GOVERNMENT INFORMATION SHARING :

CALLS TO ACTION

VOL 1: JUSTICE

NASCIO
Representing Chief Information Officers of the States

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Representing Chief Information Officers of the States

PERSPECTIVES

Government Information Sharing: *Calls to Action*

Volume 1: JUSTICE

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NASCIO represents the state chief information officers from the 50 states, six U.S. territories and the District of Columbia. Members include cabinet and senior level state officials responsible for information resource management. Other IT officials participate as associate members and private sector representatives may become corporate members.

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introduction

Background

In 2000, NASCIO (formerly NASIRE, The National Association of State Information Resource Executives) published a report titled, "*Toward National Sharing of Government Information*." The report focused on the justice community and provided detailed discussion of the characteristics of shared information, the definitions of significant information management issues and terms, and brought to light important "calls to action" necessary to institute change in information sharing. Among the many recommendations and topics covered was the need for common vocabularies and a national telecommunications infrastructure.

The report served as the impetus for major subsequent activities including the publishing of "*Concept for Operations For Integrated Justice Information Sharing*" in 2003. Another subsequent activity was the development of NASCIO's Enterprise Architecture Program.

The significance of "*Toward National Sharing of Government Information*" cannot be over emphasized given the subsequent proliferation of products and services within NASCIO's Enterprise Architecture Program.

In the fall of 2004, NASCIO's Architecture Working Group decided that the report should be revisited to assess progress to date, and that a new set of "calls to actions" be established. This follow-up report is just that. It takes a different approach in that it covers a variety of lines of business and levels of government. The intention here is to look at the current state of information sharing, identify and discuss the major issues and outline the "calls to action" required to move forward.

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A Changing World

In today's world, managing change has become the most important dimension of management. Charles Kettering once stated, "If you have always done it that way, it is probably wrong." Government must change in order to effectively respond to the current dynamics in today's world. There must be an operating discipline in place that both anticipates change and fully leverages that change for the benefit of the enterprise, and its constituents. NASCIO believes that operating discipline is *enterprise architecture*. Enterprise architecture provides an *enterprise view*—a comprehensive, holistic view of the enterprise that includes environmental understanding, explicit strategic intent, and the organization, business processes, *and* technologies that enable that intent. Enablers are capabilities that must be evaluated, and prioritized. Capabilities are delivered or further leveraged through management initiatives, programs and projects.

Enterprise Architecture Value Chain

Enterprise architecture provides the means for *managing the complexities* inherent in any enterprise. Enterprise architecture also provides the necessary *operating discipline* for managing the *changing enterprise*. The enterprise must be seen as an organism that changes and adapts—and even *causes* change. However, change must be seen as a *continual process*. NASCIO created the **Enterprise Architecture Value Chain** to describe an ongoing, iterative operating discipline for managing the enterprise as a fluid that is continually changing through time. This holistic

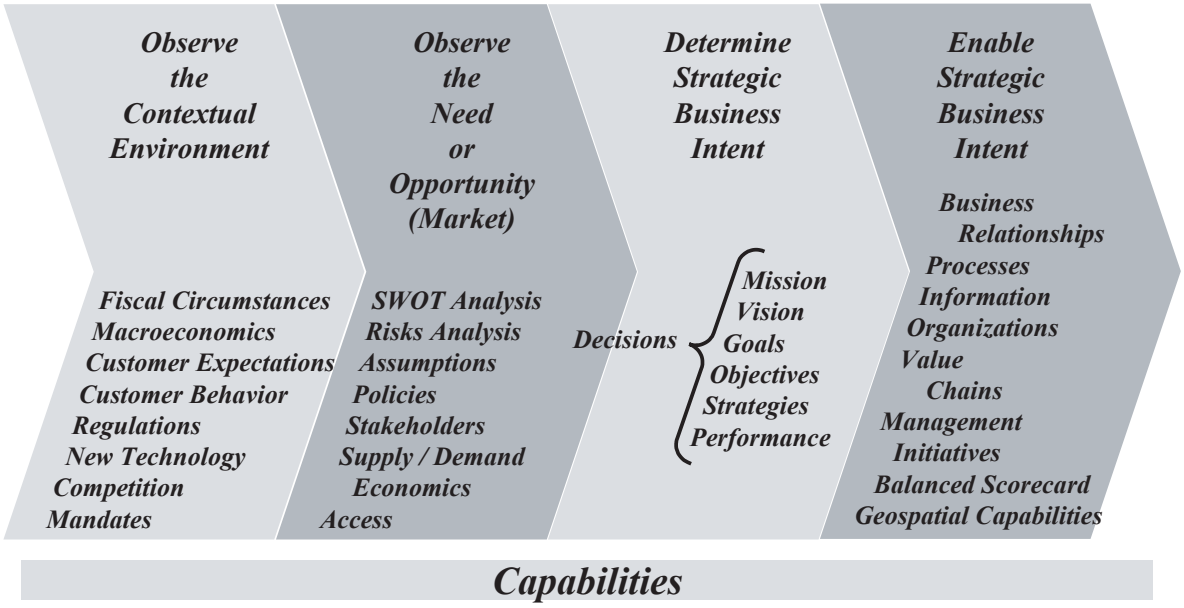

Figure 1

view just described goes beyond the immediate. An enterprise perspective is needed that understands the importance and complexities of i*nter-enterprise relationships*. Quickly, this enterprise perspective looks beyond traditional boundaries and conceives of value chains that move across these boundaries. These greater *clusters of enterprises* may be termed *communities of interest*. Further inquiry uncovers that the borders of these communities of interest are also becoming fuzzy as the need for interaction becomes more and more apparent. These interactions materialize into inter-enterprise architectures involving inter-enterprise business processes and information exchanges. Information sharing and collaboration between state governments for law enforcement is an example.

Information exchanges, or information sharing—these are different terms referring to the same concept. Others may use different terms. The point is that information is flowing more than ever, and it is flowing over traditional boundaries as decision makers become more and more sophisticated in their understanding of events and the interactions of influences that drive primary, secondary and tertiary effects. This sharing has become complex as will be described in this document. Changes include cross jurisdictional and cross line of business information exchanges. Changes also include delegated information exchanges to the computer involving machine to machine automated exchanges. These machine to machine exchanges include the necessary logic to review content for sensitive information and automatically assign the proper security classification. These automated exchanges also evaluate the requester to determine authority and authenticity before allowing the exchange to occur. Emerging technologies, such as Service Oriented Architectures (SOA), enable the connectivity of various automated functions that allow applications to trigger other applications. For example, this occurs when an application triggers an identity management system to authenticate an automated request for information from yet another application.

As we begin to look at information exchanges, we find there are new information exchanges as our culture sees more and more necessity and benefit from sharing information. Nowhere is the need for these types of exchanges more apparent than in homeland security. Homeland security touches any number of lines of business depending on the event. These include integrated justice, public health, environmental protection, national defense, international alliances, and even commerce. Certainly, it appears homeland security will be the primary developer of information sharing capabilities as we move into the future and an area that will benefit most from an *enterprise perspective*.

In the recent *Final Report of the National Commission on Terrorist Attacks Upon the United States*[1] the lack of information sharing is frequently cited as a primary factor leading up to 9/11, and the lack of comprehensive coordination during 9/11. One of the key recommendations going forward is the imperative for a unity of effort in information sharing both nationally and internationally. Information sharing capabilities are absolutely necessary for intelligence and justice agencies to be able to "connect the dots" in order to prevent future terrorist attacks. In the event of a future terrorist attack, information sharing is again one of the key imperatives for responding to the aftermath.[1] The recent

[1] http://www.gpoaccess.gov/911/

intelligence reform bill which implements recommendations from the 9/11 commission is replete with requirements for information sharing. Information sharing is indeed one of the key capabilities in transforming the intelligence community.[2] Other examples can be drawn from medical records, hazard alerts, and integrated justice. Again, the capability to share information is critical in all government lines of business in government.

As stated, government is never done exercising the ongoing "Enterprise Architecture Value Chain." We must continually monitor the world around us as we identify needs and markets, anticipate market and political disruptions, establish explicit strategic intent, and deliver the capabilities to enable that intent. As we move into the future, one of those capabilities is information sharing across jurisdictions, and across lines of business. As we explore this topic, we urge the reader to maintain an "enterprise perspective" of the world. This perspective may also be termed a "global perspective." If information sharing as a necessary capability is to be effectively developed, it will be necessary for all involved to maintain this "enterprise view" in order to avoid point solutions, and stovepiped applications.

Government Information Sharing: Calls to Action

"Calls to Action" seemed appropriate as this report and those who participated in its creation are convinced that all must participate in the overall *call* to address this issue of information sharing. This must truly be a mission in which we all participate. For as the reader will see, this is not a technology problem—it is an organizational problem, and a human problem. It is critical that barriers to information sharing be understood in this way if we are ever to truly conquer this issue.

If information is to be shared, there is the necessary *establishment of standards for sharing*. Exchange partners must agree on the content of the information and the protocols for how that information will be represented and transmitted. For instance, the justice community has faced the issues of standards during a long history of information sharing initiatives.

If information is to be shared, then the *rules for sharing must be well understood* by all involved, and those rules must be consistently and effectively applied.

If information is to be shared, then *people must begin thinking with an enterprise view*. They must put the enterprise and its constituents ahead of their own career, and personal ambitions.

If information is to be shared, people must accept and embrace the changing of boundaries, job scope, and business processes. If government is to be truly transformed, than old paradigms must be abandoned. There will need to be a new type of manager. One that adapts roles and responsibilities to best serve the changing needs and requirements of the citizen. Government must be seen as an institution for the citizen, not for the career public administrator. The same change must occur with all government personnel. Change should not be merely tolerated. It should be embraced. What

[2] S.2845, "Intelligence Reform and Terrorism Prevention Act of 2004."
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:s2845enr.txt.pdf

is proposed in that change in mindset is a view of government service as a *commitment to public service*—i.e., one of high calling.

If information is to be shared, then it cannot be withheld. This seems too obvious. The many dynamics involved in organizational behavior become most relevant in this issue. Dynamics include power, prestige, control, personal security, and even fear of change. *Information that is withheld will serve limited purpose in government*. Notwithstanding this admonition, information must be properly protected and treated as an asset.

If information is to be shared, it must be properly managed. This includes the appropriate security to ensure information assets are protected. However, properly managed information is shared with those who are authorized to use it. *This requires that information is properly and consistently classified*. This also requires that information stewards are properly trained. And, requesters of information are properly authenticated to have the proper authority, and the necessary clearances to access information.

NASCIO is exploring the subject of information sharing from this enterprise perspective. As part of this initiative, NASCIO recently published a video on information sharing titled "*In Hot Pursuit: Achieving Interoperability Through XML*"[3], which presents some of the barriers and solutions. Additionally, NASCIO has conducted a survey of opinions from a variety of individuals, and expertise centers regarding the concept of information sharing—barriers and calls to action. This report, presented in two volumes, offers a variety of perspectives and a variety of modes of delivery. Included are interviews, written submissions, and summaries of existing testimonials and literature. Interviews are presented that involved both individuals and panels from various recognized expertise centers on information sharing. In all cases, NASCIO was motivated to present expert opinions. These opinions are honest and frank—but all are offered in the spirit of continual improvement. If we can be honest, and provide a candid assessment of the "as is", then there is true potential for making things better.

This survey of opinions included representatives from integrated justice, state government, public health, homeland security, environmental protection, and transportation. This report is presented in two major sections: Volume One is devoted to the justice community, and Volume Two is covers the broader topic of "government." This compilation is not exhaustive. However, it is believed that it successfully outlines the major barriers to information sharing that are prevalent throughout government. The end game is to objectively identify these barriers with the intent of rationalizing the relevant solutions for overcoming or mitigating these barriers. These solutions and recommendations are termed "calls to action" in the context of this report.

NASCIO recognize the valued contributions of all who participated in the making of this report.

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[3] See, https://www.nascio.org/publications/index.cfm#xml

justice perspective

Information Exchange Modeling: Understanding the Enterprise and Creating a Blueprint for Success

Kelly J. Harris, SEARCH Deputy Executive Director

The barriers facing those who are trying to foster collaboration, information sharing and integration are not new or unique. Indeed, the age old challenges of politics, personalities, turf and ownership continue to surface as the most difficult to overcome, yet also the most critical issues to address for jurisdictions to further information sharing.

What has changed in recent years, however, is that justice and public safety practitioners realize that these historical barriers must be kicked down, hurdled over, or blasted completely out of the way. There is simply no choice. Mandates and directives, from Executive Orders to congressional legislation, to after-action reports that investigate the handling of major public safety events (especially the 9/11 Commission Report) demand information be shared—immediately, effectively and securely. And if that's not enough, perhaps the biggest driver is an increasingly vocal and sophisticated public expectation. The public—which is becoming acutely aware of the power of technology and the obstacles to government information sharing—will not tolerate excuses of politics, personalities and battles over turf for failing to share needed public safety information.

And so, in the past several years, there has been a great deal of nationwide activity to build tools that will help overcome, or at least mitigate, these challenges and get us on our way to successful information sharing. Best practices have been identified, tools have been created, methodologies have been adopted, standards are being developed and the justice information sharing industry is taking an unprecedented leadership role to make integration happen.

Understanding the Enterprise: A Complex Problem

The justice enterprise alone includes numerous justice and nonjustice agencies that operate a myriad of systems for collecting, maintaining, analyzing and sharing data and information critical to carrying out their respective missions. Creating the capacity to share information and data among and between agencies, levels of government and a variety of disciplines—indeed, creating an enterprise approach—means overcoming established barriers to data exchange. It involves understanding cross-jurisdictional information needs and the data and information exchanges that cross sometimes radically different lines of business.

Interoperability is the ability of agencies to work together toward common ends. It depends on a vision of what those ends are and how separate capabilities are combined to serve them. Representatives of the various agencies, disciplines and levels of government, therefore, must come together to formulate and agree to a unified strategy for achieving interoperability. These are not exclusively technical issues that can be addressed by programmers and data

processing managers. To the contrary, planning for and implementing information sharing systems is a complicated *business* that involves a multifaceted array of political, organizational, legal, technical, security, cultural and personal issues that must be addressed and upon which decisions must be made. Because of the inherent complexity of these issues and the constitutional separation of powers that is also present, decision makers, stakeholders and other users must be intimately involved in effectively designing an enterprise information sharing capability.[4]

The difficulty in planning for information sharing initiatives (e.g., getting business leaders and practitioners to the table to talk, establishing a strategic plan, developing an information architecture, adopting appropriate standards, etc.) in many instances is associated with the lack of understanding about how the enterprise actually operates.

During day-to-day business, for example, a law enforcement agency's activities have enormous impact on its partner organizations throughout the justice system. But on a daily basis, law enforcement administrators are not necessarily examining that impact. For example, when a police officer makes an arrest, numerous activities are set in motion. The officer may use a mobile computer to query, access and send critical information about an incident. The officer may request information about an individual's correctional, probation, or parole status; information regarding wants and warrants, hot files and information from the National Crime Information Center (NCIC); and/or information from local, regional and state records management systems. Each of these requests demands the responding organization provide accurate, timely and complete information while protecting the confidentiality of certain data, and ensuring distribution to only authorized users.[5]

Meanwhile, information generated by the arrest triggers numerous activities *internal* to the law enforcement agency, while simultaneously generating *external* activity at locations such as the jail, the prosecutor's office, sometimes the court house, social services and potentially many others. Indeed, many activities have been set in motion by this single event, and thousands of such events and transactions occur daily within tens of thousands of justice agencies alone. It is even more daunting to envision when you consider that this example merely considers a single, one-way push of information out to multiple partners. In reality, at the same time this one-way push is occurring, this agency is also receiving multiple information queries and pushes from other partners.

Law enforcement agency administrators, like all other administrators within the enterprise, are responsible for the daily operational activities of their agency, and that leaves little time to consider the details of how each organization's partners within the justice enterprise (no matter how critical their role) conduct their business.

But the challenge *is* getting all participant organizations thinking as an enterprise. As the introduction to this report noted, "Enterprise architecture provides an *enterprise view*—a

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[4] See "Governance Structures, Roles and Responsibilities," published in *Information Systems Integration: A Library of SEARCH Resources for Justice and Public Safety Practitioners*, 2004. Available to download at: http://www.search.org/files/pdf/IntegrationLibrary.pdf

[5] See *Concept of Operations for Integrated Justice Information Sharing*, July 2003, V1.0, National Association of State Chief Information Officers. This publication is available online at: https://www.nascio.org/publications/index.cfm#conops.

comprehensive, holistic view of the enterprise that includes environmental understanding, explicit strategic intent, and the organization, business processes *and* technologies that enable that intent." Viewing justice as an enterprise means each participating organization understands its role in the overall process of administering justice, the dependencies it creates and the interdependencies that are critical to the overall success of the enterprise. Those dependencies and interdependencies are centered around information, and how participants share, process and use it.

A fundamental part of achieving integration and information sharing is understanding how the enterprise works, how information is exchanged, and how daily business processes enable or inhibit information sharing.

Modeling Business Process and Analyzing Information Exchanges Reveals the Enterprise

When organizations come together to understand how they are currently doing business, and how they can improve operations and develop efficient and streamlined business processes, something else happens. A detailed understanding of information flow among and between agencies affords participants the opportunity to visualize the individual components operating (or not operating) as a whole, and this, in turn, underscores the enterprise nature of information exchange.

There is no great secret in conducting a review of business processes and information exchanges. Analyzing information exchange between agencies has been a recognized and important part of IT planning for justice agencies. Historically, however, it often took an agency-centric approach, looking at information exchanges between a single agency and its closest business partners. But to make information exchange modeling *effective*, the recipe´ demands getting the right people involved and providing the right tools for analysis. To clearly envision the enterprise, the business processes must be understood. This is not a technical exercise, but one that relates to the group's vision and mission. To do this effectively, *decision makers* from participating organizations must be actively involved and they must represent all of the constituent agencies. They come together to analyze how they *collectively* do business and discussions will center on the needs each partner has for information, policy and legal constraints, security concerns and priorities, maintenance and dissemination procedures and many other policy level considerations.

In addition to getting the right people around the table, it's also important to establish and agree upon a methodology for capturing and analyzing detailed information about business processes and the data and information that is and/or needs to be exchanged among the partners. By following a consistently applied methodology, participating organizations expose current business processes, and from there can model new processes. They can also investigate the impact to those processes created by changes in systems and business practices.

Creating a Blueprint for Information Sharing

Once practitioners understand the enterprise and how it conducts business, they can begin to build a blueprint for a more effective enterprise. Information sharing analyses will expose inefficiencies, redundancies, gaps and opportunities in the current system. Once the systems' current operations are clear to decision makers,

they can make decisions about how they want to work together in the future and construct a blueprint or "to-be" plan.

The Benefits to Analyzing Business Process and Information Sharing

Throughout this document and in many other writings, the challenges to information sharing have been articulated and are strikingly similar—most have to do with people and personalities, concerns over "turf" and struggles over policy-related issues and decisions. Some of the ancillary benefits of business process and information sharing analysis can help address these issues.

Conquering Personality Conflicts and Bringing People Together

Conducting a business process/information exchange analysis is critical for more than just analyzing information exchange. It is one of the few opportunities to bring all the different partners together to take a holistic view of an operation. It assists in breaking down barriers between people and turf. It is a mechanism that brings people together on common ground with a common purpose and goal. As such, conducting business review exercises has, in many cases, helped jurisdictions overcome one of the biggest challenges to successful integration and information sharing: getting people to work together.

Analyzing business processes and the information shared provides a look at how the *enterprise* operates, rather than merely focusing on a single participant's operations. It illustrates how each agency operates and its responsibilities, challenges and obstacles, while highlighting how its operations impact the effectiveness of the enterprise as a whole. The methodology allows for all partners to specify their information-sharing requirements within the context of the enterprise. Because all partners are heard and the business needs are commonly presented, mutual understanding of each partner's roles, responsibilities and burdens are revealed. Partners can then begin to develop solutions that help one another, creating a synergy, and thereby improve the enterprise.

As partners uncover the way their enterprise conducts business, they begin to recognize how the enterprise could change for the better and they begin to overcome the fear of change, which is often associated with a feeling of loss of control and subsequent turf issues. Through this review, partners gain an understanding of and empathy for one another's challenges and insight into why business may be done a specific way. In many instances, one agency's challenges have easily been overcome by a partner agency offering a solution, but that solution could only have come with a knowledge of the current process.

Adopting Standards

Information exchange and business process analysis also builds the foundation for successful standards implementation. It identifies what information is needed by participant agencies; determines when and under what circumstances to share information; highlights the difference between agencies regarding a) whether the information is even captured, and b) how the information is captured, stored and available for transfer. With the emergence of contemporary technologies (e.g., eXtensible Markup Language, or XML), agencies do not necessarily need to significantly reprogram their existing information systems, but they can use integration hubs, broker technologies and practitioner-based data dictionaries and data models to transform data for effective exchange. With the "as-is" business processes and information exchanges understood, and the "to-be" models built, enterprises

can then settle on standards for operation and implement them for re-engineered business practices.

Making Funding Decisions

Funding for information sharing is sporadic, at best, primarily because few funding streams are structured to recognize the enterprise nature of these efforts. Instead, funding streams are often developed and targeted directly for partners within the enterprise. In justice, for example, there are numerous funding streams that provide needed monies to law enforcement and public safety agencies via the Departments of Justice and Homeland Security. Courts often have revenue bases that are driven by fines and fees, but that are obviously pumped back into the court's operating budget. But because of the nature of the "stovepipes" that have been developed within jurisdictions over time, few funding streams are specifically designed to encompass an enterprise approach.

Developing the blueprint for how an enterprise desires to operate will clarify for each of the partners where enhancements are needed, and can illuminate business processes with the most need for reform. That, in turn, can assist jurisdictions with making decisions about priority projects and efforts. It can foster agreement among partners so that when a funding stream becomes available to one partner, it may also be leveraged to enhance the efforts of the enterprise.

Security and Privacy Efforts

As enterprise partners examine what types of data and information is/should be exchanged, with which partners and how it is used, this information can give them very real understanding about data security, and direction concerning how to make policy decisions about the privacy of data and information. Concerns over which data is made available and what happens to the data when it is shared are always paramount in an information-sharing environment. Demystifying the process and detailing the information shared helps policymakers make appropriate decisions about critical privacy and security issues.

Justice Information Exchange Model© (JIEM)

One of the most promising tools for analyzing business processes and associated information exchanges, and, thereby, addressing some of these more pervasive barriers to integration is the Justice Information Exchange Model © (JIEM). It is rapidly expanding to public safety, homeland security and has great potential for other information sharing efforts.

JIEM is a vital information sharing modeling tool and methodology that has been developed by SEARCH[6] with funding by the Bureau of Justice Assistance, U.S. Department of Justice. JIEM was initially designed to research and analyze the information exchanges that occur within the justice system and to prove a theory: that most of those exchanges were common across the entire U.S. justice system. Proving the theory began to take shape as the business processes and information exchanges of five participating states were analyzed. It immediately became

[6] SEARCH, The National Consortium for Justice Information and Statistics, provides onsite, no-cost assistance to state and local jurisdictions under several grant programs administered within the Office of Justice Programs, U.S. Department of Justice. See www.search.org. Information about the Justice Information Exchange Model© is available at http://www.search.org/programs/technology/jiem.asp.

clear that a large percentage of exchanges were common across these initial research sites. As JIEM expanded to include more and more state and local jurisdictions, the research continued to build, and the automated tool that resulted became a critical asset in facilitating justice information sharing systems planning and implementation throughout the nation.

Justice information sharing refers to the ability to access and electronically share critical information at key decision points throughout the justice process. Through identification of these key decision points, and the information that flows between various justice entities at these critical exchange points, state and local practitioners are provided with an enterprise-wide view of information sharing priorities.

JIEM provides a conceptual framework to represent the flow of information between justice agencies; defines the key events that trigger the need to share information; identifies the agencies involved in the exchange; and describes the nature of the information exchange, down to the data element level. Most importantly, the information exchanges captured in JIEM can be mapped to the Global Justice XML Data Model (GJXDM),[7] the XML standard for justice information sharing.

JIEM is in use by over 45 jurisdictions across the country to analyze, document and re-engineer their information sharing processes and has been groundbreaking in establishing a standardized methodology for justice information exchanges.

JIEM allows an enterprise to map both the current "as-is" information exchanges, and then, through analysis and business process alignment and reengineering, to model enhanced processes in the "to-be" or future exchanges. This is how JIEM contributes to the development of a blueprint for information sharing.

Common Exchanges Create a Reference Model for Others to Use

Of particular importance is that the state and local jurisdictions using JIEM have created databases that contain their detailed justice information exchanges. JIEM was designed to allow administrators to review, compare, contrast and find commonalities with exchanges entered by other jurisdictions. That research has led to the development of a universal set of common exchanges for justice integration.

The "Justice Reference Model" is comprised of nearly 700 common justice exchanges nationwide. With the Reference Model, sites that are just beginning their integration efforts can incorporate those exchanges contained in the model, rather than starting with a blank sheet of paper to create their own. They can download those exchanges into a new database that can then be tailored, added to and adapted to reflect the unique needs of their jurisdiction. The Reference Model enables justice agencies to build exchanges that reflect their individual business practices, but in a manner that is consistent with national activities and initiatives. Moreover, it saves jurisdictions a great deal of time by enabling them to leverage the work of other jurisdictions, and build on the common exchanges that research has demonstrated are truly universal. Most importantly, this essential capability of JIEM was developed by and for the

[7] The Global Justice XML Data Model is accessible online at: http://it.ojp.gov/topic.jsp?topic_id=43.

practitioners who use the tool to model actual, operational exchanges in their jurisdictions.

While JIEM was developed to target justice system integration, the JIEM concepts and project methodology are transferable to any domain facing similar information sharing business problems. Indeed, efforts are presently underway to extend the benefits of JIEM analysis and modeling to tribal justice, juvenile justice, first responders, emergency management, and similar types of information exchange business models. The JIEM conceptual framework documents the flow of information between agencies and describes the nature of the information exchange, irrespective of whether one is analyzing justice or non-justice system exchanges of information.

The JIEM methodology and tool have direct relevance and can be used by any enterprise seeking to analyze its business processes, understand its information exchanges, and reengineer the way it does business.

What is JIEM?

The Justice Information Exchange Model (JIEM) is a tool to assist justice system leaders to analyze and document existing information exchange at the enterprise level, to design new electronic exchange processes as a part of an integrated justice initiative, and to adopt and implement national business, data, and technology models to save time, effort, and money.

JIEM has four components:

- A conceptual framework for understanding justice information exchange
- A methodology for analyzing current information exchange and for reengineering information exchange in an information sharing environment
- The JIEM Modeling Tool©, a Web-based software package to assist justice system practitioners in applying JIEM
- The JIEM Reference Model, a set of information exchange descriptions that are common to most jurisdictions

Who Uses JIEM?

JIEM can be used by justice—or any—practitioners during the strategic planning phase of an information sharing initiative, or later by developers during the design of specific interfaces between applications. Using JIEM, a site can accomplish the following:

- Document existing business processes and information flow among and between partners with a variety of text and graphical outputs
- Analyze the effectiveness and economy of existing practices
- Model improved information exchange, creating blueprints for the integration initiative
- Analyze existing data transfers to determine which provide the most favorable cost/benefit ratios for automation
- Use JIEM outputs as inputs to other developer tools to enhance justice applications and to develop interfaces between systems
- Access, import, and extend national models, such as the JIEM Reference Model, the Global Justice XML Data Model, and reference exchange documents and implementation specifications from the developing Global Justice XML Registry/Repository
- Register locally developed XML implementation specifications for documents in the national repository for use by others

- Provide data to support national efforts to develop and improve models, methodologies, and tools to support integrated justice.

JIEM Benefits

The JIEM analysis requires the active participation of stakeholders from all participating organizations. It delivers a number of benefits to local, state, and regional integrated justice efforts that go beyond the specific products provided by the system, including:

- An opportunity to bring staff from diverse but interdependent justice disciplines together with a common language and methodology to focus on business practices of mutual concern at the enterprise level
- Access to best practices from around the nation to avoid reinventing the wheel
- Free software and support to preserve scarce resources; a personal computer and internet access are the only requirements to access JIEM
- Participation in national efforts to improve the integration of justice information resources.

What is the Future of JIEM?

Since the release of version 3.0 of the JIEM Modeling Tool© in February 2004, 325 individuals have been trained and 168 have been certified to use the software in 25 training programs held throughout the nation. 14,599 exchanges have been documented in 65 production databases. A link has been created between JIEM and the Global Justice XML Data Model (GJXDM), providing the capability to search and import elements from the GJXDM directly into JIEM. A business reference model has been created, which saves time and effort in using JIEM, and helps ensure results that are more consistent across jurisdictional boundaries.

The principles upon which JIEM is based are not specific to the Justice enterprise. As such, using JIEM for other government information sharing initiatives in emergency management, transportation, and intelligence are already being explored. Those domains will also benefit from reference models comprised of common exchanges for their constituent agencies.

In the coming year, new tools will be added to JIEM to assist developers, including Universal Modeling Language (UML) and Extensible Markup Language (XML) outputs to speed the implementation of JIEM and the GJXDM. The JIEM/GJXDM interface will become a web service, ensuring that the latest data model changes will be instantly available to JIEM users. A search wizard and mapping wizard will be added to JIEM to improve access to the GJXDM and to allow the creation of GJXDM-compliant documents within the JIEM Modeling Tool. Users will be able to create want lists and conformance, constraint, and extension schemas within JIEM. They also will be able to search and download reference exchange documents and implementation specifications from the Global Registry/Repository when it becomes available. Finally, JIEM users will be able to register their own versions of reference exchange documents as implementation specifications in the registry.

JIEM is an essential tool for information sharing. When used in conjunction with the GJXDM, it provides help through the entire development spectrum: business processes, the data layer, and the technical tiers of the architecture.

Case Study: Alaska

Alaska had a six-month backlog of 17,000 citations, totaling about $1 million, awaiting default judgment at the court. The old citation handling process required that each citation be manually entered in three different locations: the Anchorage Police Department, the court, and the state repository. The data entry backlog at the court increased the difficulty of collecting on the citations, because of people moving, etc. It also kept the state from attaching funds paid from the permanent fund dividend, Alaska's equivalent of a tax intercept program. After mapping out the business processes carefully with JIEM, both the current "as-is" and the desired "to-be" procedures, they developed the design for an interface to pass the citation electronically from the police system to the court and repository. Once the interface had been designed from a business perspective, they were able to use the GJXDM and a private-sector XML middleware product to implement the exchange of citations between the Anchorage Police Department and the court, instantly eliminating redundant data entry and 12,000 of the 17,000 citations in the backlog. Now default judgments are processed immediately, which increases the amount of money collected and helps ensure better compliance with the law. JIEM played a critical role in solving this justice system problem in Alaska.

Conclusion

Business process modeling and information exchange analysis are critical parts of planning for information sharing. The obvious benefits are in solving operational inefficiencies and business challenges, and creating a blueprint for streamlined and efficient operations. Of equal—if not greater—importance are the ancillary benefits this exercise generates. Overcoming barriers by creating bonds between information-sharing partners through the understanding of common challenges and needs; developing a clear link between re-engineered processes and adopting information sharing standards; prioritizing funding challenges; and making informed policy decisions about data and information security and privacy are some of the most important results of this exercise.

JIEM is a tool that has been created to facilitate this analysis and modeling from an enterprise perspective, and it's proven effective in countless jurisdictions around the nation. In addition to documenting information exchange, the tool has enabled jurisdictions to model business practices and reengineer business processes to facilitate greater and more effective information exchange. It has also served as a critical catalyst for change by bringing decision makers and practitioners together to examine how they work together and how their coordinated efforts can build an effective information sharing enterprise. It has worked in the justice domain. JIEM's principles, practices and methodology can work in other domains as well. For more information on JIEM, please visit www.search.org.

justice perspective

Developing Law Enforcement and Justice IT Standards for Information Exchange

by Paul Wormeli, Executive Director, Integrated Justice Information Sharing (IJIS) Institute

Effective and timely information sharing has been a challenge for some time in the justice community. In 1998, the Office of Justice Programs (OJP) of the U.S. Department of Justice convened a series of focus groups around the country to discuss issues of information sharing and to identify the impediments to information system interoperability. There were a number of conclusions reached from these meetings, but a primary theme was that the lack of standards for exchanging information between computer systems was at the heart of the reason "stovepipe" systems continued to proliferate. As a direct result of practitioner recommendations made in these meetings, OJP undertook an initiative to improve automated information sharing in the law enforcement and justice world.

In addition to funding studies by the International Association of Chiefs of Police (IACP), the National Center for State Courts and other agencies to document the state of information sharing and integrated justice information systems, the Office of Justice Programs (OJP) initiative led to the formation of the Global Information Sharing Advisory Committee, Global, which is a formal Federal Advisory Committee (subject to Federal law such as requiring all meetings to be open to the public) appointed by the Attorney General. Global, as it is referred to in shorthand notation, is essentially a consortium of 28 organizations that represent the leadership of law enforcement and justice agencies throughout the country, as well as selected Federal agencies. Global is not an operational entity, but adopts by consensus policies and positions that result in recommendations to the Attorney General regarding information system advances.

Based on the premise that information technology standards would have to be developed and then fully adopted by the companies who make most of the software applications employed in law enforcement and justice agencies, the Attorney General urged OJP to invite input from these companies collectively and OJP invited companies to participate in the Integrated Justice Information Systems Industry Working Group (IJIS IWG). These companies later founded the Integrated Justice Information Sharing (IJIS) Institute, a non-profit organization designed to provide technology assistance and training in the use of advanced technologies to state and local governments through grants from the Bureau of Justice Assistance in the OJP. The IJIS Institute also participates in the development of standards for information sharing.

The Promise of XML

Around the time that OJP began to address this problem, a new technology was emerging that offered significant potential for building standards and reducing the cost of interoperability between computer systems. The broad adoption of an internationally recognized open standard called

the eXtensible Mark-up Language (XML) was seen as the basic mechanism around which law enforcement and justice agencies could automate the exchange of information between computer systems. XML is basically a set of rules and procedures for creating electronic representations of the kind of documents that law enforcement and justice agencies exchange every day to conduct their business. A series of standards for creating and sending electronic documents were adopted by international standards organizations and by all the major technology companies to allow computer based information exchange.

The members of Global clearly saw the potential of using XML as a standard in the justice world, and quickly adopted a policy endorsing the use of XML across justice disciplines. However, the effective use of this exciting new technology required the development of a vocabulary of terms and definitions that would be interpretable by any stakeholder agency in developing automated exchanges. Global then recommended to the Attorney General the creation of an XML Structure Task Force (XSTF) to define a standard data dictionary and to define the relationship between data elements in a structured model that could form the basis of national information exchanges between law enforcement and justice agencies.

The Promise of GJXDM

The XSTF is primarily a practitioner driven organization, augmented by technologists from industry and academia, which has defined the content and structure of a national model called the Global Justice XML Data Model (GJXDM). It took input from many individual organizations from around the country and relied heavily on the research that had been conducted by SEARCH, the National Consortium for Justice Information and Statistics, regarding the nature of information exchanges between justice agencies. The engineering work to develop the model as defined by the XSTF was assigned to the computer scientists of the Georgia Technology Research Institute.

Over twenty-one state and local law enforcement and justice organizations saw the potential of using the GJXDM as a basis for information exchange. Among those involved were the states of Pennsylvania, Arizona, New Mexico, Kentucky, Colorado, and Minnesota; counties including Maricopa County, Arizona, and Orange County, Florida; and over nine hundred police departments in the state of Ohio. These organizations came together and began to implement the first production release of the GJXDM which was issued in January, 2004. However, it is a complicated and sophisticated model, involving very modern concepts such as object orienting modeling, and few technologists in the public or private sector were prepared for the adoption of this model. In response to this situation, OJP created an adhocracy called the GJXDM Training and Technology Assistance Committee (GTTAC) as a consortium of organizations engaged in technical assistance and training related to technology in the justice field, and GTTAC has been delivering training and technical assistance programs since May of 2004. GTTAC members include the Law Enforcement Information Technology Standards Council (LEITSC), the IJIS Institute, SEARCH, the National Center for State Courts, the National Law Enforcement and Corrections Technology Centers, the Georgia Technology Research Institute (GTRI), the XSTF, the Regional Information Sharing Systems Program (RISS), and others who offer help in understanding and applying this model.

In addition to training on the implementation of the GJXDM, GTTAC has recognized the need

for models that state and local agencies could use to implement, document or exchange specific implementations. The member organizations have divided up the work of creating what are called reference documents to be guides that give examples of specific document exchanges, such as an arrest report or sentencing order, so that implementers can have a starting point for adopting the GJXDM in their systems. This is the major focus of GTTAC for 2005, along with the creation of a national virtual help desk centered on the GJXDM.

In addition, efforts are underway to extend the GJXDM to incorporate other needs. The IJIS Institute is working under a grant funded by the Department of Justice Bureau of Justice Assistance (BJA) to extend the model to handle juvenile justice exchanges, and there will be an effort to incorporate transportation system exchanges particularly between transportation centers and first responder CAD systems.

The GJXDM continues to increase in its application, as the FBI has now adopted the GJXDM as the standard on which its new National Data Exchange (NDEx) incident reporting program will be built, and future Uniform Crime Reports (UCR), National Incident-Based Reporting System (NIBRS) and other incident sharing for investigative purposes will operate. The national exchange of terrorist information will also be based on the GJXDM, and many states have already fully adopted this standard for information exchange among justice agencies in the state. In the fall of 2004, OJP created a special condition to apply to all Federal grants that had any aspect of automated information sharing. As a part of the grant requirements, the recipient must agree to base such exchanges on the GJXDM.

Standards

There are actually three levels of standards that have to be put in place for all of this work to result in true interoperability among computer systems. The **technical** standards have been and are being developed around XML by such bodies as the world wide web consortium (w3c), the International Standards Organization (ISO) and other standard setting bodies. The **data** standards are being presented in the GJXDM and continue to develop under the guidance of the XSTF and GTRI. What remain to be established are the **functional** standards calling for the use of the technical and data standards in implementation. It is generally recognized that the development of functional standards should come from the individual disciplines engaged in law enforcement and the administration of justice. As an example, the National Center for State Courts has for several years been developing the functional standards for the various kinds of court systems (criminal, civil, etc.).

In the law enforcement field, there is one specific consortium tasked and funded to develop functional standards—Law Enforcement Information Technology Standards Council (LEITSC). With the active participation of IACP, the National Organization of Black Law Enforcement Executives (NOBLE), the National Sheriffs Association (NSA), and the Police Executive Research Forum (PERF), this body will define functional standards for the IT functions needed to serve law enforcement. The research resulting from the LEITSC Council and its subcommittees will then be vetted through appropriate committees of each participating organization in an effort to define and adopt national standards.

When this work is complete, there will be fully defined consensual standards that can be applied to ease the work of information sharing

throughout the nation. However, standards can never be allowed to stagnate, and each participating organization will have to ensure that there are programs and projects to review and revise the standards or they will die from lack of use. The challenge to stakeholder organizations is to create an ongoing refreshment of all of the standards as technology changes, and as the nature of the business changes.

justice perspective

Governance and Stakeholders

Interview with Thomas Kooy, President, Justice Information Sharing Professionals

In the mid-1990's, a lot of momentum was created around a process for developing information technology solutions within the justice enterprise. The planning models prescribed included the following:

- Identify stakeholders
- Establish governance
- Do an assessment of what you have
- Conduct a capability and needs assessment
- Establish a visionary process for describing the future enterprise
- Conduct a gap analysis
- Develop integration projects/plans.

This is basically the high-level process that evolved and was propagated. The justice community started to use it and followed that process logic as dogma. However, has there been any real evidence to say that this works? Those who developed and presented this approach had no best practices to draw upon. It appears logical, but is it applicable and manageable to a level of detail that can guarantee outcomes for success? There were never any specific details, definitions or examples that were truly useable. For example, "Gather your Stakeholders." What does that really mean? Have we truly gathered our stakeholders? Project managers need to ask that question and, determine whether they have established an adequate governance that can function effectively, and make the kinds of decisions necessary for their enterprise. One governance mechanism may have worked in one jurisdiction, but that does not mean that the same mechanism will work in others.

The level of success of these complicated projects is often measured by the politics. That is, what has been presented and demonstrated in order to justify an investment, versus true outcome and performance measures. These former measures of success are often a political or commercial hyperbole that comes out of the communication machine of the invested politicians or vendors, and not fact.

Much of this issue lies in the overwhelming complexity and immense amount of detail required in the planning of enterprise information sharing projects. Within a governance mechanism, leadership (and delegated authority given to committee and work teams) must be able to drill down to this kind of detail. So the question remains: have the necessary stakeholders been engaged to accomplish this, and is there the necessary *organizational will* to deliver that due diligence?

Projects fail, and in trying to determine why they failed project managers identify other issues when the problem was caused by a lack of clear and effective governance. The reality is, too often project managers gather the stakeholders that they are most comfortable working with. The highest-level leaders will either not be engaged, leaving those middle-managers and users in their agencies powerless to fully participate and execute, or these same policy-makers take too much control and micro-manage a

process they do not understand—frequently out of need to protect their turf, their budgets, or the control of the project as a whole.

Trust—A Level Playing Field

In applying an *enterprise view*, we have to foster and facilitate a network of trust. However, this issue of governance and stakeholder participation begins and ends with an ability to change how entities of government interact and the true level of trust that actually exists. It's about power, control, and budget. And there are limits as to how far agency heads are willing to go with integration and information sharing projects.

Many stakeholders can agree that the process outlined earlier is conceptually good, and they know they should participate politically. However, when the rubber hits the road, when money gets dispersed, or decisions are made to determine what projects will get funded, the outcomes are dependant on who will reap the most benefit. Leaders, realizing that they may be on the short end of a decision, will back away or undermine the project.

So, what is the acid test for proper stakeholder involvement, and what is the model for governance that will insure success of a project? That needs to be determined through a legitimate strategic planning and project definition process. And once determined, it needs to be applied within a framework of sound project management discipline.

This issue of trust is also critical, and one of the struggles in identifying stakeholders and establishing governance structures and membership. We have trouble with governance because governance positions are often not filled with the highest-level people who can "make things happen." Often they are not "engaged" and "at the table." The existing governance and stakeholder positions are filled with middle managers who bring forth excellent recommendations, but "nothing happens" because their superiors are not engaged.

Another problem is putting people in the governance positions that are at too high a level compared with other positions. This creates an environment that isn't fair from the start. This can happen when incorporating representatives from counties and municipalities. These jurisdictions must feel they have an equal voice along with larger jurisdictions. Further, the appropriate "roles and responsibilities" of an enterprise project need to be matched to the appropriate level of the governance body. For example, executives should not be engaged in details about technology, project management, process review, etc. But they should establish direction and visioning.

So, how is the right governance established, and how are the right stakeholders identified and brought into the project so that the initiative can commence, funding can be obtained, and the initiative moves forward? Rules must be established that reach down to the right level of detail. There must be a methodology that is executable and can be repeated. Examples must be presented that demonstrate what has worked, and how it works on a day-to-day basis. Examples can be very effective in gaining commitment, understanding and appreciation of the enterprise perspective. But it's hard to find examples where such a process has worked, or has been well documented. There are a handful of states that have had broad success in justice information sharing, yet all examples have some shortcoming in one aspect or another across the spectrum of projects.

JISP Pre-RFP Toolkit

The Justice Information Sharing Professionals (JISP)[8] has worked with the IJIS Institute to develop a Pre-RFP Toolkit that provides examples of strategic plans, needs assessments, standards guidelines, etc.[9] In the first (current) edition a framework was developed, but good and consistent content was difficult to come by. There continues to be a struggle today (as the 2nd edition is being developed) to collect and cull these examples and demonstrate any standardization between the outputs. It was felt that it was important to emphasize that project teams should not simply copy the samples. They need to go through the enterprise development process for themselves with the right stakeholders. It is fundamental that these project teams define the problem for their jurisdiction, generate the calls to action and the business case, then develop their approach and execute on their plan. Simply copying and pasting an example from another project and declaring it a "best practice" is not how to do a project plan, or develop any documentation relating to a unique enterprise architecture. The examples in the Pre-RFP Toolkit are intended as guides to assist and "jump-start" an initiative. To prevent, as much as possible, teams from having to "re-invent the wheel." However, it is still imperative for them to go through the due diligence of defining themselves and their direction.

With respect to technology, there has been a lot of lip service toward embracing an enterprise perspective, and growing excitement about the emerging open architecture standards, and internet standards (e.g., XML). And it is important for teams to understand and embrace these things. But in a world where technology can solve the physical problems of integration, the whole paradigm shift falls back on government to develop the means for establishing trust when it comes to actually sharing information, establishing security policy and practices, establishing access control, and dealing with mistrust in sharing data. Agencies must be proactive in defining what information they have, what they can and are willing to share, and what they are willing to relegate to a centralized service model. In the end, if the entities involved and their respective leaders are not willing or able to sit down and agree to a framework of policies for the sharing and acceptable use of their collective data, they cannot expect technology to solve their problems.

It's often hard for agencies to move to this paradigm. Many agencies are still grossly stovepiped and even though agency heads will come together in forums, they continue to work independently. They need to move toward working collaboratively with a common purpose and a common galvanizing point.

There is significant challenge in these projects both from an enterprise perspective and a technology perspective. Often we are dealing with people who are working in 20 year old technologies for doing summary reporting, while managing antiquated data repositories and communication switches. If they are moving forward at all, in most cases they are putting web-enabled front-ends on these systems. In essence, they are one full wave behind the emerging technology. The reality is they are not being pushed forward by their leadership or their current environment. Enterprise architecture

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[8] see OJP/JISP, http://it.ojp.gov/topic.jsp?topic_id=51
[9] see OJP/JISP/RFP, http://it.ojp.gov/procurement/files/Applying_IT.pdf

projects simply can not be led by this group. It is imperative that projects like this involve innovators, forward thinkers, and a strategic approach to lead these types of efforts.

Contributing Initiatives

Some initiatives that are contributing significantly to the necessary paradigm shift include National Law Enforcement Telecommunication System (NLETS)[10] in their recent upgrades to TCP/IP and in beginning to move some of their interstate messaging to XML and the Global Justice XML Data Model (GJXDM). The Global XML initiative, as a whole, is also beginning to contribute to what is a slow evolution into new standards and enterprise components and concepts for affected agencies. These initiatives are positively influencing state agencies to move into new technologies. Another influencer is the FBI. In law enforcement, wherever the FBI Criminal Justice Information Services (CJIS) chooses to raise the bar, the state agencies will be forced to follow (e.g., the National Crime Information Center (NCIC) 2000). Without this influence, most agencies will remain in the framework of 20 year old technology which cannot effectively reflect current and emerging business needs and practices. These efforts will even begin to merge in their impacts, as in the FBI National Data Exchange (N-DEx) project and their adoption of the GJXDM for the project's data specifications. Forward and strategic planning state agencies will recognize the benefit of moving ahead of this curve.

Unfortunately, the majority will lag behind it for many years. When it comes to the full range of services and technologies encompassed within the Service-Oriented Architecture, along with the shifting business and management approach for IT inherent in that architectural design pattern, Gartner Group (and several other researchers) have observed that an entire generation of IT managers will have to be retired before this paradigm truly transforms our technologies and business approaches to information sharing.

[10] see NLETS, http://www.nlets.org/general.html

justice perspective

Restorative Justice and Project Management Issues

Interview with Tammy Woodhams, Executive Director, Kalamazoo Criminal Justice Council, Kalamazoo County, Michigan

Today it is a foregone conclusion that improved information sharing is critical to delivering effective justice programs and ensuring our homeland security. But when it's all said and done, information sharing needs to demonstrate an increase in public safety and reflect sound public policies. We must ask ourselves, as trusted policy makers, stewards of public resources, citizens, and taxpayers involved in information sharing: As a result of our work, are our families and friends any safer than they were yesterday? What about a year ago? If not, why not? And, what will be the long-term impact of our efforts?

Restorative justice is defined as a systematic response to wrongdoing that emphasizes healing the wounds of victims, offenders and communities caused or revealed by crime. This concept has a complete set of principles, values, goals, and stakeholders.[11]

Policymakers cannot be comfortable with the status quo or govern their agencies in the absence of clear policies and measurable programs. Action and results are expected by our constituents and, further, the consequences of a failure to plan are tantamount to a failure to act. That action needs to be planned and executed using best practice tools and resources now available to the field.

Vision

The vision for community safety and justice in Kalamazoo County is: "Kalamazoo County seeks to be the safest, most just and restorative community in the nation." In keeping with that vision, the community has developed a "Community Safety and Justice Service Continuum" inclusive of prevention, intervention, rehabilitation, corrections, and reentry services. This requires the use of data-driven approaches, assessing risk, strengths and needs, applying "evidence-based" strategies, and measuring and evaluating "what works." All require good data and resulting information. Kalamazoo County is not unlike most jurisdictions: it struggles to obtain the information it needs for good decision-making, it does the best it can with the information it has, and is working to address the gaps using the tools and resources that are now available to advance data collection and information sharing.

Cross Agency Collaboration

People using the services along the continuum (from prevention through reentry) typically require the services of multiple other agencies. For example, a child involved in the county's

[11] See, http://www.restorativejustice.org/rj3/RJ_City/01-03/rjcity_defetc.htm

local family services program may have an unemployed non-custodial parent who is incarcerated, who is enrolled in community treatment or under alternative forms of supervision, and is behind in child support. There is an increasing demand for cross agency collaboration and an emphasis for sharing information outside traditional agency boundaries to bring about a more holistic approach to dealing with families.

There must be a balance maintained in information sharing with clear and thoughtful policies for the "need to know" regarding the information being shared. There must be the establishment of a culture of understanding around what that information means and in the end, how it's going to be used and its impact on the safety and security of citizens. Many times, information sharing can actually work against established goals in certain lines of business.

Potential Barriers

Regarding restorative justice, information can become a barrier to forgiveness and community reconciliation. This is not to say that pertinent information should not be shared—rather that there is a responsibility to understand and prepare for how that information is going to be used. Examine, as a case in point, the reentry of ex-offenders from prison. This year there will be around 650,000 people across the country returning to our local communities—in Michigan that number is over 10,000—in Kalamazoo County that number is about 300, or 25 to 30 a month. Based on historical data, without appropriate community interventions and services, we can expect half of them to return to prison within 24 months. Many of these ex-offenders will face multiple barriers upon release including their basic survival needs: food, clothing, and shelter. Additionally, issues of substance abuse and mental health, community connectivity, and employment make successful reentry problematic for the majority of ex-offenders.

There are many legal barriers and restrictions with regard to ex-offenders being eligible for low-income housing subsidies and vocational opportunities. There are additional barriers to obtaining employment: If an ex-offender shares information with a potential employer that they are, in fact, an ex-offender, they are much less likely to obtain a job. If they can't work, they can't support themselves and their family, they can't successfully reintegrate back into society, and they will likely return to what they know. Ultimately, this has implications for public safety, for the taxpayers who foot the bill for their re-incarceration, and to the other domains (such as education) that vie for their share of limited state funding. The point is, society needs to think through what actions it should take to mitigate the risks associated with information sharing.

Anytime information sharing is driven by the intent of the agency or organization, it is based on a belief that the agency objectives can be better achieved through information sharing. That intent needs to be understood and should be driving the development of any capabilities to enable that intent. It cannot be assumed that collaboration and information sharing will automatically lead to more effective delivery of services or higher quality of life.

Metrics

Incorporating performance measures into justice information sharing initiatives is critical to effectively monitoring project implementation and demonstrating success toward achieving long-term goals and outcomes. Performance measures should be used to:

- Establish a baseline for demonstrating results;

- Align project goals with policy strategies;
- Make project goals operational;
- Provide for benchmarking; and
- Ensure cost effective returns on investment.

Tools

The Center for Society, Law and Justice (through the Bureau of Justice Assistance-grant number 2002LD-BX K002) has designed a set of tools to assist in the development of performance measures for justice information technology projects tied to "public safety" and "reduced crime." The Logic Model Framework is a useful tool that can help planners make the links between process improvements and desired outcomes.

In addition to resources available through NASCIO, there are a number of other tools and standards being developed that can expedite the implementation of successful information sharing projects (referenced throughout this document). Technical assistance and tools around performance measures, facilitated strategic planning, project management training, emerging technologies and standards, capability assessments, and the Justice Information Exchange Model (JIEM) are available in the public domain. Further, the Justice Information Sharing Professionals group (JISP) is also a good resource for sharing best practices and lessons learned. All of this assistance is in place to help expedite the sharing of information and bring this knowledge to the states. In the end, it is crucial to the health and safety of our country.

justice perspective

Enabling Information Sharing through Service-Oriented Architecture

Mike Ryan, Enterprise Architect for the State of Minnesota, and member of the Global Architecture Working Group representing NASCIO and the State of Minnesota

Global's concept of justice information sharing is an ambitious vision of a justice community that is defined in the broadest terms possible, reaching across disciplines, levels of government, and branches of government. Global has decided to use enterprise architecture to support the vision of the organization. This can be found in a report titled "*A Framework for Justice Information Sharing: Service-Oriented Architecture (SOA)*"[12] produced by the Global Infrastructure/Standards Working Group and published on December 9th, 2004, on the Global website.

Global's Vision

This report presents *six requirements* for an architecture that will support Global's vision for the sharing of data:

1. The architecture must recognize innumerable independent agencies and funding bodies from local, state, tribal, and federal governments.
2. Information sharing must occur across agencies that represent divergent disciplines, branches of government, and operating assumptions.
3. The infrastructure must be able to accommodate an infinite range of scales, from small operations with few participants in a rural county to national processes that reach across local, state, tribal, federal, and even international boundaries.
4. Information sharing must occur among data sources that differ widely in software, hardware, structure, and design.
5. Public sector technology investment must reflect and incorporate the lessons and developments of the private sector.
6. The infrastructure design must be dynamic, capable of evolving as the information sharing requirements change and the technology is transformed.

The Global Justice Architecture work group recommends leveraging Service-Oriented Architecture (SOA) to accomplish these six requirements. These six requirements present a formidable landscape for an infrastructure that will support justice information sharing on a local, state, tribal, and national level. It is Global's contention that the technologies are now maturing for meeting the technical requirements and that a conceptual framework is available to exploit these technologies for the justice community. These technologies consist of the standards, specifications, and protocols that have been developed to support the Internet, specifically the Web. The conceptual framework

[12] See http://it.ojp.gov/documents/20041209_SOA_Report.pdf

that has emerged to apply these technologies to information sharing is Service-Oriented Architecture (SOA).

Justice Service-Oriented Architecture

Justice SOA is an approach to the design and development of an information system. The assumption is that a system should be designed and developed around the basic components of the operational procedures or, in the language of the software literature, the business practices of an agency. These components are then combined into a loosely related larger structure that, in turn, can be combined into an even larger entity. It assumes that the design of a system begins with a concept of the business practices of an enterprise (e.g., case-flow management, investigations, or trial preparation), which identifies the critical components (e.g., personal identification, sentencing document, or arrest report), that define the parameters of standalone pieces of software (i.e., *services*).

The effect is to permit the evolutionary development of a system. Software can be written to serve specific purposes (e.g., define the identity of an individual) and shared on an approved basis with other programs (e.g., borrow the identity definition software of the postal service in a judicial case management system). Lessons learned from development of the components can be used to revise the business practices that, in turn, can guide the development of additional components. It then follows that a system can begin small—organized around specific operations—and evolve into a larger, more comprehensive system as the parts are linked together. This approach to design, development, and implementation is possible because of the technology developed for the Web.

The ability of these Internet-based technologies to support exchanges of messages and searches for information across a seemingly infinite number of participants has become all too familiar. The focus is upon the message and its utility to the user rather than on the underlying data source. The technology allows a search across a crazy quilt of hardware and software systems for information that is relevant to the user. SOA exploits those attributes in architectural design, whether the problem involves a single, small agency working on a dedicated network or a far-flung operation involving numerous agencies, databases, and operational requirements. SOA and "Web services" are often used interchangeably, but strictly speaking, Web services is just one—if the most viable—way to realize the benefits of SOA.

The second breakthrough was the advent of open standards for sharing information across networks without regard for the underlying technologies or applications. This is what an SOA enables. At one stroke, the need for centralized coordination of technology or application disappeared and an economical means of communicating became possible because many vendors support the open standards around which SOA is built.

Global's Action Agenda

If SOA is to be used successfully as the framework for justice information sharing architecture, Global must play a proactive leadership role in several areas.

First, Global has formally, actively embraced SOA as the recommended framework for a national infrastructure to support justice information sharing and will integrate its requirements into all of its activities.

Second, Global will take steps to encourage the

creation of a mechanism for drawing together the experiences and lessons from the field. Global is looking for a process and refers to their XML Standards Task Force (XSTF).

Third, Global will reach out to existing national systems to incorporate their efforts into the design of an overall strategy. The pipes for moving this information across the country already exist in the National Law Enforcement Telecommunication System (NLETS), the American Association of Motor Vehicle Administrators network (AAMVAnet), Regional Information Sharing Systems (RISS), etc. Global wants to take advantage of these existing pipes, not supplant them.

Fourth, the six issues identified in the aforementioned report—services, standards, interagency agreements, registries, security, and privacy and data quality—will be a major part of the agenda for the next set of activities of Global. Global understands that the first roadblock is the private data issues. Therefore, there is a committee to work on service level agreements such as information resource planning (IRP) agreements for interstate trucking.

Fifth, Global will develop a multi-tiered strategy for the public sector to influence standards. It will include encouraging the creation of a public process as it did with XML; taking part in industry groups developing standards that are relevant to justice (e.g., World Wide Web Consortium [W3C]); and developing partnership processes with industry and other public entities. There is a standards committee to address this issue.

Conclusion

Global is uniquely situated to provide the leadership required. There is no other entity at the national level that can command agreement by local and state governments, agencies, or branches of government. This is exemplified by the on-going collaborative relationship Global maintains with NASCIO and other communities of interest. There are national entities that are in a position to structure the debate within specific subject areas, but no other body exists for the justice community. National standards and practices that are to serve the justice community require a group that holds enough stature in all of the several disciplines to give immediate credence to its products. Global brings that credibility to the process.

justice perspective

Barriers to Re-engineering Justice Related Business Processes

Panel interview with
Dr. Peter Scharf, Executive Director, Center for Society, Law and Justice
Dr. Heidi Unter, Associate Director of Research, Center for Society, Law and Justice
Dr. Mike Geerken, Chief Information Officer, Attorney General's Office, State of Louisiana
Steve Prisoc, CIO and Director, Judicial Information Division, State of New Mexico
Mark Myrent, Assistant Director, Illinois Information Authority
Lt. Lon Ramlan, San Francisco Police Department

Barriers

The major barriers to re-engineering justice processes to facilitate information sharing are not technological in nature. Technological capabilities have been in place from some time and additional technologies are being invented and implemented everyday. The major barriers to justice process re-engineering instead have to do with the people side of managing change and the difficulties inherent in multi-stakeholder collaborations.

While there are many people in criminal justice, both technical and non-technical, who are working with older legacy systems and are unable to reap the advantages of new technologies, this is becoming less and less the case. Through initiatives such as JIEM and GJXDM the benefits that current technologies offer to information sharing is quickly spreading across the justice landscape.

With technology becoming less of a major obstacle, the remaining major hurdles involve the inability of criminal justice agencies to effectively collaborate. This difficulty goes beyond projects seeking to facilitate information sharing. In fact, many people can embrace and participate in information sharing initiatives, but become resistant to business process re-engineering initiatives that involve cross-agency business processes. The re-engineering and streamlining of justice business processes are key to enabling improved performance on agency missions and effectuating improvements in core outcomes such as public safety.

Information technology is a tool that enables information sharing and cooperation among diverse agencies. A major barrier is motivating people at the local level to participate. There has been great progress in some areas, but, there are still problems. Some of the challenging organizational dynamics in the justice community are described in a research paper titled, "*Reengineering Justice Business Processes: Identifying and Overcoming Barriers to Change*." This paper is available through The Center for Society, Law and Justice (CSLJ).

The nature of electoral politics, and the fundamental power struggles that go on in these government offices, often make cooperation and collaboration difficult. Understanding some of the key foundations for how and why agencies and organizations behave is critical for successfully navigating a business process re-engineering

effort designed to promote information sharing among justice agencies.

One of the issues in managing projects for success is ensuring there is proper representation at the table. You need representatives from business, management, operations, technology, and policy level leadership. However, in many projects only one or two of these interests are represented.

The CSLJ paper states:
An effective design team requires a wide range of authority, knowledge, and skills, including:

1. *Executive authority with complete commitment to change and to the design/implementation process*
2. *Management skill: what can be done and how to do it*
3. *Knowledge—technical (existing systems, possible systems)*
4. *Knowledge—criminal justice (business)*[13]

Information sharing projects incorporate a highly diverse mix of stakeholders and team members. These types of projects bring together business people and technology people. These two groups often fail to effectively communicate with each other, which can lead to breakdowns in project plans and schedules. Exacerbating this challenge is the fact that it is difficult to convey the technical aspects of integration to people without a technical background, or who lack expertise in that particular aspect of technology.

Role of Organizational Dynamics

There is a neglected area of study and that is the area of inter-organizational relations. What is interesting is that there has been significant success in the corporate world in completing projects that involve many departments and organizations. Yet, we have not seen that kind of success in government. Why?

Part of the answer lies in the nature of government and the underlying organizational dynamics that drive behavior in the government context. Often in government bureaucracies, there is a high propensity to promulgate the status quo. In contrast, the business process changes associated with successful collaboration in the corporate world is necessary for their survival. Cross organizational collaboration is also desirable in government and the justice community. However, there are times when it appears that government agencies can survive year after year and even be "rewarded" for seemingly doing nothing. Some of this is due to an aversion to risk on the part of entrenched civil service employees. Some of this behavior is due to the power basis of government which is vested in elected and appointed officials. These officials are at times not necessarily the most qualified for the job, nor are they necessarily available for business transformation kinds of projects. Their planning horizon is too short—looking only to the next election and not beyond. In short, they lack an *enterprise perspective*.

Team Formation

We are talking about inter-organizational relations and the motivations for forming, cultivating and sustaining these fundamental relationships. This aspect of program and project management

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[13] "*Reengineering Justice Business Processes: Identifying and Overcoming Barriers to Change*", by Dr. Michael Geerken, Center for Society, Law & Justice, New Orleans, Louisiana. See http://www.cslj.net/

must be understood if projects are going to be properly planned and framed, project teams properly assembled, and projects are to sustain through completion, delivering the outcomes established in the business case. It is extremely difficult to maintain continued participation from the respective parties understanding that the project teams are adhoc assemblies, and the team members have full time commitments that compete and win over any demands from such projects.

Additionally, the process for assembling teams is typically not effective. An effective approach is to establish a formal process for assembling project teams. This begins with establishing a governing board and the definition of what working committees should exist and their composition regarding knowledge, skills and experience. Board members should decide who will participate. It is important to recognize that decision making in government is often based on political self-interest. This behavior has to be mitigated if successful project teams are to be assembled and projects are to be properly managed to deliver the outcomes they are intended to deliver.

Data Quality

Once a project is launched, the discovery and analysis phases of the project can uncover a plethora of data quality problems that have been previously hidden or only understood by people very close to the associated processes that have used that data. As discovery continues, analysis may uncover additional conflicts related to risk management in a highly political environment. With cross-agency initiatives, various information protections are suddenly challenged. Such protections were in place as part of the political dynamics, but in an information sharing environment they create barriers to developing and implementing collaborative solutions.

Some of the barriers to information sharing that arise in such initiatives are due to the disparity in the level of granularity required by the newly partnered agencies. For example, if the information steward is the clerk of court, and the information consumer is the prosecutor's office, there is a problem. So, some information is re-entered redundantly because the different functions in justice store and use information differently. The prosecutor will need significantly more granularity in the information that the clerk of court.

Another barrier to information sharing is the concept of unique identifiers. Often, there is a lack of agreement on what constitutes a unique identifier and what the unique identifier should be. Some states have actually done this quite well. Most have not.

Organizational Deficiencies

Sometimes the biggest problem is ignorance among the CIO, agency directors, and policy makers. These roles often obscure key issues and hide deficiencies within their own agencies. This inability or unwillingness to admit deficiencies is a barrier to identifying root causes, and developing solutions that will enable information sharing. Information sharing initiatives quickly make these deficiencies apparent.

In addition, there is often a covert resistance from the rank and file. People are often reluctant to embrace change. Often people are motivated to simply wait for retirement. Change is seen as only complicating their lives. So, there is no motivation to embrace change, and so there is no motivation to productively participate in change management projects. Change management projects require innovation, creativity, and excitement about the future. What is needed is an entrepreneurial spirit. However, those with this kind of motivation are frequently sidetracked or

"downsized" out of the organization. This anticipated outcome stifles those who are innovative. So, there is no freedom to act, no freedom to truly change the organization, processes, or information sharing capabilities.

Fiscal Crisis May Drive Cooperation

There is another dynamic juxtaposed to the dynamics described. *Scarcity of resources*. David Osborne presented at the NASCIO 2004 Annual Conference, and has co-authored a book with Peter Hutchinson on the subject of permanent fiscal crisis that faces government.[14] This permanent fiscal crisis should provide significant leverage in changing motivations and in overcoming these behaviors. Fiscal crisis will force agencies to cooperate, pool resources, and even consolidate common functions and applications. So, out of this crisis can come new behaviors that promote the common good.

Level Playing Field

Agencies that have worked together in the past have developed institutional memory that will hopefully serve them well in future collaborative efforts. Of course, if past working relationships were not healthy, this can work against collaboration. However, we are now in an age where a wide diversity of stakeholders need to be at the table. These stakeholders represent a variety of functions and expertise. Bringing together multiple agencies in a collaborative venture involves overcoming great disparities in culture and mission. Experts often present the concepts of collaboration, integration, information sharing, and project management as processes that can and should be implemented with all stakeholders maintaining an equal participation in such efforts. This is idealistic and often not the reality.

The reality is that agencies are often being brought together on such projects with other agencies. And, this is the first time they have worked together. They have had no previous relationship, or they don't have a healthy relationship. Initiatives and decisions tend to be driven by one or two agencies that dominate the discussions, leaving the remaining participating agencies frustrated and resentful. Typically, these dominant agencies are those that contribute most of the investment, or have more of a presence in national policy making. These more powerful organizations can steer information sharing discussions and planning in a way that is predominantly self serving and not consonant with the real aim of information sharing.

Even if the larger and more dominant agencies are generous in inviting and supporting true participation, the smaller agencies may resent the "benefactor" and may even spawn resistance from other agency members. So, again, the real aim of the initiative is not achieved. Both behaviors are irrational organizational pathologies. Dominating agencies on the one hand, and small agency saboteurs on the other. The small agency pathology is the result of a history of a general feeling of exploitation by the larger agencies in previous multi-agency initiatives. Past experiences breed resentment.

How are these pathologies overcome? The key is the establishment of a level playing field.

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[14] *The Price of Government: Getting the results we need in an age of permanent fiscal crisis*, by David Osborne and Peter Hutchinson, Basic Books Inc., Cambridge, MA. ISBN 0-465-05363-7

Power must be dispersed. This can be accomplished by setting up statutory veto power. Altruism on the part of the larger agencies can not be relied upon. It will either not exist, or be misinterpreted by the smaller agencies. However, providing veto power to all agencies gives even the smaller agencies real power. And, the establishment of equality is a most effective message regarding the true intent of the initiative and goes a long way to establishing trust and agreement. When projects are managed with this kind of preliminary governance, success is highly predictable. Projects that are successful should be well publicized to demonstrate what is truly possible in a collaborative environment that embraces equality, and maintains project management discipline. The end result is successful initiatives that improve public safety and the quality of life. Again, this type of behavior and the results it brings can be attributed to achieving an *enterprise perspective*.

The need for this perspective has been recognized within the justice community. Agency directors need to understand the fundamental principles of enterprise architecture as described in the beginning of this document. Without this enterprise perspective, agencies will easily misapply technology to the wrong business issue. Are we looking at solving an immediate problem, or are we thinking about business transformation? Every issue and problem is an opportunity to rethink how something is done.

What is required are initiatives that will proliferate this *enterprise perspective*. Leadership as well as all other staff need some level of understanding of what enterprise architecture is. Often the organizational dynamics in government are comprised of political fiefdoms. Planning large information sharing initiatives must recognize this dynamic. Motivations and incentives for participation must be defined that take this dynamic into account.

Part of the motivation definition must acknowledge that technology planning windows must relate to political planning windows. Timing must be established in sync with the political cycle. If the support of an elected official is required, then the timing of the project must take into account where that official is on their term timeline. If an initiative will not be substantially completed by the end of that term, there may be little support.

conclusion: making a difference

The contributors to this report touched on a number of issues and initiatives regarding information sharing within multiple lines of business within government. The interviews that were conducted involved people who are dealing with these issues on a daily basis. Their experience, knowledge and resilience is impressive. They were also willing to participate in the creation of this document with the intention of making things better.

There are a number of themes and solutions that have come out of these interviews.

- Enterprise Architecture
- Organizational Dynamics
- Identity Management
- Privacy
- Sponsorship
- Funding
- Incentives
- Methodology
- Tools
- Common Vocabularies

Calls to Action

The recommendations from this list of contributors can make a difference, but only if they are used. The people interviewed are dedicated professionals who have stepped up to the plate as change agents who are willing to provide the rest of us with the benefit of their expertise and experience. This benefit won't be realized unless everyone works to overcome barriers to information sharing and respond to the calls to action outlined in this report. It will take the combined effort of everyone to make a difference. NASCIO encourages the readers of this report to respond to these Calls to Action within the limitations and opportunities of their own circumstances.

Please submit any inquiries to Eric Sweden, NASCIO, esweden@amrinc.net, 859-514-9189.

appendix

Acknowledgements

NASCIO expresses its sincere appreciation to those who participated in interviews and contributed articles. These individual contributed candid remarks that present not only the real barriers, but also productive suggestions on how to move forward with information sharing—and establish an *enterprise view* within government.

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appendix

Organizations of Interest

American Medical Informatics Association	http://www.amia.org/ The American Medical Informatics Association is a non-profit 501(c)(3) membership organization of individuals, institutions, and corporations dedicated to developing and using information technologies to improve health care. AMIA was formed in 1990 by the merger of three organizations - the American Association for Medical Systems and Informatics (AAMSI), the American College of Medical Informatics (ACMI), and the Symposium on Computer Applications in Medical Care (SCAMC). The 3,200 members of AMIA include physicians, nurses, computer and information scientists, biomedical engineers, medical librarians, and academic researchers and educators. AMIA is the official United States representative organization to the International Medical Informatics Association.
Association of Public Health Laboratories	http://www.aphl.org/ The Association of Public Health Laboratories (APHL) works to safeguard the public's health by strengthening public health laboratories in the United States and across the world. In collaboration with members, APHL advances laboratory systems and practices, and promotes policies that support healthy communities. The association's founding members are directors of state and territorial public health laboratories. Others include state laboratory staff, city and county laboratory directors, and international representatives. APHL is a non-profit, 501(C3) organization with a history of over fifty years. The LIMS initiative is described at http://www.aphl.org/Informatics/index.cfm

Bureau of Justice Assistance	http://www.ojp.usdoj.gov/BJA/ The Bureau of Justice Assistance (BJA) is a component of the Office of Justice Programs, U.S. Department of Justice, which also includes the Bureau of Justice Statistics, the National Institute of Justice, the Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime. The mission of BJA is to provide leadership and assistance in support of local criminal justice strategies to achieve safe communities. BJA's overall goals are to (1) reduce and prevent crime, violence, and drug abuse and (2) improve the functioning of the criminal justice system. To achieve these goals, BJA programs emphasize enhanced coordination and cooperation of federal, state, and local efforts.
ComCARE Alliance	http://www.comcare.org ComCARE stands for Communications for Coordinated Assistance and Response to Emergencies. ComCARE's goal is to promote an integrated, coordinated approach to emergency communications and support the development of a comprehensive "end-to-end system" to link the public to emergency agencies, and to link those agencies together. ComCARE seeks to enhance the ability to respond to individual and mass emergencies of all types by creating a network of survival which links existing technologies in homes and businesses, smart cars and trucks equipped with telematics, warning devices, wireless telecommunications, intelligent transportation systems, and advanced emergency care. Introducing 21st Century information and communications technologies to the often-antiquated communications infrastructure of emergency agencies will save thousands of lives each year, substantially reduce the severity of injuries and enhance homeland security.
Center for Society, Law and Justice	http://www.cslj.net/ CSLJ at the University of New Orleans, provides technical assistance, research, and training to criminal justice managers and other law enforcement personnel in cooperation with the Bureau of Justice Assistance.

Center for Technology in Government	http://www.ctg.albany.edu/about/ The Center for Technology in Government works with government to develop information strategies that foster innovation and enhance the quality and coordination of public services. The Center carries out this mission through applied research and partnership projects that address the policy, management, and technology dimensions of information use in the public sector.
Department of Homeland Security	http://www.dhs.gov/dhspublic/index.jsp DHS leads the unified national effort to secure America. DHS will prevent and deter terrorist attacks and protect against and respond to threats and hazards to the nation. DHS will ensure safe and secure borders, welcome lawful immigrants and visitors, and promote the free-flow of commerce.
Department of Justice	http://www.usdoj.gov/ The mission of the Department of Justice is to enforce the law and defend the interests of the United States according to the law; to ensure public safety against threats foreign and domestic; to provide Federal leadership in preventing and controlling crime; to seek just punishment for those guilty of unlawful behavior; to administer and enforce the Nation's immigration laws fairly and effectively; and to ensure fair and impartial administration of justice for all Americans.
Federal Enterprise Architecture Program Management Office	http://www.whitehouse.gov/omb/egov/ The Federal Enterprise Architecture Program Management Office (FEA-PMO) was established on February 6, 2002, in accordance with direction issued by the Associate Director for Information (IT) and E-Government, Office of Management and Budget (OMB). The lack of a Federal Enterprise Architecture had been cited by the 2001 Quicksilver E-Government Task Force as a key barrier to the success of the 24 Presidential Priority E-Government initiatives approved by the President's Management Council in October 2001.

Global Justice Information Sharing Initiative

http://it.ojp.gov/global/childTopic.jsp?topic_id=59&parent_id=2

The efforts of the Global Justice Information Sharing Initiative (Global) Advisory Committee (GAC) have direct impact on the work of more than 1.2 million justice professionals. The importance of the organization's mission, however, positions Global to impact citizens of the U.S., Canada, and beyond. Global's mission—the efficient sharing of data among justice entities—is at the very heart of modern public safety and law enforcement.

Global is a "group of groups," representing more than thirty independent organizations spanning the spectrum of law enforcement, judicial, correctional, and related bodies. Member organizations participate in Global out of shared responsibility and shared belief that, together, they can bring about positive change in inter-organizational communication and data sharing.

The GAC advises the nation's highest-ranking law enforcement officer, the U.S. Attorney General. Global aids its member organizations and the people they serve through a series of important initiatives. These include the facilitation of the Global working groups; development of technology standards, such as the Global Justice XML Data Model, Version 3.0; creation of white papers on data sharing issues, such as the National Criminal Intelligence Sharing Plan; and the dissemination of information via the Global Web site.

The work of the GAC has implications of the highest importance—making it the foremost voice for justice information sharing.

Global Justice XML Data Model

http://it.ojp.gov/topic.jsp?topic_id=170

The Office of Justice Programs (OJP), together with the Global Justice Information Sharing Initiative (Global), has officially issued a newer version of the Global Justice Extensible Markup Language (XML) Data Model (Global JXDM) to the justice community—Version 3.0.2. This latest release of the Version 3.0 Global JXDM series is enhanced to increase the ability of justice and public safety communities to share justice information at all levels—laying the foundation for local, state, and national justice interoperability.

George Washington University Homeland Security Police Institute	http://www.homelandsecurity.gwu.edu/dhs/programs/policy/ The Homeland Security Policy Institute (HSPI) draws on the expertise of The George Washington University and its partners from the academic, non-profit, policy and private sectors for a common goal of better preparing the nation for the threat of terrorism. HSPI frames the debate, discusses policy implications and alternatives and recommends solutions to issues facing America's homeland security policymakers. By linking academicians and scientists to decision makers at all levels of government, the private sector and the communities we live in, HSPI is working to build a bridge between theory and practice in the homeland security arena.
Integrated Justice Information Systems Institute (IJIS)	http://www.ijis.org/ The mission of the IJIS Institute is to apply the expertise of industry to assist justice agencies in the innovative use of advanced technologies to better share information in a way that benefits industry, the public sector, and society as a whole.
Justice Information Exchange Model (JIEM)	http://www.search.org/programs/technology/jiem.asp This project, funded by the Bureau of Justice Assistance, U.S. Department of Justice, is designed to facilitate the development of integrated justice information systems planning and implementation throughout the nation. Integration of justice information systems refers to the justice community's ability to access and share critical information at key decision points throughout the justice process. It is through identification of these key decision points and development of information exchange models that SEARCH will further nationwide integration efforts.
Justice Information Sharing Professionals (JISP)	http://www.jisp.us JISP is a National Network of state and local justice and public safety integrators responsible for the facilitation, collaboration, and advocacy of information sharing.

Kalamazoo Criminal Justice Council (KCJC)	http://www.kcjc.org/ The Kalamazoo Criminal Justice Council (KCJC) is a multi-disciplinary, collaborative organization of countywide justice system and community leaders, who encourage local planning activities, enhance interagency cooperation, efficiency, effectiveness, and innovation. The KCJC's vision is "to become and continue to be the best criminal justice system in America" by: • Ensuring a safe community for all, • Fostering fair and impartial treatment of all involved in the justice system, • Effectively holding offenders accountable and restoring victims, • Guiding offenders toward being responsible, contributing, and valued citizens, • Initiating and supporting crime control and prevention efforts, and • Serving as responsible stewards of public resources.
National Association of State Chief Information Officers (NASCIO)	http://www.nascio.org NASCIO represents state chief information officers and information resource executives and managers from the 50 states, six U. S. territories, and the District of Columbia. State members are senior officials from any of the three branches of state government who have executive-level and statewide responsibility for information resource management. Representatives from federal, municipal, and international governments and state officials who are involved in information resource management but do not have chief responsibility for that function participate in the organization as associate members. Private-sector firms and non-profit organizations may join as corporate members.

National Law Enforcement Telecommunications System (NLETS)	http://www.nlets.org The National Law Enforcement Telecommunication System (NLETS) was created by the principal law enforcement agencies of the states nearly 35 years ago. Since the founding, NLETS role has evolved from being primarily an interstate telecommunications service for law enforcement to a more broad-based network servicing the justice community at the local, state, and federal levels. It is now the pre-eminent interstate law enforcement network in the nation for the exchange of law enforcement and related justice information. The mission of NLETS is to provide, within a secure environment, an international justice telecommunications capability and information services that will benefit to the highest degree, the safety, the security, and the preservation of human life and the protection of property. NLETS will assist those national and international governmental agencies and other organizations with similar missions that enforce or aid in enforcing local, state, or international laws or ordinances.
Public Health Informatics Institute (PHII)	http://www.phii.org/about.html Through fostering collaboration, innovation and action, the institute will advance the public health practitioners' ability to strategically apply and manage information systems. The institute provides service, educates stakeholders, informs policy, and conducts research on appropriate use of public health information systems.
Public Health Information Network (PHIN)	http://www.cdc.gov/phin/ The Public Health Information Network (PHIN) is this framework. Through defined data and vocabulary standards and strong collaborative relationships, the Public Health Information Network will enable consistent exchange of response, health, and disease tracking data between public health partners. Ensuring the security of this information is also critical as is the ability of the network to work reliably in times of national crisis. PHIN is composed of five key components: detection and monitoring, data analysis, knowledge management, alerting and response. Creating a strong network that continues to define shared data standards to support the exchange of key health data is critical for a more effective and response-oriented public health system. The Public Health Information Network will serve as the framework supporting this new system, a system better positioned to respond to the changing needs of public health and consequently the nation.

The National Consortium for Justice Information and Statistics (SEARCH)	http://www.search.org/ SEARCH helps state and local justice agencies with their information and identification technology needs through effective planning and implementation assistance, high tech crimes investigation training, and criminal history policy. SEARCH developed the Justice Information Exchange Model (JIEM) tool for modeling information exchanges. JIEM has dynamic reference capability to the Global Justice XML Data Dictionary. To learn more about JIEM see http://www.search.org/programs/technology/jiem.asp

appendix

References

NASCIO Report Information Privacy: A Spotlight on Key Issues	https://www.nascio.org/publications/index.cfm#privacyguide This publication, produced by the NASCIO Privacy Committee, serves as a resource for states developing privacy policies that protect citizen information and are compliant with federal and state legal requirements. This publication highlights key issues in the following areas of privacy: • Children's Information • Drivers' Information • Health Information • Financial Information • Education Information • Social Security Numbers • Homeland Security-Related Information • Website Privacy Policies • Government Data Matching Activities and Agreements. In addition, the publication includes state examples for many of these areas of information privacy, an overview of recent privacy events at the federal level and a glossary of privacy related terms.
Principles for Managing Privacy	http://www.privacy.gov.au/publications/npps01.html The office of the federal privacy commissioner has extracted principles from the Privacy Act of 2000.
NASCIO Enterprise Architecture Tool-Kit	https://www.nascio.org/publications/shoppingCart/ NASCIO has published version 3 of its Enterprise Architecture Tool-Kit. This document presents approaches to governance, business architecture, process architecture, data architecture, and technology architecture.

GOVERNMENT INFORMATION SHARING :

CALLS TO ACTION

NASCIO
Representing Chief Information Officers of the States

BJA Bureau of Justice Assistance

PERSPECTIVES

Government Information
Sharing: *Calls to Action*

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NASCIO represents the state chief information officers from the 50 states, six U.S. territories and the District of Columbia. Members include cabinet and senior level state officials responsible for information resource management. Other IT officials participate as associate members and private sector representatives may become corporate members.

AMR Management Services provides NASCIO's executive staff.

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introduction

Background

In 2000, NASCIO (formerly NASIRE, The National Association of State Information Resource Executives) published a report titled, "*Toward National Sharing of Government Information*." The report focused on the justice community and provided detailed discussion of the characteristics of shared information, the definitions of significant information management issues and terms, and brought to light important "calls to action" necessary to institute change in information sharing. Among the many recommendations and topics covered was the need for common vocabularies and a national telecommunications infrastructure.

The report served as the impetus for major subsequent activities including the publishing of "*Concept for Operations For Integrated Justice Information Sharing*" in 2003. Another subsequent activity was the development of NASCIO's Enterprise Architecture Program.

The significance of "*Toward National Sharing of Government Information*" cannot be over emphasized given the subsequent proliferation of products and services within NASCIO's Enterprise Architecture Program.

In the fall of 2004, NASCIO's Architecture Working Group decided that the report should be revisited to assess progress to date, and that a new set of "calls to actions" be established. This follow-up report is just that. It takes a different approach in that it covers a variety of lines of business and levels of government. The intention here is to look at the current state of information sharing, identify and discuss the major issues and outline the "calls to action" required to move forward.

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A Changing World

In today's world, managing change has become the most important dimension of management. Charles Kettering once stated, "If you have always done it that way, it is probably wrong." Government must change in order to effectively respond to the current dynamics in today's world. There must be an operating discipline in place that both anticipates change and fully leverages that change for the benefit of the enterprise, and its constituents. NASCIO believes that operating discipline is *enterprise architecture*. Enterprise architecture provides an *enterprise view*—a comprehensive, holistic view of the enterprise that includes environmental understanding, explicit strategic intent, and the organization, business processes, *and* technologies that enable that intent. Enablers are capabilities that must be evaluated, and prioritized. Capabilities are delivered or further leveraged through management initiatives, programs and projects.

Enterprise Architecture Value Chain

Enterprise architecture provides the means for *managing the complexities* inherent in any enterprise. Enterprise architecture also provides the necessary *operating discipline* for managing the *changing enterprise*. The enterprise must be seen as an organism that changes and adapts—and even *causes* change. However, change must be seen as a *continual process*. NASCIO created the **Enterprise Architecture Value Chain** to describe an ongoing, iterative operating discipline for managing the enterprise as a fluid that is continually changing through time. This holistic

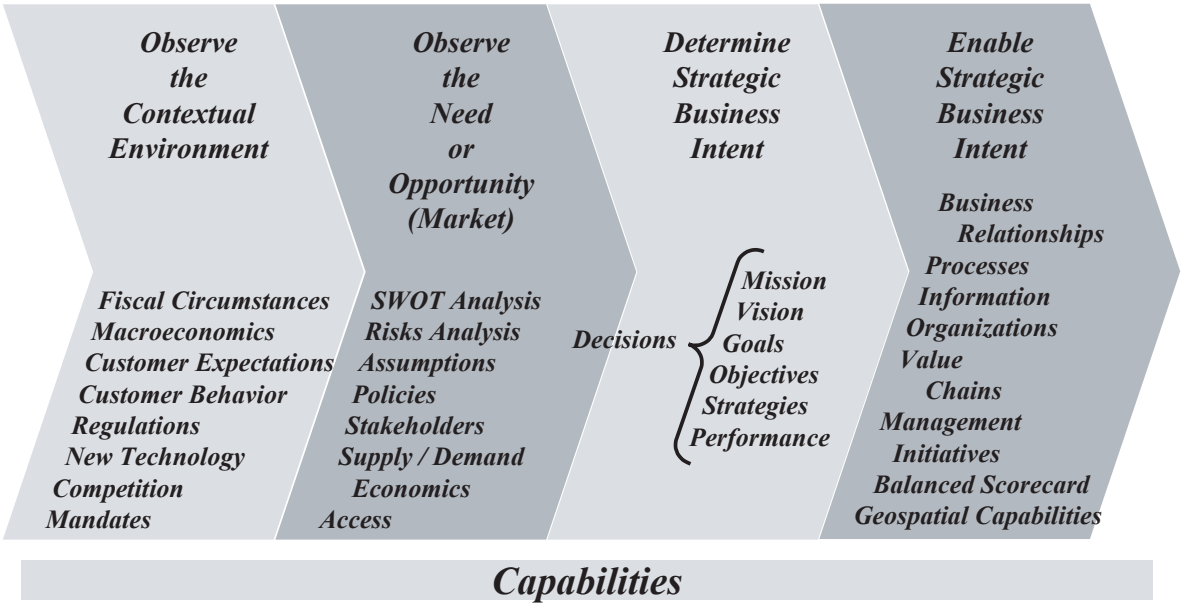


Figure 1

view just described goes beyond the immediate. An enterprise perspective is needed that understands the importance and complexities of i*nter-enterprise relationships*. Quickly, this enterprise perspective looks beyond traditional boundaries and conceives of value chains that move across these boundaries. These greater *clusters of enterprises* may be termed *communities of interest*. Further inquiry uncovers that the borders of these communities of interest are also becoming fuzzy as the need for interaction becomes more and more apparent. These interactions materialize into inter-enterprise architectures involving inter-enterprise business processes and information exchanges. Information sharing and collaboration between state governments for law enforcement is an example.

Information exchanges, or information sharing—these are different terms referring to the same concept. Others may use different terms. The point is that information is flowing more than ever, and it is flowing over traditional boundaries as decision makers become more and more sophisticated in their understanding of events and the interactions of influences that drive primary, secondary and tertiary effects. This sharing has become complex as will be described in this document. Changes include cross jurisdictional and cross line of business information exchanges. Changes also include delegated information exchanges to the computer involving machine-to-machine automated exchanges. These machine-to-machine exchanges include the necessary logic to review content for sensitive information and automatically assign the proper security classification. These automated exchanges also evaluate the requester to determine authority and authenticity before allowing the exchange to occur. Emerging technologies, such as Service Oriented Architectures (SOA), enable the connectivity of various automated functions that allow applications to trigger other applications. For example, this occurs when an application triggers an identity management system to authenticate an automated request for information from yet another application.

As we begin to look at information exchanges, we find there are new information exchanges as our culture sees more and more necessity and benefit from sharing information. Nowhere is the need for these types of exchanges more apparent than in homeland security. Homeland security touches any number of lines of business depending on the event. These include integrated justice, public health, environmental protection, national defense, international alliances, and even commerce. Certainly, it appears homeland security will be the primary developer of information sharing capabilities as we move into the future and an area that will benefit most from an *enterprise perspective*.

In the recent *Final Report of the National Commission on Terrorist Attacks Upon the United States*[1] the lack of information sharing is frequently cited as a primary factor leading up to 9/11, and the lack of comprehensive coordination during 9/11. One of the key recommendations going forward is the imperative for a unity of effort in information sharing both nationally and internationally. Information sharing capabilities are absolutely necessary for intelligence and justice agencies to be able to "connect the dots" in order to prevent future terrorist attacks. In the event of a future terrorist attack, information sharing is again one of the key imperatives for responding to the aftermath.[1] The recent

[1] http://www.gpoaccess.gov/911/

intelligence reform bill which implements recommendations from the 9/11 commission is replete with requirements for information sharing. Information sharing is indeed one of the key capabilities in transforming the intelligence community.[2] Other examples can be drawn from medical records, hazard alerts, and integrated justice. Again, the capability to share information is critical in all government lines of business in government.

As stated, government is never done exercising the ongoing "Enterprise Architecture Value Chain." We must continually monitor the world around us as we identify needs and markets, anticipate market and political disruptions, establish explicit strategic intent, and deliver the capabilities to enable that intent. As we move into the future, one of those capabilities is information sharing across jurisdictions, and across lines of business. As we explore this topic, we urge the reader to maintain an "enterprise perspective" of the world. This perspective may also be termed a "global perspective." If information sharing as a necessary capability is to be effectively developed, it will be necessary for all involved to maintain this "enterprise view" in order to avoid point solutions, and stovepiped applications.

Government Information Sharing: Calls to Action

"Calls to Action" seemed appropriate as this report and those who participated in its creation are convinced that all must participate in the overall *call* to address this issue of information sharing. This must truly be a mission in which we all participate. For as the reader will see, this is not a technology problem—it is an organizational problem, and a human problem. It is critical that barriers to information sharing be understood in this way if we are ever to truly conquer this issue.

If information is to be shared, there is the necessary *establishment of standards for sharing*. Exchange partners must agree on the content of the information and the protocols for how that information will be represented and transmitted. For instance, the justice community has faced the issues of standards during a long history of information sharing initiatives.

If information is to be shared, then the *rules for sharing must be well understood* by all involved, and those rules must be consistently and effectively applied.

If information is to be shared, then *people must begin thinking with an enterprise view*. They must put the enterprise and its constituents ahead of their own career, and personal ambitions.

If information is to be shared, people must accept and embrace the changing of boundaries, job scope, and business processes. If government is to be truly transformed, than old paradigms must be abandoned. There will need to be a new type of manager. One that adapts roles and responsibilities to best serve the changing needs and requirements of the citizen. Government must be seen as an institution for the citizen, not for the career public administrator. The same change must occur with all government personnel. Change should not be merely tolerated. It should be embraced. What

[2] S.2845, "Intelligence Reform and Terrorism Prevention Act of 2004."
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:s2845enr.txt.pdf

is proposed in that change in mindset is a view of government service as a *commitment to public service*—i.e., one of high calling.

If information is to be shared, then it cannot be withheld. This seems too obvious. The many dynamics involved in organizational behavior become most relevant in this issue. Dynamics include power, prestige, control, personal security, and even fear of change. *Information that is withheld will serve limited purpose in government*. Notwithstanding this admonition, information must be properly protected and treated as an asset.

If information is to be shared, it must be properly managed. This includes the appropriate security to ensure information assets are protected. However, properly managed information is shared with those who are authorized to use it. *This requires that information is properly and consistently classified*. This also requires that information stewards are properly trained. And, requesters of information are properly authenticated to have the proper authority, and the necessary clearances to access information.

NASCIO is exploring the subject of information sharing from this enterprise perspective. As part of this initiative, NASCIO recently published a video on information sharing titled "*In Hot Pursuit: Achieving Interoperability Through XML*"[3], which presents some of the barriers and solutions. Additionally, NASCIO has conducted a survey of opinions from a variety of individuals, and expertise centers regarding the concept of information sharing—barriers and calls to action. This report, presented in two volumes, offers a variety of perspectives and a variety of modes of delivery. Included are interviews, written submissions, and summaries of existing testimonials and literature. Interviews are presented that involved both individuals and panels from various recognized expertise centers on information sharing. In all cases, NASCIO was motivated to present expert opinions. These opinions are honest and frank—but all are offered in the spirit of continual improvement. If we can be honest, and provide a candid assessment of the "as is", then there is true potential for making things better.

This survey of opinions included representatives from integrated justice, state government, public health, homeland security, environmental protection, and transportation. This report is presented in two major sections: Volume One is devoted to the justice community, and Volume Two is covers the broader topic of "government." This compilation is not exhaustive. However, it is believed that it successfully outlines the major barriers to information sharing that are prevalent throughout government. The end game is to objectively identify these barriers with the intent of rationalizing the relevant solutions for overcoming or mitigating these barriers. These solutions and recommendations are termed "calls to action" in the context of this report.

NASCIO recognizes the valued contributions of all who participated in the making of this report.

Eric Sweden, Editor
Enterprise Architect
NASCIO

[3] See, https://www.nascio.org/publications/index.cfm#xml

state government perspective

Authoritative Sources and Identity Management

Interview with Bill Roth, Chief Enterprise Architect, State of Kansas

One of the first priorities in planning information sharing projects is to conduct a discovery phase in order to understand what information exists and who has it. A first step in such an initiative is the development of an inventory of the information assets in each of the participating agencies. Often, people do not know what information they have that would be useable outside of their agency. There is a need for consistent data models that are tied back to a business reference model such as the one defined by the federal government (i.e., Federal BRM).[4] The BRM can assist in categorizing subject areas and also in identifying natural touch points between agencies.

Authoritative System of Record

The authoritative system of record must be identified for all information. This is different for the various jurisdictions and it varies from state to state. However, when someone needs information, they may go to another source more readily available and reliable. Often the agency with *legal authority* for certain information relegates substantive authority to an agency that has a more complete database. This has occurred because technological capability has overshadowed the actual responsibility. Technical ability at the state level results in state agencies effectively becoming the authoritative sources for local information for which they have no legal coverage.

For example, accident data is supposed to be the legal responsibility of the *local* police departments in the state of Kansas. According to Kansas state law, whoever initiates a record *has system of record responsibility*. Local police departments send all accident data to the Department of Transportation for statistics on safety improvements. This data is also sent to the Department of Revenue (DOR). The DOR associates accident information with the driver's license. This can trigger other action by the DOR such as revoking a license after so many traffic tickets.

People looking for accident data for their local area, such as a city manager, go to the state DOR for this information because it is perceived as the most complete and efficient source for this information. In effect, state agencies such as the DOR become the primary source for accident information rather than the local police department. The DOR does not have the authoritative clearance to *be* the system of record, but they have the technology to bring that information to bear. Because of their accessibility and completeness, the DOR system becomes the *effective system of record*. Also, a researcher can go to *one place* for data

[4] The Federal Business Reference Model, see http://www.feapmo.gov/feaBrm2.asp

on multiple local jurisdictions rather than call each police department. It is simply more efficient to make one call to the DOR.

The complete solution to this involves both a business solution and a technical solution. An agency at any level of government (i.e., local, state, federal) *could* become an official source for much of its data even without legal authority. This can happen as agencies develop greater technical capabilities, and acquire more and more information. The call to action is, do not give in to that inclination. Understand the statutory authority that has been established and support that authority. Another approach is for the legislature to change statutory authority because of the technical capability of higher governing authorities. However, before an agency is designated the official authority, the law should be changed to match these changes in technical capability so that the owner of the effective system of record is protected and also enabled by statute.

Identity Management

Another business priority is identity management. It is necessary to find a secure and reliable way to identify agencies, and computer systems. The systems must be identified because often it will be machine to machine data exchange that occurs. Identity management should be a data service that is based on the necessary business logic. Authentication and authorization must be automated with this business logic so that an information request can be validated quickly. If someone is requesting specific information from a system, the authentication process should not print out a lengthy report on the requester. Rather it should provide a simple YES or NO. Again, this decision logic should be imbedded in the system.

When a system is designated as the system of record for particular information, the rules for information sharing should be established in that system of record. It must be determined who can retrieve that information. Consideration should be given to the public, other state agencies, universities, the federal government, other local and county officials, etc. One approach is to create an identity management broker that keeps track of who has what authority to access what information at what classification.

Data Classification

Accurately classifying data is also a critical issue. In reality, data is "classified" according to the 95/5 rule. 95% of the time, the information steward is reluctant to share information. 5% of the time, the information steward is willing to share information. If an agency is burned once because it shared classified information, it will be reluctant to share information again for decades. When requests are made, more often than not the information steward will respond, "I'll have to review your request with our legal counsel."

95% of the solution is education. Information stewards should be trained so they understand and can apply the rules for information classification, and those rules should be applied consistently. Additionally, data and information should have attached meta data that documents its classification, thus removing any question as to its classification. As that data is passed on to information consumers, the rules accompany the information payloads. Consumers are also mandated to apply the classification meta data. However, consumers should not repack information and resend. Data should be locked so the consumer can access it, but not resend it. Digital signatures should have associated

authority meta data so the requester/consumer profile accompanies an information request. In a Service Oriented Architecture (SOA), the system of record requests authorization information from the identity management system and verifies requestor or requestor system authorization. Once authority is verified, the system of record sends the information with the classification meta data attached to the payload.

Agency Interoperability

One additional area that needs exploration is interoperability among agencies. Currently, there is a lack of understanding of how agencies are using information. Agencies often use the same information differently. For example, many agencies deal with human resource information. Do they use it the same way? Do they have different business processes for processing that information? This needs to be determined. There is a lack of awareness of inter-agency and intra-agency business processes. This understanding must be developed in order to truly achieve interoperability among various agencies. And there is the need to have trained business analysts in place to pursue this understanding. Kansas is currently developing training in-house in order to develop these skills in our staff.

Many state agencies could benefit from shared business processes and shared technology to enable those processes. Ultimately, the Service Oriented Architecture (SOA) is a necessary approach where multiple agencies could be leveraging the same applications. This could drive cost down significantly. The vendors could provide a clean service layer on top of their applications. One of the issues with SOA is much of the vendor community uses different terms for the same concepts. SOA is the recommended direction with appropriate interaction with identity management capabilities.

state government perspective

Privacy, Politics, and Technology

Interview with Larry Johnson, Chief Information Officer, State of South Carolina

Privacy

Privacy is a major issue that must be addressed when planning information sharing initiatives. It's important to establish the boundaries for privacy. South Carolina has encountered this issue with sharing health information. It was necessary to mask personal data before sending diagnostic and treatment information that is used for state population studies. There is this continued fear, or appearance, associated with letting "private" data out to others. While there are some privacy concerns that need to be addressed, sound legal measures and guidance are required to overcome these issues. Sometimes this issue is really a disguise for a second issue. A fear of losing control.

Politics

There is a fear among many in government that controlling the data is somehow equivalent to power. Actually, it is to a point. Too many think that sharing information will somehow make their position, or program, less important. This is a political issue that must be solved by political means. The solution is to set up mechanisms that reward and publicize information sharing as a means for providing additional constituent benefit, or for more effectively managing government cost.

Many recognize that information sharing is useful. However, there is an unwillingness to implement any changes that would allow others to access "our" data. No matter what types of technologies are used, some stovepipe data definitions have to be made shareable within a greater context. However, the owners of the data have to see the value of doing this work. Their data has been structured for their immediate and focused needs. To move to an *enterprise perspective* of data is difficult for them to justify. Proponents for change need to do a better job of explaining the value of this perspective, and how data owners will benefit.

Technology

Data standards are needed for information exchanges. Standards like the Global Justice XML Data Dictionary (GJXDD) are on the right track. However, other agencies and communities of interest such as revenue, or the department of motor vehicles, have no such standard.

The call to action here is to present a compelling message for an *enterprise perspective* on information management. There must be more initiatives like the GJXDD within other lines of business that also maintain an enterprise perspective so at the end of the day there are not multiple, independent XML vocabularies. Rather, information can truly be shared across lines of business. Proponents for change need to deal with the organizational dynamics of control, power, and prestige that inhibit information sharing. This requires understanding these dynamics and establishing the incentives to transform this thinking to see the "power" and prestige of sharing information—becoming a quality source for information should be seen as a desirable position.

state government perspective

The Importance of Sponsorship, Business Knowledge, and Funding

Interview with Steve Schafer, Manager of IT Financial Solutions, The Office of the CIO, State of Nebraska

Sponsorship

Sponsorship is one of the keys to success for any initiative involving information sharing or other types of collaboration. An effective sponsor will have a vision for an integrated view, or enterprise perspective. The sponsor must also have the resources to implement solutions and provide operational support. .

Nebraska has initiated an integrated justice project that developed momentum very early, because participants shared an *enterprise perspective*. The Nebraska Crime Commission assumed the role of sponsor, and the director and staff of the Commission have been instrumental in guiding many initiatives in the Criminal Justice Information Services (CJIS) Strategic Plan to a successful conclusion.

A good sponsor is important to any project, but it is especially critical for statewide strategic initiatives. The sponsor must be viewed as neutral and able to pursue the vision of the enterprise as a priority. This can be a difficult role for agencies that must balance their individual priorities while trying to champion the broader vision. By virtue of its very existence, every agency must place its own mission as the number one priority even when it sees the benefits of a broader effort.

Business Knowledge

Another challenge is to combine strong sponsorship with sound business knowledge. It is one thing to promote ideas such as an integrated view of information and data sharing, but eventually one must enlist business experts who understand the policies and processes and what will work in the field. Business experts are indispensable, and good business experts who understand computer systems are very hard to find. As a rule, their plate is full, and they have their day-to-day jobs to do. However, without their involvement, you can not go forward with analysis, systems planning or systems development. And, if you do, the results won't be legitimate.

Other challenges to data sharing include statutory barriers, conflicting federal requirements, other organizational dynamics, politics, and funding. All of these challenges must be dealt with, but funding is one issue that often rises to the top.

Funding

One approach to funding is to leverage sponsorship by providing some amount of "seed" money. This helps the sponsoring entity get the initiative off the ground. For example, Nebraska is working on a statewide telehealth network. By the end of 2005, every hospital in the state will be connected to this network. Some of the

early planning money came from a variety of sources including the CIO office, the Nebraska Information Technology Commission, and the Nebraska Hospital Association, which has now assumed sponsorship of the network. Those early efforts took a while to gestate, but they have now resulted in funding commitments from bioterrorism grants, federal Universal Service funds, state Universal Service funds, and local hospitals. The initial planning funds were small but essential to success, because they allowed the sponsor to create momentum.

Funding is also a critical component in the state's approach to e-government initiatives that transcend organizational boundaries. Nebraska relies on a self-funding model for the state portal, which provides a modest amount of income that the State Records Board uses for new initiatives. Without this funding source, efforts to create an integrated view of government would never get beyond the "good idea" stage.

state government perspective

Barriers to Information Sharing: Legislation, Funding, and Turf

Interview with Chaed Smith, Senior Technology Officer, State of West Virginia

Barriers

There are multiple barriers to information sharing. Legislation can create barriers through privacy laws which preclude the collection or dissemination of certain information. Some of that information would be useful in decision making and could still be protected.

There are specific laws that determine what is legal and what is not legal regarding data or information sharing. Certain information is highly protected by both state and federal law. And strict requirements must be met when working in these subject areas. These requirements can add a tremendous amount of lag time to project plans because multiple permissions must be requested and given before a project can proceed. An example is the tax department. This information is highly sensitive. In order to touch tax data, there are multiple forms that must be completed. These safeguards are in place for a good reason. However, there are approaches for expediting these permissions.

Lack of resources also presents a barrier. These include financial, personnel, and capital. Without these resources the necessary processes and technologies cannot be designed and implemented to enable information sharing. The states are facing gross shortages in resources in a time when information sharing is becoming more critical to effective governing.

Turf battles create an ongoing detriment to information sharing. Agency personnel take ownership of certain data, and they simply won't share it. The challenge is how to motivate people to cooperate. Thirty to forty years ago processes began to leverage automation. This automation was not done with an *enterprise perspective*. The result was multiple stovepipe solutions that do not interconnect. This approach actually added to the problem of turf. Systems were developed that supported little fiefdoms. Then the adage became a reality, "he who holds the knowledge, holds the power." This has been carried to an extreme. No one wants to see their power reduced. So, they keep their data.

This behavior is seen at all levels of government and authority. When change agents come along and try to move to a new paradigm, an *enterprise perspective* paradigm, they get little if any cooperation. This has occurred many times. Recalcitrant personnel in the civil service system have the attitude, "..*we be here before you came.. we be here after you go*…." When these individuals don't want to embrace change, they can stick their heels in the dirt—and a project manager can not get around that.

Incentives

The call to action is to find incentives for them to cooperate. Those incentives will vary depending on the agency, and the level of responsibility. Each agency has their own culture and their own "family" organization. We need to understand the dynamics of these organizations.

Some incentives include measuring and reporting performance and providing shared resources.

West Virginia started a one-stop business registration and licensing system that could be used by tax, workers compensation, the treasurer, the secretary of state, and unemployment. Data entry was streamlined down to one form. Any new business must fill out the form and the information is disseminated in the background to individual agency systems and departments. The result has been higher levels of customer service and increased customer satisfaction. These performance measures go up to the governor and the state legislature. This effort proved effective.

Integrated workflow solutions would also free up personnel resources who can then be retrained and refocused where the agency is understaffed.

Key Elements

There are a number of key elements to launching initiatives like this. Stakeholders must be identified in order to gain their participation and support. Appropriate incentives must be identified for these stakeholders. That requires knowing them and understanding their line of business, culture, and mission. Stakeholders need to see a demonstration of how their work will be made easier or enhanced. They need to be convinced that proposed changes will be effective in helping them reach their objectives. Finally, engage their help. Leverage their knowledge. Develop solutions that they feel they own.

Funding is an ongoing challenge. Agencies are much more willing to allocate funds for initiatives that remain within their "borders." It is very difficult to convince agencies to flow money to an initiative that would serve a community of agencies. They feel they would not have control, or enough control.

state government perspective

Maintain a Level Playing Field

Interview with Otto Doll, Chief Information Office, State of South Dakota

What we hear from the governor's office is they want to share and leverage information sharing solutions from state to state. However, they want to be comfortable that the IT used is as cost effective as possible.

The challenge is that most states are beyond the point where sharing solutions doesn't threaten a state. All of the states have reached this level of sophistication. For example, the states will get an offer from the federal government to partner with them on some initiative. The states then determine these federally focused initiatives don't buy much for the states but mostly benefit the federal government.

With the increase in competition for industry, jobs, and resources, from here on out, the states will be asking how these collaborative initiatives will affect their competitiveness. Another issue is related to state identity. States will ask, "can we share without losing our identity and competitiveness?" Any collaborative efforts aimed at sharing information will have to ensure there is a level playing field for all the participants.

In South Dakota, much of our activities are already centralized so we don't have a problem aligning multi-agency initiatives. Essentially we already have an enterprise perspective.

We are also working on a vision for *unified government* integrating people, process, and data. We are realigning programmatic activities so staff and the agencies look at problems from an enterprise viewpoint. This is where enterprise architecture is today in South Dakota.

We want the person in a given agency to have a sense that other agencies may be interested in his/her data. There needs to be an affinity among the agencies. For example, GIS is a natural for relating agency data to a particular location; thereby, allowing the alignment of many agency datum together. The Department of Agriculture may be interested in Department of Transportation road information to help milk producers plot a route to market during the winter storm season. Identifying what information has a *potential for sharing* is key.

One of the initiatives we have going in order to facilitate this data discovery and analysis, and eventual sharing is the implementation of one data dictionary. This dictionary ties together all processes, applications, and data all in one repository. This gives us a statewide view—an enterprise view—of these domains. The capabilities of this repository allow us to map one process to another and agency data to process. Everything is transparent and viewable. We've been in the process of populating this repository for the past 3 years. It will probably take us another 10 to 12 years before everything is documented.

Our point of contact with the agencies are senior analysts assigned to those agencies. Any project, bid, or initiative goes through the point of contact. These points of contact come together as a community. This provides for

better communication across all the agencies. Eventually we like to see this role filled by the agencies. It's preferable to have their own personnel as representatives. This forum provides the opportunity for the entire community to know what projects are ongoing and what capabilities they are delivering. There are obviously opportunities to leverage many of these capabilities across the agencies. The forum is the communication tool for ensuring this happens.

state government perspective

Human Services—A Comprehensive View

Interview with Pete Bailey, Chief of Health and Demographics, Office of Research and Statistics, State of South Carolina

South Carolina is looking at a full fledged human services capability. This brings together multiple perspectives relating to the citizen. This initiative includes the following kinds of information:

- elderly services
- disability and special needs
- vocational rehabilitation
- law enforcement
- juvenile justice
- public safety
- probation
- parole
- child care data
- social services
- abuse and neglect reporting
- Medicare and Medicaid
- state employee medical claims
- community health centers information
- home health care billing
- outpatient billing
- emergency room visit
- free clinic treatment
- hospitalizations
- mental health
- alcohol and drug abuse
- birth and death
- achievement scores and school readiness
- disease registries including cancer, Alzheimer's, and spinal injuries
- reportable diseases

Some of this information will be updated monthly. A unique tracking number will be established for each person. This information will be brought into a data warehouse that will facilitate any query. The warehouse will be available to any agency. Cubes have been developed for mother/baby, injury, and violence information and statistics. Other cubes will be developed to serve the research needs of each agency.

Client Management System

A client management system will access this data warehouse. Agencies will be able to easily see what other services a particular client is receiving. Historical reporting will be made available providing reporting capabilities such as, what services have been provided over time to an individual over a period of time. This will include the cost of those services, and even what drugs were prescribed. A tickler or kick out feature will be added that will indicate what processes or services should be initiated and when. This feature is intended for use by agency management to facilitate the management of government.

Statistical analysis capabilities will be provided through the client management services. Researchers will be able to access and analyze data within the system. As more analytical cubes are developed, a solution will have to be implemented for managing permissions and rules of operations.

This central broker approach will not entail

changing any systems within the agencies. Data will be taken as it is offered. It is expected that several agency systems will be identified as being the preferred source. For example, the food stamps system has the highest quality address information. So, it will become the system of record for that information. Other agencies have systems that will become the original or preferred source for other information.

This centralized approach emphasizes an *enterprise perspective* and effectively resolves some of the barriers to information sharing. There are basically two ways to share data: either the data from one agency data is moved to the requester agency's computer, which upsets the balance of power in government; or information stewardship for all of the agencies is delegated to a third party, which sidesteps the balance of power issue. The objective is an integrated data system that is holistic and comprehensive, and that everyone can access. This effort will eventually include geospatial information as well.

There is no competition among agencies if a third party information broker is in place. Everyone is treated the same whether it's a large agency or a small agency. Much of the barrier to information sharing in government is related to negative publicity. Information has to be protected and yet be available for analysis. These safeguards will be imbedded in the data warehouse.

A More Holistic View of Communities

An effect that is being seen from this effort is a new way to look at information and the delivery of services to South Carolina. State government has traditionally looked at serving the citizen as an individual. Government is now at the advent of looking at that individual holistically, taking into account all of the services that are relevant to that citizen and ensuring they receive them. Society is moving into a future where agencies rethink how they deliver services. In addition to looking at the individual, agencies will begin looking at households and whole neighborhoods in order to understand what impact they are making in the quality of life for South Carolinians. This will allow data associations and analysis only begun to be conceived.

For example, the University of Maryland is combining information on emergency room visits with air quality data. This is an opportunity for environmental protection and public health to work together. Those presenting at the emergency room with respiratory symptoms may be responding to air quality problems. The data association is incidence of respiratory disease *with* geospatial data *with* air quality data. This will potentially allow for the determination of cause-effect relationships. The next iteration of this approach could be more *predictive*. A change in air quality could conceivably be a predictor of increased visits to the emergency room. Environmental data could prompt local hospitals to provision for expected increased demand of their services. This kind of *cross domain data analysis* and *cross agency collaboration* is where we are headed.

Part of the rationale is that people using the services of one agency typically require the services of other agencies. People served through our mental health system are often dealing with social challenges that require assistance from social services, or family services. Alcoholics are dealing with law enforcement, drug intervention programs, and potentially unemployment. New cross agency collaboration will bring more effective assistance to these individuals. It is anticipated that this holistic and comprehensive approach will be significantly more effective in delivering service and improving lives.

state government perspective

Information Sharing Capability Assessment Tool

Anthony M. Cresswell, Deputy Director, Center for Technology in Government, University at Albany-SUNY

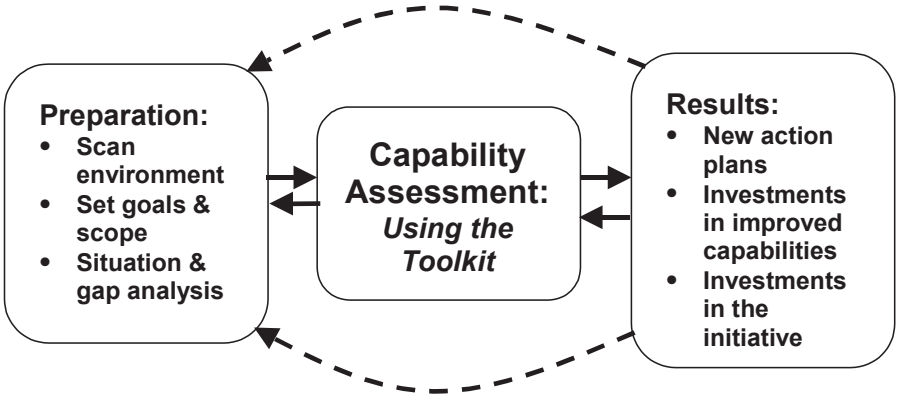
The Center for Technology in Government (CTG) has created a method and supporting tools for assessing capabilities for inter-organizational information sharing. Use of the assessment tools and the results obtained provide support for addressing many of the issues encountered in information sharing initiatives. In its current version, the Capability Assessment Toolkit is targeted for the justice community. However, this toolkit and its approaches are intended to be applicable for other government agencies working on information sharing initiatives.

The Capability Toolkit describes the process for planning and implementing an information sharing initiative. The Toolkit includes an overall framework, tools for assessing readiness, and describes how to use the assessment results to develop the necessary action plans to ensure the information sharing initiative is a success. Shortcomings or potential gaps in capability are mitigated through action plans that are intended to bring the information sharing initiative through to completion.

The approach presented by CTG includes an assessment activity for each participating agency. A combined assessment for the information sharing initiative can then be done based on the readiness of each participant. Worksheets, workshop planning guides, and even sample letters of invitation are provided. The guidance document was made available in January 2005. A web based assessment tool will be available later in 2005.

The dimensions and sub-dimensions evaluated echo the kinds of issues described in this report. These issues range from willingness to collaborate to technological capabilities. The overall process described is shown below.

The associated call to action is to use this discipline and the associated automated tool in preparation and implementation of any information sharing initiative in order to ensure success of the project.



public health perspective

Developing an Enterprise View of Public Health Information Systems

Dave Ross, Terry Hastings, and John Kiely, Public Health Informatics Institute

Public health informatics is the systematic application of information and computer science and technology to public health practice, research, and learning.

Unlike medical or laboratory equipment, which wears out and loses value with use, information becomes more valuable the more it is used. Information does not grow in value, however, merely by residing in a database. The more it is made accessible to increasing numbers of people and used in more ways, the better it serves society.

It stands to reason, then, that an enterprise view of health information, in which information is shared among many partners, would be valued. But for all of its technical advances, the world of health care has been slow to transition from a largely paper-based industry to one that fully embraces information systems that enable broad exchange of health information.

In the last year, the concept of a national health information network has been gaining ground, principally because it holds promise for reducing medical errors. Such a network would electronically link disparate health care information systems—allowing patients, physicians, hospitals, payers, public health agencies, and other authorized users across the nation to share clinical information in real-time. All network systems and participants would operate under stringent policies on access, security, privacy, and other protection provisions.

This enterprise view of clinical health care information exchange—that is, information about individual patients—is becoming a reality in a few model programs. Numerous regional collaborations, known as Regional Health Information Organizations (RHIOs), are under development across the country. When fully realized—although it could take a decade or longer—these health information exchanges will enable hospitals, health care providers, payers, and public health agencies to send and receive individual patient information securely using Web-based technology.

A number of complex, thorny issues remain to be resolved, however, before such large-scale enterprise-wide interconnectivity becomes reality in more than a few forward-thinking locales. These include issues of governance, technology architecture, data use agreements, and financial and business models that ensure sustainability. It is important to note that no single, national system is planned; rather, the vision is of a network of interoperable RHIOs that use a common architecture.

Public health agencies—agencies whose work focuses on the health of populations rather than individuals—also have a role in these health information enterprises. Data from public health information systems can provide clinicians with individuals' immunization records or case management information at the point of service.

Private health care providers can also benefit from aggregate population-level data to establish risks and trends (e.g., infectious disease outbreaks) and expert guidance for management of public health problems (e.g., smoking cessation, lead screening, infection control).

But the barriers to public health acting as part of the national health information network, or enterprise, are great. In fact, barriers to an enterprise view of public health, in which information is shared across and among public health agencies themselves, are also formidable.

Barriers to an enterprise view of public health are related in large measure to funding. The federal government funds much of public health at the state and local levels. As federal funding has increased, states have cut their contributions. However, the legal authority—and spending authority—for public health resides at the state and local level. The typical sequence for public health funding begins with lobbying activities at the federal level to convince Congress to fund very specific public health programs. Funds are allocated to states and disseminated with strict spending timelines.

When the program involves information technology, often little guidance is given to help effectively apply the funds. State and local public health offices receive the money through a grant process, and the accompanying instructions for building applications to tackle specific public health problems range from detailed to non-specific. Requirements are typically not provided. At the same time, a ticking clock mandates that the money be spent quickly. In many cases, the funds are spent at the discretion of individuals within public health who have little or no background in information technology, business process improvement, information architecture, or enterprise architecture.

As a result, progress toward interoperable health information systems among public health agencies has been slow, and anecdotal evidence points to limited positive impact on desired health outcomes. Health information systems projects are often narrow in focus, poorly defined, or driven by consultants from a wide spectrum of expertise and experience in developing specifications and implementing requirements. Consultants also vary in their knowledge and experience in enterprise architecture.

All Together Now

So what's needed to overcome these challenges, to create the conditions for public health to act as an enterprise, take an enterprise view of its information systems, and share information in a way that serves public health goals?

The Public Health Informatics Institute's goal is to tip the public health belief system from its perception that the business of public health is unique in each locale, to a belief that the public health enterprise can succeed only if it defines tomorrow's information systems together. Public health agencies need to understand that, in most respects, they are not independent islands in need of tailor-made solutions. The rationale can be summed up with a straightforward question: Why develop multiple, similar systems when our problem and information needs are similar?

Aligning information infrastructure with information needs requires group action and group adherence to a new operational model:

- To act as an enterprise, public health agencies must first reach consensus on the health problem to be solved, conceptualize the public health needs and goals, and understand how information systems can improve health outcomes.

- They must develop the social will to create real change, that is, they must be willing to work together for the common good, and to put aside individual agency agendas and turf control. They must be willing to come to the table as collaborators, not competitors. They must be willing to develop one-on-one relationships and trust among one another. This constitutes the "social glue" that makes collaborations work.
- They must develop a common understanding of their business processes: how their work is done. Through this exercise, participants invariably discover that despite their different circumstances (e.g., geography, size, budgets, etc.), they are all in the business of public health, perform the same basic functions, and thus have more business processes in common than not.
- With the discovery that business processes are principally the same, public health agencies that define requirements together find that the requirements for the systems to do the work (business processes) also are more common than unique.

Health agencies that take an enterprise view by collaboratively defining the health problem, the business processes, and requirements can get ahead of the funding curve. When funding for information systems becomes available through a federal initiative, the health organization can respond quickly and effectively, with requirements already in place. Information technology investments can solve real problems and add long-term value.

Shared Understanding, Shared Architecture

Once public health agencies understand their common purpose and have social will to act as an enterprise in defining business processes and requirements together, the architecture is the most easily accomplished piece of the process. The elements of the architecture—data standards, code sets, and vocabulary—are being actively developed by standards organizations and the Centers for Disease Control and Prevention through its Public Health Information Network (PHIN) initiative. Shared architecture makes information shareable, but the collaborative group first must define the infrastructure. The result is a seamless interoperable enterprise.

Public Health Labs: Collaborating on a National Scale

In 2002, the Institute had an opportunity to demonstrate on a large scale that greater benefit can be gained through collaboration. In response to the bioterror events following 9/11, federal funding was appropriated to "modernize" public health laboratories at the state and county levels. In conversations with members of the Association of Public Health Laboratories (APHL), the Institute learned that most public health laboratory directors were not sure what their laboratory information management systems (LIMS) needs were. As is often the case with federal funding, they needed to spend the money within a tight timeline.

The Institute and APHL agreed to collaborate to solve the problem. Supported by funding from The Robert Wood Johnson Foundation, the Institute, APHL, and 16 public health laboratories, (i.e., 14 states, one county, and one city) set out to collaboratively develop the business processes and requirements for public health LIMS.

The first challenge was to convince the participating lab directors that their business processes had more in common than they realized. At the start of the project, the lab directors believed that their laboratories' information systems were

unique because the laboratories are organized differently from state to state, and they vary greatly in size and services provided. The Institute, however, found that laboratory processes are largely the same. For example, they all collect specimens. Specimens are processed. Results are reported. They all manage inventories of equipment and supplies. They all have standard laboratory procedures and testing protocols. Their few real differences were not in critical areas.

Over time, project participants experienced a number of aha! moments, dramatically changing their mutual perception from "We're all different" to "Hey, we're not so different after all." Once this premise was accepted, project participants, guided by the Institute, produced a business process framework for all public health LIMS. Next, a comprehensive requirements document was developed. Within six months, public health LIMS business processes and requirements were developed—by public health laboratories for public health laboratories.

With this information in hand, public health laboratories are now ready to "visit the showroom" of solutions and evaluate alternative solutions in the marketplace. They have the option of creating their own LIMS applications or using the requirements to develop RFPs for purchasing commercial off-the-shelf (COTS) LIMS. Perhaps the most valuable outcome is that public health laboratories now understand their common business processes, speak the same language, and can more easily interconnect and integrate their LIMS.

Now, public health laboratories can avoid "reinventing the wheel" when launching a project. They have the information they need to build a better system. Developing requirements through a multi-state collaborative consortium led to a more comprehensive product (BETTER) in a rapid process (FASTER) and at LOWER COST. These requirements also more accurately reflect interoperability needs. The collaboration produced requirements with lasting shelf life that allow for expansion and upgrades, and offer widespread cost efficiencies for future participants.

An Even Taller Order: Integrating Child Health Information Systems

The Institute offers an example of an even broader collaboration in its work with state and federal agencies to integrate child health information systems. This initiative focuses on linking the results of newborn dried blood spot screening with immunization records, vital records, lead screening, and hearing screening to provide a much more complete picture of the child, the environment, and the various at-risk populations in a community.

Integrated child health information systems are in many ways more complex than LIMS because the boundaries are very broad and not as crisply defined. Participants in the initiative represent many aspects of child health and are program-focused and data-oriented, rather than process- or technology-driven, as the public health LIMS participants were.

Fortunately, this collaboration has a vision of a comprehensive child health profile that can become a child's "electronic health record." With guidance from the Institute, state and federal health agencies are collaboratively developing a common understanding of the need for a child health profile (what is the business case?), the business processes (how does the work get done?), and the requirements (what does the system need to do?) for information systems that make a child's information available when and where it's needed.

Conclusion

In the world of health information systems, a shared enterprise view of information is critical to improving the health of individuals and populations. A shared architecture makes information shareable, but a collaborative approach to defining the health problems and developing information systems is equally essential to the goal of information sharing.

For the fields of public health and heath care, the language of information enterprises, business process, and systems architecture is sometimes foreign and can create a conceptual barrier to understanding. The Institute seeks support of and collaboration with organizations such as NASCIO and its member CIOs to communicate and incorporate best practices in enterprise information systems projects undertaken by public health agencies.

homeland security perspective

Information Sharing Perspectives from Homeland Security

Selected testimony before the House Committee on Government Reform's Subcommittee on Technology, July, 2004

Information sharing within the Department of Homeland Security (DHS) involves multi-jurisdictional interactions that must occur quickly. In defining the necessary information exchanges that must occur, there needs be a clear definition of business requirements. Business requirements must be established in front of any technical solution development. However, within homeland security, a comprehensive concept of operations does not exist in many of the areas that comprise homeland security.

The enterprise architecture approach will typically entail the identification and cataloging of the "as-is." However, DHS is currently facing a lack of catalogs of existing information stores. This understanding is necessary as part of the process for defining the "to-be" and then developing the process for moving from the "as-is" to the "to-be." Information must be properly classified before decisions can be made regarding access to this information. However, currently there is a lack of clear criteria for information holders.

DHS may be facing one of the most significant information sharing challenges having combined some 22 agencies into one department. This re-organization has significant implications relative to organization, business process integration, and information sharing. DHS has met this challenge by establishing an Information Sharing and Collaboration Program. This program involves the following imperatives:

1. *Improve information sharing and collaboration within each of the Directorates of the Department,*
2. *Improve information sharing and collaboration between DHS elements,*
3. *Improve information sharing and collaboration across the cabinet level departments and agencies, and*
4. *Improve information sharing and collaboration with our State, tribal, territorial, local, and private sector partners responsible for securing the people and infrastructure of this country.*[5]

The department has also recognized the need to establish an enterprise view as demonstrated by its objective to create an Information Sharing *Enterprise* System. The Terrorist Threat Integration Center (TTIC) was launched with online capabilities for ensuring information sharing *horizontally*, i.e., for sharing information with other federal agencies. It has created additional online capabilities for sharing information with

[5] Statement of Patrick M. Hughes, Lieutenant General, USA, Ret, Assistant Secretary for Information Analysis, Information Analysis and Infrastructure Protection Directorate, U.S. Department of Homeland Security, Before the House Committee on Government Reform's Subcommittee on Technology, Information Policy, Intergovernmental Relations and the Census

state, local and private sector entities. This includes the deployment of a Sensitive But Unclassified (SBU) version of the TTIC on the Open Source Information System (OSIS) network. The department is working to develop additional *vertical* information sharing capabilities where the information will originate at the local level and be passed up to the federal level.

The Department of Homeland Security has made the following statements:

1. *. . . The intelligence, law enforcement and homeland security communities are invariably faced with a complicated mix of technical, security, policy and legal challenges associated with improved sharing of information.*
2. *Attaining the proper balance is the key. There seems to be an underlying current suggesting that all "terrorism-related" information should go to all people that are somehow involved in the USG counterterrorism effort. Such an approach will likely put at risk sources of information and operations critical to winning the war on terrorism. …*
3. *. . . Information Sharing is not a panacea : In short, information sharing is necessary but not sufficient. If we don't have the basic business process for terrorism analysis right, and haven't established critical mass of analytic talent, we can pass information all over the government and still not connect the proper dots; indeed we could even face the prospect of simply being wrong faster.*
4. *. . . --"Effective information sharing" is critical: We are seeing an explosion of networks and websites, containing terabytes upon terabytes of information.. . . As agencies "post" their information, they can legitimately say they have shared the information. Whether anyone on the other end knows how to find it and read it is an entirely different matter.*[6]

These statements clearly make the point that the challenges forthcoming will not be easy to allay. Effective information sharing is not simply publicizing everything—rather, careful judgment must be applied to ensure the right information is available to those that need it. Finally, information must be categorized, and organized so it can be retrieved.

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[6] Statement for the Record of Russell E. Travers, Deputy Director for Information Sharing and Knowledge Development, Terrorist Threat Integration Center (TTIC), "Facilitating an Enhanced Information Sharing Network that Links Law Enforcement and Homeland Security for Federal, State, and Local Governments" before House Government Reform Committee's Subcommittee on Technology, Information Policy, Intergovernmental Relations and the Census, July 13, 2004, http://reform.house.gov/TIPRC/Hearings/EventSingle.aspx?EventID=1188

homeland security perspective

Ten Barriers to Information Sharing

Martin Smith, Office of the Chief Technology Officer, U.S. Department of Homeland Security[7]

There are ten barriers to information sharing within the context of homeland security.

1. *Lack of a clear definition of the business needs, or a concept of operations, before information-sharing projects are undertaken. This is particularly true of the "to-be", or improved, business processes that might be enabled by new technology or better data.*

   Once a business process is understood and documented, it should be clear what data is needed to properly execute the process. Once that data is identified, we can address the more tactical issue of how to obtain and deliver that data as quickly as possible. Before making major IT investments, we need an overall strategy or concept of operations that describes how individual projects will fit into a consistent process framework and how that framework supports a strategic goal. For example, if there is a proposal to build a criminal intelligence fusion center, decision-makers need to know that the proposed center will fit into the overall process of gathering and using criminal intelligence in the "to-be" state. Has a national approach to this process been defined, or will it be implemented at a State or regional level? We cannot hold up all investment until we have re-engineered every process, but we should make it a priority to invest in defining and documenting processes critical to homeland security.

2. *Lack of catalogs of existing information collections.*

   Many people believe there are existing databases and information collections that would be of great value to law-enforcement and homeland-security operations if they could be shared more widely. An obvious first step toward sharing this information is to publicize what collections exist in some sort of on-line catalog.

   While it would be great to have lots of detailed information in the catalog, we would be ahead of where we are if the databases and major information collections held by federal agencies were cataloged with even so general a description as "immigration applications." A simple catalog would facilitate exploitation of this information as a tactical improvement toward information sharing.

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[7] The opinions expressed by Mr. Smith are his own, and do not necessarily represent the views or policies of the U.S. Department of Homeland Security.

3. *Lack of clear criteria for information holders (e.g., Federal agencies) to make decisions regarding access to existing data assets by potential users (e.g., State agencies).*

   It is remarkably difficult and time-consuming to get one organization to decide whether it can provide a database to another organization, and if so under what conditions. My experience is that it may take months or even years to negotiate and implement such an exchange, and too often the conditions of the exchange are very restrictive. Certainly there are legal, security and other issues that must be addressed, but other obstacles like confusion over who has the authority to approve an exchange can be eliminated.

   At some point, automated information brokers will be used to quickly disseminate information to qualified recipients in seconds. For now, it would be a huge improvement if the time it takes to establish a new information exchange could be reduced to a few weeks. To make this happen, Federal agencies and others should identify a single point of contact for coordinating information-exchange initiatives, and they should standardize (and publicize) the process and the criteria for reviewing proposed exchanges.

4. *Lack of a clear plan—or even widely-accepted ideas—on how to get beyond the conceptual goal of increasing the priority of "need to share" versus "need to know" for sensitive information.*

   Every Federal agency involved in homeland security has a program to improve or expand information sharing. At the same time, no responsible official favors indiscriminate dissemination of non-public information or abandoning the concept of need-to-know. How close or far are we from the "correct" balance between sharing and restricting access? Can we quantify or at least clearly articulate the costs of sharing versus not sharing? How do officials now making these decisions on a daily basis define the correct balance, in general or even in a specific case? Should sharing decisions be made by data "owners" exclusively? What considerations should enter into a decision to share, and is the information available to support good, consistent decisions? We need a lot more baseline data to understand where we are on information sharing and some consensus on how to define the optimal extent of sharing. This should be recognized as an important research issue.

5. *Lack of a performance baseline from which to set performance improvement targets for information sharing.*

   There is a lack of well-defined measures of "success" in information sharing. Sharing itself is just a means to an end: more effective mission performance. We should define sharing metrics that are relevant to the intended outcomes of better mission performance. We may be able to score some initial successes by making small improvements that are of obvious value, but to justify the cost of major sharing projects or to sustain sharing programs we will need to show clear value.

6. *Lack of agreement (or at least documentation) of the "real" business rules versus common practice, or tribal knowledge.*

   "Real" business rules are based on regulations, official policies, operational doctrine,

etc. That is, there is a legal basis or business reason for the rules. However, it's a common observation among people who have been involved in documenting business processes that workers are typically quite inconsistent from one to the next in following official procedures. What's more, workers often assert the existence of rules that have been changed or that have no valid basis whatever. The constraints that apply to sharing of sensitive information are complex, and they change. In fact, in the post-9/11 world we want them to change. The challenge is to implement new rules and procedures that expand and speed sharing, while at the same time making sure the "real" rules are observed consistently.

To meet the challenge we have to do two things: first, re-examine the rules, eliminating the obsolete or dysfunctional ones, and documenting the ones that are valid and the new or changed ones. This is a huge task so we'll have to prioritize. Second, drive the new rules into effective application. We may be able eventually to automate many of these sharing decisions, but for now most decisions are made by people, so training (or re-training) will be the critical success factor.

7. *Lack of effective ways to extract and distribute unclassified, actionable information from classified sources.*

   There is currently no affordable, expeditious, consistent method for pulling unclassified content from classified content. Part of this issue relates to determining and understanding what content is classified and what is unclassified. Again, it is absolutely necessary to understand the business rules when evaluating solutions. For example, if the process has a target execution time of 5 seconds, solutions for extrapolating unclassified content that take 10 minutes will be irrelevant. Even process improvements that may realize performance gains of a 5% decrease in time are inconsequential. We have to understand the parameters for process performance, then develop solutions that are bounded by those parameters.

8. *Lack of an effective facility for leveraging existing trust relationships and credentials to support "fine grained" sharing decisions.*

   We need some type of federated identity and privilege management system that presents who a person is and what they are empowered to authorize, view, retrieve, download, etc.

   Such a system is described in the following diagram:

Information Decision Logic

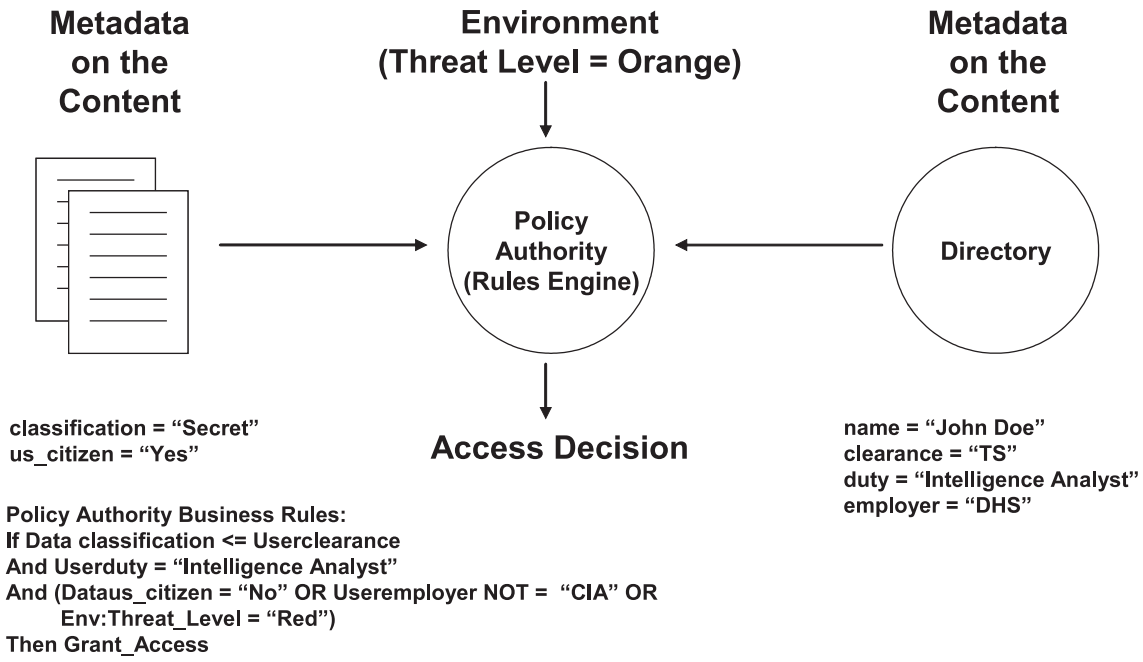

Figure 2

There is an associated logic chain incorporated in this type of model. The scope of this model is far too large to design and implement from the ground up. It must be designed and implemented to leverage existing business processes and logic within a diverse population of agencies and jurisdictions. This will require leveraging the logic in de facto authoritative sources. An example of such an authoritative source would be a payroll system for establishing "employee status." Another example is an established certification for carrying firearms. Such a list already exists. It would be an authoritative source for issues related to firearms.

Such a system must be detailed to a high level of granularity. This level must also be established based on the classification of the data, the level of security required in the process, etc.

9. *Lack of a method for effectively ensuring distribution restrictions accompany the information or data throughout its lifecycle.*

   Information custodians who have some information collection responsibilities also have legal responsibilities for what happens to that information once it is distributed. Often these custodians will hold information back because of these legal obligations and potential legal exposure. As well, once information is distributed to a primary recipient, there is no effective way to ensure that the distribution restrictions are maintained for secondary, and tertiary distribution.

Digital rights management is an existing technology for ensuring business rules accompany the content of information exchanges. The further iteration of this technology would be a federated identity management system. This system would be used to manage roles and rights. It would also have the intelligence to determine the sensitivity of the information exchange by evaluating the content against established policy decision rules. In its highest iteration, this capability can make a decision without human intervention.

Such a system would interact with local systems' requests for information and respond regarding the classification and shareability of the information. This capability is currently available for use within reasonably trusted organizations and for less sensitive information.

10. *Lack of individual and organizational incentives to share information.*

    This is a knowledge management issue. Much of the problem is related to the current incentives and disincentives used by some management. The disincentive for sharing information is the "punishment" system that is often in place. And, there is no "reward" for sharing information. So, information stewards will most certainly do what they can to avoid "punishment" when there is no "reward."

    There need to be appropriate incentives for sharing information instead of hording it. This again touches the training and risk management issues as well. If, in fact, information stewards are trained in the proper operating discipline for information stewardship, they will know when to share, and when not to share content because very clear, precise decision logic will be well documented. In this instance, risk is eliminated or reduced as documented decision logic ensures all information stewards make consistent decisions.

environmental protection perspective

The Age of Information Sharing

By Kimberly T. Nelson, Assistant Administrator for the Office of Environmental Information & Chief Information Officer, U.S. Environmental Protection Agency and Co-Chair, Architecture and Infrastructure Committee, Federal CIO Council

Ten years ago, the world stood at a crossroads as the digital revolution began to unfold. The idea of being able to send an e-mail message in a matter of seconds to a colleague across the country was a tantalizing concept. The World Wide Web—a virtual information marketplace allowing for the exchange of data, information, and communication on a level previously unattainable—achieved a rare shared enthusiasm between private and government businesses.

At that time, the Pennsylvania Department of Environmental Protection was one of the first state agencies in the country to create and post a web page. During its first few months of existence, the site was hosted not on a government server, but on an employee's personal computer in his garage. How times have changed!

Now ten years later we are at a new crossroads. We live in an age where businesses, organizations, and individuals, having adapted to emerging technologies, are at the point where the desire for bigger, better and faster technology has been replaced by the demand for high quality information—accessible anytime, anywhere.

The U.S. Environmental Protection Agency (EPA) strives to provide citizens with useful information about the quality of the water they drink, the cleanliness of the air they breathe, and the health of the land on which they live. This information can be retrieved by the citizen while in the comfort of their home, office, or school and with a few clicks of a keyboard and mouse. In the past ten years, EPA and the Office of Environmental Information have taken tremendous steps in turning that vision into reality. However, these efforts must continue.

New approaches and technology like web services, portals, virtual repositories, and grid applications—all of which are in use at EPA—can assist. But they are no substitute for the partnerships that must be developed in order to get our arms around the vast amounts of data that currently are scattered across our various agencies and departments.

Two years ago, EPA published the first *Draft Report on the Environment*.[8] It was the first document of its kind in the agency's thirty-year history. What quickly became apparent during the research and writing of the Draft Report was the number of key questions that couldn't be answered due to lack of data. Thirty-five questions concerning air, land and water conditions could not be answered fully in the 2003 Draft Report. While there were detailed reasons for this that often varied by indicator and question

[8] Draft Report On The Environment, please see: http://www.epa.gov/indicators

posed, there were also data sharing challenges that were made very clear.

A wide variety of organizations, including other federal and state agencies and two nonprofits, contributed the information included in the Draft Report. Among the data sharing challenges were organizations collecting similar information using different standards and formats, gaps in areas of collections and coverage, and a lack of a data needs framework for environmental information on trends and conditions. Work is underway to develop the next *Report on the Environment* for publication in 2006, and the task of analyzing data from many different partners paints an accurate picture of the challenge EPA faces in accessing and sharing information in support of its mission.

National Environmental Information Exchange Network

Five years ago, EPA, along with state and tribal partners, began to address the technical challenge of data sharing with the creation and use of the National Environmental Information Exchange Network.[9] Thirty-one states currently have nodes on the Exchange Network, with more joining every week. Via their nodes, states maintain their own data and share common data with EPA and each other using Internet-based, web services. The Exchange Network was jointly conceived, built and is governed by a partnership of state environmental agencies and EPA. It is scalable to include other

The Exchange Network

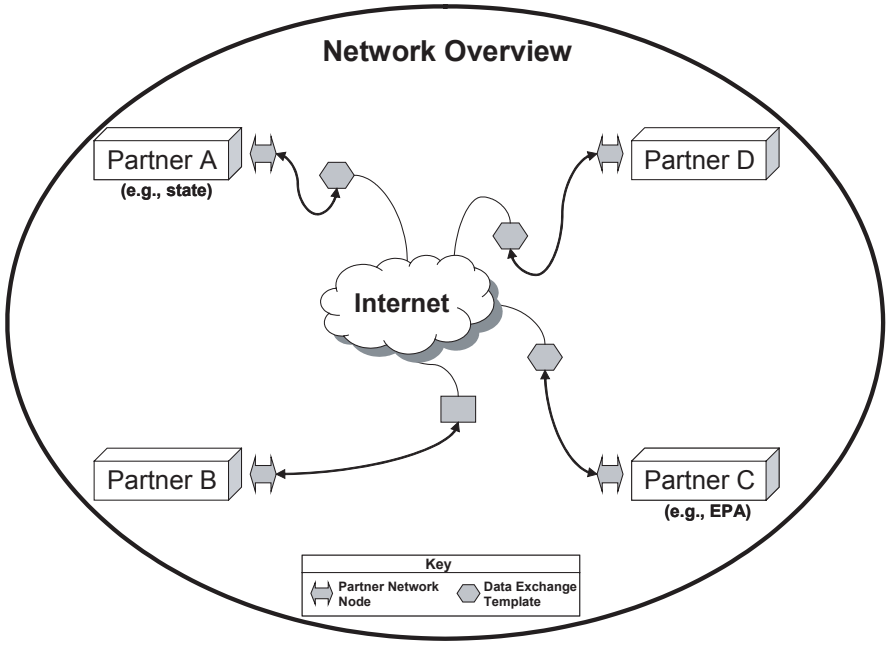

Figure 3

[9] National Environmental Information Exchange Network, please see: http://www.exchangenetwork.net

partners. After just two years, the Exchange Network has proven to be a sound investment with real outcomes that have enhanced environmental protection across this country.

In New Hampshire, state regulators now receive important drinking water quality information from laboratories faster, thereby improving their ability to protect public health. Michigan taxpayers are experiencing a cost savings due to the Exchange Network's ability to support electronic water discharge monitoring reports, cutting red tape and duplication of work. States in the Pacific Northwest are, for the first time, exchanging data about the quality of surface water in the Snake and Columbia rivers, resources jointly managed by two states. The Exchange Network's accomplishments are just a preview of what is to come.

Other federal agencies and departments have embraced similar intergovernmental net centric approaches to data sharing. The U.S. Centers for Disease Control and Prevention has unveiled a new Environmental Public Health Information Network; the Department of Homeland Security fosters a network for first responders (e.g., fire fighters, police) and the Department of Justice promotes data and interoperability through the Global Justice Information partnership. These are just three examples of federal agencies employing technology to improve data sharing and communication with trusted partners.

The federal government makes an annual information technology investment of approximately 60 billion dollars. There is a need to work together across the federal government and

Environmental Information Exchange Network: State Implementation Progress January 2005

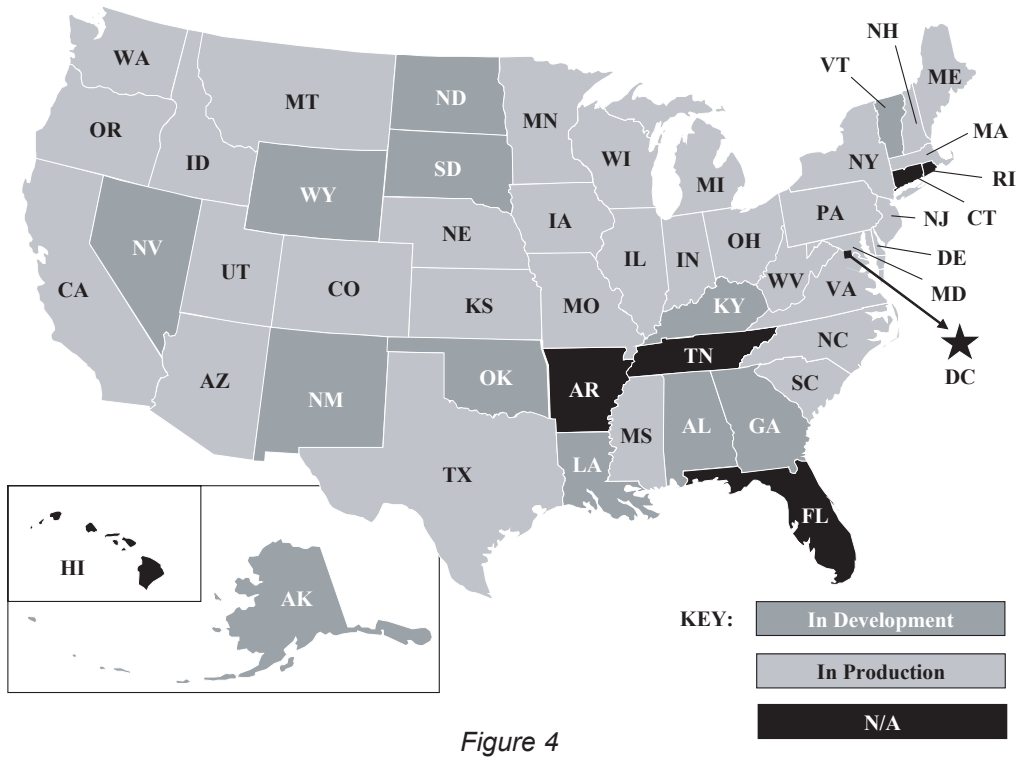

Figure 4

with tribal, state and local governments to ensure that the data produced by these various networks and systems are compatible, thereby maximizing their use and benefit. It is significant to note that last year's report by the 9/11 Commission[10] noted a strong need for better information sharing among federal and state agencies and departments, but had few recommendations for new technologies.

Most government information systems were never designed to enable interoperable data flows across agencies. Data and information are the fundamental building blocks for interoperable organizations and work flow, as we have learned through the Federal Government cross cutting twenty-four e-Government initiatives and the Lines of Business. **Therefore government must begin to place a greater emphasis on the exchange of data between and among its trusted partners.**

The Office of Management and Budget recently published the Federal Enterprise Architecture Date Reference Model (DRM).[11] The model is based on three concepts: the categorization, structure, and exchange of information and is widely considered as the foundation on which the entire federal enterprise architecture structure rests. The DRM holds promise for enabling the federal government to embrace fully net centric technologies because it addresses key questions regarding how one searches, accesses, and understands various forms of information. I have no doubt that the DRM will be a catalyst for driving new interoperability policies.

As the DRM evolves and federal agencies and departments work towards building true enterprise-wide data architectures, it will facilitate the harmonization of the structure and definitions of data across the federal government, affording agencies, departments and their partners the ability to "reuse" data. With a fully developed DRM, we may be able to move closer to the concept of "data on demand" among government's trusted partners.

To realize fully the potential of technology and truly leap into the Information-Sharing Age, CIOs will need to make use of semantic approaches and ontologies. The semantic or "intelligent" web is where the convergence of knowledge management and information technology occurs.[12] New methods are needed which support data access and search capabilities over a wide spectrum of information networks or even stand alone legacy systems. Currently, there are pockets of the federal government, mainly devoted to scientific research, where these concepts are quickly becoming reality. Called the next evolution of the Internet, the semantic web will expand and take its place in everyday society ultimately providing data, information and tools on demand. EPA is already exploring the new possibilities that a semantic world presents via our international partnerships on ecoinformatics and through creating ontological approaches that link public health and environmental contaminate information.

Unlike ten years ago, there isn't a need to operate out of the confines of a garage in Pennsylvania as government begins exploring

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[10] National Commission on Terrorist Attacks Upon the United States Final Report, please see: http://www.9-11commission.gov/report/index.htm

[11] Federal Enterprise Architecture Program Management Office DRM Version 1.0, please see: http://www.feapmo.gov/feaDrm.asp

[12] W3C-Semantic Web, please see: http://www.w3.org/2001/sw/

the possibilities of sharing the vast amounts of information that are contained within our various organizations. Regardless of where one sits within the IT community, it will be increasingly necessary to see the need for intergovernmental collaboration and governance structures, enterprise architecture frameworks and semantic web approaches. It's the Information-Sharing Age.

transportation perspective

Information Sharing Perspectives from a Transportation Agency

Ben Nelson, Computer Services Bureau Chief, Kansas Department of Transportation

Data sharing is not primarily a technology issue. A major challenge in data sharing is the ability to know what data exists and how the data contained in one system may be used in other systems. Data is conceived, defined, collected, stored and manipulated to support business processes that enable the agency to accomplish its mission. Thus, to fully understand the value of individual pieces of data it is importance to understand, at least in general, the processes for which the data was generated. Even the best of metadata descriptions of data elements often can not fully define the data in sufficient terms that will allow both the provider and recipient of the data to feel comfortable with sharing data elements.

The Kansas Department of Transportation (KDOT) has undertaken several projects to understand their data. To broadly understand and articulate how data is used, KDOT engaged the University of Kansas in a research project to build an agency taxonomy. The project team is currently searching for a model that will allow the agency to locate data, understand the basic organization of that data, and be able to define data elements so that the data will have meaning across the agency. As long as data is defined in the context of a single system, the probability of the data's use in other systems is not high.

KDOT is developing an enterprise architecture which will bring an understanding of the business processes of the agency and the data or information that enables these processes. The focus of this *enterprise perspective* is a look at all agency processes, especially when the processes span different systems. Experience with other state departments of transportation reveals that systems with similar names often have widely varying functions and sub-functions, but the actual processes and flow of data can be remarkably similar. Fortunately, the enterprise architecture has various levels of abstractions, thus allowing the identification of classes of data. By using the appropriate level of abstraction, further research allows the determination of the value of sharing specific data elements.

Another challenge to data sharing is the lack of a clear understanding of just what is meant by *data sharing*. It could mean sharing a single record of data, sharing a single definition of a data element by means of rigorous meta data, establishing harmonization of synonyms, or a variety of other aspects of sharing information. The objective for an agency is to balance "responsibility with responsiveness." Data sharing then must be subjected to a benefit-to-cost consideration. Management's view of short term versus long term savings will drive the decision to spend resources to enable data sharing more globally. Users of individual systems may wish to define and collect their own data rather than take on the burden of more global optimization initiatives across the agency. Scope becomes the issue. That is, does the agency look at the scope of data sharing in terms of "city planning" or as a "single family home construction?" Is agency management prepared to develop the infrastructure for data

sharing from an enterprise perspective or is agency management more concerned with more traditional and tangible aspects of traditional systems development.

The State of Kansas has worked over a decade to develop an organizational culture that encourages cooperation between agencies which promotes data sharing. An Information Technology Executive Committee has the responsibility for overall coordination of information technology with representatives from the judicial, legislative, and executive branches of government; from the Regents, and from the private sector. This committee has the power to dictate information technology polices and to form committees to investigate and implement specific policies. The committee has clearly indicated its desire that data be shared across state entities.

The State Executive Branch CIO has developed a federated approach to management of information systems whereby organizational CIOs at all levels of government meet once a month to discuss items of interest to the whole community, including data sharing. This has accentuated the desire by organizations to seek out ways to reduce costs of systems development, including data sharing.

Within the Kansas Department of Transportation, the Information Technology Executive Committee oversees all systems development. This committee is supported by a senior management team, which provides policy recommendations while overseeing functional teams comprised of professionals from various organizational units. These teams are tasked to integrate systems across agency organizational boundaries.

There are five major ongoing initiatives which are contributing toward increased data sharing:

- Enterprise Architecture,
- Intelligent Transportation System (ITS),
- Statewide GIS data sharing,
- American Association of Transportation Officials (AASHTO) development of multi-state transportation software, and
- KDOT data warehouse.

Enterprise Architecture and Data Sharing

An important program that is having an impact on information sharing within KDOT is Enterprise Architecture (EA). Over the past couple of years, KDOT has embarked on a program to document its existing business, data, applications, and technology architectures. The data architecture is perhaps the furthest along. KDOT now has a good estimation of exactly how many databases, tables, and attributes are contained within its thousands of programs and applications.

Despite a strong database design and management activity, many improvements can significantly contribute toward better data sharing both within the agency and between the agency and its business partners. One of the discoveries that has come out of this program is an understanding of just how much redundancy exists. Key data attributes like "project no" and "route," for example, appear on dozens of tables. And dozens of redundant tables exist for concepts like "county." With redundancy, it is difficult for end users or even developers to know which attribute is the "best" or "official" one or which table they should use for their application. Often, developers choose to clone an existing table, and give it a different name. Of course, this makes the situation worse.

All of the above limits KDOT's ability to support its users when they make requests for management data or try to provide better information to the

public. This is reality with what is labeled "structured data." In the area of "unstructured data" (images, photographs, documents, email, attachments, web pages, voice, video, etc.), the situation is even more complicated. In a recent "Project Portal" project, KDOT has developed a data warehouse of project information that draws on different kinds of data that include structured data from key applications, documents, and maps to provide the public and KDOT personnel up-to-date information on highway projects. It is anticipated that this project will be the first of many. However, tying structured and unstructured data together successfully is currently a major challenge, since these different data types currently exist in different domains and to date there has not been a great deal of examination of how these various kinds of data fit together.

One of the next tasks in the Enterprise Architecture program is to extend KDOT's "Enterprise Data Architecture" to fully document what data already exists, and to identify the steps necessary to make the input, indexing, integrating and retrieving of KDOT's information much more straightforward.

Intelligent Transportation Systems and Information Sharing

In the early 1990's, the U.S. Department of Transportation (USDOT) began work on an ambitious "multi-modal, information- and infrastructure-based" national program to "use advanced technology to improve the efficiency and safety of our Nation's surface transportation system." This program eventually became the Intelligent Transportation Systems (ITS) Program. Since its inception, ITS has worked with all of the states and many local jurisdictions to study and improve the ways that technology and communication can improve the capacity and safety of the nation's most critical infrastructure: its urban highways, interchanges, intersections, and accesses. To this end, the USDOT has funded a myriad of projects to monitor usage. And, track and respond to wide range of other problems, such as congestion and accidents, that cause a huge loss of time and money to the American economy.

By its very nature the ITS involves the collection, processing and sharing of enormous amounts of data. Starting in the mid 90s, the Kansas DOT has coordinated activities with the State of Missouri, and local agencies in the Kansas City Metropolitan area to plan, fund, and monitor the regional KC SCOUT Traffic Operations Center (TOC) in Lee Summit, Missouri. This center manages a wide range of information including a large number of closed circuit feeds from major arteries around the metropolitan area and a whole range of other traffic, weather, and other information into a traffic control center, operated by law enforcement personnel in the KC Metropolitan area.

KC SCOUT is a large scale multi-agency, multi-state information sharing initiative. Agreements with a wide range of public and private data sources have had to be defined, discussed, and committed to writing. This project has been at the forefront of advanced technology for KDOT. KC SCOUT is all about real-time information. The management issues span the gamut from contracting for high-speed fiber-optic data links to provide CATV and data feeds across the system, and relaying messages for dynamic message signs (DMSs) to the development of wireless links to law enforcement, local media, and KDOT maintenance crews.

ITS will continue to push information sharing to the state-of-the-art. Over the next decade it is anticipated that "intelligent roadways" and "intelligent vehicles and trucks" will communicate

with one another in more and more ways, to reduce traffic congestion, reduce accidents, and allow motorists and truckers to make more intelligent travel decisions in real-time.

Geographic Information Systems and Data Sharing

KDOT has a huge investment in the transportation infrastructure. The natural display and access to this information is via a Geographic Information Systems (GIS) interface. A large part of the operational expense is directly related to the transportation infrastructure. Information sharing with local agencies is almost entirely related to investments and usage of the local transportation network and the interaction between their local highway networks and the KDOT statewide highway system.

Following a consistent GIS referencing framework for transportation allows KDOT to share information easily without large conversion expenses. The GIS Data sharing community in Kansas develops technical standards and supports a Statewide GIS data clearing house at the Kansas Data Access and Support Center (DASC) (http://gisdasc.kgs.ku.edu/). This clearing house is supported by the Kansas GIS Policy Board that establishes standards including metadata, monitors ongoing efforts of all parties, and helps establish sharing agreements between parties. The Policy Board also encourages information sharing between federal, state and local entities.

KDOT is evolving its GIS effort by incorporating a geospatial phase in every project whether it entails new development or a major revision to an existing system. This will ensure that GIS data collection and presentation is addressed and resolved in the early planning stages of any project. Incorporating geospatial concepts into the design stage using consistent standards and formats will facilitate sharing information. Training, executive support, and standards have been instrumental in facilitating GIS data sharing.

American Association of State Highway and Transportation Officials (AASHTO) Software Development and Data Sharing

For more than a decade, the American Association of State Highway and Transportation Officials (AASHTO) has facilitated data exchange by developing software, called AASHTOWare, which is used by multiple departments of transportation. The strategic direction of the software development is stated by AASHTO:

> "The AASHTOWare® technical service program is a thriving activity generating in excess of $24 million in annual revenue. Last year, all 50 state transportation agencies, as well as two Canadian Provinces, several foreign countries, U.S. counties and cities, as well as numerous consulting firms licensed one or more AASHTOWare products. The simple philosophy of sharing resources to acquire or develop transportation software solutions that would be otherwise uneconomical to produce has proven to be a powerful strategy against escalating software lifecycle costs and risks."[13]

AASHTOWare software covers the following transportation functions: transportation software

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[13] ASHTOWare Strategic Plan 2004 at http://www.aashtoware.org/sites/aashtoware/docs/AASHTOWare%20Strategic%20Plan%20-%20August%202004%20final%20.pdf

management solutions, bridge management, bridge rating and design products, and survey data management. These and future systems are jointly developed under the overall guidance of AASHTO by volunteers from state departments of transportation with assistance from selected software development vendors. Funding results from solicitations for voluntary contributions to develop and maintain the systems.

By developing systems, complete with system documentation of processes and data elements, this program has been both the vehicle and catalyst for data sharing between departments of transportation.

Enterprise Decision Support Data Warehouse and Data Sharing

The Data Warehouse (DW) program is having an increasing impact on the data sharing at KDOT. The DW concept allows mission-critical data needed to support decision-making functions to be separated from the operational systems, while complementing these transactional applications. The demand for data warehousing systems has made it necessary to prioritize the subject areas to provide the highest impact direction for the program and support for a phased approach to improving access to information.

The DW Project Management team utilizes the Business Dimensional Lifecycle (a trademark of Ralph Kimball Associates) to support the development and maintenance of the Data Warehouse. The goal is to make KDOT's information more accessible and consistent with a DW that is an adaptive and resilient source of information, which will become the foundation for decision making.

Each data warehouse project starts with a sponsor that has general management responsibility in a specific subject area (e.g., planning, accident and traffic data). The business requirements are gathered through a process of defining the types of business questions to be answered by the data warehouse starting with the higher level executive, and working toward the business user.

The next step in the process is the data audit and analysis task, which identifies required data sources, prepares the data requirements document, and analyzes the required data for any data issues outside of the normal business rules. It is within this task that information sharing becomes evident. As would be expected there are a number of data sources containing similar information in varying stages of enterprise usefulness. Inter-organizational discussions are conducted with associates at all levels of management. Data sources and data definitions are identified which support the enterprise view of information in the data warehouse.

The results of the data analysis are documented and presented to the administrators of the data for their review and action. Information that does not fall within the business rules is identified and quantified for quality control purposes. Some data is clean enough for the operational system, but not for the Enterprise Data Warehouse. Finally, business rules to handle the exceptions are agreed upon by the business community and are implemented in the data warehouse data staging process. The business rules are documented in the Data Warehouse Metadata Repository for review by those accessing information in the Data Warehouse.

The process of developing and maintaining information sharing through the KDOT Decision Support Data Warehouse will be repeated for each subject area leading toward an *Enterprise* Decisions Support Data Warehouse.

economic development perspective

Developing a Regional Perspective

Tom Christoffel, AICP, Senior Planner, Northern Shenandoah Valley Regional Commission, Commonwealth of Virginia

A lot of barriers are structural relating to bureaucratic organizations. Some of the fundamental issues are in the way a state government is organized, the way assignments are made, and maintaining compliance with statutory requirements. Risk aversion is common. All data is imperfect and a manager may not be comfortable sharing data unless it is 100% perfect so they don't get bit later. If someone bases a decision on data that is imperfect, and the wrong choice is made, then the blame game begins. Thus the causes for not sharing data are often understandable. Reducing risk and creating community advantage though sharing are strategies to consider.

Data Management

So how is this achieved? A state "information utility" was proposed for California about 1997. Logically, each subject area is sourced from the most appropriate agency, e.g., the agency that has responsibility for that particular data. The agencies focus on keeping their layers current. A user is always getting the best data at any point of use. This is not the historical data warehouse, that is, a library archive where all reports sit. Information is often kept by librarians based on the chance that someday perhaps it will be used.

As a regional planner, it is necessary to find and use local, state and Federal data sets on many issues and in response to many data requests. As an Affiliate State Data Center, the Northern Shenandoah Valley Regional Commission has received Census Bureau, Department of Commerce and a variety of state agency reports for the past 30 years.

There is a categorization problem that occurs with such a document collection, since the information does not fit a traditional library subject mode. This is due to the fact that the data is mixed when it comes in a report—it's not pure data. The organizing scheme currently used by the commission is to file reports by the name of the agency that created the report, within geographic sections: local, regional, state and federal. State agency name changes create a continuity problem, so things are grouped by the current name.

This is being simplified as agencies use the Internet to make their data available to the public. This is often driven by a transparency or open government policy and it is very useful in creating a climate for improving information sharing. Search engines also speed up the process of finding information. If a researcher has the 1999 report and wants 2003—they can search on the report name and will generally find it very quickly—more so than when going to the agency page and working through the menus.

Google® is now available for the desktop and it works very well. If a researcher needs to find something, they can easily find it using key

words for subject, author, or content. It would be useful if the classification and indexing scheme it creates from a collection could be made visible. That could help build organizing schemes for initial classification which is still needed.

One of the problems with data categorization is that generally data is collected in response to a stovepipe requirement, e.g., some program or initiative requires this data be collected for reporting purposes. This may be required by statute. What many people are realizing is that the data has more value than the original purpose. Or, the design of the system that generates the data missed one or two critical elements. This happens due to a lack of an *enterprise perspective*. The project team that developed the system was not *thinking far enough ahead*. In reality when business problems are being addressed, whether they are in transportation, or economic development, the analysis must draw from many datasets. Business problems anymore have a regional dimension that encompasses a scope beyond the stovepipe. In this changing world, there is a need for a new integration in thinking, in problem solving, and in evaluating opportunities. Bureaucracies *disintegrate* things and put them in departments. This is the historic approach to managing complexity—divide and conquer. The modern world wants more sensitive solutions and the mitigation of impacts not previously on the radar. That calls for working across boundaries—to *re-integrate* so a more whole picture of the issues, problems and potential solutions can be envisioned.

For example, in exploring an economic development opportunity, you must involve the department of transportation and its perspectives relative to impact on highway and road traffic, availability of mass transit, etc. It is necessary to involve the department of education and its perspectives on new demands for education, availability of schools, availability of teachers, availability of facilities, the tax base for supporting these resources, etc. It is necessary to involve the departments of health and environmental protection to understand the impacts on air quality, water quality, etc. So, problems can not be solved without an integrated approach—that is, a *community enterprise perspective* that uses information relating to the state, the region and the locality.

Promoting a regional perspective and cooperation, and information sharing appears to be a "no-brainer." But for some reason it is difficult. Partially because agencies are reluctant to share data—there is a risk adversity to data sharing. Sometimes this is because the *organization in focus* doesn't know what data they need. Other times it is because agencies do not and have no history of working together. Therefore, it is necessary to first create this sense of community before you can elicit cooperation.

Agency directors, analysts, and information managers at the state level can't anticipate what problems will need to be solved in the future. As society determines what can be gained from integrated data, it will need utilities for integrating data. There is a need for regional datasets and the associated intelligence for using the data. Currently, there is a general lack of this regional intelligence. In fact, data must be integrated in order to gain understanding.

At a recent conference for analyzing data, it was presented that in order to understand what is happening in a county it is necessary to look at data going back 10 years—so there is a *time dimension*. It is necessary to expand geographical analysis of a county to include an area as much as 90 miles in radius because people now live in regional environments where they

may drive 90 miles to get to their job—this is the *geographical dimension*. It is necessary to look at housing costs and salary data. People go where the jobs are, but they can't afford the housing, so they keep their home where they can afford housing, and drive to where their salary can pay the cost of living—this is the *economic dimension* and *population density dimension*. Society is getting more and more dispersed. Data must be analyzed from all of these dimensions to get a clear picture of what is really happening.

Some of the difficulty could be solved by establishing standard regional blocks. This approach should be part of a strategy for aggregating data while maintaining confidentiality. Some examples of existing standards are the geo-political definitions of state, county, and city. An intermediate geography needs to be defined that spans counties. It already exists in many states as a system of regional councils established in the late 1960's or early 1970's. Those states like Virginia, that utilize a standard regional geography scheme in the development of data sets, have an advantage. However, no state is using this concept to its full potential. A state standard region for census data that gave 100% geographic coverage is a simple solution now being pursued. It is fundamentally a state strategy that can be used for a competitive advantage. The value of the enterprise architecture in this case is that each departmental enterprise unit responds to its respective needs and requirements based on political geography, each contributing a perspective as part of an intelligent community.

Geographic Information Systems

The federal government has been working on *data coordination* since the 1980's. As part of the Federal Geographical Data Committee (FGDC) analysis, it was discovered that longitude and latitude were recorded using 22 different formats for the same information. There aren't standards for this information at the state level either, and the states won't use the federal approach that came out of this effort. This is demonstrated in the database design approach used at the state level. There is the example of three different counties that developed different GIS designs. And, a subsequent effort created yet another design.

There is an integration problem that becomes obvious when looking at the geo-spatial dimension. Each discipline has a different set of protocols for granularity whether its water science data, biological data, or economic data. It's not necessary to have a high degree of accuracy for longitude and latitude for economic data. But there is a need for higher accuracy and granularity for water science data. So, all of these datasets have been generated for different disciplines, but no way to cross reference them. One set is very granular, and others are at too high a scale. Or, some data within the same discipline is captured with varying degrees of geospatial granularity because it is intended for different uses.

Some GIS vendors state they can import any data. Is this really reachable? Standards are needed but the states don't come together on standards. And the federal government has been working on standards for 20 years. GIS is becoming more and more important as a dimension of data, providing context for analyzing data. The spatial dimension has been invisible to many database people.

Data Survival

Data survival is an ongoing problem, especially as we migrate to new media and new systems.

Software changes and equipment obsoletes, but the data *must* survive. This should be a key priority in state government. On the other side of the spectrum is another extreme which can be termed a librarian mentality. Someone *may* need this information a hundred years from now, so it better be kept and protected.

There needs to be a balance among all of these issues. Data survival, better designs, better data collection, regional perspectives, etc. All pursued as part of a data quality goal. There could be "perfect" data collected and stored, but never used. The ultimate users are the ones who will require various correlations. So, these users must be involved in data analysis. It must be kept in mind that some of these ultimate users may be outside the community of data collectors. This requires careful identification of all stakeholders to be sure all stakeholders are involved in determining what data is collected, and stored for analysis.

conclusion: making a difference

The contributors to this report touched on a number of issues and initiatives regarding information sharing within multiple lines of business within government. The interviews that were conducted involved people who are dealing with these issues on a daily basis. Their experience, knowledge and resilience is impressive. They were also willing to participate in the creation of this document with the intention of making things better.

There are a number of themes and solutions that have come out of these interviews.

- Enterprise Architecture
- Organizational Dynamics
- Identity Management
- Privacy
- Sponsorship
- Funding
- Incentives
- Methodology
- Tools
- Common Vocabularies

Calls to Action

The recommendations from this list of contributors can make a difference, but only if they are used. The people interviewed are dedicated professionals who have stepped up to the plate as change agents who are willing to provide the rest of us with the benefit of their expertise and experience. This benefit won't be realized unless everyone works to overcome barriers to information sharing and respond to the calls to action outlined in this report. It will take the combined effort of everyone to make a difference. NASCIO encourages the readers of this report to respond to these Calls to Action within the limitations and opportunities of their own circumstances.

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appendix

Acknowledgements

NASCIO expresses its sincere appreciation to those who participated in interviews and contributed articles. These individual contributed candid remarks that present not only the real barriers, but also productive suggestions on how to move forward with information sharing—and establish an *enterprise view* within government.

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appendix

Organizations of Interest

American Medical Informatics Association	http://www.amia.org/ The American Medical Informatics Association is a non-profit 501(c)(3) membership organization of individuals, institutions, and corporations dedicated to developing and using information technologies to improve health care. AMIA was formed in 1990 by the merger of three organizations - the American Association for Medical Systems and Informatics (AAMSI), the American College of Medical Informatics (ACMI), and the Symposium on Computer Applications in Medical Care (SCAMC). The 3,200 members of AMIA include physicians, nurses, computer and information scientists, biomedical engineers, medical librarians, and academic researchers and educators. AMIA is the official United States representative organization to the International Medical Informatics Association.
Association of Public Health Laboratories	http://www.aphl.org/ The Association of Public Health Laboratories (APHL) works to safeguard the public's health by strengthening public health laboratories in the United States and across the world. In collaboration with members, APHL advances laboratory systems and practices, and promotes policies that support healthy communities. The association's founding members are directors of state and territorial public health laboratories. Others include state laboratory staff, city and county laboratory directors, and international representatives. APHL is a non-profit, 501(C3) organization with a history of over fifty years. The LIMS initiative is described at http://www.aphl.org/Informatics/index.cfm

Bureau of Justice Assistance	http://www.ojp.usdoj.gov/BJA/ The Bureau of Justice Assistance (BJA) is a component of the Office of Justice Programs, U.S. Department of Justice, which also includes the Bureau of Justice Statistics, the National Institute of Justice, the Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime. The mission of BJA is to provide leadership and assistance in support of local criminal justice strategies to achieve safe communities. BJA's overall goals are to (1) reduce and prevent crime, violence, and drug abuse and (2) improve the functioning of the criminal justice system. To achieve these goals, BJA programs emphasize enhanced coordination and cooperation of federal, state, and local efforts.
ComCARE Alliance	http://www.comcare.org ComCARE stands for Communications for Coordinated Assistance and Response to Emergencies. ComCARE's goal is to promote an integrated, coordinated approach to emergency communications and support the development of a comprehensive "end-to-end system" to link the public to emergency agencies, and to link those agencies together. ComCARE seeks to enhance the ability to respond to individual and mass emergencies of all types by creating a network of survival which links existing technologies in homes and businesses, smart cars and trucks equipped with telematics, warning devices, wireless telecommunications, intelligent transportation systems, and advanced emergency care. Introducing 21st Century information and communications technologies to the often-antiquated communications infrastructure of emergency agencies will save thousands of lives each year, substantially reduce the severity of injuries and enhance homeland security.
Center for Society, Law and Justice	http://www.cslj.net/ CSLJ at the University of New Orleans, provides technical assistance, research, and training to criminal justice managers and other law enforcement personnel in cooperation with the Bureau of Justice Assistance.

Center for Technology in Government	http://www.ctg.albany.edu/about/ The Center for Technology in Government works with government to develop information strategies that foster innovation and enhance the quality and coordination of public services. The Center carries out this mission through applied research and partnership projects that address the policy, management, and technology dimensions of information use in the public sector.
Department of Homeland Security	http://www.dhs.gov/dhspublic/index.jsp DHS leads the unified national effort to secure America. DHS will prevent and deter terrorist attacks and protect against and respond to threats and hazards to the nation. DHS will ensure safe and secure borders, welcome lawful immigrants and visitors, and promote the free-flow of commerce.
Department of Justice	http://www.usdoj.gov/ The mission of the Department of Justice is to enforce the law and defend the interests of the United States according to the law; to ensure public safety against threats foreign and domestic; to provide Federal leadership in preventing and controlling crime; to seek just punishment for those guilty of unlawful behavior; to administer and enforce the Nation's immigration laws fairly and effectively; and to ensure fair and impartial administration of justice for all Americans.
Federal Enterprise Architecture Program Management Office	http://www.whitehouse.gov/omb/egov/ The Federal Enterprise Architecture Program Management Office (FEA-PMO) was established on February 6, 2002, in accordance with direction issued by the Associate Director for Information (IT) and E-Government, Office of Management and Budget (OMB). The lack of a Federal Enterprise Architecture had been cited by the 2001 Quicksilver E-Government Task Force as a key barrier to the success of the 24 Presidential Priority E-Government initiatives approved by the President's Management Council in October 2001.

Global Justice Information Sharing Initiative

http://it.ojp.gov/global/childTopic.jsp?topic_id=59&parent_id=2

The efforts of the Global Justice Information Sharing Initiative (Global) Advisory Committee (GAC) have direct impact on the work of more than 1.2 million justice professionals. The importance of the organization's mission, however, positions Global to impact citizens of the U.S., Canada, and beyond. Global's mission—the efficient sharing of data among justice entities—is at the very heart of modern public safety and law enforcement.

Global is a "group of groups," representing more than thirty independent organizations spanning the spectrum of law enforcement, judicial, correctional, and related bodies. Member organizations participate in Global out of shared responsibility and shared belief that, together, they can bring about positive change in inter-organizational communication and data sharing.

The GAC advises the nation's highest-ranking law enforcement officer, the U.S. Attorney General. Global aids its member organizations and the people they serve through a series of important initiatives. These include the facilitation of the Global working groups; development of technology standards, such as the Global Justice XML Data Model, Version 3.0; creation of white papers on data sharing issues, such as the National Criminal Intelligence Sharing Plan; and the dissemination of information via the Global Web site.

The work of the GAC has implications of the highest importance—making it the foremost voice for justice information sharing.

Global Justice XML Data Model

http://it.ojp.gov/topic.jsp?topic_id=170

The Office of Justice Programs (OJP), together with the Global Justice Information Sharing Initiative (Global), has officially issued a newer version of the Global Justice Extensible Markup Language (XML) Data Model (Global JXDM) to the justice community—Version 3.0.2. This latest release of the Version 3.0 Global JXDM series is enhanced to increase the ability of justice and public safety communities to share justice information at all levels—laying the foundation for local, state, and national justice interoperability.

George Washington University Homeland Security Police Institute	http://www.homelandsecurity.gwu.edu/dhs/programs/policy/ The Homeland Security Policy Institute (HSPI) draws on the expertise of The George Washington University and its partners from the academic, non-profit, policy and private sectors for a common goal of better preparing the nation for the threat of terrorism. HSPI frames the debate, discusses policy implications and alternatives and recommends solutions to issues facing America's homeland security policymakers. By linking academicians and scientists to decision makers at all levels of government, the private sector and the communities we live in, HSPI is working to build a bridge between theory and practice in the homeland security arena.
Integrated Justice Information Systems Institute (IJIS)	http://www.ijis.org/ The mission of the IJIS Institute is to apply the expertise of industry to assist justice agencies in the innovative use of advanced technologies to better share information in a way that benefits industry, the public sector, and society as a whole.
Justice Information Exchange Model (JIEM)	http://www.search.org/programs/technology/jiem.asp This project, funded by the Bureau of Justice Assistance, U.S. Department of Justice, is designed to facilitate the development of integrated justice information systems planning and implementation throughout the nation. Integration of justice information systems refers to the justice community's ability to access and share critical information at key decision points throughout the justice process. It is through identification of these key decision points and development of information exchange models that SEARCH will further nationwide integration efforts.
Justice Information Sharing Professionals (JISP)	http://www.jisp.us JISP is a National Network of state and local justice and public safety integrators responsible for the facilitation, collaboration, and advocacy of information sharing.

Kalamazoo Criminal Justice Council (KCJC)	http://www.kcjc.org/ The Kalamazoo Criminal Justice Council (KCJC) is a multi-disciplinary, collaborative organization of countywide justice system and community leaders, who encourage local planning activities, enhance interagency cooperation, efficiency, effectiveness, and innovation. The KCJC's vision is "to become and continue to be the best criminal justice system in America" by: • Ensuring a safe community for all, • Fostering fair and impartial treatment of all involved in the justice system, • Effectively holding offenders accountable and restoring victims, • Guiding offenders toward being responsible, contributing, and valued citizens, • Initiating and supporting crime control and prevention efforts, and • Serving as responsible stewards of public resources.
National Association of State Chief Information Officers (NASCIO)	http://www.nascio.org NASCIO represents state chief information officers and information resource executives and managers from the 50 states, six U. S. territories, and the District of Columbia. State members are senior officials from any of the three branches of state government who have executive-level and statewide responsibility for information resource management. Representatives from federal, municipal, and international governments and state officials who are involved in information resource management but do not have chief responsibility for that function participate in the organization as associate members. Private-sector firms and non-profit organizations may join as corporate members.

National Law Enforcement Telecommunications System (NLETS)	http://www.nlets.org The National Law Enforcement Telecommunication System (NLETS) was created by the principal law enforcement agencies of the states nearly 35 years ago. Since the founding, NLETS role has evolved from being primarily an interstate telecommunications service for law enforcement to a more broad-based network servicing the justice community at the local, state, and federal levels. It is now the pre-eminent interstate law enforcement network in the nation for the exchange of law enforcement and related justice information. The mission of NLETS is to provide, within a secure environment, an international justice telecommunications capability and information services that will benefit to the highest degree, the safety, the security, and the preservation of human life and the protection of property. NLETS will assist those national and international governmental agencies and other organizations with similar missions that enforce or aid in enforcing local, state, or international laws or ordinances.
Public Health Informatics Institute (PHII)	http://www.phii.org/about.html Through fostering collaboration, innovation and action, the institute will advance the public health practitioners' ability to strategically apply and manage information systems. The institute provides service, educates stakeholders, informs policy, and conducts research on appropriate use of public health information systems.
Public Health Information Network (PHIN)	http://www.cdc.gov/phin/ The Public Health Information Network (PHIN) is this framework. Through defined data and vocabulary standards and strong collaborative relationships, the Public Health Information Network will enable consistent exchange of response, health, and disease tracking data between public health partners. Ensuring the security of this information is also critical as is the ability of the network to work reliably in times of national crisis. PHIN is composed of five key components: detection and monitoring, data analysis, knowledge management, alerting and response. Creating a strong network that continues to define shared data standards to support the exchange of key health data is critical for a more effective and response-oriented public health system. The Public Health Information Network will serve as the framework supporting this new system, a system better positioned to respond to the changing needs of public health and consequently the nation.

The National Consortium for Justice Information and Statistics (SEARCH)	http://www.search.org/ SEARCH helps state and local justice agencies with their information and identification technology needs through effective planning and implementation assistance, high tech crimes investigation training, and criminal history policy. SEARCH developed the Justice Information Exchange Model (JIEM) tool for modeling information exchanges. JIEM has dynamic reference capability to the Global Justice XML Data Dictionary. To learn more about JIEM see http://www.search.org/programs/technology/jiem.asp

appendix

References

NASCIO Report Information Privacy: A Spotlight on Key Issues	https://www.nascio.org/publications/index.cfm#privacyguide This publication, produced by the NASCIO Privacy Committee, serves as a resource for states developing privacy policies that protect citizen information and are compliant with federal and state legal requirements. This publication highlights key issues in the following areas of privacy: • Children's Information • Drivers' Information • Health Information • Financial Information • Education Information • Social Security Numbers • Homeland Security-Related Information • Website Privacy Policies • Government Data Matching Activities and Agreements. In addition, the publication includes state examples for many of these areas of information privacy, an overview of recent privacy events at the federal level and a glossary of privacy related terms.
Principles for Managing Privacy	http://www.privacy.gov.au/publications/npps01.html The office of the federal privacy commissioner has extracted principles from the Privacy Act of 2000.
NASCIO Enterprise Architecture Tool-Kit	https://www.nascio.org/publications/shoppingCart/ NASCIO has published version 3 of its Enterprise Architecture Tool-Kit. This document presents approaches to governance, business architecture, process architecture, data architecture, and technology architecture.