

**WEB SERVICES TO
INTEGRATE THE
JUSTICE ENTERPRISE**



IJIS Institute

EMERGING TECHNOLOGY WHITE PAPER

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Matthew A. D'Alessandro, *Motorola* –
Committee Chair



John Crouse, *ACS Government Solutions* –
Committee Co-Chair



Fred A. Lengerich, *SAIC*



Sharad Rao, *Tetris Consulting*

Bob Slaski, *Nlets*



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INTRODUCTION

In the world of integration, there are a variety of technologies and methodologies that provide the capability to exchange information or data between systems. Determining the best solution is important, because choosing another can add risk, time, cost, and complexity to an already challenging endeavor. As integration technology matures and implementation becomes more widespread, trends are becoming increasingly apparent within the Justice and Homeland Security domains. These trends indicate that as more users implement integration technology and their use grows, it benefits the entire user community. One of these new technologies is called Web Services. Its use is becoming the de facto standard based on its adoption rate with other associated technologies and data standards such as middleware and the Global Justice XML Data Model (GJXDM).

Web Services are a set of standards that define how information from each agency application or system is packaged, in what way it can connect to other agency systems, and how it finds a service enabling the transfer to take place. This standardization permits existing agency applications and technologies to be readily plugged in or removed from the agencies enterprise with less effort than non-standardized, less efficient technologies and methodologies. In short, using Web Services can significantly reduce the time, effort, and cost required to provide integration capabilities throughout the integrated justice enterprise.

Web Services can be utilized when one agency desires to share information contained in at least one of their existing data applications or systems with at least one other agency system or application.

“Web Services can be utilized when one agency desires to share information...”

The use of Web Services varies by agency, but an example might be a law enforcement agency sharing arrest information with a prosecutor, a jail, probation, or court. Another example may include the court providing disposition information to law enforcement, the prosecutor, probation, or the jail. Regardless of the reason, the capability to share this information in a structured manner, using agreed upon standards and practices is a key component to make an integration program successful. Using Web Services reduces the risk, complications, and costs of the integration process of an enterprise by avoiding one-off application integration points between justice applications.

The set of standards associated with Web Services include:

- *Simple Object Access Protocol (SOAP)*—a transport level standard specifying how to package data in an XML message
- *Web Services Description Language (WSDL)*—a XML format that specifies how to describe interfaces for Web Services, so that other applications or services may access it
- *Universal Description, Discovery, and Integration (UDDI)*—a protocol that specifies how services are registered and discovered on the network
- *Hyper Text Transfer Protocol/encrypted (HTTP or HTTPS)*—a transport mechanism used to send information from one system to another.

This set of standards specifies the basic foundation technology for Web Services; namely, how Web Services can be deployed and made available to others. The interesting work is enabling Web Services to be combined or interact with one another to perform useful business functions. Web Service orchestration and choreography are the operations that make this possible.

This paper addresses the foundations of Web Services for integrated justice, the current standards for this technology, case studies of current applications of this technology, potential applications for Justice, Homeland Security, and Public Safety agencies, and the various vendor products available today.

WHAT ARE WEB SERVICES?

Web Services are software systems designed to support interoperable machine-to-machine interaction over the Internet as well as private intranets. Web Services communicate using messages to obtain access to information appearing in an eXtensible Markup Language (XML) form. Web Services are written to strict specifications or standards, enabling them to easily work together with similar components. And as a result, an increasing number of Web applications communicate with backend systems via Web Services. The more established standards within Web Services today are messaging, directories of business capabilities, and descriptions of technical services. Others that are evolving through a world-wide standards organization called the World Wide Web Consortium (W3C) include: standards for security, transactional consistency, and message reliability.

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Web Services represent an important evolutionary step to integrated justice projects, because they enable applications in different agencies and organizations to share information with each other without one-off programming efforts. As an example, imagine living in a typical U.S. house with different types of electrical wall-outlets, rather than the U.S. standard of two flat blade-prongs. If this were the case, every appliance manufacturer would need to provide a series of adapters to ensure the appliance will work requiring additional expense and time for adapters, storage, and use. However, with U.S. electrical standards for connections anyone can plug any lamp into any room. Similarly, Web Services would allow one Social Security Number (SSN) data format to be used for any application adhering to the Web Service standards the agency employs, hopefully GJXDM.

Once an organization makes the investment and commits time to implement Web Services, the integration of applications becomes simplified. Then, when it's time to implement information, it flows in an enterprise with little required effort. The alternative approach involves a struggle to incorporate each application or system's unique view of its data and communication methodology. According to Gartner, 30-40% of an IT budget is spent on the integration of data between applications. This effort is spent on integrating, transforming, and maintaining the data. With a common interface architecture such as Web Services this cost will be significantly reduced, because integration becomes standardized and not custom one-off projects.

The justice community is moving steadily towards a spirit of closer cooperation and increased data-sharing between agencies. Because of the increased demand, the capability to provide connectivity between

existing legacy systems quickly and efficiently is becoming more important. The movement towards widespread use of Web Services gives agencies the capability to share real-time data with more agencies, while potentially reducing risks and costs.

Web Services are written according to standards, with all parties working from the same basic component interface design. Organizations then add value and domain specific capabilities to the basic design to meet the needs of their users. For example, a state department of motor vehicles (DMV) can offer other systems the capability to query their driver's license and vehicle registration data. Web Services provide the basic data formatting and service-description operations for this kind of electronic relationship. The DMV could build on these basic features by providing specific data services to the users, such as a notification service. In addition, agencies can extend these capabilities to other stakeholders because they are built on standards.

Since Web Services provide standard mechanisms for interfacing an application to other applications (backend servers or Web applications), more systems developers can enter the market, which increases competition and can reduce prices. The competition among vendors also encourages more innovation in the products and services offered to customers. Moreover, basing systems on standards helps prevent being locked-in to a specific vendor or type of computer or software.

Web Services are still a work in progress. Some of the standards are relatively new and not fully tested and many of the potential business uses are still being identified. However, it is important for IT organizations to start planning for Web Services and to begin asking vendors for their plans to support them.

HOW DO WEB SERVICES WORK?

The standard elements of a Web Service are:

- *SOAP* – Defines the “envelope/payload.”
- *WSDL* – A special type of XML document describing how the payload is to be connected to other services (e.g., describes how an electrical plug is to mate with a wall socket).
- *UDDI* – A registry of services (e.g., telephone yellow pages. If a social security number (SSN) needs to be validated, a UDDI can provide a link to that capability).

Current and future applications need to ‘talk’ to other applications using Web Services to make the interoperability a “standard” function. Many of the vendors listed at the end of this document provide tools to support this building process.

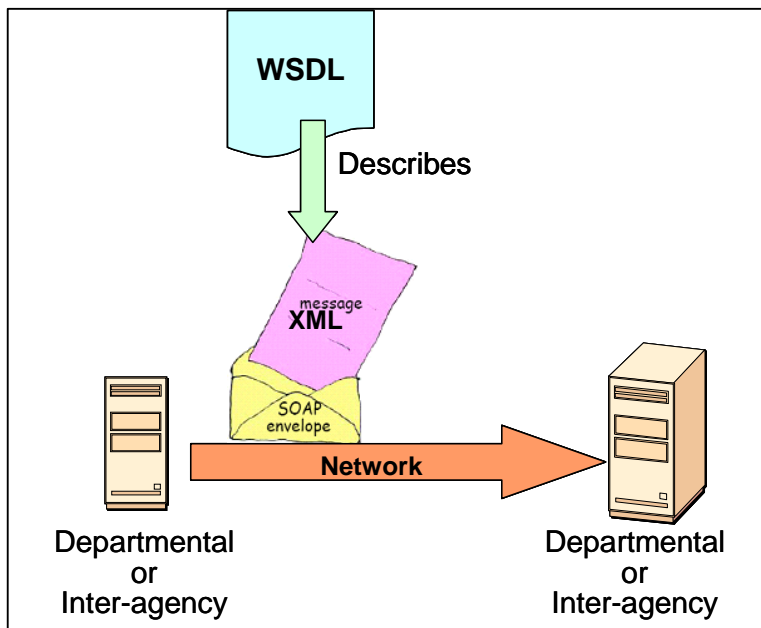
validate a SSN) uses its Web Services interface, makes a call (request) to the UDDI to ask for a SSN validation service, and the UDDI returns the contact information to the calling application. Much like the phone book gives you a phone number and not an actual person, the UDDI tells the applications how to get in touch with the requested service.

Once the application requiring the service has the contact information, the application “calls” the service, establishes a connection, and transmits the application data in a SOAP package.

If both applications (sending and the service) understand a SSN as an 11-character string using numbers and hyphens then everything is fine. If the requesting application is sending 11 characters using

hyphens and the service wants spaces not hyphens, then a translation operation is required between the requestor and the service. This translation is typically carried out by an integration or messaging broker. A messaging broker can also provide a variety of other capabilities and services.

Once systems are Web Service-enabled and talking the same language (e.g., SSN means 11 characters with hyphens), then applications and services can be inserted or deleted in a modular manner similar to Lego® pieces by plugging them in or pulling them out.



When two systems are Web Service-enabled, the mechanics of using Web Services are analogous to using your telephone yellow pages to get a service completed (e.g., calling a plumber). The application needing a service (e.g., to

Getting to this point does take some time and commitment, but the end results are nearly frictionless data-sharing.

HOW CAN WEB SERVICES BE APPLIED TO JUSTICE AND HOMELAND SECURITY APPLICATIONS?

While Web Services have been readily adopted by the commercial IT community, they are not as well established within the Justice and Homeland Security communities yet. Web Services are now being adopted in increasing numbers in the greater public sector and have the potential to simplify and standardize the process of justice systems integration in several areas. These include:

Lowering the cost of accessing data from applications

Justice Integration generally implies sharing information between agencies and, to a lesser extent, between applications within a single agency or organization. Web Services can reduce the time, complexity, and cost of establishing this type of data-sharing relationship by utilizing standard interface technologies and methodologies, rather than more customized interfaces. Utilizing standardized technologies, like Web Services, enables the reuse of a technology within a pre-defined construct that each interface point shares. The cost savings of a Web Services approach can be realized anytime an application (e.g., law enforcement records management, prosecutor and court case management, etc.) needs to share data with one or more other applications (e.g., pre-trial services, jail, probation, parole) or a user with an application (e.g., query from the division of motor vehicles, computerized criminal history, wants and warrants, sex registry, terrorist watch list, probation conditions, etc.). Web Services technology reduces costs by standardizing the interfaces to applications, thus reducing the time to integrate new applications or satisfy requests for data reporting.

Alternative to "one off" or custom interfaces

In the past, a mainstay in the integration of criminal justice systems has been the custom development of system-to-system interfaces. These interfaces required customized designs and extensive implementation efforts. They also required the cooperation of system "owners" which in many instances was not easy to obtain. Some were accomplished using proprietary application programming interfaces (APIs) or by accessing core systems directly bypassing application software. Changes to the systems at either end of the interface usually resulted in a breakdown of the exchange requiring the interface to be fixed manually.

Using the sharing examples provided above, Web Services allow for the creation of standard interfaces so that systems with the appropriate permissions can share data with others. This is particularly important in the deployment of "Best of Breed" integrated systems where each system can be selected based on its merits and not on its designed capability to share data.

Enforcement of data and security protocols

A byproduct benefit of the use of Web Services is enforcement of data management and security protocols. Most Web Service implementations involve a centralized service to define and enforce data standards (e.g., GJXDM), security, and privacy protocols. This makes management more efficient across the enterprise.

Reuse

It is normally more cost effective, timely, and involves less effort to have one service that passes data (e.g., Arrest, disposition, inmate status, etc.) or retrieves information for a given object or individual (e.g., SID), than an IT organization or each agency to have their own technology providing that capability. When Web Service standards are embraced, it eliminates or reduces the need to build multiple custom applications to perform the same function for each unique application-based technology or methodology.

Application agility

Process dynamics or statutory regulations periodically change the way applications need to interact with other applications (integration). When each application is unique in the way its data integration mechanics operate, the effort required of application vendors or in-house IT resources in implementing these requirements can be great. In comparison, Web Services can make each application more agile to changing business requirements. Since the integration capabilities are now loosely coupled with the application, the communication between applications is standardized and the business rules are centralized across the enterprise.

PROJECT EXAMPLES

The following examples are active programs implemented in the field as well as others in a planning or pre-production stage. These examples demonstrate how Web Services is becoming the de facto standard among justice and public safety agencies and how their use is expected to increase significantly in the next few years.

New York State Police DMV Project

The New York State Police had a mandate from the Office of Information Technology to replace the long unsupported bisync interface between the State Police and Department of Motor Vehicles (DMV). DMV data is the most critical information that troopers require and it must be available around the clock. The use of Web Services became an obvious choice because it was a sustainable technology that was being widely deployed.

As implemented, the three existing bi-sync connections were replaced with Web Services. The same information is exchanged, but now the information is exchanged at a much higher speed because the limitation of synchronous connectors is no longer a constraint. In this case, Web Services are being used to replace legacy communications with standard supportable technology. The new exchange capability was up and running quickly. It has been operational for a year without difficulty and currently handles tens of thousands of messages in peak hours.

In addition to developing the Web Services exchange, New York State redefined all of the transactions into XML using GJXDM. The implemented standard was defined by Nlets, the International Public Safety and Criminal Justice Information Sharing Network, which had developed GJXDM compliant specifications for public safety DMV information exchange under the Collaboration between American Association of Motor Vehicle Administrators (AAMVA) and Nlets for Driver License Exchange (CANDLE) project.

In another major program, the New York State Integrated Justice Advisory Board is in the process of implementing an integrated approach to providing access to criminal justice information. The Integrated Justice Portal project will replace, integrate, and enhance many existing components of the State's IT infrastructure including the New York Statewide Police Information Network (NYSPIN) and Division of Criminal Justice Services (DCJS) eJusticeNY systems.

Using open standards technology, users will realize increased productivity and a reduction in costs including the time currently spent in training to access existing systems on proprietary client hardware and software. Using evolving technologies such as eXtensible Markup Language (XML), Web Services, and portal technology, information will be presented in a more timely, accurate, and readable manner resulting in improved efficiency. For example, software and applications will be automatically updated and immediately available to all users.

Through the deployment of a standard browser-based criminal justice portal (e.g. the baseline access tool), users may take advantage of a continually evolving and enhanced suite of services. The portal will support the exchange of mug shots, images, fingerprints, driver photos, standardized DMV and criminal history data, file transfer data, and a variety of new integrated applications as well as the established applications and services.

Nlets Accelerated Information Sharing for Law Enforcement (AISLE) Project

Nlets, the International Public Safety and Criminal Justice Information Sharing Network, was faced with the need to upgrade the national law enforcement network. The network was proprietary and lacked support for newer, more efficient standards including XML. Under the Accelerated Information Sharing for Law Enforcement (AISLE) Project and with the support of the National Institute of Justice (NIJ), Nlets proceeded with the deployment of Web Services as an alternative to its exclusive, proprietary TCP/IP protocol. Nlets was able to readily establish a Web Services information exchange between the Microsoft .NET system used at Nlets and the IBM WebSphere system used by the State of Wisconsin. The AISLE Project has expanded to several states including Georgia and Tennessee who are using Web Services exclusively for all interstate law information exchange with Nlets. Each hour thousands of police requests are reliably exchanged using Web Services.

Nlets will be expanding Web Services to include the more recent Web Services standards from OASIS and to incorporate planned advances in the profiles developed by the Web Services Interoperability (WS-I) consortium. New Nlets partners are able to easily implement the Nlets Web Services interface. In addition, Nlets is seeing the advantages of Web Services standards as it looks to deploy image exchange on a national level. For more information, visit the following Web site at <http://www-306.ibm.com/software/ebusiness/jstart/casestudies/ats.shtml>.

Wisconsin Integrated Justice Information System (WIJIS)

Wisconsin's Justice Information Sharing Program received Federal Homeland Security funds to assist local law enforcement agencies with participation in the Justice Gateway pilot project. Under the terms of the grants made by the Office of Justice Assistance, each pilot agency will send a subset of local incident and arrest data to the Enterprise Services Bus (ESB) at the Wisconsin Department of Administration. The ESB will route the data to the WIJIS index using Web Services technology and the Global Justice XML Data Model (GJXDM). Indexed data from all participating agencies will be made available to authorized persons using a Web browser.

The pilots will serve as a test bed for WIJIS to evaluate Web Services and the security architecture necessary to securely share sensitive information over the World Wide Web. Based on the lessons learned through the pilots, WIJIS will develop specifications for a statewide system, identify and address information-sharing policy issues, and publish technology standards. Later additional grant opportunities will be announced for other law enforcement agencies to participate in a limited rollout of the Gateway system using the methodologies developed during the pilot.

VENDORS

A variety of companies are involved in the development of technology to support Web Services. In general, integration companies have embedded the tools for orchestration and choreography into their integration system, so there isn't a separate Web Service "building application." It is either part of, or an add-on to the integration offering. The following vendors each offer technologies and/or services related to the implementation of Web Services. Vendors listed in bold are full members of the IJIS Institute and a "*" indicates an affiliate membership.

- BEA Weblogic Workshop
(www.bea.com)
- Blue Titan
(www.bluetitan.com)
- Cape Clear
(www.capeclear.com)
- Fiorano Software
(www.fiorano.com)
- Fuego
(www.fuego.com)
- IBM WebSphere
(www.ibm.com)
- Iona
(www.iona.com)
- Intalio I n3
(www.intalio.com)
- KnowNow
(www.knownow.com)
- Magic Software
(www.magicsoftware.com)
- Microsoft Biz Talk Server
(www.microsoft.com)
- Quovadx QDX Platform V
(www.quovadx.com)*
- SAP
(www.sap.com)
- Sonic Software
(www.sonicsoftware.com)
- Sun WSCI Editor
(www.sun.com)
- TIBCO
(www.tibco.com)
- WebMethods
(www.webmethods.com)
- WRQ
(www.attachmate.com)

Analyst firms such as Gartner (www.gartner.com) and Current Analysis (www.currentanalysis.com) provide good coverage on this technology and vendors in this space.

LINKS TO MORE INFORMATION

- www.w3c.org or www.w3.org
- www.webservices.org
- US Department of Justice, Office of Justice Programs, Information Technology Initiatives
www.it.ojp.gov/
- Project 54:
www.project54.unh.edu
- Boston Globe Article:
http://www.boston.com/ae/theater_arts/articles/2005/05/22/for_police_word_from_the_wise_is_sufficient?mode=PF
- Washington Technology Article:
http://www.washingtontechnology.com/news/20_22/emergingtech/27310-1.html.