

RCA No:	RCA20050711	RCA Title:	eDart Failed Code Release
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DESCRIPTION OF EVENT

Migration of incorrect code to production during a planned release on July 11, 2005 caused a loss of eDart functionality from 1830 on 7/11/05 until 2100 on 7/12/05.

Three complete failures of the eDart system lasting 5 minutes each were experienced during this period as a result of restoration efforts. These failures occurred at 2000 and 2200 on 7/11/05 and 0130 on 7/12/05.

The initial observable problem was the inability of generation customers to upload outage “actual switch” start and stop times using the eDart “browserless” XML interface. This Root Cause Analysis identified underlying causes related to source code repository management, inadequate migration and back out planning and a failure to utilize issue escalation and restoration processes.

ROOT CAUSE

Cause of outages:

The three complete eDart outages were caused by database failures resulting from continuous outage ticket upload requests. Because eDart was not translating the switch date start and stop information, the outage information management system of at least one member company was never being synchronized with eDart. Essentially, the customer system and the PJM system entered into an unending transaction process (an “endless loop”). The customer system would upload the outage data, eDart would not process it correctly, the customer system would attempt to confirm the upload and see that it had failed, and re-upload the data. This would continue until eDart had used all available system resources and the database would fail.

Cause of the failed release:

The source code that was used to generate the eDart release was inadvertently built using a version of code from a prior baseline (9/04).

As part of an organizational migration of source code repositories, the eDart source code had been migrated to a new code management tool (ClearCase). The July eDart release was the first time ClearCase was used to generate an eDart production release. During the source code migration, work that had been done in the old repository was lost. This was not discovered during the migration or during testing and only came to light when customers began to access the new version of the application in production.

Several opportunities to identify and resolve the issue prior to production implementation were missed.

- ◆ There was no defined process to confirm the successful migration of source code from the existing repository to the new repository.
- ◆ Because only specific functionality was planned to change with the release, only that functionality was tested. Regression testing was not done.
- ◆ The fact that the July release was being generated from a new code repository was not well known by the implementation team. Better awareness of this change should have resulted in a complete regression test.
- ◆ The ability for customers to test the application changes prior to production implementation was provided for – the new release was migrated to the external testing environment (Sandbox) – but customer testing did not reveal the problem.

Secondary cause – extended problem resolution time:

Two issues prevented PJM from resolving the issue quickly.

- ◆ The initial observable problem, although it met the criteria for a Severity 1 issue, was not classified as such. No ESR (Emergency Service Restoration process) was initiated. The issue could have been resolved more quickly if it had been communicated and / or escalated more quickly.
- ◆ Adequate preparation for a potential back out was not made as a part of the migration plan and the back out plan was not well developed or communicated.

Secondary cause – lack of visibility of the issue:

Although the individuals who were working the issue were in contact with customers while they worked to resolve the problem, PJM management was largely unaware of the situation. When customers called about the problem, PJM was generally unable to provide information related to the cause or plans to resolve the problem. The Sev1 / ESR processes are designed to provide both the appropriate resource priority for issue resolution and an on-going communication vehicle for PJM management and customers during problem resolution. This incident should have resulted in a Sev1 declaration and an ESR event.

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Immediate Corrective Action Taken	COMMENTS
The 7/05 release was recreated using a 9/04 baseline of source code.	Complete
All major XML functionality was tested prior to production migration.	Complete
All XML JAVA code verified in ClearCase.	Complete
Update migration planning template with verification steps for proper backups and back out plans, and broader functional testing, including regression testing.	Complete
Include all eDart application directories in backups.	Complete

Long Term Recommendations	COMMENTS
Expedite the ClearCase code migration plan for eDart and perform process training complete prior to any new development work.	In progress
Investigate developing automated full regression tests for the eDart application.	In progress – Deloach and O’Brien
Develop a standard test plan that executes all major operations within eDart and seeks member participation and verification in the testing cycle.	In progress – Deloach and O’Brien
Establish quality checkpoints and verification steps for the code build process.	Not started – Conboy
Identify any additional applications that have been migrated to ClearCase and confirm the completeness and accuracy of the migration.	In progress – CM team
Review the process for the development and approval of production migration plans and develop a template to ensure complete and thorough consideration of all requirements in the migration plan. Communicate the importance of complete migration planning to all project teams	In progress - McNamara
Determine why this problem was not identified as SEV1 and improve the problem severity identification process. Communicate the importance of problem escalation and communication to all personnel involved in project development and implementation activities, and in production support activities.	In progress - Conboy

RISK OF REOCCURRENCE
Specific changes have already been made to the standard eDart migration plan template which guides all major eDart code releases. These specific changes reduce the likelihood of reoccurrence significantly. The entire eDart code management process will be reviewed as it migrates to using ClearCase. No new development activity will be initiated until the process is complete and verified. These process changes, along with PJM’s commitment to quality, will reduce the risk of reoccurrence of the generic root causes involved in this issue.