



IBM Software Group

# CICS and Web Services: Problems and Pitfalls

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# Agenda

- Introduction to Web Services
  - Industry perspective
- A Peak Under the Covers
  - CICS' implementation of Web services
- CICS Web Services Recommendations
  - Learn from others who have already been there
- Common Problems
  - A sample of typical errors
- Problem Investigation
  - Tools and techniques
- Summary, and References
  - For additional information

# Introduction to Web services: What are “Web services”?

- Service-Oriented Architecture (SOA)
  - ▶ Business processes are packaged as ‘services’
  - ▶ SOA is a style for creating and using those services
  - ▶ Forms the basis of Web services

“It’s defined by standards and is equally accessible to individuals and small and large enterprises. It’s the best solution we have today for application construction.”

Jim Rhyne, IBM Distinguished Engineer

“SOA and the mainframe software environment”

- Web services
  - ▶ Clients and Servers communicate using XML
  - ▶ Follows the SOAP standard

“A software system designed to support interoperable Machine to Machine interaction over a network.”

World Wide Web Consortium (W3C)



# Introduction to Web services: Industry Perspective

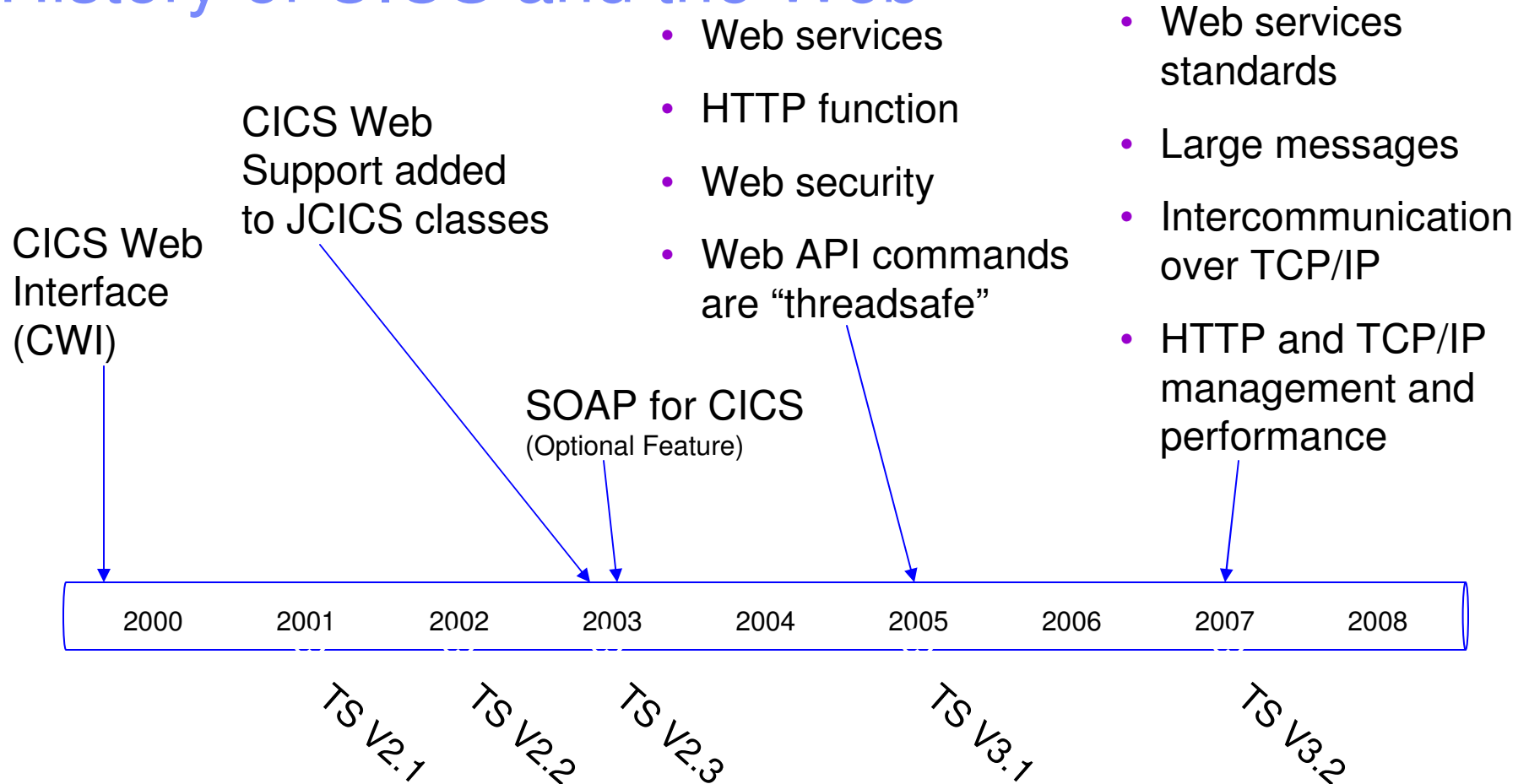
- More from Jim Rhyne:
  - ▶ “...the value of being able to reinvent and reuse mainframe code worldwide for our customers is in the tens of trillions of dollars.”

Jim Rhyne, IBM Distinguished Engineer  
September, 2007
  
- Numerous Gartner reports tout the benefits and popularity of Web services
  - ▶ “Web services... shows steadily increasing and widespread adoption of these technologies but modest deployment”

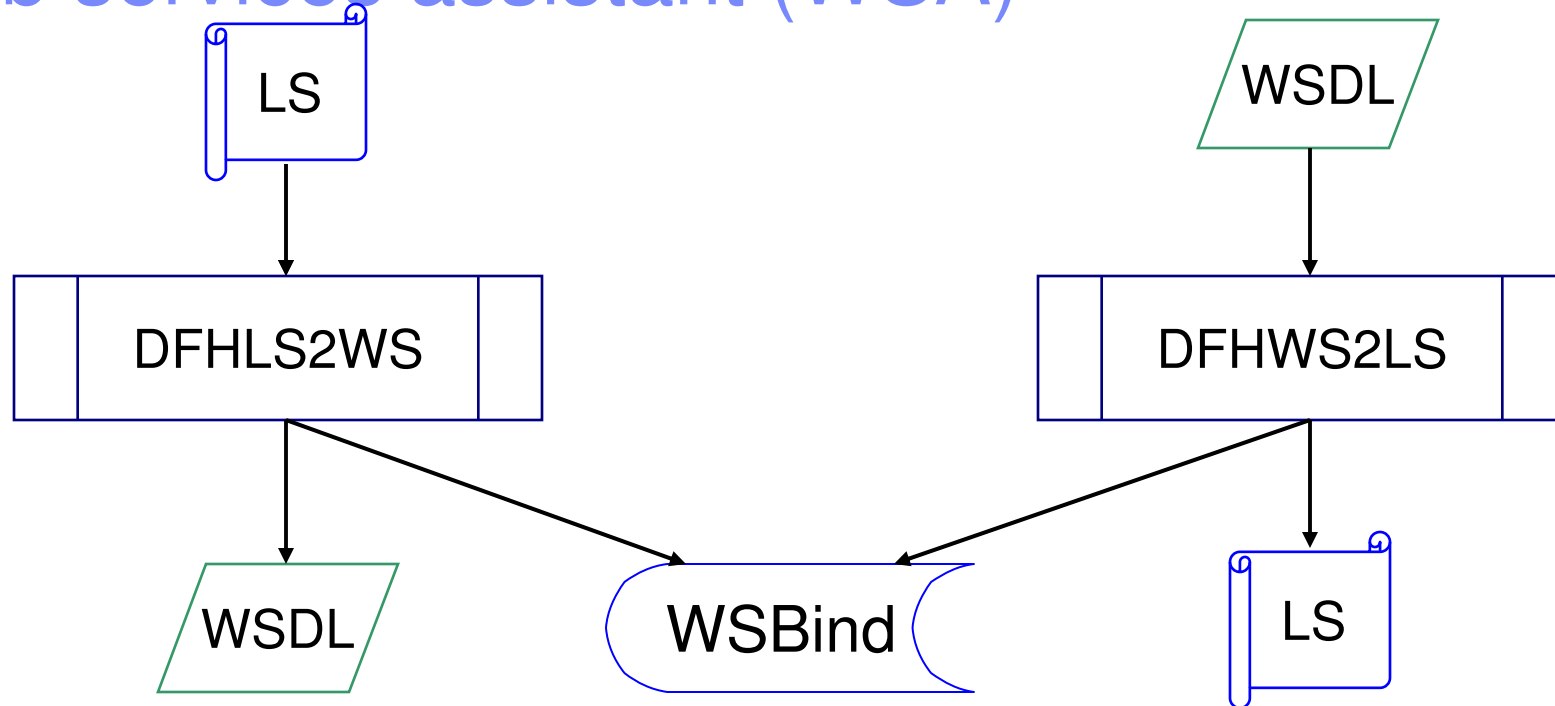
July, 2007
  
  - ▶ “There has been little adoption of... Web services in healthcare. The results at Duke (University Health System) show great promise using this architectural style for application integration”

October, 2007

# Introduction to Web services: History of CICS and the Web

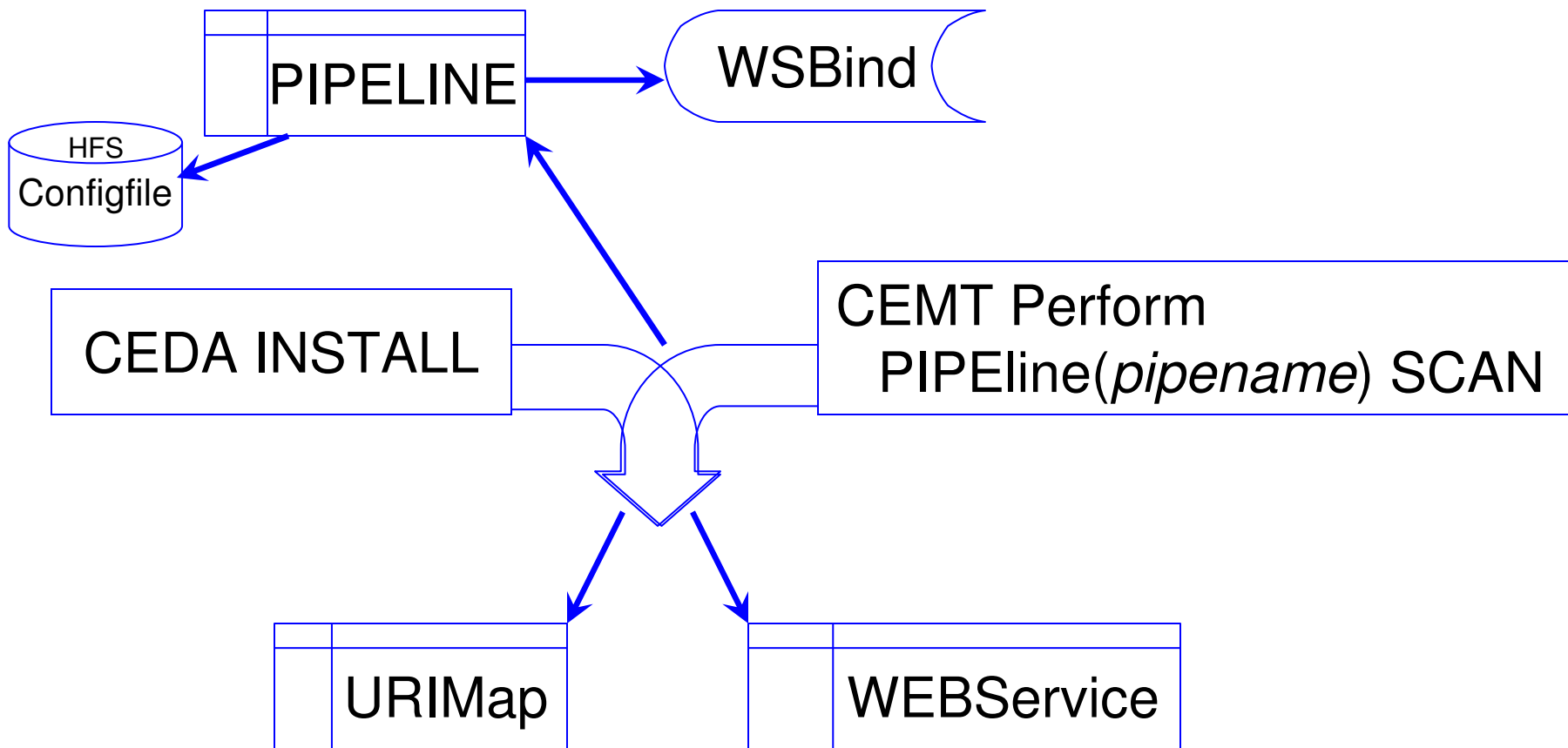


# CICS Web services components: Web services assistant (WSA)



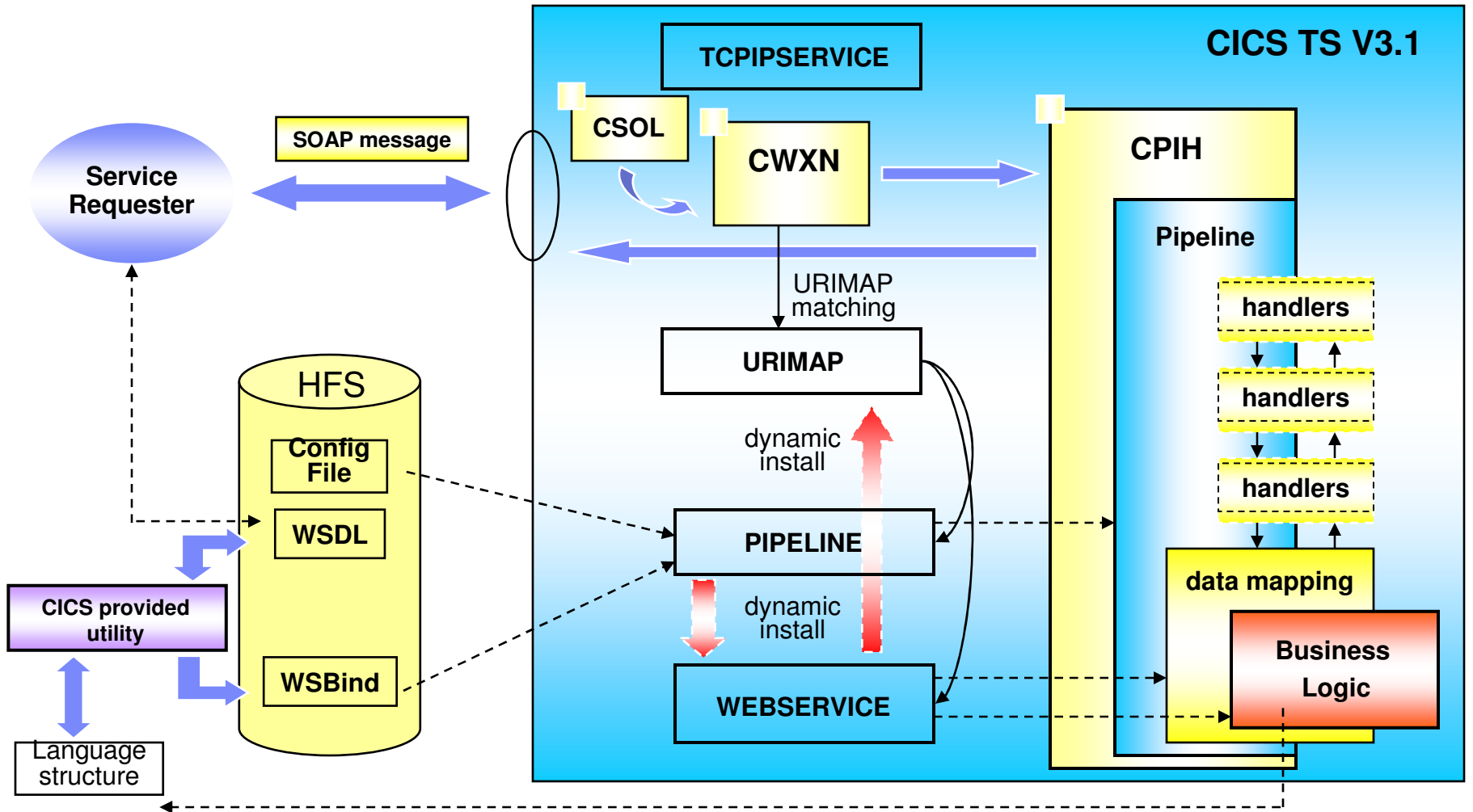
LS                      Language Structure (copybook)  
 WSDL                    Web Services Definition Language  
 WSBind                   CICS artifact used to map LS ↔ WSDL

# Creating the necessary CICS resources

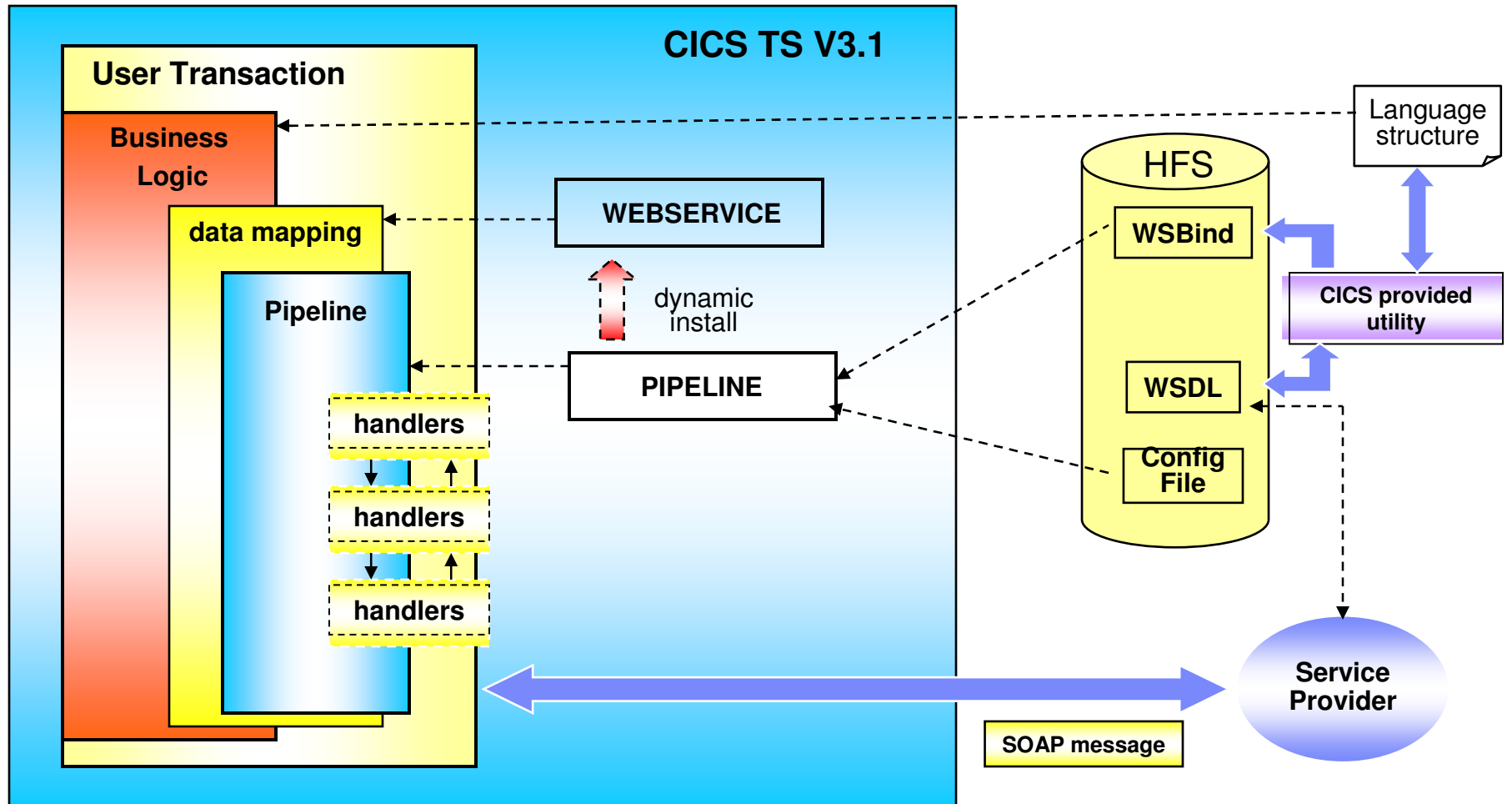




# Overview: CICS as a Service Provider



# Overview: CICS as a Service Requester



# Recommendations: General Strategies

- Check your maintenance!
  - ▶ Don't waste time trying to solve a problem that's already been solved
- Ensure sufficient dataset access
  - ▶ HFS: WSBIND, Pipeline CONFIGFILE, WSDIR
- Consider case-sensitive parameters
  - ▶ URIMap "PATH" parameter
- Consider using VALIDATION option
  - ▶ specified dynamically with  
**CEMT SET WEBSERVICE (*ws-name*) VALIDATION**
  - ▶ Can be defined in your WEBSERVICE resource definition

# Recommendations: Read the appropriate documentation

- Be aware of published requirements and limitations
  - ▶ Requirements:
    - Code Page support
    - PL/I support
    - IBM SDK for z/OS, Java 2 Technology V1.4.2
    - IBM XML Toolkit for z/OS V1.7
  - ▶ Limitations:
    - CICS complies with WS-I Basic Profile, adheres to all *MUST*-level requirements
    - CICS does not specifically implement support for UDDI registries
    - WSA and associated runtime are not fully compliant (limited support in mapping certain schema)
    - Mappings between high level language data types, and Web services descriptions are **not** symmetrical (logically equivalent, but not identical)
    - Transport protocols supported: HTTP, HTTPS, WebSphere MQ

## Recommendations: Read the appropriate documentation (continued)

- Additional details in the InfoCenter, “CICS compliance with Web services standards”, and in the specific topics:
  - ▶ COBOL and XML Schema mapping
  - ▶ C/C++ and XML Schema mapping
  - ▶ PL/I and XML Schema mapping
  - ▶ Variable arrays of elements
  
- Consider CICS’ `SOCKETCLOSE(NO)` recommendation

## Recommendations: Use the Sample!

- Install and play with the supplied sample
  - ▶ ‘walk before you run’
  - ▶ Catalog Manager application is simple, but provides a practical illustration of Web Services

“CICS provides an example of a catalog management application which can be enabled as a Web service provider...Use the example if you want a rapid “proof-of-concept” demonstration that you can deploy a Web service in CICS, or if you want a “hands-on” way to learn about Web services in CICS.” CICS Information Center, “Getting Started with Web services”

# Recommendations: Web Services Assistant (WSA)

- Use the latest MAPPING-LEVEL to ensure the most recent WSA support

MAPPING-LEVEL	APAR
1.0, 1.1	PK15904
1.2	PK23547
2.0	CICS/TS 3.2 base

- ▶ Unlike other CICS maintenance, WSA support enhancements are NOT automatically incorporated into WSAs
  - ▶ Caution is advised, as this may result in unintended changes to the generated artifacts (WSBind, Copybook, and WSDL files)
  - ▶ Refer to CICS InfoCenter, “Mapping levels for the CICS Web services assistant” for more details
- Verify you’re using the correct input parameters
    - ▶ For example, it’s invalid to specify PGMNAME for a Web service **requester**
    - ▶ Be aware of the case-sensitive parameters

# Common Problems: Deployment

- Performance problems with the CICS WSA
  - ▶ Check your LE configuration

```
//STDENV DD *  
_CEE_RUNOPTS=STACK(49152,16384,ANY,KEEP,262144,16384)  
/*
```
  - ▶ Additional details available in Technote #1249544  
<http://www.ibm.com/support/docview.wss?rs=1083&uid=swg21249544>
- WSDL or WSBind errors (“deployment errors”)
  - ▶ Unusable WSDL
  - ▶ Unsupported features
  - ▶ Unable to install PIPELINE or WEBSERVICE resource
    - Just because an INSTALL completed, doesn’t mean it was successful!
    - Use CEMT to inquire against the status of the appropriate resources
    - Diagnosis: Messages in Logs, and Trace of the install with PI=1-2



# Common Problems: Runtime

- Access from a Browser
  - ▶ (not appropriate for Web Services)
- Response time is longer than expected
  - ▶ Can be caused by the TCP/IP “DELAYACKS” parameter
  - ▶ Code NODELAYACKS on the TCPCONFIG statement
    - DELAYACKS can still override this setting for specific PORT, PORTRANGE, BEGINROUTES, or GATEWAY statements
  - ▶ Refer to Technote #1250026 for further details
- DFHPI0602 The CICS SOAP handler failed to parse a message. The parse error code is error-code. The DFHPIEP return code is return-code.
  - ▶ CICS SOAP handler program uses the PL/I XML parser to process the contents of the SOAP message; a parsing error generates this message
  - ▶ Detailed explanation and diagnosis in Technote #1264885

## Common Problems: Runtime (part 2)

- Data Conversion errors
  - ▶ After PK23547, one of the following messages are also issued:
    - DFHPI1007, DFHPI1008, DFHPI1009, DFHPI1010
  - ▶ Possible causes:
    - invalid SOAP message
    - Out-of-range value
  - ▶ Detailed diagnosis assistance in Technote #1211424

# Common Problems: CICS and HFS

- Insufficient HFS dataset access

- ▶ Example showing an error accessing the Pickup shelf in a PIPELINE resource definition:

```
DFHPI0705 E 13/01/2006 23:10:54 DBDCCICS CICSUSER PIPELINE  
EXPIPE02 encountered an error writing the configuration to  
the derived shelf /var/cicsts/DBDCCICS/PIPELINE/EXPIPE02/.  
The response code from the HFS write was X'00000081' and the  
reason code was 'X'0594003D'.
```

- Corrupt WSBIND file

- ▶ **Symptom:** DFHPI0914 WEBSERVICE *webservice* is unusable because the WSBIND file is corrupt
- ▶ If you generated your WSBIND file on a distributed platform -- for example, Rational Developer for z (RD/z) -  
- make sure you transferred the file to z/OS in BIN  
(binary) mode

## Problem Investigation: Check for previously-reported problems

- IBM ServiceLink SIS – APARs, PTFs, other technical information
  - ▶ Software defects
- Web-based CICS TS Support: Technotes, Troubleshooting, FAQs
  - ▶ Site also provides options to subscribe to email alerts, find publications, view APARs/PTFs
  - ▶ <http://www.ibm.com/cics/tserver/support/>

# Problem Determination: Tools...

- Web services deployment (using WSA)
  - ▶ Job output
  - ▶ Log file
  
- CICS runtime errors
  - ▶ CICS Messages (Joblog and MSGUSR)
  - ▶ Trace (Internal or Auxiliary Trace)
    - Domains: AP, EI, PI, SO, PG, XS = 1-2, otherwise =1
  - ▶ CICS System dump
  - ▶ Containers (dumps and traces)

# Problem Determination: ...and Techniques

- WSDL validation tools
  - ▶ RD/z
  - ▶ Eclipse
- WSDL Formatting
  - ▶ Web Browser (Firefox)
- CEDX (CEDF) transaction
  - ▶ HTTP transport: Tran(CPIH)
  - ▶ WMQ transport: Tran(CPIQ)

## Problem Determination: Where to look for diagnostic information

- Check all error logs for messages related to the error you're encountering
  - ▶ Tooling (WSA): Joblog, SYSPRINT, HFS error log (specified by the LOGFILE parameter)
  - ▶ Runtime (CICS): CICS system log, MSGUSR – and if necessary, Dumps or Traces

# Summary

- Review the history and implementation of Web Services under CICS TS V3.1
- Describe techniques and resources for CICS problem determination
- Review categories of commonly-reported problems
- Recommendations to help avoid problems



# References:

## IBM

- **CICS Information Center**  
<http://publib.boulder.ibm.com/infocenter/cicsts/v3r1> (CICS TS V3.1)  
<http://publib.boulder.ibm.com/infocenter/cicsts/v3r2> (CICS TS V3.2)
  - ▶ Information Roadmap: “Web Services”
  - ▶ Additional details available from *search* results, and from specific categories
  - ▶ ...and, of course, the manual: CICS Web Services Guide
    - 3.1 - SC34-6458
    - 3.2 - SC34-6838
  
- **Redbooks**  
<http://www.redbooks.ibm.com>
  - ▶ CICS Web Services Workload Management and Availability SG24-7144
  - ▶ Implementing CICS Web Services SG24-7206
  - ▶ Developing Web Services Using CICS, WMQ, and WMB SG24-7425
  - ▶ Application Development for CICS Web Services SG24-7126
  - ▶ WebSphere for z/OS v6 Connectivity Handbook SG24-7064
  - ▶ Architecting Access to CICS within an SOA SG24-5466
  - ▶ Securing Access to CICS Within an SOA SG24-5756
  
- **CICS Transaction Server support site**  
<http://www.ibm.com/cics/tserver/support/>

# References: External

- World Wide Web Consortium (W3C) specifications for the following:
  - ▶ SOAP 1.1, 1.2      <http://www.w3.org/TR/soap>
  - ▶ WSDL 1.1          <http://www.w3.org/TR/wsdl>
  - ▶ XML 1.0            <http://www.w3.org/TR/REC-xml>

You can check the CICS Information Center, under the topic “External standards” for a more extensive list and current references (for your CICS release)
  
- Wikipedia ([www.wikipedia.org](http://www.wikipedia.org)) for the following articles:
  - ▶ Service-oriented architecture (SOA)
  - ▶ SOAP
  - ▶ Web services
  - ▶ Web Services Description Language (WSDL)

# References: For Further Information

## ▪ Technotes and FAQs:

<http://www.ibm.com/support/docview.wss?rs=1083&uid=swg2<document#>>

- ▶ Webcast replay: Understanding Urimaps, Pipelines, and Webservices for CICS #7010693
- ▶ How to read WSDL – A bottom-up approach #1199529
- ▶ MustGather: Documentation for Web services problems in CICS on z/OS #1220283
- ▶ Testing CICS Web services #1268824
- ▶ Customization of generated WSDL using DFHLS2WS #1264647

## ▪ z/Journal articles:

- ▶ CICS TS 3.1: Debugging Background and Guidance  
<http://www.zjournal.com/index.cfm?section=article&aid=737>
- ▶ CICS 3.2 Delivers New SOA Capability to Enterprises  
<http://www.zjournal.com/index.cfm?section=article&aid=848>
- ▶ Responding to Business Dynamics with Web Services and CICS  
<http://www.zjournal.com/index.cfm?section=article&aid=933>
- ▶ Configuring CICS Pipelines in CICS TS v3.1  
<http://www.zjournal.com/index.cfm?section=article&aid=723>

# Additional WebSphere Product Resources

- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at:  
<http://www.ibm.com/developerworks/websphere/community/>
- Learn about other upcoming webcasts, conferences and events:  
[http://www.ibm.com/software/websphere/events\\_1.html](http://www.ibm.com/software/websphere/events_1.html)
- Join the Global WebSphere User Group Community: <http://www.websphere.org>
- Access key product show-me demos and tutorials by visiting IBM Education Assistant:  
<http://www.ibm.com/software/info/education/assistant>
- View a Flash replay with step-by-step instructions for using the Electronic Service Request (ESR) tool for submitting problems electronically:  
<http://www.ibm.com/software/websphere/support/d2w.html>
- Sign up to receive weekly technical My support emails:  
<http://www.ibm.com/software/support/einfo.html>

# Questions and Answers

