regulatory programs by using appropriate data transfer technologies to reinvent the process of industry compliance. Pilot projects include: Program for Reformulated Gas Reporting, Discharge Monitoring Reports, Hazardous Waste Manifests, and Municipal Water System Laboratory reports. The overall goal is to cut as much red tape as possible.

One of the more interesting projects is the development and implementation of one stop facility identification.¹⁰ An executive Steering Group is to guide the full scale implementation of One Stop Vision within grantee states. The building blocks of the One-Stop Reporting program are identified as burden reduction, data integration, stakeholder process, electronic reporting and public access. More specifically, burden reduction intends to reduce or eliminate obsolete, duplicative and unnecessary monitoring record keeping and reporting requirements. Data integration intends that each system should have ability to provide comprehensive meaningful and relevant views of environmental activities. An important initial test case will be to strive to reach consensus on a unified format for common identification of facilities. Stakeholder process will consult with stakeholders through established national advisory groups. Electronic reporting intends that appropriate innovative data transfer technologies be employed in support of the other goals. Public access denotes that the data should be readily available in timely, flexible and easy to use manner.

An early prototype test bed for obtaining consensus about common data formatting for interoperability purposes is in the identification of a regulated facility. Traditional media based regulations have identified a facility by any means relevant for that particular media. The location of the discharge pipe, emitting stack, waste storage areas, or the street address are all typical means for identifying a facility. It has not been simple to identify that the same overall facility is intended when such disparate identifiers have been employed. Anecdotally, it has been reported that a facility was being commended for waste reduction by one program and simultaneously sanctioned by another program, unknown to the respective programs that they were both dealing with the same entity (facility). In an effort to remedy this, a common "Facility Identification Template For States ("FITS")" has been suggested under the auspices of the Environmental Council of States ("ECOS").¹¹

The EPA has developed working guidelines for unified facility identification as one approach to obtaining common information across different programs and work towards ending single program (single media) myopia. FITS proposes a generic approach to facility identification. It identifies sets of desirable data elements but does not address data sharing or interchange requirements between states and USEPA. FITS looks to data integration in contrast to mere data warehousing. Up until now, data integration has been reflected by each agency's (and sometimes each program's) data model and vision, and includes data connections and reconciliation. Both data content and data functionality issues and questions are to be addressed. An important goal is to integrate program data across programs. To facilitate FITS it is envisioned that a responsible steward be assigned to oversee data integrity. A three level data model for

¹⁰ "Environmental Council of States: Role in One Stop and Facility Identification Initiative"
<http://www.epa.gov/reinvent/onestop>.

¹¹ The details can be found at <http://www.sso.org/ecos.fits>: entitled "Facility Identification Template for States (FITS), Prepared under auspices of Environmental Council of States, US EPA One-Stop Reporting Program, Washington Department of Ecology.

facility identification is proposed and includes FITS-specific definitions. FITS relates facility identification number and that becomes the unique identifier for regulated facilities. Meta-data coders are envisioned including information about method, accuracy and description of the geographic coordinates (“MAD” codes).

III. ONE STOP REPORTS AVAILABLE ON-LINE AMONG FIVE SELECTED STATES

Those states receiving USEPA grants under the One-Stop program prepare and post “120 Day Plans”¹². Among the five states selected for study, Massachusetts and Washington had posted 120 Plans as of the date of review for purposes of this IEP study. Synopses of salient features of these 120 plans follow.

Massachusetts. 120 Day Report by the Department of Environmental Protection (“DEP”): INFO 2001 denotes the DEP Information Revolution to strive to get the proper information to proper place(s). The state INFO 2001 initiative is being leveraged by the \$500K One-Stop grant. Massachusetts has developed its own cross-program data handling system as “Environmental Protection Integrated Computer System-EPICS.” Older computer, data handling and storage systems (frequently called “legacy systems”) not only use old (frequently obsolete) technology, but such legacy may become roadblocks in the way of interoperability. Typical sources of staff frustration within DEP include: the complexity of many information systems; their advanced age and inflexibility; variations in data quality, value, completeness; and lack of sufficient integration.

There is increasing demand for public access. Among the questions to be considered are: should government provide contextual information or just the data? What is the appropriate role of government in providing data or contextual information? How best to convey data accuracy and to insure that the information asked for is information needed? How to collect, store, distribute meta-data? Burden reduction measures would include steps to insure gathering only the information needed (not information that would merely be “nice” to have) and to eliminate redundancies. An important component of burden reduction is to improve data flow through reporting, electronic data collection, and posting on the Internet.

Program change involves the recognition that existing stand-alone systems do not support a modern integrated information technology environment and sometimes hinder its adoption. Program evaluation denotes being able to track effectiveness of information technology strategies, targeting actions and setting priorities. The government needs to prioritize its activities and integrate facility data with ambient environmental data to prioritize its environmental protection efforts. Specific tasks include taking an inventory of existing information to determine its content, data completeness and accuracy, why data is collected, program goals supported by specific

¹² Many of the 120 plans are available at <http://www.epa.gov/reinvent/onestop>.

data, identify the users and end uses, track data flow, identify and evaluate the data stewardship procedures and the access procedures.

Opinions are to be solicited on the value of the data and what makes it valuable, additional data elements users would like and why, which data is not useful, additional uses to which available data might be put, desirable additional analytical capacity, factors limiting the value and usefulness of data, advantages and disadvantages of present data. and those changes users would like to see in existing data flow. Among the advanced technologies to be evaluated are the uses of on-site telemetry and/or videos, for continuous monitoring of data.

Washington. The Washington 120 Day Plan connects with Washington Department of Ecologies (WDE) Information Integration Project (IIP). In 1995, WDE developed a comprehensive information strategic plan (ISP). Among the components deemed important are the following: a dedicated budget, commitment and steering from senior management. The articulated vision includes multi-media information across all programs, geographically based (geo-referenced). Functional linkages are present. Enforcement and release data are included. Expenditures and general business practices need to be linked to environmental conditions and results. Data must be of known quality and standards must be followed.

The WDE integration strategy includes system development driven by WDE's and customer needs. Information engineering methods are used. WDE seeks to institute a philosophy of "our data is yours." As data is moved from older information systems to modern systems, steps are taken to insure that such migrated data are clean and of known quality. Data will be "cleaned" and held to consistent standards of accuracy. WDE envisions the creation of a position of "web master" to oversee the data postings.

IV. OVERVIEW OF STATE ENVIRONMENTAL ADMINISTRATIVE ARCHITECTURE

It is well beyond the scope of the present study for IEP to provide a comprehensive survey of environmental protection for the five selected states. However, to appreciate the interoperabilities at work in state and local environmental protection, it is useful to provide a quick description of the various state schemes.¹³

Ohio. The Ohio Environmental Protection Agency shares environmental responsibilities with other states agencies in ways typical of many states. Other responsible state agencies include: Department of Agriculture (having lead responsibility for regulation of pesticides); Department of Natural Resources (coastal area management, wild, scenic and recreational river areas, forest preserves, litter control, recycling, geological surveying, oil & gas well drilling and monitoring, parks and recreation, water craft and waterways); Air Quality Development Authority (assists in financing of air pollution

¹³ Much of this is obtained from Environmental Law Practice Guide: State and Federal Law, Michael B. Gerrard, Ed. (Matthew Bender, 1997)

control facilities); Environmental Board of Review (certain review authority over Ohio EPA); Emergency Response Commission (emergency response and preparedness planning); Hazardous Waste Facility Approval Board (location and construction of hazardous waste treatment, storage and disposal facilities); Ohio Water Development Authority (assist in financing water pollution control projects); Department of Industrial Relations Division of Workshops and Factories (responsible for occupational safety in the workplace); Director of Health (radioactive materials, use and waste, low-level waste only as high-level waste regulated by federal Nuclear Regulatory Commission). Ohio uses its own definition of "solid waste". Municipal governments, cities, townships and villages have primary responsibilities for zoning and land use controls and some limited additional environmental regulations. Local air pollution laws are not preempted by state law unless clearly inconsistent. Therefore, several independent municipal air pollution codes exist in Ohio. Ohio has cradle to grave management of medical and infectious waste and such waste must be accompanied by shipping papers.

Texas. Environmental Protection in Texas is chiefly the responsibility of the Texas Natural Resource Conservation Commission (TNRCC) created by the consolidation of the Texas Air Control Board and Texas Water Commission. The Dept. of Agriculture regulates pesticides overseen by an independent Texas Agricultural Resources Protection Authority. The Texas Railroad Commission ("TRC") is responsible for regulation of environmental contaminants (except material deemed hazardous waste) associated with oil and gas production. The TRC is also responsible for promoting industry in occasional conflict with its environmental regulatory duties. Texas has provision for a large number of special authorities and districts. Twenty-one river authorities exercise authority over certain uses of surface water. Texas counties generally lack zoning or pollution control authority. Municipal governments have broader powers in both areas. Both counties and municipalities have been given certain authority of enforcement. Inaccurate record keeping and reporting and other paper violations in Texas are not considered simply technical but are considered substantive violations that can trigger penalties or permit revocation. State General Land Office has authority to identify critical dunes and wetlands in coastal areas but protection is left to county governments with some oversight. Texas uses "memoranda of understanding" between agencies to coordinate rules.

Washington. Environmental protection in the State of Washington is the primary responsibility of the Department of Ecology. However, responsibilities are shared with the Department of Health (drinking water, radiation, shellfish, on-site sewage disposal systems); Department of Fisheries and Department of Wildlife (which are separate state agencies); Department of Agriculture (pesticides). Department of Labor and Industries. Local governments; counties; 1st class, 2nd class, 3rd class and optional Municipal Code Cities; 4th class municipalities or towns; assert local land use authority and administer state Environmental Policy Act. Washington has numerous specific preemptions of local authority and a large variation in procedures for seeking state and local regulatory permits. The state Environmental Coordination Procedures Act is seen by some as a "pioneering effort" to coordinate and expedite multiple regulatory permits. Coastal Areas are assigned as the primary responsibility to local areas. Drinking water

is regulated by the Dept. of Ecology and Board of Health. "Hazardous waste" in Washington includes more types of waste and uses different terminology than corresponding federal programs. "Dangerous waste" or "extremely hazardous waste" is defined by Washington State employing criteria of toxicity, persistence and carcinogenicity in addition to federal criteria. Also, Washington has lower regulatory thresholds for some hazardous waste generators. The Model Toxic Control Act in Washington goes beyond federal comprehensive Environmental Response Compensation and Liability Act CERCLA. Washington lacks a comprehensive plan for the regulation of medical and infectious waste, but rather piecemeal regulation of transportation by Utilities and Transportation Commission. Occupational exposure is regulated by the Department of Labor and Industries.

Kansas. Environmental protection in Kansas is the primary responsibility of the Department of Health and Environment divided into Division of Health and Division of Environment. Other responsibilities are shared with several other agencies, in manners not substantially dissimilar from that of other states included in this study.

Environmental regulation in Kansas, as in most states in our study, is not centralized but divided among several state agencies with indistinct boundaries. Primary responsibility lies with the Kansas Department of Health and Environment ("KDHE") administered by a department secretary responsible to the governor. The KDHE comprises the Division of Health, the Division of Environment, the Kansas Health and Environmental Laboratory and the Division of Information Systems. The heads of all four divisions report to the Secretary of the Department. KDHE has sole authority under state law for air quality, asbestos, public water supplies, sewage and surface and subsurface water pollution. KDHE shares responsibility with the Kansas Corporation Commission with respect to oil and gas wells, underground storage reservoirs and saltwater injection. The Board of Agriculture regulates pesticides and agricultural chemicals while the Kansas Animal Health Department deals with environmental issues and citizen complaints resulting from operation of feed lots. Kansas lacks a general state provision requiring environmental impact review either resulting from legislation or from executive order. However, power generation facilities are subject to environmental impact review under the Kansas Department of Public Health.

Massachusetts. Massachusetts is a "home rule jurisdiction" in which home rule amendment to the Massachusetts Constitution gives cities and towns the power to enact their own legislation on many subjects (if non conflicting with state or federal) with out prior legislative approval.

Massachusetts has more centralized regulation of environmental matters than many states in our study with the Massachusetts Executive Office of Environmental Affairs ("EOEA") administering the basic environmental regulations of Massachusetts. Five departments comprise EOEA with jurisdictional responsibilities often found in separate agencies in other states. The Department of Environmental Protection is the primary environmental regulatory arm. The Department of Environmental Management manages state-owned forests, parks and other properties. The Department of

Fisheries, Wildlife and Law Enforcement includes the environmental police functions. The Department of Food, Agriculture includes the Pesticide Board. The Metropolitan District Commission operates many public parks and facilities. In addition to these five departments, the Office of the Secretary of EOEA includes the Office of Coastal Zone Management, the Division of Conservation Services and the unit responsible for implementing environmental impact reviews for state project, among other functions. Massachusetts is among the "home rule" jurisdictions in which cities and town may enact legislation on a broad range of subjects without prior state legislative authorization so long as not in conflict with state or federal law. The result is a range of zoning, land use and other regulations having an impact on environmental regulation in Massachusetts at the local level with various methods of interacting with state and federal regulators.

Appendix C: References

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APPENDIX D: PROJECT TEAM INFORMATION

DAVID LANDSBERGEN, LEAD AUTHOR

David Landsbergen is an Associate Professor and the Associate Director for Doctoral Studies in the School of Public Policy and Management at the Ohio State University. Professor Landsbergen teaches, conducts research, and consults on the legal and policy issues surrounding the introduction of new information technology. He holds a J.D. and a Ph.D. from the Maxwell School at Syracuse University. He was an Ameritech Research Fellow. Professor Landsbergen has consulted with, among others, the National Regulatory Research Institute, the U.S. Department of Health and Human Services, the Georgia Public Service Commission, the Columbus Chamber of Commerce, the Utah Department of Public Utilities, the Ohio Department of Administrative Services, and the Niagara Mohawk Power Company. He also conducts executive education programs with the Fisher College of Business and the School of Public Policy and Management Executive Education programs. Professor Landsbergen has published numerous articles for both theoreticians and practitioners and has served as a guest editor for Telematics and Informatics and the Journal of Management Science and Policy Analysis.

GEORGE WOLKEN, JR, CO-AUTHOR

Dr. Wolken brings to the program considerable personal background in computer and electronic technology including a Ph.D. degree from Harvard University making use of advance computer and software technologies applied to physics and over 40 journal publications related to software and computer technologies. Dr. Wolken is Of Counsel in the intellectual property group of Porter, Wright, Morris & Arthur (Columbus office) responsible for providing representation, counseling and legal services in patent and related areas of intellectual property law concentrating on the development, creation, management, commercialization and litigation involving advanced technology with special emphasis on modern developments in software technologies, advanced computing technologies, optical and wireless communication technologies and related licensing, commercial, security and policy issues.

CLAY BENTON, RESEARCH SPECIALIST

Clay Benton, a third-year student at the Ohio State University College of Law, is a research assistant for ECLIPS working on the interoperability project. He received a dual degree in Chemistry and Psychology from Ohio Wesleyan University in Delaware, Ohio. While obtaining his undergraduate degree, Clay managed Comic Town, a comic book specialty store in Westerville, Ohio. Clay's primary interest area is in Intellectual Property Law.

JEFF WILHELM, RESEARCH SPECIALIST

Jeff Wilhelm, a third-year law student at the Ohio State University College of Law and a Managing Editor of the *Ohio State Law Journal*, is a research assistant concentrating on

privacy issues. Previously, Mr. Wilhelm was involved in developing another ECLIPS project, the States Inventory Project, where he was the primary researcher. He received a B.A. in political science and history from Furman University in Greenville, South Carolina.

SHANNON SULLIVAN, RESEARCH SPECIALIST

Shannon Sullivan, a third-year law student at the Ohio State University College of Law, is the graduate research assistant on the ECLIPS interoperability project. Shannon has demonstrated interest in a variety of academic areas, having obtained a major in Piano Performance and a minor in Management from Miami University, Oxford Ohio. Before attending law school she worked briefly at a US Brokerage House dealing primarily with garment imports, simultaneously teaching piano at a local conservatory. Her primary interests in the field of law include the new area of Cyberlaw, and International Law.

CHERYL D. STEVENS

Cheryl D. Stevens is the Program Coordinator at ECLIPS. She currently manages a staff of ten people including professors, researchers, and graduate students. She is also responsible for the financial management of the program. In addition to her many managerial tasks, Ms. Stevens was instrumental in providing research for the IEP Privacy and Interoperability projects as well as for providing exposure for the States Inventory Project. She is a graduate of Bowling Green State University with a B.A. in Political Science. Ms. Stevens is a national member of Pi Sigma Alpha, the political science honorary fraternity.

J. KEITH HARMON, PROJECT DIRECTOR

J. Keith Harmon is the Project Director at ECLIPS. He is currently involved in several Internet and electronic commerce-related projects, covering such areas as telecommunications policy, privacy law, smart card issues, and Internet use policies. He is also the Research Director of the States Inventory Project. Mr. Harmon's other duties include researching and reporting on other legal and policy issues relating to the Internet, including intellectual property, jurisdiction in cyberspace, First Amendment law, procurement reform, electronic authentication, and related issues.

Prior to joining ECLIPS, Mr. Harmon served as a Legal Fellow at the Office of Information and Regulatory Affairs (OIRA) at the Executive Office of the President. Mr. Harmon graduated with honors from the John Marshall Law School and was on the Editorial Board of the *John Marshall Journal of Computer and Information Law*. He has an undergraduate degree in business administration from the University of Florida and is a licensed attorney with the Florida Bar.

ABOUT ECLIPS

ECLIPS (Electronic Commerce, Law, and Information Policy Strategies) was founded in 1994 as a center to aid governments, businesses, and academic institutions across the

globe in the development of policies for the governance and use of cyberspace. Our extensive activities demonstrate our commitment to strategies that maximize the growth and acceptance of electronic commerce, help governments minimize the need for regulation, and ensure the protection of individual rights.

ECLIPS is dedicated to developing and maintaining a high level of expertise in the many issues concerning electronic commerce and cyberspace. As a result, our research staff spends a considerable amount of time researching and keeping pace with the ever-changing laws, policies, business practices, and technologies of the Internet and electronic commerce. Our research areas are as diverse as cyberspace itself—including the issues of electronic commerce as well as related areas such as intellectual property, standards development, and privacy.

ABOUT OSC

The Ohio Supercomputer Center (OSC) is a state-supported resource serving Ohio's higher education community. OSC offers computing resources on a peer-review basis to faculty and students conducting research in several disciplines, including medicine, business, economics, law, engineering, chemistry, mathematics, and physics.

Center staff assist faculty and student researchers by providing workshops, one-on-one classes, and web-based training materials. Ohio high school students step into the world of high performance computing and networking during OSC's annual Summer Institute. Students explore scientific investigation through collaborative team projects and intensive classes. Ohio high school teachers may also participate in this program.

Critical partnerships in computational science, like the Department of Defense's High Performance Computing Modernization Program and the National Computational Science Alliance, allow OSC to help position the state as a national technology leader. The Center's networking initiative, OARnet, provides Internet access to the majority of Ohio's colleges and universities and state government agencies. Through OARnet, more than a million Ohioans are connected to the vast information resources available on-line.