An ITIL Perspective for Storage Resource Management

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Abstract

Providing an ITIL perspective to storage resource management supports the consistent integration of storage information and storage processes into the overall management of an IT environment. The objective is to improve the efficiency and effectiveness of a storage organization by utilizing a set of ITIL-aligned storage management processes based on a CMDB that contains storage Configuration Items (CIs).

This tutorial will demonstrate how the ITIL 'process perspective' can be enhanced with a 'storage resource perspective' that is required to support storage management operations. Included in this tutorial will be scenarios that demonstrate how the following ITIL processes can be used to enhance the management of storage resources: Service Support (including Configuration Management, Change Management, Incident Management and Release Management) and Service Level Management.
Agenda

• Introduction to ITIL
• Reference Architecture
• Scenarios
• Summary
Most enterprises will fail to realize the benefits of IT best practices due to lack of business justification, lack of governance and lack of executive support “ - Gartner

- A Best Practice
  - Improves service levels
  - Lowers costs
  - Reduces risk

- A Best Practice is
  - Replicable
  - Adaptable
  - Transferable
ITIL Defined

Information Technology Infrastructure Library (ITIL)

- A library of books describing best practices for IT Service Mgt
- Describes goals, activities, inputs & outputs of processes
- Not a “standard” – just best practices
- Specific procedures can vary from organization to organization
- Worldwide de facto approach to IT management
- OPEN approach – not tied to any particular vendor

\(^R\) ITIL is a registered trademark of the OGC (the UK Government’s Office of Government Commerce)
Why is ITIL important for driving operational efficiency?

Key ITIL Benefits:
- Redirected Support Costs
- Improve Customer Service
- Lower TCO
- Improve Predictability of IT Costs and Chargebacks
- Facilitates Outtasking / Outsourcing Operations

ITIL services are the key to understanding how well IT is being utilized and the extent to which the IT function is meeting its service level commitments.
## IT Management Process Maturity

<table>
<thead>
<tr>
<th>Level</th>
<th>Maturity</th>
<th>Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Value</td>
<td>Linking IT to business metrics</td>
</tr>
<tr>
<td>3</td>
<td>Service</td>
<td>Service Level Mgt, Capacity Mgt, IT Service Continuity Mgt</td>
</tr>
<tr>
<td>2</td>
<td>Proactive</td>
<td>Availability Mgt, Problem Mgt, Change Mgt, Configuration Mgt</td>
</tr>
<tr>
<td>1</td>
<td>Reactive</td>
<td>Tactical firefighting, up/down, Service Desk, Release Mgt</td>
</tr>
<tr>
<td>0</td>
<td>Chaotic</td>
<td>Multiple help desks, minimal standards, user call-driven, Incident Mgt</td>
</tr>
</tbody>
</table>

Source: Gartner Group
Benefits of ITIL

Standard Services

Predictable Results

Control of Infrastructure

Control of Changes

Common Terminology
### Benefits of implementing ITIL – Real world results

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous process improvement</td>
<td>70%</td>
</tr>
<tr>
<td>Consistent quality</td>
<td>62%</td>
</tr>
<tr>
<td>Cost savings</td>
<td>38%</td>
</tr>
<tr>
<td>Predictable results</td>
<td>28%</td>
</tr>
<tr>
<td>Speed of delivery</td>
<td>27%</td>
</tr>
<tr>
<td>Respect from other execs</td>
<td>19%</td>
</tr>
<tr>
<td>Don't know</td>
<td>11%</td>
</tr>
</tbody>
</table>

Base: 647 respondents

Source: Forrester’s online survey for itSMF March 2006
Significant improvement by implementing ITIL

- Incident closure time: 64%
- Common process terminology: 61%
- Customer satisfaction: 59%
- IT/Business alignment: 57%
- Visibility of IT service performance: 55%
- Rationalization of software/hardware: 38%
- Resource management: 36%
- IT cost reduction/avoidance: 34%
- ROI tracking: 17%

Base: 647 respondents  
Source: Forrester’s online survey for itSMF  
March 2006
Overview of Processes
Service Management Processes

Storage resource perspective complements Service Management process perspective.

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Important Concepts – Service Support for Storage

**Incident Management**
- Storage errors
- Storage outages
- Storage service requests

**Problem Management**
- Root cause of related storage incidents
- When understood, becomes a Known Error

**Change Management**
- Significant changes to the storage infrastructure
- Does not include “standard” or “preapproved” changes

**Release Management**
- 1 or more storage changes built and tested together

**Configuration Item**
- Storage Hardware
- Storage Software
- Relationships between Storage CIs and rest of IT CIs

*Service Desk*
Incident Management Concepts

- Incident
  - Any event which is not part of the standard operation of a service and which causes, or may cause, an interruption to, or a reduction in, the quality of that service

- Incident detection and recording
  - Service Desk – Single Point of Contact

- Classification and initial support
  - 1st, 2nd, and 3rd-line support
  - Functional vs. hierarchical escalation

- Investigation and diagnosis

- Resolution and recovery

- Incident closure

- Incident ownership, monitoring, tracking and communication
Incident Management Key Issues for Storage

• Incident spikes – Storage outage
• Significant events recorded as incidents
• Levels of support
• Resolving root causes (usage of SRM product and CMDB to relate storage to rest of IT) in problem management
• Incident categorization and prioritization (based on data service level objectives – re. SNIA ILMTWG work)
Problem Management Concepts

• Incident trends become problems
• Root cause analysis (problems) vs. workarounds (incidents)
• First identify root cause
• Then, resolve → known error
• Problem control
• Error control (Known Errors)
• Not all problems should be resolved
  – Too costly
  – Outdated systems
• Proactive problem management
  – Trend analysis
  – Targeting preventive action
• Major problem reviews
• Problem and Known Error DB
  – Knowledge management
Problem Management Key Issues for Storage

- Individual incidents as problems
  - Major
- When is a problem worth resolving?
- Proactively looking for problems
  - Where to start?
- Vendor cooperation in resolving problems
Change Management Concepts

• Requests for Change
  – Mostly from Problem Mgt, Operations
• Change logging and filtering
• Prioritization
• Categorization
• Change Advisory Board (CAB)
  – CAB/ Emergency Committee
• Forward Schedule of Changes
  – Projected Service Availability
• Approved changes
• Preapproved or standard changes
• Urgent changes
• Change models
• Change scheduling
Change Management Key Issues

- Implementing storage changes should follow same process as rest of IT
  - Development
  - Release Management
- Development and the approval of changes to applications
- Change models for different types of changes
  - Minor
  - Major
  - Emergency
- Preapproved or standard changes
  - Who does this resolution?
  - Who maintains the list?
- Monitoring progress of the change
Release Management Concepts

• One or more changes → Release
• Release precedence
  – Major software releases and hardware upgrades
  – Minor software releases and hardware upgrades
  – Emergency software and hardware fixes
• Release policy and planning
  – Release identification
• Types of releases
  – Full release
  – Delta release
  – Package release
• Definitive Software Library (DSL)
• Definitive Hardware Store (DHS)
• Build management
• Testing
• Back-out plans
• Release acceptance
Release Management Key Issues for Storage

- Backout procedures aren’t always easy
- Deploying badly-tested systems
- Estimating time needed for deploying releases
  - Must have time for possible back-out procedures
- Some changes are deployed manually
Configuration Management Concepts

- Configuration Items (CIs)
  - Hardware, software, related documentation, and relationships
- CMDB
  - Virtual
  - All CIs, plus related info such as related incidents, problems, individuals, locations, business units, suppliers, services, etc.
- Planned/designed versus actual
- Configuration identification
- Configuration control
- Configuration status accounting
- Configuration verification and audit
- Configuration baseline
- Software and document libraries
- Definitive Software Library (DSL)
- License Management
Configuration Management

Key Issues

- Scope of configuration management
  - All systems?
  - All relationships?
- Different locations
- What else is in the CMDB?
  - Incidents, problems, SLAs, RFCs?
- Relationship with Asset Management
Business Perspective – The Business View on Successful IT Service Delivery

The Business Perspective 2 – Business View

- Strategy
- IT Governance
- Managing change

- Business and service continuity
- IT asset management
- Service sourcing

- Risk management
- Quality management
- Standards
Important Concepts: Service Delivery for Storage

Service
- Service catalog
- Service level
- Service level agreement

Availability Management
- Reliability
- Maintainability
- Serviceability

Capacity Management
- Business capacity
- Service capacity
- Resource capacity

Continuity Management
- Business continuity
- Threats
- Vulnerabilities
- Risks

Financial Management for IT Services
- Budgeting
- Accounting
- Charging
- Cost types

Service Provider
Service Level Management

Concepts

• Service
  – Process + applications + other resources
• Service catalog
• Service Level Agreement (SLAs)
• Operational Level Agreement (OLAs)
• Underpinning Contract (UCs)
• Service Quality Plan
• Service Improvement Program
• Service review meetings
Service Level Management
Key Issues for Storage

• What are the IT organization’s services?
• What are appropriate service levels?
• How formal should SLAs be?
• Reviewing SLAs
• Creating appropriate OLAs and UCs that will not hinder SLAs
• What are appropriate service levels?
• Can we meet the service level targets?
Availability Management Concepts

• Availability
  – Ability of an IT service or component to perform its required function at a stated instant or over a stated period of time

• Reliability
  – Freedom from operational failure

• Maintainability
  – Ability of an IT infrastructure component to be retained in, or restored to, an operational state

• Security
  – Confidentiality, Integrity, and Availability (CIA) of data

• Serviceability
  – Contractual agreements made with 3rd-party IT service providers

• Vital Business Function
  – Business-critical elements of a business process supported by an IT service
IT Service Continuity Management Concepts

- Service Continuity Management
- Business Continuity Management
- Risks
- Vulnerabilities
- Threats
- Business Impact Analysis
- Risk Assessment
- Recovery options
Financial Management for IT Services Concepts

- Direct and Indirect costs
- Fixed and Variable costs
- Capital or Operational costs
- Unabsorbed costs
Capacity Management Process

Capacity Management Process Flow

- Application Owners
  - Application Baseline
  - Application Forecasts
  - Application Trending

- Business Capacity Planner
  - Application Baseline
  - Application Trending

- Infrastructure Capacity Planner
  - Infrastructure Baseline
  - Infrastructure Trending
  - SAN Infrastructure Requirements
  - SAN Infrastructure Baseline

- Storage Capacity Planner
  - Storage Configuration/Capacity
  - SAN Configuration/Capacity

- Application Owners
  - Application Baseline
  - Application Forecasts

- SAN Administrator
  - SAN Infrastructure Requirements
  - SAN Administrator

- Resource Capacity Planner
Caveat about Capacity Management

- Experience has taught us that even within the same industry, Capacity Management processes vary significantly from client to client
- Experience has taught us that even within the same client, Capacity Management processes vary significantly from site to site
- The challenge is to bring all parties together on the same page, moving in the same direction using the same processes
From an ITIL® perspective, the benefits of Capacity Management are clear

- Reduce spending **on capacity through effective workload management**
- Reduce spending **on capacity acquisition through effective planning, planned and bulk purchases**
- Delayed, **reduced and “just in time” acquisition of capacity due to better planning and workload management**
- Reduce incidents **caused by a lack of capacity (User and IT Staff time, FTE requirements)**
Capacity Management

Aligns capacity of the IT services and infrastructure to current and future needs of the business by focusing on design and planning of service rather than the operational aspects of service capacity.

**Goals**
- Ensure cost justifiable IT capacity exists and is matched to the current and future identified needs of the business.
- Accommodate scalability requirements
- Minimize incidents due to lack of capacity
- Reduce the cost of capacity acquisition by planning and optimizing capacity usage
- Balance the benefits of technology refresh against leveraging existing technology based on business requirements and needs.

**Scope**
- Includes
  - Business capacity planning and management
  - Service capacity planning and management
  - Demand planning and management
  - Resource capacity management (for in-house service operations)
  - High-level service capacity monitoring
  - Performance management
- Excludes
  - Low-level system capacity monitoring
  - Generalized human resource management
ITIL Storage Asset Management

ITIL Software Asset Management

- Retire
- Requirements
- Optimize
- Operate
- Deploy
- Design
- Build
- Evaluate
- Procure
- Core
- Verification and Compliance
- Relationship Management
Security Management

ITIL Security Management

Maintain → Plan

Control

Evaluate → Implement
## Key Concepts to Remembering the Service Management Processes

<table>
<thead>
<tr>
<th>Process</th>
<th>Key Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability Management</td>
<td>Optimization</td>
</tr>
<tr>
<td>Change Management</td>
<td>Standardization</td>
</tr>
<tr>
<td>Configuration Management</td>
<td>Control</td>
</tr>
<tr>
<td>Financial Management</td>
<td>Stewardship</td>
</tr>
<tr>
<td>Incident Management</td>
<td>Quick Fix</td>
</tr>
<tr>
<td>IT Service Continuity Management</td>
<td>Prevent, cope, recover</td>
</tr>
<tr>
<td>Problem Management</td>
<td>Root cause, initiate request for change</td>
</tr>
<tr>
<td>Release Management</td>
<td>Doers</td>
</tr>
<tr>
<td>Service Desk</td>
<td>Single point of contact (SPOC)</td>
</tr>
<tr>
<td>Service Level Management</td>
<td>Maintain and improve</td>
</tr>
</tbody>
</table>
Reference Architecture
Service Support & CMDB
Storage Extensions to Change Management

Create & Submit RFC

<table>
<thead>
<tr>
<th>RFC Group</th>
<th>RFC Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server</td>
<td>Deploy OS</td>
</tr>
<tr>
<td></td>
<td>Deploy Patch</td>
</tr>
<tr>
<td>Storage</td>
<td>Add Storage - New</td>
</tr>
<tr>
<td></td>
<td>Add Storage – Existing</td>
</tr>
<tr>
<td></td>
<td>Data Cleanup</td>
</tr>
</tbody>
</table>

Storage Processes
1. Add new RFC types
2. Use new CIs & relationships (storage CI’s and ILM Policy)
3. Use data loaded by new DLAs
4. Add new process / activity templates
5. Launch SRM Tool
6. Storage Roles

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Scenarios
## Application Rollout Storage Linkages

<table>
<thead>
<tr>
<th>ITIL Process</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Service Catalog</td>
<td>Request to deploy app based on Data Service Level Objectives</td>
</tr>
<tr>
<td>2 Capacity Management</td>
<td>Review request based on existing capacity, if not enough, order more storage</td>
</tr>
<tr>
<td>3 Financial Management</td>
<td>Ensure requester won’t exceed budget for storage request</td>
</tr>
<tr>
<td>4 Asset Management</td>
<td>Move storage from loading dock to raised floor.</td>
</tr>
<tr>
<td>5 Change and Configuration</td>
<td>Change tasks performed for storage, SAN and server domains.</td>
</tr>
<tr>
<td>Management</td>
<td></td>
</tr>
</tbody>
</table>
Example Interrelationship of Storage Incidents, Problems, Known Errors, and RFCs

- **INCIDENT**: Any event which is not part of the standard operation of a service
- **PROBLEM**: The unknown underlying cause of one or more incidents
- **KNOWN ERROR**: A problem that is successfully diagnosed and for which a work-around has been identified
- **REQUEST FOR CHANGE**: A means of proposing a change to any component of the IT infrastructure or IT service.

- File System out of space
- Backup failure – file open
- Software defect that consumed all temp space
- Backup schedule incorrect
- RFC to deploy SW update
- RFC to change backup schedule

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Summary
Applying ITIL to Storage Resource Management

• Helps customers implement best practices
• Links storage resource management with server and network management to accomplish end-to-end management.
• Provides a bridge from operational management to business process management.
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Many thanks to the following individuals for their contributions to this tutorial.

SNIA Education Committee

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