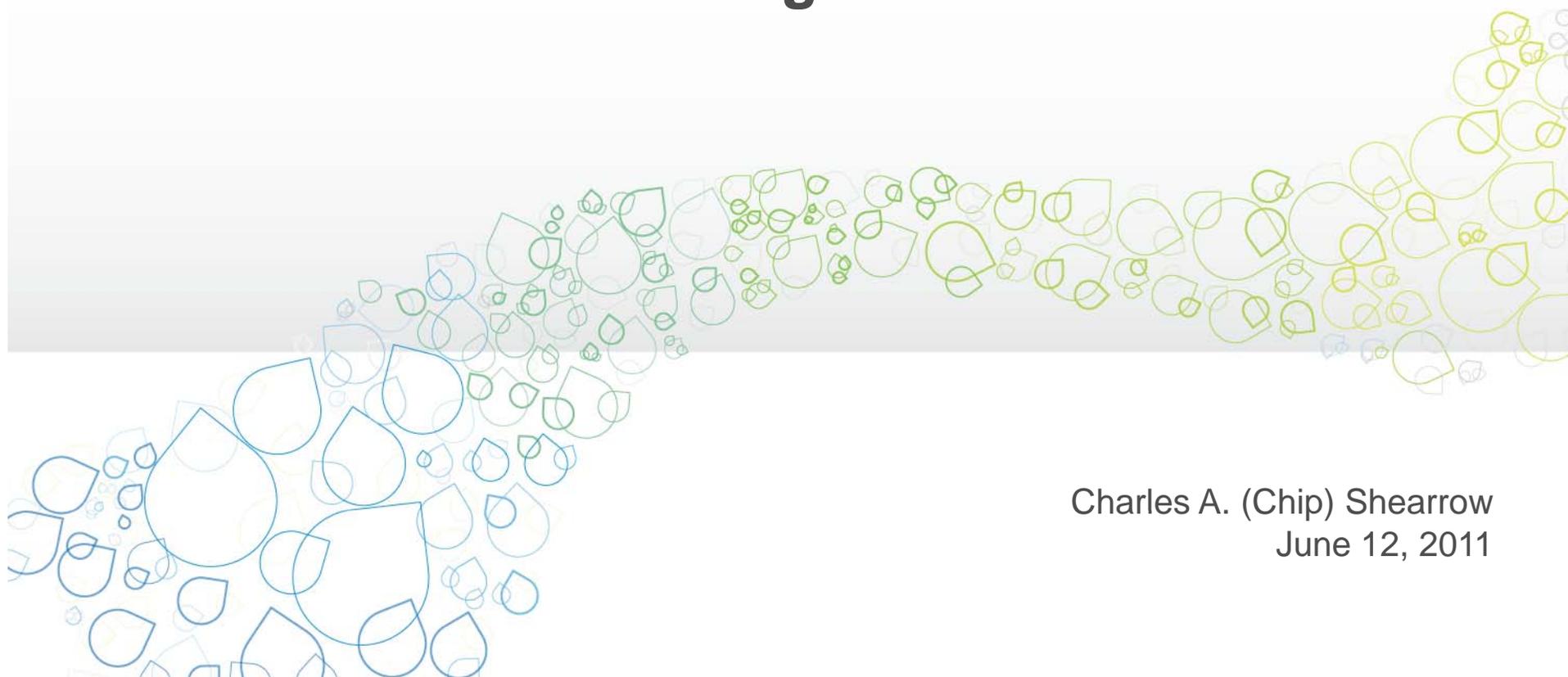




Minimizing Production Downtime for a PDMLink 8.0 to 9.1 Migration



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June 12, 2011

Agenda



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Introduction



Charles A. (Chip) Shearrow

- > 1991-June 2000 Ohio Northern University (Advanced Robotics and Automation)
- > 1998- Summer Proposal for the Design Data Management System
- > 1999- Summer NASA-JSC Directors Grant for Virtual Simulation
- > June 2000- 2011 Indyne, Inc. at NASA-JSC (Pro/E User, Intralink Administrator, Workflows, Training, Operations Lead, Supervisor, Senior Systems Engineer)
- > January 19, 2011- Present MEI Technologies at NASA-JSC (Operations, Supervisor, Senior Systems Engineer)
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- > MEI Technologies - <http://www.meitechinc.com>

Migration Requirements



> Minimize Risk to Data

- Active data not stored in other systems
- Data constantly changing

> Minimize length of outage

- Due to the number of users and active projects supported with the system

> Maintain access to data

- Even during the outage access to data must be maintained

> Correct data anomalies

- "Stuff" in "stuff" out
- System has been migrated 4 times

> Upgrade system software

- LDAP, Apache, Tomcat, Rware and Windchill on active production servers

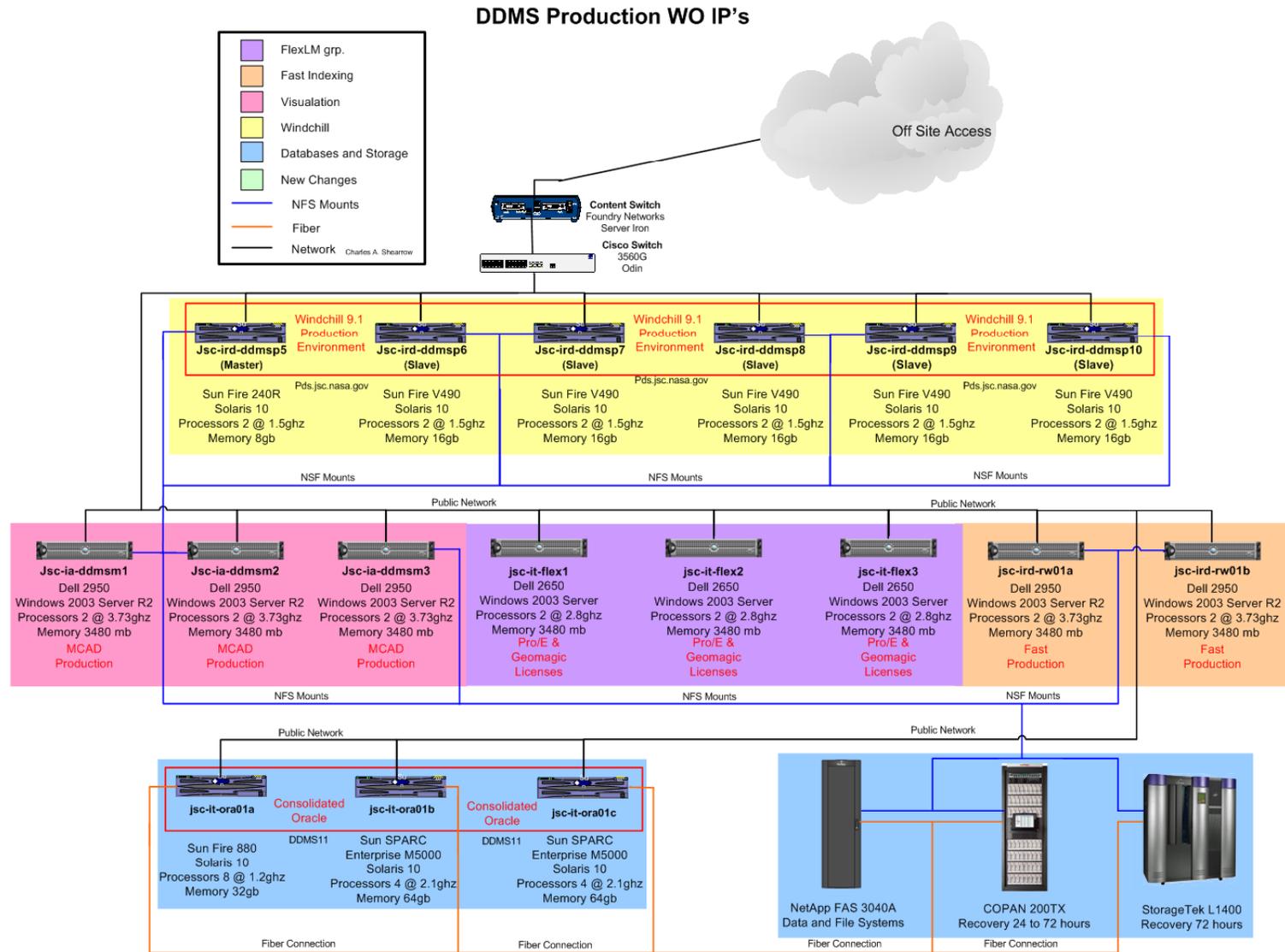
> Transfer Customizations

- Maintain functionality between versions

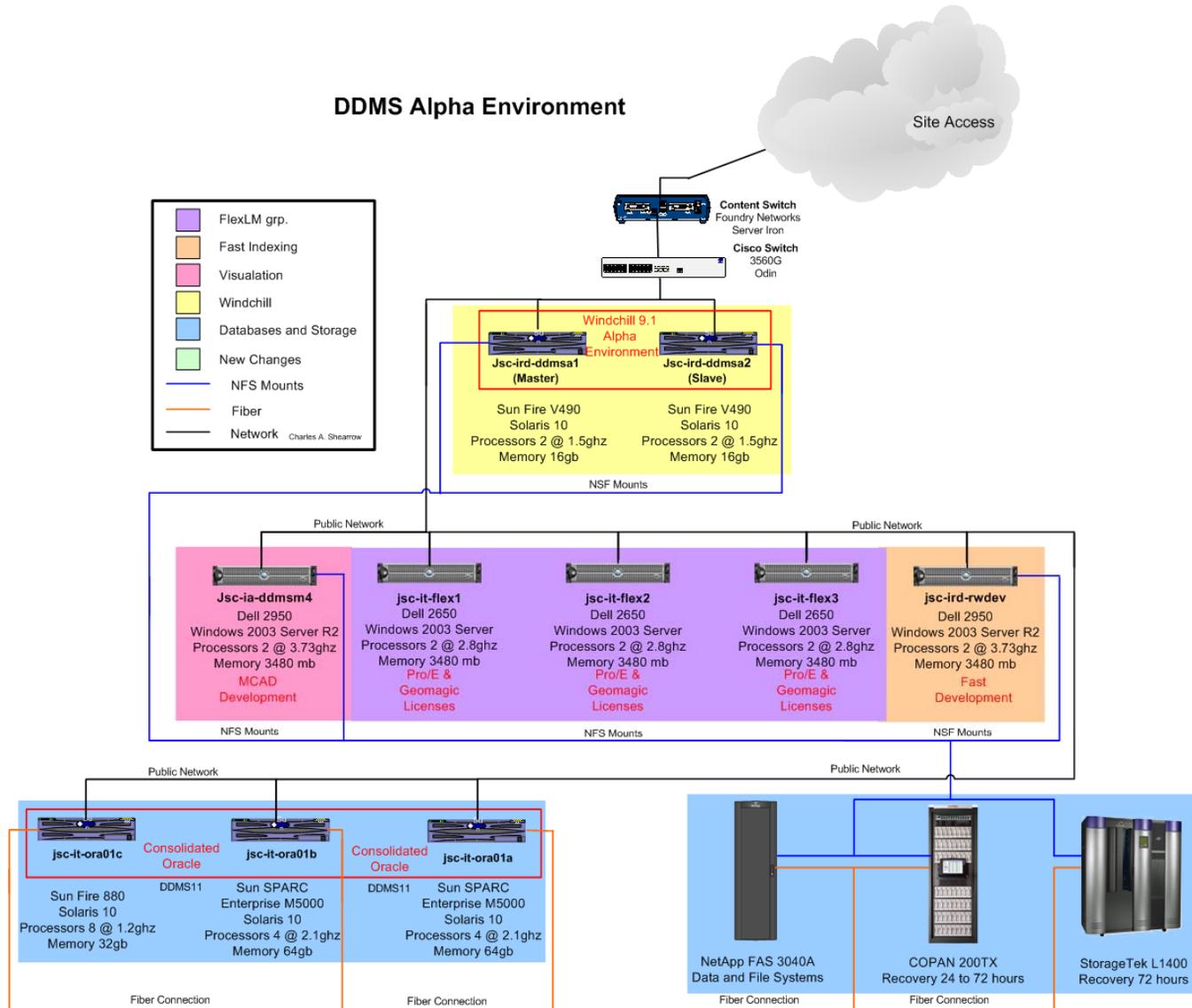
> Deploy automated testing

- Automated testing completed before rollout

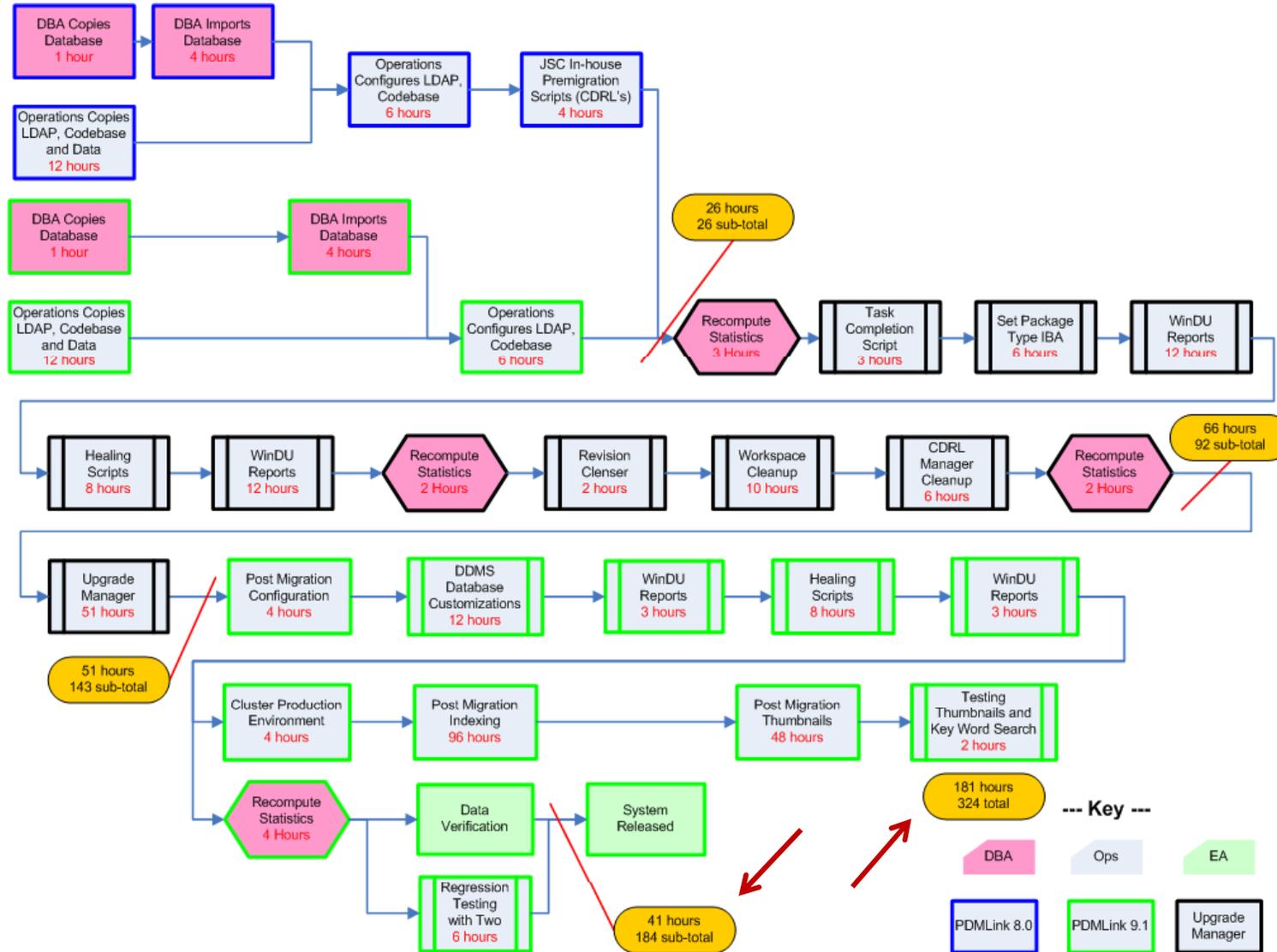
Migration Environment



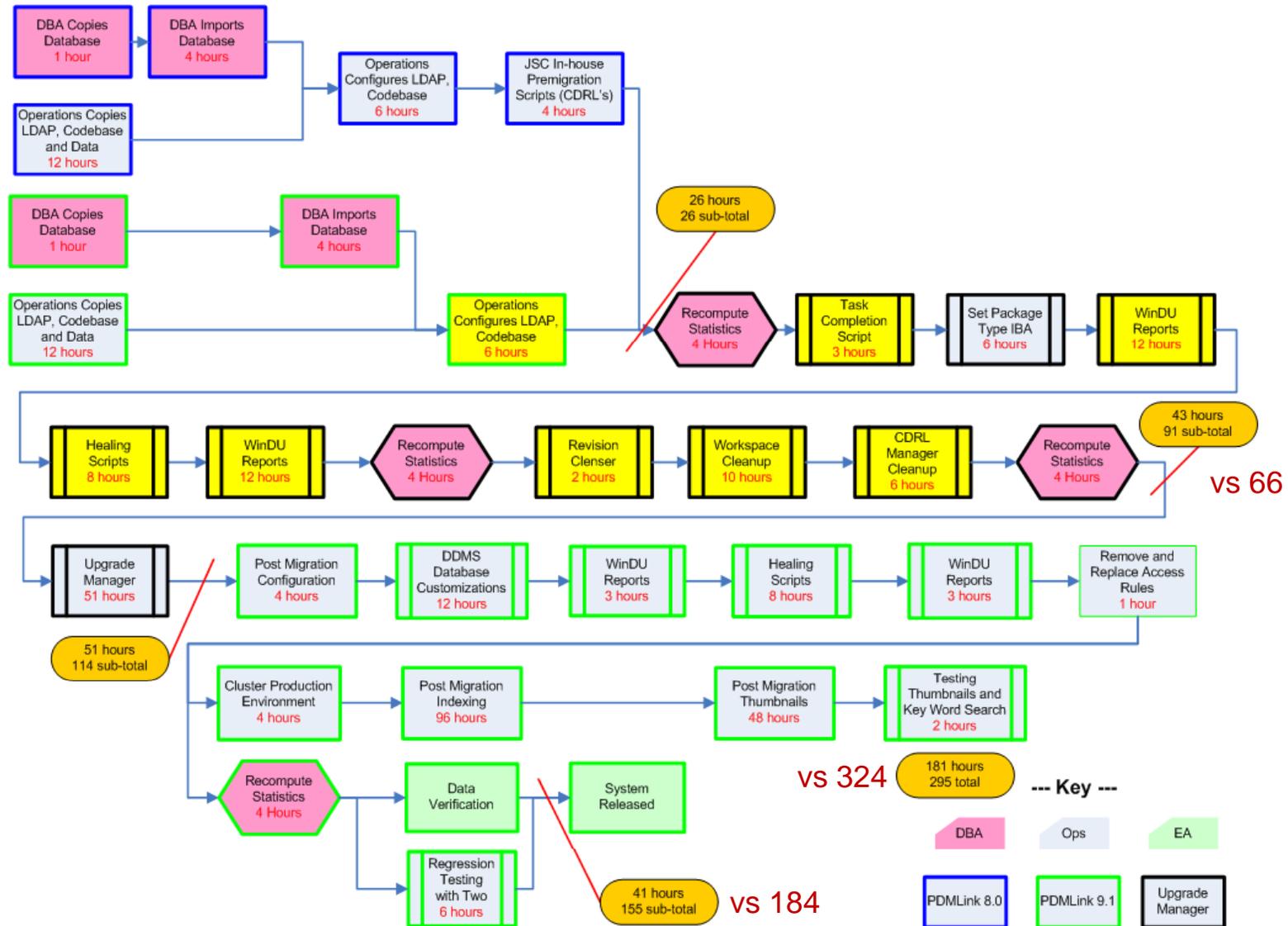
Migration Environment



Initial Estimated Timeline



Pre-Migration Time Savers



> Custom Task Completion Script:

- Would reduce the time at migration and post migration to restart workflows. Can be eliminated from future migration runs. **Low risk due to past success.**

> WinDU Reports:

- Currently runs 32 hours but can be reduced significantly at migration time by fixing issues now. **Low risk due to past success.**

> Revision Cleanser:

- Task takes two hours to run and can be eliminated from future migration runs. **Low risk due to past success.**

> Workspace Cleanup:

- Encourage cleanup on production at two weeks and one week out from the migration. Runs about ten hours now and could be reduced to 4 or 5 hours. **Low risk due to past success and customer participation.**

Pre-Migration Time Savers



> CDRL Manager Cleanup:

- Currently runs in about 6 hours and by pre running this on production it will reduce the time to about 1 hour. **BUT** only the latest iteration of each version will be kept. **Low risk due to past success but customer outreach required.**

> Fixing EPD:

- Repairs attachments so they can be seen in the 9.1 environment. Will cause the 6.2 legacy links on the workflow and lifecycle pages to disappear in the 8.0 system undoing a customization. **Low risk because the data is not lost and the customer still has access to the information**

> Run our WTPProduct to WTPart Script:

- Used to resolve migration conflicts. If it does not work then we perform the PTC solution of deletion of the access rules **at migration**. **Low risk due to the object not being used in the 8.0 system.**

> 8.0 migration Patches:

- Install them on production before the migration process. **Low risk due to pre application to Staging and Alpha environments.**

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> Establish the 9.1 Environment:

- Pre migration install and configuration of the new 9.1 environment will save 8 hours time for the migration. **Moderate risk due to working on an active production system. This task would be configured one node at a time. The configuration and testing would have to occur at low usage times because 8.0 would have to be stopped.**

> Rware Upgrade:

- Currently the 9.1 systems are working with the old Rware it is recommending this upgrade come after a successful migration. **Low risk due to current 9.1 environments are using the current version of Rware successfully.**

> WCDS:

- Is the Windchill replacement for the current LDAP. It is recommending this task be held until after the migration has been completed. **Low risk because the current 9.1 environments are using Aphelion.**

Migration Time Savings



- > Task Completion Script 2.5 hours
- > WinDU Reports 4 hours
- > Healing Scripts 6 hours
- > WinDU Reports 4 hours
- > Revision Clenser 1.5 hours
- > Workspace Cleanup 5 to 8 hours
- > CDRL Manager Cleanup 5 hours
- > Fixing EPD (Aprox.1 hour)
- > Run our WTPProduct to WTPart Script (Aprox .5 hours)

Migration Time Savings



- > Pre Configure and test 9.1 install 6 hours
- > 8.0 migration Patches 1 hour
- > Establish the 9.1 Environment 8 hours

Review

- > Total potential time savings to the migration process is estimated to be 36.5 hours
- > 10 of the 11 tasks are low risk
- > Risk is controlled on the moderate risk task by configuration and testing being performed after hours.
- > Shortens the pre-migration timeline by almost 40 hours per run or overall 120 hours.

Migration Activities



Parallel Efforts

> Customized code migration

- 8.0 customizations upgraded to work with 9.1

> Data migration

- Parallel system (Alpha) established with current production data

> Training development

- Materials developed in parallel as code is deployed to the 9.1 training environment

> Environment deployment

- Production could not be stopped
- Different users for the Unix system
 - Root vs wchill
- Also deployed a common code base
 - Located on NetApp
- Vaulting changed for automated deployment of folders
 - Done in hours not weeks

Post Migration Activities



Statistical Evaluation of Data

> Quantitative vs. Qualitative

- Establishing sample size scientifically is a quantitative sample selection
- Goal is to minimize the time spent in testing and still deliver a quality product
- Confidence level was set at .05 (accepted scientific standard)

> Identification of objects

- Used the object types identified in the system
- Only sampled items to be migrated

> Identification of strata

- Unique objects divided into stratus to more accurately pull the sample
- Each stratus was treated as a separate sampling exercise
- Total of the sampled objects must equal the master sample goal

> Random selection

- Internet site
- Excel functionality

> Thumbnail Generation

- 8.0 thumbnails not compatible with 9.1 system
- To be completed during low peak times

> Keyword Indexing

- New index due to new software version
- Exclusion list used for selective publishing
 - Zip, pdf, avi by size
- Identify long processing items and publish them last

> Data verification

- Performed during the indexing process
- Quantitatively guided for time savings
- Performed by system champions and migration team

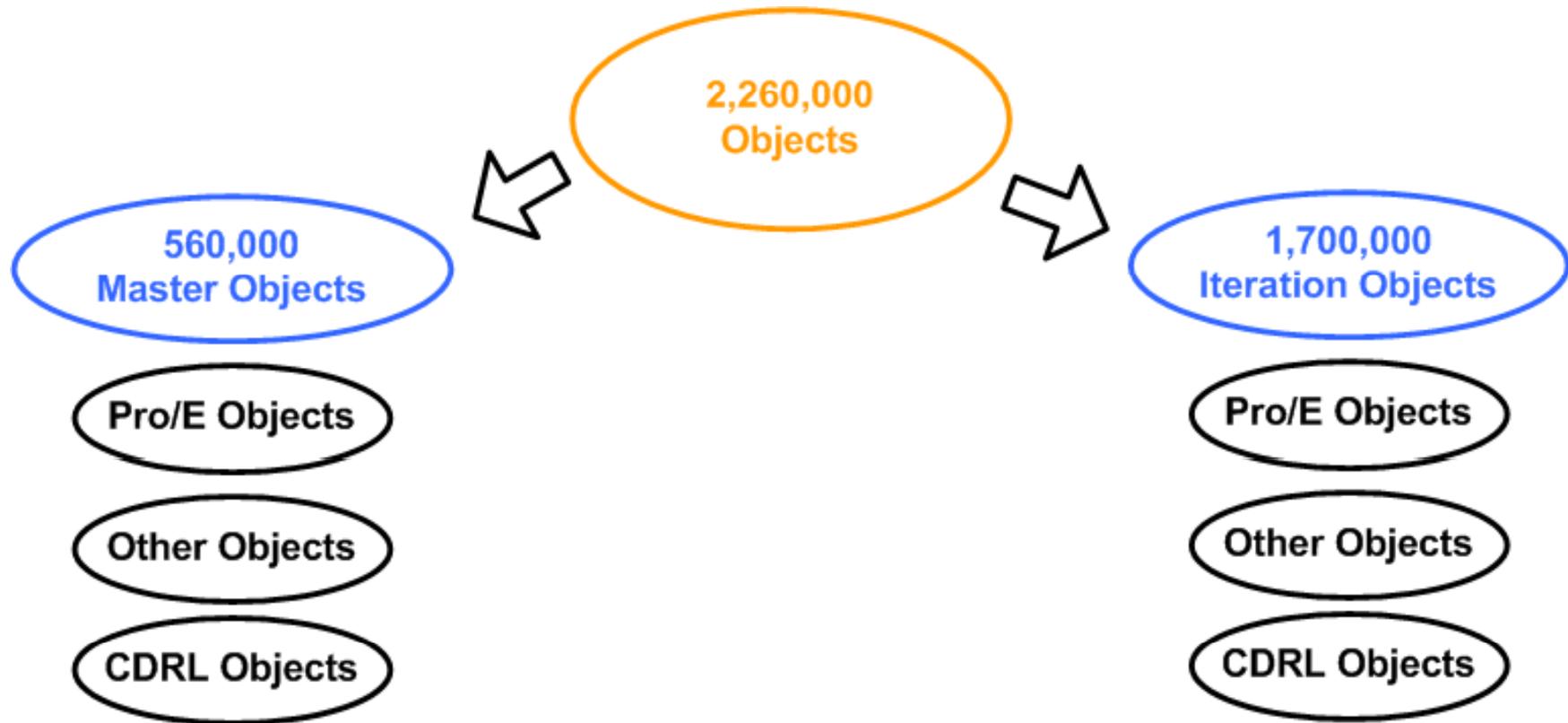
> Regression Testing

- Sanity check to insure the customizations had been deployed correctly
- Most testing done with automated testing software (Test Director)

> Establish Data Validation Boundaries

- Stratified random sample technique
- Margin of error set at .03
 - Maximum errors during testing can be no larger than 685
- Confidence level set to .05
 - Standard scientific sampling confidence level
- Total number of objects 2,283,244
 - Objects in the system to be migrated
- Sample size 1,067
 - To be achieved by a random sample
 - About 4.7% of the objects

Statistical Evaluation of Data

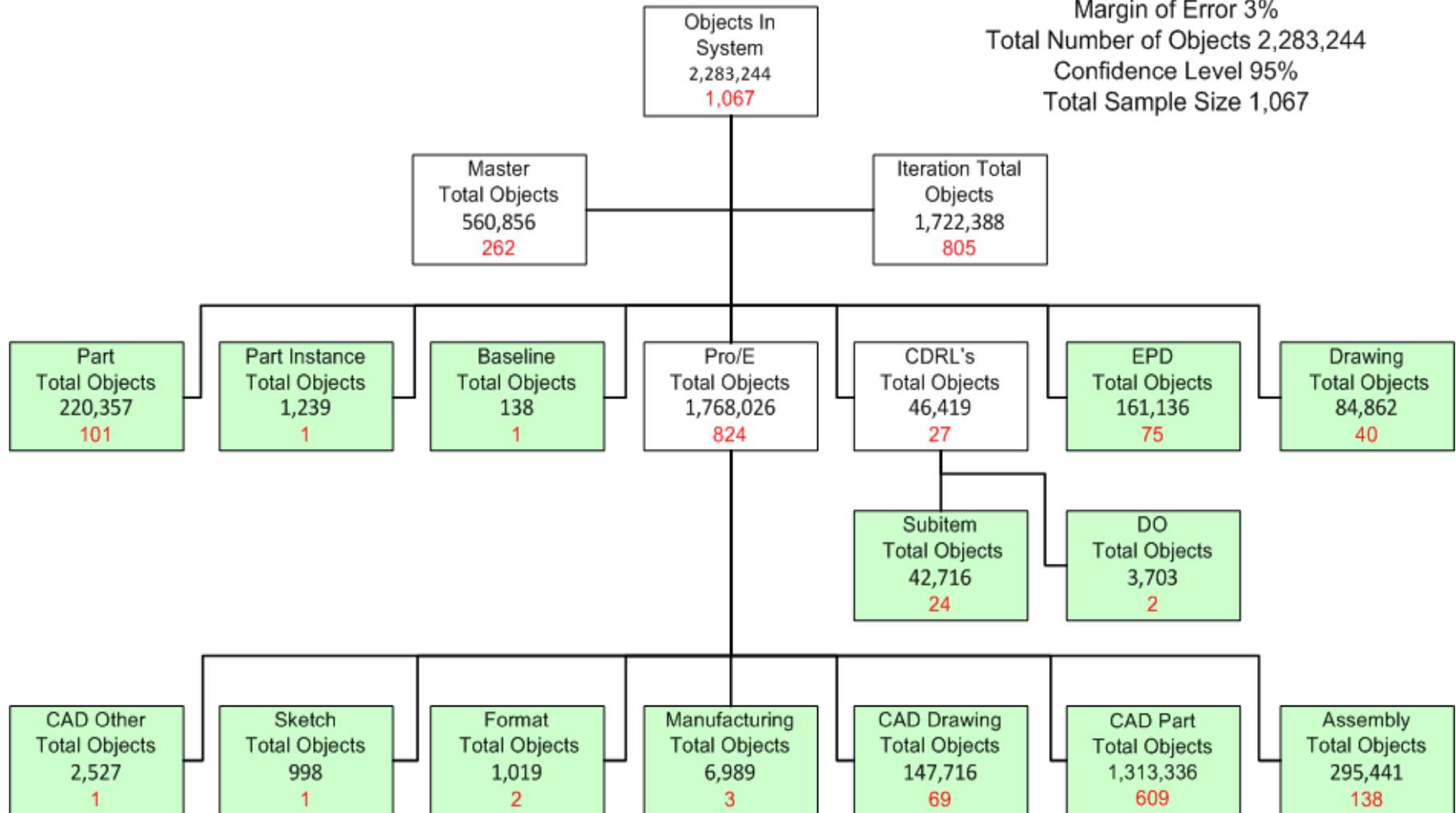


Statistical Evaluation of Data



PDMLink 9.1 Upgradation

Stratified Random Sample
 Margin of Error 3%
 Total Number of Objects 2,283,244
 Confidence Level 95%
 Total Sample Size 1,067



Risk Management Activities



> Duplicate Systems

- Clone production to Alpha
- Providing as close to production as possible
- Only difference is the hardware

> Duplicate Data

- Clone production to Alpha
- Cloned multiple times due to live system accumulating data between runs

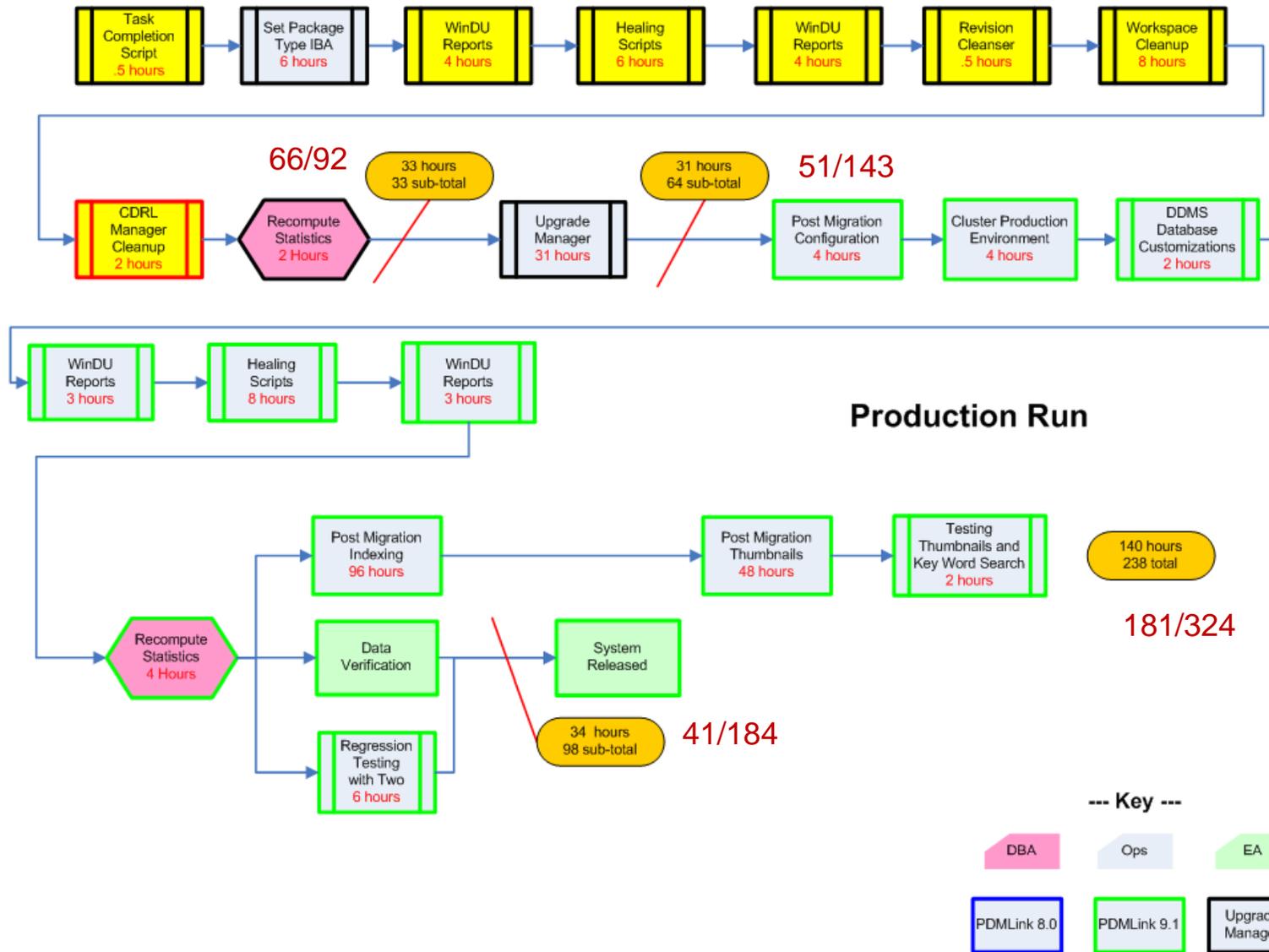
> Statistical Analysis

- Minimize quantity of data to be evaluated
- Provide the most accurate validation of data in a timely manner

> New Production System

- Built on the running production system
- Different Unix users
- Different codebases
- Same LDAP

Production Migration



Lessons Learned



> Parallel efforts

- Code conversion and migration
- Migration runs and operations
- System building and operations
- Data evaluation and indexing
- Sanity check and indexing
- Thumbnails generation and operations

> Quantitative Evaluation

- Data quantity
- Selection of strata
- Selection of champions
- Execution

> WinDu

- Start before planning starts

> Migrator

- Will require many runs before it is over
- Indexes may be needed to shorten the process

Minimizing Production Downtime for a PDMLink 8.0 to 9.1 Migration



> Questions and Answers

“Failure is not an option”

“Go Forth and Migrate” Chip

- Coined by a True American Hero

Gene Kranz

***NASA Flight Control Director and
Presidential Medal of Freedom
Recipient***