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How to Select & Implement the Right CMDB

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Just 2,000 employees with just two devices per user can result in 20,000–60,000 CI lifecycle, status, and/or attribute modifications in a one-year timeframe! Manual CMDB population and maintenance is a nearly impossible endeavor -- automation is the key to success with a CMDB project.

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IT infrastructures enable the delivery of critical tools and services to both internal and external customers. The primary building blocks of an IT infrastructure are configuration items (CIs). As defined by the ITIL®, a CI is any component within the IT infrastructure, e.g., computing devices, hardware, software, and procedures.

A collection of CIs form the IT infrastructure, and the IT infrastructure supports the advanced applications that provide complex services to the business.

Businesses must collect and manage data about CIs infrastructures in order for IT managers, executives and CIOs to leverage this information when making critical business decisions, (e.g., investing resources, and ensuring the organization operates securely and efficiently).

The CMDB deposits the wealth of CI data from numerous sources into a database repository, logically depicting the IT infrastructure. Further, the CMDB maps CIs to IT services, documents processes, and links the CIs to IT Service Management processes in order to achieve business goals. Thus, the CMDB sits at the juncture between the elements that comprise a complex IT infrastructure and the processes that govern its operation.

Implementing a Configuration Management Database (CMDB) can be a daunting task. Even determining the benefits and what your organization's specific needs are can be challenging. Based on my experience with many CMDB projects, this article explains how to navigate the CMDB planning process, and explains just what it takes to get a CMDB up and running.

CMDB Preparation

More simply, the CMDB contains:

A unique identifier for all CIs, e.g., devices, hardware, software, applications, services, people, facilities, procedures and related documentation (SLAs, OLAs, etc.)

- A logical model of the IT infrastructure
- CI version and status
- CI relationships

While the contents of the CMDB appear simple, the answers to the following questions are the first step to your CMDB project and will govern CMDB content.

1. What does the business require?
2. What is IT Service Management's role?
3. What does IT require?

These questions must be answered in order to ensure CMDB project success; the answers will identify the business, service, and technical requirements of your CMDB project.

1. What does the business require?

What do executives and business leaders really care about? They care about profit, quality, competitive advantage, differentiation, regulatory compliance, and satisfied and repeat customers. The CMDB project must be aligned with business goals and must meet the day-to-day tactical objectives of IT Service Management, which briefly stated are to 1) align IT services with business goals and customer needs, 2) deliver quality IT services, and 3) improve the cost efficient provision of IT services. This alignment of the CMDB and the business can be accomplished by addressing the questions that business executives really care about:

- How will the CMDB enable IT efficiency and contribute to increased business profitability?
- How will the CMDB enhance the delivery of quality service?
- How will the CMDB contribute to the business's competitive advantage?
- How will the CMDB increase flexibility?
- How will the CMDB facilitate changes to allow the organization to differentiate from the competition?
- How will the CMDB ensure regulatory compliance?
- What role will the CMDB play in the delivery of quality services that result in satisfied and repeat customers?
- How will the CMDB secure and protect my IT assets from disaster?

The success of any IT project is significantly reliant upon IT's ability to relate a technical project to executive-level goals. The CMDB can be considered a success only if it contributes to the business by leveraging IT Infrastructure CI data in a meaningful way to further the goals of the business

Dedicating the necessary time to correctly plan a CMDB project is critical. Proper planning ensures that the CMDB project aligns with business goals, thus securing project funding and executive sponsorship—critical success factors for any IT project. The goals defined in the business planning phase now guide the IT group as it maps business services to CMDB functionality, links IT Service Management processes across the organization, and defines CMDB technical requirements.

2. What is IT Service Management's role?

To prepare for your CMDB project, IT must continue its planning efforts, but this time from the perspective of the IT services that the CMDB will support. The CMDB must support the critical IT services your business uses to conduct day-to-day activities. Does your business utilize email services to transact customer orders? Does the business rely on Instant Messaging for critical user communication? Is your business reliant on a customer call center to provide technical support?

The CMDB (and Configuration Management) functions as the intermediary process that connects business goals to the tactical and operational activities of IT (discussed in the next section), linking services to CMDB technical specifications. The ITSM group must be grounded in best practices for CMDB management, which are guided by ITIL's framework for Configuration Management. The goals for Configuration Management focus on:

- Accurately controlling and accounting for all of the IT assets and configurations.
- Depicting the relationships between CIs and IT services.
- Providing a repository for all information about CIs.
- Enabling the audit and verification of the CI infrastructure in order to provide a sound basis for managing IT services.

Your CMDB should allow you to document the IT infrastructure in order to later perform analyses and create linkages to other ITIL processes. The main activities of Configuration Management, according to the ITIL framework, are planning, identification, control, status accounting, and verification and audit. The following table depicts how Configuration Management activities relate to the technical requirements of a CMDB and defined business goals, which is the overall role of ITSM in a CMDB project.

Configuration Management Activity	Definition	Technical Requirements	Business Goal
Planning	Analyzing and assessing the existing environment, locating CI data sources, defining strategic objectives, defining roles, and obtaining executive sponsorship. .	CMDB structure CI Discovery Standards Business analytics	Aligning IT activity with: Only those services that provide value to the business' customer and encourage repeat business
Identification	The logical and physical selection and identification of CIs that compose the IT infrastructure, including CI attributes: type, relationships, location, ownership, lifecycle state, variants, baselines, etc.	Auto discovery Standards Analytics	Increased network uptime ensuring quality services Efficient operation of IT infrastructure contributing to business profitability Fast network recovery from failure ensuring adherence to SLAs
Control	Involves the integrity, authorization, and identification of CIs recorded in the CMDB, and who has access to the data contained in the CMDB.	CMDB structure Auto discovery Analytics	Regulatory compliance (SOX) Security
Status Accounting	Consists of recording and reporting the planned, current, and future lifecycle state of the CIs and their attributes.	Analytics	Rapid network and IT service analysis facilitating change and competitive advantage IT investment planning
Verification and Audit	Ensures that the CMDB content accurately reflects the existing IT infrastructure.	Auto discovery Analytics	Regulatory compliance Business continuity and disaster recovery

By now you can see that the CMDB sits at a critical juncture in your IT Services organization; the CMDB fully documents the IT infrastructure, maps CIs to services, links the IT infrastructure to the other

processes governing the quality operation of your IT services, and enables the delivery of reports and analysis to inform business-critical decisions.

IT's goals are crucial to the CMDB's success and to the day-to-day operation of IT services. However, it is the triad of documenting CI raw data, linking operational processes, and enabling business reporting that achieve the business' goals: efficient and cost effective delivery of quality IT services.

3. What does IT require?

Enough already with the planning phase of your CMDB project! Most likely, the IT group just wants the opportunity to do what it perceives as its main objective: define the technical requirements and deploy the tool. They will utilize drivers, identified by the business and service planning exercises outlined above, to translate them into technical and functional specifications for the CMDB. The IT group will relate these drivers to characteristics such as CMDB structure, the configuration item discovery methods it uses, technical standards upon which the CMDB relies, and analysis tools that help to support business decisions.

CMDB Structure

CMDB products fall into three structural categories: monolithic, distributed, and federated. Businesses should determine the preferred structure based on business goals.

Category	Description	Type of Organization Supported
Monolithic	Typified by a single data repository managing all CI information	Monolithic CMDB structures support the selected CI data, logical structure, and CI relationships in one large database, unifying the data repository across all company departments and data sources, regardless of the business size.
Distributed	Locates data in sources, databases, management applications, discovery tools, etc., across IT silos.	Distributed and federated CMDB models leverage existing data located in the organization and investments in enterprise data management applications via third party integration and vendor partnerships. Highly dispersed organizations with developed and embedded data repositories will benefit from this model.
Federated	Consists of a common (virtual) data store containing CI information linked with data, attributes and related information located in other information stores	

The selection of a CMDB structural model is an art form; selection relies on filtering business requirements through the prism of current industry models to select an appropriate solution. It is important to acknowledge, however, that current industry trends are adopting the federated CMDB model.

Configuration Item Discovery

Configuration Item discovery is the process by which infrastructure components are discovered, uniquely identified, and populated into the CMDB. It is important to remember that not every element of the IT infrastructure will be identified and controlled in the CMDB. The ITIL framework calls for identifying CIs according to the lowest level of change managed by the IT group in support of the IT services.

Auto discovery, as opposed to manual discovery (see sidebar), is imperative given the complexity of most IT network components, relationships, and frequency of changes.

Three types of auto discovery are performed to populate the CMDB:

Discovery Type	Description

Agent-less (SNMP polling*)	Agent-less polling utilizes the native SNMP agents installed on network devices. Auto discovery polls all the network-connected devices and discovers basic operating system (OS) hardware and software information. This method discovers network-connected devices and is the only way to collect data about CIs that do not support agents.
Agent-based	Auto discovery utilizes third-party agents installed on network systems to collect detailed information about CIs, and works to discover mobile and handheld CIs.
Packet- and protocol-based	Analysis that captures application flows across the network.
Manual modeling	The CMDB should allow manual modeling and CI entry of non-discoverable infrastructure elements (e.g., employees, locations suppliers, and business units).
* SNMP, regardless of whether it's native or a third-party agent, must be configured on every device that the organization wants to track and control through a Configuration Management process. Otherwise, the auto discovery polling process will not discover the network device. Depending on the sophistication and size of the organization, this may dictate a project in and of itself, if SNMP is not used when you start your CMDB project.	

CI discovery is the most complex aspect of translating business requirements into technical specifications; the results of CI discovery touch several important CMDB considerations:

Consideration 1: Quickly populate the CMDB with CIs

Auto discovery tools work to populate the CMDB with identified and controlled CIs. This is a "quick win" in immediately populating the CMDB with meaningful CI items. It is important to remember that standard naming schemas and unique identifiers are critical to the auto discovery process; otherwise, the automatic population of the CMDB is potentially redundant. The discovery types can be used alone, in conjunction with one another, or as a hybrid discovery approach.

Consideration 2: Limit CI granularity

Give careful consideration to the granularity of CIs contained in the CMDB. Too much CI data is impossible to reasonably track and update, even with auto discovery capabilities. It is not appropriate to populate the CMDB with every CI that auto discovery processes are capable of discovering.

CI selection for inclusion in the CMDB is dictated by Service Level Agreements between the business and IT; specifically, aspects of the SLA that define Change to IT services. The CIs that the organization intends to control via the Change Management process determines the level of CI selection in the Configuration Management plan. Thus, this focus will drive CI selection to the lowest level of change defined in the Change Management plan. This is important because IT groups often exercise a tendency toward capturing every detail about all IT infrastructure CIs without regard to why tracking a CI is valuable, and the level of metadata that is reasonable. The CI data will impact the data schema model, maintenance activities, and audit of CI attributes.

Consideration 3: Control CI integrity

Start small; ensure that the CMDB contents are accurate. This is particularly important when multiple data sources are used during auto discovery (i.e., when a CI is discovered by multiple tools or is stored in more than one data source) The CMDB must be able to parse the CIs, assign unique identities to each, and implement a strong, rules-based reconciliation process to ensure integrity and accuracy. CMDB accuracy will build trust, which will enhance the CMDB adoption as the trusted, "golden" repository of all IT infrastructure and services information.

Use automated processes to verify that the CMDB is golden and that it reflects the reality of the IT infrastructure. Configuration Management is a highly detailed and process-heavy activity; organizations will achieve great economies of scale and efficiency by automating both the population and verification of

the CMDB. Further benefits of automated verification include historical baseline configuration data for regulatory compliance and IT infrastructure Change assessment as well.

Standards

Collaborative and iterative in nature, CMDB projects are long-term implementation commitments with multiple phases. The project phases, such as design, development, and testing, take months, if not one to three years in length to implement. The phases require ongoing audits—at least yearly—to incorporate continuous improvements.

CMDB tool development is in a nascent state. Businesses, therefore, will want to select CMDB solutions that are based on industry standards so that the CMDB project is not hindered. To date, however, industry standards that govern interoperability (e.g., auto discovery, data population, data schema, information models, etc.) are still developing.

Most CMDB vendors recognize the need for industry standards, thus, they are incorporating existing application standards in their product development. The intent of this approach is to position CMDB products well, so that when the standards are finally released, CMDB vendors maintain the existing embedded customer base and allow smooth upgrade paths. Examples of existing and developing standards that are being used to aggregate data from distributed sources to negotiate interoperability include the following:

Standard	Description	Existing or Developing
CIM	The Distributed Management Task Force's (DMTF) Common Information Model (CIM) is the foundation for the data schema.	Existing
XML	CMDB developers are keeping data in XML format for interoperability purposes.	Existing
DCML	Data Center Markup Language	Being Developed
WS-CIM	Web-Services Common Information Model	Being Developed
WSDL	Web Services Description Language	Being Developed

The use of existing industry standards prepare the foundation for a graduated CMDB implementation and support the incorporation of new data sources as they are acquired or developed. Look for products that support these standards. Query vendors as to the extensibility of their product as industry standards mature.

Business Analytic Tools

To achieve the goals of your CMDB project, such as enabling operational efficiency and supporting business-critical decisions, the CMDB must provide strong business analytic tools. After all, most IT managers are generally submerged by a sea of uncorrelated IT infrastructure data, frustrating their ability to operate efficiently or provide real-time data for the decision-making process. Further complicating the IT manager's responsibilities, IT infrastructure data is typically contained in a myriad of sources, such as Excel spreadsheets, databases, Visio diagrams, and even tribal knowledge spread throughout the organization. The dispersion of data, thus, hinders managers from making fully informed decisions.

The real question is, how do you leverage the accumulated information contained in the CMDB to achieve quality IT Service Management? The answer: business analytic tools resident in the CMDB that correlate the raw data into coherent information to support the business. IT managers will use CI information to provide meaningful reports to the other business processes in support of business decisions. The analysis tools enable the IT department to decipher CI roles, show what is connected to a CI, identify

the services a CI supports, show where a CI is located in the network, and whether a CI is a member of another CI. From a wider, IT perspective, these tools support:

- Relationship and dependency mapping
- Physical topology views
- Visualization mapping of IT infrastructure to applications and services
- Application portals and dashboards
- Analyses that enable business-critical decisions

In turn, the analysis tools enable important operational and business objectives, which is the long-term value proposition enabled by the CMDB, resulting in:

- Licensing and regulatory compliance (SOX, HIPPA, etc.)
- Increased network uptime
- Quality IT services
- Cost and benefit analysis

Summary

CMDB projects involve a significant amount of planning. The planning and preparation are critical success factors, the results of which ensure that the CMDB satisfies critical business goals, and prevents the complexity of the organization's IT infrastructure and services from subsuming the CMDB. ITIL recommends a full, six-month commitment to plan Configuration Management and CMDB projects. Start your CMDB project with the end in mind: the CMDB project must fit your business goals and meet your user needs; the initial planning phase of your CMDB initiative can not be short-circuited.

No matter how daunting your CMDB project, just getting started can be a substantial accomplishment. In order to ensure success, start small, contract with an external consultant or advocate, and stay committed to your CMDB project. Return again and again on small starts, refocusing each time on your ultimate goal. With a long commitment you will consistently mature the breadth and value of your CMDB.

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