The Global Justice Reference Architecture (JRA) Specification

Working Draft V 1.4

by
The Global Infrastructure/Standards Working Group

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Acknowledgements

The Global Justice Reference Architecture (Global JRA) was developed through a collaborative effort of the Global Justice Information Sharing Initiative (Global), Office of Justice Programs (OJP), U.S. Department of Justice (DOJ).

Global aids its member organizations and the people they serve through a series of important initiatives. These include the facilitation of Global Working Groups. The Global Infrastructure/Standards Working Group (GISWG) is one of four Global Working Groups covering critical topics such as intelligence, privacy, security, and standards. The GISWG is under the direction of Tom Clarke, Ph.D., National Center for State Courts. The GISWG consists of three committees: Management and Policy, Service Interaction, and Services.

Although this document is the product of Global and its GISWG membership, it was adapted primarily from the technical reference architecture developed by the state of Washington, and sincere appreciation is expressed to Mr. Scott Came, State of Washington and SEARCH, The National Consortium for Justice Information and Statistics, for his guidance and leadership. In addition, parts of the architecture were derived from the Organization for the Advancement of Structured Information Standards (OASIS) Reference Model for Service-Oriented Architecture 1.0 (SOA-RM). Other major contributors include the OASIS Court Filing Technical Committee, OASIS SOA-RM Technical Committee, and the Messaging Focus Group.

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How to Use This Document

Policymakers, Executives, and Decision Makers

Global is committed to providing Service-Oriented Architecture (SOA) resources, such as this document, to local, state, regional, tribal, and federal justice and public safety organizations. As additional resources become available, these materials will demonstrate the value of the architecture to the stakeholders in a way that is targeted to their particular needs.   Other planned resources include strategy, executive summary, case studies from early implementers, management and policy, and other planning briefings, which will be targeted towards managers, chiefs, and executives.

For the purposes of this document, Global has selected a distinguished group of technical and domain representatives from a group of skilled peers who have volunteered to develop this material as a starting point in establishing the Global Justice Reference Architecture (Global JRA).

Keep in mind that the sections in this document referencing the conceptual diagram, high-level components, and relationships establish definitions that are intended for use by technical architects and project managers who are responsible for identifying all the elements necessary within their jurisdiction to implement SOA. **This document is intended as a formal and complete architectural specification for people with previous knowledge of technical architecture, service-oriented architecture, and supporting industry standards (such as Web services).**

Project Managers, Architects, and Technologists

This report is intended as a resource for a technical audience, including Global Justice XML Data Model (Global JXDM) and National Information Exchange Model (NIEM) implementers, architects, developers, system integrators, and other justice and public safety technical practitioners. It provides the background and concepts— a strong foundation—required for the implementation of SOA. The Global JRA is a new term coined for the justice community, and it is derived from the OASIS Reference Model for Service-Oriented Architecture 1.0 (SOA-RM[1]).   The reader should refer to the SOA-RM for more detailed information about many of the concepts in this document. JRA is intended to facilitate your SOA implementation by establishing a common language that can be used to exchange data with partner organizations.

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[1] http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf

Executive Summary

This document states a set of requirements for justice interoperability and then describes the Global JRA (concepts, relationships, and high-level components) Specification that satisfies those requirements. The document then illustrates the architecture through a set of actual scenarios. Finally, the document provides an initial elaboration of some of the concepts and components in the architecture. (This section will be significantly expanded in future versions.)

Introduction

Global's SOA Initiative

On September 29, 2004, the Global Justice Information Sharing Initiative (Global) Advisory Committee (GAC) unanimously adopted **SERVICE-ORIENTED ARCHITECTURE** (SOA) and the recommendations in the report titled *A Framework for Justice Information Sharing: Service-Oriented Architecture (SOA)*.

Global provides support for SOA by:

- Recognizing SOA as the recommended **FRAMEWORK** for development of justice information sharing systems;
- Promoting the utility of SOA for the justice community; and
- Encouraging the members of the justice community to take these recommended incremental steps in the development of their own systems.

Global's approval was based on the understanding that SOA is an approach that is most likely to result in an infrastructure that will support its vision of how information should be shared among the justice community.   If SOA is to be used successfully as the framework for justice information sharing **ARCHITECTURE**, Global must play a proactive leadership role in several areas.   The development of the **GLOBAL JUSTICE REFERENCE ARCHITECTURE** was based on the following actions recommended by Global.

- Incorporate SOA into the activities of all of the Global Working Groups. SOA raises issues for security, privacy and information quality, and intelligence that will be given explicit attention and treated as part of a broad initiative.
- Encourage the creation of a mechanism for drawing together the experiences and lessons from the field.
- Reach out to existing national systems to incorporate their efforts into the design of an overall strategy.
- Address the following six issues as priorities—services, standards, interagency agreements, registries, security, and privacy and data quality—because they will be a major part of the agenda for the next set of Global activities.
- Develop a multitiered strategy for the public sector to influence standards. It will include encouraging the creation of a public process (as it did with XML), taking part in industry groups that are developing standards relevant to justice (e.g., OASIS), and developing partnership processes with industry and other public entities.

An Interoperability Strategy

Solving interoperability challenges continues to be a significant problem and a high priority for the justice and public safety community. There are approximately 100,000 justice agencies that have the critical need to share information across their various information systems, and this variety creates multiple layers of interoperability problems because hardware, software, networks, and business rules for data exchange are different. The need for information sharing has led to this interoperability strategy and the Global JRA.

The strategy for developing JRA involves many steps. This paper details some highly technical and abstract concepts. Understanding these concepts may require significant effort from the reader. Though it may seem strategically questionable to place such a high hurdle at the beginning of a multistep process, doing so actually creates a flexible vocabulary and conceptual framework that will enable the desired interoperability to flourish. Additionally, subsequent steps that will build from this framework will be incrementally more concrete, and will ultimately lead to actual implementation specifications that can be used by practitioners in the field. Global believes that this dynamic interoperability strategy will help to prevent incompatibilities, guide vendors and organizations on how to fit components together, and facilitate communication and interoperability among disparate communities.

Global's strategy for JRA, like other work that has preceded it, follows a five-step process:

Step One: Agree on common concepts
Step Two: Agree on the relationships and deliverables
Step Three: Assign the work
Step Four: Produce the deliverables
Step Five: Revise the deliverables

As an example, when the Global JXDM project started it had a small set of limited solutions. Through much iteration, Global JXDM has been expanded and refined and addresses a successively larger set of justice domains.

Consensus on the OASIS Reference Model for SOA

One of the justice requirements is to create a common language for talking about architecture across major domains. For instance, it is currently difficult for emergency management personnel to talk to justice personnel about how their respective systems might share data beyond the content standards issue because their ways of communicating about architecture are so different.

155 After considerable discussions among the stakeholders, Global adopted the
156 Organization for the Advancement of Structured Information Standards (OASIS)
157 Reference Model for Service-Oriented Architecture 1.0 (SOA-RM). OASIS has
158 approved this standard reference model for describing different architectures using
159 comparable, vendor-neutral language. Global is adopting the OASIS framework for
160 describing its architecture and holding conversations with other domains.

Creating the Global JRA

162 It is important to note that SOA-RM provides a conceptual foundation for not only
163 the justice community, but for any domain to create a **REFERENCE ARCHITECTURE**.
164 JRA builds on the SOA-RM concepts by specifying additional relationships and
165 defining and specifying these adopted concepts.

166 Although there is no perfect solution, and since there is a need to start somewhere,
167 SOA-RM is recommended as the best place to start Global's SOA work efforts.
168 Global began by mapping the SOA components, documenting and leveraging the
169 work that has been already done—like the Global JXDM—and, finally, identifying
170 and filling the gaps.

> **Justice Reference Architecture is derived from the OASIS 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 Global JRA builds on or expands from the OASIS model.**

179 Specifically, Global is developing a modular architecture that cleanly and
180 appropriately identifies and separates technical and governance layers so that
181 standards can be developed to improve interoperability.

What Is the Global JRA?

183 This section defines the Global JRA and explains why a reference architecture is
184 useful. Keep in mind that there are potentially many justice reference architectures,
185 but that the Global JRA focuses entirely on SOA for the justice and public safety
186 community. Out-of-scope components and other considerations are listed on page
187 40.

JRA is an abstract framework for understanding significant components and the relationships between them within a Service-Oriented Architecture. It lays out common concepts and definitions as the foundation for the development of consistent SOA implementations within the justice and public safety communities.

The Global JRA is a description of the important concepts in a justice information sharing architecture and the relationships between those concepts. The Global JRA also identifies, at a high level, the kinds of "components" (software systems, hardware infrastructure, policies, practices, intersystem connections, and so on) necessary to bring those concepts to life in a particular context. The Global JRA is generally not specific enough to govern the implementation of any individual software system implementation. Rather, it is a framework for guiding implementations in general, with the aim of standardizing or harmonizing certain key aspects of those implementations to support reusability or interoperability.

It is important to note that at this time the Global JRA is not complete. Many sections of this document are still under development, but the document does attempt to identify the necessary concepts, relationships, and components that will require further elaboration and/or implementation.

Architecture Requirements

This section documents the business requirements to be addressed and satisfied by the Global JRA.   In future revisions, this section will be changed from requirements to guiding principles and goals.

As previously described in the Introduction, the justice world has close to 100,000 justice agencies, and most of these are very small and have few information technology resources. They use different applications, hardware, and networks that have diverse topologies and interoperability capabilities. Nonetheless, the Global JRA must reflect the influence of the following factors, representing the key characteristics of the justice and public safety environment.

Requirement 1—The Global JRA must recognize innumerable independent agencies and funding bodies from local, state, tribal, and federal governments.

For anyone connected to the justice community, this requirement is self-evident. One factor has not changed throughout American history: the business of justice is largely the province of local, state, and tribal government. The independence and number of entities that need to share justice information is almost overwhelming. Certainly, it is beyond the ability of existing conceptual frameworks, computer models, financial resources, or jurisdictional authority to create an integrated network using traditional technology. SOA, however, can be a meaningful bridge. A quote from SOA literature makes this fit clear: "Designing for SOA involves thinking of the parts of a given system as a set of relatively autonomous services, each of which is (potentially) independently managed and implemented, which are linked together with a set of agreements and protocols into a federated structure." **[Sholler]** "Autonomous," "independent," "agreements," and "federated" capture the environment for justice information sharing.

Requirement 2—The Global JRA must accommodate information sharing across agencies that represent divergent disciplines, branches of government, and operating assumptions.

It is difficult, if not impossible, to define precisely the boundaries of the justice community. The obvious list of participants—law enforcement, prosecution, courts, defense counsel, probation, and corrections—is only the beginning.   Accurate, timely, and appropriate justice information sharing among the entities is necessary for effective apprehension, prosecution, adjudication, and punishment of an offender. However, these are only some of the objectives.

This same information, or portions of it, are necessary to meet the business requirements of related justice, public safety, and homeland security agencies. For example, this information is required to regulate the sale of firearms; complete

244   criminal background checks of employees at schools, child care services, and elder
245   care facilities; identify aliens who have been convicted of crimes or have entered the
246   country illegally; notify the local community of the release and location of sexual
247   predators; prevent training in the operation of aircraft by aliens or other designated
248   individuals who may present a risk to aviation and national security; do background
249   checks of those transporting hazardous materials; or create information models to
250   provide information and predict the spread of disease and its effects, and decide on
251   countermeasures for potential health epidemics like the avian flu.

252   The events of September 11, 2001, resulted in the creation of the
253   U.S. Department of Homeland Security (DHS) with its constituent agencies, such as
254   the U.S. Citizenship and Immigration Services, U.S. Customs and Border Protection,
255   and the U.S. Coast Guard. September 11 also elevated the importance of
256   information sharing between and among public safety agencies such as fire,
257   emergency medical services, and other first-responder organizations.

258   The list would not be complete without the recognition of the numerous entities
259   outside of the justice and public safety communities—such as schools, child care
260   services, transportation, and licensing agencies—that need critical justice-related
261   information to perform daily business activities, such as hiring new personnel,
262   approving gun purchases, or granting professional licenses.

263   Finally, the list of relevant constituencies also includes the public, who expect greater
264   accountability and access to justice information that is considered sensitive or
265   protected by privacy laws in some settings (e.g., state criminal history records in
266   many state repositories and the FBI system), while viewed as public record in others
267   (e.g., criminal history record information in the courts). Increasingly, the public also
268   expects that this access be automated and online.

269   The diversity of justice information consumers carries an attendant consideration:
270   different types of users have different requirements. A judge making a sentencing
271   decision has more time for their task—and a less expedited need for response to
272   inquiry—than an officer on the scene requiring instant access to succinct information.

273   The purposes also vary. For example, it is one thing if the primary objective is to
274   validate the identity or status of an individual (e.g., a law enforcement officer
275   communicating with the Department of Motor Vehicles to check on a driver's
276   license), but another when an exhaustive search for information is required (e.g., a
277   probation officer conducting a pre-sentence investigation of a convicted offender).

278   Different sources also mean differences in expectations about who can use what
279   information. Privacy and data quality issues, which are demanding enough when
280   dealing with a single information system, grow exponentially when dealing with
281   different disciplines. It is one thing to share the records of a criminal sentencing
282   hearing held in open court; it is quite another when dealing with health records or an

283 ongoing criminal investigation. Incomplete or inaccurate data may be an annoyance
284 if the task is to identify leads for subsequent investigations; they are a different issue
285 entirely if they prohibit one from getting a job, traveling on an airplane, or lead to
286 incarceration. Working documents in one setting can become dispositive evidence in
287 another.

288 What this means is that the information system design cannot begin with a clear
289 definition of the boundaries of the organization. Nor can we assume that all of those
290 who participate share a common set of objectives or an understanding of the
291 process. On the contrary, the information system design must assume diversity, even
292 conflicts, in the operating procedures and objectives of the participating
293 organizations.

294 **Requirement 3—The Global JRA must be able to accommodate an**
295 **infinite range of scales, from small operations with few participants in a**
296 **rural county to national processes that reach across local, state, federal,**
297 **and even international boundaries.[2]**

298 The context for information sharing is not the same everywhere, and the scale will
299 depend upon the objectives and the geographical setting. It is one thing if the
300 objective is to move cases quickly from investigation to arrest through adjudication in
301 a rural county where all of the participants know each other and have ongoing
302 contact on a personal level. It is quite another thing if the objective is to share
303 information about warrants between law enforcement and the judiciary in a large
304 state on a real-time basis. And it is different still if the context moves to a national
305 level, and the objective is to share information among many local, state, tribal, and
306 federal law enforcement and health agencies about a reported health epidemic.

307 The resources required to implement advanced justice information sharing
308 architectures will come from many independent sources, the largest body of which
309 will be local. It is safe to assume that the funds will be spent to meet the immediate
310 needs of the entities within the funding source's jurisdiction and not as a result of
311 priorities that are provided by a state or national plan. An approach to infrastructure
312 design that cannot be adapted to the different scales without losing its internal
313 integrity will quickly be marginalized.

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[2] For clarity, we have changed the original language in the documents to fit the current terminology
that is based on the OASIS and JRA work efforts. This current work is based on the requirements
from the document titled, A Framework for Justice Information Sharing: Service-Oriented
Architecture (SOA), December 9, 2004, which was written by The Global Infrastructure/Standards
Working Group.

Requirement 4—The Global JRA must be able to accommodate data sources that differ widely in software, hardware, structure, and design.

The history of efforts to develop integrated information systems among local criminal justice agencies around a single hardware and software platform is large and filled with many disappointments. When the focus shifts to the state and national level, the success rate becomes even smaller and is largely populated by single-purpose efforts. The explanation for this phenomenon is relatively simple: technology investment decisions are made by funding sources with their own tax base, budget cycle, and spending priorities. The result is that information system development among local, state, tribal, or federal justice community entities rarely occurs in concert.

The reality is that no infrastructure development strategy can assume that all participants will be at the same point in the technology cycle. To paraphrase: new technologies are important, but legacy systems will always be with us.

Requirement 5—The Global JRA must reflect and incorporate the lessons and developments of the private sector.

It often surprises the justice community to learn how much of the technology needed to share information is common to the private sector as well. When you think about it, only parts of the data and the transaction definitions are unique to the justice world. The several other technical layers in a transaction that provides a service are driven by open standards defined by private industry and implemented in their tool sets and products. The justice community must learn how to incorporate and leverage private industry.

The Global process and the projects sponsored by it must take these powerful trends in the private sector into account. The justice community can have some influence on such decisions, even in the private sector, by more fully participating in the open standards bodies that decide what will be proposed to the market for implementation. Often, such participation and collaboration will educate us on how to develop and/or reuse the standards without needing to invent something new and unique for our business problems. And, as Global puts together an agenda for progress, lessons learned are provided from initiatives that have failed as well as succeeded. These discoveries and lessons learned from the private sector will save us money and facilitate the sharing of critical data in ways that increase public safety.

Requirement 6—The Global JRA must be dynamic and capable of evolving as the information sharing requirements change and the technology is transformed.

The operational requirements of members of the justice community are in constant change. The events of September 11 have elevated intelligence information to a leading priority for law enforcement; the rise of domestic violence cases has expanded the judiciary's need to reach out to the family services community; the increased mobility of the population has complicated probation's efforts to monitor offenders; and the spread of AIDS has put a premium on health management by corrections administrators. An infrastructure design that cannot adapt to an evolving definition of the boundaries and critical components of the justice community will, before long, become irrelevant.

Requirement 7—The Global JRA should leverage open industry standards where possible.

The justice environment will benefit from the stabilization of standards as the basis for an overall approach to interoperability among large and diverse organizations. The evolution of open industry standards for systems integration has reached a point where these standards will facilitate interoperability. Many prominent programming languages, software development environments, packaged applications, and integration platforms/tools support the standards. Although some common integration needs are met by competing standards, the number and significance of competing standards continue to shrink.

Requirement 8— The Global JRA must support marketplace diversity.

The marketplace for integration products is highly diverse and is likely to remain so for the foreseeable future. Support for Web services standards, key integration capabilities (such as transformation, content-based routing, and collaboration), and off-the-shelf adapters for applications (such as Enterprise Resource Planning [ERP] packaged applications) exist from a variety of vendors.

Requirement 9— The Global JRA should use a service-oriented design philosophy.

Requirement 10— The Global JRA should be driven by business need.

Requirement 11— The Global JRA should derive service requirements from business process requirements.

Requirement 12— The Global JRA should preserve data control by the source organization.

382 **Requirement 13— The Global JRA should minimize dependencies among**
383 **justice business processes and supporting information systems.**

384 **Requirement 14— The Global JRA should treat services as reusable**
385 **assets to be shared beyond the original context as required.**

386 **Requirement 15— The Global JRA should support business agility as the**
387 **fundamental business requirement.**

388 **Requirement 16— The Global JRA should be developed in an iterative**
389 **way.**

390 **Requirement 17— The Global JRA should evolve indefinitely in response**
391 **to changing business requirements.**
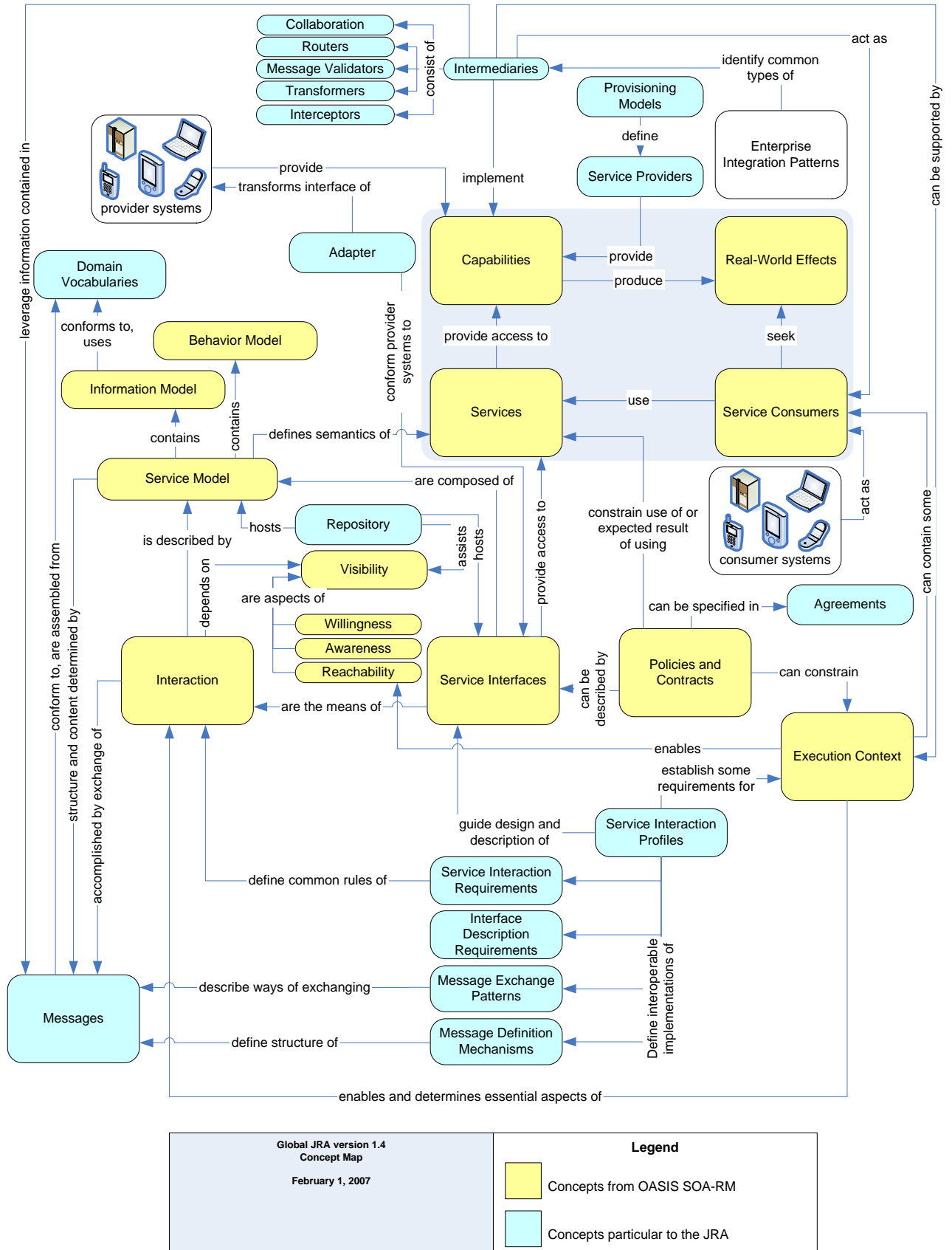
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The Global JRA

Graphical Overview

The following diagram depicts the concepts, high-level components, and relationships in the Global JRA specification version 1.4. These elements are described in detail in the following sections.

Global JRA version 1.4
Concept Map

February 1, 2007

Legend

Concepts from OASIS SOA-RM

Concepts particular to the JRA

Concepts and Relationships

The following sections describe the concepts, components, and relationships depicted in the diagram on the previous page.

OASIS Reference Model for Service-Oriented Architecture

The Global JRA depicted in the diagram above (and defined in this document) adopts and builds on the OASIS SOA-RM.

The SOA-RM defines its purpose as follows:

> "A **REFERENCE MODEL** is an abstract framework for understanding significant relationships among the entities of some environment. It enables the development of specific reference or concrete architectures using consistent standards or specifications supporting that environment. A reference model consists of a minimal set of unifying concepts, axioms, and relationships within a particular problem domain and is independent of specific standards, technologies, implementations, or other concrete details." (**SOA-RM**, p. 4)

> "The goal of this reference model is to define the essence of service-oriented architecture and emerge with a vocabulary and a common understanding of SOA. It provides a normative reference that remains relevant for SOA as an abstract and powerful model, irrespective of the various and inevitable technology evolutions that will impact SOA." (**SOA-RM**, p. 4)

While the SOA-RM is a powerful model that provides a vendor-neutral, open-standard definition of service-oriented architecture, its abstract nature means that further work must be done to create a reference architecture. This work should include the definition of specific standards, guidelines, and recommended infrastructure necessary to elaborate and make actionable the concepts in the SOA-RM. It should do this in a way that satisfies the goals and requirements of the enterprise creating the reference architecture.

The Global JRA is just such a reference architecture, intended to satisfy the goals and requirements of justice information sharing by identifying specific standards, guidelines, and infrastructure requirements for any group of justice partners interested in sharing information among themselves.

In the Global JRA diagram, OASIS SOA-RM concepts are shaded yellow with a dashed line as the border. Concepts and components particular to the conceptual architecture defined by this document are shaded light blue with a solid border. Relationships between concepts (indicated by arrows) are defined in the SOA-RM if

the arrows connect concepts shaded yellow. Relationships between cyan-shaded concepts or between cyan-shaded and yellow-shaded concepts are particular to the Global JRA.

The descriptions of SOA-RM concepts provided in the following sections are intended to be brief summaries; consequently, they omit certain details that appear in the SOA-RM. Concepts listed in bold, blue caps are listed in the glossary at the end of this document, and the glossary contains definitions of the SOA-RM concepts, which are repeated from the SOA-RM glossary for convenience. The SOA-RM itself is the primary source for full exposition of SOA-RM concepts and the relationships between them.

Core Concepts—Services, Service Consumers, Capabilities, and Real-World Effects
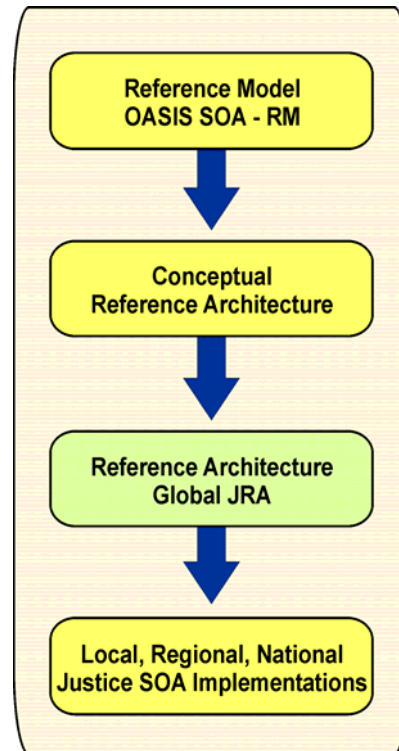
These four concepts make up the core of the Global JRA. All other concepts support these concepts. It is strongly advised that these concepts be clearly grasped before reading the section called Supporting Concepts.

The Global JRA begins from the premise that a group of justice partners have **CAPABILITIES** that they provide to one another. These capabilities "solve or support a solution for the problems [businesses] face in the course of their business." (**SOA-RM**, p. 8) That is, capabilities are the things organizations have to solve problems and therefore add value, directly or indirectly, to their stakeholders.

Note that the Global JRA is generic enough to support virtually any kind of capability. However, the purpose of the Global JRA is to describe an approach to achieving interoperability among automated, computer software-based information systems. Therefore, the Global JRA considers only those business capabilities that are provided by information systems. The Global JRA calls these systems **PROVIDER SYSTEMS**.

Each capability produces one or more **REAL-WORLD EFFECTS**, each of which is an outcome of the business value sought by one of the partners. A real-world effect can be either the obtaining of information, the changing of something of business relevance to the participating partners, or both. Because the Global JRA establishes that capabilities are implemented by provider systems, real-world effects consist of the functional business requirements of provider systems. That is, real-world effects in the Global JRA are essentially the information made available by provider systems

or the outcomes resulting from business processes and workflows automated by provider systems, or both.

In a service-oriented architecture, a **SERVICE** is the way in which one partner gains access to a capability offered by another partner. A partner that uses a service to gain access to another partner's capability is called a **SERVICE CONSUMER**. As with capabilities, the architecture is generic enough to support virtually any kind of service consumer. However, since the purpose of the Global JRA is to describe an approach to information systems interoperability, the Global JRA narrows the SOA-RM definition of service consumer to information systems that interact with services directly through an interface that conforms to a service interaction profile (as defined below). The Global JRA calls such systems **CONSUMER SYSTEMS**.

One of the most important features of the Global JRA is the separation of consumer systems from provider systems by services in the middle. This is the defining characteristic of a service-oriented architecture and is the key to decoupling systems as called for in many of the Architecture Requirements listed in the section on page 13.

The fact that information sharing is one kind of real-world effect allows the architecture to support the traditional view of system integration as "data exchange" or "information sharing." The Global JRA improves this view by encouraging systems to share information in a way that minimizes the dependencies of each system on the implementation of other systems.

Supporting Concepts

Beyond the four core concepts of real-world effects, capabilities, services, and service consumers, the remainder of the concepts in the Global JRA deal with the following three important concerns:

- How consumers may find out that a service exists

- Once they find the service, how consumers may understand what the service does and what information flows in and out of it

- How a consumer may reach and interact with or communicate with the service

The remaining concepts that address these concerns are called "supporting concepts" and are defined in this section.

A **PROVISIONING MODEL** determines the organizational (perhaps contractual or legal) responsibility for providing a capability, via services, to achieve consumers' desired real-world effect. The entity identified in a provisioning model as responsible for providing a capability is called a **SERVICE PROVIDER**.

510 **SERVICE DESIGN PRINCIPLES**[3] provide consistent guidance regarding the overall
511 partitioning of capabilities into services and the relationships between services. For
512 instance, service design principles may call for services to represent one concise, self-
513 contained function and may also suggest that services should completely hide the
514 implementation details of the capabilities to which they provide access.

515 There is a wide variety of ways in which a service can provide access to a capability.
516 In some cases, the provider system that implements the capability may already
517 expose all or some of its functionality as services (through one or more service
518 interfaces, described on page 27). In other cases, the business partner that
519 provisions the capability can purchase an off-the-shelf adapter from the provider
520 system vendor (or a third party) that exposes the system's functionality as a set of
521 services. Finally, the provider system may require reimplementation or custom
522 adaptation to expose functionality as services. This is often expensive and risky, and
523 the desire to avoid this situation should be addressed in the Service Design
524 Guidelines.

525 In general, a given information system can be both a provider system and a
526 consumer system. Similarly, a particular business organization may offer capabilities
527 to its partners and, at the same time, be a consumer of the capabilities offered by
528 others. This has important implications for how the organization should conceive
529 and describe its information systems assets and how it assigns responsibilities for the
530 maintenance and support of those assets. For example, in the past it was common
531 to think of systems as having "client" and "server" components (or "browser" and
532 "server" components), which in turn influenced thinking about systems deployment,
533 networking, security, support, and a range of other issues. These issues deserve
534 reconsideration in an architecture in which a system or system component can be
535 both a "client" (consumer of services) and "server" (provider of services) at the same
536 time. The discussion of service interaction on page 25, and the subsequent
537 elaboration of interaction mechanisms in future iterations of the Global JRA, will
538 reflect the impact of these issues.

539 Note that the concept of a service in the Global JRA does not equate to a "Web
540 service." The term "Web services" is a label for a family of standards and an
541 associated technical approach to communicating between service consumers and
542 services. The architecture supports flexibility in how this communication happens
543 through the notion of service interaction profiles (discussed on page 29). A Web
544 service profile will be developed for the Web services family of standards; however,
545 the Global JRA will include additional profiles that adopt other communication
546 mechanisms, such as MQ, JMS, and ebXML (discussed on page 37).

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[3] Principles and guidelines are important components of the conceptual JRA; however, these
principles and guidelines are not illustrated on the diagram because they will exist for most of the
components.

Interaction, Visibility, Service Models, and Service Interfaces

Services define what features of a provider system the system owner makes accessible to business partners. Services also provide a logical description of the information exchanged between consumer and provider systems as the consumer accesses the capability.

Interaction

The Global JRA refers to a consumer's accessing the features of a capability through a service as **INTERACTION**, defined as "the performing [of] actions against a service." (**SOA-RM**, p. 15) Service interaction generally involves the exchange of information between the consumer and the service.

Interaction depends on two things. First, the designers of potential consumers need to be able to find services and, once found, establish a physical interaction mechanism with them. These needs are addressed by the concept of **VISIBILITY**. Second, the designers of potential consumers need a description of the actions that can be performed on a service, as well as the structure and meaning of information exchanged during the interaction. These needs are addressed by the concept of a service's **INFORMATION MODEL** and **BEHAVIOR MODEL**, collectively called **SERVICE MODELS** in the Global JRA.

Visibility

Visibility, as the name implies, defines how service consumers and the providers of capabilities "*see*" each other in a way that enables interaction between them. The Global JRA identifies three aspects of visibility.

- A service consumer must have information that makes it aware of the existence of a service; the possession of this information is called **AWARENESS.**
- The service (or capability accessed through the service) must be willing to interact with the consumer; this is called **WILLINGNESS.**
- The consumer and service must be able to communicate with one another through some kind of communication path or channel; the existence of such a communication path is called **REACHABILITY.**

In the Global JRA, a **REPOSITORY** will support awareness by hosting service models and service interfaces. "Hosting" in this context means storing models and interface descriptions in a central location that is accessible to appropriate stakeholders. A repository will permit searching for models and interface descriptions based on a range of identifying criteria. A repository will also map logical service identifiers with physical addresses. When a consumer wishes to communicate with a service (identified by a logical identifier), the consumer queries the repository for the

584 physical address associated with the service's logical identifier. This decouples the
585 consumer from the physical location of a service at any point in time, thereby
586 permitting the physical relocation of the service without impacting the
587 implementation of the consumer.

588 The concept of willingness is related to authorization and access control policies, in
589 that a common reason for lack of willingness to interact is that the consumer is not
590 authorized to conduct the requested interaction. Willingness often manifests in
591 service descriptions, as well as policies, contracts, and agreements (discussed on
592 page 31). A **SERVICE MODEL** is defined as the information needed in order to use,
593 or consider using, a service.

594 The concept of reachability is closely related to the concept of execution context
595 (discussed on page 32).

Service Models

597 Service models, consisting of a service's information and behavior models, define the
598 semantics of interaction with the service. The **BEHAVIOR MODEL** defines the actions
599 that can be performed on the service; that is, it defines what the service "does." The
600 **INFORMATION MODEL** describes the information that consumers exchange with the
601 service in the course of performing those actions.

602 Note that the SOA-RM considers the orchestration and choreography of multiple
603 services to be "part of the **PROCESS MODEL** of a given architecture." Yet the SOA-
604 RM also indicates that a process model (part of the behavior model) applies to a
605 single service. (**SOA-RM**, p. 15) Because of this lack of clarity in the SOA-RM, the
606 Global JRA defines a **COLLABORATION** as a type of capability that leverages other
607 services; it is described on page 29.

608 In general, service models will be described at conceptual and logical levels of detail.
609 (Service models have a physical manifestation as well, in the form of the service
610 interface discussed in the next section.) A conceptual description of a service model
611 will typically describe, in prose text form, the capability to which the service provides
612 access, a listing and brief textual description of each action, and a brief textual
613 description of the information model (*e.g.*, key information entities, key properties on
614 those entities, and brief definitions). A logical description of a service model will
615 describe the actions and information structures in detail but independent of any
616 physical implementation mechanism. Often this description will be graphical and
617 follow a standard diagramming or modeling technique, such as Uniform Modeling
618 Language (UML).

619 A **MESSAGE** is defined as the entire "package" of information sent between service
620 consumer and service (or vice versa), even if there is a logical partitioning of the
621 message into segments or sections. For instance, if an interface expresses actions as

622 operations or functions that take arguments, and a particular operation has two
623 arguments, both arguments would be considered part of the same message, even
624 though they may be logically separated within the message structure. A message
625 also includes the concept of an "attachment," in which there are several additional
626 sections (attachments) that relate to a distinct, "primary" section.

627 In the Global JRA, the exchange of messages is the only way in which consumers
628 and services can communicate. This establishes a linkage between the Federal
629 Enterprise Architecture Data Reference Model (FEA DRM) and the Global JRA: a
630 message in the Global JRA equates to an Information Exchange Package (IEP) in the
631 DRM.

632 The concept of **DOMAIN VOCABULARIES** in the Global JRA includes canonical data
633 models, data dictionaries, and markup languages that standardize the meaning and
634 structure of information for a topical or business domain. Domain vocabularies can
635 improve the interoperability between consumer and provider systems by providing a
636 neutral, common basis for structuring and assigning semantic meaning to
637 information exchanged as part of service interaction. Domain vocabularies can
638 usually be extended to address information needs specific to the service interaction
639 or to the business partners integrating their systems.

640 The information model for a service generally should be built from components in
641 one or more domain vocabularies, in order to promote semantic interoperability. In
642 the justice domain, the information model for services should be built from
643 components in the National Information Exchange Model (NIEM) when NIEM
644 components exist that satisfy the semantic requirements of the model.

645 **SERVICE MODELING GUIDELINES** govern the style, structure, and description of
646 service models.

647 As previously stated, a repository should contain service model description artifacts
648 for each level of detail. The availability of service model descriptions to consumer
649 system designers, implementers, and purchasers is a key factor in establishing
650 visibility and the reuse of services.

651 *Service Interface*

652 Service models describe the actions available from a service and the information
653 exchanged between a consumer and the service during the performance of those
654 actions. In this way, the service models describe the "what" of interaction.

655 A **SERVICE INTERFACE** "is the means for interacting with a service. It includes the
656 specific protocols, commands, and information exchange by which actions are
657 initiated [on the service]." (**SOA-RM**, p. 22) A service interface is what a system
658 designer or implementer (programmer) uses to design or build executable software

659 that interacts with the service. That is, the service interface represents the "how" of
660 interaction.

661 In many cases, the capability to which a service provides access is some kind of
662 information system. The Global JRA calls such a system a provider system, as
663 discussed above (IIR maintain reference to previous section). However, in general a
664 provider system will not conform to or satisfy the constraints imposed by the service
665 interface through which consumers access the capability. A software component
666 called an **ADAPTER** is required to transform interactions with the provider system into
667 interactions that conform to the service interface. Depending on the type of provider
668 system, adapters may be available from the system vendor or a different vendor; in
669 other cases, the service provider may need to build a custom adapter.

670 The Global JRA considers the service interface to be the physical manifestation of
671 the service models. Best practices call for a service interface to be described in an
672 open-standard, referenceable format (that is, a format whose contents are capable of
673 automated processing by a computer).

674 Note that at least some policies and contracts can be described in a service's
675 interface.

676 The format, structure, and allowable contents of a service interface are established by
677 **INTERFACE DESCRIPTION REQUIREMENTS**, described in the following section.

Design and Description of Service Interfaces

679 The Global JRA identifies four architectural elements that guide the design and
680 description of service interfaces.

681 **SERVICE INTERACTION REQUIREMENTS** define common rules of service interaction.
682 Typically, these requirements are not directly related to the capability used by the
683 service consumer, nor are they related to the real-world effect resulting from use of
684 that capability. Rather, the requirements enforce (or support the enforcement of)
685 policies or contracts or otherwise protect the interests of particular business partners
686 or the business organization overall.

687 Common service interaction requirements address areas such as security, reliability,
688 and availability. An initial elaboration of service interaction requirements appears on
689 page 35.

690 **INTERFACE DESCRIPTION REQUIREMENTS** establish common characteristics of
691 service interface descriptions. These requirements address areas such as required
692 interface contents, naming rules, documentation rules, and specification of a
693 standard structure and format for descriptions.

MESSAGE EXCHANGE PATTERNS identify common sequences of message transmission between service consumers and services. They provide a label to a series of message transmissions that have some logical interrelationship. An initial elaboration of message exchange patterns appears on page 37.

MESSAGE DEFINITION MECHANISMS are closely related to interface description requirements, described above. Unlike interface description requirements, message definition mechanisms establish a standard way of defining the structure and contents of a message. Note that since a message includes the concept of an "attachment," the message definition mechanism must identify how different sections of a message (for example, the main section and any "attachment" sections) are separated and identified and how attachment sections are structured and formatted.

Service Interaction Profiles

A SERVICE INTERACTION PROFILE defines a family of industry standards or other technologies or techniques that together demonstrate implementation or satisfaction of:

- Service interaction requirements.
- Interface description requirements.
- Message exchange patterns.
- Message definition mechanisms.

Service interaction profiles are included in the Global JRA to promote interoperability without forcing the organization to agree on a single way of enabling service interaction. Each service interface will support a single profile; a service will have multiple interfaces if it supports multiple profiles. By supporting a profile, an interface establishes the mode of interoperation it allows from service consumers; any consumer that also supports that profile can "reach" the service.

The Global JRA explicitly recognizes that a service interaction profile may be further constrained by an implementer to require specific techniques, technologies, or mechanisms, as long as the additional constraints remain consistent with the original profile.

Capabilities in Detail

The Global JRA identifies several types of capabilities to assist decision makers in understanding where certain capabilities should be deployed in the organization and what relationships they may have to other capabilities and services.

Intermediaries

An INTERMEDIARY is any capability that receives messages from a consumer and subsequently, as a service consumer itself, interacts with another service. The term

730 "intermediary" indicates that these capabilities sit between other services and
731 "mediate" the interaction by managing, controlling, brokering, or facilitating the
732 transmission of messages between them.

733 The Global JRA identifies five types of intermediary, but recognizes that other types
734 are possible.   The five identified types are: collaborations, routers, message
735 validators, transformers, and interceptors.

736 An **COLLABORATION** is a capability that coordinates interaction with multiple
737 services. A collaboration is often implemented using an open industry standard
738 implementation mechanism such as Business Process Execution Language (BPEL)
739 or Web Services Choreography Description Language (WS-CDL), which allows the
740 implementation to be shared across tools and platforms.

741 It is often possible to implement collaborations using a graphical approach, in which
742 the implementer diagrams business processes and work flows, the steps of which are
743 services that already exist. After the diagram is complete, the implementer generates
744 a standards-based artifact that is deployed into a software component that exposes
745 the work flow as a service through a service interface. The promise of this approach
746 is that less technical implementers with greater business expertise can be responsible
747 for the implementation of orchestrated capabilities.

748 The diagram that defines the collaboration is called a **BUSINESS PROCESS MODEL**.

749 Note that the execution of the steps described in a business process model can be
750 considered a capability in and of itself. In addition, each of the steps in a business
751 process model can unfold into yet another business process model at a more focused
752 level of detail. In this way, each step in a series of service interactions can itself be a
753 series of service interactions. And, in theory, this recursion of models can go on
754 forever, though in practice it rarely exceeds three or four levels of containment. So,
755 services and capabilities form a hierarchy, where a service provides access to a
756 capability whose real-world effect is to accomplish the coordination of multiple
757 services at a lower level of detail.

758 As a side effect, each of the steps in a business process model provides a contextual
759 justification for service interaction between a particular consumer and particular
760 provider. This is often useful information to capture in a taxonomy for services, in
761 order to understand better where services are being used and adding value.

762 **ROUTERS** are capabilities that receive a message, examine it, and transmit it to one
763 or more destinations based on the contents. In general, routers can be designed to
764 operate on any of the information contained within the message; they may use
765 information about the origin of the message, routing directive information contained
766 within the message or the main content of the message itself.

767 **TRANSFORMERS** are capabilities that receive a message and transform it into another
768 format before transmitting it on to another destination.

769 **MESSAGE VALIDATORS** are capabilities that examines a message to ensure that the
770 contents adhere to established business rules.

771 **INTERCEPTORS** are capabilities that receive a message and use the message content
772 to trigger a secondary action; generally, the interceptors pass the message unaltered
773 to the next step in a process. Most interceptors capture information from the
774 message for reporting or analytical purposes.[4]

775 Routers and transformers are useful mechanisms for decoupling the senders and
776 recipients of messages. They tend to centralize and share certain kinds of logic so
777 that the logic can be maintained independently of the provider and consumer
778 capabilities at the edges; sharing also improves the likelihood of reuse, since it is
779 easier to reuse functionality if it encapsulates a single task.

780 Support for router, transformer, and collaboration capabilities is a common feature
781 in many integration platforms, and therefore support for these capabilities is a
782 consideration in choice of execution context (discussed on page 32).

783 Routing, transformation, and collaboration capabilities are well understood and well
784 documented in the integration architecture literature. The most common flavors of
785 these capabilities have been collected into pattern form as **ENTERPRISE**
786 **INTEGRATION PATTERNS. (Patterns web site)** the Global JRA incorporates these
787 patterns by reference.

788 Intermediaries are a key component in implementing business process models and
789 also lead to the formation of service/capability hierarchies.

790 ### Service Policies, Service Contracts, and Service Agreements

791 **SERVICE POLICIES** and **SERVICE CONTRACTS** express rules that govern the
792 interaction between a service consumer and a service. A policy is an assertion by
793 either a consumer or service provider of that participant's requirements for
794 willingness to interact. A policy also has an enforcement aspect and must be stated
795 in such a way as to permit enforcement. A **SERVICE CONTRACT** is an agreement by
796 the parties involved, and there is a process associated with the agreement action.
797 Whereas a policy is an assertion by one participant in the interaction, a contract is an
798 agreement between the participants that expresses some expectation or requirement
799 of the interaction. And whereas policy enforcement is generally the responsibility of

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[4] The concept of interceptor defined here is similar to, but separate and distinct from, the notion of an interceptor as defined in the SOAP protocol [reference needed to SOAP standard]. The definition of this concept in JRA is not intended to imply any implementation technique or technology.

800 the participant who asserts the policy, contract enforcement may involve resolution
801 of disputes that arise between the parties.

802 A **SERVICE AGREEMENT** is a document that establishes policies and contractual
803 elements for a given interaction or set of interactions (that is, for one or more
804 services).

Execution Context

806 **EXECUTION CONTEXT** is "the set of infrastructure elements, process entities, policy
807 assertions, and agreements that are identified as part of an instantiated service
808 interaction." (**SOA-RM**, p. 24)

809 Execution context is the primary enabler of the reachability aspect of visibility.
810 Execution context includes the set of infrastructure elements that provide a physical
811 communication path between service consumers and services.

812 The Global JRA considers execution context to be primarily the supporting
813 infrastructure elements that permit service consumers and services to interact. These
814 infrastructure elements consist of:

815 • Data networks used by service consumers and services to exchange
816   information.
817 • Integration infrastructure (hardware and software) that makes
818   service interfaces available and handles higher-level message
819   routing, transformation, and collaboration.
820 • Common capabilities that support service interaction; examples
821   include access control services, policy decision services, public key
822   infrastructure (PKI), and metering services.

823 Execution context can implement (or support the implementation of) some service
824 interaction requirements, such as reliability and availability. Service interaction
825 profiles, contracts, and policies can constrain the behavior of execution context
826 elements by requiring particular technologies or techniques or establishing service
827 level policies, for example.

828 Finally, execution context can support intermediary capabilities (as defined above)
829 directly in the integration infrastructure.

830   # Illustration Scenarios

831   In version 1.5 of the Global JRA, this section will include scenarios that illustrate the
832   concepts in the architecture.

Elaboration of Global JRA Concepts

The purpose of this section is to establish a direction and initial "straw model" for the components to be defined in detail within the Global JRA. Note that many of these components are currently deliverables within the Global JRA Work Plan for the 2006 time frame. The GISWG will develop these concepts in incremental steps over time as noted in the Plan. The components that are future deliverables and the other concepts that are more mature are also listed below.

In version 1.5 of the Global JRA, this section will change to be a list of pointers to additional documents that fully elaborate and define some of the concepts in the Global JRA.

Services and Related Deliverables

The Global JRA deliverables related to services are documented in this section. To cross reference the definitions of corresponding concepts in this section, see page 22.

Services

The SEARCH Justice Information Exchange Model (JIEM) Reference Model 1.1 will be used as the starting point to define services in the Global JRA. The list of key Information Exchange Package Documentation (IEPD) that have already been developed will be used to further narrow the initial list of services to define. (See http://it.ojp.gov/iepd/.)

A methodology that analyzes business capabilities and the interactions between them will be leveraged to prioritize identification of services.

Future Service Deliverables

- *Identification of Service Definitions*
- *Service Specification Guidelines*

Business Process Models

Business Process Models are explained starting on page 30.

Although not part of the normative Global JRA, these business process models may be drawn from normative guidance within specific communities for specific services, such as fusion centers or the exchange of classified intelligence data. They are also useful as guides to more complex orchestrated services that support core business processes within the justice community.

Interaction, Service Models, and Related Concepts

To cross reference the concepts and related deliverables in this section, please see page 25.

Domain Vocabularies

The domain vocabularies for the Global JRA are the Global Justice XML Data Model (Global JXDM) Version 3.0.3 and the National Information Exchange Model (NIEM) Version 1.0. Information about these vocabularies can be accessed at:

http://it.ojp.gov/jxdm

http://www.niem.gov

Registries/Repositories

Several SOA registries are now under pilot development in the justice community and could potentially be used to host the Global JRA. Further research is being compiled, and the documentation listed below is currently under development.

Future Interaction and Service Model Deliverables

The GISWG is currently evaluating various approaches to best elaborate the following components. These components will be completed as part of the Global JRA Work Plan, and will be documented once the deliverables have been solidified.

- *Registries/Repositories Principles*
- *Registries/Repositories Requirements*
- *Registries/Repositories Guidelines*
- *Service Description*
- *Service Modeling Guidelines*

Design and Description of Service Interfaces

As a cross reference, the concepts and related deliverables in this section correspond to the concepts that are explained in the section starting on page 28.   The Global JRA Work Plan includes the following deliverables.

Service Interaction Requirements

The following is an initial list of candidate service interaction requirements. Note that when these requirements refer to "Service Consumer," this is not a human being, but an information system that interacts with a service. This is consistent with the Global JRA usage of the term, as defined on page 22.

- **Service Consumer Authentication:** Information provided with messages transmitted from service consumer to service that verifies the identity of the consumer.
- **Service Consumer Authorization:** Information provided with messages transmitted from service consumer to service that documents the consumer's authorization to perform certain actions on and/or access certain information via the service.
- **Identity and Attribute Assertion Transmission:** Information provided with messages transmitted from service consumer to service that asserts the validity of information about a human or machine, including its identity.
- **Service Authentication:** The ability of a service to provide a consumer with information that demonstrates the service's identity to the consumer's satisfaction.
- **Message Nonrepudiation:** Information provided in a message to allow the recipient to prove that a particular authorized sender in fact sent the message.
- **Message Integrity:** Information provided in a message to allow the recipient to verify that the message has not changed since it left the control of the sender.
- **Message Confidentiality:** Information provided in a message to prevent anyone except an authorized recipient from reading the message or parts of the message.
- **Message Addressing:** Information provided in a message that indicates where a message originated, the ultimate destination of the message (beyond physical end point), a specific recipient to whom the message should be delivered (this includes sophisticated metadata designed specifically to support routing), and a specific address or entity to which reply messages (if any) should be sent.
- **Reliability:** Information provided with messages to permit message senders to receive notification of the success or failure of message transmissions, and to permit messages sent with specific sequence-related rules either to arrive as intended, or fail as a group.
- **Transaction Support:** Information provided with messages to permit a sequence of messages to be treated as an atomic transaction by the recipient.
- **Service Metadata Availability:** The ability of a service to capture and make available (via query) metadata about the service. Metadata is information that describes or categorizes the service and often assists consumers in interacting with the service in some way.

Service Interaction Profiles

Several service interaction profiles have already been prioritized for development: Web services, MQ, JMS, ebXML, fixed wireless, and mobile wireless. A draft of the Web services service interaction profile is available as part of the OASIS Legal XML Electronic Court Filing 3.0 committee draft specification.

Message Exchange Patterns

The Global JRA will identify the following message exchange patterns:

The **FIRE-AND-FORGET** pattern calls for the sender of a message (which could be the service consumer or service) to send the message and not expect a reply message back from the recipient. This pattern is useful for one-way transmission of information, such as notification that an event has occurred.

The **REQUEST-REPLY** pattern calls for the sender of a message to send the message and expect a reply back from the recipient.

These two patterns are considered "primitive" patterns, in that they are the fundamental building blocks of more complex information exchange scenarios. For instance, the complex **PUBLISH-SUBSCRIBE** pattern involves an initial request-reply exchange in which the subscriber subscribes to a service, followed by the service using the fire-and-forget pattern to notify subscribers of an event.

Future Service Interaction Deliverables

- *Service Interaction Profile Guidelines*
- *Interface Description Requirements*
- *Message Definition Mechanisms*

Capabilities in Detail and Related Components

To cross reference the concepts and related deliverables in this section, please review page 29.   The Global JRA Work Plan includes the following deliverables.

Provisioning Models

Although not part of the normative Global JRA, best practices for **PROVISIONING MODELS** provide guidance on how best to implement key facilitation services like message validation, collaboration, routing, and transformation using intermediaries or other means. The GISWG plans on documenting Provisioning Model Guidelines and Principles.

Enterprise Integration Patterns

Although not part of the normative Global JRA, the existing best practices can be combined with the provisioning models to indicate preferred approaches to the implementation of key services within a community. The GISWG will adopt existing best practices by reference. **(Patterns)**

Future Deliverables

- *Collaboration Guidelines*
- *Collaboration Principles*
- *Collaboration Mechanisms*

Policies, Contracts, and Agreements

Model Policies and Contracts

It is possible for every service provider to establish a unique set of policies and business requirements for each service. This approach would create almost insurmountable barriers to the widespread consumption of services for cost reasons alone. The definition of model policies and contracts will provide reusable policies across common services and sets of related services, based on national policies on security, privacy, and other policy requirements. Given the current local and state variations in policy based on statute and court rule, these model policies must necessarily be aspirational initially. The GISWG will develop and recommend potential model policies and contracts.

Model Agreements

These model agreements (termed memorandum of understanding [MOUs], etc.), together with model contracts, lay out standard provisions for consuming services. The GISWG will develop and recommend potential model agreements.

Execution Context

Version 1.5 of the Global JRA specification will reference an initial elaboration of the Execution Context concept.

What is Out of Scope for the JRA?

995

996 This section is a placeholder for a new section to be included in Global JRA 1.5.
997 The purpose of the new section will be to define a scope boundary around the
998 Global JRA, and perhaps refer to another document that addresses some of those
999 out-of-scope items.

Glossary

Architecture

A set of artifacts (that is: principles, guidelines, policies, models, standards, and processes) and the relationships between these artifacts that guide the selection creation and implementation of solutions aligned with business goals.

Awareness

A state whereby one party has knowledge of the existence of the other party. Awareness does not imply willingness or reachability.

Behavior Model

The characterization of, and responses to, temporal dependencies between the actions on a service.

Business Process Models

A description (usually formal and often graphical) of a series of activities that culminate in the achievement of some outcome of business value. Some (but not necessarily all) of the steps in this series of activities involve producing a real-world effect provided by a capability, and some of the steps require a consumer to use a service. Each one of these steps, then, provides the contextual justification for service interaction between a particular consumer and particular provider.

Capabilities

Real-world effect(s) that service provider(s) are able to provide to a service consumer.

Consumer Systems

The information system that gains access to another partner's capability offered by means of a service.

Domain Vocabularies

Includes canonical data models, data dictionaries, and markup languages that standardize the meaning and structure of information for a domain. Domain vocabularies can improve the interoperability between consumer and provider systems by providing a neutral, common basis for structuring and assigning semantic meaning to information exchanged as part of service interaction. Domain vocabularies can usually be extended to address information needs specific to the service interaction or to the business partners integrating their systems.

Enterprise Integration Patterns

Enterprise integration has to deal with connecting multiple applications running on multiple platforms in different locations. Enterprise Integration Patterns help integration architects and developers design and implement integration solutions more rapidly and reliably. Most of the patterns assume a basic familiarity with messaging architectures. However, the patterns are not tied to a specific implementation.

Execution Context

The set of technical and business elements that form a path between those with needs and those with capabilities and that permit service providers and consumers to interact.

Framework

A set of assumptions, concepts, values, and practices that constitutes a way of viewing the current environment.

Information Model

The characterization of the information that is associated with the use of a service. The scope of the information model includes the format of information that is exchanged, the structural relationships within the exchanged information, and the definition of terms used.

Interaction

The activity involved in making use of a capability offered, usually across an ownership boundary, in order to achieve a particular desired real-world effect.

Interface Description Requirements

Establishes common characteristics of service interface descriptions. These requirements address areas such as required interface contents, naming rules, documentation rules, and specification of a standard structure and format for descriptions.

Interceptors

Interceptors are capabilities that receive a message and use the message content to trigger a secondary action; generally, the interceptors pass the message unaltered to the next step in a process.

Intermediaries

Routers and transformers are collectively called intermediaries. This term indicates that routers and transformers generally sit between other services and "mediate" the interaction by managing the transmission of messages between them or by reformatting messages in transit.

Global Justice Reference Architecture

The Global JRA is an abstract framework for understanding significant components and relationships between them within a service-oriented environment. It lays out common concepts and definitions as the foundation for the development of consistent service-oriented architecture (SOA) implementations within the justice and public safety communities. The term refers to the modular architecture that cleanly and appropriately identifies and separates technical and governance layers so that standards can be developed to improve interoperability. The Global JRA is being developed by Global; it leverages the work of others, such as the state of Washington, and builds upon the work of OASIS.

Messages

The entire "package" of information sent between service consumer and service (or vice versa), even if there is a logical partitioning of the message into segments or sections.

Message Definition Mechanisms

Establishes a standard way of defining the structure and contents of a message; for example, Global JXDM- or NIEM-conformant schema sets. Note that since a message includes the concept of an "attachment," the message definition mechanism must identify how different sections of a message (for example, the main section and any "attachment" sections) are separated and identified and how attachment sections are structured and formatted.

Message Exchange Patterns

Identifies common sequences of message transmission between service consumers and services. They provide a label to a series of message transmissions that have some logical interrelationship.

Message Validators

An intermediary that examines a message to ensure that the contents adhere to established business rules.

Collaboration

A capability that coordinates interaction with multiple services. A collaboration is often implemented using an open industry standard implementation mechanism, which allows the implementation to be shared across tools and platforms.

Process Model

The characterization of the temporal relationships between and temporal properties of actions and events associated with interacting with the service.

Provider Systems

The information system that offers the use of capabilities by means of a service.

Provisioning Models

The responsibility/models for making a service available to customers in a manner consistent with formal (or occasionally informal) customer expectations.

Reachability

The ability of a service consumer and service provider to interact. Reachability is an aspect of visibility.

Real-World Effects

The actual result(s) of using a service, rather than merely the capability offered by a service provider.

Reference Architecture

A reference architecture is an architectural design pattern that indicates how an abstract set of mechanisms and relationships realizes a predetermined set of requirements.

Reference Model

A reference model is an abstract framework for understanding significant relationships among the entities of some environment that enables the development of specific reference or concrete architectures using consistent standards or specifications supporting that environment.

A reference model consists of a minimal set of unifying concepts, axioms, and relationships within a particular problem domain, and is independent of specific standards, technologies, implementations, or other concrete details.

Repository

Stores models and interface descriptions in a central location that is accessible to appropriate stakeholders. A repository will permit searching for models and interface descriptions based on a range of identifying criteria. A repository will also map logical service identifiers with physical addresses.

Routers

A capability that receives a message, examines it, and transmits it to one or more destinations based on the contents. In general, routers can be designed to operate on any of the information contained within the message; they may use information about the origin of the message, routing directive information contained within the message or the main content of the message itself.

Services

The means by which the needs of a consumer are brought together with the capabilities of a provider.

Service Agreements

A document that establishes policies and contractual elements for a given interaction or set of interactions (that is, for one or more services).

Service Consumers

An entity that seeks to satisfy a particular need through the use of capabilities offered by means of a service.

Service Contracts

An agreement by two or more parties regarding the conditions of use of a service.

Service Design Principles

The documentation to provide consistent guidance regarding the overall partitioning of capabilities into services and the relationships between services.

Service Interaction Profiles

Defines a family of industry standards or other technologies or techniques that together demonstrate implementation or satisfaction of:

- o Service interaction requirements.
- o Interface description requirements.
- o Message exchange patterns.
- o Message definition mechanisms.

Service interaction profiles are included in the Global JRA to promote interoperability without forcing the organization to agree on a single way of enabling service interaction. Each service interface will support a single profile; a service will have multiple interfaces if it supports multiple profiles.

Service Interaction Requirements

Define common rules of service interaction. Typically, these requirements are nonfunctional in nature, in that they are not directly related to the capability used by the service consumer, nor are they related to the real-world effect resulting from use of that capability. Rather, the requirements enforce (or support the enforcement of) policies or contracts or otherwise protect the interests of particular business partners or the business organization overall.

Service Interfaces

The means by which the underlying capabilities of a service are accessed.

Service Model

1182

1183 Interaction depends on two things. First, the designers of potential consumers
1184 need to be able to find services and, once found, establish a physical
1185 interaction mechanism with them. Second, the designers of potential
1186 consumers need a description of the actions that can be performed on a
1187 service, as well as the structure and meaning of information exchanged during
1188 the interaction. These needs are addressed by the concept of a service's
1189 information model and behavioral model, collectively called service models in
1190 the Global JRA.

Service Modeling Guidelines

1191

1192 Documents guidelines for services provided and consumed among partners.
1193 It provides guidance as well as compliance information regarding the
1194 modeling and description of services to promote consistency.

Service-Oriented Architecture (SOA)

1195

1196 Service-Oriented Architecture is a paradigm for organizing and utilizing
1197 distributed capabilities that may be under the control of different ownership
1198 domains. It provides a uniform means to offer, discover, interact with, and
1199 use capabilities to produce desired effects consistent with measurable
1200 preconditions and expectations.

Service Policies

1201

1202 A statement of obligations, constraints, or other conditions of use,
1203 deployment, or description of an owned entity as defined by any participant.

Service Providers

1204

1205 An entity (person or organization) that offers the use of capabilities by means
1206 of a service.

Transformers

1207

1208 A capability that receives a message and transforms it into another format
1209 before transmitting it on to another destination.

Visibility

1210

1211 The capacity for those with needs and those with capabilities to be able to
1212 interact with each other.

Willingness

1213

1214 A predisposition of service providers and consumers to interact.

1215

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Document History

Date	Version	Editor	Change
March 25, 2006	1.0	Scott Came	Initial Draft
March 28, 2006	1.0	Tish Cunningham Kim Geer	Editorial changes and IIR QC
May 1, 2006	1.1	Monique La Bare	Integrate comments from EAC, glossary, introduction, acknowledgements, insert scenario, editing page numbers

Date	Version	Editor	Change
June 1, 2006	1.1	Tom Clarke	Elaboration of concepts and principles.
June 28, 2006	1.1		Reordered elaboration of concepts, added warrant scenario
November 2, 2006	1.?	Scott Came	Consistency edits Edits resulting from October GISWG meetings Reflect comments of Iveta Topalova and Martin Smith
December 6, 2006	1.3	Kim Geer Dolores Parker	Formatting Editorial changes and IIR quality control

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