

Managing Quality and Performance of Teamcenter Enterprise Customization at Delphi

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Premium Partners:



Microsoft

Agenda

- Delphi
- GES
 - Overview
 - Architecture
 - Release Management
 - Development
 - Quality Assurance
 - Performance
 - Summary

PLM/PDM Systems at Delphi

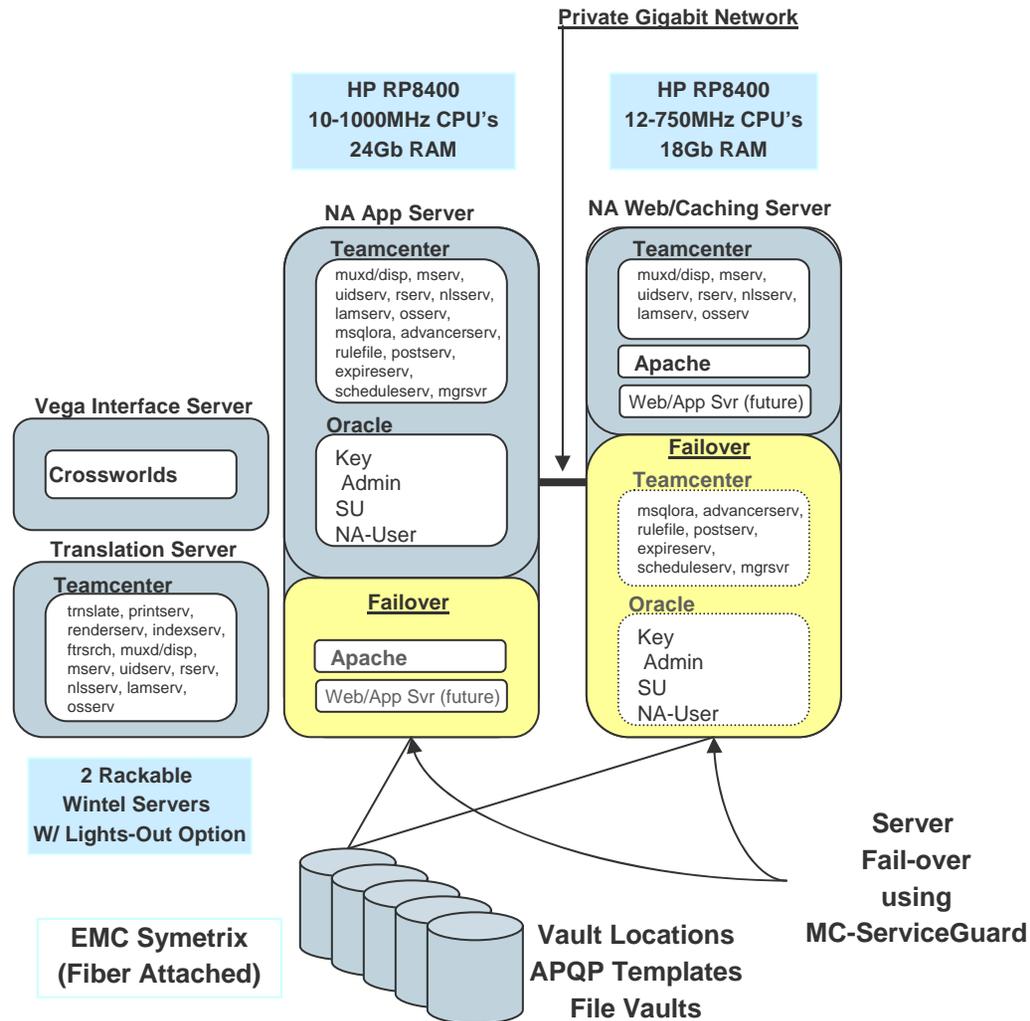
- TcEngineering
 - 34 Production Servers running TcEng v9.1.2.10D
 - Over 4,000 users
- TcEnterprise
 - 1 Production Server running TcAS v4.0
 - html / e!Vista only, no OMF for users
 - Upgrade to Teamcenter 2005 by Q3'06
 - 14,000 named users
- Various systems as required to release to Customers
- Legacy systems already scheduled for replacement

GES Summary

- The Global Engineering System (GES) is a repository for product related information
 - Based on Teamcenter Enterprise TcAS (Teamcenter Automotive Supplier)
 - Main functions:
 - Item Master
 - parts, materials, packages, manufacturing objects, documents
 - Engineering Bill of Materials
 - structured items
 - Bill of Everything (Bill of Documents)
 - hierarchy of all information related to a Product
 - Document Management
 - management of source documents
 - Integrated Change Control based on CMII
 - CM-II is 2nd Gen Configuration Mgt as defined by the Institute of Configuration Management
 - External System Interfaces (legacy systems, program management, substance of concern, ERP)

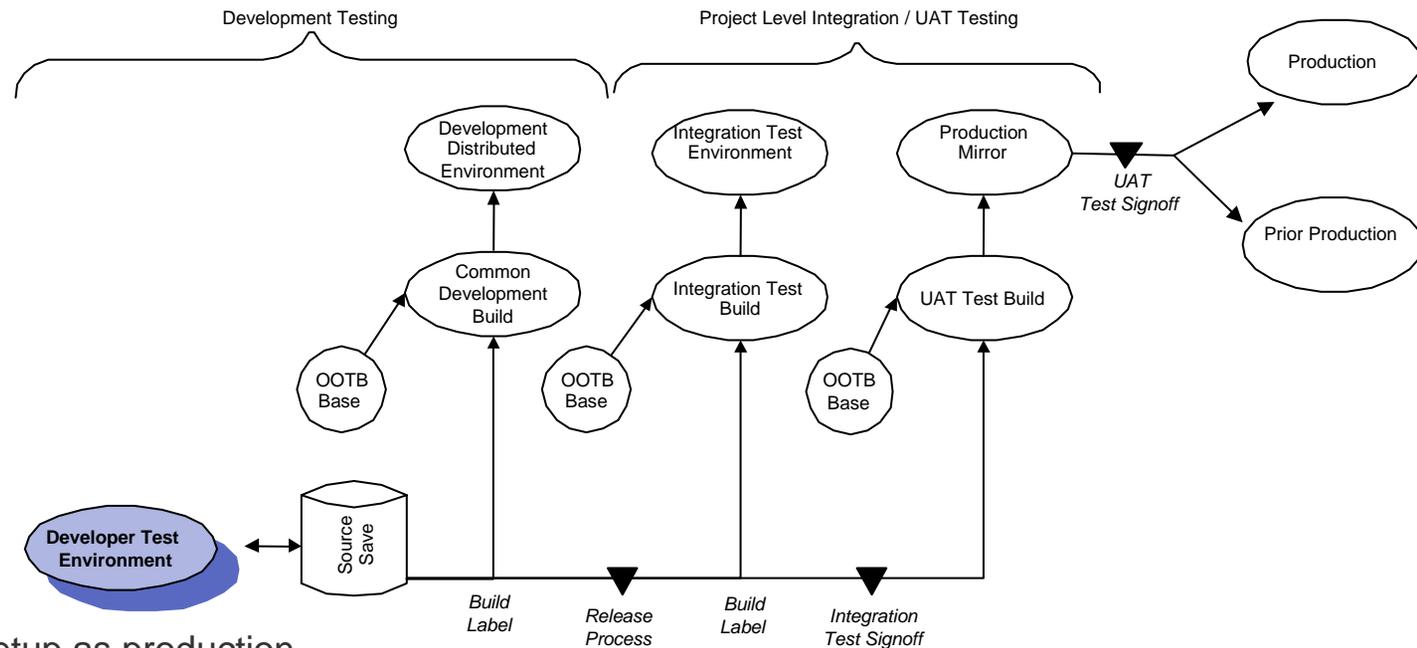
GES Hardware Architecture

- GES Environments
 - Central Production
 - Testing Environment
 - Model Office
 - Development
 - Training (regions)



GES Testing Environment

- Development Distributed Environment
 - Enables developers to test changes with production-like data
- Integrated Testing Environment
 - Test new builds. Used by testers for system / integration testing of new software
Performance and load testing will also be performed here

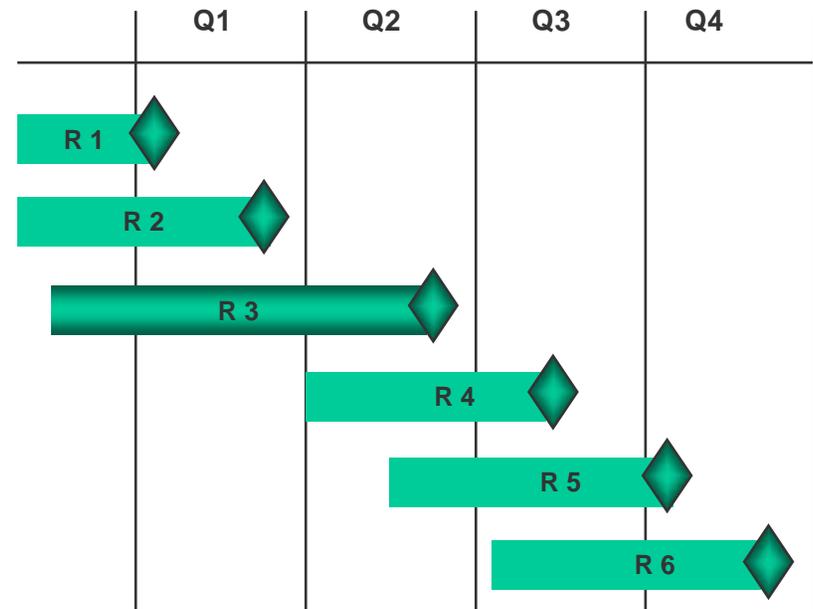


- Production Mirror
 - Environment setup as production.
Final staging environment prior to installation in production.
- Prior Production Release
 - Keep copy of previous release for Tier II, Tier III testing and analysis

GES Release Management

Release Phases

- Requirements Definition
 - Business Content Planning
- Capacity planning
 - Development resource planning
- Development
 - Business design
 - Technical design
 - Code development
 - Unit test
 - Walkthrough
 - Documentation
- Testing Phase
 - System / Integration Testing
 - User testing
- Deployment
 - Release into production



GES Release Management

➤ Release Planning

- Establish release plan for the year
 - Advance planning of content, schedule and milestones
 - Deployments based on approved release plan

★ ➤ Manage Requirements

- Enforce proper documentation of requirements
- Validate requirements against common business process
- Request prioritization based on scope and deliverables of the program

★ ➤ Manage Release Content

- Requirements that meet criteria get added to the master content list
- Change requests in each release are limited to available capacity
- Final Release Content is submitted to development group

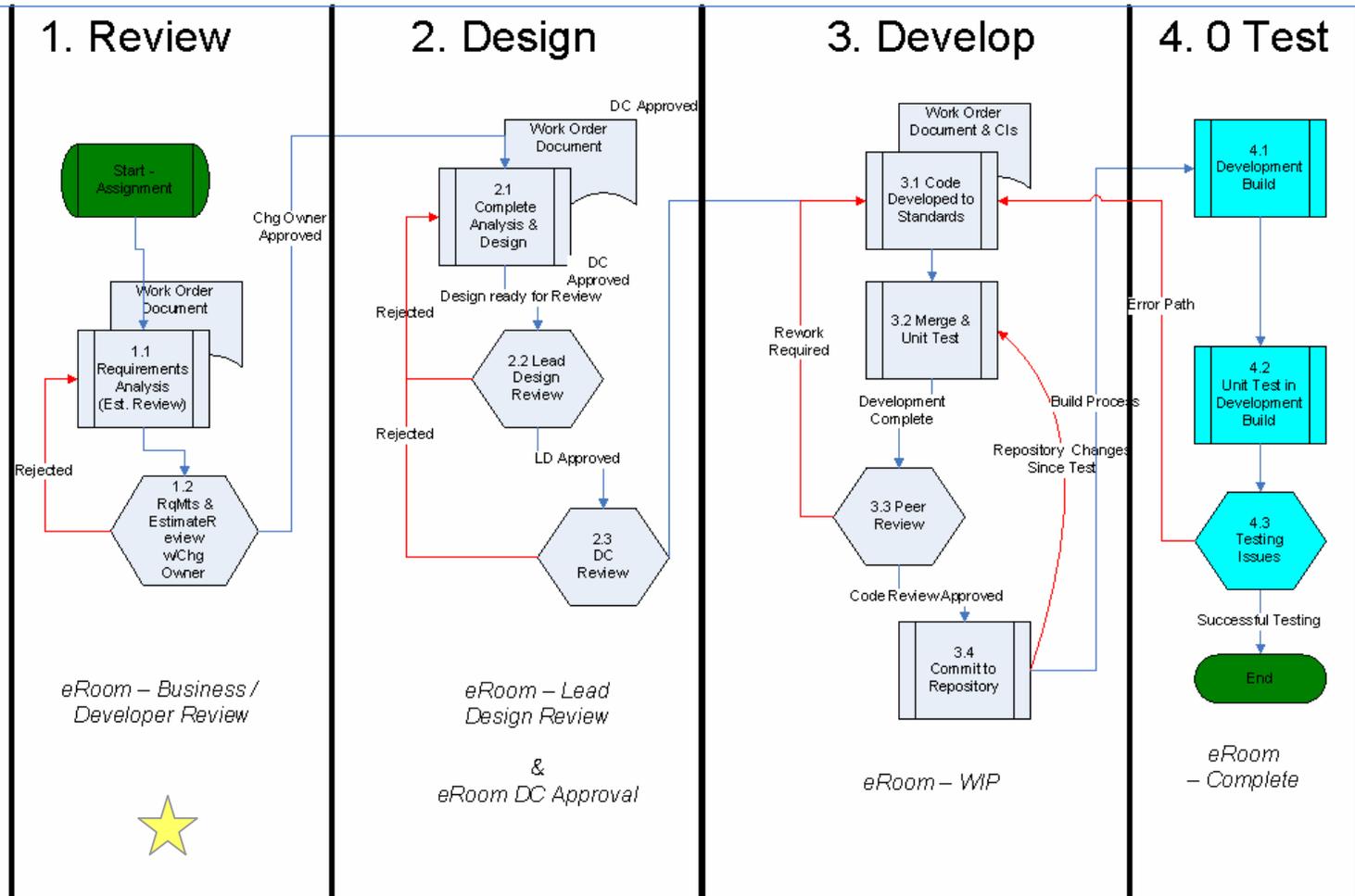
➤ Capacity Planning

- Development group assigns requests based on resource pool
- Detail work schedule is prepared for the current release
- Development group confirms deliverables for current release
- Release Work starts

GES Development Process

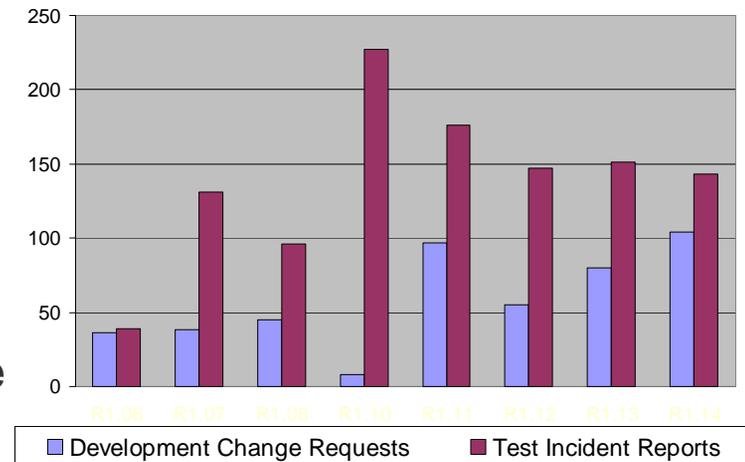
GES Development Process

Friday, January 13, 2006



GES Development Process

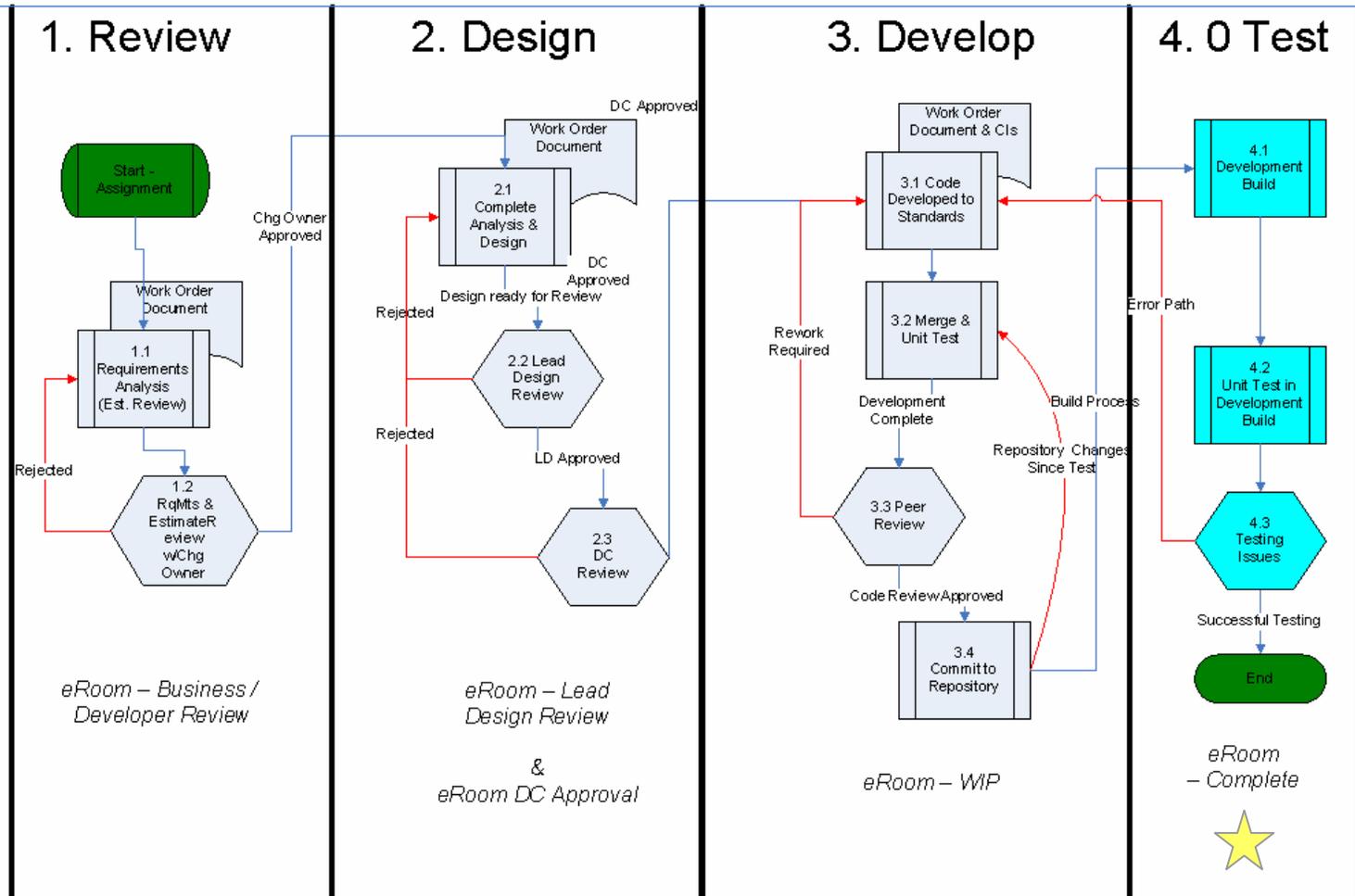
- Improvement area:
 - Reduction of Test Incidents/Change Request occurring within the GES Development Cycle
- Six Sigma tools being applied for process improvement:
Survey, PMAP, FMEA, Control Plan
- Two key processes identified:
 - Requirements Analysis Process
 - Unit Test Process
- Process improvement:
 - Formal detail review of change request by developer and owner to gain complete understanding of requirements
 - Measure and compare results
- Goal:
 - achieve first time quality, eliminate rework



GES Development Process

GES Development Process

Friday, January 13, 2006



GES Quality Assurance

- Software tool is used to track testing status for a release
- Single database maintains test plans and test results information
- Status is shared by all testers
- Ability to generate real-time readiness reports

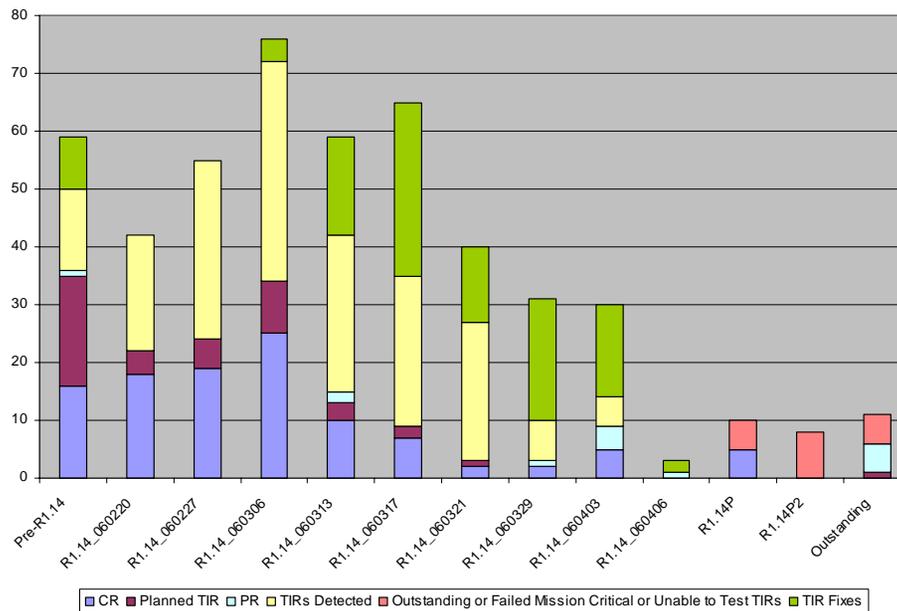
Div Recap			EC							
Build No	Type	CR/TIR State	Fail	In Process	N/A	Pass	Required	Grand Total	% Complete	% Pass
R1.14_060317	CR	Approved			4	3		7	100%	100%
	TIR	Closed			8	17		25	100%	100%
		Open			4	3		7	100%	100%
R1.14_060321	CR	Approved			1	1		2	100%	100%
	TIR	Closed			3	9		12	100%	100%
		Open			1	1		2	100%	100%
R1.14_060329	CR	Approved			1	1		2	100%	100%
	PR	Open			1			1	N/A	N/A
	TIR	Closed			2	6		8	100%	100%
Open			3		3	7		13	100%	70%
R1.14_060403	CR	Approved			4	1		5	100%	100%
	PR	Approved			1			1	N/A	N/A
		Open			2	1		3	0%	0%
R1.14_060406	TIR	Closed			2	5		7	100%	100%
		Open			8	1		9	11%	11%
	PR	Open						1	0%	0%
	TIR	Open						2	0%	0%

The screenshot shows a software testing tool interface. At the top, there are navigation icons and a project name: "Project : TD_GES [hz5mrl]". Below this, there are tabs for "REQUIREMENTS", "TEST PLAN", and "TEST LAB". The main area is titled "Test Grid" and contains a list of test results. The filter is set to "Subject[^Subject\Integration Testing for R1.14^]; Sorted By: Subject[Asc]; Test Name[Asc]".

Subject	Test Name	CR/TIR State	Build #	QA Status	EC Test Status	ES Test Status	S Test Status
CR-0506	CR-0506 Inactive Users Should Not Appear in Route Selection Lists	Approved	R1.14_060306	Pass	Pass	Pass	N/A
CR-0547	CR-0547 Modify Plants Affected Attribute	Approved	R1.14_060306	Pass	Pass	Pass	Pass
CR-0547	TIR-1445 Problem with view screens on CR-CN	Open	R1.14_060317	Pass	Pass	Pass	Pass
CR-0547	TIR-1475 Run Time Error on Clear Button on Create CR	Closed	R1.14_060317	Pass	Pass	Pass	Pass
CR-0707	CR-0707 CN Link From CR Print Friendly Produces a Run Time Error	Approved	R1.14_060306	Pass	Pass	N/A	N/A
CR-0714	CR-0714 Cross-Divisional Change Processing Solution	Approved	R1.14_060306	Fail	Pass	Fail	In Process
CR-0714	TIR-1421 E&S Not able to create CR-S	Closed		N/A	N/A	N/A	N/A

GES Quality Assurance

- Release statistics provide information of outstanding and high-severity test incidents
- TIRs are assigned for development action and resolved through re-testing
- Trend reports track progress on TIRs reduction in the current release and compare performance against other releases



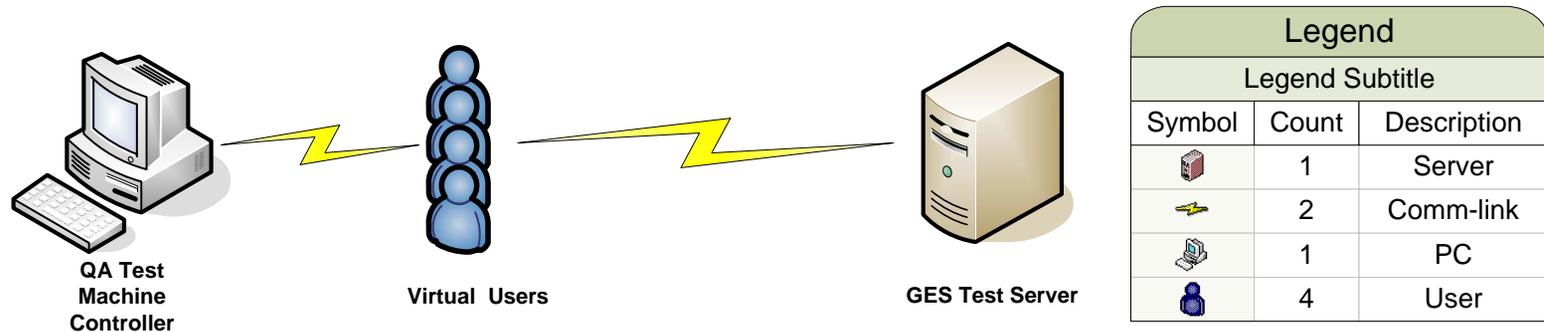
Automated Testing

- An automated testing solution addresses problems of time and resource constraints by dramatically speeding up the testing process.
- Tests can be created to check all aspects of the application, and be executed every time the application changes.

<i>Benefits of Automated Testing</i>	
<i>Fast</i>	<i>Tests execute significantly faster than human users.</i>
<i>Reliable</i>	<i>Tests perform precisely the same operations each time they are run, thereby eliminating human error.</i>
<i>Repeatable</i>	<i>Tests how the application reacts after repeated execution of the same operations.</i>
<i>Programmable</i>	<i>Program sophisticated tests that bring out hidden information.</i>
<i>Comprehensive</i>	<i>Build a suite of tests that covers every feature in the application.</i>
<i>Reusable</i>	<i>Reuse tests on different versions of the application, even if the user interface changes.</i>

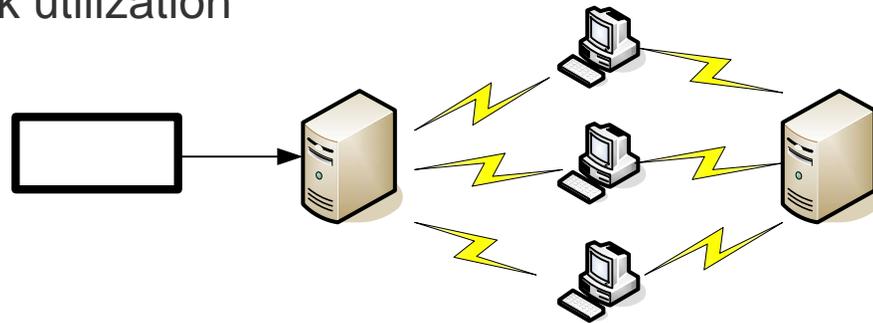
GES Load Testing

- Load test is the verification of the application capacity and variability under stress
- Duration of each test is 2-3 hours (off business hours)
- Load test simulates up to 50 users performing change management life cycle
- Execution takes place in the testing environment
- Results become a decision criteria for the release deployment
- Considerable reduces risk of system failure in production



GES Performance

- Performance monitoring:
 - Software tool in place to monitor GES production performance and network throughput
 - Currently implemented at least in one location of the following regions:
 - North America, Europe, Asia
 - System monitoring runs a business process script 24 X 7
 - Provides reports of system and network performance from several sites
 - Sends alerts on performance bottleneck or production failures to system administrators
 - Generates trend reports and historic information of production system transactions and network utilization



GES Performance

Average Response Time – Service Quality by all Location

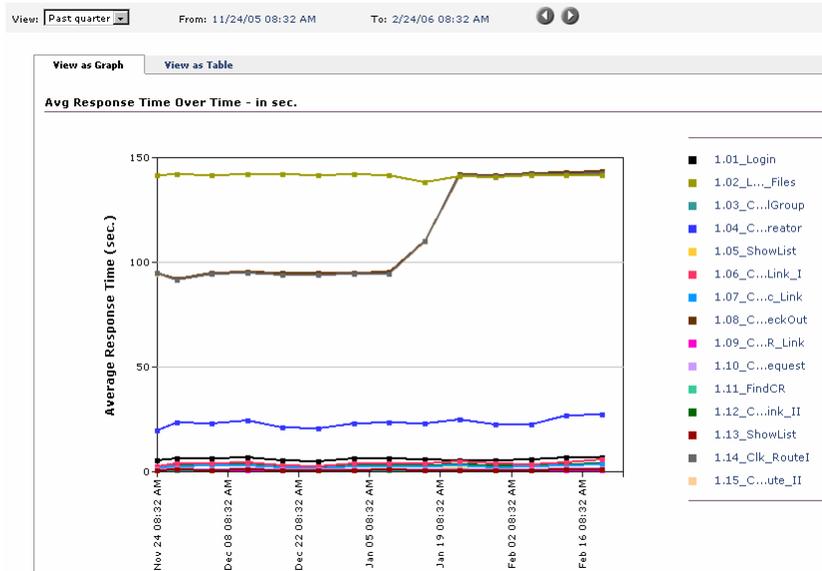


Note: Report uses daily aggregated data.

Average Response Time by Location

Average Response Time by Transaction

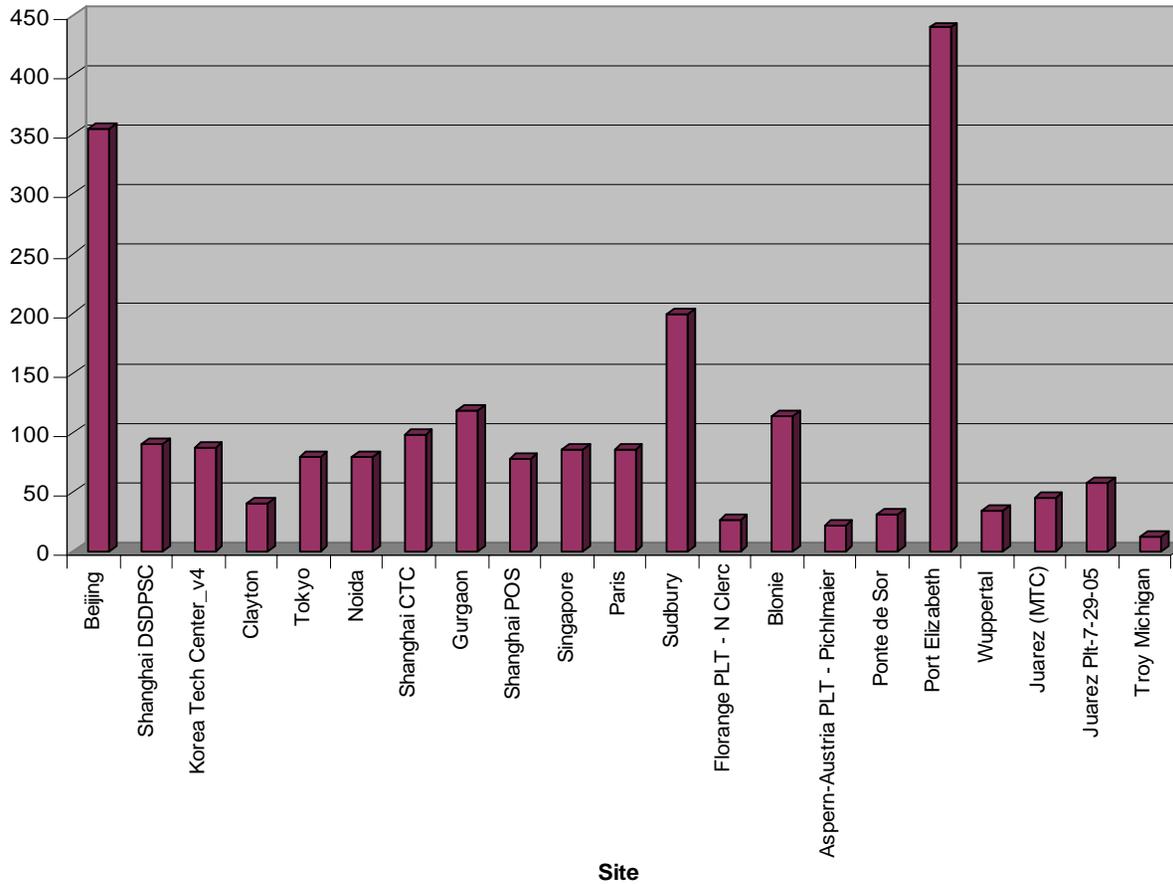
Average Response Time – Service Quality by all Transactions



Note: Report uses daily aggregated data.

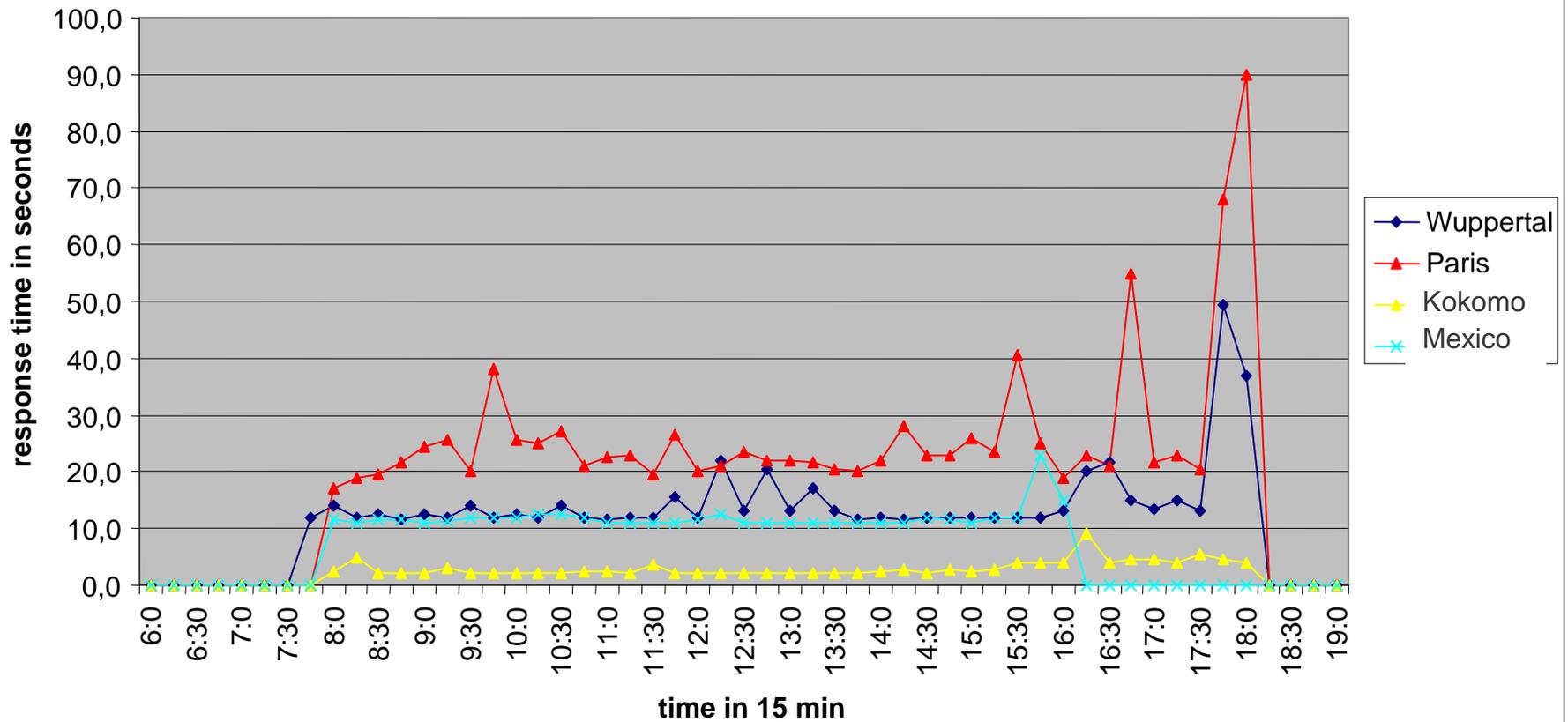
GES Performance - Sites Monitoring

Average Response Time - Route Function



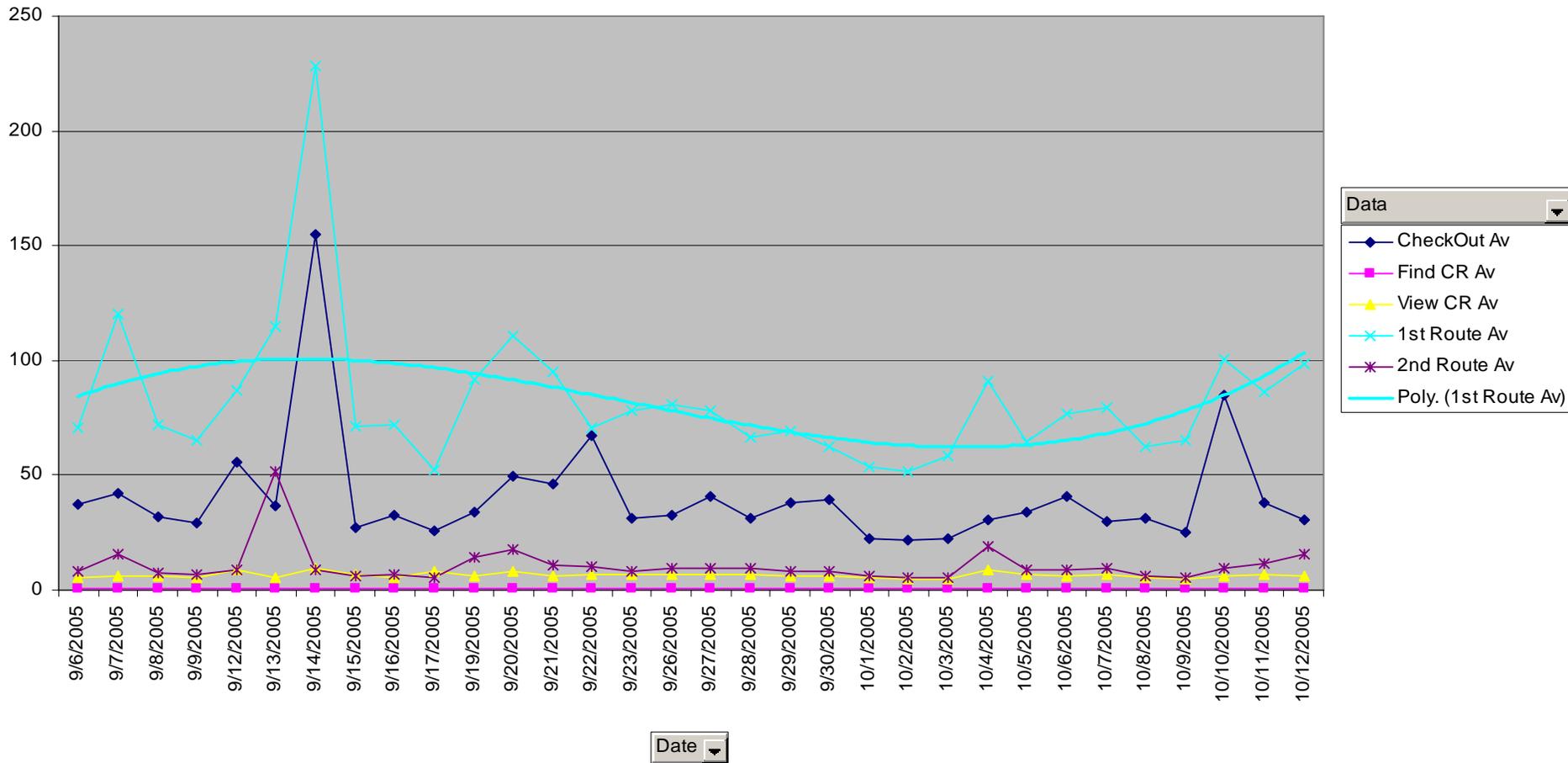
GES Performance - Sites Monitoring

Average Route First Q1 2006

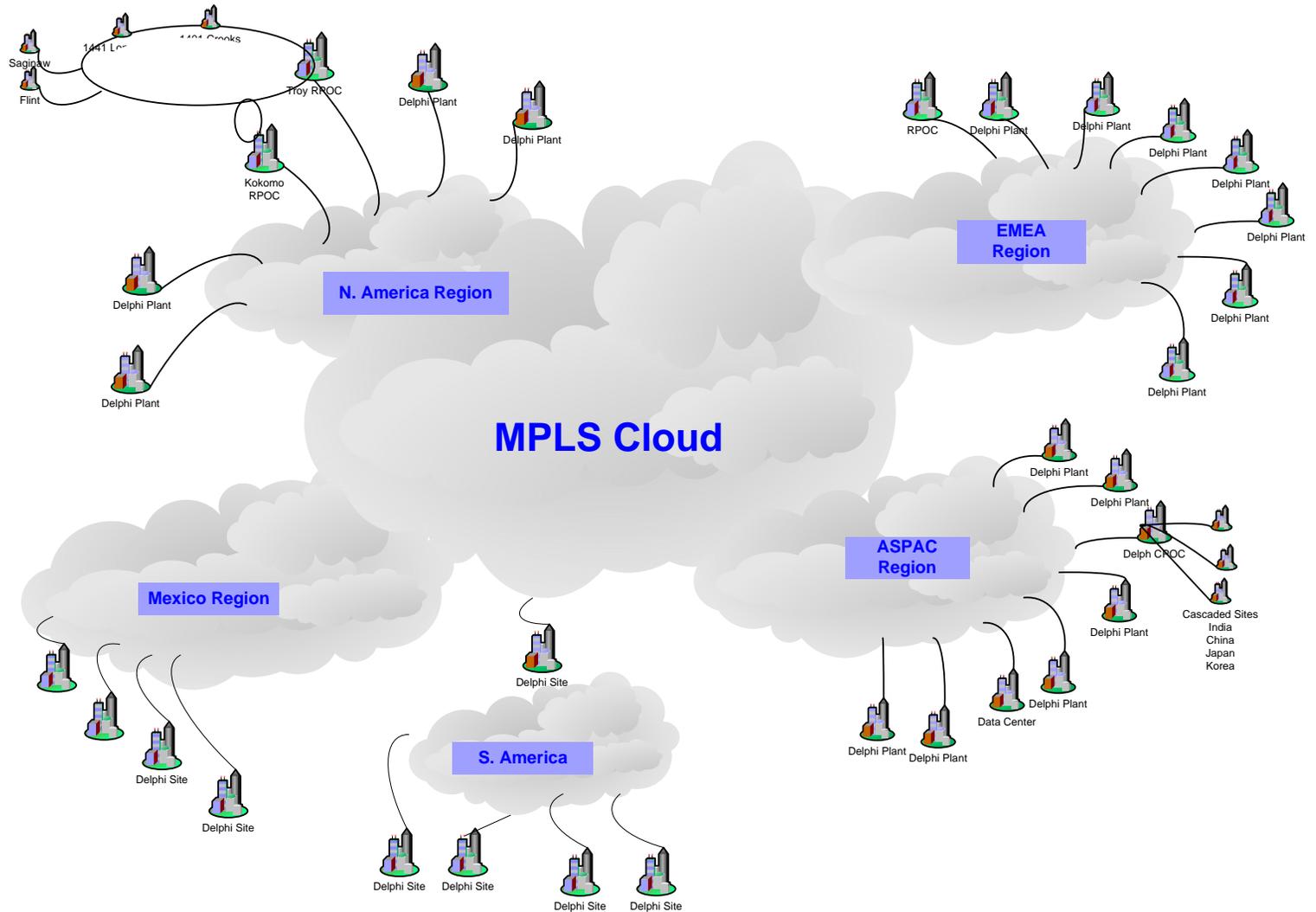


GES Performance - Sites Monitoring

Average daily metrics – single location



Delphi WAN



GES Application Performance

- Performance Improvement
 - Continue monitoring and measuring application performance
 - Get measurements from additional sites
 - Locations with higher number of users
 - Compare average performance to benchmark
 - Identify problem sites
 - Analyze and identify root cause of poor performance at problem sites:
 - Virus
 - Load balancing
 - Bandwidth size
 - Network hardware,
 - Network device / PC configuration
 - Optimize use of resources to resolve performance issues

Summary

- Continuous Improvement
- Scalability
- Simplification
- Integration
- Competence
- Benchmark

Thank you !

Questions?

Premium Partners:



Microsoft