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Standardized Design Deliverables in the Enterprise

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Overview

Of all the elements in a network lifecycle, the design cycle is often the most subjective and least controlled process for managers. This problem has many contributing factors: the sheer numbers of hardware and software solutions available; the breakneck speed of technological advancement (often making technologies obsolete before they can be fully deployed); and the lure of creative expression available to engineers during technical design.

Regardless of the cause, inconsistencies within the design process can drastically reduce the efficiency of implementation. These problems can carry over into the operational support arena if design deliverables are similarly inconsistent. Standardizing the hardware, addressing, and technologies can only achieve limited results if the design process itself is not well defined. Though this document demonstrates the concept of a standardized process within a network design, a single design process can be applied to all engineering groups within an enterprise organization (e.g., Network, Systems, Applications, Database, etc.)

Design and the Structure of a Technology Department

Within an enterprise technology organization, there are typically three sub-groups: Engineering, Implementation and Operations. Though design is often thought of as strictly an engineering process, it is in fact essential that all three groups be involved during design. Each group has specific functions to perform during the design process: Engineering must ensure that the design meets all standards while fulfilling the business requirements of the project. Implementation must verify the feasibility of the design and formulate an implementation plan. Finally, Operations must ensure that needed documentation is received, and support staff is properly trained to support the design once it moves into production. Only through timely involvement of all three groups in a standardized design process can these functions be optimally fulfilled.

A common misconception within a networking department is that design engineers should maintain full responsibility during any design project. This would seem logical since the design engineers are normally the most experienced and knowledgeable technicians on staff. The problem with this approach is the tendency to lose sight of the true business goal of a project and to concentrate on the technology considerations. The intended business outcome of a network design project is never to install an ultra high-tech network with minimal latency and high bandwidth throughput, but rather to install a network that provides services to support the business initiatives of the company. With this in mind, a more user-centric or market-centric view of the outcome must be the driving goal of any network design project, and operational concerns are of the utmost priority.

To ensure a smooth transition from group to group, turnover and acceptance points must be established and enforced within the design process. The two major acceptance points are Engineering-to-Implementation acceptance (Implementation accepts the design and install plan), and Implementation-to-Operations acceptance (Operations accepts responsibility for supporting the solution). Only by involvement early in the design process can the criteria for these acceptance points be fully identified. Enforcement of the acceptance points can be most efficiently driven by standardizing the deliverable outputs of each step in the process as described later in this document.

An often overlooked benefit of cross-discipline involvement in a design is the informal peer review that results. The chance to freely review and comment on a pending project not only helps improve the quality of the end product, but can also improve the job satisfaction of everyone involved. Implementation and Operations staff will realize that their opinions and experience are valued within the organization, while also gaining valuable experience from interaction with senior designers. This increased morale contributes to an environment of professional development, as Implementation and Operations are often the best training grounds for future design engineers.

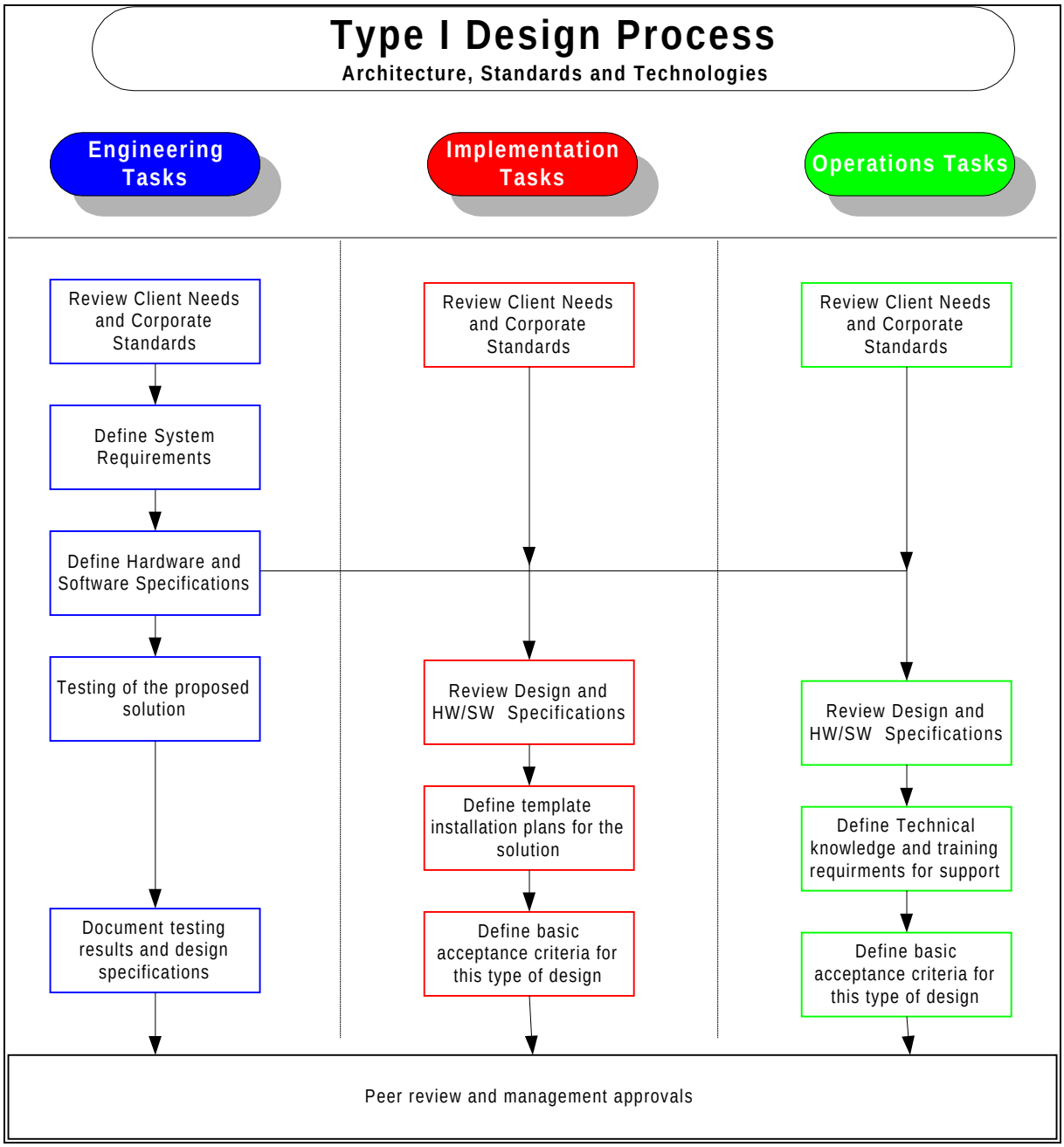
Two Major Categories of Designs

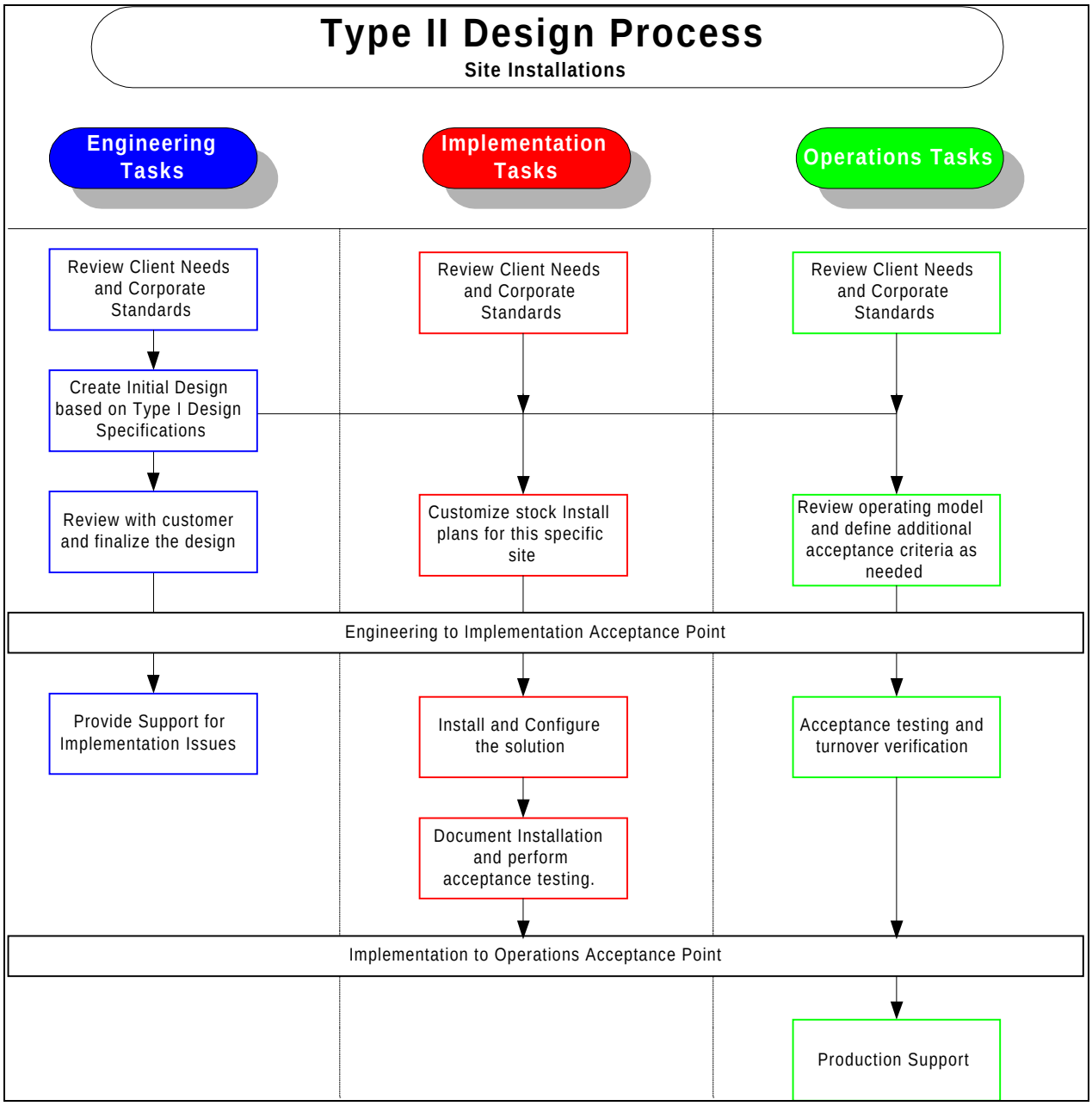
There are two major categories of designs, which will be referred to here as Type I and Type II respectively. Type I designs involve new technologies, architectures, and standards. Such projects require significant research, but may not involve a specific site implementation. This type of design makes up roughly 5% of design projects. Type II designs are site implementation projects utilizing standard technologies previously tested, approved and documented. These make up the majority (95%) of design projects. The processes for these two types of designs differ significantly.

Type I designs serve to evaluate new technologies, and consequently depend heavily on testing by the engineering team. During testing, the implementation team can focus on installation issues involved with the technologies and create template installation plans. Likewise, customers can document equipment and service lead times to avoid unrealistic timeframe expectations. Meanwhile, Operations should be evaluating the technical knowledge and training requirements necessary to support the new technology. Type I design projects are also used to identify the acceptance criteria that will be enforced during subsequent installation projects. The final result of a Type I design is a fully tested and approved technology design template that can be used for future implementations of the technology.

Type II designs contain very little actual “design” work. Rather, designs that have been tested and approved are customized for actual site installations. The engineering focus during these projects is on identifying the business needs of the customer, and customizing the design template into a technical solution that supports those needs. Implementation focuses on customizing the template installation plan for the specific site targeted,while Operations identifies any additional acceptance criteria that might be needed for the site and ensures that support documentation is complete prior to moving the site to production.

The following diagrams depict the necessary interaction of network groups during the design process.


Type I Design Process
Architecture, Standards and Technologies
Engineering Tasks
Implementation Tasks
Operations Tasks
Review Client Needs and Corporate Standards
Define System Requirements
Define Hardware and Software Specifications
Testing of the proposed solution
Document testing results and design specifications
Review Client Needs and Corporate Standards
Review Design and HW/SW Specifications
Define template installation plans for the solution
Define basic acceptance criteria for this type of design
Review Client Needs and Corporate Standards
Review Design and HW/SW Specifications
Define Technical knowledge and training requirments for support
Define basic acceptance criteria for this type of design
Peer review and management approvals



Group Roles and Responsibilities During the Design

Although all three groups of an Enterprise engineering department are involved in the design, they have different and complimentary roles to perform, which vary according to their respective customer.

Engineering has the original requestor as its primary customer, with Implementation as a secondary customer. This requires that Engineering design a solution to meet both the needs of the requestor and generate design specifications that will allow Implementation to install the solution.

Implementation has Operations as its primary customer in completing the all-important Implementation-to-Operations acceptance point. Operations has no direct customer during the design process, but must ensure that the solution can be properly supported after implementation. In this way, Operations bears final responsibility for satisfying the end user and must ensure proper delivery from both Design and Implementation.

The separation of these roles can be seen in the process flows depicted earlier. The first step for each of the groups in any design is to review the client needs and corporate standards. This step has different tasks associated for each group. Engineering begins by evaluating the technical aspects of the request in order to begin identifying the required technologies. Implementation uses this step to begin identifying resources and timeframes for the future implementation. Operations uses this step to begin identifying the support needs that the final solution will require, including possible training needed for the support staff and the need for new or upgraded operational support systems.

Most Operations groups maintain a standard acceptance checklist of items to be completed prior to operational support. This checklist may exist in any format, including a web-based tool, spreadsheets, commercial workflow tools, or even a simple paper-based checklist. Such checklists are essential to verifying operational readiness. However, the checklist must be flexible enough to allow for additions or deletions based on the specific design being implemented. Identifying these specific acceptance criteria for inclusion in the acceptance checklist is the primary responsibility of Operations during the design process. Verification of this customized checklist then constitutes the Implementation-to-Operations acceptance step within the process.

One role that is critical to any large-scale design project is the project sponsor. This individual is most often a liaison to upper management who communicates the value and progress of the project. He or she is rarely involved in any technical aspect of the project and can quite often be the original requestor. The project sponsor ordinarily interfaces directly with the project manager for updates and budgetary considerations. This individual is external to the design process itself, but can be of the utmost importance in mediating issues between technical and business considerations. Senior management or corporate board members rarely have the time available to perform this role effectively.

Standardized Design Deliverables

An essential element of standardizing the design process is to standardize the output of the process and define the process tasks around this output. Design deliverables serve not only to document the entire design and implementation, but also as operational support documentation once the site moves to production. Therefore, the quality of support provided by an operations group can be compromised by incomplete or inaccurate design deliverables.

Defining a design deliverable standard starts by defining the needs of output recipients (e.g., who will be using the documentation and for what purpose). The exact structure and format of design deliverables must be customized to the corporate environment and culture; however, the basic elements to be included are fairly static. The charts below demonstrate the basic elements of a design deliverable as well as ownership within a project:

Type I Design Deliverable Elements

Deliverable Element	Description	Creator	Recipient
Project Description	Short text narrative of the project to describe the intended business goals of the customer	Project Manager	All
Strategy Compliance	Demonstration of how this technology will match the formally defined technology strategy of the company	Engineering	All
Standards Compliance	Demonstration of where this technology will fit into the technology standards of the company	Engineering	All
General Hardware Software Specs	Analysis of the hardware and software necessary for the solution. Includes supplier/reseller information.	Engineering	Implementation
Testing	Testing plans, test results, and performance design characteristics	Engineering	Implementation and Operations
Logical Schematic Diagrams	Diagrams showing a typical design using the technology. These will serve as "templates" for Type II projects.	Engineering	Implementation
Implementation Plan	General template task list and plans for implementing the technology	Implementation	Implementation (used in Type II installations)
Operating Instructions	Details recurring operational tasks once the technology is moved to production. Should include troubleshooting guides for use by support staff.	Operations	Operations (used in subsequent Type II installations)
Tunable Parameters	Parameters unique to the technology and recommended settings for various environments	Engineering	Implementation
Training Requirements	Technology and training necessary for operations staff in order to support the technology	Operations	Management
Operations Turnover	Acceptance criteria that must be met before moving an installation of this technology to production	Operations	Implementation

Type II Design Deliverable Elements

Deliverable Element	Description	Creator	Recipient
Exceptions to Standards	Description of any defined standards that will be exceeded and justification for doing so	Engineering	All (including Management)
Detailed Operating Instructions	Detailed operational tasks associated with this particular implementation or site	Operations	Operations support staff
Detailed Installation Plan	The "template" install plan created in Type I customized for this particular implementation	Implementation	Project Manager
Procurement and Maintenance	List of all hardware and software elements needed to complete the proposed solution	Engineering	Project Manager
As-Built Documentation	Diagrams showing the solution as actually installed, including any changes made during implementation	Implementation	Operations
Configuration Information	Detailed hardware and software configuration documentation	Implementation	Operations
Production Turnover	Complete list of all tasks to be completed prior to moving the implementation to production, customized for this installation	Operations	Implementation
Moves, Adds, Changes	Typical day-to-day operational changes made at user request	Operations	Operations (update support documentation)

Integration with the Project Management Process

The importance of enforcing turnover and acceptance criteria within the process as a means to ensure quality cannot be stressed enough. Traditionally, this is handled through time-consuming methods such as hands-on verification of the installation, and after-the-fact documentation. Such methods are not only costly and time-consuming, but often lead to corner-cutting and rushed work to meet project deadlines. The inevitable result of such methods is incomplete or inaccurate support documentation.

By integrating the expected deliverables from a design with the project management process, the required documentation from the design can serve as a vehicle for enforcement of project acceptance points. A project manager can use the deliverables as milestones within a project plan to accurately track the complex technical design progression, even if the project manager is not well-versed in the technical issues. This self-governing system allows the project manager to focus on the business issues of the project, rather than on technical concerns.

A central repository for design deliverables should be established that allows access for all who share an interest in a project. Commonly, this is achieved through a web-based interface to facilitate easy access from any area of the network. Due to the sensitive nature of the information stored in this repository, security issues must be addressed to allow access only to authorized individuals. This repository can be customized to whatever extent is desired, and is often fully integrated with an operational support database or project database.

Summary

The advantages of a standardized design process reach far beyond the design itself. Comprehensive support documentation and more efficient installations are some of the primary benefits, with project management integration, peer review, and in-house professional development of staff resources adding significant value as well. A well-constructed design process, driven by standardized deliverables can have benefits throughout the entire network lifecycle.

For further information, see the Lucent NetworkCare℠ Professional Services (Lucent NPS) website at http://www.lucent-networkcare.com, or call 1-877-369-1115 in the U.S. or 1-727-217-2303 outside the U.S.

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