



Global Justice Information Sharing Initiative: Exploring Service-Oriented Architecture Registries for Justice Information Sharing



www.it.ojp.gov/global

- ▶ Learn about the U.S. Department of Justice's Global Justice Information Sharing Initiative (Global) and its pursuit of a Justice Reference Architecture
- ▶ Explore the concept of SOA and why it is important to the future of justice information sharing
- ▶ Delve deeper into *registries*—a chief component of Global's envisioned Justice Reference Architecture



GLOBAL SERVICE-ORIENTED ARCHITECTURE: TOWARD A BRAVE NEW WORLD OF JUSTICE INFORMATION SHARING

Information sharing is a long-standing practice among justice agencies. As society becomes more mobile, the importance of effectively and efficiently sharing data to secure our nation and improve day-to-day public safety grows exponentially. Technological advancements have been critical to the increased ability to share information. As we have moved from paper, telegraphs, telephone, and teletype machines to computers and wireless communications, the working partnerships and the types of data exchanged have been transformed. The arrival of the World Wide Web and its supporting technologies have spawned a brave new world of information sharing. This new world goes beyond exchanges among specific partners to embrace the whole of the justice community—including law enforcement, prosecutors, defense counsel, courts, probation, corrections—and a host of nontraditional justice partners, such as homeland security, fire, emergency services, health, education, transportation, and motor

vehicle licensing. In particular, the availability of Service-Oriented Architecture (SOA) points the way to not only developing an effective, efficient means to share information in a seamless and timely fashion but also to significantly increasing our data exchange capabilities while vigorously considering privacy and security concerns. Furthermore, the incremental nature of SOA takes the prohibitive “all or nothing” sting out of the proposition for justice and public safety decision makers. Public policymakers and justice system managers are critical to the success of the SOA—they cannot stand back and “leave it to the experts” but, instead, must become active participants in the design, development, and implementation of information systems. The U.S. Department of Justice's Global Justice Information Sharing Initiative is committed to providing decision makers with educational resources (such as this booklet), so they can intelligently add their voice to this exciting information sharing dialogue and pursuit of a Justice Reference Architecture.

PREFACE

Harnessing the promise of new technologies for the good of the collective justice community is no easy task. While the challenge is formidable, with the leadership and support of the Bureau of Justice Assistance (BJA) and Office of Justice Programs, U.S. Department of Justice (DOJ), significant inroads have been made. A large portion of these successes are due to the dedication of volunteer members of DOJ's Global Justice Information Sharing Initiative (Global) Advisory Committee (GAC).¹ Since 1998, practitioners from local, state, tribal, and federal justice entities have participated in this federal advisory committee to collaboratively address issues that have historically impeded effective justice information sharing.

Global's initiatives and activities, especially the development of information exchange standards, are derived from actual user requirements and have been driven from the "bottom up," based upon the business process problems of all justice disciplines. The development of information exchange standards through Extensible Markup Language (XML) began with the Global Justice XML Data Model (Global JXDM)² being adopted across the nation at all levels of government as



1 The GAC is a "group of groups," representing many independent organizations spanning the entire justice spectrum. Global's members are justice agency executives and policymakers; justice system planners and managers; justice information practitioners; and, most importantly, end users. This last group is vital since it distinguishes Global as an entity whose members are actively dedicated to the issue of information sharing, precisely because they continue to be producers, consumers, and administrators of critical justice and public safety information. More information is available at www.it.ojp.gov/global.

2 See Global Justice XML Data Model (Global JXDM) at www.it.ojp.gov.

a key justice standard.

Building on the momentum of the Global JXDM, in September 2004, the GAC unanimously recommended the report of the Global Infrastructure/Standards Working Group (GISWG), titled *A Framework for Justice Information Sharing: Service-Oriented Architecture (SOA)*³, for delivery to the U.S. Attorney General and BJA for appropriate action. By doing so, the GAC recognized SOA as the recommended framework for development of justice information sharing systems, adopted the report's action agenda for its activities to further the utility of SOA for the justice community, and urged the members of the justice community to take corollary steps in the development of their own systems.

The adoption of the SOA report reflected the belief of Global that an SOA approach was most likely to achieve its mission:

Any member of the justice community can access the information they need to do their job, at the time they need it, in a form that is useful, regardless of the location of the data.

Several things about this statement are important. First, the emphasis is upon access to information, not the origin of the data. Second, the focus is on the services that the user receives. Third, it expects that information sharing will cross agency, discipline, and government boundaries. Fourth, it recognizes that privacy and security are major considerations. This is an ambitious vision that requires an equally ambitious action agenda. It is also a vision that demands that justice managers and

3 Located at http://it.ojp.gov/documents/20041209_SOA_Report.pdf.

policymakers educate themselves on issues related to SOA.

Recognizing the potential and challenges of this architecture, Global is working to peel back the complexity of SOA for the justice world, much like they have been doing for several years with XML through the Global JXDM. The ambitious goal of Global is to create a Justice Reference Architecture. At a very high level, the Justice Reference Architecture consists of four pieces: standards (such as the Global JXDM for content), services, policies, and registries. This paper provides an executive briefing on **registries**.

SOA

The concept of large-scale justice information sharing (sometimes referred to as “integrated justice”⁴) has become a holy grail of sorts in the justice and public safety communities. While the laudable increase of information sharing relationships has brought us closer to the promise of enterprise-wide data exchange, in most cases, we continue to build information technology (IT) connections in the same old way: drop lines from point A to point B, execute interagency agreements or memorandums of understanding (MOU), and then contract all around. And, as long as there is a direct system-to-system connection and parties are willing to enter into an agreement, data access is granted. But this model is time- and resource-intensive; limited in scope, application, and efficiency; and approaching obsolescence in the face of increasing (and increasingly complex) information needs.

Fortunately, the advent of Web technology provides the means to achieve the elusive goal of enterprise-wide justice information sharing.

⁴ The concept represented by the phrase “integrated justice” is more appropriately represented by the term “information sharing,” stressing the act of data exchange as opposed to physical interlinking of systems. As such, this report uses “information sharing.”

In particular, the availability of SOA points the way to not only developing an effective, efficient means to share information in a seamless and timely fashion but also to significantly increasing our data exchange capabilities while vigorously considering privacy and security concerns. Furthermore, the incremental nature of SOA takes the prohibitive “all or nothing” sting out of the proposition for justice and public safety decision makers.

Conceptually, SOA is a distributed software model in which small pieces of application functionality are published, consumed, and combined with other applications over a network on demand. The difference from past integration efforts is that the business processes and information sources remain functionally autonomous—the “owner” of the data retains control of the information. SOA is the ideal framework for developing effective justice



information sharing systems because it is uniquely suited to accommodate the distributed, heterogeneous nature of the American justice information sharing landscape. SOA tolerates diversity and allows for the dynamic “many-to-many” information

exchanges that justice, public safety, and homeland security agencies require. It shifts the focus to providing and gaining access to “services” to get the *right information* to the *right person* in the *right place* at the *right time*.

The concept of a *service* is also useful for describing which business processes need to

be integrated. The key is what the receiving organization does *after receipt* of the message. For example, a prosecutor may send out a message with a charging document. Upon receipt of that message, 1) a court may initiate a case, 2) a law enforcement agency may change the status of a case, and 3) a criminal history repository may alter a record. The *same information* is exchanged in all three cases, but the “business” usage is different. In this example, it may literally be the same “service” sending the data, but different “services” receiving. On the other hand, the originating agency may have different business requirements for the different receivers of the data. Even though the information *content* of the message may be the same, the services from the originating agency should be considered different.

REGISTRIES

At the heart of *A Framework for Justice Information Sharing: Service-Oriented Architecture (SOA)* is the assumption that software components (services) will be shared. This requires not only standard policies (business rules) and services but also a means for locating and accessing the relevant components. Solutions to this requirement range from simple Web site links to a sophisticated system of federated registries and repositories.⁵ These are sites where the reusable policies, standards, services, and documentation can be located. For instance, if the appropriate justice association develops a standard service to publish outstanding warrants, it can make the service definition available for others to use in creating their own outstanding warrant service. Once the registry mechanism has been embraced by the justice community, this approach of utilizing reusable software will ultimately reduce the cost of deploying new services and speed their time to market.

⁵ “Registries” and “repositories” are often used interchangeably, the distinction between the two is explained later in this report.

REGISTRY BASICS

The numerous complex issues surrounding the creation and operation of public registries for the justice community will have to be addressed. One of Global’s principles in developing justice-related standards is to harness standards already created and accepted in related endeavors. In the context of the registries discussion, the two standards of particular interest are Universal Description, Discovery, and Integration (UDDI) 3.0 and Electronic Business XML (ebXML) Registries 3.0. Global can leverage these already-established technology standards for developing justice registries.

A registry facilitates information sharing by either housing reusable software and services (for example, the previously mentioned charging document) or containing instructions for accessing such software—a sort of “services yellow pages.” In this context, submitted content for a registry includes, but is not limited to, XML schema and documents, process descriptions, business rules and policies, and software components. The registry securely stores both XML and non-XML artifacts, as well as details (known as “metadata”) about the artifacts themselves. The file system or database that holds registered objects is known as a “repository,” while the part of the information system that maintains the metadata and provides services for the registered objects is known as a “registry.”

Registries—although not technically *necessary* for an SOA⁶—can play numerous supporting roles in a Justice Reference Architecture. They are viewed by GISWG as an important component in the overall justice architecture. For instance, registries enable:

⁶ The issue of “registry or no registry” is discussed later in this document.

- A service provider organization to register its organization information, its services information, and the artifacts related to the services.
- A service consumer organization to browse any registered organization's services information.
- A service consumer organization to download the service information and related artifacts.
- A service provider and the consumer organizations to thereafter make agreements on doing business with one another.

REGISTRY “RULES OF ENGAGEMENT”—HOW TO PLAY IN SOA

Using registries to facilitate justice-related information sharing requires that the entities involved in accessing and distributing the data follow what are known as *rules of engagement*. These rules are a vital piece of the puzzle, and ensure that all business regulations and contractual obligations are fulfilled and applied consistently throughout the system. For example, the data they govern often demand specific security and privacy considerations, and the transactions they regulate are complex, becoming even more so as increasing numbers of constituencies participate in the system.

Creating SOA rules of engagement often includes the need to define a classification tree for participating organizations and services as the basis for the security rules applied to the system. Ultimately, these security policies are defined in the registry specification. Fortunately, enhanced security management services are supported in the current generation of registries. The beauty of the registry approach to security—echoing the beauty of

SOA in general—is that such advanced features can be enabled incrementally.

Rules of engagement are integrally involved with *rules regarding content ownership* that must be sorted out prior to deployment. These, too, can be handled in a variety of ways. For instance, a participating organization may own the service content and provide the service. This model is used frequently in the business-to-business (“B2B”) environment. Another model is a situation in which a third-party agency may own the service content and consume the services from other organizations. This model is used when various organizations report criminal history to a central repository.

A third model is a federated registry. In this model, any registry can create a federation and every registry is equal. In justice practice, the culture of local autonomy is best supported by a federated structure. However, some service dependencies will need to be appropriately managed by a federated governing structure. Repositories can also enforce certain government mandates, such as Global JXDM compliance, as a validation function of their content management services.

FEDERATED VS. CENTRALIZED REGISTRIES

Current technologies allow systems to be distributed throughout the world yet appear to the user as a single system in a single location. This provides essential redundancy and reliability, especially in the case of mission-critical applications where system failure could mean the difference between life and death. This has far-reaching implications for the application and management of a Justice Reference Architecture. Significant among them is whether the justice community should employ “federated” or “centralized” repositories. There

are a number of advantages and disadvantages to each approach.

Employing a centralized registry means that a single entity or organization can assume responsibility for its maintenance and care. This provides a single point of contact, and it is more likely that policies will be applied consistently across the registry system. It provides for tighter integration of the security model.

There are, of course, potential problems with this model. With a single entity responsible for the registry, sustainability must be carefully addressed through long-term funding commitments or usage tariffs. Further, justice and public safety organizations may not trust a single entity to be responsible for such a mission-critical system. This, in turn, may lead to slower buy-in by system operators, reducing utility of the system.

A centralized registry also means a single point of failure, so appropriate measures to ensure its reliability and availability through business continuity planning is a must. The registry operator also has an obligation to avoid disrupting existing local systems. Thus, a registry should not upgrade its service version too frequently. When such upgrades do occur, a grace period should be provided before old services are decommissioned. This entails providing notifications about any services change to all subscribers and handling the management of multiple versions of the services that may exist from the same service provider.

Likewise, distributed registry management has points that recommend its use. Since a variety of entities and organizations must cooperate to implement this type of system, trust and a stronger sense of community are automatically engendered among the participants. There is no single point of failure for management breakdown, and this registry approach may

achieve quicker buy-in by users. In addition, funding for maintenance is distributed across many entities, allowing system continuity if any single entity or organization has to remove a particular server because of financial burden.

On the other side, distributed registries provide the potential for inconsistent policies to be employed across the federated system. Although this problem can be mitigated by extensive documentation of policies and procedures, it remains a significant operational problem. Nevertheless, it is most likely that a federated approach to justice registries will prevail in the near term because of the decentralized governance structures that exist.

INDUSTRY PRODUCT MATURITY

Even though most implementations of registries are only in the pilot stage, industry support and product availability are growing. In particular, ebXML registry products are emerging in three areas: registries/repositories, support for existing products, and developer tools.⁷

Both UDDI and ebXML registry/repository software are already available both commercially and through open-source channels. For example, at least five commercial and three open-source ebXML registry products are available now. Many of these products are in their first version, so any product being considered for implementation should be closely examined for functionality and stability. Major software development tools are beginning to include appropriate support for standards-based registry products.

As previously mentioned, many products

⁷ The list of products on the Web site provided below is only for example and is not considered exhaustive by any means. Inclusion in a list of products is not to be construed as an endorsement by Global, any of the participants in Global, the U.S. Department of Justice, or any other entity or organization. For more information on ebXML products that are available, visit www.ebxml.org.

are in their first release, so caution must be demonstrated in implementation planning. The surest way to success is to have clearly defined requirements before any product is examined and a clearly defined test suite to ensure that a selected product actually meets those requirements.

WHY TRY SOA REGISTRIES NOW?

Implementation of SOA through registries is not a silver bullet that will solve information sharing issues among the justice and public safety communities. Current implementation plans for SOA using UDDI or ebXML registries and repositories anticipate 12 to 18 months for the pilot phase and 5 additional years for full SOA implementation.⁸ Because of the required cultural changes and funding cycles, it may take even longer for full implementation across the justice and public safety enterprises. This brings up an important point: registries are not *necessary* to implement SOA. Therefore, the question becomes, “Why try SOA registries now?”

One answer is that registry security is not linked to data system security. The registry keeps track of what security procedures are used to access an information sharing service, but it does not provide actual access to services. Users cannot access data or services unless the terms of the required business rules and policies have been met. This means that system owners maintain control of their data and services security. Thus, it is easier to provide access to valuable information and services at a national level. Because of this flexibility, registries have significant emerging industry support. If a structured approach is followed in implementing a registry, it can “scale up” as users require.

Of course, a registry is only as useful as the services registered. They also require start-up investments. So, registries inevitably start out being limited in scope. The initial registration of services will need to be encouraged (perhaps through ties to grant funding). Patience will be required to see the benefits. More importantly, if registries are implemented without a structured plan, an inadequate system will be the likely result.

Registries require concentrated effort, long-term vision, and planning. The return on investment may not be immediately apparent, but the long-term payoff will be a significantly more flexible and robust Justice Reference Architecture that will better meet the needs of the justice and public safety professionals—and all the people they serve.

⁸ See www.ebxml.org/case_studies/NHS-ebMSG-casestudy-041206.pdf.

ABOUT GLOBAL

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

Global is a “group of groups,” representing more than 30 independent organizations, spanning the spectrum of law enforcement, judicial, correctional, and related bodies. Member organizations participate in Global out of shared responsibility and shared belief that, together, they can bring about positive change in interorganizational communication and data sharing.

The Global Advisory Committee (GAC) advises the nation's highest-ranking law enforcement officer, the U.S. Attorney General. Global aids its member organizations and the people they serve through a series of important initiatives. These include the facilitation of the Global working groups; development of technology standards, such as the Global JXDM; creation of documents on data sharing issues, such as the *National Criminal Intelligence Sharing Plan* and *Privacy Policy Development Guide*; and the dissemination of information via the Global Web site.

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