Enterprise Configuration Management:

Taming IT Infrastructure

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System Configuration and Enterprise Configuration Management

- **System Configuration** - Settings, components and dependencies which control/affect the behavior of computer systems, services and applications.

- **Enterprise Configuration Management** - The enterprise-wide establishment, monitoring, correction and analysis of system and inter-system configurations with the goal of optimizing the effectiveness and minimizing the cost of IT infrastructure operation (in the face of constant change).

Configuration Management: Disciplinary Evolution

- **User Configuration Management** – making user settings and profiles ubiquitously available
- **Software Configuration Management** – tools and techniques used to manage change to software assets, Ref.: “Software Configuration Management Strategies”, Brian White, Addison Wesley, 2000; different systems components require different software deployment/change frameworks
- **Enterprise Configuration Management** - enterprise-wide establishment, monitoring, correction and analysis of system and inter-system configurations

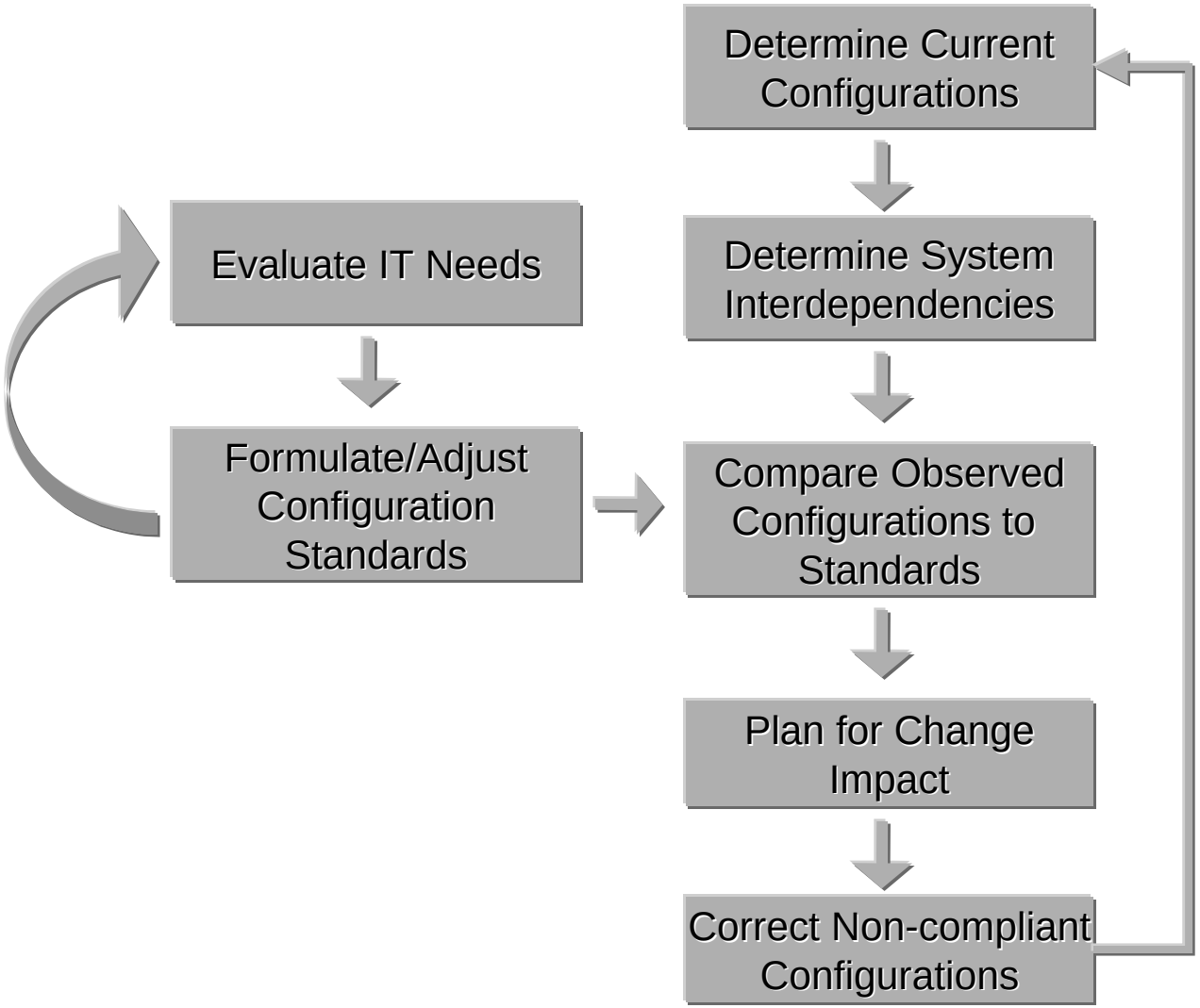
Motivation

- Value
  - Availability –achieving 99+% availability requires "…careful Planning, rigorous configuration control and diligent change management…", Ref.: Achieving High Availability for Critical Distributed Applications", Gartner, 6/26/1997
  - Security – recent devastating E-commerce intrusions were permitted by systems up to a year out of date on published hot fixes, Ref.: FBI, NIPC Adivsory 01-003
  - Efficiency – regular configuration inventory reduces IT cost per PC, Ref.: *Lowering Help Desk Costs With LAN Based Inventory Tools,* Gartner, 17, July 1997
- Not effectively addressed by other system management disciplines

Enterprise Configuration Management: The Problems

- Different systems, applications and services represent configuration information in different mechanisms accessible through many different APIs
- Comprehensive configuration information is distributed across thousands of data elements
- Different configuration settings are often tightly coupled by application requirements
- Configuration changes are often not reversible

Enterprise Configuration Management: Process



Formulate/Adjust Configuration Specifications

Sources of Configuration Standards:

- Corporate Standards
- Consultant Best Practices Recommendations
- Vendor Recommendations

Sources of Configuration Change:

- Emergent security fixes
- Technology evolution
- Application upgrade requirements

Determine Current Configurations

Sources of Configuration Information (NT):

- Registry
- WMI: CIM and Providers
- Active Directory
- SAM Database
- File System
- Configuration Tools: IPCONFIG, Collect.exe, …
- Application Management API's
- Stored Procedures
- Metabase
- Idiosyncratic Files
- … and many others…

Analogous sources exist for UNIX(es), Linux, MVS …

Determine System Interdependencies

Typical Interdependencies:

- DHCP, WINS, DNS …
- GC Replicants
- Active Directory
- Client/Service Component Consistency (MDAC, SQL …)
- Down Level Service Systems
- Shared resources
- …

- Identification of dependencies requires comprehensive monitoring of detailed settings, versions, service packs, hot fixes …

Compare Observed Configurations to Standards

Expressing Standards

- Scope: Not all standards apply to all systems
- Secure: Compliance conveys potentially sensitive information
- Versioning: All standards are subject to potentially rapid change (security exposures, incompatibility with key application upgrades, emergent business need…)

Results of Comparison

- Clear indication of the specific cause of the variance
- Provision for granting permanent and semi-permanent exceptions
- Provision for surfacing variances despite large amounts of compliant data (e.g. drill down, alerts, summary results…)

For identified variations: What changed when?

Plan for Change Management

Enterprise Configuration Management systems are able to facilitate inter-system configuration change by:

- Easily identifying the scope of systems affected by proposed changes
- Comprehensively identifying specific dependencies across interacting systems
- Verifying that complex configuration changes are indeed in place
- Identifying isolated and rogue changes before outages and service level violations manifest

Correct Non-Compliant Configurations

- Most configuration changes can be adjusted through configuration APIs.
- Some configuration changes require integration with software distribution facilities
- All configuration change requires knowledge of application/service imposed ad hoc compatibility restrictions
- “Getting it right the first time” is important because many configuration changes are irreversible
- Confirming that intended configuration changes have actually been effectively made is essential

Interfaces to Other Systems Management Applications

Management Applications

- Help Desk Management
- Event Management
- Service Level Management
- …

Key Integration Technologies

- XML – Inter application data interchange
- DMTF CIM – Cross platform queries using the CIM Common schema
- SNMP – Access to specialty system and component MIBs
- Directory Integration – Consistent group naming and definition, RBAC, Location services…

Enterprise Configuration Management Application Requirements

- Very low CPU, Memory, I/O and footprint impact on monitored systems
- Minimized and controllable impact on network infrastructure
- Scalability that covers the many interdependent systems within an enterprise
- Provide visibility of *important* information in the midst of large amounts of data
- Provide facilities for establishing and verifying compliance to configuration standards
- Provide mechanisms for integration with other system management facilities
- Timely analysis across large numbers of systems implies the need for a configuration data repository

Summary

By providing key Information for configuration control, enterprise configuration management facilitates:

- Increasing the degree of compliance with proven configuration standards (early, detailed alerts to configuration drift)
- Improving system availability by supporting adherence to *best practices* and providing more detailed change management/system dependency information
- Improving MTTR by providing access to detailed historical configuration data to inform IT problem response
- Reduced Vulnerability Through more Rapid Identification and Deployment of Emergent OS, Service and Application Fixes
- More reliable software deployment by verifying successful software installation and patch application