Week 2

Introduction to Project Management

457.307 Construction Planning and Management

Department of Civil and Environmental Engineering
Seoul National University

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What is a Project? (PMBOK Chapter 1)

- **"A temporary endeavor undertaken to create a unique product, service, or result." (PMBOK, pg. 5)**
  - *Temporary* means that every project has a defined beginning and a defined end.
  - Projects involve doing something which has not been done before and which is, therefore, *unique*.
- **Examples?**
  - Developing a new product or service
  - Effecting a change in the structure, staffing, or style of an organization
  - Developing or acquiring a new or modified information system
  - Constructing a building or infrastructure
  - Implementing a new business process or procedure

What is a Project?

- **A project is**
  - Decided by people, materials, and equipment
  - Characterized by phases, multiple participants from different organizations, scheduling, cost constraints and creativity.
  - Very dynamic in nature and involves considerable coordination and communication.

What is Project Management?

- "A process that helps project teams coordinate their efforts so they may create the right product (or service, process, or plan) at the right time, for the right customer, within the resource limits established by the organization" (PMMJ, pg. 2)

- "The art and science of coordinating people, equipment, materials, money, and schedules to complete a specified project on time and within approved cost." (PMEC, pg. 8)

What is Project Management?

- "The application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project." (PMBOK, pg. 6)
  - Meeting or exceeding stakeholder needs and expectations invariably involves balancing competing demands among:
    - Scope, time, cost, and quality
    - Stakeholders with differing needs and expectations
    - Identified requirements (needs) and unidentified requirements (expectations)

- ***Communication and Leadership!***

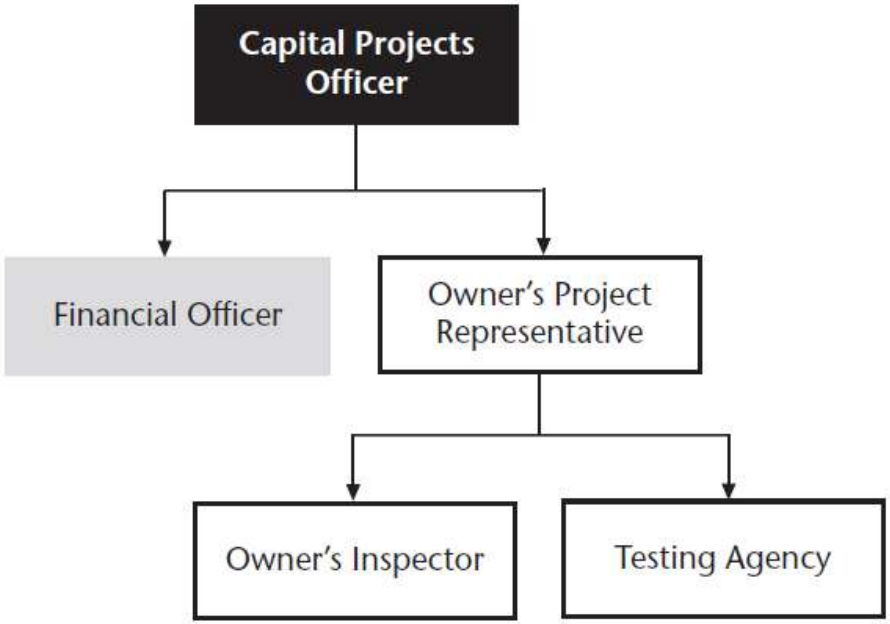
World's 5 Mega Construction Projects

Project Participants/Stakeholders

- **Owners** (Public, Private)
- **Designers** (Architect, Engineer)
- **Constructors** (General, Sub)
- **Management consultants**
- **Material suppliers**
- **Operating equipment vendors**
- **Labor**
- **Accountants**
- **Attorneys**
- **Financial institutions**
- **Inspection / Testing companies**
- **General public**

Project Participants - Owner

- **Role**
  - Initiates a project, finances it, contracts it out and benefits from its outputs



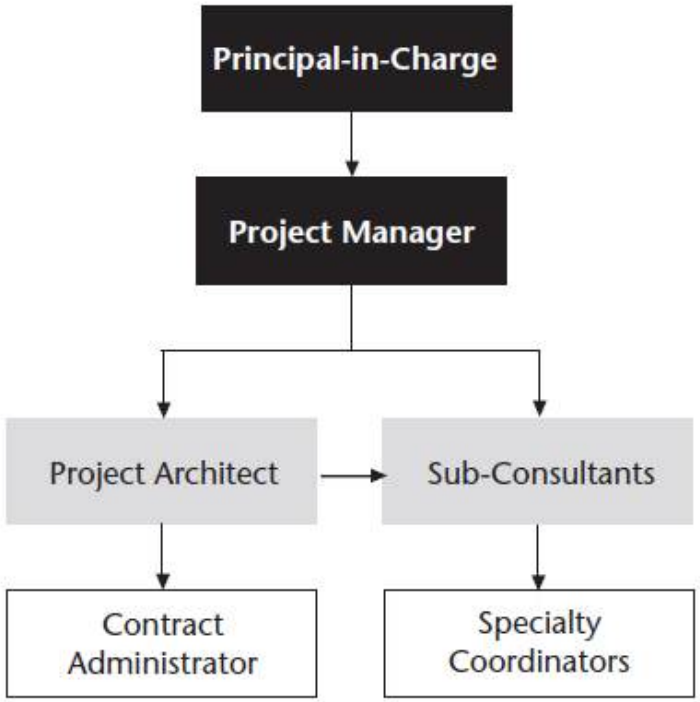
Owner's Organization for the Construction Project

- **Capital Projects Officer**
  - Owner or upper-management-level individuals
  - Makes ultimate decisions, authorizes major changes, and oversees the construction phase periodically
- **Financial Officer:** Manages the cash flow of the project
- **Owner's Project Representative**
  - Owner's project manager responsible for the project
  - Primary contact participating on a daily basis
- **Owner's Inspector (clerk of the works)**
  - Mainly observes, reports the quality of construction works
- **Testing Agency**
  - Outside testing agency contracted by the owner
  - Tests materials to verify their specified standard

***Shop Drawings**: Drawings explaining item fabrication and installation produced by contractors, suppliers, manufacturers, etc. (e.g., 50m = 5 x 10m-rebar, 25-24-15 : 25mm-24Mpa-15cm)*
***RFI**: Information request from CM to A/E to clarify any parts of construction documents*

Project Participants – Designer (A/E)

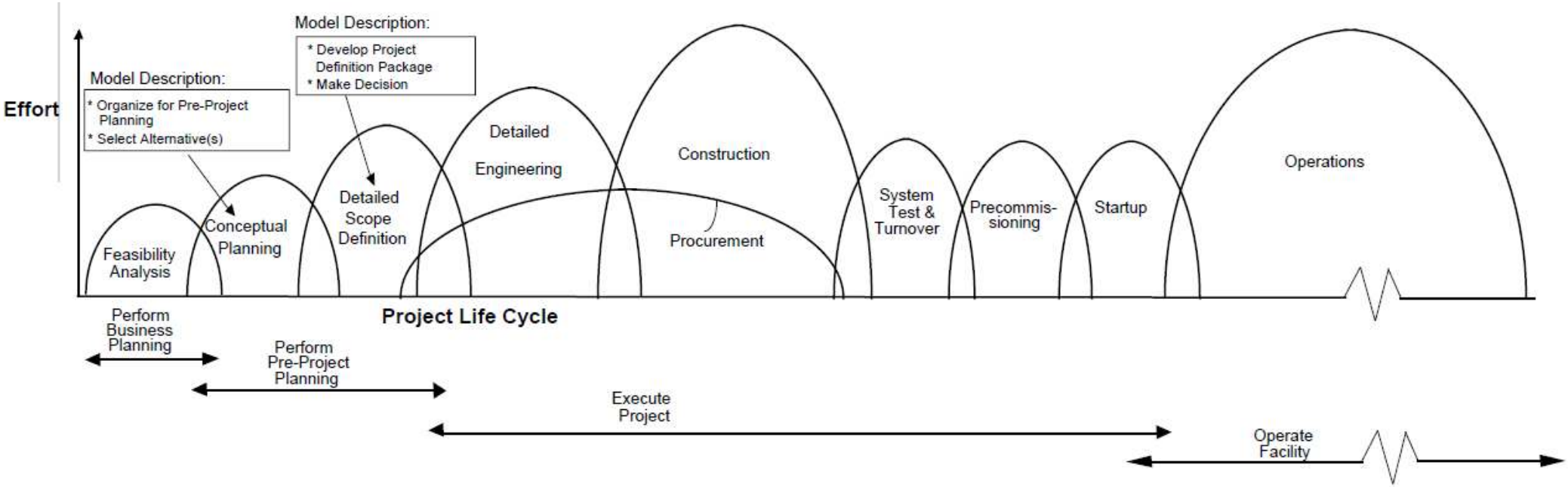
- **Role**
  - Develops the owner's concept on paper and construction documents
  - Architect: Lead designer administrating construction as the owner's agent
  - Engineer: Designs structural, mechanical, electrical, and plumbing systems



Architect's Organization

- **Principal-in-Charge:** Owner or upper-management-level person
  - Makes ultimate decisions and handles major issues
- **Project Manager:** Primary contact
  - Responsible for the project, organizes the project team
- **Project Architect**
  - Designs the project and produces construction documents
- **Contract (construction) Administrator**
  - Processes shop drawings, payments, RFI, change orders
  - Observes construction and have meetings with the contractor
- **Sub-consultants**
  - Engineering firms: Civil, environmental, structural, mechanical, or electrical
  - Interior design firms
- **Specialty coordinators**
  - Inspectors and engineers hired by sub-consultants
  - Provides services on the jobsite during the construction phase

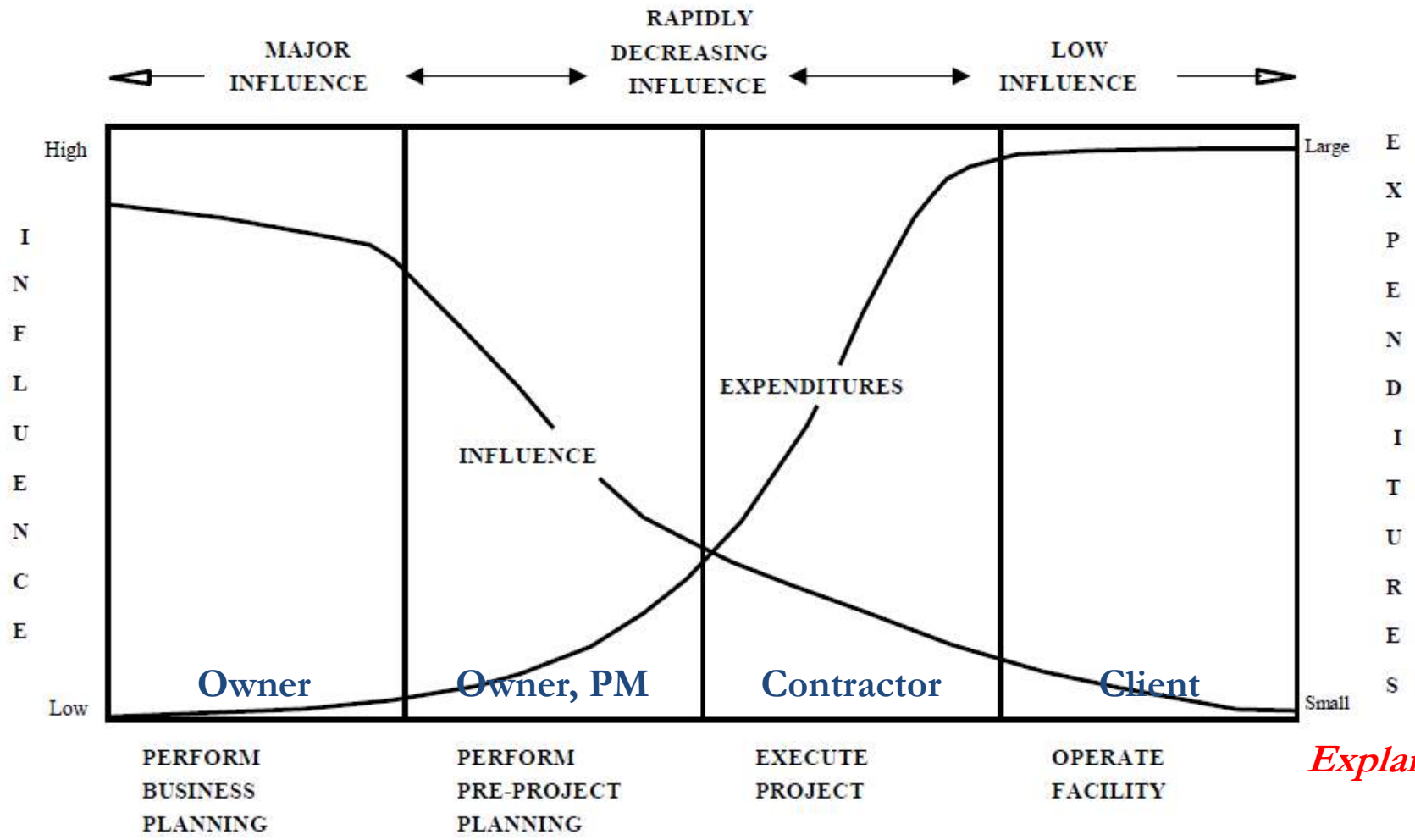
Project Lifecycle



Typical Project Objectives

- Project performance (scope and reliability): Time-Cost-Quality
- Safety management
- Material management
- Contract administration
- Human resource management
- Dispute minimization

Cost-Influence Diagram



"Influence" reflects a company's ability to affect the outcome of a project.
It is much easier to influence during the early project stages, when expenditures are relatively lower.

Week 2

Project Objective Setting

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Construction Industry Teams

- Construction is a people intensive industry.
- A project team exists for most construction projects.
- Multiple and overlapping teams are common.
- Effective teams are more likely with a proactive team building process.
- Successful project outcomes are more likely when effective teams are in place.
- Costs associated with team building are very low when compared to the benefits.

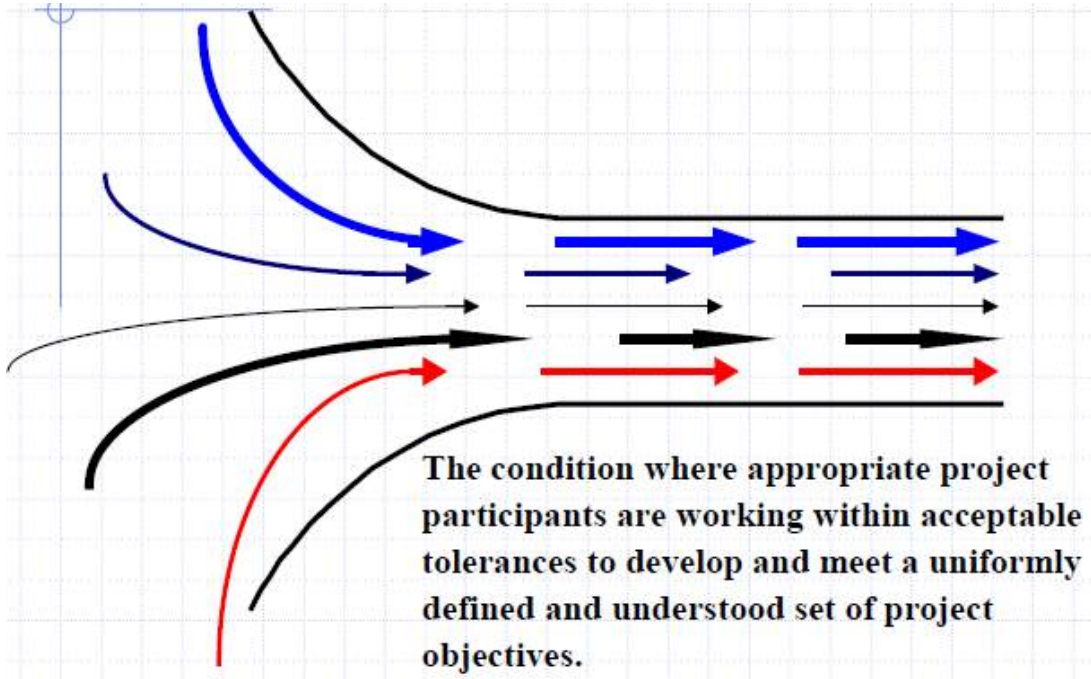
Construction Team Participants

- **Project advocates (owner representatives)**
  - Project manager
  - Contracting officer
  - Owner/client representative
- **Project delivery team**
  - Project manager
  - Contracting officer
  - Owner/client representative
  - A/E designer
  - Specialty consultant
  - Construction contractor
  - Construction manager
- **Make-up of team varies on type and size of project, owner's staffing, etc.**

Team Leader Skills & Alignment

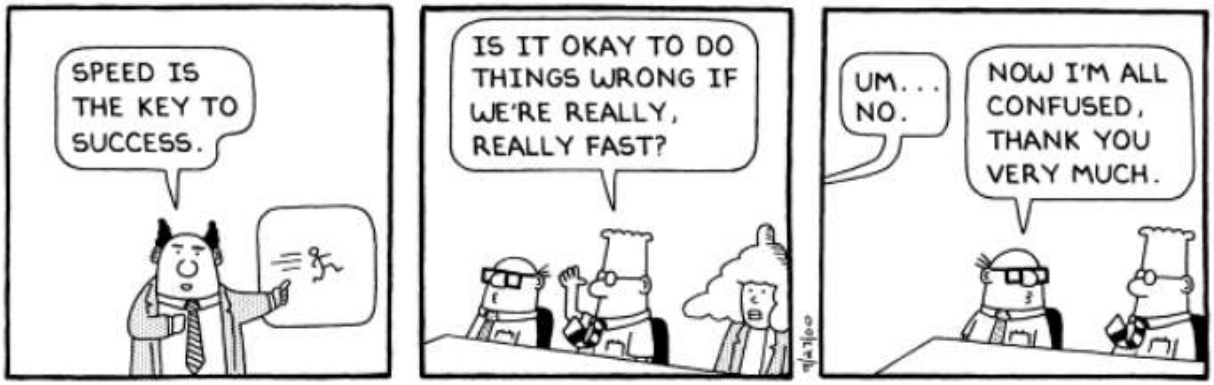
- **Team leader skills**
  - Leadership and decision-making
  - Facilitation
  - Coordination of tasks
  - Communication
  - PM knowledge
- **Alignment**
  - Everyone moves

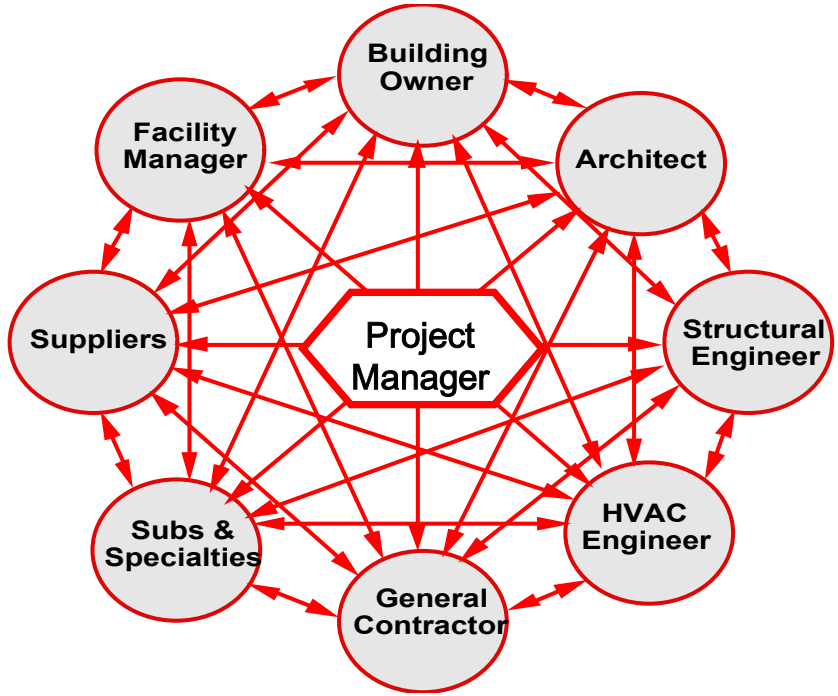
    to the same direction!



Why is Alignment Difficult to Achieve?

- Mixed stakeholders cause project complexity (SMEs) – different functional groups – Multiple/Decentralized decision-makers
- Specialists tend to do their own thing
- Time pressure: project cycle time reduction
- Complex objectives
- Objectives often in direct conflict
- Change over time





Different Perspectives on Changes

"We commission hundreds of new build and refurbishment projects of various sizes every year. Many of them do not complete on time or within budget. As a result, we suffer significant losses in terms of both higher construction costs and delayed business opening."

<Client (Owner)>

<Project Manager>

"Many serious project delays can be traced to some seemingly insignificant delays that happened sometime ago somewhere upstream in the project delivery process."

<Contractor>

"We often have to delay the work on-site and even re-do the work because the drawings provided by the designers are either incomplete or inconsistent with the site conditions."

<Design Consultant>

"In many of our projects, we have to make late changes to the design because the client keeps changing their requirements. This results in a waste of staff time as high as 30% in a typical project."

<Source: Managing Changes in Construction Projects>

Teamwork Success Factor

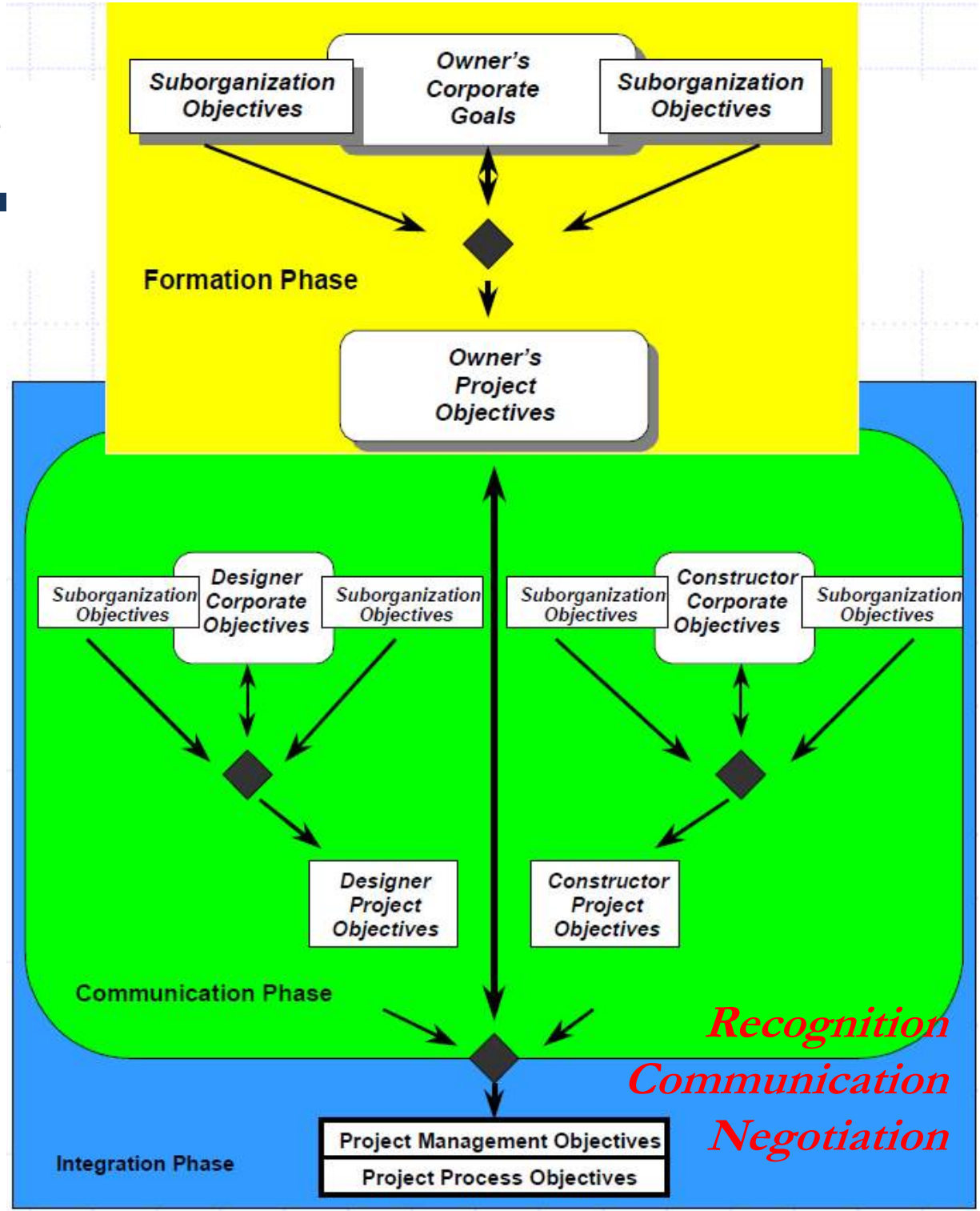
- Starts with sponsor defining goals, objectives, priorities, etc.
- Proactive: process starts at project beginning and last for entire project.
- Focus on common goals and priorities
- PM is team leader.
- Effective team building process

- **Objective-setting modifies behavior in three ways**
  - Focuses attention: "should be doing"
  - Regulates energy expenditure: "don't waste time"
  - "Hard" goals increase persistence: "push yourself hard"

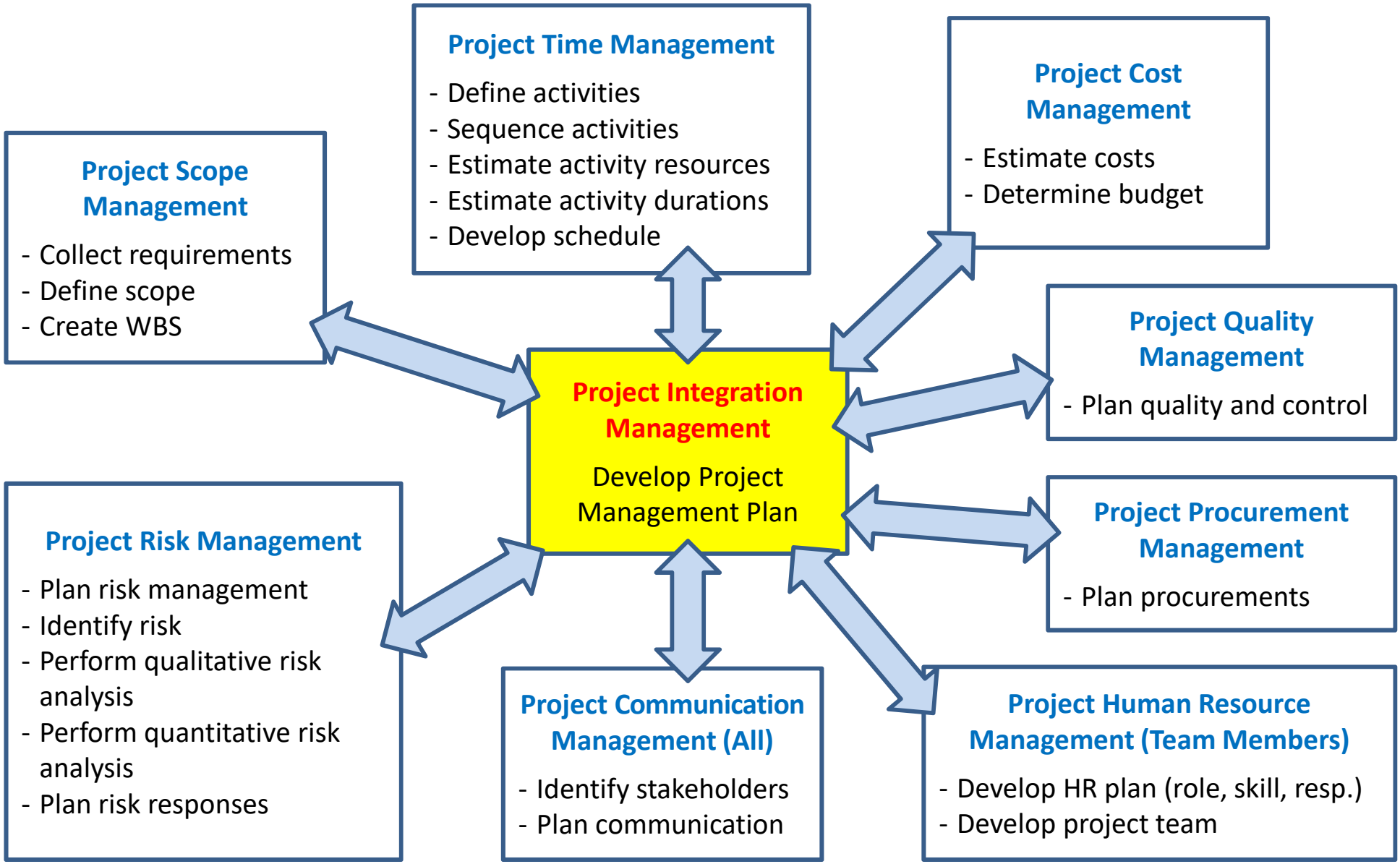
Objective Setting

- Agreement

- **Formation Phase:** Form a single set of project objectives.
- **Communication Phase:** Disseminate directly or indirectly the developed objectives.
- **Integration Phase:** Project objectives to form an integrated project strategy.



Project Management Objectives



Checklist

- **Is the objective:**
  - Specific and identifiable?
  - Oriented toward single-ended results?
  - Set against deadlines?
  - Attainable?
  - Responsive to organizational needs?
  - Controllable?
  - Assignable to responsible parties?

Project Management Objectives

The John Minor Wisdom 5th Circuit Court of Appeals, located in New Orleans, Louisiana was built in1890 at a cost of 1.3 million dollars. The mechanical and electrical services need to be upgraded while the building is occupied. Your company is not allowed to make any noise, so the judges can work without interruption. Consequently, you had better perform all the renovation work between the hours of 5 pm through 6 am. While this project does not involve a large number of trades, it is still very complex due to the condition of the building. The client for this project is the Federal Government. The project budget is about $10 million. The area has the high risk of hurricane effects as Hurricane Katrina hit New Orleans in August of 2005.

Project Management Objectives

10-story Court Renovation Project in New Orleans

Project Characteristics	Project Management Objectives	Detailed PM Objectives	Goal	Stretch Goal	How to Conduct or Behave?
Construction after working hour (5pm-6am)	Time management	No delay on intermediate milestones and all system startup	Meet all dates	Ahead of schedule for 2 weeks	Use Primavera, Fast tracking, Team/Public communication channels
Construction in the downtown area	Procurement management	Less storage time and cost for material management	Meet material cost and expenses	5% saving	Just in Time processes, IT-based location tracking
Hurricane effects	Scope management	Landscape, roof, structure, etc.	Sea oats, water-proof, con't, etc.	Other state-of-the-art tech.	Collaborative objective setting
	Quality management	No rework	< 6% of direct work hours	< 4% of direct work hours	QA/QC, BIM, Team coordination, Documentation protocols

*RIR (Recordable Incident Rate): Number of Claim / Number of Workers *1,000 (accidents per 1,000 workers)*
*LWCIR (Lost Workday Case Incident Rate): Number of lost workday cases * 200,000 / total hours worked (accidents per hours)*

Project Management Objectives

10-story Court Renovation Project in New Orleans

Project Characteristics	Project Management Objectives	Detailed PM Objectives	Goal	Stretch Goal	How to Conduct or Behave?
Public safety is always first!	Risk (Safety) management	Less accident	RIR : 3.0 LWCIR : 2.0	RIR : 1.0 LWCIR : 1.0	TBM, W2W, Site monitoring
Public project budget saving	Cost management	Meet project total cost	Meet project budget	10% saving	PDCA + all other PM
		Increase contingency return	$6 million remaining	$7.5 million remaining	More budget and time for PPP, Enhance risk management

***Contingency (예비비)**: downside risk estimates that make allowance for the unknown risks associated with a project. Typically, contingencies refer to costs, and are amounts that are held in reserve to deal with unforeseen circumstances.*

***Retainage (유보금)**: a portion of the agreed upon contract price deliberately withheld until the work is substantially complete to assure that contractor or subcontractor will satisfy its obligations and complete a construction project*

Project Process-Related Objectives

- **How to conduct or behave?**
  - Roles and responsibility definition
  - Team behavior/code of conduct
  - Communication channels: kakaotalk, eTL, …
  - Documentation protocols: google drive, PMIS, …
  - Dispute resolution within team, with public
  - Team building and meetings
  - Team member satisfaction: alignment, survey, …
  - Education and training
  - ……

Alignment Checking

- **The Alignment Thermometer**

1: Strongly Disagree
5: Strongly Agree

Project Name:	LEVEL OF AGREEMENT					
ALIGNMENT ISSUES	1	2	3	4	5	SCORE
1. Stakeholders are appropriately represented on the Project Team.	0	3	5	8	10	
2. Project leadership is defined, effective, and accountable.	0	3	5	8	10	
3. The priority between cost, schedule and required project features is clear.	0	3	5	8	10	
4. Communication within the team and with stakeholders is open and effective.	0	3	5	8	10	
5. Team meetings are timely and productive.	0	3	5	8	10	
6. Our team culture fosters trust, honesty, and shared values.	0	3	5	8	10	
7. The PPP process includes sufficient funding, schedule and scope to meet our objectives.	0	3	5	8	10	
8. Reward and recognition systems promote meeting project objectives.	0	3	5	8	10	
9. Teamwork and team building programs are effective	0	3	5	8	10	
10. Planning tools (e.g., checklists, simulations and work flow diagrams) are effectively used.	0	3	5	8	10	
TOTAL SCORE						

Alignment Checking

- Step 1

Project Name: Project 1	LEVEL OF AGREEMENT					
ALIGNMENT ISSUES	1	2	3	4	5	SCORE
1. Stakeholders are appropriately represented on the Project Team	0	3	5	(8)	10	**8**
2. Project leadership is defined, effective, and accountable.	0	3	(5)	8	10	**5**
3. The priority between cost, schedule and required project features is clear.	0	3	(5)	8	10	**5**
4. Communication within the team and with stakeholders is open and effective	0	3	(5)	8	10	**5**
5. Team meetings are timely and productive.	0	3	5	8	(10)	**10**
6. Our team culture fosters trust, honesty, and shared values	0	3	5	(8)	10	**8**
7. The PPP process includes sufficient funding, schedule, and scope to meet our objectives.	0	3	(5)	8	10	**5**
8. Reward and recognition systems promote meeting project objectives.	0	(3)	5	8	10	**3**
9. Teamwork and team building programs are effective.	0	3	5	(8)	10	**8**
10. Planning tools (e.g. checklists, simulations and work flow diagrams) are effectively used.	0	3	5	8	(10)	**10**
				TOTAL SCORE		67

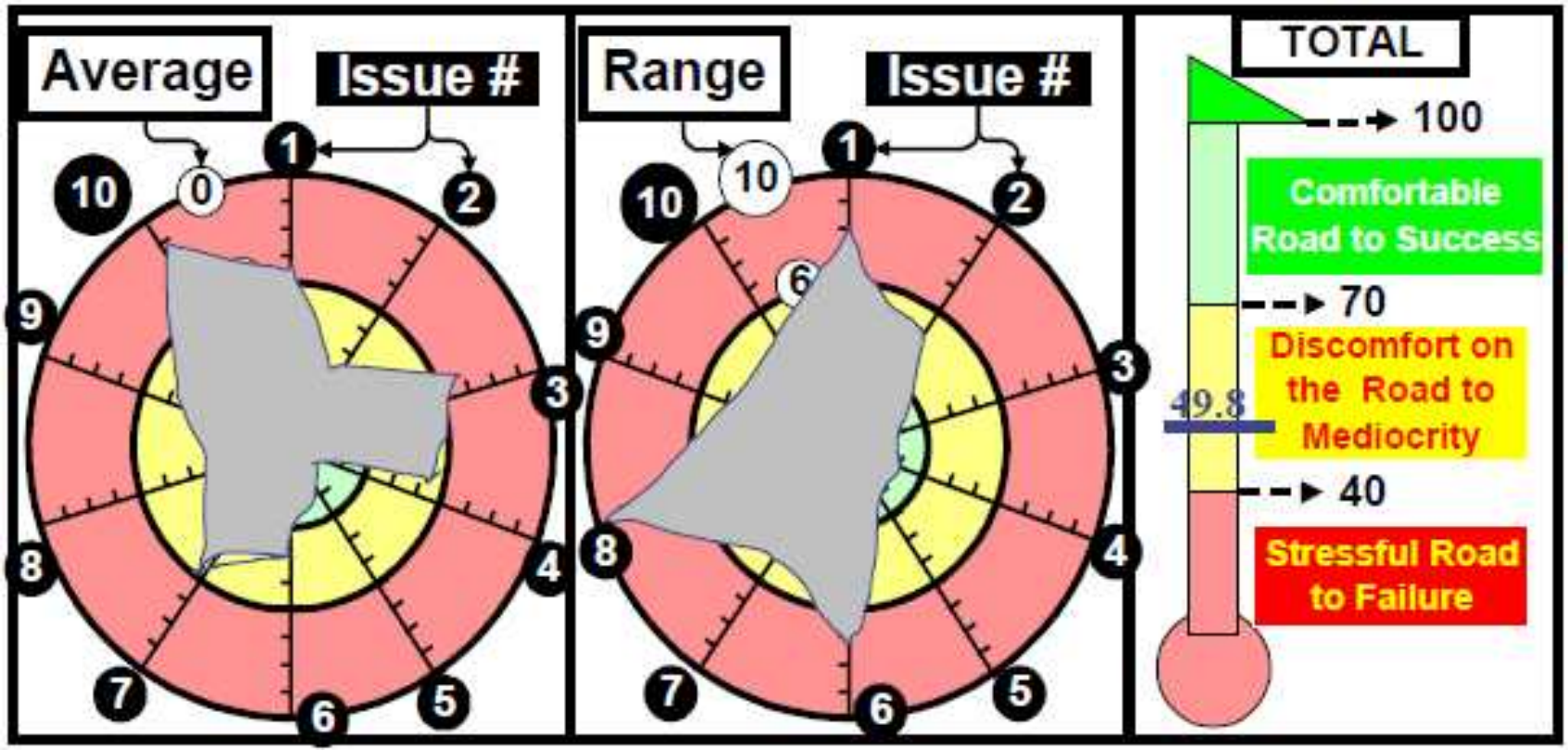
Alignment Checking

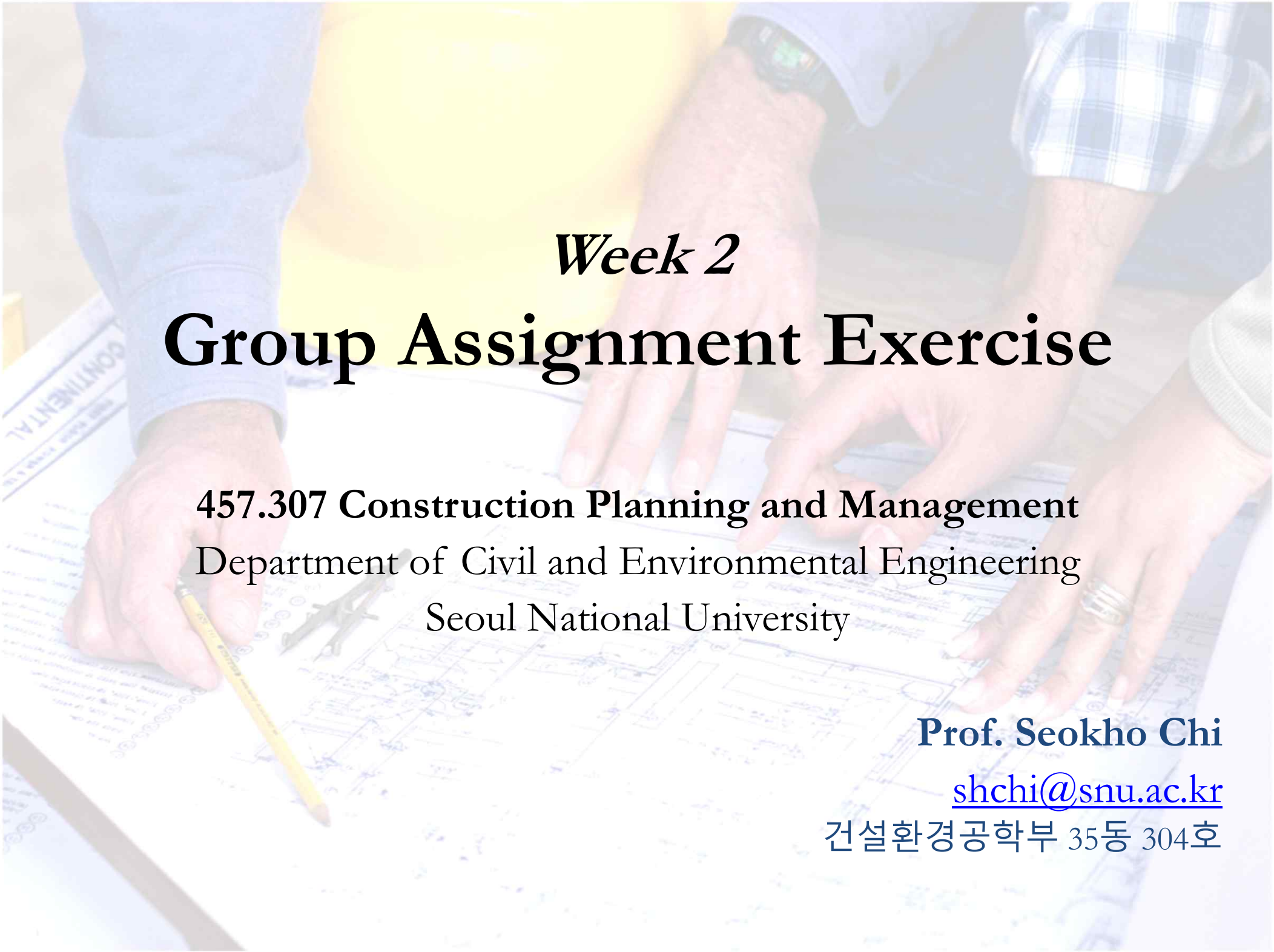
- **Step 2**

TEAM SCORE	Respondent									
Issue	1	2	3	4	5	6	7	Calculated Average	Calculated Range	Range/ Average
1	3	5	8	3	5	0		24/6 = 4.0	8	2.0
2	8	8	8	5	10	8		47/6 = 7.8	5	0.6
3	3	3	3	5	3	3		20/6 = 3.3	2	0.6
4	5	5	3	5	5	3		26/6 = 4.3	2	0.5
5	8	8	8	10	8	8		50/6 = 8.3	2	0.2
6	3	3	5	8	10	3		32/6 = 5.3	7	1.3
7	0	3	3	5	3	5		19/6 = 3.2	5	1.6
8	0	8	8	10	5	8		39/6 = 6.5	10	1.5
9	3	5	8	8	5	3		32/6 = 5.3	5	0.9
10	0	0	3	0	5	3		11/6 = 1.8	5	2.7
						TOTAL		49.8		

Alignment Checking

- Step 3





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Group Assignment Exercise

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Group Assignment Exercise

- **Form a group of 7 students**
- **Select a team name and logo**
- **Agree to team assignments**
  - Group leader
  - Facilitator
  - Recorder
  - Others

Group Assignment Exercise

Selection of Project

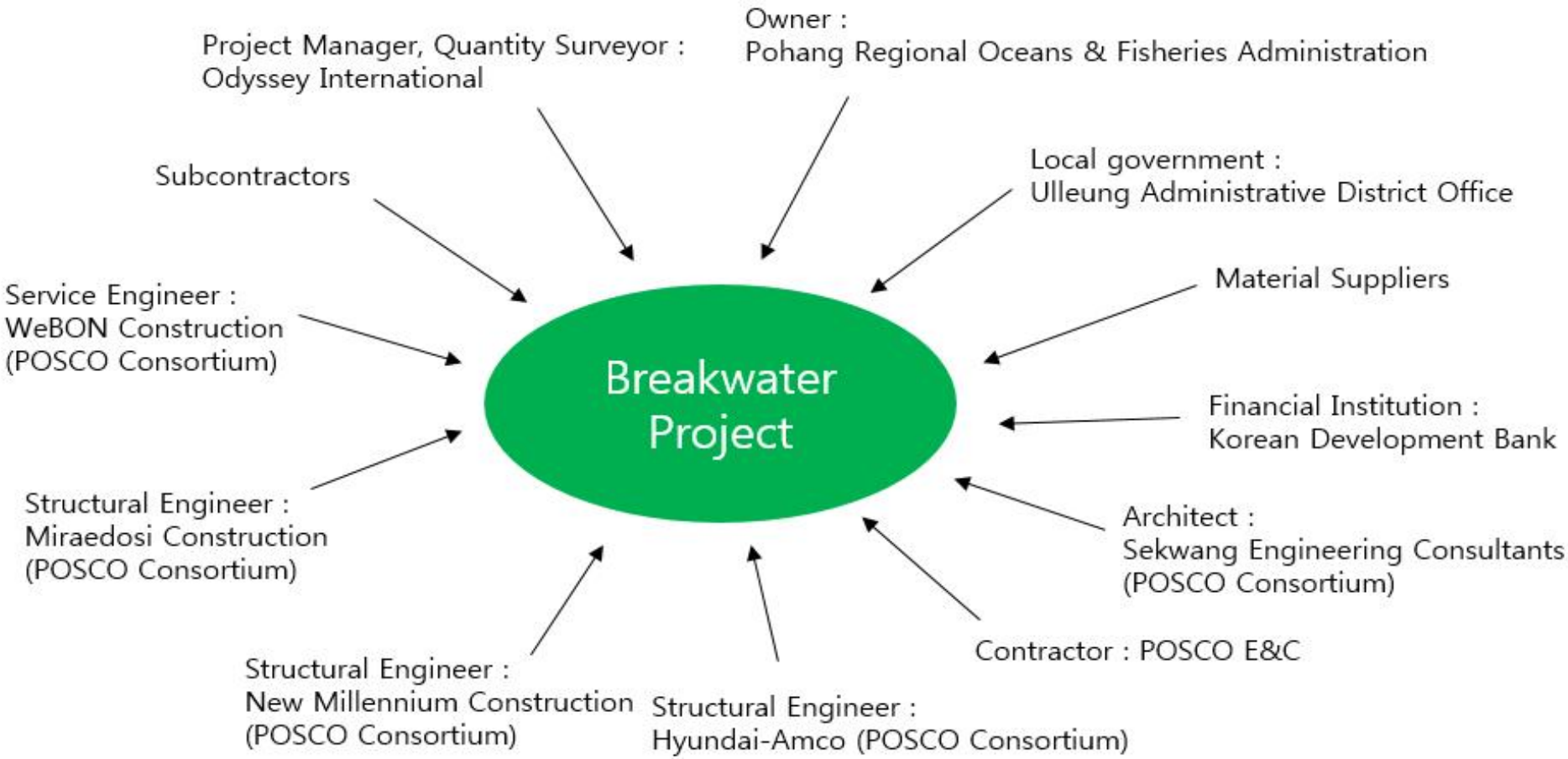
- ***an actual ongoing and/or recently completed project.***
- ***The project should have a construction cost over $1 million.***
- ***access to project information and data is important.***
  - *Assumptions can be made. Project specific data need to be real as possible whereas some data can be fictitious.*

Group Assignment Exercise

- **Project Overview**
  - The project is constructing the 2nd stage of breakwater structure located on the east coast of Ulleung Island, South Korea.
  - The 640m construction work consists of 3 main components:
    - 640m length east breakwater structure
    - inflow seawater tunnel
    - appurtenant work
  - Cost: $ 152 million USD
  - Construction period: from Feb. 2014 to Jan. 2017
  - Precast work done in Pohang, carried by ship to Ulleung Island
  - Accommodations must be offered for the workers
  - Client : Pohang Regional Maritime Affairs and Port Office
  - Top class safety and quality

Group Assignment Exercise

- **Project Delivery Team (Ulleungdo Seawall Construction)**



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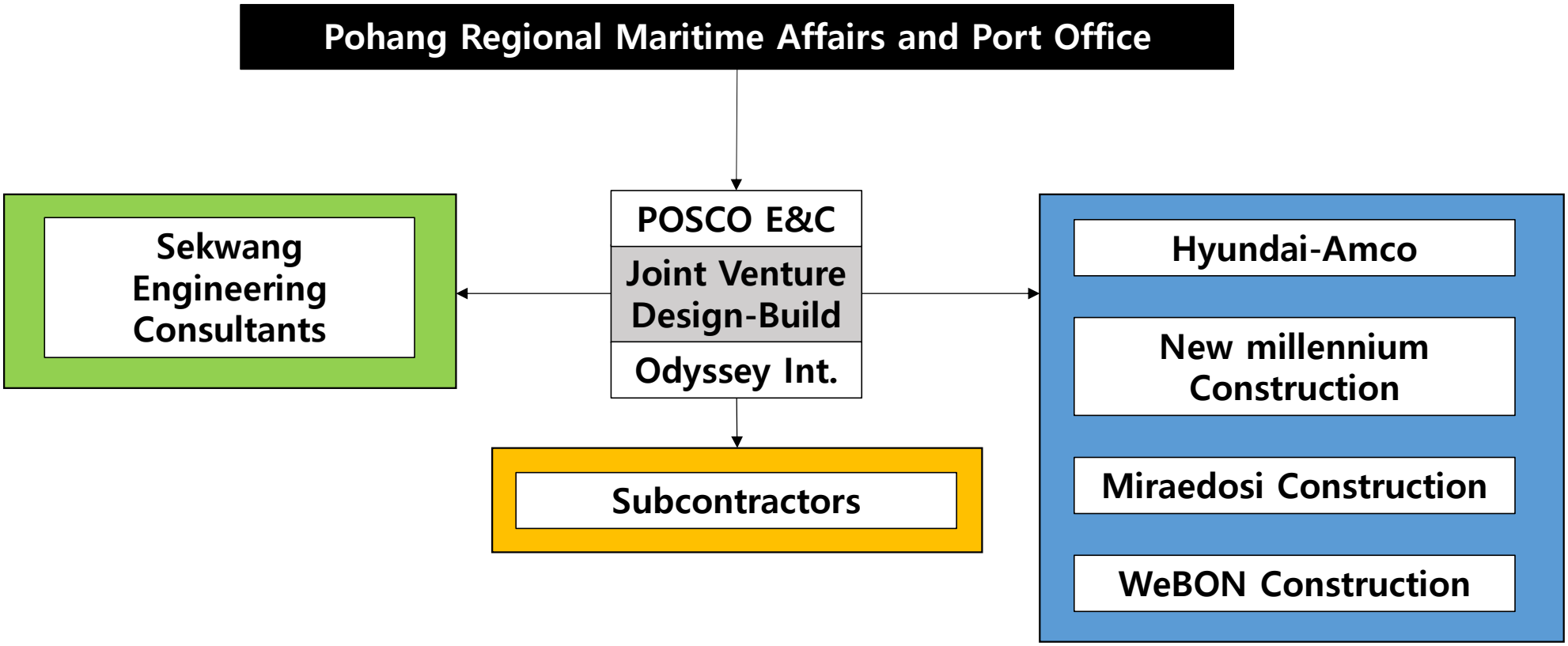

Group Assignment Exercise

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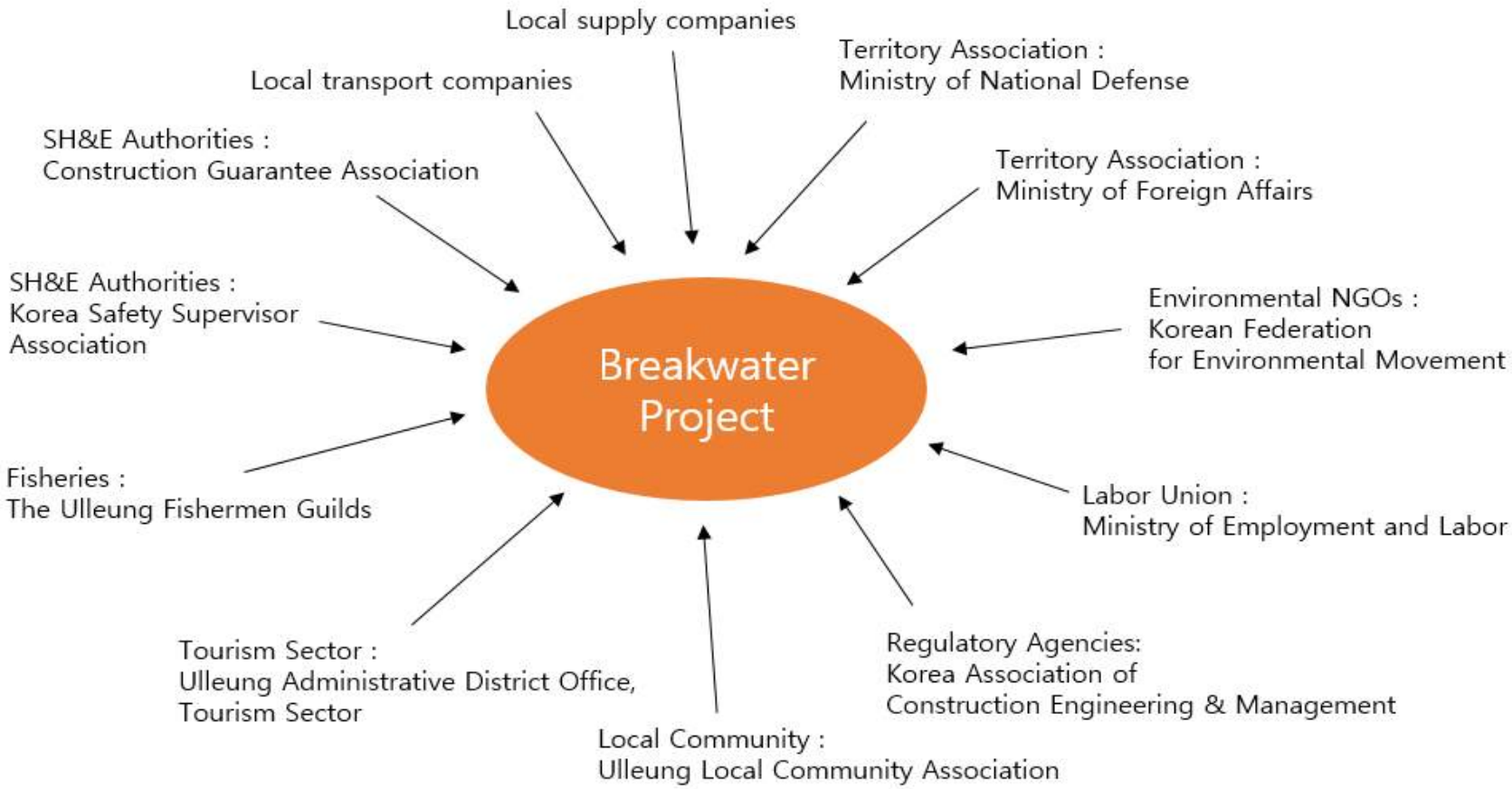

Group Assignment Submission by 11am, 4/1(Wed)

Group Assignment Exercise

- Project Management Objectives

Project Characteristics	Project Management Objectives	Detailed PM Objectives	Goal	Stretch Goal	How to Conduct or Behave?

- Project Process-related Objectives