

# Project Management and ISO 9001— An Integrative Approach Through Process Management

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## Introduction

The issue of *Quality in Project Management*, recognized as one of the *PMBOK® Guide* nine areas of knowledge, has been widely written about. Most of what has been published on the subject refers to the application, in a project context, of quality concepts used essentially in manufacturing environments.

*Project Management in Quality* has become the topic of various publications as the methodology was found to be an effective and efficient way to implement a quality management system per ISO 9001 or other quality related standards.

On the other hand, the issue of *Quality and Project Management* has received very little attention as judged by the quasi absence of reference material on the subject. In other words, how can proper project management methodology (per the *PMBOK® Guide* guidelines) be implemented at the enterprise level, that complies with the ISO 9001 (revision 2000) requirements in order to obtain third party registration?

As ISO 9001 is gaining popularity in the U.S. and is now a basic requirement to do business in Europe, more and more companies enjoying the benefits of good project management will be faced with ISO 9001 registration mandates.

This paper offers a generic method for implementing ISO 9001 in a project management environment, using process management as a tool. The methodology exposed has been developed, implemented and validated in a capital equipment environment but could easily be applied to any organization involved with project management.

## The Context

### The Organization

Dürr Environmental, Inc. (DE) is the world's largest supplier of VOC and hazardous air emission control systems to a wide variety of industries including automotive, wood, cement and semiconductor. The company relies heavily on project management to effectively and efficiently execute 50 to 60 unique projects per year, with contract values ranging from \$250,000 to \$10,000,000 per project.

### The Issue

As a result of a worldwide corporate mandate, customer requirements and an internal quest for improved operations, DE management decided to embark on the ISO 9001 journey.

## The Approach

At first, the 1994 revision of the ISO 9001 standard (ISO 9001:1994) was used. Heavily tailored to manufacturing operations, it was found to be very "unfriendly" for a business environment such as DE's. Wide interpretations were required to attempt the most basic level of compliance with the requirements, thus making the task even more challenging and uncertain.

In light of this fact, a back-to-basics approach focusing on core activities was considered. ISO 9001's purpose is to define generic guidelines to set up a quality management system (QMS); as such the standard cannot dictate how companies are set up or even operate. As far as core processes are concerned, a careful analysis of the company's operations lead to the conclusion that the only commonality between the 50 to 60 projects per year was the way they were being executed. This established project management activities as DE's core processes.

The approach taken can be summarized as follows:

1. Identify the business processes that constitute DE's operations.
2. Establish and develop core activities first, i.e. project management.
3. Extend the effort to the other activities as they relate to project management.
4. Ensure compliance with ISO 9001.
5. Hope for the best!

With the recent publication of ISO 9001:2000, this approach is not only officially recognized but promoted by the international standard, making compliance easier to achieve, especially for service type businesses. As stated in the March 2001 issue of *Quality* magazine "This is good news for those who attempted to implement reality-based quality management systems that reflect and build on actual business configurations and resources."

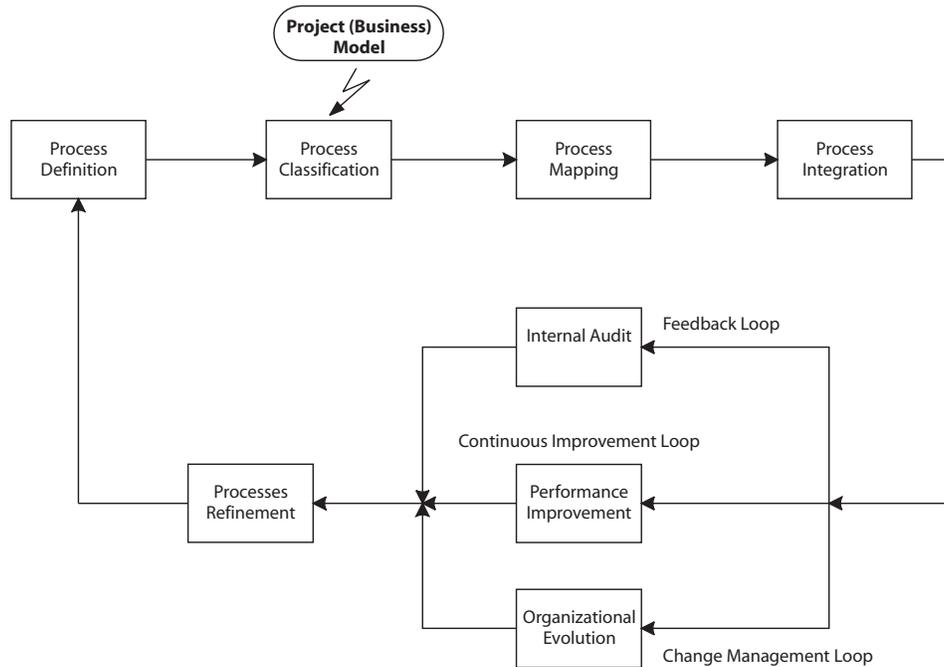
## Key Concepts

Following is a short introduction to the key concepts referred to throughout this paper.

### Quality

ISO 9001:2000 defines the requirements for a Quality Management System (QMS) that demonstrates the ability of an organization to consistently meet *customer and applicable regulatory requirements*, as well as to enhance customer satisfaction.

## Exhibit 1. Process Management Model



The 2000 revision explicitly recognizes that the QMS design should be influenced by the needs, objectives and products provided, *processes employed*, size and structure of the organization. Process management is promoted as the preferred method for QMS implementation.

### Project Management

The *PMBOK® Guide* (as well as ISO 10006:1997 “*Quality Management—Guidelines to Quality in Project Management*”) provides a basic reference for project management, the practice of which is described in terms of *processes* organized into nine areas of knowledge: integration management, scope management, time management, cost management, quality management, human resource management, communications management, risk management, and procurement management. The practice of project management seeks to *meet or exceed stakeholder needs* (identified requirements) and *expectations* (unidentified requirements) from a project within the limits of scope, time, cost and quality.

Project management is now also being recognized by ISO 9001:2000 as a “unique *process*, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective *conforming to specific requirements*, including the constraints of time, cost and resources.”

### Process Management

A *process* is an activity or group of activities transforming an input into an output of greater value through the use of resources. *Process management* consists of maintaining the

processes as well as ensuring their continued excellence. Maintenance is required to keep up with ongoing changes in the organization or its business environment and process improvement seeks to keep them effective and achieve ever-higher efficiency levels.

### Quality and Project Management

Considering that our ultimate goal is the integration of project management and ISO 9001:2000, it is reassuring to find out that both methodologies share the same goal of addressing customer requirements (meeting them at a minimum) and rely on a process approach. This leads to the conclusion that process management is the critical link in the integration of these two concepts.

### The Process Approach

Following is an overview of the various steps that were involved in the integration of ISO 9001:2000 and project management through the use of process management.

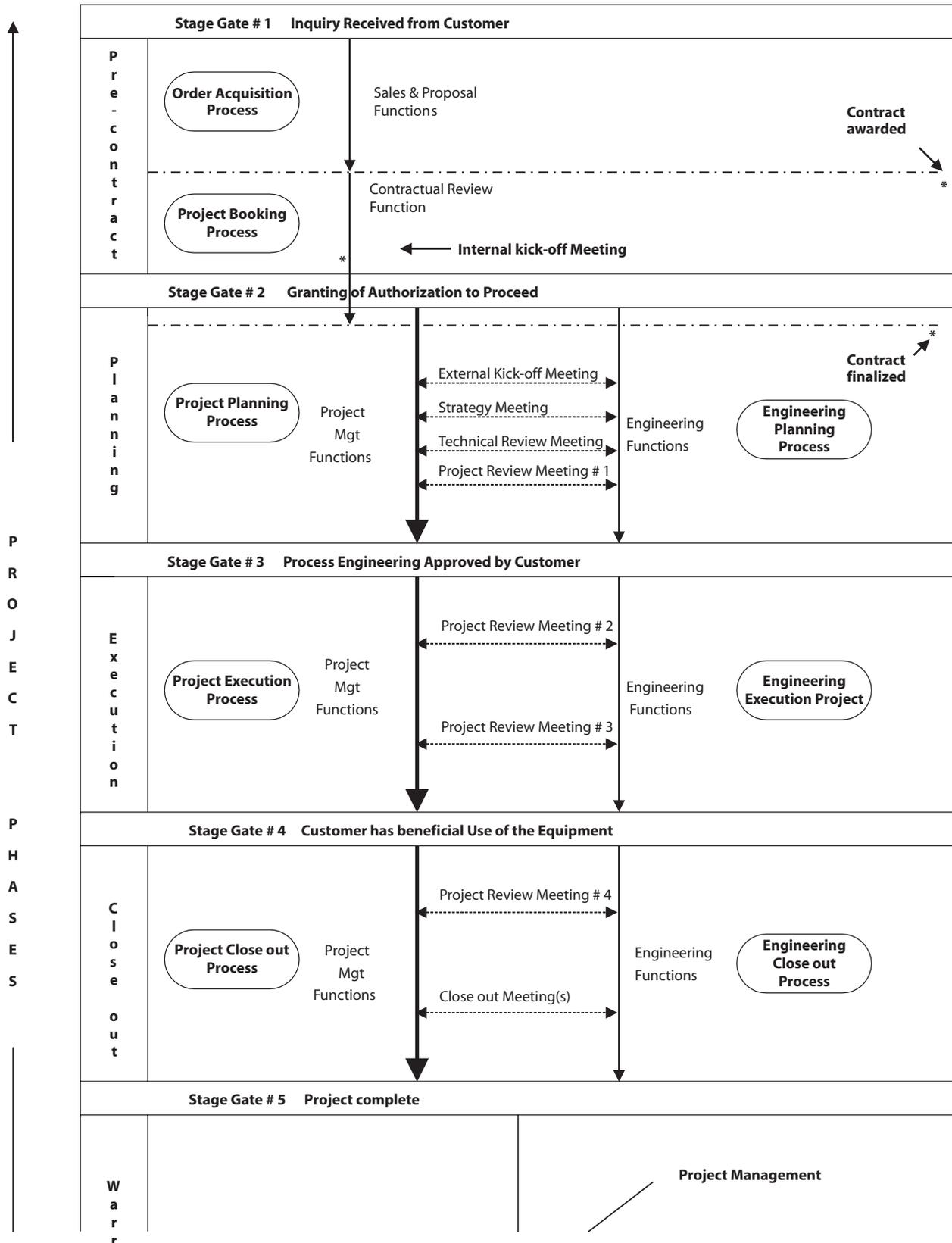
### Process Management Model

The Process Management Model (see Exhibit 1) is a formalization of the approach described above; it consists of a series of processes leading to a companywide implementation of process management.

The processes composing the model are as follows:

- *Process Definition*: Establishment of an inventory of all company processes

## Exhibit 2. Dürr Environmental's Project Life Cycle (context of capital equipment projects)



- *Process Classification*: Classification of the processes using the Project (Business) Model (see below)
- *Process Mapping*: Detailed description of each process
- *Process Integration*: Ensuring proper interaction between the processes.

Note: this step is often overlooked but is actually critical to the overall performance of the organization; properly interacting processes can prevent many of the mistakes and breakdowns in the expected flow of business activities as a result of existing gaps in the system.

Once the above four processes are completed, a baseline model of the organization has been established.

Considering the dynamic condition of today's business environment, however, this is not sufficient; provisions must be made to account for feedback regarding performance, continuous improvement and change management. These three considerations are addressed in the model by the following processes:

- *Internal Audit*: Verify for compliance, effectiveness and efficiency using the baseline model established
- *Performance Improvement*: Continuous search for increased effectiveness and efficiency (business process reengineering, benchmarking...)
- *Organizational Evolution*: Take account of on-going changes in the organization's structure or method of operation as a result of market conditions, mergers and acquisitions, divestitures, etc.

Note: the impact of organizational changes on a company's processes often lacks the required in-depth analysis, which explains many of the problems resulting from structural changes.

- *Process Refinement*: Incorporation of the outputs of the above three processes in the baseline model.

The model described allows us to establish a process view of the organization; once that baseline has been established, provisions for process maintenance and management have been made.

## Project Life Cycle

The *PMBOK® Guide* teaches us that projects are usually divided into *phases* to allow for better control and appropriate links to the ongoing operations of the performing organization. Collectively, the project phases constitute the *Project Life Cycle*. The phases are separated by *stage gates* representing intermediate project goals.

Exhibit 2 provides an example of application of the concept at DE, in a capital equipment context. In this particular example the natural flow of project activities also corresponds to the contractual aspects of the project.

The phases of the DE Project Life Cycle include the following activities:

- *Pre-Contract phase*: Includes all sales and proposal activities as well as order booking, (a critical activity in a business environment as diversified as DE's).
- *Planning phase*: Includes activities such as scheduling, budgeting, process engineering, etc.

- *Execution phase*: Includes detailed engineering, manufacturing (management), field activities, start-up, etc.
- *Closeout phase*: Includes system optimization, testing, etc.
- *Warranty phase*: Includes all service activities addressing contractual warranty requirements.

Project management activities were defined above as DE's core processes that lead to the establishment of the project life cycle just described. In the particular situation of DE, engineering activities are actually conducted in parallel to the project management ones. The project life cycle in Exhibit 2 displays that ongoing interaction between the project management and engineering processes as well as the formal lines of communication between them. This project structure allows for better integration of the engineering activities with the management ones. Additionally, such a schematic representation provides an excellent clear snapshot of how an organization handles projects.

This approach is totally in-line with ISO 9001:2000 guidelines as it provides for planning and control of the activities of an organization, the management of projects in the particular case of DE. The stage gates can also be considered as checkpoints at key milestones of the project. The Project Life Cycle concept combined with process management transforms the management of a project into a series of well-defined processes.

## The Project (Business) Model

As described earlier, once an inventory of all the company processes has been completed, the various processes are then classified using the Project Model. The model resulting from the application of process management in a project environment can be described as follows:

- *Specific Project Processes (Project Life Cycle)*: Project processes that belong to a specific phase of the Project Life Cycle and directly affect the external customer, such as project planning and engineering execution.
- *Ongoing Project Processes*: Project related processes that do not belong to a specific phase of the Project Life Cycle or do not directly affect the external customer, such as buy equipment and project change management.
- *Ongoing Company Processes*: Company processes that are not related exclusively to project activities, such as inventory management and training.
- *Quality Management System Maintenance Processes*: Processes required to build, maintain and upgrade the QMS, such as document and data control and internal audit.

The Project Model reflects the project orientation of the company and the centrality of project management in its operations. All processes are classified based on how closely they relate to the management of projects, the company core processes.

## The Enterprise Model

The Enterprise Model is obtained by classifying all the organization's processes within the four categories constituting the Project Model. Exhibit 3 provides a generic example of such a model for a capital equipment environment.

### Exhibit 3. Enterprise Model

Ongoing Company Activities	
Service Calibration of Measuring Equipment Qualification of Suppliers Evaluation of Suppliers Handling of Defective Materials Guidelines for Business Development	Inventory Management/Warehousing Servers Back-Up/Restore Training Shipping and Receiving

Specific Project Activities - Project Life Cycle					
Pre-Contract Phase	Planning Phase		Execution Phase	Close-Out Phase	Warranty Phase
Order Acquisition Order Booking and Review	Project Planning	Engineering Planning	Project Execution	Eng. Execution Project Close-out Eng. Close-out	Service

Ongoing Project Activities		
In-Manufacturing Quality Control Project Change Control Project Budget Establishment Field Operations	Field Safety Equipment Start-up Buy Equipment Hire a Subcontractor	Parts Manual

Quality Management System Maintenance Activities	
Management Review Corrective and Preventive Action Initiation/Revision of a Quality System Document Internal Auditing	Document and Data Control Document Retention Control of Customer Supplied Products

The theory of process management further classifies process into *core processes* and *supporting processing*. *Core processing* are key processes by which the organization achieves its goals; they usually affect external customers directly and are crucial to the organization's success. These processes tend to be large and complex and cut across organizational boundaries. *Supporting processes* typically are internal processes that do not directly create value to the external customer but help core processes achieve their goals. By applying this classification to the process categories of the Project Model, we obtain the following:

- Specific Project Processes (Project Life Cycle) can be considered as Core Processes
- Ongoing Project Processes can be considered as Project Supporting Processes
- Ongoing Company Processes can be considered as Company Supporting Processes
- Quality Management System Maintenance Processes can be considered as QMS Supporting Processes.

With this additional level of analysis the Enterprise Model now not only provides a macro level view of the organization, but also provides additional information as to how it operates. This can be referred to as a *Company ID Card*.

### Applications

#### Dürr AIS, Inc. (AIS)

AIS is a turnkey supplier of industrial paint finishing equipment to non-automotive markets, such as heavy trucks, motorcycles, automotive tier-one suppliers and aerospace.

In addition to sharing office space with AIS, DE is also providing administrative services to AIS. These services include the implementation of a QMS.

Despite the fact that AIS's activities are different from DE's, they relate to capital equipment and use project management as core processes. This being the case, the methodology presented above has been applied to AIS and was found to fit perfectly. At the task level some processes show some variation that reflects the differences between the products and services of DE and AIS as well as some methods of operation. This 100% applicability of the methodology validates the concept.

#### Reeco (Bridgewater, NJ)

In 1999, DE acquired Reeco, a direct competitor. At first the company was considered a fully owned subsidiary operating

quite independently from DE. At the time, there were few concerns regarding integration of the two operations or even of QMS implementation. In January 2000, Reeco became the Standard Product Division of DE and its product had become central to DE's market offering. The issues of integration and QMS implementation became critical. By applying the methodology described above, Reeco's processes were first identified, and then categorized between Reeco specific processes that would need to be mapped separately and common processes between Reeco and DE (such as purchasing) that would require joint development and harmonization between both offices.

## Conclusions

- Project Management and ISO 9001:2000 can be easily integrated through the use of process management.
- The methodology and models described above should be transferable to all project environments (construction, pharmaceutical, information technology, defense contracting, etc.).
- The *Company ID Card* provides an excellent synoptic rendering of the organization and how it operates, and constitutes a good starting point for continuous improvement and reengineering efforts as well as an excellent baseline for change management endeavors.
- The process approach is universal as it allows for a representation of a company through its "building blocks."

The implementation of project management with an additional focus on ISO 9001:2000 and the use of process management further reinforces the methodology, enhances the quality and use of the management system developed, and provides additional benefits in terms of reduced mistakes and customer satisfaction.

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