



U.S. Department of Energy Golden Field Office Information Technology

GOanywhere – Real World Virtual Desktops in the DOE



Agenda

1. Brief Intro to the Golden Field Office
2. VDI Drivers and Architecture
3. Lessons Learned
4. Benefits of VDI
5. Follow-On Initiatives



About The Golden Field Office

Management of EERE Projects

- Technical field project management
- EERE program support

Intergovernmental Projects & Outreach

- State Energy and Weatherization Assistance programs
- EERE program outreach support

Acquisition & Financial Assistance

- Procurement services for EERE programs

Management & Oversight of NREL

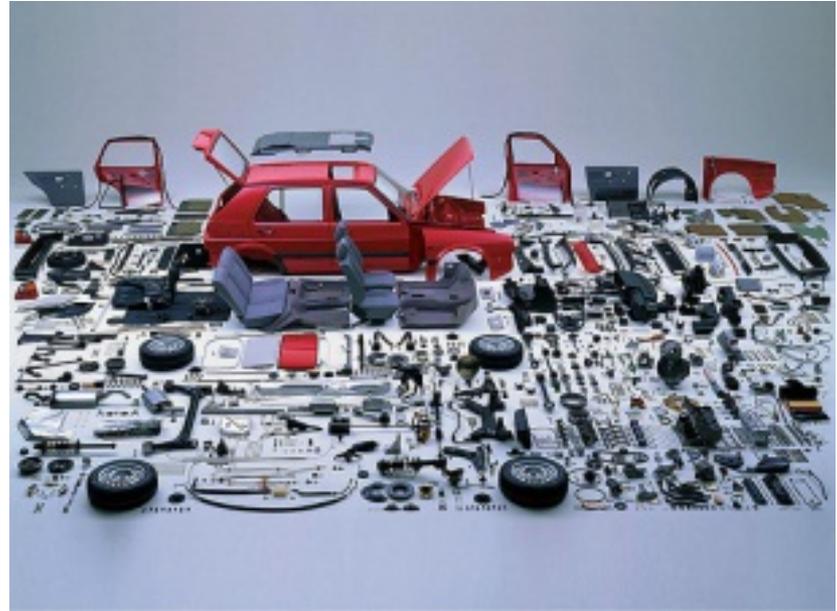
- Administration of the contract
- Federal stewardship of the investment

Administrative Support

- Human Resources
- Information Technology
- NEPA
- Finance

Professional Services

- Public Affairs
- Legal Counsel



BUILDING GOLDEN'S VIRTUAL DESKTOP INFRASTRUCTURE

Background

- Preparation to move Golden Field Office staff to the NREL RSF
 - The RSF is a Leeds Platinum Plus certified facility
 - Power consumption was restricted to 60 watts per user
 - Golden IT must increase network resources while reducing power



Approx. 200 Users

2008

Small Office

Modest IT Services Needed

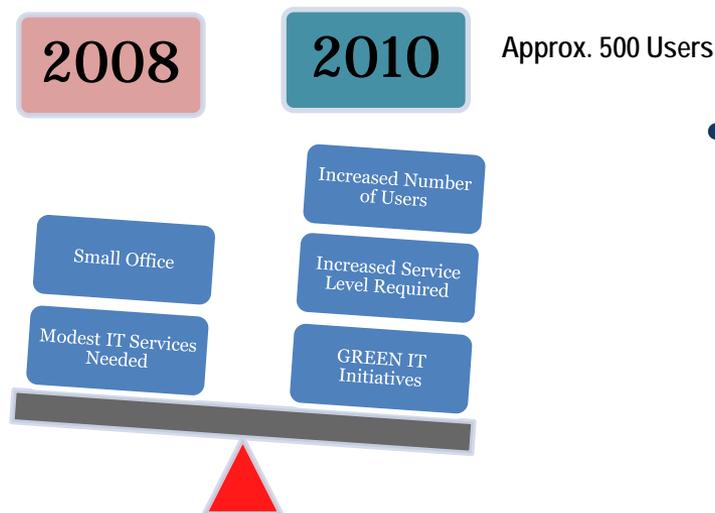
2010

Increased Number of Users

Increased Service Level Required

GREEN IT Initiatives

Approx. 500 Users

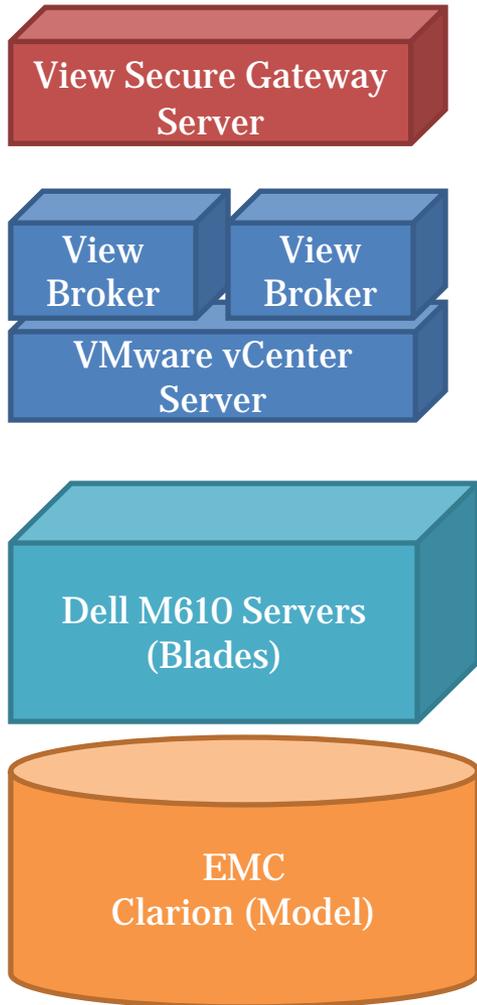


- Golden Field Office receives ARRA funding and requires additional staff



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Architecture



Virtual

- 550 virtual desktops
 - Linked Clones
 - Windows 7 / Office 2010
 - ~20% running dual-monitors
- Single (virtual) VM View Security Gateway Server for remote access
- Redundant View Broker servers
- Single (virtual) vCenter Server

Physical

- Internally accessing VDI through Zero-client Thin Clients
- 16 ESX hosts running on Dell M610 blade servers
 - 96 GB RAM
 - Approx 35:1 vDesktop/Host ratio
- Fully redundant SAN Fiber mesh
- 20 TB SAN storage





LESSONS LEARNED

Hardware Selection



Typical Fiber SANS

- 42U Standard Rack
- 3U Drive Enclosures
- 15 Drives per Enclosure**
- 32 Enclosures**
- 300GB FC Drives**
- 480 Spindles**
- 3 Racks**
- Power usage 15,200 Watts
- Cooling 51,860 Btu/hr
- Watts for cooling 15,195
- Total power consumption 30,395 Watts
- 144TB raw capacity



High Density Fiber SANS

- 42U Standard Rack
- 8 Systems**
- 320GB SATA II Drives**
- 1,200 Spindles**
- 1 Rack**
- Power usage 9,304 Watts
- Cooling 37,840 Btu/hr
- Watts for cooling 11,087
- Total power consumption 20,391 Watts
- Consumes 42U of rack space
- 409.6TB raw capacity

High Density Advantages

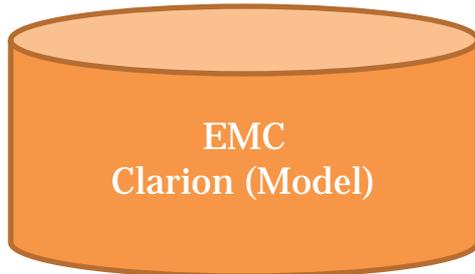
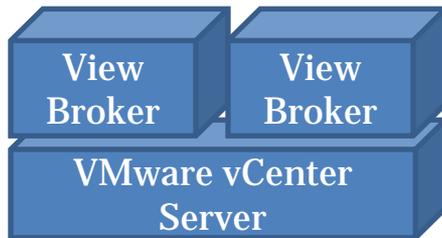
- 2.8 x Capacity
- 2.5 x Number of Spindles (Faster Disk I/O)
- 27% Reduction in Cooling
- 33% Reduction in Space
- 31% Reduction in Power Utilization



Resource Management



Environment Tuning



View Broker

Virtualized & Load Balanced
Storage Over Utilization – Aggressive

vCenter Server

Virtualized
Don't get too conservative with DRS
Allow sufficient space for Update Services

ESX Hosts

Maximum amount of RAM
Disable Transparent Page Sharing

SAN Fabric

All HBAs speed set
Multipath set to Round Robin (needs reset after power cycles)
LUN Masking

Storage

500 GB LUNs w/ vDesktop Replicas on the first disk only
20% of VMFS available for overhead
Separate disks for persistent disks



Multi-Media Support



Initial Deployment

- RDP protocol had limited native support for multi-media
- Multi-media enhancement packages had limited effect
- Zero-clients hardware resources limited

Subsequent Upgrade

- Leverage VM View 5 w/ PCoIP
- Network QoS further enhanced multi-media delivery
- Zero-clients hardware no longer a contributing factor



Local Devices



Initial Deployment

- USB redirection unreliable
- Driver installation incompatible with LUA
- Device disappeared after re-compose
- Encrypted USB drives unsupported

Image Customization

- Drivers included on all desktops
- Administratively intensive
- Work-around identified for encrypted USB

Alternative Devices

- Move to “Personal” wireless printers
- Encrypted USB support fixed with View 5 / P20 deployment



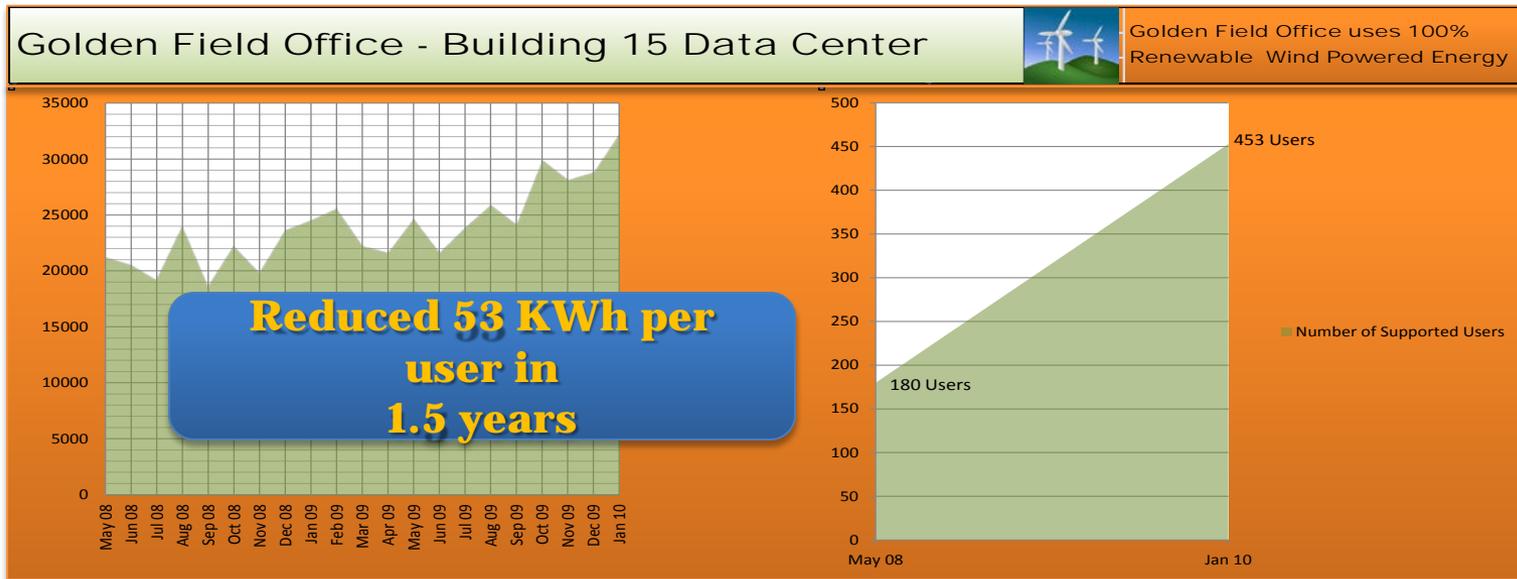


REALIZED BENEFITS

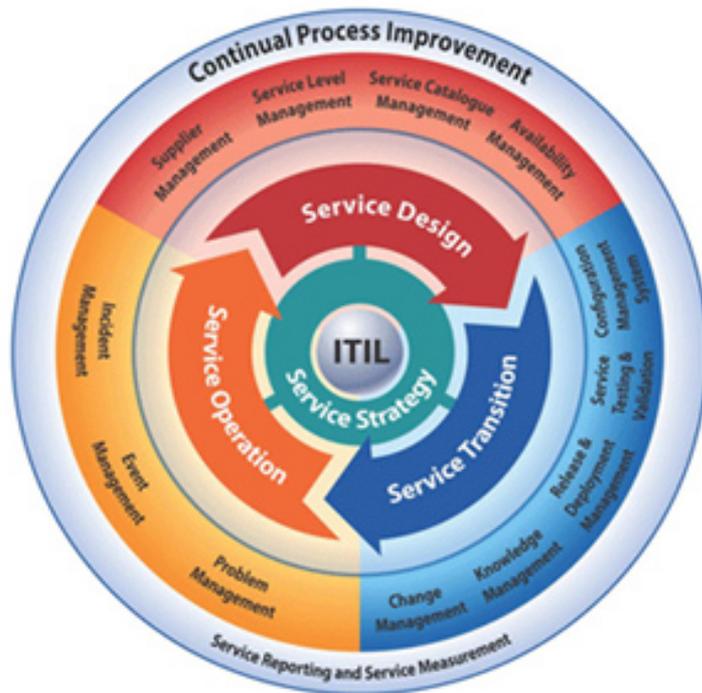
Sustainability & Scalability

180 Users → 453 Users

176 Watts → 35 Watts



Improved Processes



Highly centralized VDI drove IT process improvements

Implemented "ITIL Lite" for

- Incident Management
- Change Management
- Problem Management
- Service Catalog

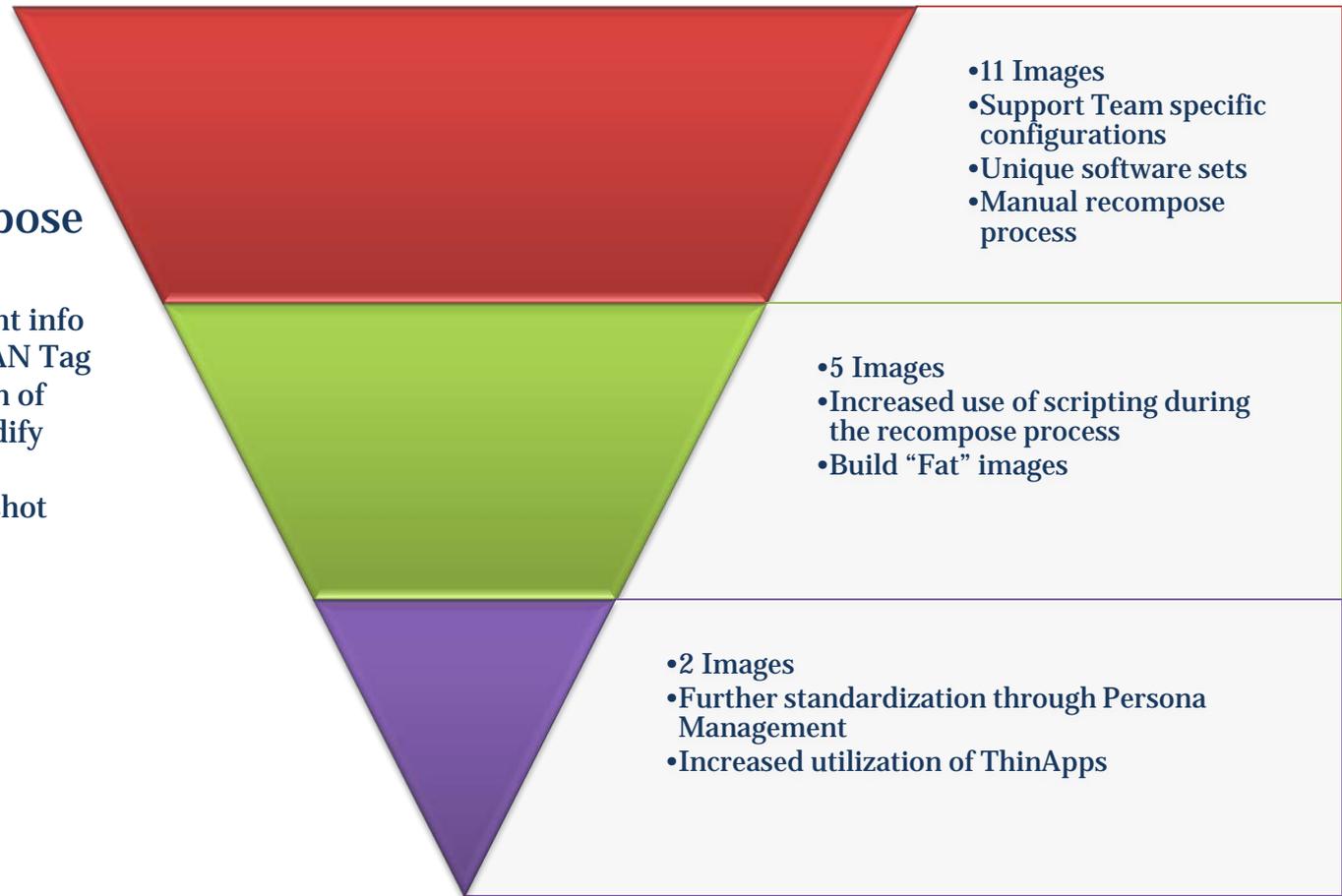
Change & Problem Management critical for VDI



vDesktop Standardization

Custom Re-compose Scripts Built to:

- Reset Anti-virus client info
- Change Desktop VLAN Tag
- Complete installation of select software / modify registry settings
- Manage image snapshot automation



Enabled Windows 7 roll-out to 500+ vDesktops with minimal user interruption and no additional cost in 4 weeks

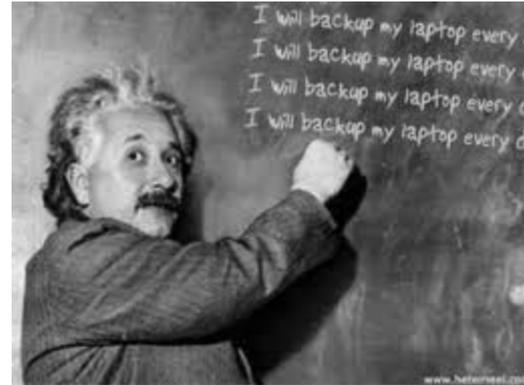


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Data Security and Protection

Cyber Security

- Linked Clones allow for monthly machine imaging
- Guaranteed delivery of patches & security fixes to all systems
- No need for separate software distribution platform
- Profiles are kept on a separate disk, so modifications to the OS drive are limited
- vDesktops are still dedicated per user
- Logs are all written to a central logging server - not lost on re-compose



Data Protection

- Data centralized within GO's data center
- No data stored on individual user's desktops
- Access to data import/export controlled
- Benefits of redundant SAN hardware



GOanywhere



Opened up almost device-agnostic computing
Access GO Virtual Desktops from any Internet
connected device

- Windows, Mac OS, Linux computer
- SmartPhones
- Tablets

Enabling GO IT to support

- Full-time remote workforce
- Nearly 100% of Golden's staff are Telework enabled



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FOLLOW-ON INITIATIVES

Enhanced Virtualization

BYOD

- Pilot under way leveraging existing Telework solution
- Site-wide wireless access

System Development and Testing

- Implementation of vCloud Director to provide automated provisioning of internal development and test environments
- Potential “external” service offering for other interested parties

RightPath Integration

- Discussions ongoing regarding integration of existing VM solution
- Opportunity for surge capacity, disaster recovery



Increased Mobility



The Golden Field Office Application & Productivity Portal System is the Single Sign On Portal for the Golden Field Office Collaboration Cloud.

To request access to any of the Golden Field Office systems, please contact gohelpdesk@go.doe.gov.

Available Applications:

- [DocShare](#): Golden Field Office SharePoint Document Sharing Repository
- [EERE-PMC](#): Energy Efficiency & Renewable Energy Project Management Web Site
- [GNet-Teams](#): DOE, EE and Golden Team Collaboration SharePoint Site
- [Golden Field Office Web Site](#): Golden Field Office Public Web Site
- [Virtual Desktop Login](#): Log into your Golden Field Office Desktop



DocShare



EERE-PMC



GNet-Teams



Golden Field Office



Virtual Desktop

Golden Field Office Mobile Applications



GO Portal Mobile App



Now Available for Phone and Tablet Devices



Coming Soon for iPhone & iPad



Coming Soon for BlackBerry Playbook



Application and Productivity Portal

Access to externally available systems

- EERE-PMC (Project Management Center)
- GNet-Teams / DocShare (SharePoint)
- Android & Apple Apps (GOPortal)

<https://apps.go.doe.gov>

U.S. Department of Energy - GO Business Center



1. Enter your User ID.



2. Select your registration method.

This is a public computer

This is a private computer



3. Enter your registration code.

User ID:



4. Enter your password.

Please select the 'Public Computer' option if this is not a machine you use regularly, then enter your User ID below and click 'Submit' to access the system.

[Restart Login](#)

Running Android?
Copyright © 2011 SecureAuth Corp. All rights reserved.

GO Business Center

- Non-RSA based 2-Factor authentication for internal applications
- Internal SharePoint sites
- MS Project Server / Team Foundation Server
- Outlook Web Access
- Select other internal web-enabled systems

<https://GOBusinessCenter.go.doe.gov>



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Collaboration

External Customers

- Supports collaboration with non-DOE grant applicants and recipients
- Services include
 - EERE-PMC
 - DocShare
 - Locally hosted web meetings leveraging Lync



DOE Internal

- Leverages ADFS authentication for HQ users
- Services include
 - GNet-Teams (team-centric fully enabled SharePoint environment)
 - Lync services for IM, Presence, & Web meetings



Questions?

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