# Lessons Learned from the Novell and GroupWise Upgrade of the Summer 2003 or "What We Did on our Summer Vacation!"

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## ABSTRACT
This presentation will focus on the effects a recent major hardware and software upgrade had on the Indiana State University end user community and how collaboration between Technical and User Services resulted in a positive experience for the end user community. There were many hours of overtime put into this project and lots of concerns from User Services personnel about having to go out and "touch" each computer to facilitate necessary changes. The effects of the unsolicited visits produced some surprising results.

## Categories and Subject Descriptors
B.8.1 [Performance and Reliability]: Reliability, Testing, and Fault-Tolerance

## General Terms
Performance, Design, Reliability, Human Factors, Standardization

## Keywords
Novell Upgrades, Reliability, Standardization, Support

## 1. HISTORICAL PERSPECTIVE
In January 2003, the NetWare and GroupWise messaging environment at Indiana State University suffered from an antiquated design in need of updates. There were periodic episodes of instability that lead to a significant amount of ill-will on the part of faculty, staff, and students.

Efforts to enhance performance and improve stability by the Office of Information Technology (OIT) staff personnel were not successful. Existing staff members were too engrossed in day-to-day issues to be able to dedicate sufficient time to analyze systems and develop an improvement plan with sufficient details to implement. Recognizing this, the decision was made to engage Novell Consulting services to assess the NetWare/GroupWise environment. This consulting engagement occurred in February and March of 2003.

The objective of this engagement was to assess the health and maintenance of the Indiana State University eDirectory Tree, to clearly identify the business and technical needs of Indiana State University with regard to the migration to NetWare 6, and to define the process for upgrading to GroupWise 6.

The environment in April of 2003 consisted of numerous Novell products and versions. Specifically, NetWare versions 4.11, 5.1, and 6 were installed. There were too many versions of NDS and not the correct mix. In addition, multiple systems were running GroupWise 5.5, which was slated for end of support in December 2003. There were 29 NetWare servers containing over 49000 user objects on a wide range of dissimilar server hardware.
Working collectively, ISU Technical Support, Novell Consulting, and ISU User Services developed the following assumptions for implementation: 1) Current server based applications would require upgrades to both NetWare and NDS. 2) Dated hardware would create difficulties moving from IPX to IP. 3) Out of date computers would have to be replaced (Win95 & below) 4) All users would move off of all unsupported & old versions of software, such as NetWare 4.11, Mercury/Pegasus email. 5) Migration from queue based printing to NDPS/iPrint would require a full inventory of all network-connected printers on campus. 6) University would have to accelerate the movement to NetWare 6 and eDirectory 8.7 in a very aggressive timeline in order to minimize disruption of the end user community. 7) A central and standardized GroupWise 6.5 electronic mail system should be developed and design architecture should implement cluster technologies for redundancy and fail over.

The implementation of these seven assumptions and the back-end work necessary to execute was performed during the summer and early fall of 2003. This work provided improved operational efficiency via server consolidation. Administrative tools that were included with updated software as well as the elimination of unsupported software (Novell version 4.11 was not supported in April of 2003) were significantly improved. In addition, the


*SIGUCCS'04*, October 10–13, 2004, Baltimore, Maryland, USA

upgraded infrastructure facilitates workstation management through ZEN. The implementation of pure IP will reduce network overhead. NDPS/iPrint has proven to be less maintenance intensive than queue based printing.

From the user's perspective, the upgraded GroupWise system has proven to be well received among campus constituents due to the additional features provided by version 6.5. The perception is also benefited by the improved stability and performance that has come with the implementation of new server hardware that includes clustering technologies.

## 2. Internal System Changes

Internal systems activities began in May of 2003. These activities were performed both by on-site NetWare corporate engineers as well as internal ISU system personnel. Sections 2.1 through 2.6 outline the internal system activities performed during the summer of 2003.

I. NetWare Upgrade
   A. Consolidate Servers
      1. Identify Services running on each server
      2. Determine Services to be retired
      3. Determine Services to be migrated
      4. Identify mission critical legacy applications
      5. Devise strategy for addressing these applications
      6. Identify Services to be upgraded to new solutions
      7. Identify resource requirements of each service
      8. Identify servers capable of hosting new services
   B. Remove NetWare 4.x
      1. Identify hardware capable of running NetWare 6 with or without hardware enhancements
      2. Upgrade hardware capable of being deployed as NetWare 6 servers
      3. Systematically remove all NetWare 4.x servers from the tree
      4. Remove services from the servers
      5. Remove bindery context from the servers
      6. Remove DS Replicas from the servers
      7. Remove DS from the server
      8. Place server in a holding state for a determined period of time
      9. If capable re-deploy server as a NetWare 6 server, if not capable then retire server
   C. Upgrade NetWare 5.x
      1. Deploy latest Service Packs to all servers
      2. Identify hardware capable of running NetWare 6 with or without hardware enhancements
      3. Upgrade hardware capable of being deployed as NetWare 6 servers
      4. Develop Back-Out Plan for server upgrades
      5. Systematically upgrade all NetWare 5.x servers
      6. Verify latest patch levels
      7. Backup Servers as part of recovery plan
      8. Remove DS Replicas from the servers
      9. Upgrade the Server to NetWare 6
      10. Replace any DS replicas as needed
      11. Test services on the server to verify functionality
   D. Deploy SLP
      1. Design SLP infrastructure
   E. Address Certificate Services
      1. Identify current Certificate Services
      2. Identify network requirements for Certificate Services
      3. Design a functional, efficient Certificate Solution
      4. Deploy new Certificate Server Solution on NetWare 6
   F. Address Licensing
      1. Identify current licensing scheme
      2. Define licensing requirements
      3. Design and Deploy new licensing solution
   G. Server Specialization/Pooling
      1. Identify Servers by Function
      2. Plan Server Deployment strategy by function
      3. Identify services for clustering
      4. Target servers for specialization by function

II. eDirectory Deployment
   A. Version Upgrade
      1. Patch all current deployed servers to current levels
      2. Upgrade servers starting at the [Root] and moving down through the tree structure
   B. Partitioning
      1. Repartition the tree according to recommendations
      2. Separate [Root] from the rest of the tree
      3. Consolidate partitions as needed
   C. Replica placement
      1. Place NDS replicas on servers identified for DS hosting
      2. Ensure proper replication of each partition
      3. Control Subordinate Reference placement

D. Directory Structure

1. Redesign DS structure to fit ISU environment and needs
2. Analyze DS requirements
3. Analyze Secure Identity Management (SIM) requirements
4. Analyze Campus infrastructure requirements
5. Ascertain the need for multiple Directory Service Trees
6. Design Security infrastructure around the Directory Service Tree/Trees
7. Determine Administrative rights/roles
8. Determine Public read/browse rights
9. Recommend physical security policies

III. GroupWise Upgrade

A. Design and Configuration

1. GroupWise Software Configuration
2. Novell GroupWise version 6.5
3. Novell Cluster Services version 1.6
4. Novell NetWare 6.0 (SP2)
5. GroupWise DNS requirements
6. GroupWise NDS Object Placement
7. TCP/IP Port Allocation
8. GroupWise Port Allocations
9. Post Office Agent Settings
10. Planning Internet Addressing
11. Determining Internet Domains
12. Selecting the System's Default Internet Agent
13. Selecting the System's Preferred Addressing Format

B. Lab testing

C. Migration to 6.5

1. Upgrade the Primary Domain
2. Upgrade Post Offices within the Primary Domain
3. Upgrade Gateways within the Primary Domain
4. Upgrade Secondary Domains, Post Offices, and Gateways
5. Setting Up Internet Addressing
6. Installing the Internet Agent
7. Enabling Internet Addressing
8. Overriding Internet Addressing Defaults
9. Domain Overrides
10. Post Office Overrides
11. User/Resource Overrides

D. NetWare Configuration for GroupWise

1. NetWare Server Setup
2. NetWare File System Setup
3. NetWare Server Tuning for GroupWise

E. Cluster Deployment

1. Cluster-enabled Volumes
2. Cluster Load and Unload Scripts
3. Cluster Fail-over Paths
4. Cluster Resource Policy Settings

F. System Consolidation

1. Domain Placement
2. Post Office Placement
3. Gateway/WebAccess

G. GroupWise Monitor

IV. DirXML Deployment

A. Design and Configuration

1. Determine population to be provisioned
2. Analyze available data from input system
3. Select data to be provisioned
4. Design output/population strategy
5. Determine frequency of data refresh/update
6. Design initial population strategy
7. Determine method of population
8. Determine matching criteria
9. Determine how to report and handle exceptions
10. Determine flow of data/authoritative sources

B. Lab Development and Testing

1. Create a development lab for DirXML coding
2. Create a Testing lab
3. Prepare a duplicate of the ISU eDirectory environment
4. Prepare test populations data
5. Test code and implementation strategy, revise as necessary and re-test

C. Banner Development

1. Design final population strategy from Banner
2. Determine whether text delimited files or XDS documents will be used
3. If XDS selected, train ISU staff on creation of XDS documents

D. eDirectory integration Testing

1. Test SIMs solution against ISU applications
2. Test User access and security

E. Deployment

1. Develop deployment strategy
2. Develop Back-Out plan
3. Implement changes in Banner
4. Implement changes in eDirectory
5. Deploy Drivers
6. Engage solution
7. Verify functionality

V. Ancillary Services

A. ZEN for Desktops

VI. Ongoing System Maintenance

A. Documentation

B. Pre-Production and Lab Environment

C. Change control procedures

D. eDirectory Maintenance

E. Standardization (naming/numbering)

# 3. COMMUNICATION

During the initial stages of planning the upgrade it was agreed that information dissemination was key and that a top down – bottom up approach was necessary. OIT had to be very straight forward about what this upgrade would do for the stability of the network environment in the long term as well as the instability that would occur while the upgrades were taking place. To communicate this to campus the Chief Information Officer (CIO) provided information to the President, Executive Cabinet and to the Deans (top-down) while the User Services group provided information to front-line users through personal contacts (bottom-up). The Information Technology Advisory Committee (ITAC) was given similar information to make certain this was an initiative they could support. ITAC consists of several key faculty and staff that are technology leaders in the University. The President, Executive Cabinet, Deans, and ITAC were all in favor of proceeding with the upgrade.

## 3.1 Internal Communication Tools

The Technical Support and User Services groups initially setup daily informational meetings where all questions, concerns and comments could be addressed directly with everyone sitting at the table. The Technical Support and User Services Directors were in constant contact and spoke frequently to make certain that the internal communication was flowing freely.

## 3.2 External Communication Tools

Every change that was made to the network environment was addressed through global email announcements. All of these emails were sent through the senior management for critique to make certain that the context of the message being sent had positive overtones. A targeted email was sent to users who were directly affected by changes to their GroupWise post office just prior to the upgrade. This was done on each post office.

## 3.3 Personalized Communication

There were many times when a more personal approach was applied in which the Help Desk would call key individuals within the University to notify them of changes, upgrades and occasional outages. It was also common to have the User Services Consultants visit technology leaders in each of their support areas to give them an overview of what was taking place. The User Services group and specifically the Help Desk were used as a barometer to gauge the general attitude and tolerance level of the University Community. The senior management of OIT met every morning throughout the upgrades to discuss progress of the initiative and the general attitudes of the customers.

## 3.4 Effective Communication

We knew we had delivered a tremendous amount of information to the campus, but it was not clear how effective OIT had been in the campaign. It was not until a similar theme started to be repeated from several customers about the shear number of announcements they had seen about the upgrades. This answered the question about communicating the changes effectively.

Sample communications that were sent out to various constituencies:

> "GroupWise Migration Update"
> *During the migration of GroupWise to the clustered environment, the GroupWise Post Office One (ISUGWPO or PO1) database became corrupt, in spite of numerous integrity checks during the process; however, the data corruption did not present itself until the system was placed under load on Monday morning. Manual repair of the post office database could not be implemented. Novell engineering and ISU OIT personnel determined the best course of action was to restore the post office to its condition immediately prior to the migration on Friday July 18th.*
> *This should not have affected users on PO2, PO3, or PO4, other than in the exchange of e-mail with users on PO1.*
>
> *PO1 users who sent or received any electronic mail messages between 10:30 pm. Sunday July 20th and 10:00 a.m. Monday July 21st, will find that they are gone. E-mail to and from PO1 may be re-sent, if you wish to do so. We apologize for any inconvenience this may have caused and are working to stabilize your email system.*
>
> *OIT will continue to make adjustments and changes to settings in the GroupWise environment for the next several weeks to ensure proper fail-over capability and protect the integrity of the data. This maintenance may result in interruptions of*

*service. OIT will make every effort to minimize their number and duration.*

"Intermittent GroupWise interruptions after 5:00 PM August 8, 2003"

*In response to the problems we recently experienced with GroupWise, Novell has dispatched a high level support engineer who is working on-site to identify and correct problems in our GroupWise environment.*

*The engineer has identified some repairs that must be made to the post offices that will require intermittent interruptions in service. These are scheduled to begin at 5:00 PM today, August 5, 2003. If you cannot access GroupWise this evening, please try again later.*

"Implementation of GroupWise Account Quotas (200 megabyte) and Increased Home Directory Space (1 gigabyte) available"

*Email systems, including GroupWise, are designed to support the transient nature of email. While they offer email organization capabilities, they are not designed as long term repositories. Retention of large volumes of email and documents within an email system degrades performance and result in excessively large mail database structures that are difficult to maintain and back-up, slow processing time, and create an email environment that is more susceptible to corruption.*

*ITAC, working with information provided by OIT and based on the recommendations of Novell engineering best practices, has reviewed the issue of email retention. ITAC has recommended, and OIT has accepted, the adoption of a 200 MB quota for GroupWise email accounts.*

*While this quota will affect less than 10% of current GroupWise users, it is important to note that this doesn't mean that email can't be retained or stored; only that it must be archived (stored) to an appropriate local or server-based location outside of the primary email system. To prepare for this, OIT will be contacting all users with accounts larger than 200 MB and will provide them with assistance to reduce the number of messages stored in their GroupWise account.*

*As an interim step, on November 24th, OIT will turn on size limits on individual GroupWise mailboxes. Initially, a quota of 5 gigabytes will be set, and will gradually be decreased to 200 megabytes per user mailbox. This initial step enables tools and metrics that can be used to determine the actual and relative sizes of an existing mailbox and how best to manage the content.*

*With quotas in place, if your mailbox size exceeds the quota limit, the Mailbox Storage Size Information dialog box will automatically appear, and your ability to send e-mail from GroupWise will be limited until you reduce the mailbox size below the quota. Receiving email will not be affected.*

*You can manually display this dialog box by clicking Tools > Mailbox Size or by clicking the Mailbox Size message on the status bar at the bottom of the GroupWise Main Window. Use the View buttons to view items in the selected folder in descending order, from the largest file size to the smallest. You can stop the processing at any time by clicking Stop Query. Use the Archive and Delete buttons to reduce your mailbox size. If you need assistance in how to use these tools, please contact the OIT Help Desk at x2910.*

*To further assist users and in recognition of growing reliance on digital documents (including email), users will now be able to request up to 1 GB of network storage. This expanded central storage area is now available to users to store files and to archive GroupWise email, if they so choose. Your home directory drive mapping will change from F: to H: in order to utilize this additional space. Please contact the Help Desk to request this change. Filling these requests is a manual process and these will be addressed in the order they are received.*

*If you have questions about the 200 MB GroupWise account quota, 1 GB of network storage space or any other related issues, please contact the OIT Help Desk at x2910.*

# 4. POST UPGRADES

Although the timelines for the upgrades were aggressive and put a tremendous workload on both Technical Support and User Services, there was an added benefit for the customers and User Services that was unforeseen. During the upgrades to the network environment, upgrading customers' computers became a very common occurrence. OIT had experienced problems "pushing" upgrades out to computers in the past so it was necessary for the User Services staff to visit each computer multiple times. The changes to the 3500 desktop computers included Windows updates, GroupWise client updates, NetWare client updates, printing changes (NDPS), software installs and anti-virus updates. As one would assume, unsolicited visits from technical personnel invites a certain amount of unscheduled work, but in this case it seemed to have a very positive effect on the stability of the computers and the tolerance levels of the customers to the work being performed. As the customers' concerns were addressed the computers were being made more robust by either fixing problems that were specific to the upgrades or causing pre-existing problems to be more pronounced thus causing additional repairs during the visit. After all of the changes were completed, and the first wave of viruses ran through the University, the workload within User Services fell off dramatically. This was directly attributed to the stability of the NetWare environment and the computer issues being addressed during the multiple visits.

# 5. WORKSTATION CONFIGURATION

Here is a sample of the work that was done on the customer's computer by User Services staff.

- Determine currently supported workstation types
  - OS Version
  - Patch level
  - Base hardware
- Installing Novell Clients
  - Preparing
  - From Workstation
  - From Network
  - Win9x
  - Win2k
  - WinXP

- ❖ Setting up Client Login
  - Scripts
  - Restrictions
  - Profiles
  - Login Dialog Box
- ❖ Setting Client Properties (Performance Tuning)
  - Before Installation
  - Single Workstations
  - Multiple Workstations
  - DHCP
- ❖ Managing the Novell Client
- ❖ Novell Client Printer Configuration
- ❖ GroupWise Client Installation (AutoUpdate)
  - Software Distribution Directory vs. SetupIP
  - Setup.cfg
  - LDAP
  - Enabling AutoUpdate
  - Addon.cfg
  - Startup switches, Admin defined settings and log files
- ❖ Printing
  - Identify printing types (Queue, Capture, NDPS)

# 6. SUMMARY

In April of 2003 ISU OIT began the process of upgrading both hardware and software in the University centralized server and electronic mail environment. This project was recommended as part of a consulting engagement performed by Novell World Wide Consulting Services. The objective of this engagement was to assess the health and maintenance of the Indiana State University eDirectory Tree, to clearly identify the business and technical needs of Indiana State University with regard to the migration to NetWare 6, and to define the process for upgrading to GroupWise 6. The environment in April of 2003 consisted of numerous Novell products and versions. Specifically, NetWare versions 4.11, 5.1, and 6 were installed. There were too many versions of NDS and not the correct mix. There were multiple systems running GroupWise 5.5, and 29 NetWare servers containing over 49000 user objects on a wide range of dissimilar server hardware. Technical and User Services personnel worked cooperatively throughout the project to make certain that as changes occurred they were communicated not only throughout OIT, but also the user community.

However, in October of 2003, there was a major slowdown in our workload. There was a lot of conjecture regarding why the workload had diminished, but it did not dawn on anyone that two major events had occurred that affected the workload specifically, stability of the NetWare environment and every computer on campus had been "touched" at least three times during the upgrades. Every time a User Services staff member went out to make necessary changes on a computer to facilitate the Novell infrastructure upgrade they were also addressing all of the other customer issues such as, Windows updates, GroupWise client updates, NetWare client updates, printing issues, software installs, anti-virus updates, user concerns about the upgrades and all other issues customers have when visited unsolicited by a technical person.

The upgrades that occurred during the summer of 2003 were perceived well by the faculty and staff. The work, although arduous and difficult at times for both OIT staff and the ISU community, had been deemed a success by senior management in the University. The NetWare infrastructure changes have provided the necessary foundation for future growth and positioned ISU for new technology initiatives.

# 7. ACKNOWLEDGEMENTS

We would like to thank the OIT staff at Indiana State University for their dedication to this project. Its success is a tribute to their technical skills and commitment. We would also like to thank the senior management of OIT for encouraging and providing us with the necessary resources to make this presentation.