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Technical Assistance Report

Supreme Court of Pennsylvania

Information Sharing Assessment of the First
Judicial District of Pennsylvania

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I. Executive Summary

The Philadelphia Inquirer's December 2009 series, "Justice: Delayed, Dismissed, Denied," prompted Pennsylvania Supreme Court Chief Justice Ronald Castille to appoint Justice Seamus McCaffery to head a reform initiative of the Philadelphia courts system. Justice McCaffery established a multi-jurisdictional task force to assess current practices and implement improvements to the administration of criminal justice in Philadelphia County, Pennsylvania. The task force requested that SEARCH, The National Consortium for Justice Information and Statistics, review the information sharing practices between the criminal justice partners and identify technology-related opportunities and barriers within the First Judicial District (FJD) of Pennsylvania.

The goal of this technical assistance engagement is to help the task force discover and document the information flow within the Philadelphia judicial system. The objective is to determine where that information sharing breaks down and whether the needed information is available.

SEARCH developed the observations and recommendations in this report following interviews with managers and staff of the criminal justice partners in Philadelphia, as well as reviews of documentation provided in advance of and during the site visit. SEARCH's involvement with the reform initiative and the task force is limited to this information sharing assessment. This report provides SEARCH's observations and offers recommendations in support of information sharing for the reform initiative. The following list summarizes the principal observations and recommendations, while report **Sections IV** and **V**, respectively, provide more detail and context for the observations and recommendations.

Observations

- The FJD has the executive-level support for the reform initiative and implementing improvements throughout the criminal justice system. Along with this support, the participating stakeholders expressed willingness for cooperation among the justice partners.
- The Philadelphia criminal justice agencies lack a formalized, cross-agency governance structure dedicated to information sharing and technology management. The Philadelphia Criminal Justice Advisory Board (CJAB) and the monthly information technology managers meetings may provide a foundation to build upon, but neither currently serve as a comprehensive, technology-oriented decision-making body.
- The Philadelphia criminal justice partners have a proven practice of implementing improvements to business practices. The FJD stakeholders established special courts and projects to address particular needs, such as the Accelerated Misdemeanor Program (AMP), Discovery Court Program, and

“Zone Courts.” Each of these, among others, demonstrates the Philadelphia justice community’s ability to successfully adapt and adopt new policies and practices with positive results.

- The FJD justice partners do not have an information sharing strategic plan in place. A strategic plan serves as an effective communication, project management, and governance tool.
- SEARCH observed that many issues the FJD Reform Initiative faces are due to the high number of case continuances. FJD stakeholders reported that this is largely due to problems related to witness scheduling and discovery issues.
- The Philadelphia criminal justice partners collect and store a large amount of electronic information regarding arrests, charges, court proceedings, subjects and inmates, but the information is isolated within individual agency systems and is generally not easily available to partner agencies. The FJD stakeholders established several interfaces between systems, but these tend to be “data dumps” of information rather than real-time information exchanges.
- Many of the FJD stakeholders rely on paper-based transactions. Although much of the shared information is maintained electronically, current information sharing between justice partners is handled primarily with paper reports, files, and forms that are physically transported between offices, courtrooms, and partner locations.
- FJD lacks a way to measure their current performance, which makes it difficult to back up the understanding about what is not working and what is being done right.

Recommendations

1. Establish a governance structure dedicated to information technology (IT) improvements within the Philadelphia criminal justice community. The FJD may elect to create a subcommittee under the direction of the CJAB or expand the agencies in the monthly IT managers meetings.
2. Formalize the executive-level commitment in a memorandum of understanding that specifies the scope and priorities of the reform initiative and dedicates resources to the identified priorities.
3. Once the FJD stakeholders have formalized the governance structure, they should utilize the governance structure to establish a strategic plan for information sharing. Strategic planning determines the overall direction and goals for information sharing.
4. FJD stakeholders should adopt a common approach for information sharing. This will serve as a blueprint for developers and technology managers to

understand *how* the Philadelphia justice community will share information. Establishing a common approach will align individual agency technology initiatives, provide basic requirements for subsequent Requests for Proposals, and streamline the development and implementation process for future projects.

5. The FJD stakeholders should leverage national data standards and guidelines to improve the flow of electronic information between systems. By doing so, FJD stakeholders will have a consistent means to identify, describe, and implement information exchanges based on established and robust data standards used by the national justice community. Utilizing national standards will also allow FJD stakeholders to reuse data components and existing systems' capabilities to reduce overall operational costs, compared to current paper-based processes.
6. FJD stakeholders should utilize the information available in the Preliminary Arraignment Reporting System (PARS); Lock & Track, the inmate records system of the Philadelphia Prison System; the Common Pleas Case Management System (CPCMS); and other systems to establish an effective court schedule information exchange. The scheduling of police officers, defendants, courtrooms, judges, and attorneys is a difficult task. Philadelphia should utilize the information available in disparate systems to establish an information exchange that includes all of the scheduling data needed to reduce officer overtime, unnecessary defendant transportation, and absent witnesses for court proceedings.
7. The Philadelphia Police Department and District Attorney's Office should collectively establish policies, procedures, and supporting electronic means to provide timely and complete discovery packages. This will reduce the number of case continuance requests and subsequent witness scheduling problems.
8. FJD stakeholders should work with the Administrative Office of Pennsylvania Courts to ensure they have access to needed reports and case information. The CPCMS provides many reports that may provide FJD stakeholders with active caseload information, including a Court Summary Report that lists all cases for a defendant. Several FJD stakeholders requested an inventory of active cases in order to search and retrieve defendant case status, case summary information, bail issues, and other particulars about a defendant and active cases related to that defendant.
9. FJD stakeholders should continue working toward establishing consistent, enterprise-level performance measures and reporting capabilities. The American Recovery and Reinvestment Act (ARRA) Technology for Optimum Performance grant application provides a foundation to gather and evaluate valuable statistics in measuring the performance of Philadelphia's criminal justice system.

II. Introduction and Request for Assistance

In December 2009, *The Philadelphia Inquirer* published a series of articles that focused on the criminal justice system of Philadelphia.¹ In many ways, the headlines in the series capture the conclusions drawn by the reporters:

- “Justice: Delayed, Dismissed, Denied” (12/13/09)
- “Witnesses Fear Reprisals, and Cases Crumble” (12/14/09)
- “Violent Criminals Flout Broken Bail System” (12/15/09)
- “Gun Arrests Galore, No Convictions at All” (12/16/09)
- “Half Empty: Courts in Disarray” (12/20/09)

These articles depict a system in need of evaluation and repair. Pennsylvania Supreme Court Chief Justice Ronald D. Castille ordered a comprehensive review of the Philadelphia courts and appointed Supreme Court Justice Seamus P. McCaffery special liaison to the Pennsylvania First Judicial District (FJD) Reform Initiative.²

Justice McCaffery has conducted meetings with justice partners from around the City and identified five key issues that contributed to the problem identified in the articles: (1) the lack of information sharing, (2) the inconsistent form of data, (3) questionable accuracy of data, (4) the unmet need for data, and (5) the lack of timeliness of data. In order to address these issues, the FJD Reform Initiative requested technical assistance to map the flow of information and, in doing so, identify problems and needs, and develop recommendations for improvement.

Justice McCaffery requested technical assistance³ through the National Training and Technical Assistance Center (NTTAC)⁴ to address information sharing issues and communications breakdown as part of the FJD Reform Initiative. As a technical assistance provider, SEARCH, The National Consortium for Justice Information and Statistics, was assigned to provide assistance to the Pennsylvania

¹ To read *The Philadelphia Inquirer* series and followup articles, see http://www.philly.com/philly/news/special_packages/79211302.html.

² The First Judicial District of Pennsylvania is composed of three courts that make up the Philadelphia County Court System: the Court of Common Pleas, Municipal Court, and Traffic Court. Source: <http://www.courts.phila.gov/courts.asp>.

³ This project was supported by Grant No. 2009-DB-BX-K009 awarded by the Bureau of Justice Assistance. The Bureau of Justice Assistance is a component of the Office of Justice Programs, which also includes the Bureau of Justice Statistics, the National Institute of Justice, the Office of Juvenile Justice and Delinquency Prevention, the SMART Office, and the Office for Victims of Crime. Points of view or opinions in this document are those of the authors and do not represent the official position or policies of the United States Department of Justice.

⁴ For information regarding the NTTAC, see <https://www.thecjportal.org/NTTA/Pages/default.aspx>.

Supreme Court and FJD Reform Initiative stakeholders for this effort.⁵ Specifically, Mr. Michael Jacobson and Mr. Mo West, Justice Information Systems Specialists for SEARCH, were the project team for this technical assistance effort. Ms. P. Karen Blackburn, Program Administrator at the Supreme Court of Pennsylvania, is the primary point of contact with SEARCH for this project. This report is a result of the research conducted before, during, and after the SEARCH project team site visit of June 29–July 1, 2010. The goal of SEARCH’s involvement was to:

- Review the information flow within the Philadelphia judicial system.
- Identify gaps in business process and technologies and provide recommendations to address identified gaps.

SEARCH developed the observations and recommendations in this report based on interviews during a site visit in Philadelphia on June 29–July 1, 2010, and from material provided by the justice partners in Philadelphia. During the site visit, the SEARCH project team met with managers and staff from the following agencies:

- Philadelphia Police Department (PPD)
- Philadelphia District Attorney’s Office (DA’s Office)
- Defender Association of Philadelphia
- Philadelphia Municipal Court (MC)
- Philadelphia Court of Common Pleas (CP)
- Philadelphia Prison System (PPS)
- Administrative Office of Pennsylvania Courts (AOPC).

Staff from each of these agencies provided SEARCH with descriptions of how they utilize information technology (IT) applications and business processes; provided details regarding the IT services that support information sharing; and discussed any planned changes to the services. SEARCH enjoyed the cooperation and assistance from the dedicated staff who participated in the project.

⁵ Information about SEARCH and the project team assigned to provide the technical assistance are included as Appendix A. Also, see <http://www.search.org>.

III. Background

The focus of the SEARCH technical assistance engagement was to ascertain the extent to which existing technology solutions utilized by the Philadelphia criminal justice community support their *collective ability* to administer justice. In order to achieve this goal, SEARCH participated in a number of meetings with representatives from each of the key stakeholder agencies to:

- 1) Gain a basic understanding of their individual business operations, focusing on the collection and exchange of information among agencies.
- 2) Identify how their information technology supports or hinders their business processes.

The following section provides a very basic and generalized view of the criminal justice process and the accompanying information flow from one agency system to another.

Overview of Business Processes

Upon an arrest in Philadelphia, the arresting officer transports the defendant along with the incident report to one of seven booking centers. An investigator enters incident information into the Preliminary Arraignment Reporting System (PARS). Using PARS, the investigator generates an arrest report with the defendant's identifying information. The PARS application interfaces with Police Integrated Information Network (PIIN) to verify the District Control (DC) number. Once the arrest report is complete, PARS interfaces with the police mainframe to extract the arresting officer's vacation schedule, which is passed to the Common Pleas Case Management System (CPCMS) along with the other case information, to help reduce police overtime.

A preliminary arraignment hearing is held within 20 hours of the arrest. Bail is set and recorded in PARS. CPCMS extracts the case data from PARS to create a CPCMS case. CPCMS stores the case data along with case scheduling in the Municipal Court. All felony preliminary hearings and misdemeanor trials are initially scheduled in Municipal Court. If a *prima facie* case is established after a felony hearing, the case is bound over to the Court of Common Pleas for trial. The conduct of misdemeanor trials falls within the jurisdiction of Municipal Court. The case schedule is also recorded in PARS so that supervisors can run a report of when an officer is needed and in what courtroom.

Prior to the preliminary arraignment and issuance of a complaint, the DA's Office makes a charging decision. The investigator creates the discovery package in PIIN. The discovery package includes arrest reports, interviews, investigator reports, evidence photos, and any other items required from the Virtual Case Folder in PIIN. At the present time, discovery comes in at various times and

many continuances are due to discovery not being available to the prosecutor or defense counsel prior to the first trial listing. This discovery is provided electronically to the DA's Office. Clerical staff prints the discovery, manually redacts it, and makes a copy for the file and for defense counsel. Defense counsel receives the redacted discovery package either in court or through the mail.

Once the case is scheduled in either Municipal Court or the Court of Common Pleas, it is tracked in CPCMS. The criminal justice partners in Philadelphia have access to CPCMS and/or its information. As cases progress through the court system, information is added to the CPCMS regarding the case, including hearing results and changes, judgment orders, and dispositions.

Defendants in custody are held by the Philadelphia Prison System. PPS uses the Lock & Track system to extract intake data from the PARS system and notify PPS staff of a defendant's court appearance date. It also contains information regarding visitation, physical characteristics, and special needs of the defendant. Twice each day, PPS dispatches a courier to retrieve detainee information and judgments from the criminal justice center. "The bag" is a locked bag that contains paper reports from CPCMS on actions from the courts during the day.

The illustration (Figure 1) is a graphical version of the basic justice process.

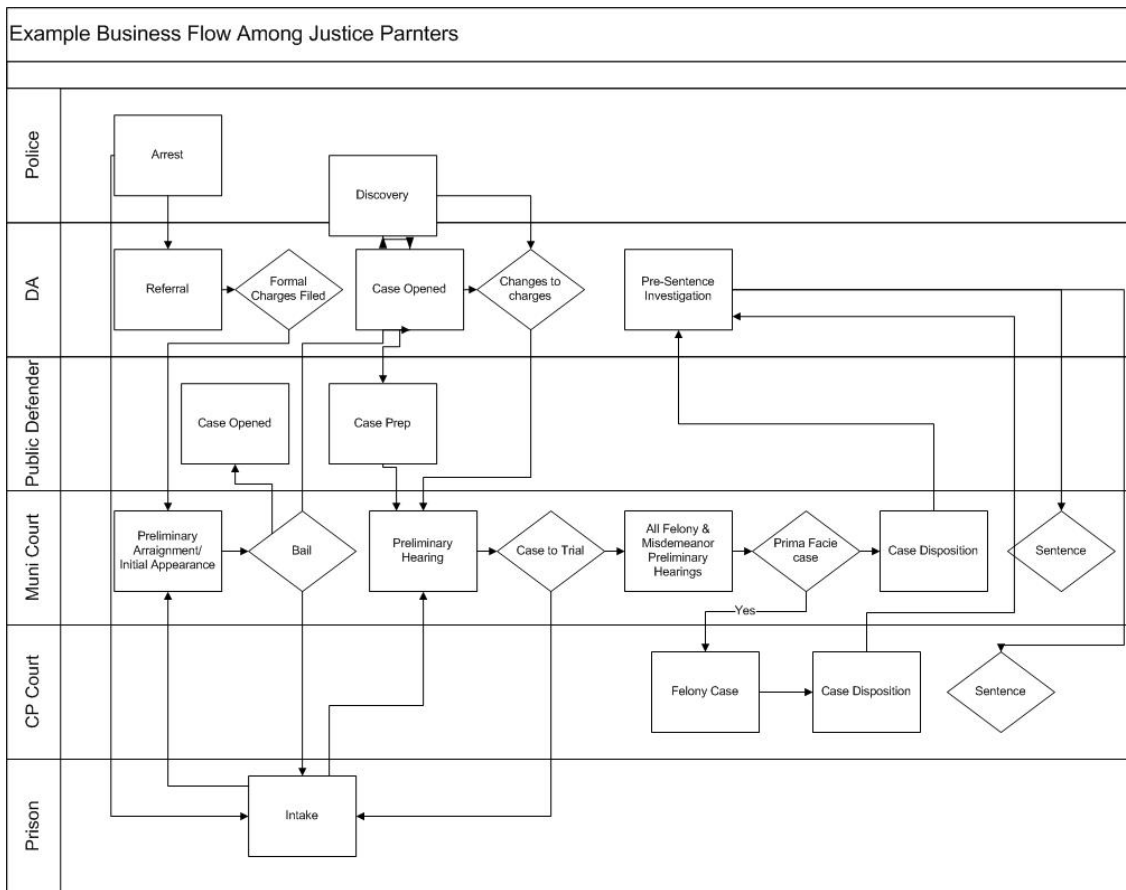


Figure 1: Basic Justice Process in Philadelphia

The FJD stakeholders collect and disseminate information to each other around the clock. *Each agency participating in this technical assistance project maintains information the other stakeholders need—and itself needs information from the other agencies.* Each agency shares information mostly through manual, paper-based processes.

Justice agencies within the FJD utilize and support several applications. Each application was developed based on the requirements of the individual agency and performs the functions necessary to conduct that agency's business. Most of the applications are maintained by the operating agency, and the Philadelphia Department of Technology supports a few others. Several of the applications have a degree of integration with others, but the majority of the Philadelphia justice community shares information through accessing another agency's application. The list below briefly describes the existing applications used by the FJD partners. SEARCH understands there are other applications in use, but these applications were the subject of the on-site discussions and identified as the core applications among partners.

PARS The **Preliminary Arraignment Reporting System** automates the processing of police arrests and other preliminary and pretrial information. PARS processes all misdemeanor and felony arrests (and the majority of summary arrests) in Philadelphia. PARS supports interfaces to send and receive information between 11 other systems during the arrest and arraignment process. These other systems exist throughout the PPD, DA's Office, and Philadelphia Courts system.

PIIN **Police Integrated Information Network** is an investigative records management system. PIIN is built upon virtual case folders, and receives a portion of discovery documents from a PARS interface. Investigators add information to the case folder by scanning documents, images, and forms. PIINS creates the discovery package once the supervisor has approved the case folder.

DALink DALink is an electronic Bill of Information e-filing system provided by the Pennsylvania AOPC. It is available to counties statewide to create and e-file Bills of Information. DALink shares information with CPCMS regarding cases through a real-time interface. The interface allows the DA's Office the ability to file Bills of Information and for the courts to accept it electronically and update the charges on a case.

DAOCMS	The District Attorney's Office Case Management System (DAOCMS) is a separate application from DALink. The DA's Office staff reported that the DAOCMS does not meet users' needs and is under-utilized. DA's Office staff plan to evaluate DAOCMS requirements and functionality to support business processes in the near future.
CPCMS	Common Pleas Case Management System ⁶ is a statewide court case management system used throughout Pennsylvania that includes criminal case dockets, accounting, and other functions for trial courts statewide. In the FJD, CPCMS is the central repository for court case records and information. CPCMS supports several interfaces among FJD stakeholders.
Lock & Track	Lock & Track is the inmate records management system utilized at the Philadelphia Prison System and has been in use since 1995. Lock & Track is a proprietary product acquired from a vendor that owns the programming code. Users indicate the software is deficient in many of its capabilities and plans are in place to conduct a needs assessment for the eventual replacement of this system.
JNET	The Pennsylvania Justice Network (JNET) ⁷ is a collaborative effort of 16 State agencies to build a secure integrated justice network and infrastructure that promotes information sharing by its applications, services, architecture, and outreach and training. JNET allows information from criminal justice and other related resources shared among Federal, State, county, and municipal agencies.
Monitor	The Court of Common Pleas Probation and Parole unit uses the Monitor application to manage probation case and client information. Monitor has very limited integration with other systems, and requires manual entry of information from paper-based exchanges.

⁶ For more information on CPCMS, see <http://www.aopc.org/T/AOPC/CPCMS.htm>.

⁷ For more information on JNET, see http://www.pajnet.state.pa.us/portal/server.pt/community/pennsylvania_justice_network/4424.

IV. Observations and Analysis

This section provides SEARCH project staff's observations and analysis based on its review of materials, as well as on-site discussions with managers and staff from the Philadelphia criminal justice partners. The observations and analysis in this section include general observations pertinent to the FJD Reform Initiative and the key discussion topics from SEARCH interviews during the site visit. **Section V** of this report provides recommendations that address these observations.

Governance

SEARCH observed that the Philadelphia justice community lacks a formal governance structure for multi-agency information technology (IT) strategy development or decision-making. Philadelphia justice partners indicated the current commitment to the FJD Reform Initiative is based on informal relationships among agency stakeholders. The Criminal Justice Advisory Board (CJAB) primarily focuses on policy and monetary activities, and the monthly IT managers meeting, staffed by the Mayor's Office, focuses on Citywide IT issues not directly related to criminal justice.

The impact of an informal governance structure resulted in justice partners developing agency-specific applications and a reliance on paper transactions or data extracts to receive information from partners. Had a formal governance structure been in place to address information sharing strategies, justice partners may have a more coordinated and effective information sharing environment.

The role of a robust governance structure is to ensure that decisions are made by the appropriate people, at the right level in the organization, and in a timely and efficient manner. IT governance generally offers approaches to keep both the provider(s) and consumers of information informed and accountable for the obligations they must make to one another for information exchanges to work effectively. The lack of a formal IT governance structure has reduced the transparency of IT decisions and impacted communications between justice partners.

Proven Practice of Improvements

The Philadelphia criminal justice partners have a proven practice of implementing policy and business improvements. The FJD stakeholders established special courts and projects to address particular needs. New initiatives such as the Accelerated Misdemeanor Program (AMP), Discovery Court, and Zone Courts demonstrate a commitment to improvement. Each of these, among others, demonstrates the Philadelphia justice community's ability to successfully adapt and adopt new policies and practices with positive results.

The ability of the justice partners to adapt and adopt new policies and business practices provides proof that they are able to accept changes for improving. This same flexibility can also be applied to technology changes. Adapting new methods of information sharing and improving communications through the use of technology will require the justice partners to accept changes that will improve how they conduct business.

Strategic Planning

The FJD does not currently have an overall vision or strategic plan for justice information sharing in Philadelphia. Without a strategic plan in place, the FJD lacks the means to identify critical needs, clearly articulate how the justice community will address their needs, and receive support from partner agencies. The lack of a strategic plan can hinder communication and contribute to assumed expectations, priorities, and objectives.

During interviews, SEARCH staff noted that partner agencies each have specific priorities and needs, but there is no venue for stakeholders to document the cross-agency impacts, potential benefits, or funding constraints of the collective FJD Reform Initiative.

Case Continuances

SEARCH observed that many of the issues faced by the FJD Reform Initiative are due to the high number of case continuances. FJD stakeholders reported that this is largely due to problems related to discovery reporting and witness scheduling. Case continuances have also caused dismissals, because witnesses are not available the next time the case is scheduled.

Through the course of the site visit, agency representatives indicated that there are delays in receiving discovery information in a timely manner. These delays are due to the inability to receive complete and timely information from law enforcement, as this process is largely paper-based and time-intensive. The DA's Office indicated that they request continuances in order to work with investigators to complete the discovery information.

Witness scheduling—specifically police officer scheduling—is caused by the court's lack of availability to an officer's normal shift schedule. Courts do have access to officer's scheduled vacations, but do not have electronic access to their shift schedule. Many times, officers work shifts that conflict with the court schedule and require officers to go to court during normal patrol, or at off-hours. This leads to unnecessarily high overtime costs, and rescheduled hearings, which further exacerbates scheduling problems.

Limited Integration

The Philadelphia criminal justice partners collect and store a large amount of electronic information among individual agency systems, including arrests, charges, court case activities, and inmate information. Because many of these applications do not effectively communicate with each other, the information they contain is isolated and unavailable to other justice partners.

The justice partners have established a few information interfaces between systems, but lack a consistent approach for enterprise-level data integration. The existing process for implementing an interface tends to focus on a single business transaction. The interfaces appear ad hoc, with little or no coordination between justice partners. For example, PARS providing arrest information to CPCMS offers great utility, but the interface is limited to that single function and inhibits PARS from adding additional capabilities found in many law enforcement records management systems.

Currently, the most common means to share information is through *access*. Basically, a partner agency provides equal access to an application by establishing usernames and passwords for each user, regardless of which agency they represent. For example, not only do the *courts* users have access to CPCMS, but users from the DA's Office, public defenders association, Police Department, and Prison System have user-level access to CPCMS as well. Granted, this is one means to an end, but this often requires accessing multiple sources (each with its own look and feel) to receive the needed information. This scenario also requires significant overhead and resources to manage individual account provisioning and de-provisioning, establish permissions, auditing, user training, and support.

Another common means to share information among the Philadelphia justice community is through *data replication*. This typically includes one agency providing access to a replicated database, allowing other partners to use the replicated data according to their individual needs.

Data replication is one alternative for information sharing, but poses a number of challenges for the "requesting" agency. Publishing and retrieving full sets of data creates large overhead on the network and other resources, and places the burden on the requesting agency to locate the specific information, reformat, and import the information into their system without compromising the integrity of the information.

Reliance on Paper

Despite the existence of several electronic information systems, the Philadelphia justice community primarily relies on paper-based transactions. The DA's Office employs staff who are responsible for ensuring that the case files are printed, transported, sorted, stored, and available in courtrooms at the Criminal Justice Center when attorneys need them. Also, the Prison System employs an armored courier to carry judgment orders from the Criminal Justice Center to the prison to so that the orders can be entered into Lock & Track.

As noted in the examples, information sharing is largely a manual process with documents physically transported among the various partners during the lifecycle of a case. Partners informed the SEARCH project team that this leads to significant problems locating specific documents in a timely manner and requires large amounts of costly physical storage space, as well as staff resources to print, process, redact, and track all the paper documents and files.

Performance Management

FJD lacks a way to measure their current performance, which makes it difficult to support any conclusions or findings about what's wrong and what is being done right. Good statistical-based performance management also provides information to make the case for funds and provide accurate information to the public.

On a more granular level, statistical-based performance management is a consistent need across all Philadelphia justice partners. Due to the reliance on paper transactions, a clear means to correlate arrests with dispositions, track charge modifications, and determine the frequency of case continuance requests is a difficult task at best.

Agency Meeting Summaries and Observations

Philadelphia Police Department

SEARCH staff met with members of the Philadelphia Police Department (PPD), who provided an overview of their business processes related to arrests, detainment, and court interactions. The participants also discussed records management applications, and priorities and needs related to electronic information sharing among partner agencies.

- Officer overtime costs related to court appearances exceed \$20 million annually. PPD staff indicated these costs are unsustainable and primarily caused by the inability for courts to receive officer shift schedules. The problem exacerbates case continuance issues, requiring the officer to return to court on a later date.

- PARS contains electronic incident and arrest information, which is available to the DA's Office staff and the Municipal Court at the preliminary hearing. This requires users to locate the specific information, print out a copy of the arrest report, and manually re-enter the information to their individual systems.
- PARS supports an automated arrest warrant request and approval process with courts, which eliminates the need for paper-based transactions. This proven process for the arrest warrants creates an opportunity to leverage this capability for search warrants and other transactions.
- PPD actively seeks input from justice partners and end users regarding PARS enhancements, and participates in Citywide IT committees to share updates and priorities among justice partners.
- PIIN, while relatively new, is capable of consolidating discovery documentation required by the DA's Office and defense attorneys. Providing complete and timely discovery packages is a top priority for the DA's Office, which seems promising for addressing discovery problems and evidence management.
- PPD hosts numerous internal applications (PARS, PIIN, Court Scanners, Scheduling system, etc.) with minimal integration among each other. This results in a lack of a comprehensive and cohesive agencywide approach to IT management.
- PPD staff indicated that the PARS system has the ability to send electronic information to the courts and prison. However, the PARS application does not receive any electronic data in return from partner systems. This presents significant challenges for case updates, accurate disposition reporting, and crime analysis, among others.
- PPD indicated their main information sharing priorities are as follows:
 - Resolve officer schedule conflicts to reduce court appearance overtime costs.
 - Receive charge and case modifications and complete dispositions.
 - Provide complete and timely discovery documentation to the DA's Office.
 - Establish electronic means to request and issue search warrants.
 - Consolidate information into a repository for crime analysis, trends, targeted enforcement, performance management, and statistical analysis.

Philadelphia District Attorney's Office

The SEARCH project team met with staff from the Philadelphia District Attorney's Office. They provided a high-level overview of the business processes of the DA's Office and the IT tools used to support their business.

- The DA's Office has a wide range of responsibilities above arguing cases in court. The dynamic nature of the services managed and provided by the DA's Office reflects the agency's ability to adapt business processes and respond to a variety of policy-driven initiatives as needs or priorities evolve. This creativity is demonstrated through the Office's pursuit of Federal funds to initiate several IT-related assessments to determine causes of repeated case continuances, its establishing confidentiality and access control methods, and finding more efficient means to access critical case information in a timely manner.
- DA's Office staff indicated that, historically, IT has not been a high priority of the office. The office lacks basic technology tools, including laptops for attorneys, and an adequate functional case management system to record case information and updates. They also do not have the means to generate and manage electronic records. The result of this situation is a significant—if not complete—reliance on paper documents to conduct their business.
- DA's Office staff indicated that the reliance on paper-based documents limits statistical analysis and performance management, leads to incomplete case files, impedes attorney case preparation, and in a few instances results in lost case files. The office is working to address providing discovery packages in a timely manner. The inability to provide complete discovery is, anecdotally, the leading cause of case continuances requested by staff attorneys, which exacerbates witness-scheduling problems. The advent of the "Discovery Court" improved this business process and reduced the timeframe for collecting discovery documents, but still lacks the technology support to sustain these improvements.
- DA's Office staff informed SEARCH that the existing DAOCMS provides a limited range of case management capabilities, and agency staff does not consider it a viable tool to assist in their business operations. The office is working on a needs assessment to evaluate the DAOCMS functionality to determine the most effective and feasible options to manage and produce case and statistical information.
- The DA's Office employs nearly 20 full-time staff to manage paper records among justice partners and attorneys. Additionally, the office depends upon justice partners to provide information required for court case activities in a timely manner. Due to the limited use of DALink and the DAOCMS, justice partners are required to provide paper documents.

- With a recent administration change, the need for robust information technology tools has become an agency priority. As mentioned above, staff is actively pursuing Federal grants to offset City funding to implement several pilot projects and technology-related initiatives to establish the foundation for future integration capabilities.
- The DA's Office indicated the following to be information sharing priorities:
 - Improve the discovery process.
 - Collect and analyze statistical data to understand case attrition.
 - Receive timely defendant status and logistical information.
 - Establish quality assurance and accountability mechanisms to more effectively manage agency performance, and identify key problem areas.
 - Reduce time-consuming clerical functions through technology improvements and improved information management.

Defender Association of Philadelphia

Representatives from the Defender Association of Philadelphia, which provides public defense services to the City, provided SEARCH staff an overview of their IT capabilities and related interactions with the rest of the Philadelphia justice community.

- Public defenders handle approximately 70% of the cases in Philadelphia.
- The Defender Association staff indicated that their IT budget is disproportionately small for the size of the agency, and they make effective use of their existing applications.
- Timely receipt of discovery documentation was a key concern of the public defenders, similarly with the DA's Office and Police Department. This reduces the defense attorney's ability to arrive in court fully prepared to argue cases. The participants acknowledged that the prosecutors provide discovery materials in accordance with statute, and indicated they are interested in receiving electronic versions of discovery files in order to integrate with their existing system.
- Defender Association staff pointed out that they are in the process of restructuring their existing case management system to accommodate information made available through nightly updates from a replicated CPCMS database.

- Given the significant volume of paper documents received from justice partners, the Defender Association scans paper documents into electronic copies to reduce document storage costs and increase efficiencies when preparing case files.
- Priorities for the Defender Association includes streamlined access to information, such as:
 - Electronic delivery of discovery reports.
 - Lock & Track custody data.
 - PPD documents, including 9-1-1 calls, video, mug shots, and other incident forms relating to cases.

Philadelphia Municipal Court

SEARCH staff met with the Deputy Court Administrator for the Philadelphia Municipal Court (MC) and the Director of Data Processing and Technology for the FJD. They provided SEARCH staff an overview of the court's interactions with the other justice partners and described the priorities and needs for the court's staff and operations.

- The MC is the only municipal court in the Commonwealth. The other counties in Pennsylvania have Magistrate Courts that perform a similar function to the MC.
- MC staff utilize the CPCMS as their case management system, which appears to meet most of the court's operational needs. The significant information gap is the inability to produce localized reports on specific variables unique to Philadelphia. MC staff continue to work with the AOPC for customized reports and queries.
- MC staff indicated that they have positive interactions and good working relationships with partner agencies. The MC and PPD, in particular, have been working together to improve processes and have developed an electronic notification of arrest warrants.
- MC courtrooms process every adult arrest—more than 60,000 cases per year. The MC has a unique case assignment process of assigning an individual case number for each victim, based upon complaints filed by the DA's Office. Assigning an individual case number to each victim results in case management and statistical reporting problems. When a case is referred to the Philadelphia Court of Common Pleas (CP), the CP typically consolidates the individual MC cases into a single case. The effects of this practice may contribute to skewed conviction statistics and disposition reporting omissions. Similarly, the CP remands cases to MC. The inconsistent case management practices cause unnecessary complexities that impact all justice partners.

- The MC staff recognized a need to improve data quality when recording dispositions by the Clerk of Court. Since the CPCMS implementation in December 2006, disposition grading is passed from PARS to CPCMS. Several stakeholders discussed data entry issues with the accuracy of disposition grading and the reporting of dispositions, especially for statistical purposes.
- The MC has a history of continual process improvement. Along with creating the Accelerated Misdemeanor Court and special community courts for DUIs, drug offenses, veterans, and family court, the MC has found ways to address court needs and solve problems within the community.
- MC staff listed the following priorities:
 - Robust statistical analysis and reporting capabilities.
 - Include the complete schedule for police officers for court scheduling.
 - Automated search warrant request/issuance processes with PARS.
 - Receive electronic non-traffic citations from all other law enforcement agencies.
 - Enhanced identification measures utilizing biometric technology.
 - Real-time custody status updates from Lock & Track.
 - Real-time custody status for Pennsylvania Department of Corrections inmates.

Court of Common Pleas

The Deputy Court Administrator for the Philadelphia Court of Common Pleas (CP) met with the SEARCH project team. The CP hears major felony cases, traffic court appeals, and consolidated MC court cases. In 2009, the CP processed a caseload of 15,964 cases.⁸

The PARS system electronically submits at least 150 new arrests each day to CPCMS. Arresting officers, investigators, the DA's Office Charging Unit, Pre-trial Bail Interview Unit, and Municipal Court data clerks each enter information into PARS. The CP's Data Management Unit reviews these entries to ensure that CPCMS received the appropriate information.

⁸ Annual Report 2009 Philadelphia Court of Common Pleas, January 2010.

- Multiple cases that involve the same incident from the MC become a single case in the CP. This requires staff to reassign case numbers and ensure that all information related to the cases is passed correctly, including bail amounts. Case consolidation occurs in two ways:
 - The DA’s Office is the bridge between MC and CP court cases. When the DA’s Office consolidates multiple MC cases to one CP case, the offense tracking numbers are in DAOCMS.
 - ARC (Advance Review and Consolidate) reviews all pending cases for a defendant in the system and consolidates them into a single pretrial conference. All the active and post-trial matters are consolidated, freeing the court calendar and helping to solve issues with scheduling conflicts.
- The Trial Commissioners have created a “Discovery Court” in an effort to ensure that all evidence is available at the time of arraignment.
- Information about a person is in multiple places and the CP has to find all that information. The court’s Data Management Unit has the daily responsibility to review information to make sure that information from each system—including PARS, PIIN, CPCMS, Lock & Track, and Monitor—have the correct identifier information, such as state identifier (SID), address, offenses, bail, offense tracking number (OTN), and date of birth, and that calendaring information is also correct.
- Priorities for CP include:
 - Being provided the reason offenders are at the Criminal Justice Center or on the “Bus List.”⁹
 - A complete inventory of all active case status for case management, resource management, funding requests, probation officers, and other program needs.
 - Expanded electronic evidence tracking in PIIN to support pre-trial conferences and discovery reporting.

⁹ The “Bus List” is the term used to describe the report of defendants who are on the buses for transportation to and from the Criminal Justice Center by the PPS. It includes the type of court event, date, time, and courtroom for which the offender is to appear.

Philadelphia Prison System

As of 10:30 a.m. on July 1, 2010, the Philadelphia Prison System (PPS) housed 8,325 inmates. The PPS is responsible for ensuring the security and safety of these inmates, as well as protecting the public. The PPS provides rehabilitation services that help inmates return to the communities with the skills, knowledge, and support that they need.

- As described in Section III, Lock & Track is a dated system that is reported to not be very user-friendly. PPS staff indicated that it still provides the basic functionality needed to manage inmates' personal information, locations, transportation schedule, and special needs.
- The interface between PARS and Lock & Track has reduced data entry at the time of inmate intake by 40 minutes.
- Lock & Track does not consume electronic information from CPCMS, requiring a manual entry of court information into Lock & Track. Lock & Track does submit electronic housing information to pre-trial services and CPCMS.
- There is a heavy reliance on paper: Every court order that is relevant to the prison is paper-based.
 - Twice a day, the prison dispatches an armed officer to the criminal justice center to pick up the "bag" with all the orders from the last time a courier was dispatched.
- Pre-trial detainees comprise 74% of Philadelphia's prison population.
- The PPS would like to work on the following priorities:
 - Real-time electronic interface between Lock & Track and CPCMS for case status, court orders, and security alerts with notifications of changes to an inmate's status while they are at the criminal justice center.
 - Improved prison information sharing capabilities among other justice practitioners for intelligence purposes, the parole process, and decision-making.
 - Biometrics-based positive identification.

Administrative Office of Pennsylvania Courts

The AOPC owns and maintains CPCMS along with three other statewide court systems, several other smaller systems, and a number of Web applications that provide information from the major case management systems. It also provides office automation support for the Supreme Court of Pennsylvania and the AOPC staff. The AOPC maintains a disaster recovery site and has a continuity of operations plan in place for all major automated systems utilizing a secondary data center located in western Pennsylvania.

- All 67 Pennsylvania counties use CPCMS, and AOPC recognizes the need for statewide court forms and standard operations.
- AOPC provides strong IT support and responsiveness to the FJD's requests for custom reports, data queries, and data dumps.
- AOPC has experience using national data standards and architectural approaches:
 - AOPC staff informed SEARCH they created several electronic data exchanges using the Global Justice Information Exchange Data Model (GJXDM) and the National Information Exchange Model (NIEM), and these data exchanges follow the Information Exchange Package Documentation (IEPD) guidelines adopted by Federal justice and public safety agencies.
 - The AOPC leverages web services and adopted service-oriented architecture for all CPCMS interfaces with other State agencies.
- The AOPC tracks requests for CPCMS modifications through a considerations list.
- The AOPC priorities include items from the 5-year plan and budget that they have just completed:
 - Provide a statewide delinquent system.
 - Provide a juvenile case management system.
 - Provide a document management system.
 - Develop an e-Filing IEPD.

There are common priorities among the FJD justice partners. These priorities align with the overall findings and observations. Throughout the meetings with each justice partner, it was apparent that they have dedicated resources to continue to improve the FJD justice system through information sharing practices and to reduce the reliance on manual, paper processes.

V. Recommendations

Based on the observations and analysis documented in **Section IV**, SEARCH staff recommends the following actions and technology enhancements for continued support and information sharing improvements of the FJD operations.

Recommendation 1: Establish a governance structure dedicated to information technology improvements within the Philadelphia criminal justice community.

The FJD Reform Initiative has the support and attention of the key Philadelphia stakeholders. The positive response to the issues highlighted in recent press articles created the momentum to address significant gaps in the information technology capabilities across the entire justice community. The FJD partners should seize this opportunity to create a mechanism for making critical decisions and addressing political, organizational, cultural, and legal issues that *will* surface during the course of an initiative of this scale. Information technology projects are complicated, take time and resources to complete, and require the continued support from all the participating agencies.

Rationale

A formal governance structure will help sustain the current momentum of the FJD Reform Initiative, and also provide project leadership, define the business of justice, and analyze technical environments, policies, and solutions.¹⁰

Moving to a formal governance structure—complete with appropriate policy-, business-, and technology-level decision-making capabilities—requires commitment from all stakeholders. Establishing a formal governance structure provides a mechanism in which policy, business unit leaders, and technology managers are able to develop IT strategy. This benefits the enterprise by providing direct input from the information customers and providers, in a forum where competing priorities are recognized and resolved. It creates a sense of joint accountability for the strategic direction of IT—as a partnership between the business units. It focuses the FJD leadership, even for a few hours each month, on how they are collectively using IT, and how they could be using it more efficiently. It tends to improve trust, accountability, and transparency in making significant IT investment and policy decisions.

¹⁰ This section is adapted from the report *Governance Structures, Roles, and Responsibilities*, Kelly J. Harris, SEARCH, The National Consortium for Justice Information and Statistics, November, 2004. This report provides a significant amount of pertinent information for the FJD Reform Initiative. SEARCH staff recommends Philadelphia stakeholders review this brief document. It is available at: <http://www.search.org/files/pdf/GovernanceStructures.pdf>.

As part of the governance structure, the FJD should create a multi-agency advisory group to address specific information sharing and technology issues that affect the Philadelphia justice community. The Philadelphia Criminal Justice Advisory Board (CJAB) is composed of a panel of Citywide officials to coordinate a multi-agency response to fighting crime, making the courts more efficient, and driving down the prison population rate. The CJAB facilitates local-level agency coordination and primarily focuses on policy and business issues. SEARCH recommends that the FJD Reform Initiative create a group comprised of similar representatives from the CJAB, and focus on information sharing and technology issues. Both the CJAB and the new information technology-based group would be integral to the overall governance structure.

Establishing an IT-based group, with the goal to take action and collaborate on information sharing and technology decisions that affect the criminal justice partners, will allow a mechanism for communicating information sharing priorities, share resources, and focus cooperation on projects that mutually benefit multiple agencies.

The FJD should formalize the executive-level commitment and established governance structure in a Memorandum of Understanding (MOU). As described above, each justice partner recognizes the need for enterprise-wide information sharing improvements and expressed a willingness to adopt and implement changes within their individual agencies. SEARCH recommends that, along with the formulation of a governance structure, each justice partner participate in the development of a MOU that documents the FJD Reform Initiative's scope and the roles and responsibilities of each partner. If appropriate, the MOU should include provisions for supporting appropriate staff and dedicated resources to coordinate activities among agencies.

Integration initiatives such as the FJD Reform Initiative are not the responsibility of a single partner, but rather rely on the cooperation of all engaged. These types of initiatives require a coordinating entity to manage the various activities among partners, as well as a commitment of resources from the partners

Recommendation 2: FJD stakeholders should develop a comprehensive strategic plan.

The original scope of this technical assistance engagement was to document business requirements and information flows. SEARCH believes this is a good step for the stakeholders to take, but only *after* governance and a strategy are in place. Thus, SEARCH recommends holding off on this step for now, and focusing instead on formalizing governance and establishing a strategic plan.

A strategic plan is an effective tool to establish the overall scope of any integration initiative. Given the variety of issues FJD stakeholders raised during the site meetings, SEARCH recommends they document the FJD Reform Initiative's purpose, intent, and near-term objectives in a formal strategic plan.

Strategic planning development can often be seen as a pro forma exercise and result in an unused document. However, **when properly developed, a strategic plan serves as an effective communication, project management, and governance tool.** It should describe the information at an appropriate level so that a wide audience (e.g., funding sources, elected officials, and non-justice stakeholders) can easily understand the correlation from technology to policy. From SEARCH staff’s experience, it can be difficult to convey this connection; therefore, using the following methodology is useful to describe the components of a strategic plan.

Enterprise Strategic Planning Methodology: A strategic plan is a document that clarifies where a business enterprise is headed and how it will get there. To do this most effectively, a strategic plan follows a certain structure that ensures coverage of the right topics in a way that builds a case for the envisioned future. Figure 2 depicts the major plan sections and their relationships to one another:

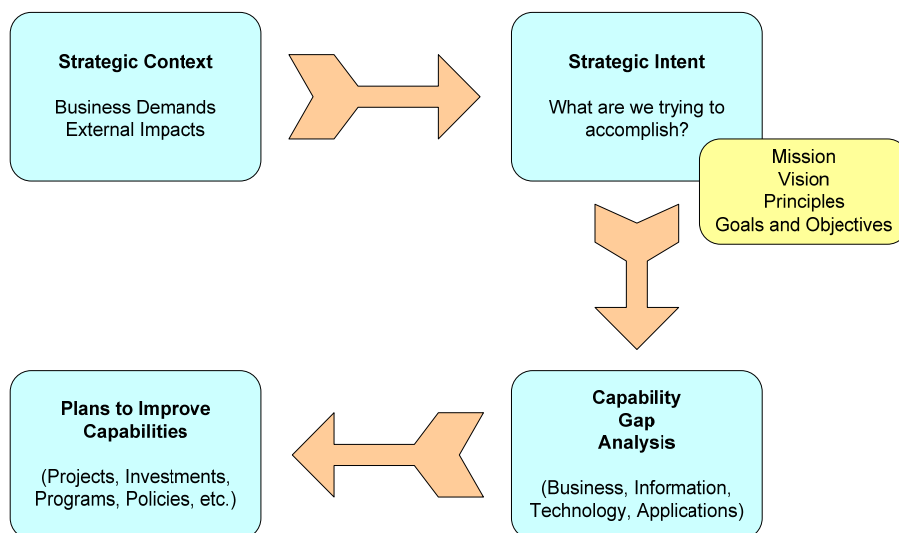


Figure 2: Major Sections of a Strategic Plan

The purpose of each section of the strategic plan is as follows:

- **Strategic Context:** This section documents the factors—from the enterprise executive leadership, key external stakeholders, and environmental factors—that will inform and constrain what the enterprise expects to accomplish.
- **Strategic Intent:** This section identifies what the enterprise is to accomplish during the time-period covered by the plan. It includes:
 - *mission* (what business the enterprise is in),
 - *vision* (what the future looks like at the end of the planning horizon),
 - *goals and objectives* (specific, measurable, business-oriented accomplishments that collectively lead to the vision), and

- *guiding principles* (statements of value that help the enterprise make decisions in fulfillment of the plan).
- **Capability Gap Analysis:** This section identifies current and future capabilities necessary to fulfill the goals and objectives. The gap between current and future capabilities identifies what work the enterprise must do in order to achieve the vision.
- **Capability Improvement Plan:** This section lays out, at a high level, what investments, projects, programs, policies, and so on are necessary to build or enable the necessary future capabilities. This section does not delve into the details of how individual projects will achieve their own objectives, what the detailed investment plans are for investments, etc. Rather, this section sets out project and investment goals/objectives, so that the enterprise can organize properly to run those projects and make those investments.

Rationale

A strategic plan will help articulate the challenges faced by the FJD by clearly identifying internal and external factors affecting their environment. The plan will help identify and prioritize information sharing needs and help position the FJD to advocate for future information sharing changes. Consequently, strategic planning influences numerous aspects of the organization, including:

- The **information and services** to be shared among stakeholders.
- The **organizational design and roles** needed by the organization.
- The **performance goals** established throughout the organization.
- The **resources** needed to reach those goals and, consequently, how much money is needed to procure those resources—in the end, the goals determine the content of various budgets.

Ultimately, developing a strategic plan will enable the FJD partners to:

- Develop clearly articulated goals and objectives.
- Assess current and needed capabilities.
- Define capability gaps that are preventing achievement of the goals and objectives.
- Create consensus and support among diverse stakeholders.
- Clarify the scope of priority activities.
- Provide a project management tool to assess progress among stakeholders.

Strategic plans are “living” documents and should be reviewed, refined, and updated on a periodic basis. Periodic review helps the organization and its customers and stakeholders to assess the status of plan progress; identify and adopt new priorities; reprioritize existing priorities; and plan for the next phase of program activities. By reviewing project progress periodically, changes to the plan will be potentially less significant “course corrections,” rather than major changes in direction.

Recommendation 3: FJD stakeholders should review and adopt a standard architecture for information exchanges among agencies.

As described in Section IV, agencies in the FJD share information through various technical means, creating a mish-mash collection of isolated and proprietary interfaces for accessing limited information. SEARCH recommends that the FJD Reform Initiative collectively establish a standards-based interaction among the existing systems.¹¹ This standards-based interaction should leverage open industry standards and reduce the technological and business process dependencies (i.e., building one-off interfaces) among the stakeholders.

More specifically, the FJD should evaluate the Justice Reference Architecture (JRA), developed through the U.S. Department of Justice Global initiative.¹² SEARCH recommends the JRA because it provides specific guidance to practitioners on how to establish an enterprise-level information sharing environment to automate business processes and workflow. The JRA supports the following principles, each of which applies to the FJD Reform Initiative:

- Independence of information sharing partners
- Promote scalability
- Diversity of data sources
- Agility
- Reuse and asset sharing
- Align with best practices and experience.¹³

¹¹ Please refer to Appendix B of this report for a high-level description of the methods, technologies, and considerations of several integration techniques.

¹² Global is a Federal advisory committee to the U.S Attorney General dedicated to support justice and public safety information sharing. For information about Global and the JRA, see <http://www.it.ojp.gov/default.aspx?area=globalJustice>.

¹³ For more information about the JRA, see: <http://www.it.ojp.gov/default.aspx?area=nationalInitiatives&page=1015>.

Rationale

A standard architecture provides guidance to support more consistent and effective decisions in planning, designing, acquiring, and implementing technology. A standard architecture provides a well-documented and -understood view of the entire technology landscape, and links business processes with the systems that support these processes. A more complete understanding of the business and information needs can reduce the system development effort and improve responsiveness to business change.

Recommendation 4: FJD stakeholders should leverage national data standards.

FJD should develop and implement information exchanges based on national data standards, specifically the National Information Exchange Model (NIEM).¹⁴ NIEM is a collaborative effort among the U.S. Departments of Justice and Homeland Security to create a common language and structure for all justice and public safety agencies to share information. In essence, NIEM includes a data dictionary of elements shared among agencies and a technical structure, so that each agency can translate and map their information to their individual systems. This eliminates the need for one agency to conform to another agency's data definitions for each exchange. NIEM exchange development best practices also include a standardized way to package technical specifications based on business processes, called an Information Exchange Package Document (IEPD). An IEPD allows implementers to subset NIEM according to specific data requirements. In effect, the IEPD is a NIEM-based technical representation of a paper document.

Rationale

NIEM adoption has many benefits, but to summarize, NIEM provides the Philadelphia justice community with a well-established and widely used set of reusable data standards that will meet the vast majority of the current information exchanged via paper transactions. Ultimately, NIEM use will reduce information exchange development and implementation costs, while increasing the effectiveness of the existing IT investments, by utilizing existing standards and information exchange models.

Recommendation 5: Establish an information exchange to address court witness scheduling.

SEARCH recommends that the FJD Reform Initiative stakeholders make witness and officer scheduling a high priority. CPCMS has the ability to store and report scheduling information. Utilizing the scheduling information *already contained* within the disparate applications, the FJD stakeholders should be able to develop the means for court staff to view an officer's complete schedule.

¹⁴ For more information about NIEM, see www.niem.gov.

Rationale

The majority of agencies that met with the SEARCH project team commented that witness and officer scheduling was a challenge and very costly. Providing officer shift and vacation schedules to court clerks will significantly reduce the amount of officer overtime costs, and reduce the number of continuances.

Recommendation 6: The Police Department and District Attorney's Office should work together to establish policies, procedures, and mechanisms to make discovery information more readily available more quickly.

SEARCH recommends that the DA's Office, PPD, and the Defender Association collaboratively establish criteria for ensuring that all discovery information is available when it is needed. Utilizing PIIN and the advent of the "Discovery Court" is a valuable step in achieving this recommendation. However, discovery is still largely paper-based; the stakeholders should look at ways to provide discovery in an electronic format that is beneficial to all.

Rationale

Providing discovery as quickly as possible in electronic format can help to reduce the number of continuances, which will also help with some of the scheduling issues.

Recommendation 7: The CPCMS system should provide an inventory of active cases.

FJD stakeholder should work with AOPC to create a specific report or set of reports to provide an inventory of active cases for Court staff, DA's Office, and Police to be able to search and retrieve defendant status, case summary information, bail issues, and other particulars about a defender and active cases related to that defender. The inventory should be a brief summary of the active cases that provides information so the reader is able to understand exactly where a case is in the process. AOCPC staff indicate that the CPCMS provides many reports that supply an active inventory of cases.

Rationale

An inventory of active cases provides information at a glance that allows the courts and others to determine if the case is ready to proceed. This inventory can assist with scheduling, case management, and resource management. It can also provide a mechanism for communicating the status of a particular case to the public, which provides system accountability by ensuring that cases are handled as expected. The active case inventory can also provide statistics and trends to help with funding requests, as well as determine if new programs are successful.

Recommendation 8: Continue developing performance measures and reporting capabilities.

SEARCH recommends that the FJD stakeholders continue current efforts to establish baseline measurements to identify information sharing inefficiencies. The FJD reform initiative has begun this process, and should describe the desired outcomes in concrete and measurable terms. Establishing the baseline is the first step toward articulating a clear and compelling narrative to garnering support for subsequent FJD initiatives. To ensure that “reform” is taking place, justice partners need to track activities and outcomes across the justice community in a consistent manner. These measurements should justify the need for technology integration efforts and describe how information sharing investments will address the business problems, not visa versa.

FJD stakeholders should keep the performance reporting simple and understandable, and include dashboards for the performance reporting structure that focus on the following:

- The top objectives and why they are important.
- Answer the “So what?”—What do the numbers mean, why are they important, what are they measuring, and at what levels are great, good, need improvement, or unacceptable?
- This effort should seek to enhance the outcomes of the ARRA project, and provide additional context from the rest of the Philadelphia justice community.

Rationale

Incorporating performance management tools allow stakeholders to make decisions in areas of information system deployment, application development, and information sharing that provide continued improvements in administering justice. Focusing time, funding, and resources appropriately and effectively will allow not only cost savings, but also better services to internal and external customers.

SEARCH has the following recommendations for each justice partner. Most of these recommendations integrate with the overall recommendations above, however they are specific to each partner. SEARCH staff recommends that each justice partner participate in strategic planning exercises, as described in Recommendation 2, within their agency. This will allow the justice partners to bring goals, objectives, and priorities to the overall strategic planning process.

Recommendations for the Philadelphia Police Department

- PPD should provide a means for CPCMS to receive officer shift schedules and any changes to schedules in an appropriate amount of time for court scheduling. Working with the court to provide additional schedule information will reduce overtime costs associated with court appearances.
- PPD should continue collaborating with partners for system improvements and establishing collaborative priorities.
- PPD should look for opportunities for application consolidation to reduce independent and isolated internal systems. Collecting information once and reusing it for specific business processes reduces clerical errors and time spent entering or searching for information in multiple systems. Application consolidation and information sharing will also improve the quality of the information.
- PPD should establish clear requirements for application changes and explore different technical approaches to meet agency needs.

Recommendations for the Philadelphia District Attorney's Office

- The DA's Office should continue to make technology an agency priority. Agency management and staff recognize that existing paper-based processes are no longer acceptable methods of conducting business, and should continue to use the FJD Reform Initiative as an opportunity to advocate and solicit funding dedicated to technology.
- The DA's Office should leverage existing technology, or develop new technology to manage case information. Establishing basic information technology capabilities—including a case management application, laptops for attorneys, and supporting IT resources—will help foster a culture that accepts and utilizes technology and reduce the reliance on the “red wells.”¹⁵

¹⁵ The term “red wells” describes the folders containing case information used by the DA's Office. The office has 11 full-time employees that handle these, making sure that the right file is in the right courtroom for the attorney working the case.

- More specifically, the DA's Office should continue to explore means to address electronic submission of discovery packages with the PPD and AOPC.

Recommendations for the Defender Association of Philadelphia

- The Association should stay engaged with criminal justice partners by participating in the governance structure, strategic planning, and information sharing initiatives.
- The Association should continue to explore innovative technology solutions, especially open source technologies, to support the agency's priorities.

Recommendations for the Philadelphia Municipal Court

- The MC should consider reviewing its policy for creating individual cases per victim. Look at the Court of Common Pleas' court case consolidation practices as a model. By consolidating cases by incident, the work involved with case management, resource management, and scheduling could ease.
- The MC should engage the Clerk of Court in business process improvement discussions and/or system improvement projects. The clerks are on the front line of the process and have valuable insights for improving business processes and suggests for making systems work easier for them.
- The MC should continue to foster a collaborative and mutually beneficial relationship with the CPCMS support staff and the other justice partners.

Recommendations for the Philadelphia Court of Common Pleas

- The CP should establish a mechanism to get all of the information about a person in the system into one place. This will provide judges and other decision-makers with a complete picture regarding a defendant.
- The CP should engage the Clerk of Court in business process improvement discussions and/or system improvement projects. The clerks are on the front line of the process, and may have valuable insights for improving business processes.
- The CP should continue to focus on "out-of-the-box" process improvement alternatives for solutions to immediate needs; for example, establishing various courts for specific purposes.
- The CP should continue to foster a collaborative and mutually beneficial relationship with the CPCMS support staff and other justice partners.

Recommendations for the Administrative Office of Pennsylvania Courts

- The AOPC should be involved within the FJD governance structure to establish additional means to communicate current and planned activities and invite input of justice partners for information sharing and technology improvements. AOPC management handles CPCMS change requests and notifications through “User Alerts,” and seeks user input from statewide conferences. These activities are commendable, and AOPC should continue to engage Philadelphia justice stakeholders for potential improvements, suggestions, and requirements and provide feedback that “closes the loop.” This type of communication will promote awareness and trust among all stakeholders.
- The AOPC should provide technical leadership in use of national standards and architecture to Philadelphia justice partners. Utilize the expertise gained in creating web service interfaces with other jurisdictions to create and share IEPDs with the Philadelphia justice partners. This will ultimately serve to benefit AOPC information sharing practices within the FJD and with the State.
- The AOPC should continue to foster a collaborative and mutually beneficial relationship with FJD justice partners by engaging in governance, strategic planning, and information sharing projects. By fostering these relationships and providing expertise in information sharing, AOPC can communicate lessons learned and best practices when developing interfaces with the FJD stakeholders.

Recommendations for the Philadelphia Prison System

- The PPS should continue plans and work to upgrade or replace the Lock & Track system, and continue with meetings with the Philadelphia Department of Technology to work through the process.
- Along with the plans to upgrade or replace the Lock & Track system, PPS should look for ways to automate information sharing with criminal justice partners.
- The PPS is a wealth of information regarding inmates, gangs, and affiliations. The upgraded or new Lock & Track system should publish inmate information to justice partners not only in Philadelphia and throughout Pennsylvania, but also to national intelligence systems.

VI. Conclusion

It has been the SEARCH project team's pleasure to work with the dedicated, professional staff of the FJD. The staff was very willing to discuss not only what they are doing well, but also any shortcomings they saw, and to provide suggestions for improvement.

The FJD Reform Initiative is a huge undertaking. In order for resolution of the issues being addressed, the justice partners will need to work together and commit to making improvements, not only in the near-term but also the long-term. The SEARCH project team would like to emphasize three recommendations that are the most important for moving forward:

1. establishing a **governance structure**,
2. undertaking **strategic planning**, and
3. developing an enterprise-wide **information sharing architecture**.

The specific priorities (such as scheduling, discovery, active case inventory, etc.) should be addressed after the initial pieces are in place, and would be good pilots of a JRA approach.

Overall, the leadership and cooperative attitude of the justice partners will prove to be a foundational building block for establishing good information sharing practices and improving the process.

SEARCH has attempted to provide some insight and guidance that the task force can use to continue to improve the relied-upon information sharing services. The recommendations in this report are not a cure-all. Rather, they are intended to offer suggestions for improvements that should allow the task force to focus on its mission.

We appreciate the opportunity to be of assistance in working with the FJD. SEARCH is prepared to provide further support if the need arises for the FJD Reform Initiative. SEARCH is also available to assist with strategic planning or information sharing initiatives, or to assist individual justice partners with any priority projects. Feel free to contact either the report's authors directly, or SEARCH generally at <http://www.search.org>.

The SEARCH project team met with the following representatives from Philadelphia and the Commonwealth of Pennsylvania:

- **Police Department:** Lt. Gabe Keown, Chris Flacco, Nola Joyce, David Jardine, John Walker, and Fred McQuiggan.
- **DA's Office:** Sarah Hart, Lauren Baraldi, John Morgan, and Denise Spadaccini.

- **Defender Association:** Charles Cunningham and Russell Troyer.
- **Municipal Court:** Kathy Rapone and George Hutton.
- **Court of Common Pleas:** Joe Lanzalotti.
- **Prison System:** Commissioner Louis Giorla, James DiNubile, and Robert Tomaszewski.
- **AOPC:** Ralph Hunsicker, Barbara Holmes, George Hutton, Harold Palmer, Lindsay Aulman, Laura Linton, and Dave Lawrence.
- **FJD:** Dave Wasson (Office of the Court Administrator) and Terry Bigley (Department of Information and Technology Services).

**Appendix A:
About SEARCH,
the National Technical
Assistance Program,
and the Project Team**

SEARCH, The National Consortium for Justice Information and Statistics

SEARCH, The National Consortium for Justice Information and Statistics, is a nonprofit membership organization created by and for the states, dedicated to improving the quality of justice and public safety through the use, management, and exchange of information; application of new technologies; and responsible law and policy, while safeguarding security and privacy.

SEARCH's primary objective has been to identify and help solve the information management problems of justice and public safety agencies confronted with the need to automate and integrate their information systems and to exchange information with other local agencies, tribes, state agencies, agencies in other states, or with the Federal Government.

SEARCH is governed by a Membership Group comprised of one gubernatorial appointee from each of the 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands. Members are primarily state-level justice officials responsible for operational decisions and policymaking concerning the management of criminal justice information.

A staff of professionals works from SEARCH headquarters in Sacramento, California, to implement solutions identified by the Membership Group. SEARCH provides justice and public safety agencies with diverse products, services, and resources through four focus areas: Systems and Technology, Criminal History Law and Policy, High Technology Crime Investigation, and Public Safety.

SEARCH:

- Is the national provider of no-cost technical assistance to address the specific needs of operational state and local justice and public safety agencies in the process of acquiring, developing, upgrading, or integrating their computer and communications systems.
- Offers hands-on training to local, tribal, state, and Federal agencies on computer technology issues with criminal justice and homeland security applications. Courses are offered on such topics as investigating computer crime, cellular device investigations, network investigations, and online child exploitation investigation.
- Prepares police, fire, and EMS agencies for successful technology projects through the Public Safety Program.
- Sponsors national conferences, symposia, and workshops for local, tribal, state, and Federal justice practitioners.
- Prepares national research, analytical, and survey reports and bulletins on a range of timely issues in criminal justice information management, technology, and law and policy, which are published and disseminated by the U.S. Department of Justice and U.S. Department of Homeland Security.

- Provides a wide variety of information about justice information systems, related technologies, standards, research, and technology acquisition via the Internet. These resources can be accessed via the SEARCH home page at www.search.org.

The National Technical Assistance Program

The National Technical Assistance Program, administered by SEARCH with funding from various agencies within the U.S. Department of Justice and U.S. Department of Homeland Security, provides no-cost assistance to all components of the state and local criminal justice system with respect to the development, operation, improvement, and/or integration of all types of criminal justice and public safety information systems (for example, records and case management, computer-aided dispatch, and criminal history record systems, etc.). The Technical Assistance Program includes both in-house and on-site technical assistance:

- In-house technical assistance includes consultation with agencies via telephone, mail, and Internet. These technical assistance projects can include consultations and information about automation, integration, communications interoperability, and planning issues, as well as review of agency automation/integration planning materials, needs assessments, data modeling, and requests for proposals.
- On-site assistance helps agencies to effectively plan for, design, develop, procure, and implement computerized information systems, and can involve the following: conducting needs assessments, identifying system requirements, and developing or reviewing site-specific planning documents; planning projects to achieve integration of information systems across functional and/or political boundaries; assistance in writing technical proposals; providing technical consultations on a wide range of operational and policy issues; proposing solutions to system problems; locating expertise and information systems for transfer; and guiding the transfer and implementation of systems and techniques to improve information management.

Project Team

Mr. Mo West is a Justice Information Systems Specialist for SEARCH, The National Consortium for Justice Information and Statistics, where he provides assistance on integrated justice systems project planning and implementation. He provides training, technical assistance, and research on automated systems development, automation planning, and justice information sharing to state, local, and tribal jurisdictions nationwide.

Prior to joining SEARCH in 2008, Mr. West served as the Program Manager for Washington State's Justice Information Network (JIN) and as a policy analyst for the Wisconsin Office of Justice Assistance In Washington, Mr. West oversaw the successful deployment of two key applications—a federated criminal history query and an electronic citations system—while securing \$4.5 million in new funding for the JIN Program and leading the state's approach to justice information sharing. He also developed a policy regarding the use of the Global Justice XML Data Model (GJXDM) and the National Information Exchange Model (NIEM) as the basis for statewide information sharing. He

also incorporated justice performance measures into the state's government accountability initiative. In Wisconsin, he monitored over \$3.4 million in justice grants, served as a liaison to vendor and user communities for the Wisconsin Integrated Justice Information System (WIJIS) initiative, staffed key WIJIS governance committees, and developed privacy and security policies.

Mr. West has a bachelor's degree in History-American Law and Public Policy from Purdue University.

Mr. Michael Jacobson is a Justice Information Systems Specialist for SEARCH, The National Consortium for Justice Information and Statistics, where he provides assistance on integrated justice systems project planning and implementation. He provides training, technical assistance, and research on automated systems development, automation planning, and justice information sharing to state, local, and tribal jurisdictions nationwide.

Mr. Jacobson has 20 years of networking, database programming, user support, administration and project management experience, with expertise in XML, business process modeling, and service-oriented architecture. Prior to joining SEARCH in 2009, he worked for the Montana Department of Justice (DOJ), most recently as an Information Technology Project Manager. In this position, he was responsible for coordinating and completing multiple simultaneous projects, including managing project scope and timelines, developing project and communications plans, providing risk assessments, developing policies, standards and procedures, conducting business process analysis, and reporting to project sponsors, stakeholders, and team members. He managed the statewide Integrated Justice Information Sharing (IJIS) Broker program, which is creating the information exchanges that allow a wide range of agencies (such as courts, jails, prisons, police, sheriffs, motor vehicle division, etc.) share real-time information quickly, securely, and accurately.

Mr. Jacobson also served as Chief of the Montana DOJ's Application Services Bureau for more than 3 years, which assists the department in planning, developing, and maintaining automated information systems. He oversaw the work of web developers, programmer/analysts, systems analysts, and database administrators, and also participated in long-range planning and coordinating development projects. He worked with IT managers statewide on enterprise-wide strategic planning, standards, and policy issues as Executive Chairman of the Montana Information Technology Managers Council, an advisory group to the state Chief Information Officer.

He also served as a System Analyst for the Montana Department of Agriculture for five years, where he was responsible for meeting its IT needs, including user support and training; network and server administration; and programming large and small database projects. He previously worked for MoreWire, Inc., as Vice President of Information Systems; Hydrometrics, Inc., as Senior Systems Specialist; and as an Information Service Specialist for state Office of Public Instruction, all based in Helena, Montana.

Mr. Jacobson has a bachelor's degree in Computer Science from Carroll College.

**Appendix B:
Supplemental Integration
Methods and Descriptions**

During the site visit to Philadelphia, several agency representatives expressed an interest in different technologies for supporting individual agency information technology (IT) priorities, and cross-agency integration tools. This is a brief and high-level description of the methods, technologies, and considerations of several integration techniques.

Methods and Technologies for Information Sharing

The primary challenge to information sharing is to exchange information between different computer platforms. Many technologies have evolved to provide the ability to share information; each has its advantages and disadvantages. It is important to understand the capabilities of each approach when designing an information sharing infrastructure that can meet the broadest needs and provide the greatest adaptability for growth and change. The major approaches are discussed here.

Before discussing the various approaches used to exchange data, it is important to understand the different methods used to define and organize data. Data are typically organized and structured using one of the methods listed here and described in further detail beginning on this page:

- **Data organization and file structures**
- **Architectural** information-sharing styles (shared system, shared database, file transfer, direct messaging, service orientation)
- Information-sharing **patterns** (push/pull, query/exchange)
 - Within queries, **federated** queries or **data warehouse** model
- **Exchanging/sharing** information (point-to-point or via data brokers)

— Data Organization and File Structures

The most basic file format is called a “flat file,” in which data are simply arrayed as a continuous string of information grouped together logically as a record. A flat file contains one to many records. In a flat file, the data are not structured in any obvious way and rely on external documentation to identify and describe individual data elements. Data fields or elements are defined by their position in the file (or offset), such as *position (or columns) 10 through 17 contains Date of Birth*. Another common structure is “delimited” files, where a special character is used to separate the data elements to make it easier to identify their location. A “comma delimited” file is a common form. Data must still be defined externally based on their sequence order within the file, such as *the third element is Date of Birth*. “Name-Value Pairs” define data within the file by matching the element name with the corresponding value. As an example, you might find element “Date of Birth” followed by the value “01201981.” Name-value pairs may also use delimiters to separate the elements within the file. While name-value pairs

are somewhat self-describing in that the element name is included with the value, name-value pairs do not provide any structure or context to the data.

XML (Extensible Markup Language) provides both definition and structure to a file. XML uses plain text to exchange data so that it is both machine- and human-readable. Plain text may also be used with the other technologies, but is the only form available in XML. XML provides structure to the data by organizing the data into logical groups and creating associations between different pieces of data. For example, “Date of Birth” can be associated with a specific individual along with other data related to that individual. While the other technologies can accomplish this through external documentation, XML embeds these relationships within the data itself. XML has become the file format of choice because it is both human- and machine-readable and is self-describing both structurally and semantically.

— **Architectural Styles of Information Sharing**

It is important that information sharing partnerships define a consistent approach to information sharing. Such an approach is referred to as “architecture.” Having a consistent approach across projects is important for several reasons:

- An architecture allows the partners to make long-term investments in technology to support information sharing, rather than investing in project-specific (and duplicative) technologies.
- An architecture accelerates the implementation of each information exchange by providing clear guidance on significant implementation decisions to developers and project managers.
- An architecture allows partner agencies to provide clear guidance to system vendors and developers, thereby accelerating procurements and making the writing of Requests for Proposals easier.
- An architecture helps enforce adherence to national justice and industry standards, thus increasing interoperability.

While the architecture for every information sharing partnership is unique, there are a relatively small number of architectural styles to choose from. Each style sets a general direction for how the partners will configure their systems and transmit data between them. It is important to note that there is no single “correct” style; the choice of a style requires that the partners carefully consider the business pros and cons of each before making a decision.

The five most common information sharing styles are:

1. Shared system
2. Shared database
3. File transfer

4. Direct messaging
5. Service orientation.

Shared System

In a **shared system**, the partners share information by all agreeing to use the same system. This style is typified by the highly integrated, mainframe applications used by all partners in the justice system. There are also client-server and web-based applications on the market that allow the various justice partners—law enforcement, corrections, probation, parole, courts, prosecutors, etc.—to purchase “modules” that exist within a single, monolithic system.

Shared Database

The **shared database** style provides a single shared repository of data that is used by multiple applications that have been designed to meet the unique needs of a given business unit. A shared database provides common data definitions and structures that are used by separate applications, and each application may only use or be authorized to use those elements within the shared database that are appropriate to that agency.

Both the shared system and shared database style are only applicable to environments where a single resource can be shared.

Various technical approaches exist for sharing databases across applications. One notable approach is Open Data Base Connectivity (ODBC). The ODBC approach enables multiple systems to exchange data by directly communicating from one database to another. ODBC can be used to update files or individual records. This was the first broadly adopted method enabling a database from one vendor to exchange data with a database from a different vendor. Most major database vendors support this technology.

The primary drawback to ODBC is that each system must “expose” their system and database to another system. By providing direct access to the data, no validation process can be easily applied to the data being exchanged and the receiving system runs the risk that the sender may provide invalid data, thus corrupting the database. ODBC does not have any built-in data encryption capabilities, but security can be provided using other network capabilities, such as a Virtual Private Network (VPN). ODBC can be used to either “push” or “pull” data. Additionally, ODBC requires networks to allow proprietary database protocol traffic, which can degrade network (and application) performance and potentially introduce security vulnerabilities.

File Transfer

The **file transfer** style enables information sharing between multiple computer systems. Data are extracted from a database and transformed into a file which is shared, usually in batch mode, with another computer system.

File Transfer Protocol (FTP) is the most ubiquitous implementation of this style. In its basic form, FTP enables the exchange data between heterogeneous computer systems using a variety of file formats. Since first developed, FTP has evolved to support the exchange of data using all of the formats described above. It can work over the Internet and provide security through encryption using Secure File Transfer Protocol (SFTP).

FTP was developed as a batch transfer exchange capability. A batch transfer method involves the sender collecting a group of records and files to be exchanged at one time. While it can be used in a transactional or event-driven environment, where an action on the sender's system triggers the exchange of a specific set of records, such as a case filing or the issuance of a warrant, FTP is not optimized for this. FTP generally uses a "push" mechanism whereby the sender starts the FTP process and "pushes" the data to the recipient (as opposed to the recipient system retrieving or "pulling" the data from the sender's system).

Direct Messaging

Direct messaging is a style of information sharing that utilizes more sophisticated methods of information sharing, and typically results in a collection of point-to-point connections between paired computer systems. There are two predominant technologies used to implement this style: Message-oriented middleware and web services.

- **Message-oriented middleware:** Message-oriented middleware enables the exchange of data by creating a dedicated connection between multiple computers to share data. In order to do this, software components are installed on each computer system that will be sharing data. This establishes and maintains a secure connection between systems. Programs or database triggers are developed that create a message, which is then exchanged with the partner systems. The data are delivered to the recipient in a queue, which can then be processed into the appropriate application. Message-oriented middleware supports multiple data formats and can function in either batch or real-time (event-driven) mode. The middleware part of this approach provides additional exchange management capabilities, such as reliable delivery and non-repudiation.

Message-oriented middleware overcomes the limitations and risks of direct database connectivity by producing and consuming data through the construct of a message, which separates the data from the database. This allows the sender to embed triggering mechanisms within the application code itself to identify, select, and send the desired data rather than sweeping or scanning through a file to find the data. It also allows the recipient to programmatically validate and manipulate the data if needed before committing it to the database. Messages can be secured using capabilities of the messaging software or by using network capabilities, such as VPN. Message-oriented middleware can be either "push" or "pull" and can use any of the data formats described previously.

The major drawback to using message-oriented middleware technology is that the messaging products are proprietary and require licenses for each machine that shares data. Messages formats may be proprietary and communication between various messaging products is often not possible.

- **Web services:** Web services provide the capabilities of the message-oriented middleware model while taking advantage of Internet technologies and removing proprietary constraints. Web services enable systems to expose information exchange capabilities to other systems without requiring each system to use the same product. Most major software vendors support web services, which enable them to communicate with one another. Web services can also be implemented using a variety of open standards and non-proprietary components. Like message-oriented middleware, the web service can be invoked through controls placed within an application to provide real-time (event-driven) exchange capabilities or by developing batch processes. Web services can support either a “push” or “pull” method of exchanging data.

Web services optimize use of open standards and resources, such as XML and the Internet. At the data level, XML is the file structure of choice. XML is used to structure both the content of the data and the routing or “envelope” information. A suite of supporting standards have been developed to address the access, management, and control requirements, thus matching the capabilities of proprietary message-oriented middleware solutions. Many national initiatives, such as GJXDM and the National Information Exchange Model (NIEM),¹⁶ and industry standards, such as Web Services (WS*), have been developed and adopted to promote the use of services.

Messaging requires that participating organizations develop (or, less likely, acquire) software components that send and receive messages to other partners, using the protocols defined by the chosen messaging standard. Depending on the standard and the degree of openness of the participating systems, the development of these components can be time-consuming and costly. Each messaging standard or technology has its own data format (e.g., XML for web services), and its own approach to key non-functional requirements such as security, reliable delivery, and so on. Development of connection components generally requires mapping application data to the protocol’s standard format—a task for which more or less sophisticated tools may be available to assist, depending on the standard chosen.

¹⁶ NIEM is a partnership of the U.S. Departments of Justice and Homeland Security. It is designed to develop, disseminate, and support enterprise-wide information sharing standards and processes that can enable jurisdictions to effectively share critical information and support day-to-day operations. See <http://www.niem.gov/>.

The web services protocols, which are arguably the most prevalent today, are supported by a wide range of proprietary (vendor-specific) and open source tools. On the Microsoft Windows platform, the Windows Communication Foundation (WCF) toolkit (which is built into .NET and therefore freely available) is an example of a toolkit that developers can use to build message senders and receivers. Similar toolkits exist, generally in open source form, for the Java platform.

Service Orientation

Service orientation is an approach that provides greater flexibility than the direct messaging style and promotes reuse of data and data sharing capabilities. This style implements a layer of abstraction between systems that manages access to the system. This abstraction layer is referred to as “loose-coupling.” Designing a system based on service orientation is referred to as “service-oriented architecture” (SOA).

“In [computing](#), a service-oriented architecture ... is a flexible set of [design](#) principles used during the phases of [systems development](#) and [integration](#). A deployed SOA-based architecture will provide a loosely-integrated suite of [services](#) that can be used within multiple business domains.

SOA also generally provides a way for consumers of services, such as web-based applications, to be aware of available SOA-based services. For example, several disparate departments within a company may develop and deploy SOA services in different implementation languages; their respective [clients](#) will benefit from a well understood, well defined interface to access them. [XML](#) is commonly used for interfacing with SOA services, though this is not required.

SOA defines how to integrate widely disparate applications for a world that is Web-based and uses multiple implementation platforms. Rather than defining an [API](#), SOA defines the interface in terms of protocols and functionality. An *endpoint* is the entry point for such an SOA implementation.

[Service-orientation](#) requires *loose coupling* of services with [operating systems](#), and other technologies that underlie applications. SOA separates functions into distinct units, or services, which developers make accessible over a network in order to allow users to combine and reuse them in the production of applications. These services and their corresponding consumers communicate with each other by passing data in a well-defined, shared format, or by coordinating an activity between two or more services.”¹⁷

¹⁷ See http://en.wikipedia.org/wiki/Service-oriented_architecture.

Service-oriented architecture has been broadly adopted as the recommended approach to designing and developing information sharing solutions. The justice and public safety community has developed and adopted a specialized form of SOA called the Justice Reference Architecture (JRA).¹⁸

The JRA is derived from the OASIS¹⁹ Reference Model for Service-Oriented Architecture 1.0. The OASIS work was developed to provide a conceptual foundation for creating a reference architecture. As intended by OASIS, the JRA builds on or expands from the OASIS model. One of the most significant additions made by the JRA is the inclusion of an XML-based data standard, the NIEM. SOA and the JRA represent the current nationally recommended approaches to developing information sharing capabilities for the justice and public safety communities. SEARCH recommends the adoption of this style of information sharing.

Summary of Architectural Styles of Information Sharing

Each of these styles has pros and cons. Generally speaking, the styles are listed above in increasing order of complexity and decreasing order of coupling (i.e., less coupling or more loose coupling). In effect, the earlier options may be easier to implement initially—and perhaps even cheaper—but the long-term costs are much higher and have a significantly lower degree of policy and technology agility.

— Patterns of Information Sharing

Push vs. Pull

There are two basic methods used to share data: push and pull. The **push** method requires the provider of data to identify and send the data that will be shared. The **pull** method requires the receiver of data to access the provider system and retrieve (and often identify and select) the desired data. Each method has advantages and disadvantages when used to share information, as previously discussed.

Query vs. Exchange

There are also two basic approaches to sharing information: The first approach is to share data by providing access to a system — this is usually referred to as **query access**. The second approach is to **transfer or exchange data** with another partner or system. This exchange approach enables a receiver to reuse the

¹⁸ The JRA is an information exchange solution designed to cut 80 percent of implementation time and costs for state and local justice agencies through reuse of established promising practices in IT architecture and design. See <http://www.it.ojp.gov/default.aspx?area=nationalInitiatives&page=1015>.

¹⁹ Organization for the Advancement of Structured Information Standards. See <http://www.oasis-open.org/home/index.php>.

data provided for subsequent processing within their environment. The exchange approach also enables a receiver to implement query functionality.

— Implementing Queries: Federated Query vs. Data Warehouse

The query approach can be implemented using either a federated query or data warehouse model.

Federated Query

The **federated query model** allows the user to access each participating system to search for, identify, and retrieve data. This model avoids the costs incurred to maintain a separate data warehouse but increases the load on the participating systems because all queries are distributed to all partner systems. It is often used in a “drill-down” environment where summary data are identified quickly, and the user performs additional queries to view more detailed data. Data are the most current because the user is accessing data directly on the source systems. In some cases, a federated query approach can be less complex to implement than a data warehouse. The use of federated query is not optimized for analytics, and often is slower in terms of response times, and also creates some added administrative complexity because users must be authenticated on each of the participating systems. This latter issue can be mitigated to some extent through the use of federated identity management.

Data Warehouse

The **data warehouse model** aggregates data from all participating source systems into one central database that is optimized for querying and analysis. It moves all of the query processing and user access control requirements onto this new system and relieves the participating systems from directly addressing and supporting these requirements. It provides quick response times because it is a resource dedicated to query processing and does not generate the high level of network traffic that occurs in a distributed query environment. This model requires the source systems to update the warehouse on a regular basis. This is typically done in batch mode at regularly scheduled intervals — hourly, daily, etc. — although message-oriented middleware and web service models can be used to provide real-time (event-driven) data updates. In a batch mode environment, data are only as current as the last batch submission of data. The data warehouse model requires system owners to allow another agency to control their data. These issues are usually addressed in governance agreements.

Both approaches require that data be standardized. In the federated query model, the source systems or data providers will typically transform the data into a common format or structure. Following the data warehouse model, the data can be transformed either by the source system or the warehouse itself. Once standardized, the data can be provided to the requestor in a consistent form.

Both approaches only address specific parts of overall information sharing requirements. The most significant strength of the data warehouse approach is the ability to exercise analytical capabilities against the entire warehouse, thereby enabling agencies to investigate and evaluate data from all available sources. The federated query approach could in theory provide similar capabilities but is not optimized to do so. Both approaches can be used to implement a query/response capability across multiple data sources. *Neither works particularly well for the exchange of information between systems to support workflow and data reuse.*

— Exchanging or Sharing Information

Point-to-point

Data sharing solutions have been typically developed using **point-to-point** connections between two agencies that reflected the exchange requirements of each agency. As the environment evolves and more partners are identified, the point-to-point environment becomes increasingly complex and difficult to maintain. Typically, there is a lack of standardization in the design of the exchanges as well as the methods of connectivity. One-off, custom solutions are developed to address the unique needs of each partner and each information exchange. The result is a “spaghetti” network of disparate connections and non-standardized exchanges.

Broker

Standardizing the exchange environment simplifies the long-term management of exchanges. The adoption of a standard environment in which to exchange information with all partners creates a more manageable and economical means of accomplishing this goal. Often the standard environment is referred to as a **hub** or **broker**. Middleware products provide proprietary methods of providing broker capabilities. Broker capabilities can also be implemented using open source products, called the “services environment.”

Enterprise Service Bus (ESB) is the term used to describe many broker implementations. Many ESB products have been developed using proprietary technologies, but others base their offerings on the open source standards and tools. The ESB or broker products provide a common environment and networking infrastructure which can be used to support a complex information sharing environment. The broker manages access control, ensures reliable delivery of messages, and provides security between systems and other infrastructure services. Using a broker as part of an information sharing solutions aligns with the design approaches and elements promoted as part of SOA.