

SOA on System z
To support your business objectives



WebSphere® software



Optimizing SOA on System z with WebSphere application infrastructure products.

Business growth and increasing complexity

Today's businesses compete in a dynamic and global business environment. As they grow and their needs change, they add new technologies to their IT infrastructures. This often results in a heterogeneous infrastructure of technologies that do not interoperate seamlessly. Applications can number in the hundreds, thousands and even tens of thousands—some monolithic, some isolated and some not being used to their full potential (see Figure 1).

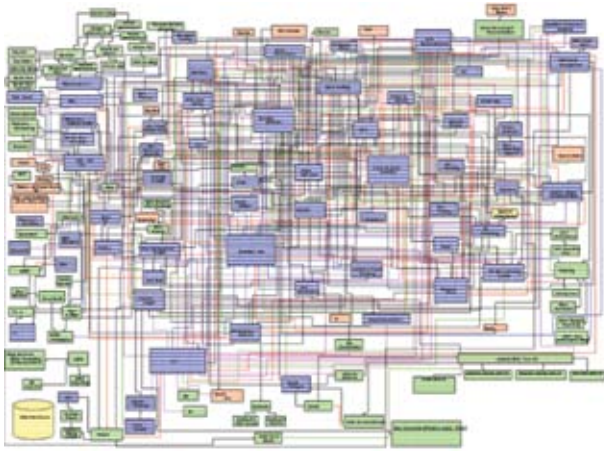


Figure 1. An actual IT infrastructure of a company with complexity challenges

A complex infrastructure can contribute to ever-increasing application maintenance costs. It can hinder a company's efforts to keep pace with the rapid speed of change, much less address today's demanding business issues, such as regulatory compliance, security, availability and accountability.

What can you do to connect multiple applications, extend their value, speed time to market for new business applications and services, support increasing numbers of business transactions, and increase reliability and compliance?

Cutting through the complexity with SOA

More companies are turning to a service oriented architecture (SOA) for agile innovation and optimization. SOA is a business-driven IT architectural approach that integrates the business as linked, repeatable tasks, or services.

The number of businesses that have used SOA successfully has promoted its growth. According to the 2007 book, *The New Language of Business*, by Sandy Carter and published by IBM Press, "Innovation in IT structures is so revolutionizing that the proven successes of SOAs have enabled this segment to grow to a worldwide market opportunity."

SOA helps businesses to eliminate needless complexity by connecting, reusing, automating and accessing their assets.

System z delivers dependability

SOA requires a robust and secure business environment, and the IBM System z™ mainframe platform is an excellent choice. The System z platform is designed for up to 99.999 percent availability, which translates into 5.3 minutes of unavailable time a year, including planned and unplanned outages (see Figure 2). System z hardware, software, storage and network technology are all designed for maximum application availability so that your business applications can stay up and running. The time between failures is measured in decades.

Percent availability	Days of downtime in a year	Hours of downtime in a year	Minutes of downtime in a year	Seconds of downtime in a year
99.0%	3.65	87.60	5,256.0	315,360
99.5%	1.82	43.80	2,628.0	157,680
99.9%		8.76	525.6	31,536
99.99%		0.88	53	3,154
99.999%		0.09	5.3	315

Figure 2. Each percentage point makes a significant difference in availability.

Optimizing SOA on System z with WebSphere

The SOA reference architecture is a vendor-neutral way of looking at and planning the set of services that go into building an SOA (see Figure 3). This architecture is not unique to IBM. These capabilities can be implemented on a build-as-you-go basis, allowing capabilities and project-level solutions to be added easily as new requirements are addressed over time.

In Figure 3, the business application services and infrastructure services that are highlighted comprise the application infrastructure of an SOA. The application infrastructure is the technical underpinning for the IBM SOA Foundation that can enable innovation that matters most—change. You can use IBM WebSphere® products to help optimize SOA on the System z platform at the application infrastructure level.

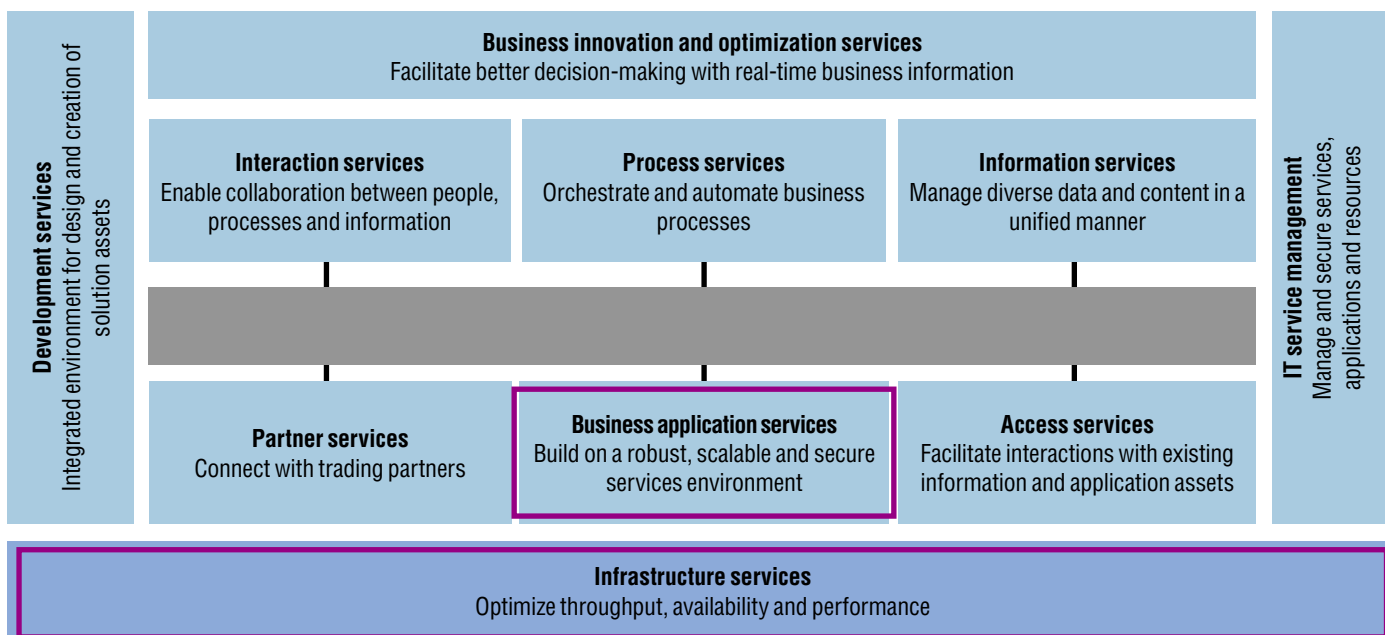


Figure 3. Application infrastructure is the cornerstone of an SOA deployment.

Smart SOA

The IBM Smart SOA™ approach is a set of guiding principles that is based on our unique experience working with more than 5700 clients using our SOA offerings. A Smart SOA infrastructure has the following key characteristics:

- Scalability – *respond to unexpected service demands*
- Agility – *meet evolving business needs and requirements*
- Resiliency – *withstand unforeseen negative changes in the environment*
- High availability – *operate with five 9's availability*
- Security – *implement security management*
- Manageability – *integrate ongoing management and governance*

IBM WebSphere Application Server for z/OS integrates with the IBM z/OS® operating system and System z platform. Together with IBM WebSphere Extended Deployment and IBM WebSphere Service Registry and Repository, WebSphere Application Server for z/OS delivers the key characteristics of Smart SOA.



Smart SOA infrastructure with WebSphere Application Server for z/OS

System z and z/OS technology has evolved over the last half century to become the premier enterprise-class platform in the marketplace. Workload management, virtualization, redundancy for high availability, highly optimized input/output (I/O) and inherent security are just a few of the critical components that have set the platform apart from its competitors.

WebSphere Application Server for z/OS integrates with the platform to deliver a highly scalable infrastructure: able to respond to fluctuating demands in workloads in a highly efficient manner; acquiring system resources as needed to meet demands; and releasing these resources when the demand no longer exists.

High availability has been designed into the platform at every level, from redundant microprocessors to I/O components to operating system services. WebSphere Application Server for z/OS leverages these high-availability capabilities, helping to assure five 9's availability, which is critical for an enterprise.

Resiliency is the ability to assure that workload goals are met while tolerating negative changes in the infrastructure. It is inherent to the platform and to WebSphere Application Server for z/OS. The application server's multiprocess architecture, integrated with System z and z/OS facilities, delivers a highly resilient infrastructure on which mission-critical applications can be deployed.

Security is critical to an enterprise. System z technology and the features of the z/OS operating system are synonymous with security in the marketplace; this combination has achieved Evaluation Assurance Level (EAL5), a security rating that can be certified and issued only by the National Security Agency (NSA). WebSphere Application Server for z/OS integrates with the security on the platform to deliver highly secure middleware.

The integration of System z and z/OS technology, and the features of scalability, high availability and resiliency make WebSphere Application Server for z/OS a foundation on which an enterprise SOA can be built.

Improve and speed development

In addition to providing support for Java™ 2 Platform, Enterprise Edition (J2EE), WebSphere Application Server for z/OS supports Java 2 Platform, Standard Edition (J2SE). These development platforms help you to simplify and integrate your applications.

Increase interoperability

WebSphere Application Server for z/OS simplifies integration with rich features that accelerate the adoption of SOA by rendering existing IT assets as service components, encouraging reuse and efficiency.

Support next-generation communications

WebSphere Application Server for z/OS supports Java Specification Request (JSR) 116 Session Initiation Protocol (SIP) servlets. SIP servlets are used to establish, modify and terminate multimedia IP sessions, including IP audio and video, instant messaging, application sharing and electronic whiteboards.

Simplify administration

WebSphere Application Server for z/OS provides features to maximize the efficiency of managing the deployment environment with a console command assistant, easy-to-use security configuration and database connectivity, wizards and a stand-alone thin administration client. WebSphere Application Server for z/OS also offers extended Web services management and advanced remote administration to make management of more complex environments less time- and resource-consuming.

WebSphere Extended Deployment and Smart SOA

WebSphere Extended Deployment extends an existing WebSphere Application Server for z/OS infrastructure. It has three subproducts, which can be purchased and used separately, or integrated to work as a cohesive unit. The Operations Optimization component of WebSphere Extended Deployment delivers features for improving the resiliency and management of the WebSphere infrastructure. WebSphere Extended Deployment Compute Grid delivers a Java batch and high-performance computing infrastructure. WebSphere Extended Deployment Data Grid delivers an infrastructure for in-memory databases and extreme transaction processing (XTP) applications.

Improve resiliency

WebSphere Extended Deployment Operations Optimization delivers the following key features to improve the resiliency and management of a middleware infrastructure:

- *A health management infrastructure, where customizable policies and corrective actions can be defined and enforced*
- *Continuous availability for interruption-free application updates with the Application Edition Manager*
- *Checkpointing the runtime configuration to improve recoverability from administrative changes*
- *Visualization technologies for viewing the relative health of the applications and infrastructure*

Improve resiliency with WebSphere Extended Deployment health management and monitoring

A key challenge in middleware infrastructures is the ability to recognize health issues in the environment and to take actions that correct the problem. WebSphere Extended Deployment delivers a policy-based health management infrastructure that addresses this challenge. Using the health management and monitoring feature of WebSphere Extended Deployment, an administrator can create policies from predefined conditions and responses, or can create custom conditions and responses. WebSphere Extended Deployment will then monitor the application and WebSphere Application Servers to determine if any of the conditions exist.

Examples of predefined conditions include these:

- Memory leaks or excessive memory usage
- Hung servers
- Excessive request timeouts or response times
- Storm drains
- Extended service policy and workload goal violations
- Server age and maximum requests

Examples of predefined actions include these:

- Notify an administrator (including notification by e-mail) that a condition has been breached
- Capture diagnostic information, including thread dumps and heap dumps
- Restart the application server in a noninterruptive manner

Maintain continuous availability with WebSphere Extended Deployment Application versioning

A second important challenge for production middleware infrastructures is the assurance that an application will always be available. Moreover, an agile testing and deployment process, along with the support of concurrent application versions in production, increase the complexity of this challenge. With WebSphere Extended Deployment, application policies can be defined that dictate how work should be routed to the applications. Autonomic features can then enforce these policies and help assure that applications are continuously available, even during migrations, rollouts and testing.

Gain batch and high-performance computing with WebSphere Extended Deployment

Reusing business services is a fundamental principle of SOA. In a May 2007 study by Dale Vecchio, *Batch processes can take advantage of SOA*, Gartner concluded that “business function used in online transactions may be the same business function used in batch processes, so organizations should think about their IT modernization strategy and consider SOA as a standardized application integration mechanism.”



Batch processing is an integral part of an IT infrastructure and comprises critical, noninteractive business processes, such as computing interest, managing supply chains, reporting and so on. Batch has traditionally been an independent execution model from online transactional (OLTP) workloads, and therefore has naturally been isolated. WebSphere Extended Deployment Compute Grid delivers an enterprise Java batch and high-performance computing infrastructure built on WebSphere Application Server for z/OS with the following capabilities:

- An enterprise Java batch-execution environment built on WebSphere (a batch environment that can run on an IBM System z Application Assist Processor [zAAP] on z/OS)
- Enablement of an incremental migration of COBOL to Java (on z/OS), reducing the risks associated with a batch modernization project
- Integration with existing enterprise batch schedulers, such as IBM Tivoli® Workload Scheduler, Computer Associates 7 (CA7), Control-M and Zeke, to help deliver a WebSphere technology-based batch execution environment that is robust and cost-effective
- Enablement of new execution patterns, including dynamic OLTP, a batch execution environment built on WebSphere software and highly parallel batch jobs
- Integration with the overall SOA strategy of reuse by enabling users to share business logic across both the OLTP and batch paradigms
- A high-performance batch processing by leveraging the System z, z/OS and WebSphere Application Server for z/OS performance optimizations gained when running in close proximity of the data

WebSphere Service Registry and Repository

SOA has the potential to drive business agility, business process vitality, reuse of your existing services, improved connectivity and closer alignment of IT to business. Making the most of this potential depends on how well you govern and manage the services in your SOA.

Businesses without proper governance and management risk losing control over their services. They face barriers to reusing services, such as redundant services, misalignment with business processes, and lack of application consistency and integrity.

Store, access and govern information to support a successful SOA

IBM WebSphere Service Registry and Repository provides governance capabilities that enable you to get the most business value from your SOA. It facilitates storing, accessing and managing service information, called service metadata, so that you can easily select, invoke, govern and reuse your services.

WebSphere Service Registry and Repository for z/OS is based on a highly scalable and available architecture along with robust registry and repository capabilities. WebSphere Service Registry and Repository has tight integration with IBM SOA Foundation, an integrated, open standards-based set of software, best practices and patterns for SOA. WebSphere Service Registry and Repository is an essential component of the Smart SOA approach. It is an industrial-strength tool that enables you to publish, find, enrich, manage and govern services in your SOA (see Figure 4).

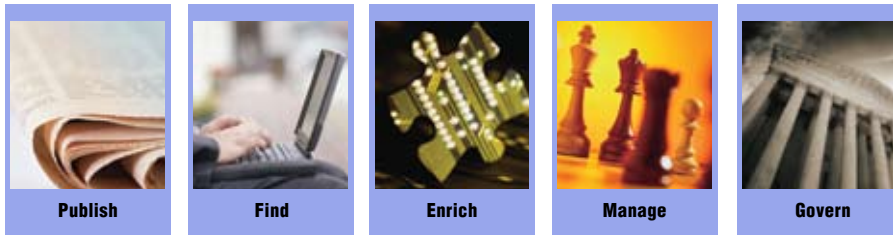


Figure 4. WebSphere Service Registry and Repository enables you to publish, find, enrich, manage and govern the services in your SOA.

Encourage reuse

The *publish and find* capabilities of WebSphere Service Registry and Repository promote service reuse in SOA projects by providing greater visibility of and easier access to existing services. These capabilities also expose redundant or inefficient services.

Service discovery

The discovery engine discovers services on both IBM WebSphere Application Server and Microsoft® .NET platforms, allowing you to keep an accurate record of deployed services as well as intended services in your SOA and enabling more reuse and control.

Faceted search

Faceted search provides a natural and user-friendly way to find the services you are looking for. You can progressively refine search results using attributes, document types or classification.

Help mainframe applications on System z to participate fully in enterprise SOA

WebSphere Service Registry and Repository helps high-value mainframe applications on the IBM System z platform (such as IBM CICS® and IBM WebSphere MQ) to participate fully in enterprise SOA (see Figure 5).

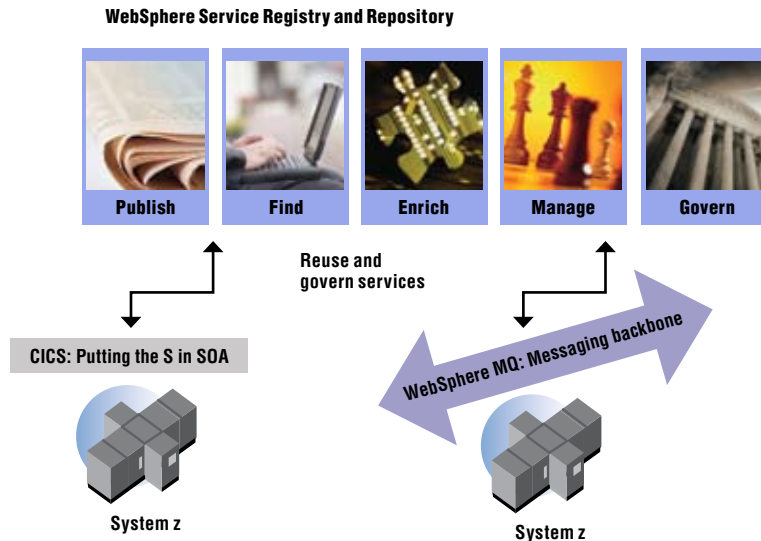


Figure 5. WebSphere Service Registry and Repository enables mainframe applications on the System z platform to participate fully in enterprise SOA.

Gain support for WebSphere MQ endpoints

The new metamodel and extensible parser enable IBM WebSphere MQ endpoints to be represented as services. This support extends the reach and visibility of applications connected to WebSphere MQ as Web services and enables reuse, governance, visibility, composition and change-impact assessment.

Service-enable your CICS applications

Web services created from IBM CICS Transaction Server for z/OS, Version 3 can be entered into the WebSphere Service Registry for use across an SOA as well as for discovery and incorporation into applications anywhere. CICS implements support for the WebSphere Service Registry and Repository application programming interface (API) through support pack CA1N so that Web services can be called dynamically from within CICS applications.

You can enable CICS Transaction Server to publish and retrieve Web Service Description Language (WSDL) files to and from WebSphere Service Registry and Repository. With WebSphere Service Registry and Repository you are able to:

- Publish and retrieve WSDL files from the CICS Transaction Server for z/OS environment to WebSphere Service Registry and Repository, where they can be accessed by other Web applications.
- Retrieve WSDL files from WebSphere Service Registry and Repository to the CICS Transaction Server for z/OS environment, where they can be modified and reverse engineered into new high-level-language (HLL) structures for CICS applications.

Enhance connectivity

The *enrich* capability enables dynamic and efficient access to services information by both runtime applications and processes that facilitate better connectivity and efficiency.

With an enterprise service bus (ESB), WebSphere Service Registry and Repository increases runtime flexibility of applications and processes by providing dynamic selection of services (for example, Web services) based on service metadata stored in WebSphere Service Registry and Repository, making intelligent decisions to route messages. WebSphere Service Registry and Repository increases runtime flexibility of the prominent ESBs in the IBM portfolio such as IBM WebSphere Message Broker, IBM WebSphere Enterprise Service Bus and IBM WebSphere DataPower® Integration Appliance XI50.

Optimize service usage

The *manage* capability enables management of service metadata, as well as service interactions, dependencies and redundancies. You can classify services into meaningful groupings based on business objectives, manage policies for service usage and monitor how services are changed and versioned. Also, you can link related binary documents (such as Microsoft Word and PDF files) to service metadata. This capability helps you optimize the use of services in an SOA by exchanging rich service metadata with runtime monitoring tools and operational data stores.

Enable enterprise governance

The *govern* capability of WebSphere Service Registry and Repository supports various techniques to enable enterprise SOA governance during each stage of the service life cycle (model, assemble, deploy and manage), as shown in Figure 6.

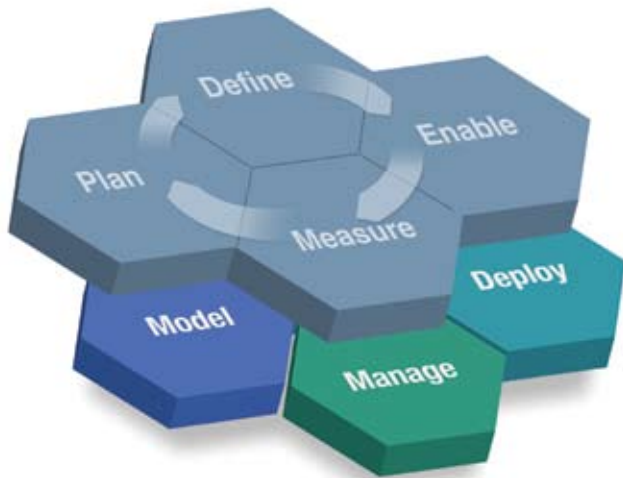


Figure 6. WebSphere Service Registry and Repository enables enterprise governance by handling decision rights, policies, versioning, classifications and change notifications throughout the service life cycle.

Access control

You can control the visibility and access to service metadata for sharing and reuse by using role-based access. Using the new access-control editor, you can easily set up access-control rules that align with your business.

Service classification

You can classify services and related metadata into groups that are meaningful in the domain of your organization and that align with your business needs. Using the new classification editor, you can improve productivity by easy set-up and modifications to your classification schemas.

Impact analysis

By maintaining relationships, WebSphere Service Registry and Repository has extensive support for analyzing the impact of service introduction, deletion or alteration. Using new graphical views, you can intuitively understand the service relationships and dependencies and determine the impact of making changes to services in your SOA environment. Registered clients can be notified of these changes through user-defined notification schemes, basic Java Message Service (JMS) publication of events and e-mail-based notification.

Service life-cycle management

By creating user-definable entities and customizing the service life cycle, you can configure WebSphere Service Registry and Repository precisely according to your business needs. WebSphere Service Registry and Repository supports tracking of service metadata as it makes its way through its governed life cycle, including approvals, deprecation and retirement in development, testing, staging and production environments. You can easily implement best practices for service life-cycle management with the ability to promote services and associated metadata based on life-cycle validations. Using custom validators, you can guard transitions in the life-cycle states of services.

Policy support

You can publish policies that apply to services stored in WebSphere Service Registry and Repository, including policy specifications that are compliant with the Web Services Policy Framework (WS-Policy). These policies are enforced by the clients of WebSphere Service Registry and Repository, such as an ESB, and help you institute best practices in your SOA deployment.

Governance profile

To help you get started easily and quickly, WebSphere Service Registry and Repository provides a well-defined service model that includes templates, associated life cycles, governance policies with a generic validator, a classification system, roles and perspectives. You can customize the model to suit your business needs.

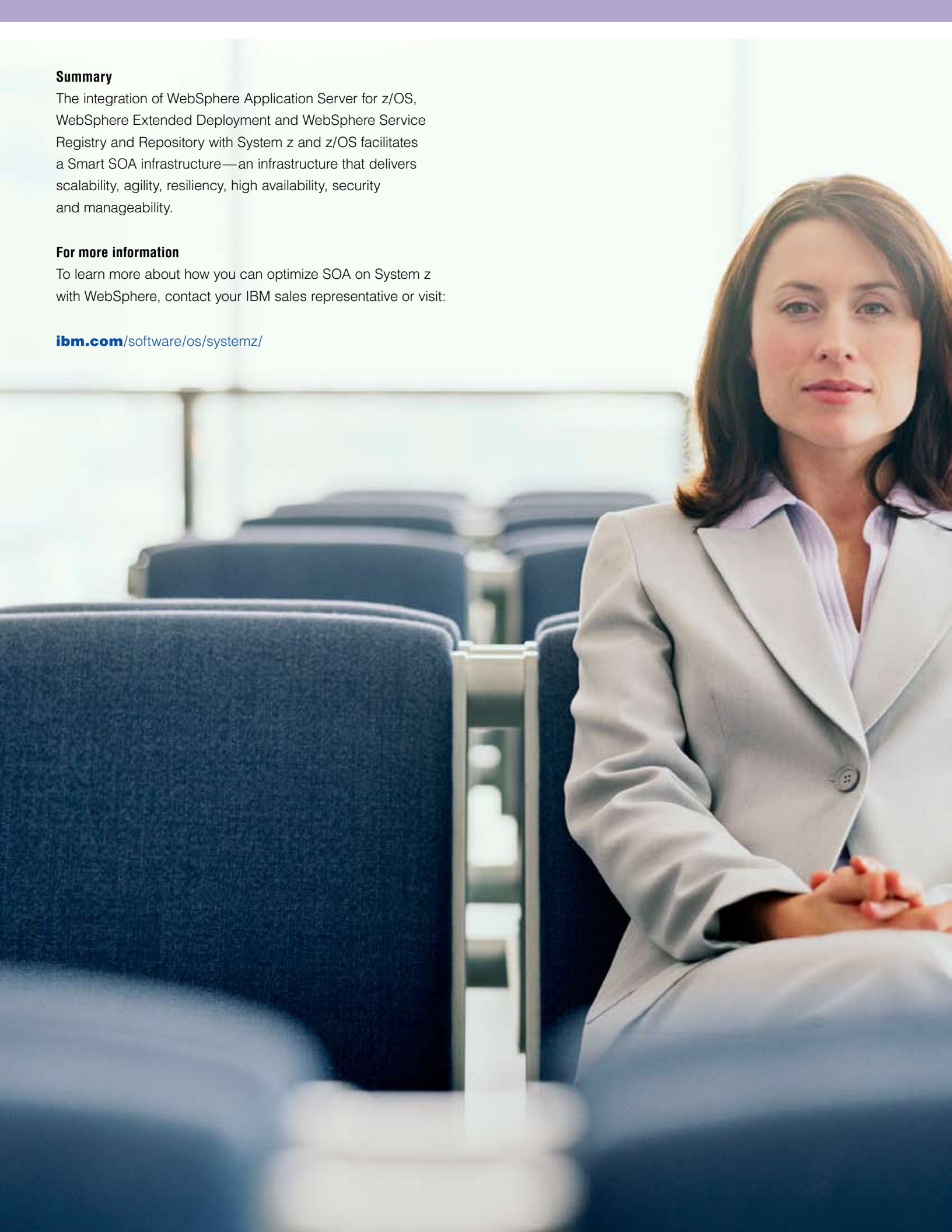
Summary

The integration of WebSphere Application Server for z/OS, WebSphere Extended Deployment and WebSphere Service Registry and Repository with System z and z/OS facilitates a Smart SOA infrastructure—an infrastructure that delivers scalability, agility, resiliency, high availability, security and manageability.

For more information

To learn more about how you can optimize SOA on System z with WebSphere, contact your IBM sales representative or visit:

ibm.com/software/os/systemz/





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