CB 311
Introduction to Construction Management

Dr. Mohamed Saeid Eid

Fall - 2017

Resume

Dr. Mohamed Saeid Eid

- BS and MS in construction Engineering, AAST (2008, and 2012, respectively)

- PhD in Civil and Environmental Engineering, Construction focus, University of Tennessee, Knoxville (2017)

TA

- Eng. Mohamed Mahmoud

Syllabus

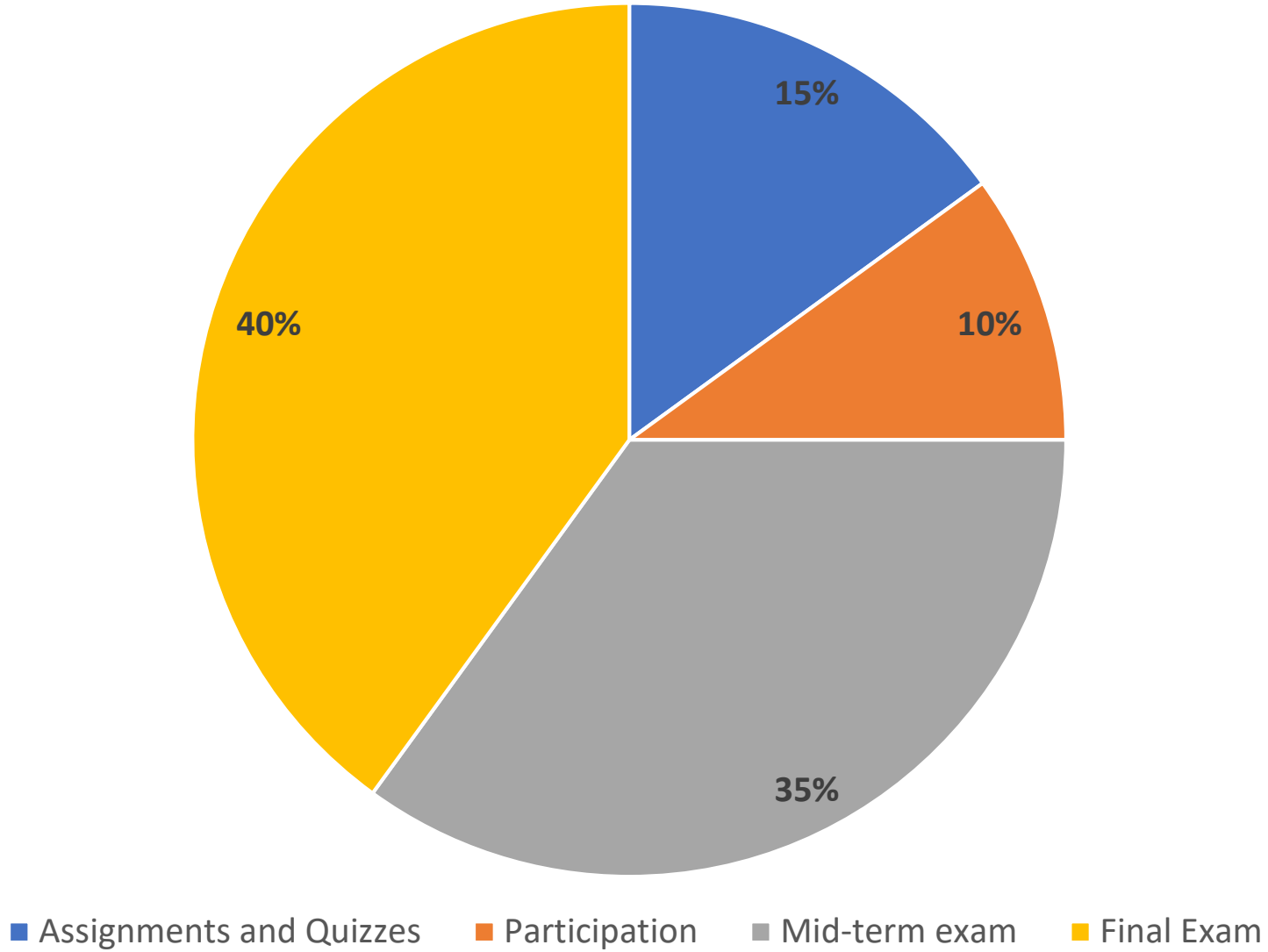
- What do you expect to learn?
  - Basics of construction management
  - Players and stakeholders within any construction project
  - Engineering economics
- What will you gain from the class?
  - Basic skills used in management
- What do I expect from my students?
  - Attention and participation
  - Curiosity to learn

Syllabus - Content

- Introduction to construction management (2-3 lectures)
- Introduction to engineering economic analysis
- Cash flow and principle of equivalence
- Time value of money: Net cash flow, present worth, future worth
- Comparison of alternatives
- Sensitivity analysis
- Feasibility studies

Syllabus – Grading

- 30% on the 7th week
  - 10% quizzes and assignments
  - 20% exam
- 20% on the 12th week
  - 5% quizzes and assignments
  - 15% exam
- 10% participation
- 40% final exam



Class rules

- Contact
  - No phone calls. Each call worth -5% of your grade.
  - eng.saeid@gmail.com
  - Use an appropriate subject title, and English language only
  - Website: Msaeideid.com
- Late assignments
  - No late assignments are accepted beyond due date
- Teamwork
- Class ethics and *Academic Honesty*
- NO CELL PHONES!

What is management?

- First, lets define when do we need management
  - Developing new products
  - Changing the structure of an organization
  - Creating a new business
  - Constructing new projects
  - Studying!

- Then, what is management?
  - It is studying, organizing, planning, monitoring, controlling, and evaluating the development of a project.

Management requires both science and experience.

Construction Industry

Does the construction industry provide service or product?

Construction Industry

- The largest industry worldwide
- Investments in North America is about 10% of the total investments in all industries
- Growth in this industry is an indicator of the economic conditions of the country
- Cuts across a large number of trades
- Feed and interact with the manufacturing industry

Construction Industry

Nature of Projects

Industry Characteristics

Increasing Challenges

- Unique and unrepeatable
- Temporary
- Constraints by time, money, & quality
- Many conflicting parties

The Construction Industry

Nature of Projects

Industry Characteristics

Increasing Challenges

- Fragment (many small specialties)
- Intense competition
- Rapidly affected by recessions
- Little R&D
- Confidentiality and lack of infor.
- Slow to adopt new technologies

The Construction Industry

Nature of Projects

Industry Characteristics

Increasing Challenges

- Global market competition
- Increasing regulations (env. & safety)
- Tight budget, less time, and better quality is demanded
- Lacking of skilled resources

Construction Vs Manufacturing industry

- Construction
  - Uncertainties
  - Projects are small term
  - No-repetition
  - Little R&D
  - Labor intense
- Manufacturing
  - Deterministic
  - Projects are long term
  - Repeatable projects
  - Major R&D
  - Machine intense

Why do we need management in construction projects?

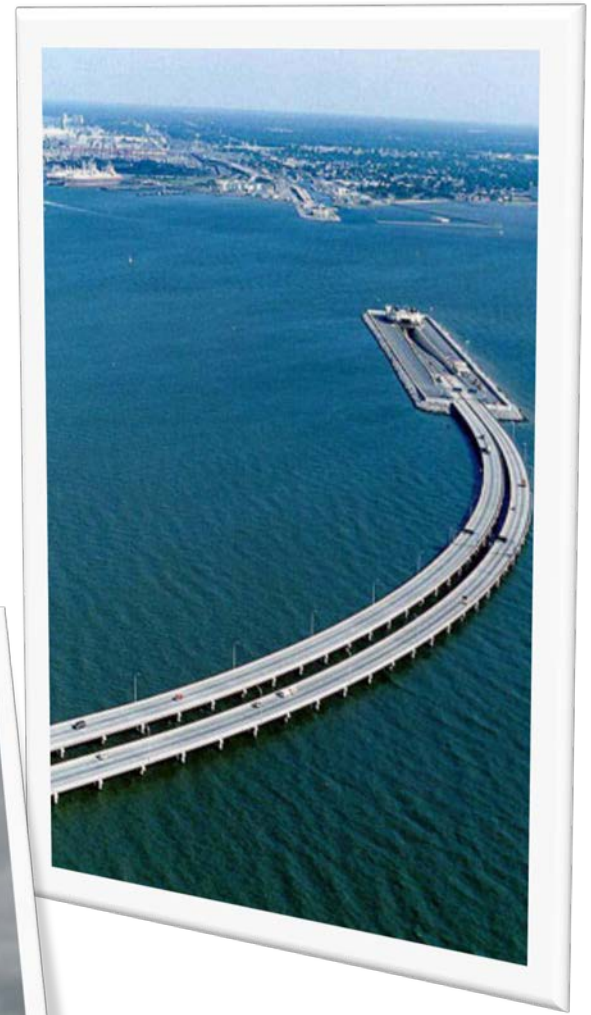
- Define the cost of a project
- Estimate the construction duration
- Minimize wastage in material
- Increase the work productivity
- Achieve the desired quality

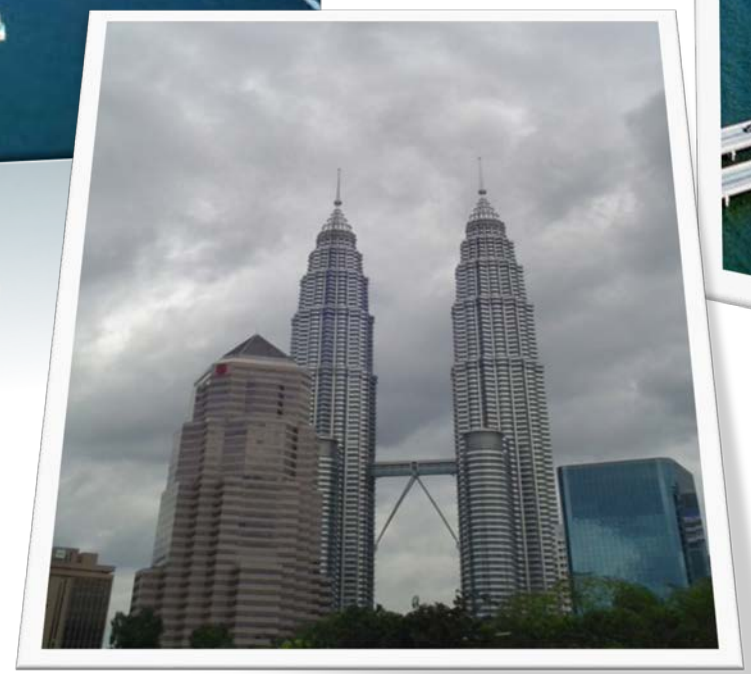
Construction project management

What is a project?

What is a project?

- PMI (Project Management Institute)
  - A temporary set of activities that creates a new product, service, or system.





Project Characteristic

- Has an established goal or objective.
- Has a defined life span with a beginning and an end.
- Requires across-the-organizational participation.
- Involves doing something never been done before.
- Has specific time, cost, and performance requirements.
- As the project progresses, the project team learns more about the project

Project Goal

- A goal is not the project deliverables, but rather then end purpose of this project.

- What is the goal of your education?

Project Scope

- The project scope defines what is and is not included in the project

- Project scope might include budget, time frame, etc.

- What is the scope of your education?

Purpose of goals and scope

Knowing the goal and scope will help to identify
the steps you should be performing to accomplish them

- To clearly define the deliverable(s) for the end user.
- Key dates
- To focus the project on successful completion of its goals
- Expectations, this help identifying your team tasks
- To be used by the project owner and participants as a planning tool and for measuring project success.
- Avoid project creep; the tendency for the project scope to expand over time due to changing requirements, specifications, and priorities.

Difference between Activities, Project and Program

- Activities are individual tasks that are done to achieve a specific objective.

- Project is a temporary set of activities that creates a new product, service, or system.

- Program is a group of related projects that are managed together to achieve a bigger goal.

Examples

Example	Activities	Project	Program
College	Assignments, exams, reports	Course	Degree
Housing	Reinforced concrete, steel	Building	Residential Complex
City Development	Excavation, pipe laying	Infrastructure project	New City

Types of construction projects

- Residential
  - Houses
  - Apartment complex
- Commercial
  - Malls
  - Hospitals
- Heavy
  - Bridges
  - Dams
- Industrial
  - Factories
  - Power plants

Project type	Labor and Equipment
Residential	Labor
Commercial	Labor and Equipment
Heavy	Equipment
Industrial	Equipment

Small pop-up quiz

Construction Project Stakeholders

- Owner
- Consultant
- Architect
- Contractor

Other players/titles

- Project Manager (PM)
- Construction Manager (CM)
- General Contractor (GC)
- Sub-Contractor (SC)

Participants

- **Owner**:

  Also referred to as the **Client;** is the individual or organization for whom a facility or project is to be built or a service furnished under a contract.

  The owner, whether public or private, owns and finances the project. Public owners are public bodies of some kind ranging from agencies of the federal government down through the state, county, and municipal entities including boards, commissions, and authorities.

  Most Public projects or facilities are built for public use and not sold to others. Private owners may be individuals, partnerships, corporations, or various combinations thereof.

Participants

- **Architect/Designer**:

  An Architect is an individual who plans, programs, and designs

  Since most architects have only limited capabilities in structural, electrical, and other specialized design, they mostly rely on consulting engineers for such work.

- **Architect/Engineer (A/E)**:

  Also known as the design professional; is part of the business firm that employees both architects and engineers and has the capability to do complete design work. The A/E firm also may have the capability to perform project management services.

Participants

- **Manager**:

  A specialized firm or organization which furnishes the administrative and management services.

  Responsibilities: design coordination, the proper selection of materials and methods, contracts preparation, and cost/schedule/quality control.

- **Engineer**:

  An individual and/or a firm engaged in specialized design or other work associated with design or construction. Design engineers are usually classified as: civil, electrical, mechanical, environmental ….

  There are also scheduling, estimating, cost, and construction engineers who originated from any of the basic engineering disciplines.

Participants

- **Engineering-Construction Firm**:

  An organization that combines both architect/engineering and construction contracting. The firm has the capability of executing a complete design-build sequence, or any portion of it. Sometimes this firm does the procurement of the equipment and materials needed to construct the project.

- **General Contractor (G.C.)**:

  Also known as the **Prime Contractor;** is the business firm that is under contract to the owner for the construction of the project, or for a major portion of the project. Subcontractors are frequently engaged, although the prime contractor retains the responsibility for the satisfactory performance of these subcontractors.

Participants

- **Project Manager**:

  The project manager is the individual charged with the overall coordination of all the facets of a construction program: planning, design, procurement, and construction, for the owner.

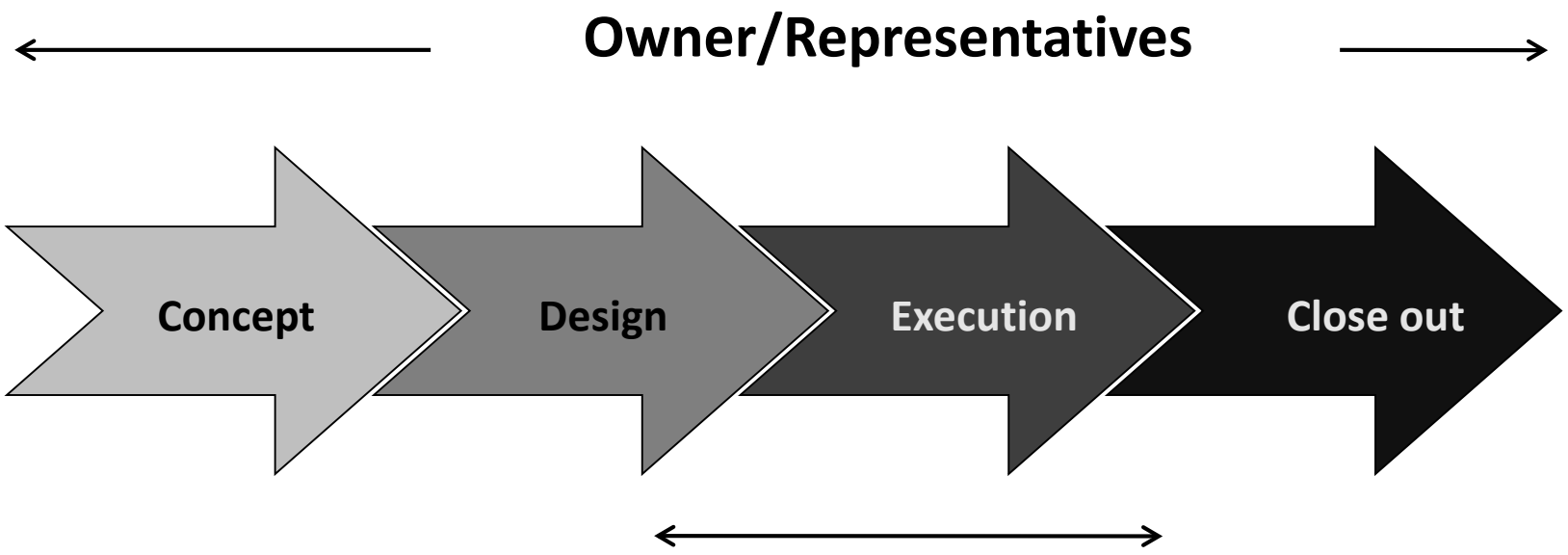
- **Subcontractor**:

  A subcontractor is under contract to another contractor, as opposed to an owner, to perform a portion on the contractor's work. A general contractor who is under contract with an owner may engage subcontractors for portions of the project, the type and amount depending on the nature of the project and the contractor's own organization. These subcontractors, in turn, may engage other subcontractors. Thus, there can be several levels of subcontracting to a general contractor.

- **Specialty Contractor**:

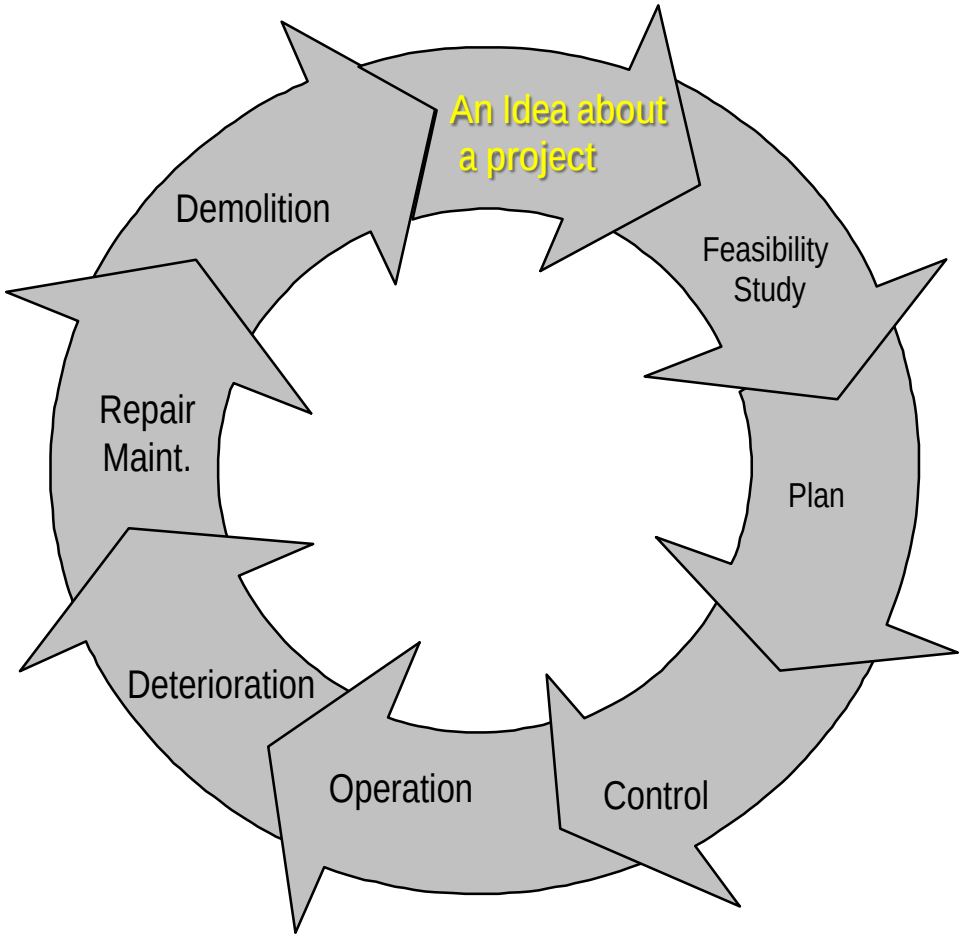
  This contractor performs only specialized construction, like plumbing, electrical, and painting, either as a subcontractor or as a prime contractor.

Construction Project Stakeholders

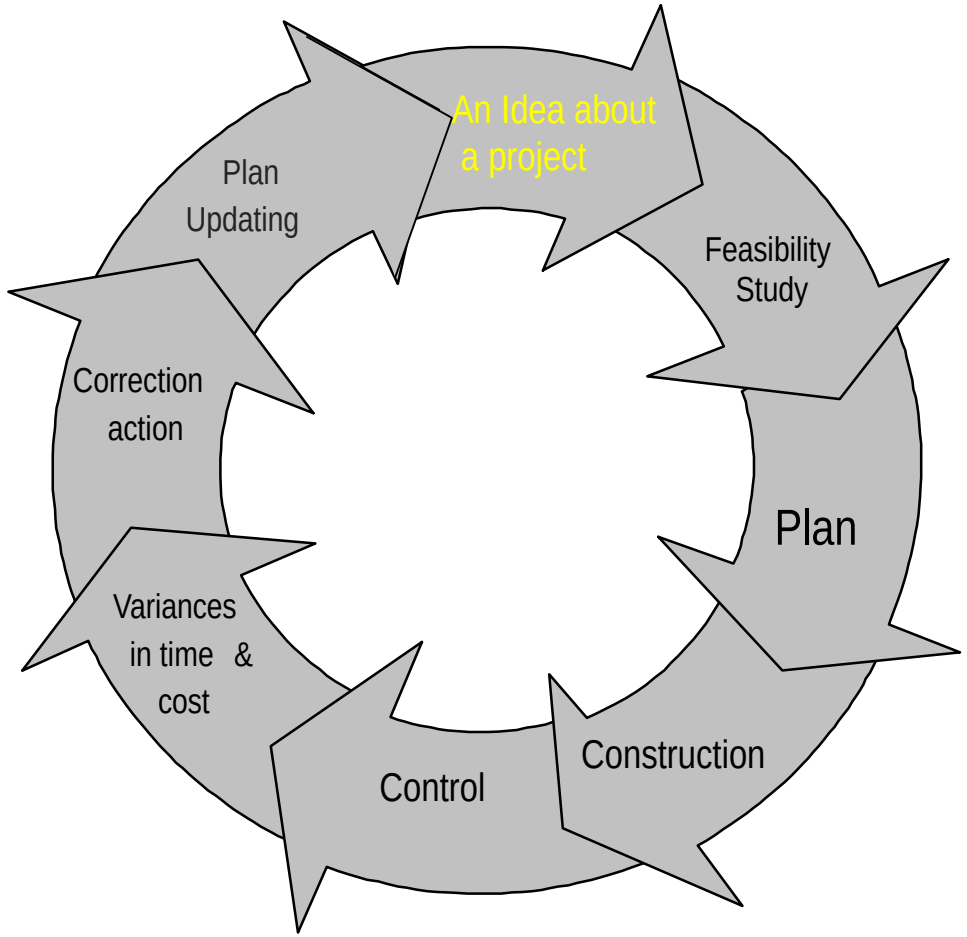


Construction Project Life Cycle

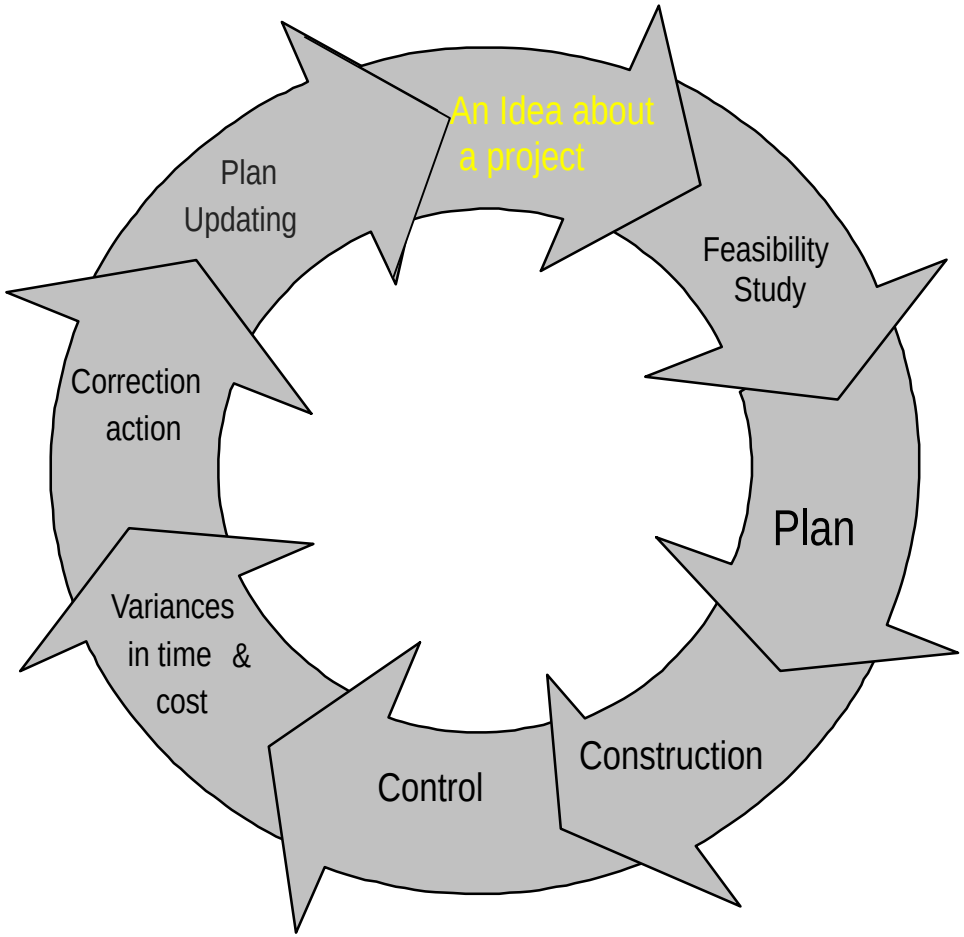
Construction Project Life Cycle

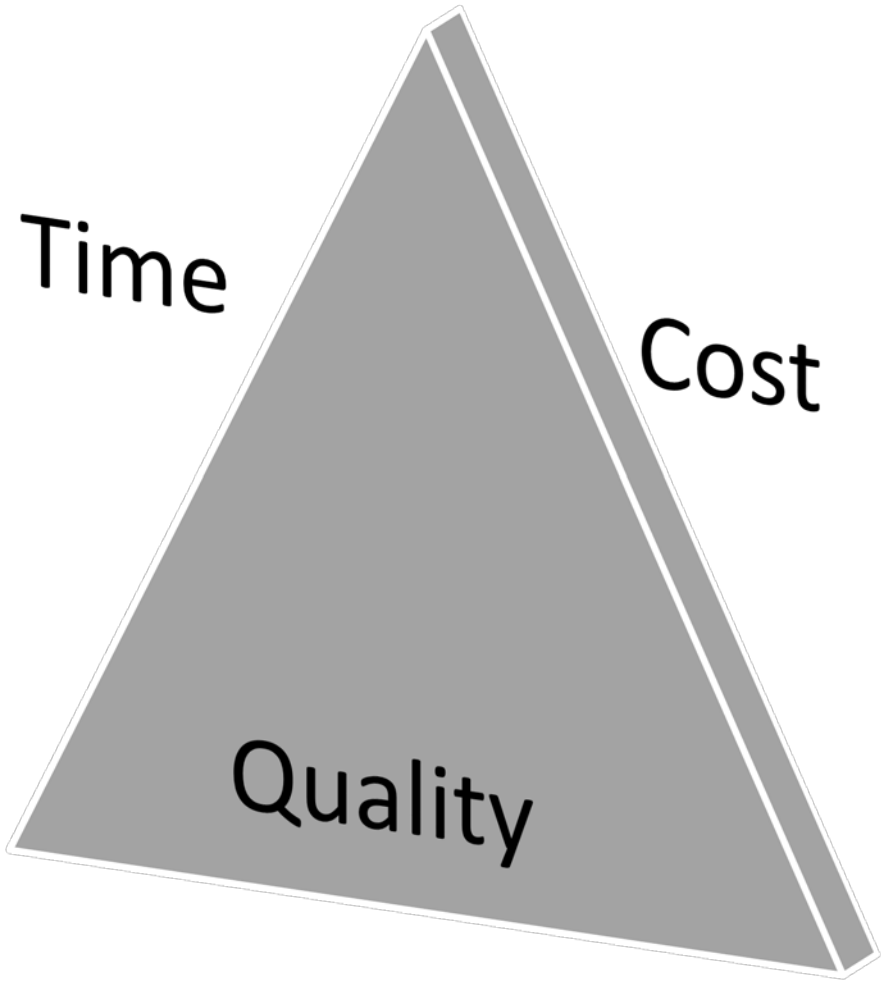


Management Life Cycle



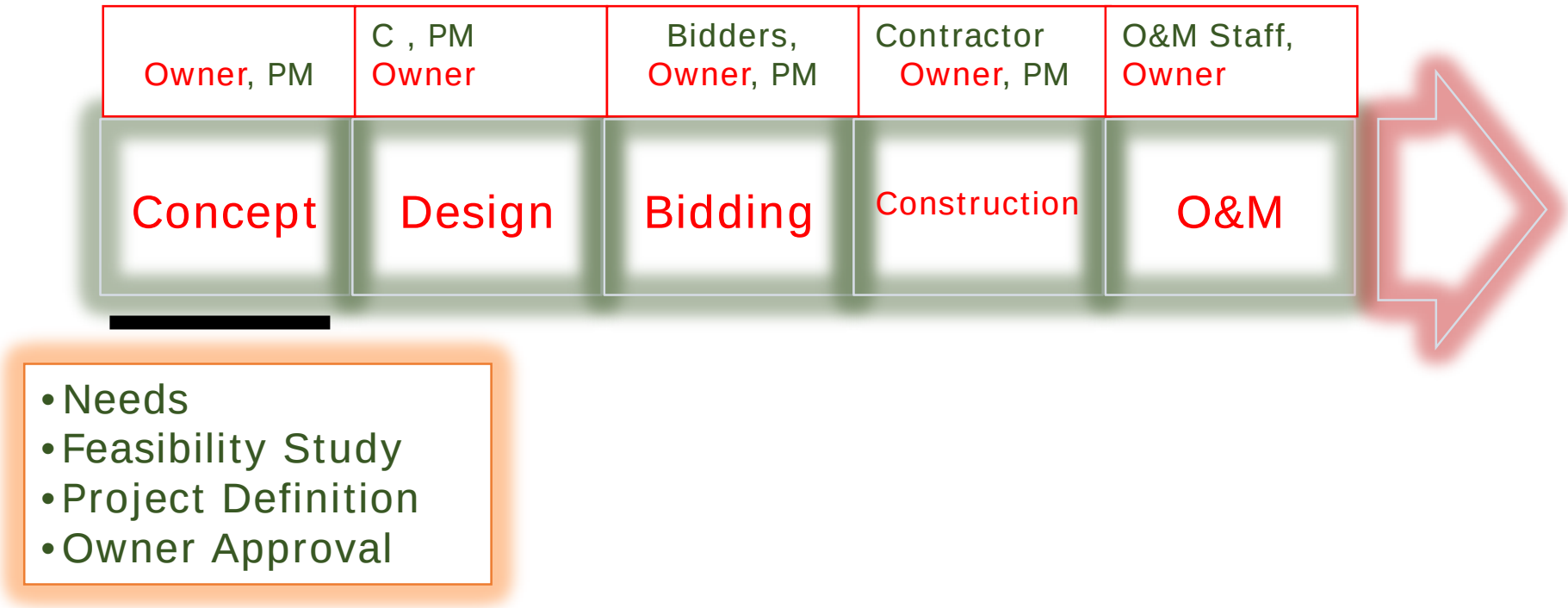
Management Life Cycle and Iron Triangle





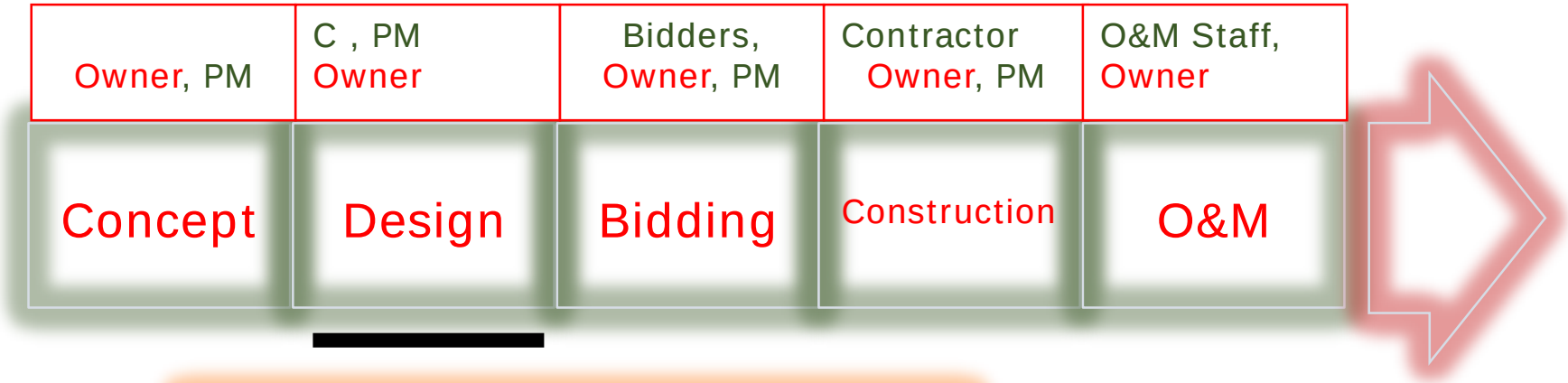
Construction Management

- Life Cycle and Duties



Construction Management

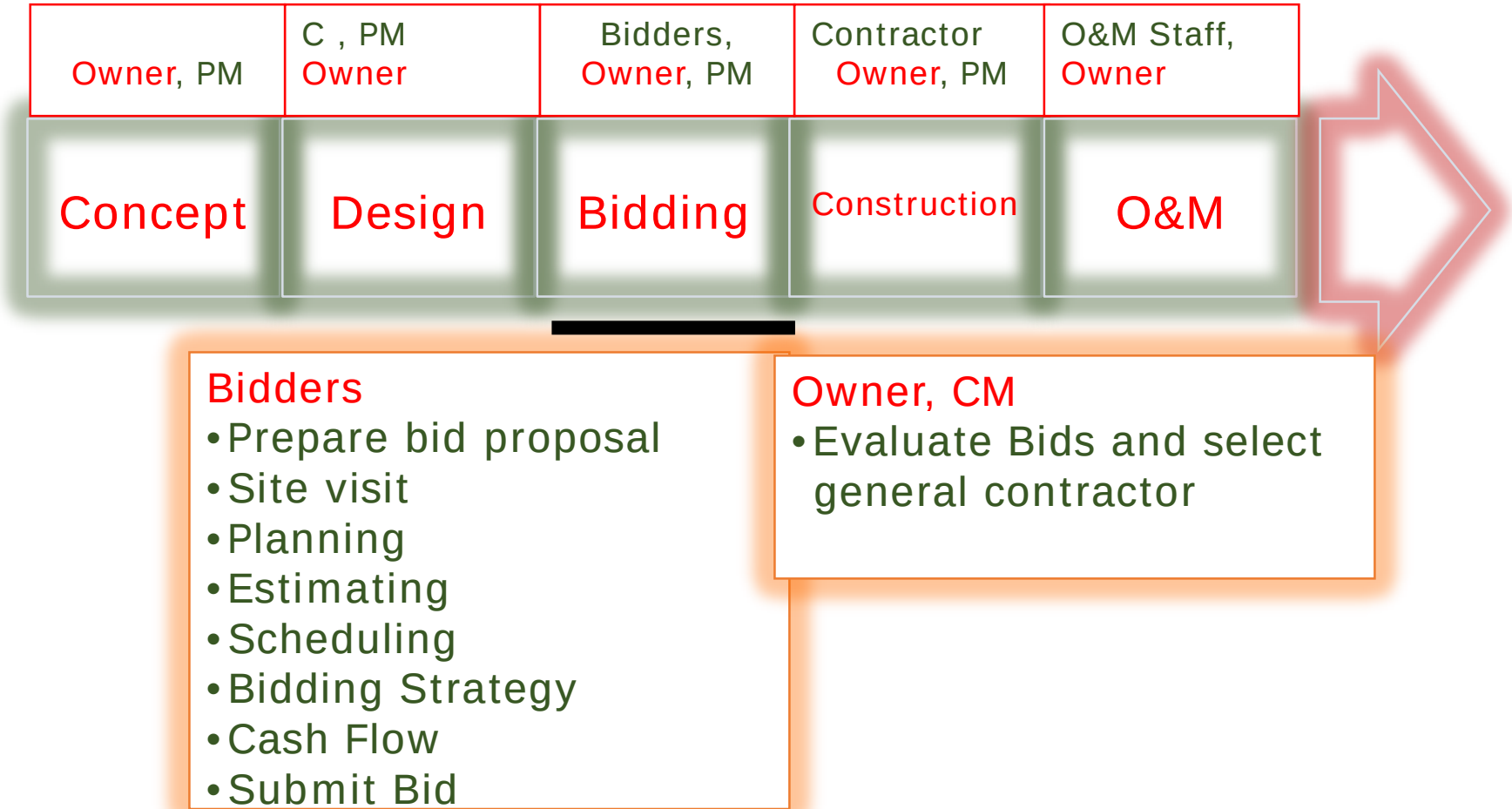
- Life Cycle and Duties



- Conceptual Design
- Owner Approval
- Reports
- Preliminary Design
- Detailed Design
- Work Documents
- Select Project Contract Strategy

Construction Management

- Life Cycle and Duties



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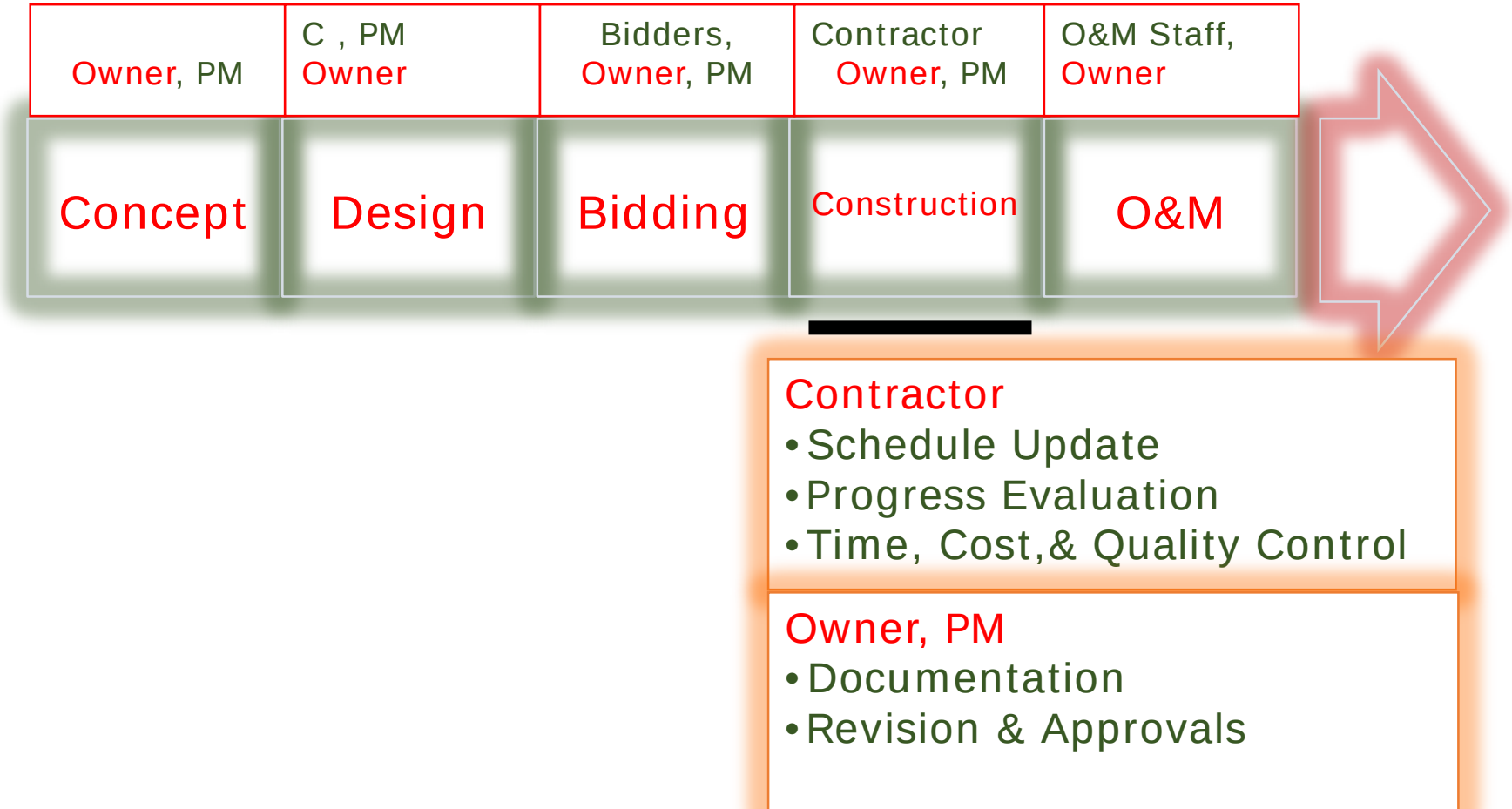

Construction Management

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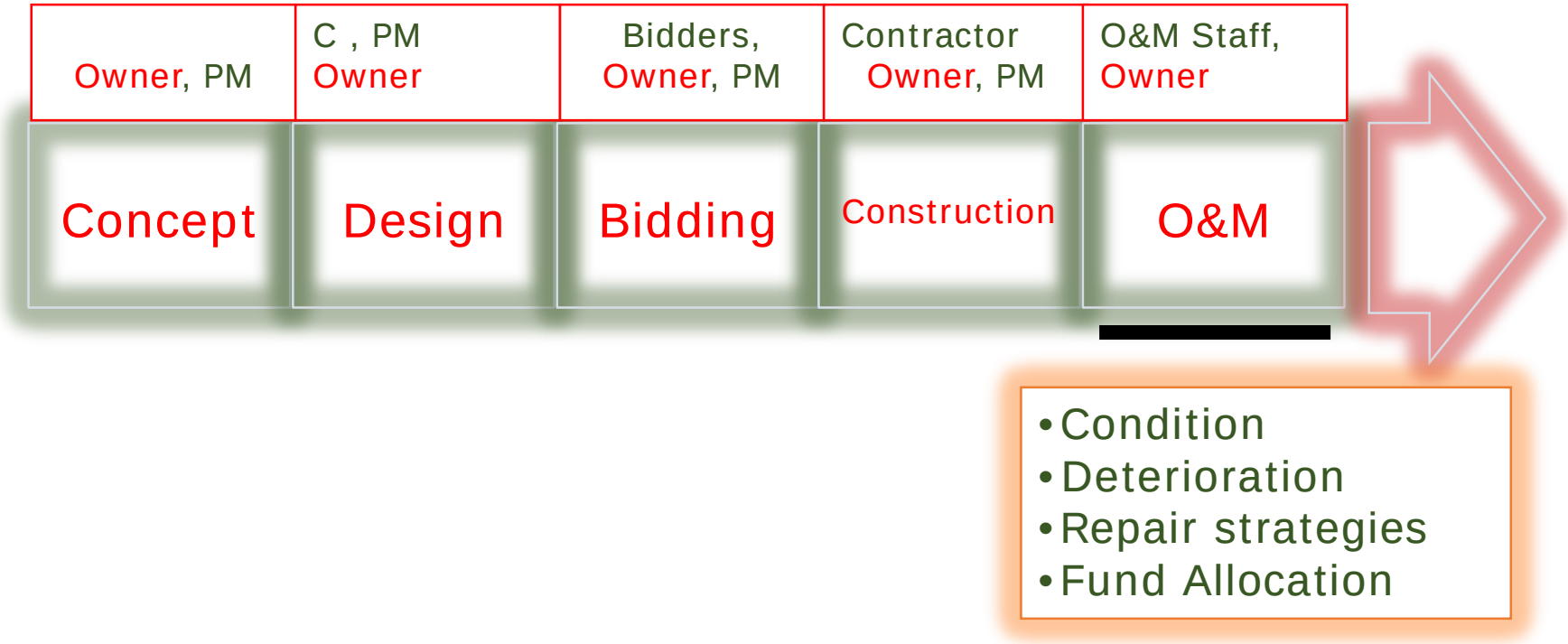
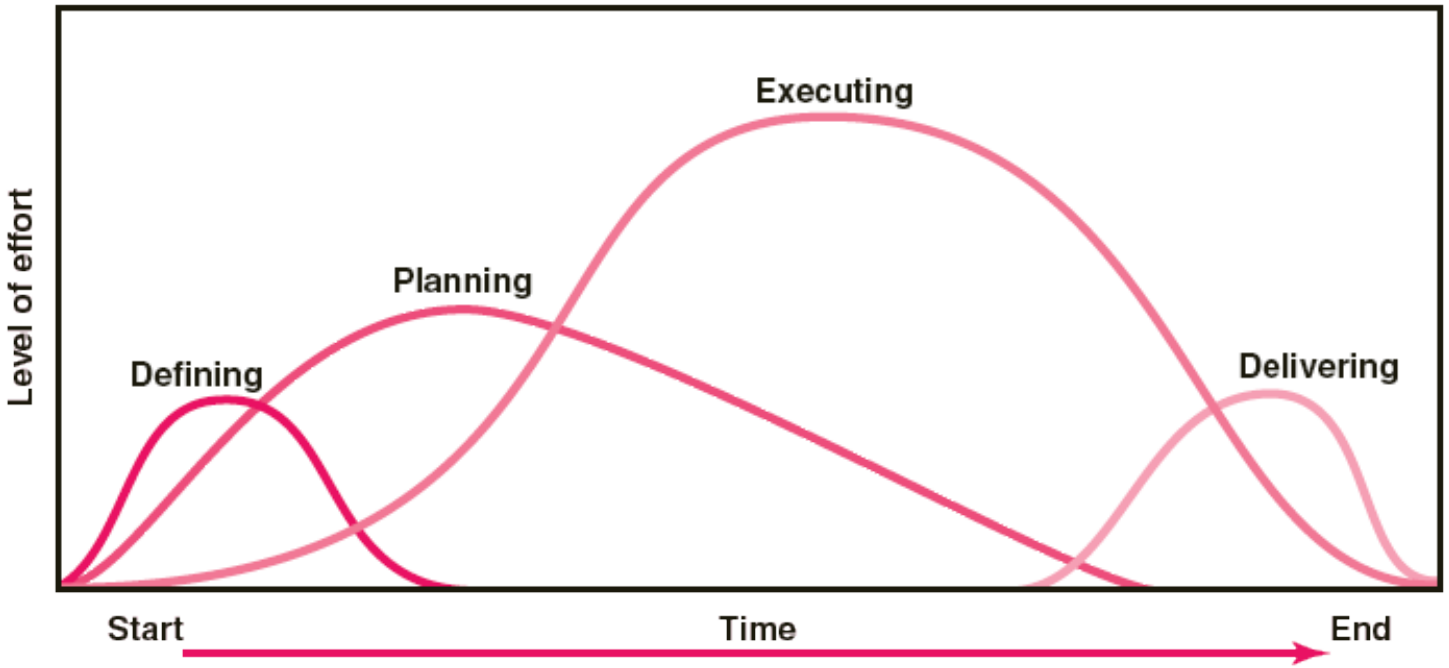


Construction Project Life Cycle



Defining	Planning	Executing	Delivering
1. Goals	1. Schedules	1. Status reports	1. Train customer
2. Specifications	2. Budgets	2. Changes	2. Transfer documents
3. Tasks	3. Resources	3. Quality	3. Release resources
4. Responsibilities	4. Risks	4. Forecasts	4. Release staff
	5. Staffing		5. Lessons learned