

**DATA CENTER  
MIGRATIONS:  
LESSONS  
LEARNED**

**GLOBAL  
TECHNOLOGY  
SOLUTIONS  
GROUP**



# DATA COLLECTION

**An accurate inventory of server-to-application mapping and Move Group development was hindered by poor data integrity across multiple data sources**

## **What worked:**

- Develop of a new migration data repository that was kept up to date and accurate by leveraging out-of-band resources to maintain and update
- “Trust but verify” a small set of data collection tools
- Don’t assume a tool is the silver bullet
- Workshop with application owners and infrastructure support teams to validate a base set of information collected by the program team
- Set accountability for Point-of-Departure (PoD) infrastructure and business process validation with the application teams

## **What didn’t work:**

- Leveraging existing Configuration Management Database (CMDB) or accounting information as anything more than a starting point
- Expecting tools would be able to update the migration data repository automatically

## **What to watch for:**

- It is easy to spend a lot of time and money analyzing data collection tools – don’t fall into the trap
- Keep the amount of data collected to the bare minimum to avoid “techie nirvana” and thereby “analysis paralysis”
- Interfaces, protocols, data flows and chattiness characteristics are key to understand

# MIGRATION PLANNING, DESIGN AND IMPLEMENTATION

**Selection of Move Methods must be a rigorous exercise with all teams buying into risk, cost, time and complexity**

## **What worked:**

- Define specific, quantifiable criteria and a process flow to drive Move Method selection (e.g., V2V, Lift and Shift, Re-install, Backup/Restore)
- Understand migration complexity of Operating Systems (OS) and Databases (DB) then staff accordingly
  - Solaris and Oracle will likely prove most complex
  - Windows and SQL tend to prove less difficult
- Move as much to a virtual environment prior to migration as possible (~65%)
- Leverage migration tools that the team is familiar with (e.g., VMware, PlateSpin, T-BMR) rather than adding a learning curve to the list of risks

## **What didn't work:**

- Use of specialty tools (e.g., GoldenGate) instead of what team was familiar with
- Not thoroughly testing at the target data center prior to migration

## **What to watch for:**

- Lift and Shift can be a valuable Move Method, but often the most maligned
- Clustering at the OS and DB level typically presents a larger challenge that support teams anticipate, regardless of method
- Hoteling of DBs and renumbering of instances can also present significant challenges during migration

# MIGRATION PLANNING, DESIGN AND IMPLEMENTATION

**Availability of the production environment is paramount, and will drive most migration decisions**

## **What worked:**

- Institute (or leverage) a rigorous change management process
  - All changes must be reviewed and approved by the steady-state and program teams
- Identify applications critical to the business and engage the application and business teams early in the process
- Review program issues and risks with steady-state operations and infrastructure support

## **What didn't work:**

- Independent change processes, or a process that was too narrow in scope to capture all changes that may have an impact
- System changes during peak periods
  - Migration changes are seldom completely transparent
- Changes to application or hardware configuration within a two-week pre-migration freeze

## **What to watch for:**

- Cowboys – technicians who feel it is ok to make a change outside change windows
- Change authorization focus that is too narrow to account for downstream impact

# REMEDIATION

**End-of-life and outdated applications and infrastructure require upgrades prior to migration to eliminate lengthy troubleshooting and back-outs**

## **What worked:**

- Establish a rigorous review and remediation of all applications prior to migration
  - Attributes to watch for include:
    - Hard-coded-IP addresses
    - MAC addresses
    - Fully Qualified Domain Names (FQDN)
    - Device and user names
    - Passwords embedded in connection strings
- Use a migration factory armed with tools to scan code for discrepancies
- Uplift or migrate applications to new infrastructure
  - Move to a virtual environment
  - Replace End-of-life hardware

## **What didn't work:**

- Not tracking teams and providing a scorecard that drives accountability
- Asking applications teams who are focused on driving business by providing functionality to identify issues without the assistance of a factory type approach

## **What to watch for:**

- Ensure all requirements are identified prior to scanning code
- Get to a highly virtualized environment prior to migration – this will be one of the biggest cost savers and increase availability substantially

# MIGRATION CONTROL

**A Migration Control function that controls all aspects of preparing for and executing migration events is key to consistent success**

## **What worked:**

- Implement a managed step-based approach for ensuring application readiness
  - The process contains steps that include Application Decomposition, Move Method development, hardware procurement, test plan development, firewall rule identification, latency testing, communication planning and storage/data replication
- Establish an infrastructure freeze at T-6 and an application freeze at T-2
- Establish a Command Center for controlling all aspects of migration day
- Create Rapid Deployment teams to separate truly complex migration issues from those more common thus allowing momentum of the many to continue
- Establish a team to fix post-migration issues so that core teams can concentrate on the next migration

## **What didn't work:**

- Allowing vendors to establish separate teams to migrate applications

## **What to watch for:**

- Application teams will deviate from prescriptive plans, maintain focus on broader success by maintaining control of migration execution
- Too many or not enough of the right resources can introduce risk to the migration

# MIGRATION CONTROL

**Strict adherence to the Migration Control Sequence (MCS) through a gated review process reduces errors, timeline slippages and helps control costs**

## What worked:

- Communicate Milestone and Deliverable expectations early and often
- Manage via a formal Gated Review process with weekly program-wide reporting and score card reviews
- Flexibility – each company we work with has different internal processes which can reduce timelines
  - Once established there should be no flexibility in rigid adherence to migration processes

Milestones		Planned	Finished	Variance	% Complete	I/R	Owner
T-28	Point of Departure Received						
T-27	Custom Application Initial Point of Arrival and Move Method Confirmed						
T-22	Architecture and Infrastructure Uplift & End of Life Commitment Validated						
T-20	Physical Infrastructure Forecast Confirmed						
T-18	Standard Hardware Request Submitted						
T-18	Storage Allocation Data Provided to EMC						
T-16	Test Focus Areas and Resource Assignments Finalized						
T-12	Storage Cut Sheet Sign-off Completed						
T-10	Latency Testing Completed						
T-6	Storage Replication Completed						
T-6	Production Build Completed and Database Testing Started						
T-5	Test Condition Creation and Timeline Alignment Received						
T-3	Point of Arrival and Move Control Book Review and Sign-off Completed						
T-2	VP "Go" Confirmation Received						
T-1	Operational Readiness "Go" Confirmation Received						
T-3d	Production Network and Security Configurations Completed						
T-0	PRODUCTION MIGRATION START						
T+3d	Production Validation Sign-off Completed						
T+1	Transition to Steady State Support Completed						
T+1	Decommission Request Submitted						

### KEY:

- Planned = Baselined Finish
- Finished = Actual Finish
- Variance = Delta from Plan to Finish
- % Complete = From Plan
- I/R = Issue or Risk
- Owner = Owner of I/R

# RESOURCES

Laying out a timeline for migration events, along with the MCS and a work breakdown structure allows for predictive staffing

## What worked:

- Align the resource model to the phase and activities
- Adjust model based on technology type
- Leverage a blend of onsite and remote resources

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# RESOURCES

## Resourcing challenges due to a lack of internal staff and experience to support all elements of the Data Center migration pose risk overall migration success

### What worked:

- Partner with external resource with data center migration experience to lead individual towers and perform key technical roles
- Leverage internal talent and skills to institutional knowledge and expertise
- Over time, workload permitting, the primary responsibility is transitioned to internal resources

### What didn't work:

- Using lower cost, less experienced resources
  - Significant rework was necessary, which translated in to lost time and credibility with business
- Lack of client-assigned resources to partner with an external consultant
  - Too much time was lost in gaining understanding of environment

### What to watch for:

- Over-committed internal resources
- Turnover of external resources
- Burnout of resources on highly complex long-term programs

Internal	External
Commercial/Contracts/Finance	Asset Tracking
Communications	PMO
Enterprise Strategy and Engineering	Data Center Migration Strategy
Application Support/Remediation	Infrastructure Uplift
Operations Support	Team Leads
Security Services	All other Tower Leads
Test Execution	Test Strategy
	Move Group Managers
	OS/DB/Stor/Net SME's

# TESTING

**Migrating cross-country introduced application risk which required a Testing Center of Excellence ensure migration success**

## **What worked:**

- Implement a matrixed Testing CoE to support verification of application connectivity and performance as well as infrastructure readiness
- Implement tools to test the effects of Wide Area Network (WAN) latency on application performance prior to migration
- Deploy WAN acceleration to mitigate latency issues
- Ensure application teams agree testing will be limited to connectivity validation and performance baselines
- Test infrastructure in the new data center prior to migrating applications or support utilities

## **What didn't work:**

- Not having sign-off from application teams on what would be tested prior to the migration
- Independent testing strategies

## **What to watch for:**

- Scope creep
  - Application owners often use the migration event as an opportunity to fix pre-existing issues

# PROGRAM MANAGEMENT

## **A strong System Integrator and Program Management Office (PMO) were both key to successfully managing a dynamic multi-vendor environment**

### **What worked:**

- Establish a System Integrator (SI) function to drive consensus, consistency and adherence to standards
  - SI should be firm and vendor independent
- Utilize a gated review process through the PMO to ensure plans, milestones and deliverables are consistent and auditable
- The PMO should be made up of internal resources and external consultants which provided a good mix of client standards with outside migration expertise
- Implement a Critical Path Manager (CPM) to link key milestones and dependent activities
  - The CPM identifies plan drift and raises concern when dates begin to slip

### **What didn't work:**

- Using client only resources to manage milestones and deliverables they had little experience or knowledge of

### **What to watch for:**

- Plans that are too small and do not provide sufficient detail
- Plans that are too large and cumbersome to manage
- Do not allow slippage of dates without agreement from an executive steering committee

# PROGRAM STRUCTURE

**A program structure providing client leadership in key domains drove alignment across all technology groups and the business**

## **What worked:**

- Establish a structure that ensured senior level executives lead the key domain areas: Data, Infrastructure, Applications and Financials
- Develop a communication plan that includes frequent updates to the business and technology teams
- Ensure application and business stakeholders are accountable for their application portfolios
- Enlist third-party review of plans to ensure leading practices are being followed

## **What didn't work:**

- An outside firm leading the overall effort without senior leadership
  - It is imperative to have leadership from the client to drive decisions from the top down

## **What to watch for:**

- Swim lane discipline: Leaders and staff must stay within their own swim lane and not encroach on other's responsibilities

Thank you for your interest in our observations.

For 30 years, GTSG has worked exclusively on Data Center transformation and optimization.

Please reach out if we can help you in any way.

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## **HYBRID CLOUD STRATEGY AND MIGRATION**

### **Strategic Approach**

- Business case development
- Transition planning
- Technical modeling
- Non-disruptive execution

### **Application Analysis Methodology and Tools**

- Decomposition
- Affinities
- Wave planning

### **Project Leadership**

### **Implementation Subject Matter Expertise**

## **INFRASTRUCTURE SUPPORT SERVICES**

### **Managed Services**

- Multi-platform including database & middleware
- Service-level based or FTE-based
- Architecture, administration, programming, and systems management
- Remote or onsite

### **Project Based Services**

- Platform upgrades
- Workload migrations
- Implementation services
- Consulting and assessment (performance, disaster recovery, high availability, etc.)
- Project Management

## **INFRASTRUCTURE TRANSFORMATION**

### **Transition Services**

- Insourcing/outsourcing
- Knowledge transfer and interim support
- Application migration
- Service management design

### **Disaster Recovery Design and Implementation**

### **High Availability Design and Implementation**

### **Application Assessment and Deployment**

- Reference architecture
- Infrastructure alternatives/recommendations
- Implementation/migration

## **INFRASTRUCTURE OPTIMIZATION**

### **Architecture Assessment and Design**

### **Server Virtualization/Consolidation**

### **Storage Optimization**

### **Data Life-Cycle Management**

- Tiering
- Standardization/automation

### **Application Decomposition Application**

### **Re-Design/Remediation Performance**

### **Management and Tuning Latency**

### **Analysis and Consulting**