

CONSTRUCTION PROJECT MANAGEMENT

**CIVIL ENGINEERING PROJECT MANAGEMENT
AND ENVIRONMENTAL ASSESSMENT**

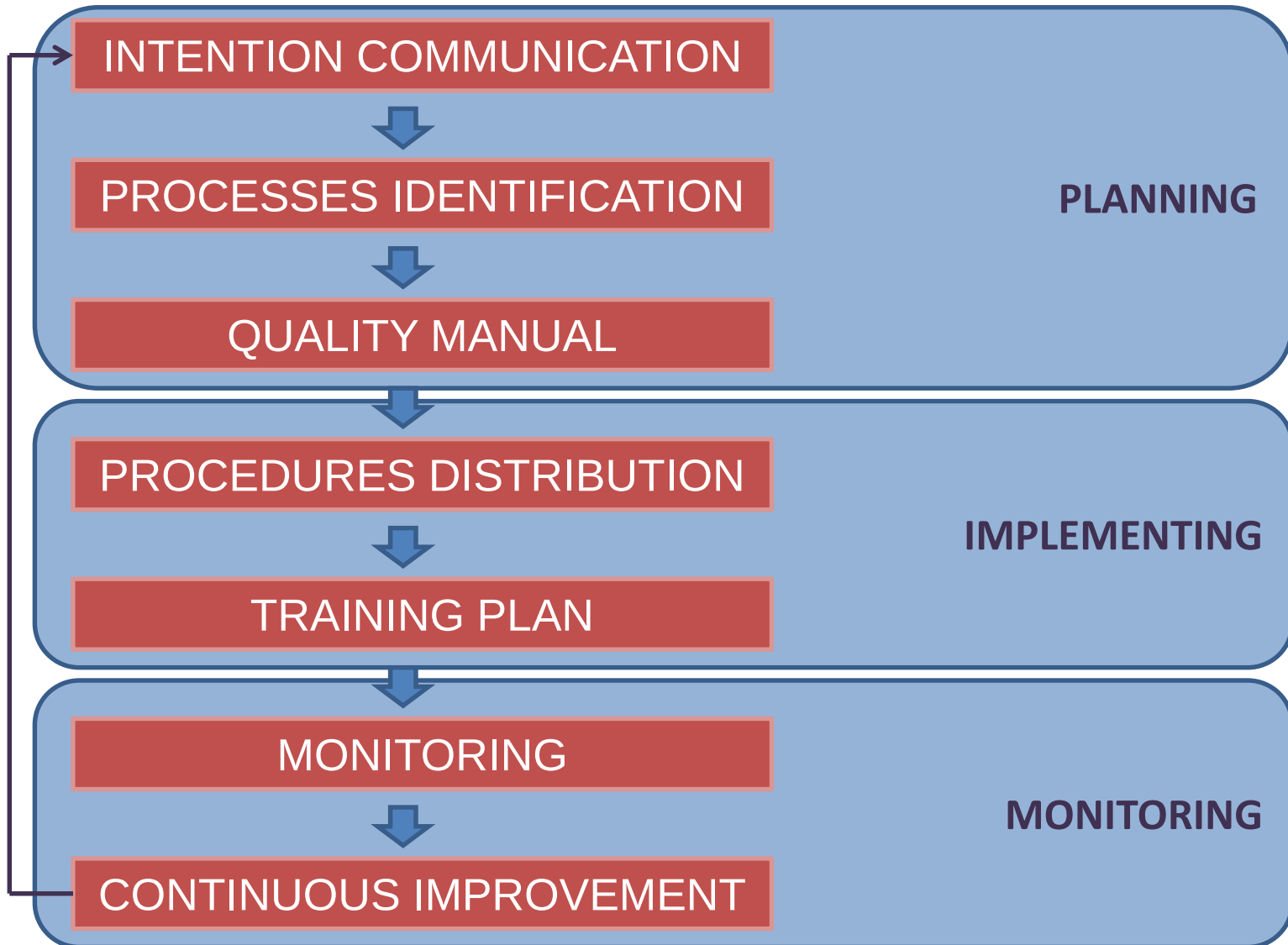
**QUALITY IN CONSTRUCTION
PROJECTS**

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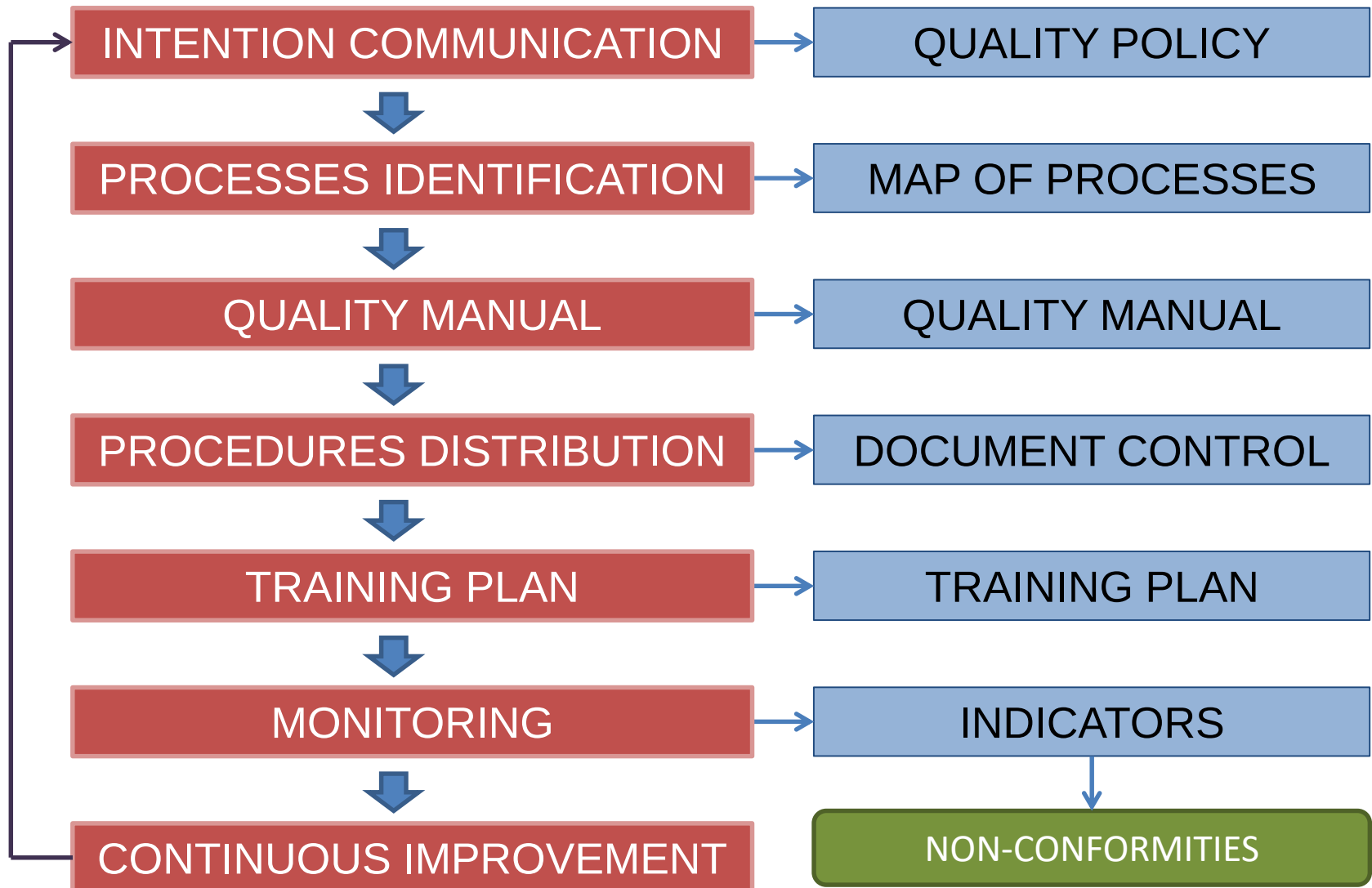


Definition of a Quality Management System (QMS)





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How can we relate this theoretical scheme to the construction process?

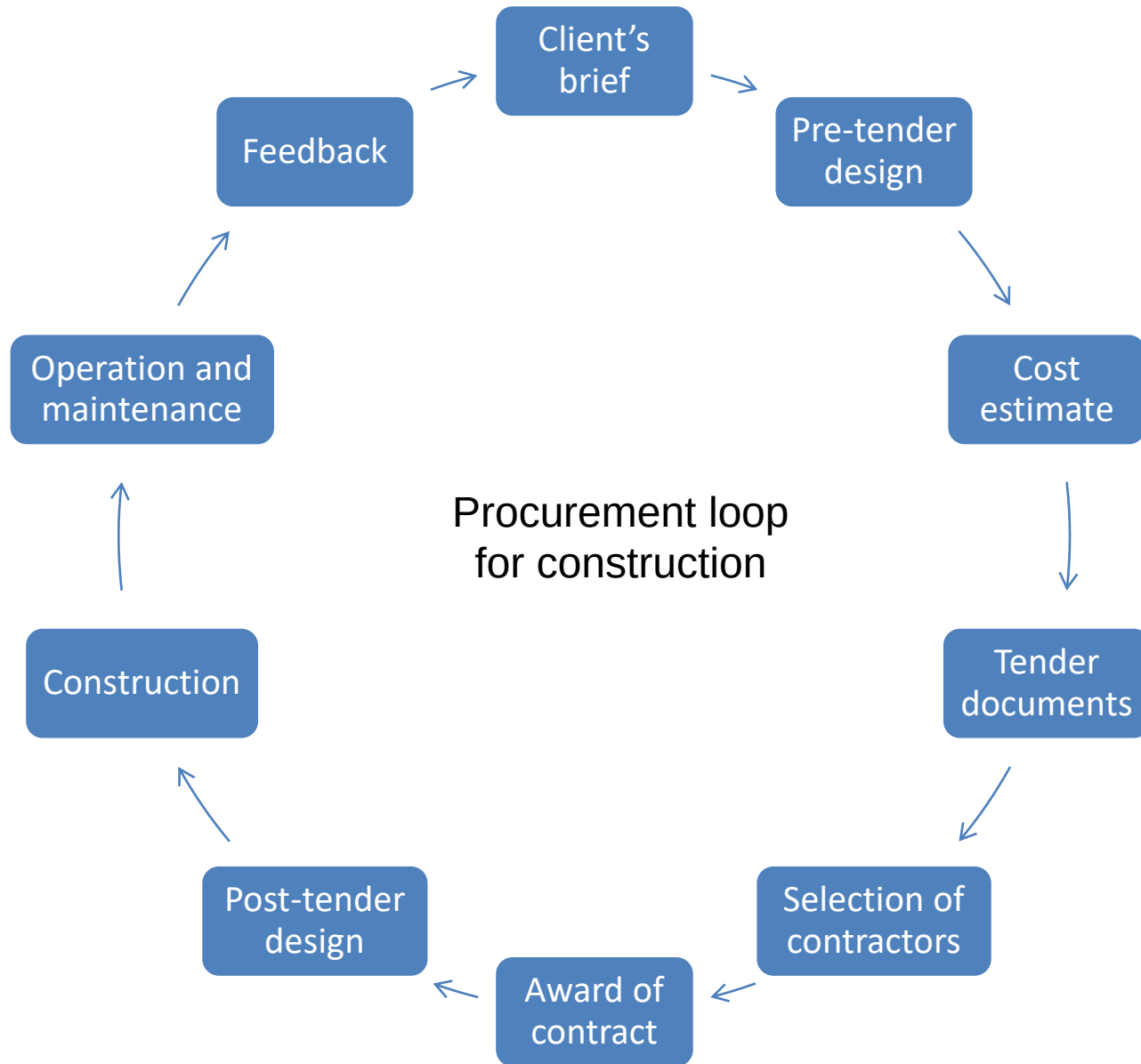
- Establish different stages (loop)
- Define activity developed in every stage
- Write procedures to manage quality
- Assign responsibilities

In groups, discuss about it and decide your own scheme for total quality at the construction process



EXERCISE

- Make groups of 3-4 people;
- Discuss about different stages in the construction process;
- Establish your own scheme ordering these stages.





QUALITY IN CONSTRUCTION PROJECTS



RIBA

The RIBA Plan of Work 2013 organises the process of briefing, designing, constructing, maintaining, operating and using building projects into a number of stages. The content of stages may vary or overlap to suit specific project requirements. The RIBA Plan of Work 2013 should be used solely as guidance for the preparation of detailed professional service contracts and building contracts.

www.ribaplanofwork.com

	0	1	2	3	4	5	6	7
Stages	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In Use
Core Objectives	Identify client's Business Case and Strategic Brief and other core project requirements.	Develop Project Objectives, including Quality Objectives and Project Outcomes, Sustainability Aspirations, Project Budget, other parameters or constraints and develop Initial Project Brief. Undertake Feasibility Studies and review of Site Information.	Prepare Concept Design, including outline proposals for structural design, building services systems, outline specifications and preliminary Cost Information along with relevant Project Strategies in accordance with Design Programme. Agree alterations to brief and issue Final Project Brief.	Prepare Developed Design, including coordinated and updated proposals for structural design, building services systems, outline specifications, Cost Information and Project Strategies in accordance with Design Programme.	Prepare Technical Design in accordance with Design Responsibility Matrix and Project Strategies to include all architectural, structural and building services information, specialist subcontractor design and specifications, in accordance with Design Programme.	Create manufacturing and assemble Construction in accordance with Construction Programme and resolution of Design Queries from site as they arise.	Handover of building and conclusion of Building Contract.	Understate In Use services in accordance with Schedule of Services.
Procurement Variable task bar	Initial considerations for assembling the project team.	Prepare Project Rules Table and Contractual Tree and continue assembling the project team.	The procurement strategy does not fundamentally alter the progression of the design or the level of detail prepared at a given stage. However, Information Exchanges will vary depending on the selected procurement route and Building Contract. A bespoke RIBA Plan of Work 2013 will set out the specific tendering and procurement activities that will occur at each stage in relation to the chosen procurement route.			Administration of Building Contract, including regular site inspections and review of progress.	Conclude administration of Building Contract.	
Programme Variable task bar	Establish Project Programme.	Review Project Programme.	Review Project Programme.	The procurement route may dictate the Project Programme and may result in certain stages overlapping or being undertaken concurrently. A bespoke RIBA Plan of Work 2013 will clarify the stage overlaps. The Project Programme will set out the specific stage dates and detailed programme durations.				
(Town) Planning Variable task bar	Pre-application discussions.	Pre-application discussions.	Planning applications are typically made using the Stage 3 output. A bespoke RIBA Plan of Work 2013 will identify when the planning application is to be made.					
Suggested Key Support Tasks	Review Feedback from previous projects.	Prepare Handover Strategy and Risk Assessments. Agree Schedule of Services, Design Responsibility Matrix and Information Exchanges and prepare Project Execution Plan including Technology and Communication Strategies and consideration of Common Standards to be used.	Prepare Sustainability Strategy, Maintenance and Operational Strategy and Handover Strategies and Risk Assessments. Undertake third party consultations as required and any Research and Development aspects. Review and update Project Execution Plan. Consider Construction Strategy including off-site fabrication, and develop Health and Safety Strategy.	Review and update Sustainability, Maintenance and Operational and Handover Strategies and Risk Assessments. Undertake third party consultations as required and conclude Research and Development aspects. Review and update Project Execution Plan, including Change Control Procedures. Review and update Construction and Health and Safety Strategy.	Review and update Sustainability, Maintenance and Operational and Handover Strategies and Risk Assessments. Prepare and submit Building Regulations submission and any other third party submissions requiring consent. Review and update Project Execution Plan. Review Construction Strategy including sequencing and update Health and Safety Strategy.	Review and update Sustainability Strategy and implement Handover Strategy including agreement of information required for commissioning, training, handover, asset management, future monitoring and maintenance and ongoing completion of 'As-constructed' information. Update Construction and Health and Safety Strategies.	Carry out activities listed in Handover Strategy including Feedback for use during the future life of the building or on future projects. Updating of Project Information as required.	Conclude activities listed in Handover Strategy including Post-occupancy Evaluation, review of Project Performance, Project Outcomes and Research and Development aspects. Updating of Project Information, as required, in response to ongoing client Feedback until the end of the building's life.
Sustainability Checkpoints	Sustainability Checkpoint – 0	Sustainability Checkpoint – 1	Sustainability Checkpoint – 2	Sustainability Checkpoint – 3	Sustainability Checkpoint – 4	Sustainability Checkpoint – 5	Sustainability Checkpoint – 6	Sustainability Checkpoint – 7
Information Exchanges (at stage completion)	Strategic Brief	Initial Project Brief	Concept Design including outline structural and building services design, associated Project Strategies, preliminary Cost Information and Final Project Brief	Developed Design, including the coordinated architectural, structural and building services design and updated Cost Information.	Completed Technical Design of the project.	'As-constructed' Information	Updated 'As-constructed' Information	'As-constructed' Information updated in response to ongoing client Feedback and maintenance or operational developments.
UK Government Information Exchanges	Not required.	Required.	Required.	Required.	Not required.	Not required.	Required.	As required.

*Variable task bar – in creating a bespoke project or practice specific RIBA Plan of Work 2013 see www.ribaplanofwork.com a specific bar is selected from a number of options.

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Different professionals that participate in the construction process

Architect

Project Manager

Construction Manager

Quantity Surveyor

Building Surveyor

Structural/Civil Engineer

Building Services/M&E Engineer

Building Contractor

Subcontractor

Site Manager



Processes/Functions in Total Quality

- Design control
- Document control
- Purchasing
- Product identification
- Inspection and testing (materials and production)
- Inspection/measuring/test equipment
- Control of non-conforming product
- Corrective action
- Handling
- Internal Quality audits
- Training



EXERCISE

Establish a relationship between these 3 groups.

Processes/Functions in Total Quality	Stages to be implemented	Professional/s responsible



TQM for the building client (project inception stage)

Complex and difficult industrial undertakings

Client's worriness:

Functional
Aesthetics
Cost
Time

Client's skills:

Planning
Organising
Budgeting
Controlling
Contracts
Human motivation
A BIG LEVEL OF MANAGEMENT



TQM for the building client (project inception stage)

Delegation to professionals

**CANNOT DELEGATE ULTIMATE
RESPONSIBILITY FOR ALL DECISION-
MAKING RELATED TO THE PROJECT**

What to build and when, what standard or level of performance, what cost and time limits, whom to implement his project

Appoint an experienced project manager or construction auditor

- Report on project development
- Quality management system – AUDITS



TQM for the design team

At the design stage

Design professional often management skills

Frequently undertaken by firms with little or no formal training in management

Technical and contractual procedures

During this stage, a lot of issues will affect the project

- The client should be aware
- sometimes this control is exercised at the end

Fully explore client's requirements in early conception stages

Quality cost arises at the beginning to be reduced at the end

- Questionnaires
- Meetings
- Audits



TQM for the design team

At the construction stage

Problems with:

- Parts of the project not defined
- Detailing
- Changes and improvements

Ways to solve:

- Good quality system implementation at the design stage
- Communication
- Documentation centralised (BIM)
- As-built drawings
- Audits



TQM for the contractor

Pre-contract and Post-contract

Needs to:

- have been presented with the project's total management plan and induced into what is required of him/her for inclusion in his/her own part of this plan
- establish his/her own company's quality management system
- Adapt it to the project's

List of contract work procedures



TQM for the contractor

Pre-contract and Post-contract

Subcontractors and suppliers

Own TQM should be in line with main contractors (difficult to assume)

Solutions:

- Standard contracts
- Adaptation to common legislation and harmonization
- Site induction courses
- Partnering (work with same firms always)



TQM during commissioning and maintenance

Necessity of solving complex integrated systems
Tuning the plant

Role of a Commissioning Engineer

- Skilled and experienced
- Know in detail the way it is supposed to work
- Tuning to optimise adjustments (same to ship or aircraft)
- Key factors observed, monitored and documented:

Once all services have been commissioned and accepted, the final inspection of the building takes place

The handover for each service should include a list of service and maintenance instructions



Quality Audits in a Construction project

Main tools for monitoring the performance of the Quality Management System
(Audits Strategy and Audits Schedule may differ between companies)

Prequalification o Pre-selection Audits

Assess a subcontractor or supplier before a contract is signed

Third-Party Audits (for certification purposes)

A third party accredited organization is invited/hired to audit a construction project

Project Internal Audits

Auditing the internal processes that have been set up for this Project.
Developed by the quality personnel



Quality Audits in a Construction project

(Audits Strategy and Audits Schedule may differ between companies)

Specific Internal Audits from the parent company

Monitoring performance of the Project according to the corporate procedures. Developed by the Quality Department of the parent company (contractor or other)

Audits by the Client or Client's representatives (Project Managers)

To make sure that all contractual requirements are in place

Internal “mini-audits”, “surveillances” or “works-audits”

Short audits to ensure that the approved documentation is followed on site. Developed by the Quality Department

Other Audits

Unplanned audits required from management after an incident



Quality Audits in a Construction project

Audit report

Output of an audit

The following points should have been identified:

- Non conformities (NCRs)
- Observations
- Improvements

Important considerations when issued:

- worded very carefully (used for important decisions)
- All important information and evidence included

<http://www.slideshare.net/rsrivastava91/project-audit-review-checklist>



EXERCISE

Work in groups of 3-4 people.

You need to make an Audit about the implementation of welfare services on site.

1. Prepare a check-list for this Audit, so that when you are on site you can fill it in and collect the required information
2. Compare your check-list with other groups and discuss the differences