



Construction Industry Institute®

Best Practices in Quality Management for the Capital Facilities Delivery Industry

Construction Industry Institute

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Best Practices in Quality Management for the Capital Facilities Delivery Industry

**Prepared by
Construction Industry Institute
Quality Management in the Capital Facilities Delivery Industry
Research Team**

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Contents

<i>Chapter</i>	<i>Page</i>
Executive Summary	v
1. Introduction	1
2. Research and Data Analysis	7
3. Findings	17
4. Application/Implementation	21
5. Conclusion and Recommendations	23
6. References	25
Appendix: Review of CII Knowledge Topic 8.01	27

Executive Summary

The roots of modern quality management science extend back to the early 1900s when the industrial revolution enabled the mass production of products. The ability to mass-produce drove the need to implement inspection and quality control measures in order to avoid unacceptable levels of deficiency. Beginning around 1950, a growing interest in the quality field resulted in the development of a discipline now known as quality management (QM). W. Edwards Deming, Joseph Juran, Philip Crosby, and other QM *gurus* made their mark and introduced QM techniques that are still considered significant.

Today, the many challenges that confront organizations in the capital facilities delivery (CFD) industry affect the quality management systems they use. Periods of tremendous growth may be interrupted by economic downturns. Capital assets are aging, and the costs to maintain and replace them are increasing. Changing workforce demographics and the availability of resources affect the planning and execution of capital projects. These challenges intensify the need for a renewed focus on QM and on the impact that an effective quality management system (QMS) can have on the success of an organization.

CII Research Team 254 (RT 254) analyzed and documented the QM systems, programs, and improvement activities currently used in the CFD industry. In this process, the key elements of an effective QMS were identified as they apply to owners, contractors, and suppliers. The team found that no single QMS standard will ensure that an organization will achieve the highest levels of quality. Moreover, while ISO 9001 is the most commonly used QM standard, most of the other industry QM standards have elements in common.

RT 254 also found that organizations that reported having highly effective QM systems were differentiated by the amount of focus they placed on the following six areas:

- Leadership and management commitment to QMS
- Level of QMS training

- Emphasis on supplier and contractor QMS
- Extensive use of metrics
- Management of work process improvements
- QMS certification and accreditation.

Based on these findings, the implementation resource (IR) developed by RT 254 presents a three-step process that is supported by tools and recommendations. This resource, IR 254-2, will enable organizations to compare their present QM systems against those of organizations that report having highly effective QM systems, and to determine how best to improve them. The IR includes the following tools:

- A QM maturity matrix for the CFD industry
- Key drivers of a QMS for the CFD industry
- Comparison of the elements of QM and business excellence systems.

Prior to the industrial revolution, tradespeople were personally accountable for the quality of the products and services they provided. The members of RT 254 found it interesting that after 100 years of QM evolution, industry is returning to the concept of personal accountability. This was evidenced by the finding that organizations reporting highly effective QMS had visible and committed leadership, made extensive use of metrics, and provided training to enable employees to successfully execute tasks.

Introduction

Background

The subject of QM has been of keen interest to CII member organizations since the institute was established in 1983. To support this industry interest, CII formed the Quality Management Task Force in 1985; this group undertook important studies in the areas of cost of quality deviations, Total Quality Management (TQM), and quality performance measures. Over the past two decades since the formation of this task force, CII has commissioned numerous studies of QM. The studies have addressed the following issues:

- Costs of quality deviations in design and construction (Burati and Farrington, 1987)
- Identifying customer requirements through QFD (Oswald and Burati, 1992a, 1993)
- Guidelines for implementing TQM in the engineering and construction (E&C) industry (Oswald and Burati, 1992b)
- Quality performance measurements of the engineer–procure–construct (EPC) process (Glagola, Ledbetter, and Stevens, 1992; Stevens, Kloppenborg, and Glagola, 1994)
- Making zero rework a reality by comparing zero accident methodology to zero rework and quality management (Smith and Jirik, 2006).

Although these studies have served the CII membership well, ongoing improvements have been made to the methods by which QM systems are applied to capital facilities project management. To keep the CII membership current on best practices in quality management, this research team performed a reexamination of the CII body of knowledge as it relates to QM best practices. Figure 1 illustrates the typical business processes currently being applied to the delivery of capital facilities.

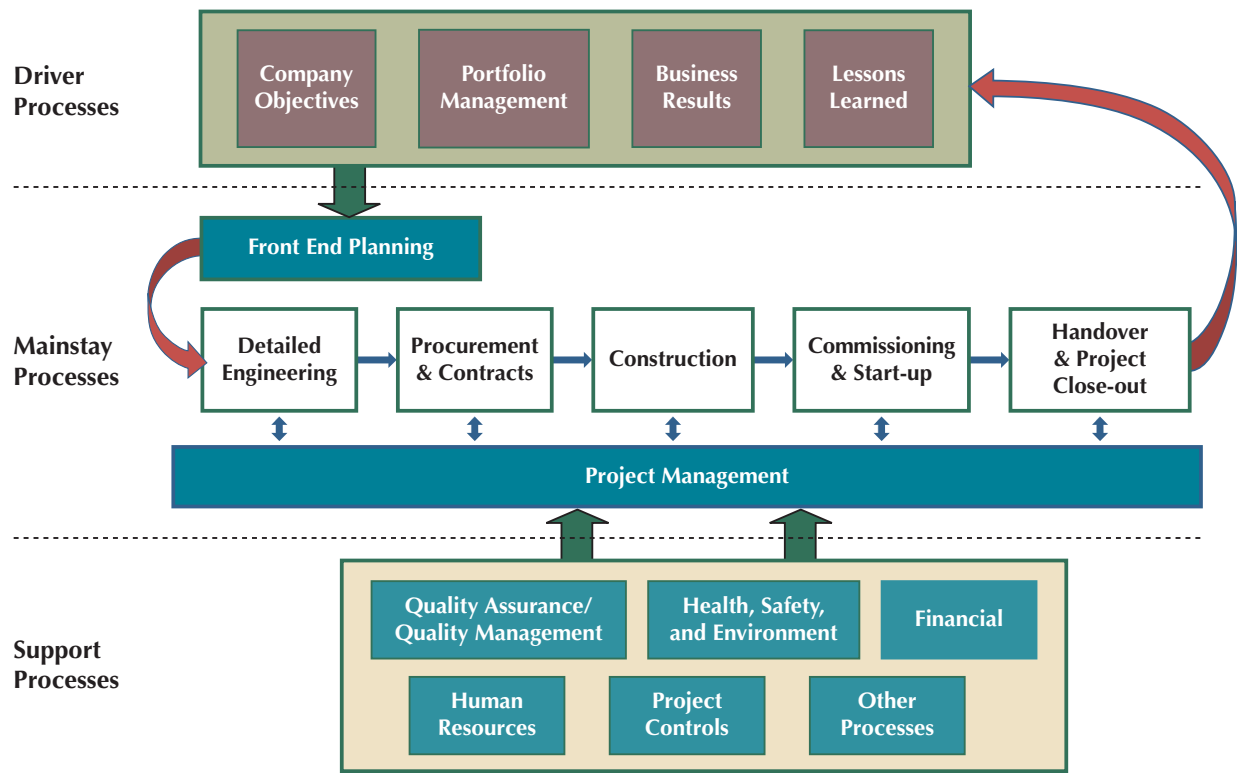


Figure 1. Capital Facilities Delivery Business Processes

Purpose and Objective

This CII Best Practice update on QM was conducted in order to accomplish the following goals:

- Identify QM best practices for the CFD industry.
- Determine which CII QM documents should be archived, kept, or revised.
- Publish new knowledge that will be part of the updated QM Body of Knowledge (BOK).
- Provide a resource for assessing and potentially improving the implementation of QM practices.

The following two primary objectives were established for this research effort:

1. Identifying and analyzing the QM systems and/or programs currently used in the CFD industry.
2. Identifying and analyzing the set of continuous improvement activities currently used in the CFD industry.

Meeting these objectives led to the identification of best practices and to recommendations on the QM tools, methods, programs, and metrics that are widely considered to be effective in the CFD industry. By examining and analyzing the QM systems of CII member organizations, the research team identified those practices and characteristics that distinguish the organizations that report having highly effective QMS.

Methodology

To accomplish its research objectives, the research team took the following steps:

1. A literature review was conducted and then used as the basis of an initial survey.
2. An initial survey was developed collectively by RT 254 members during brainstorming sessions. Questions fell into the following main areas:
 - Respondents' demographics and data
 - Nature of the QM program currently used for capital facility delivery
 - QM metrics currently used for capital facility delivery
 - Incentives, methods, and programs used for capital facility delivery.
3. The survey was sent to all CII member organizations.
4. Data from the initial survey were analyzed using standard statistical tests and methods, including examination of similarities and differences between owners and contractors, and between larger and smaller organizations. Key characteristics were identified to help differentiate organizations reporting effective or less effective QM systems.
5. The analysis resulted in the development of a Quality Management/Business Excellence System Correlation Matrix, which is included in IR 254-2. This matrix allows for comparisons of the elements, criteria, and attributes of the principal quality standards, guidelines, and business excellence approaches used today by CFD organizations (e.g., ISO 9001). The key characteristics differentiating the companies reporting QM effectiveness in the initial survey were correlated with the elements, criteria, and attributes of the various QM systems compared in this matrix.