JPL: An Inside Story of Upgrading to Oracle EBS R12

Session ID: CON3206

Present by:
Melanie Chau-Budiman
Scott Yeats
Company Information

- Jet Propulsion Laboratory (JPL)
  - Division of California Institute of Technology (Caltech)
  - Federally funded Research and Development Center (FFRDC) for NASA
  - Specialize in robotic space exploration
  - Located in Pasadena, California
  - ~ 5,000 employees and on-site contractors
  - ~ 1.6 billion operating budget
• Scott Yeats
  – Business Systems Analyst Manager
  – An employee at JPL for over 18 years
  – Lead analyst for 11i Upgrade (PO & AP)
  – Previously the Project Manager for the implementation of iProcurement, Mobile Supply Chain, JPL Custom Track-It and Hand Held Scanner Project
  – Co-Project Manager for R12 Upgrade Project
• Melanie Chau-Budiman
  – Development Manager
  – An employee at JPL for 26 years
  – Technical lead for the Oracle 10.7 implementation and 11i upgrade (PO, AP, OE and FA)
  – Managed a team of developers for the implementation of Oracle iProcurement, Oracle Property Manager, Mobile Supply Chain, TrackIt, Hand Held Scanners
  – Co-Project Manager for R12 Upgrade Project
Agenda

• JPL’s Upgrade Approach & Scope

• Strategies
  – Pre-Upgrade Activities
  – Testing
  – Change Management and Training
  – Held Desk Preparedness

• Highlights – Most Impacted Areas

• Lessons Learned

• Q & A
Project Structure

- R12 Project Champion
  CFO

- R12 Project Steering Committee & Scope Control Board

- R12 Project Co-Managers
  Melanie Chau-Budiman
  Scott Yeats

- Dir 11 - Human Resources
- Dir 17 – Information Technology
- Ofc 203 – Office of Protective Services
- Div 21 – Finance & Contract Management
- Div 22 – Enterprise Business Information Services
- Div 25 – Program Business Management
- Div 26 – Acquisition
- Div 27 – Logistics & Technical Information
- Div 28 – Facilities
- Dir 3000 – Engineering & Science
- Div 35 – Mechanical Systems Engineering, Fabrication & Test
- Ofc 5120 – Quality Assurance
Project Approach

• Treated the Project as a Technical Upgrade!

  Driven by the need to remain supported and current with Oracle e-Business Suite maintenance agreement

• Implemented new R12 required functionality only if needed to support existing business processes

• Retired customizations on a best-effort basis to reduce in-house maintenance effort
• Will leverage new R12 functionality as potential future projects to maximize probability of technical upgrade project success

• Identified and performed incremental upgrade for tasks that could be implemented in 11i to minimize downtime during upgrade
  – Upgraded Discoverer to 11g
  – Upgraded OBIEE to 10.1.3.4
  – Upgraded to Oracle DB 11gR2
  – Upgraded Kofax – Markview to 6.5
### Project Scope

<table>
<thead>
<tr>
<th>System Layer</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting</td>
<td>26 reporting tools/apps including ~300 Oracle report writer custom reports (test/fix/migrate)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>28 Oracle modules/products</td>
</tr>
<tr>
<td></td>
<td>37 3rd party apps</td>
</tr>
<tr>
<td></td>
<td>62 JPL custom apps</td>
</tr>
<tr>
<td></td>
<td>~101 custom/customized forms</td>
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<tr>
<td></td>
<td>~187 custom alerts</td>
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<tr>
<td></td>
<td>~Hundreds of custom concurrent programs</td>
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<tr>
<td>Middleware</td>
<td>Technology stack upgrade to OracleAS 10g</td>
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<tr>
<td></td>
<td>Discoverer upgrade to 11g</td>
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<tr>
<td></td>
<td>OBIEE upgrade to 10.1.3.4</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>Database</td>
<td>Upgrade to Oracle 11gR2</td>
</tr>
<tr>
<td></td>
<td>Update Data Warehouse schema and refresh scripts</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>Operating System</td>
<td>Patching</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware</td>
<td>Re-hosting of application server and development database server</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td>~85 interfaces</td>
</tr>
</tbody>
</table>
• Evaluated the need to upgrade development tools
  – Upgraded Developer 6i to Developer Suite 10g (10.1.2.3)
  – Installed OAF JDeveloper (JDeveloper Version 10.1.3.3 with R12 OA Extension)
  – Installed ADF JDeveloper 10.1.3.5 (Upgraded OAS to the latest certified OC4J version of 10.1.3.5)
  – Installed BI Publisher Desktop developer tool (formally XML Publisher) for E-Business Suite
Project Scope Graphic

- Validate & System Test
- Load & Test
- Assess
- Upgrade Development Infrastructure
- Train Analyst & Development Resources

- Business Apps 11i
  - Custom Apps (62)
  - Oracle Apps (28)
  - 3rd Party Apps (37)
  - Oracle Extensions (7)
  - Custom Interfaces (85)
  - Patches (???)

- DB Objects 11i
  - Reports, WF, and Alerts 11i

- Custom Alerts (187)
- Concurrent Reports (300)
- Work Flows (7)

- R12.1.3
Staff Utilization

- JPL utilized in-house Analysts, Database Administrators, Change and Configuration Management Administrators, Developers, Security Staff, Support Personnel, System Administrators and Training Staff

- Supplemented staff with additional consulting services for Functional, Development and DBA resources

- Average FTE over the life of the project was 44 FTE’s
Pre-Upgrade Activities

• Obtained buy-in from stakeholders regarding scope and approach
• Decided early on to utilize JUMP (a modified version of Rational Unified Methodology Process) as the framework to plan and manage the project
• Utilized SharePoint to capture assessments, gaps, RTMs, issues, module, SIT and UAT testing status
• Reviewed Oracle documents to capture all pre-upgrade steps and activities
Pre-Upgrade Activities (Cont’d)

• Compiled an inventory of custom apps, third party apps, interfaces, custom reports, customizations/extensions, custom.pll, etc.

• Reviewed customizations and extensions to ensure valid business need

• Maximized the use of personalization whenever possible to replace form customizations and custom.pll code

• Authentication
  – OID was considered, remained with ICX for now
Pre-Upgrade Activities

• Authorization - Roles and Responsibilities
  – Roles available in R12; decision by project to utilize current responsibilities model; roles will be used only if required
  – New Roles created for:
    • Concurrent request output sharing (System Profile setting in 11i)
    • Users of custom responsibilities to run Application Diagnostics who do not have Oracle seeded responsibilities
  – Utility Profile setting
    • New utility profile setting that allows users access to Help ➔ Tools ➔ Examine without requiring an apps password
Pre-Upgrade Activities (Cont’d)

• Custom Reports
  – Concurrent custom reports had to be re-compiled and executed using Oracle Developer Tools 10g. XML reports were updated and executed in BI Publisher

• Forms Server Upgrade
  – All forms were re-compiled and executed in Oracle Developer Tools 10g. Moved custom and customized forms to correct directory (new APPL_TOP) on the R12 EBS Application server
• Mod PL/SQL
  – Kept current setup with Mod PL/SQL residing on the same application server as R12
  – Re-developed in other technologies as resources allow (APEX, OBIEE, ADF, etc.) – currently underway
Pre-Upgrade Activities (Cont’d)

• Worked with Oracle to perform Upgrade Value Assessment
  – CEMLI report was useful in validating JPL’s inventory of DB objects and interfaces
  – Provided an indication of the level of JPL’s Business Systems customizations
  – Indicated the level and depth of testing that would be required
  – Provided insight into Oracle modules that could potentially be used to replace some of JPL’s custom applications
  – Validated JPL’s project timeline, scope and effort required
Pre-Upgrade Activities (Cont’d)

• Benchmarked with other organizations who were in the process of upgrading or had completed their upgrade
  – California Institute of Technology, Stanford University, Applied Physics Laboratory, and the City of Burbank
Testing Approach

• Performed three assessments 12.1.1, 12.1.2 and 12.1.3

• Multiple SIT’s but one iteration of UAT
  – Option given to least impacted modules to not participate in the second SIT

• Excluded all standalone applications (obtained test waivers from stakeholders)

• Analysts worked with SME from user community to put together the UAT test plan
• 128 target applications were included in the UAT program
  – Analysts reviewed test scripts with SMEs and assisted testers throughout the UAT program
  – Testers captured the test scripts, test results and test discrepancies or issues
  – Confirmed and logged issues into our Technical Issue List to begin resolution process
  – SME either conditionally or unconditionally signed-off on UAT

• Instituted project code freeze (*Except for conditional sign-offs*)
• Two dress rehearsals
  – DR# 1 completed successfully
  – DR #2 completed successfully with minimal & recoverable issue
  • eAM data corruption issue
    – Rolled back to previous backup point, modified 12.1.1 upgrade script to use single serial worker and continued without issue
    – Instituted production code freeze after DR #1
    – Implemented “snap” backup at various upgrade points to support rollback and recovery strategies
Change Management & Training

• Had dedicated CM and Training specialists throughout the life of the project
• Conducted stakeholder analysis and obtained buy-in for CM and Training Plan early
• Engaged user community early and often
  – Monthly Management Reviews
  – Quarterly Newsletters
  – Question of the Month
  – R12 Learning Website
Change Management & Training

• Reviewed gaps from final assessment and obtained buy-in for proposed resolutions
• Set clear expectations (scope & schedule) for SIT and UAT involvement
• Held regular monthly meetings with steering committee members
• Training was focused on what had changed or was different and not the overall process
CM engaged user community and analysts to develop overall training plan and strategy
- Screenshots
- Demo
- Quick Reference Guide
- Instructor Led Training
- Video

Provided “just-in-time” training

Provided a sandbox allowing users to practice what they learned
• For gate reviews, met with organizational stakeholder management individually to brief results, address any issues/concerns and obtain sign-off prior to the formal gate review
  – No surprises
• Go-live date selected based on
  – No flight/mission critical or major business impact
  – Planned and obtained approval for all emergency business processes during dark period
Service Desk Preparedness

• Advance Service Desk Training of applications that have changed from Oracle 11i
  – Participated in training material development and actual training classes
• Fully staffed the week of R12 go live
• Planned for analysts to be on the “floor” with their customers, as necessary
• Made aware of open issues prior to the Start of the Upgrade and immediately after
• Participated in Post Go Live daily stand ups
Significant Impacts

• Least impacted modules
  – HCM & ODM (BOM, WIP, QA etc.)

• Most impacted areas
  – Payables
  – eAM
  – GL
  – FND Load
Payables

• AP re-architected: AP, eBTax and Payments
• Significant changes in Suppliers, Invoice Lines, Payments, Taxes, Subledger Accounting (SLA)
• New user interface - from Form base to OAF
• User defined folders are no longer valid
• Performance issue with MASS Addition Create
• Internal Banks no longer reside within Payables and are now under Cash Management
Payables (Cont’d)

• Non-matched invoice distributions do not appear in the `ap_invoice_distributions_all` table until the Invoice Validation program is executed.

• Many reports and views needed to be rewritten due to new table structures. Some will work with old converted data but not with new transactions. This is partially due to some of the old tables being recreated as a view.
• Several new columns were added to the `ap_invoice_distributions_all` table, including a conversion of id columns
  – `old_distribution_id`
  – `old_dist_line_number`

• There are several new distribution types:
  – Accrual, AWT, ERV, ICMS, IPI, IPV, Nonrec Tax, Prepay, Retainage, Retroaccrual, Retroexpense, TIPV, IRV
Payables – Invoice Lines

- Introduce concept of Invoice lines
- Addition of the invoice line caused changes to the Invoice Distribution Id and Line Number
  - PA had to run the Upgrade Transaction Attributes job to re-align the supplier costs information between PA & AP
    - JPL created custom version of the program due to performance issues
Payables – Invoice Lines (Cont’d)

• Allocation of freight and special charges are captured at the line level (instead of distribution level as in 11i)
• Additional fields for capturing manufacturer and serial number information
• Provides capability for Line Level approval and matching invoice to PO
Payables – Suppliers

- Implemented OAF extension on two Supplier forms to enable the WHO column information
- Suppliers no longer exist in PO tables. Now a part of Trading Community Architecture
- Some tables become obsolete and new views are created with the same table names:

<table>
<thead>
<tr>
<th>Obsolete Tables ➔ View name</th>
<th>Underline Tables</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO_VENDORS</td>
<td>AP_SUPPLIERS</td>
</tr>
<tr>
<td>PO_VENDOR_SITES_ALL</td>
<td>AP_SUPPLIER_SITES_ALL</td>
</tr>
<tr>
<td>PO_VENDOR_CONTACTS</td>
<td>AP_SUPPLIER_CONTACTS</td>
</tr>
</tbody>
</table>
Payments

• Centralizes funds capture (AR) and disbursement (AP) into one engine
• Payments Dashboard (new OAF forms)
• Use templates and payment profiles to control the whole disbursement process
• EFT files, Printed Checks, Positive Pay and remittances are formatted using XML Publisher
• Payment Process Request Status Report & Payment Instruction Register replace Preliminary Payment & Final Payment Registers
• Oracle provides a PL/SQL package (IBY_FD_EXTRACT_EXT_EXT_PUB) that allows for the customization of XML file in order to add additional tags during the disbursement process

• Use of ETEXT to generate your own fixed length electronic payment format (other seeded available too)
• Many tables become obsolete and replaced with new ones:

<table>
<thead>
<tr>
<th>Obsolete Tables</th>
<th>R12</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP_BANK_ACCOUNT-USES_ALL</td>
<td>CE_BANK_ACCT_USES_ALL</td>
</tr>
<tr>
<td>AP_CHECK_STOCKS_ALL</td>
<td>CE_PAYMENTDOCUMENTS</td>
</tr>
<tr>
<td>AP_BANK_ACCOUNTS_ALL</td>
<td>IBY_EXTERNAL_PAYEES_ALL</td>
</tr>
<tr>
<td></td>
<td>IBY_EXT_BANK_ACCOUNTS</td>
</tr>
<tr>
<td></td>
<td>IBY_PMT_INSTR_USES_ALL</td>
</tr>
</tbody>
</table>
eAM – Upgrade Steps

• Has a pre-requisite to license and minimally configure Oracle Install Base (CSI)
  – Adding new functionality
  – Changing the data architecture
  – Skipping this process will render eAM unusable

• “Integration between eAM and Install Base/CRM” can be found on My Oracle Support in the eAM Advisor Webcast Calendar and Archive (Doc ID 1167439.1)
• Encountered eAM data corruption after the R12.1.1 upgrade driver u6678700.drv
  – Upgrade script eamsnupd.sql caused the corruption due to parallel workers running and would intermittently fail due to deadlock issues. Error appears in log file but adpatch would not report failed worker
• Oracle upgrade scripts append a suffix to Assets that are duplicated
• Manually freeze and compile Install Base Descriptive Flexfields
• Define Asset Groups
  – Asset Groups can be defined easily from a new form
  – **Note:** This is an alternative to defining Asset Groups, without having to access the Master Item form located under Activities > Master Activities

• View (Find) and Update Asset Numbers/Routes
  – No longer available in the Navigator Menu
  – Select the flashlight “Find” icon from toolbar to display the Find Asset Numbers/Route Form
• Define Asset Serial Numbers for Asset Numbers/Routes
  – Assets number is now a globally unique number
  – Asset Serial Number is a new “Required” field
  – Organization and Asset Type are new fields with defaulted data
  – Location Tab is renamed (previously labeled Production)
  – A Meters button has been added at the bottom of the Asset Numbers form
  – Asset Route button at the bottom of the form has moved from the first to the third button
• Define Preventive Maintenance (PM) Schedules – Offers two new features

  – In the Scheduling Options region the Use field has two new options: Base Date and Base Meter, where work orders are forecasted based on user-specified base date or base meter, regardless of the actual last service dates. These options are used together with the Meter Rules tab to schedule maintenance for meters.

  – In the Activity region, you can define and control multiple activities for a schedule definition. A Multiple-Activity PM schedule allows you to schedule multiple activities together in a cycle, specifying the intervals for each.
• Create Express Work Orders
  – New self-service page that allows users to create a new Work Order, charge time to it and complete it
  – **Note:** You can still create and update Work Orders using the Work Orders form (Work Orders > Work Orders)
eAM (Cont’d)

• Enter Mass Time Entry (Resource Transactions) for Work Orders
  – The Mass Time Entry self-service page replaces the 11i Resource Transactions form
  – Mass Time Entry (also known as Resource Transactions) is new functionality where you can enter time for one or multiple work orders at once
• Complete, Incomplete and Update Work Orders
  – The Work Order Completion self-service page replaces the 11i Work Order Completion form

• Create/Import Meter Readings
  – The Mass Meter Readings self-service page replaces the 11i Meter Readings form
• ADI client is de-supported, Journal Upload and Report Publishing functionality are now separate:
  – Journal upload is seeded in GL responsibility named Launch Journal Wizard (also known as WebADI)
  – Report Publishing is performed by running a GL concurrent Job named Program - Publish FSG Report or enabling the Report Manager responsibility

• Payables Detail vs. Summary transactions to GL
  – Since SLA consumes significant storage, we tried to change to Summary. We ended up staying at Detail but utilized Group By setting (Setup>Financials>Accounting Setup Manager) to consolidate daily transactions into one journal
• Account Analysis – Subledger Detail Report
  – This report is obsolete in R12. Our work around was to customize the Account Analysis Report (180 char) to allow for journal source selection and sorting

• Account Analysis Report (132 char & 180 char)
  – Source (ie. Invoice #) item column no longer displays data for new R12 transactions. Prior 11i transactions do display the source item data. The reference fields have changed where the source item data is stored
Subledger Accounting (SLA)

- Really no benefit with SLA for single Orgs
- Implemented only the required SLA capability
- JPL converted one full fiscal year plus worth of data
- Sub-ledgers (AP, PO, PA etc.) no longer interface the transactions directly to GL
- Sub-Ledgers now interface the data to SLA. SLA derives the accounting information and interfaces the data to GL
- Issue with GL journal drill down through SLA to all PA data
  - Applied two patches (5233248 & 10231107) to resolve issue
FNDLOAD - Benefits

- FNDLOAD is the Oracle supported method to programmatically load various EBS objects.
- FNDLOAD commands can be incorporated into a shell script. This provides the ability to combine multiple commands into a script that can run with minimal user intervention and easily manage dependencies within a script by sequencing the commands within the shell script.
- The input to FNDLOAD commands is an LDT flat file. This file is generated using an export from the source system. Once an LDT file is generated, it will be used as input to future object migrations.
- FNDLOAD is the supported tool to migrate the following objects:

<table>
<thead>
<tr>
<th>Concurrent Programs, Executables</th>
<th>Attachments</th>
<th>Help Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request Groups, Request Sets</td>
<td>Messages</td>
<td>Document Sequences</td>
</tr>
<tr>
<td>Profile Options</td>
<td>Value Sets and Values</td>
<td>Alerts</td>
</tr>
<tr>
<td>Key and Descriptive Flexfields</td>
<td>Lookup Types</td>
<td>Concurrent Manager Schedules</td>
</tr>
<tr>
<td>Menus and Responsibilities</td>
<td>Printer Definitions</td>
<td></td>
</tr>
<tr>
<td>Forms and Form Functions/Personalizations</td>
<td>FND Dictionary</td>
<td></td>
</tr>
</tbody>
</table>
FNDLOAD - Challenges

- Difficult to determine success/failure in some cases
- Inconsistencies in the results when migrating existing request sets & responsibilities (including menus). New ones did not have problems
- Orphaned objects can be overlooked
- Less transparency than HP Object Migrator tool that we use
- JPL used a combination of FNDLOAD and HP Object Migrator to support migrations
Major Post Go-Live Issues

• JDBC Connection Issue
  – Flatter navigation capability in 12.1.3 caused multiple sessions opened but not released
  – Unless users actively clicked the log out link, their sessions were not being released
  – Applied a few workarounds until patch 13822452 was applied
Major Post Go-Live Issues (Cont’d)

• Workflow Notification Mailer
  – Mailer was constantly going down
    • Increased the outbound thread count
    • Ran multiple scripts to reset information
    • Applied various java class files to resolve the problem

• AP Data Corruption Issues
  – Issues were discovered by users and confirmed by running the GDF Diagnostics scripts (Oracle Note #1361255.1)
    – Various Supplier conversion and accounting issues that Oracle provided scripts to resolve
Lessons Learned

• Allow sufficient time to hire Oracle Consultants
  – Challenges in finding consultants with needed experiences
    • AP Functional Consultant with R12 Upgrade experience
    • OAF Developer

• Decide how many months for SLA conversion
  – Plan hardware for data growth
  – Allow sufficient time in upgrade schedule to accommodate SLA conversion or run concurrent job to bring additional months later

• Ensure adequate tablespace during upgrade
• 12.1.3 brought on many changes to eAM that was not encountered with 12.1.1 and 12.1.2
• Plan multiple assessments/integration tests
• Test all custom menus and responsibilities
• Many reports or concurrent programs now require Operating Unit as a required field
• Register custom applications in the Multi-Org table to avoid receiving error when opening new OAF forms with custom responsibilities
Lessons Learned (Cont’d)

• Consider a back up plan in case of power outage during upgrade window

• Coordinate with Network Operations to ensure no planned network or power outages during the upgrade window

• Coordinate with functional areas to ensure minimal or no interruption to support critical business needs
Lessons Learned (Cont’d)

• Upgrade customers should contact Oracle to see what upgrade support services are available to them

• Point of contact from Oracle Premier Support helped JPL to stay on top of all upgrade issues and product updates

• JPL’s familiarity with Oracle Premier Support processes and procedures helped to proactively mitigate many risks to the project
Thank You!