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# WOOD in CIRCLE

## Project Management and Construction Management

Girts Zarins, RTU

March 17th 2022





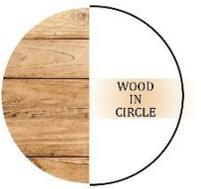
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# WHAT IS CONSTRUCTION?

# WHAT IS AN INFRASTRUCTURE?

# WHAT IS A PROJECT?



# CONSTRUCTION IS...

- Construction is an **industry** that comprises a wide range of activities involving construction, alteration, and/or repair
- The construction sector **delivers the buildings and infrastructure** needed by the rest of the economy and society
- Construction is a **professional discipline** that deals with the design, construction and maintenance of the physical and naturally built environment
- In the field of architecture and civil engineering, construction is a **process** that consists of the building or assembling of infrastructure

# INFRASTRUCTURE IS...

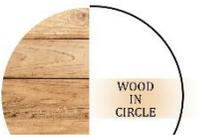


- Infrastructure is basic **physical and organizational structures** needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function
- Infrastructure is the **set of interconnected structural elements** that provide framework supporting an entire structure of development. It is an important term for judging a country or region's development
- **Infrastructure** in combination with labour and other inputs **provides services**

*Infrastructure is providing **Context** for the project ..  
Also a boundaries for the project => **Assumptions**.*



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# PRIMARY TYPES OF CONSTRUCTION AND CONSTRUCTION PROJECTS

- 1. Residential Building Construction**
- 2. Commercial and Institutional Building Construction**
- 3. Industrial Construction**
- 4. Heavy Civil Construction**
- 5. Environmental Construction**

- > Scope and requirements

# PROJECT IS...

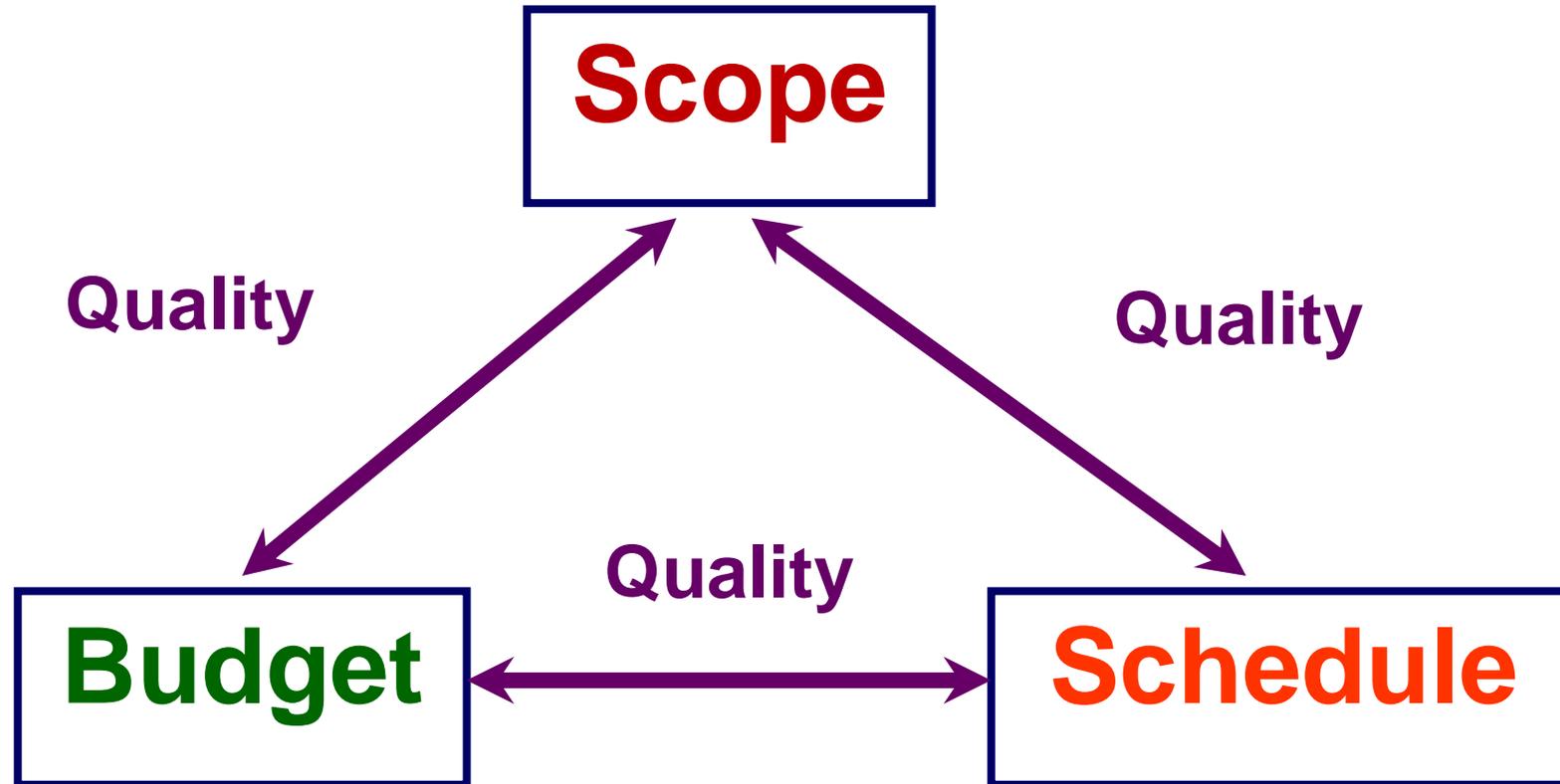


- Project is a planned **set of interrelated tasks** to be executed over a fixed period and within certain cost and other limitations.
- Project is a **temporary group activity** designed to produce a unique product, service or result.
- A project is temporary in that it **has a defined beginning and end in time**, and therefore defined scope and resources.
- A project **is unique in that** it is not a routine operation, but a specific set of operations designed to accomplish a singular goal

\* Project and **Project** methodology is a **Tool** to achieve Defined **goals** in a **controllable** and predicible way



# CONSTRUCTION PROJECT COMPONENTS (Similar ar general PM)



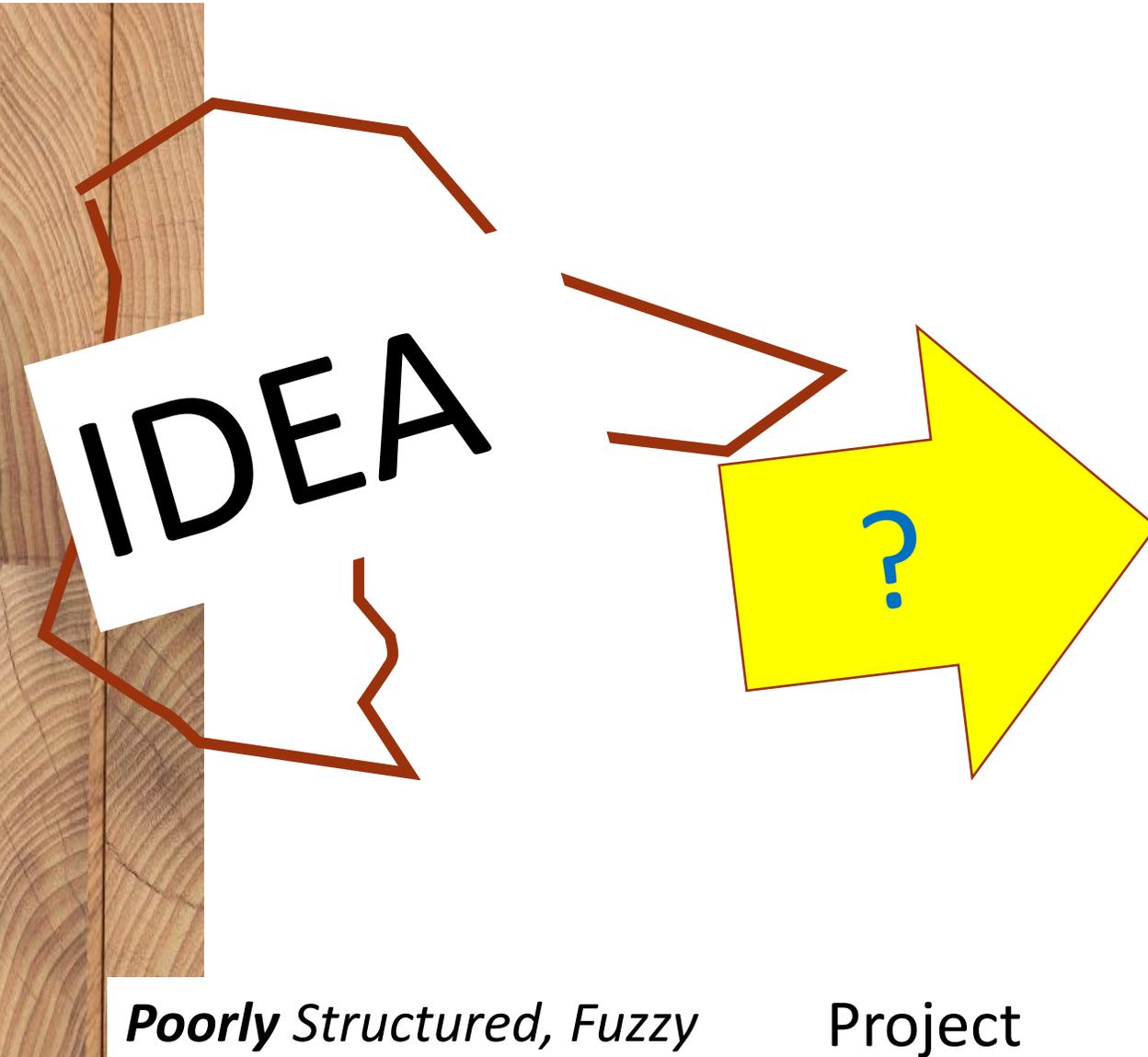
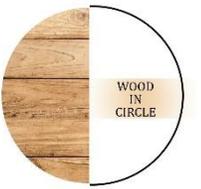


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# WHAT IS CONSTRUCTION PROJECT MANAGEMENT?

# EACH PROJECT STARTS WITH *IDEA* AND CLIENT'S NEED



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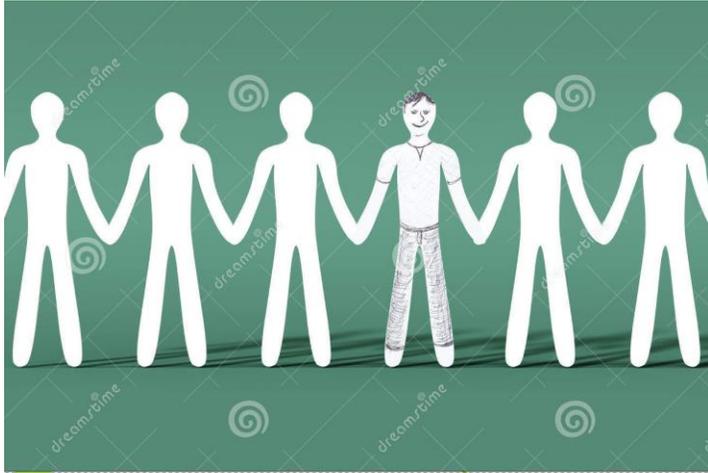
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Transformation to Structured and Controlable (managable)

# WHAT RESOURCES DO WE NEED?



People



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Finance/  
resources



Construction  
Materials



Land  
(Location)

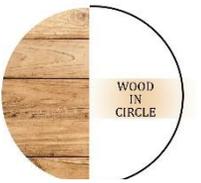


# CONSTRUCTION PROJECT MANAGEMENT IS...

- **Construction management** or **construction project management** is the **art** and **science** of **coordinating** people, equipment, materials, money, and schedules to complete a specified project on time and within approved cost
- **Construction project management** is the overall planning, coordination, and control of a project from beginning to completion
- **Construction project management**, then, is the application of knowledge, skills and techniques to execute projects **EFFECTIVELY** and **EFFICIENTLY**



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# 4 QUESTIONS OF CONSTRUCTION PROJECT MANAGEMENT

**WHO?**

**DOES WHAT?**

**WHEN?**

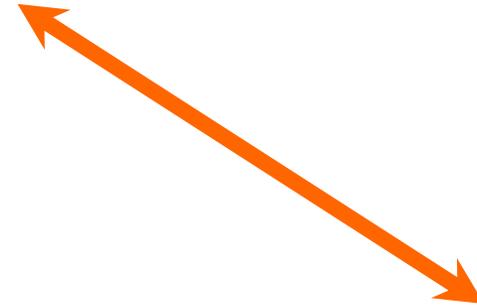
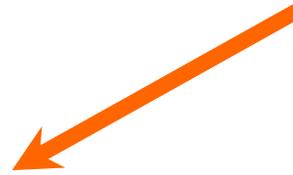
**HOW MUCH?**

# THERE ARE 3 PARTICIPANTS IN ANY CONSTRUCTION PROJECT.....

Consider to Identify \_\_\_\_\_? What are they?



? \_\_\_\_\_

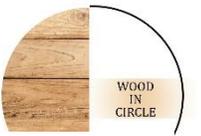


**Construction  
Project**

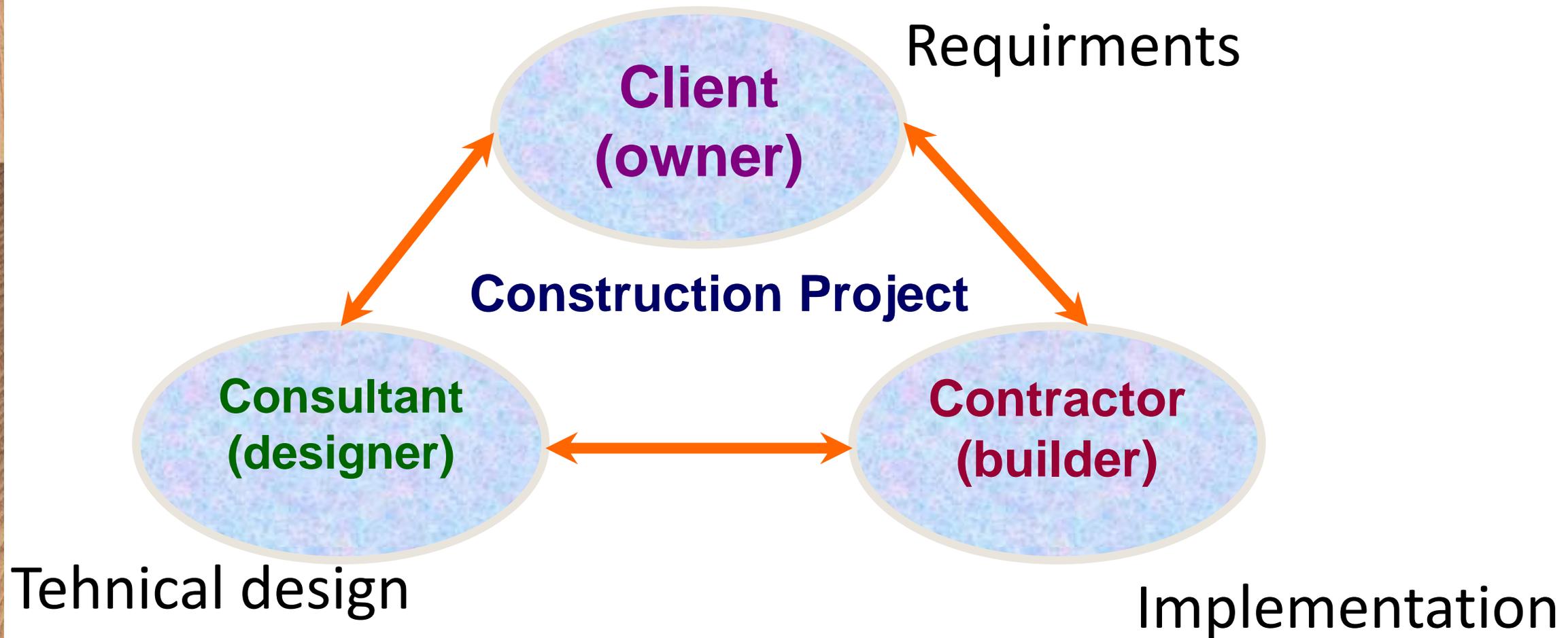


? \_\_\_\_\_

? \_\_\_\_\_

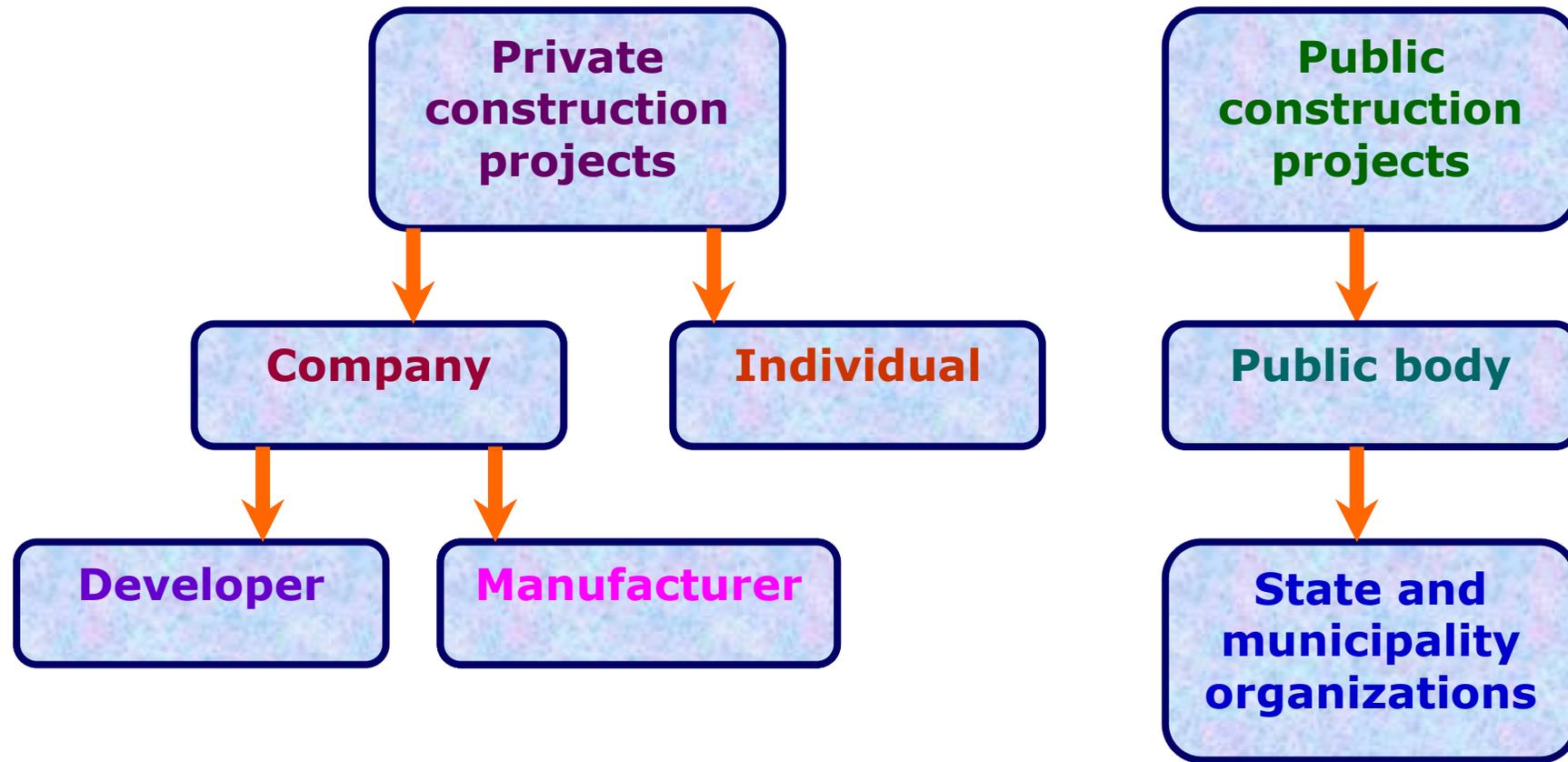
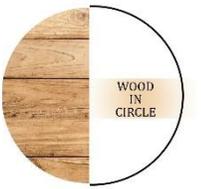


# CONSTRUCTION PROJECT PARTICIPANTS (Stakeholders)



\* More **relevant** Stakeholders might to be identified

# Simplified Classification Of Construction Projects



Different Project would have specifics for implementation!



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# CLIENT OBJECTIVES – I

**WANT**





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# CLIENT OBJECTIVES – I

**WANT**



**NEED**



Project have to transform Needs to Requirements



## CLIENT OBJECTIVES – II

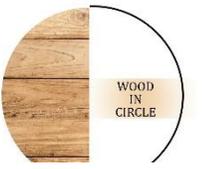
Clients objectives are the **starting point for defining the project**, but may need to be clarified by the project team.

## GOAL SETTING

- S** Specific
- M** Measurable
- A** Achievable
- R** Realistic
- T** Timely



# CLIENT OBJECTIVES – III



## Different types of clients have different types of objectives

- A **manufacturer** needs functional efficiency to meet performance criteria and to start production as soon as possible. They will be a secondary client as the building is a means to an end
- A **developer** needs a cheap, quick and attractive building. This will be a primary use as the building is being used as a commodity in itself
- A **public body** needs a building, that lasts a long time, is efficient use of tax payers' money, is within yearly budget and is low cost to run. This is again a secondary use of the building

# PROJECT STAKEHOLDERS – I



Project stakeholders **are those who have an interest** in the project process or the outcome

- ✓ The **client** wants ...
- ✓ The **member organisations** want ...
- ✓ **Users/employees** want ...
- ✓ **Community** wants ...



RELEVANT Stakeholder - Identified Stakeholder, what project have to allocate resources

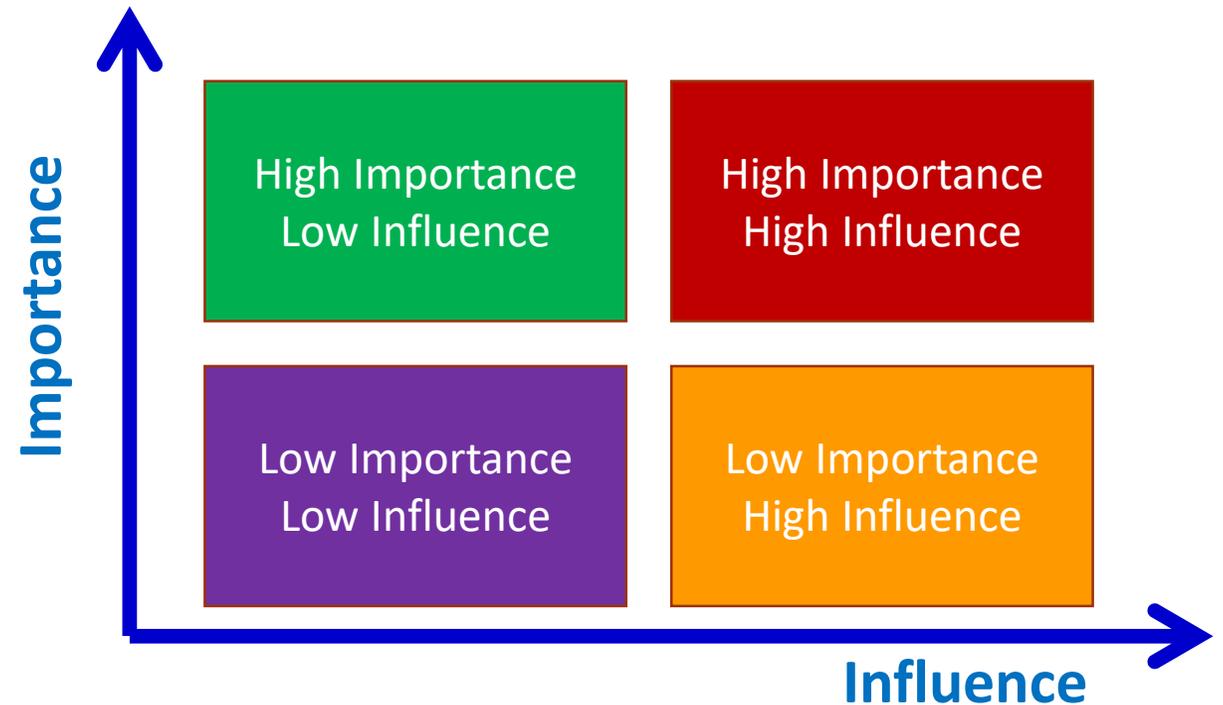
\* Common source of Risks/Problems= neglecting to identify relevant Stakeholders on time



# STAKEHOLDERS OF THE PROJECT – II

Each Stakeholder can have assigned for planning purposes

- **Influence (power)** may issues from a stakeholder's ability to take action which would be helpful or detrimental to the project outcome
- **Significance issues** from the effect on working relationships and the amount of interaction that there is between the stakeholder and the project team



\*Stakeholders sets Requirements for Project (Not Define!)

# STAKEHOLDERS OF THE PROJECT – III (Stakeholder management approach)



Each Stakeholder group can be planned appropriate overall management approach and communication plan



Stakeholders sets requirements for Project (Not Define!)

# **Construction Lifecycle**

# CONSTRUCTION LIFE CYCLE



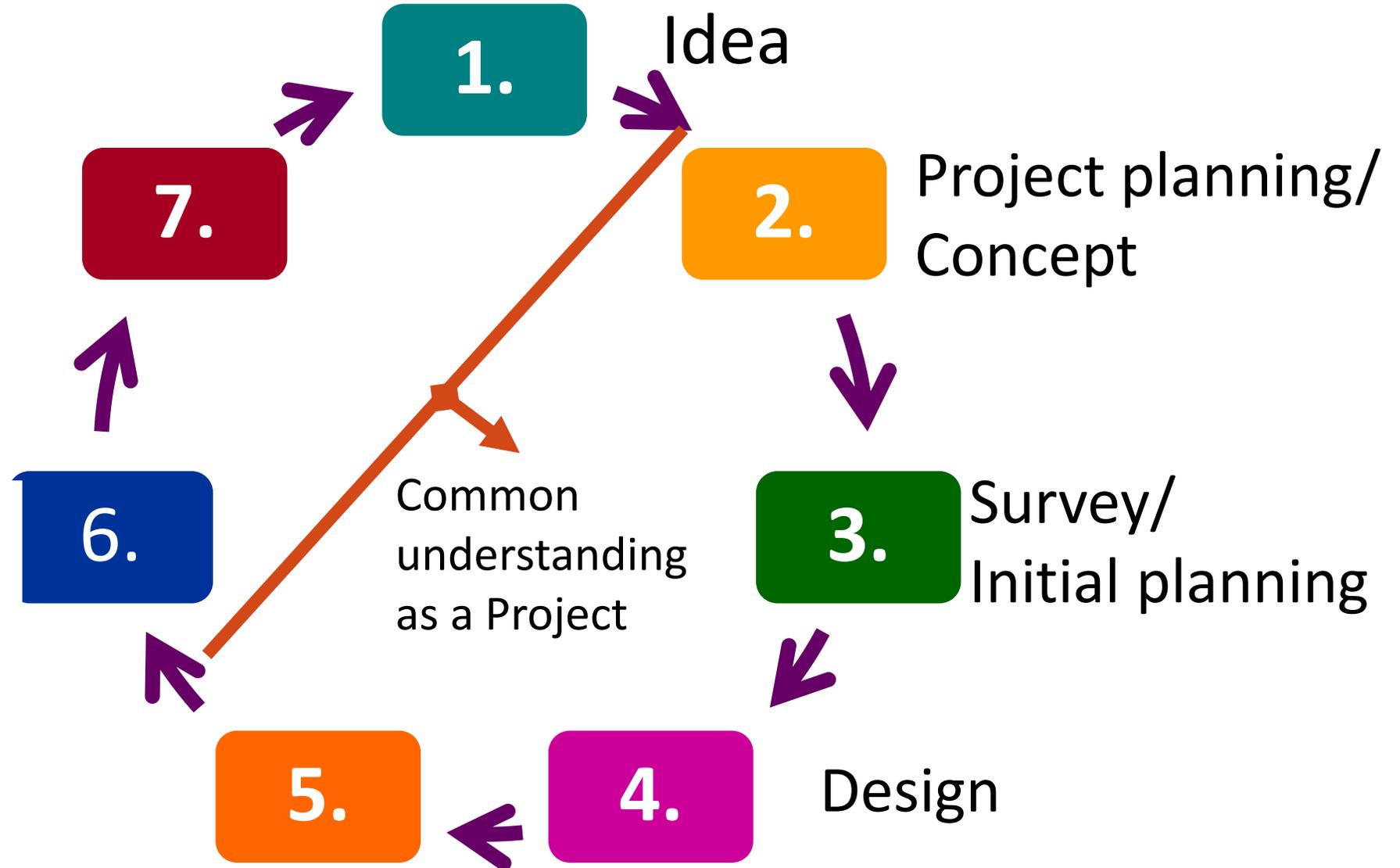


# CONSTRUCTION **Object** LIFE CYCLE

Demolition/  
Removal

Maintenance &  
Operations

Construction





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# STAGE 1: IDEA IDENTIFICATION AND FORMULATION

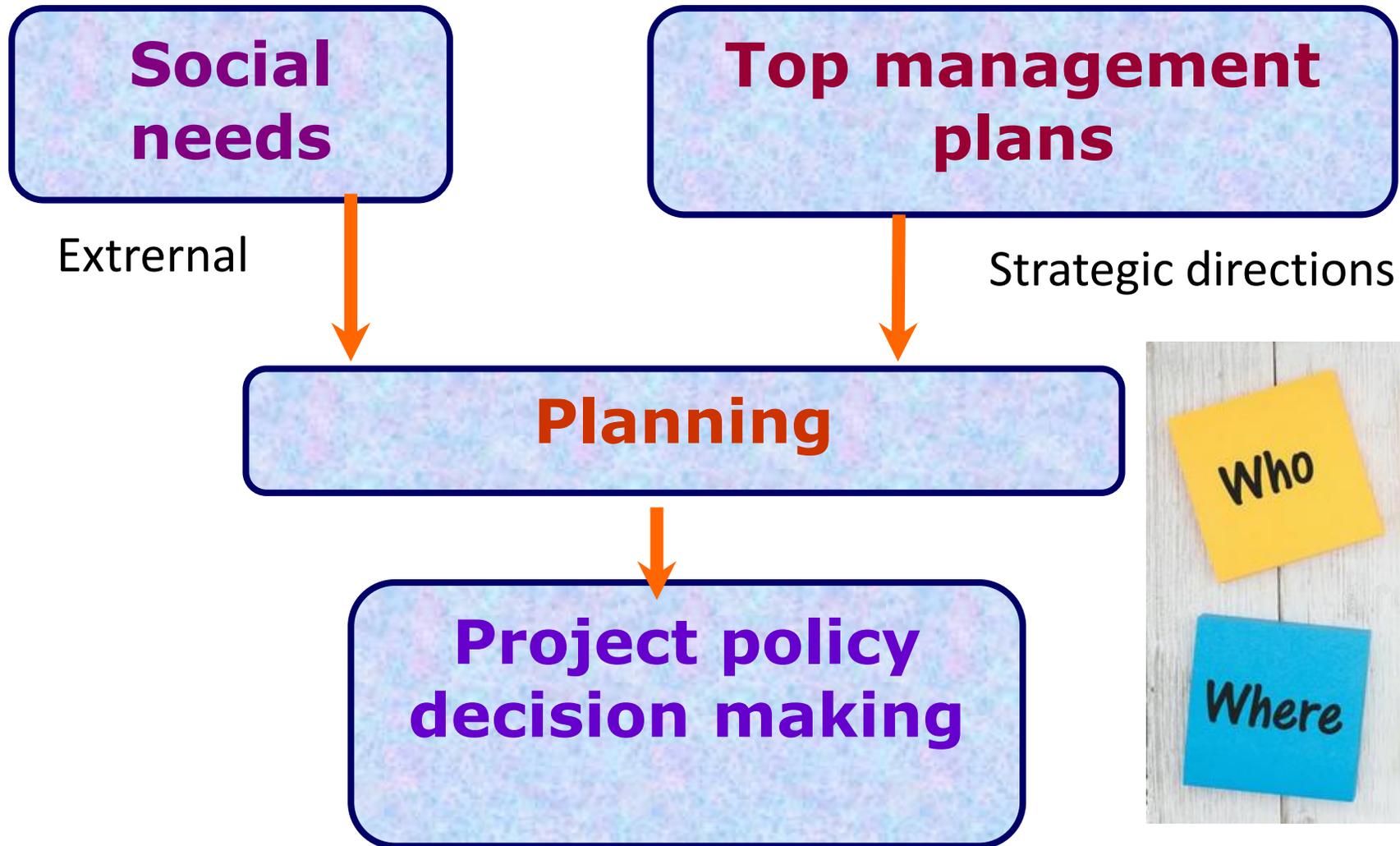
**“There is nothing  
more powerful  
than an IDEA  
whose time has  
come”**

*V.M.Hugo*

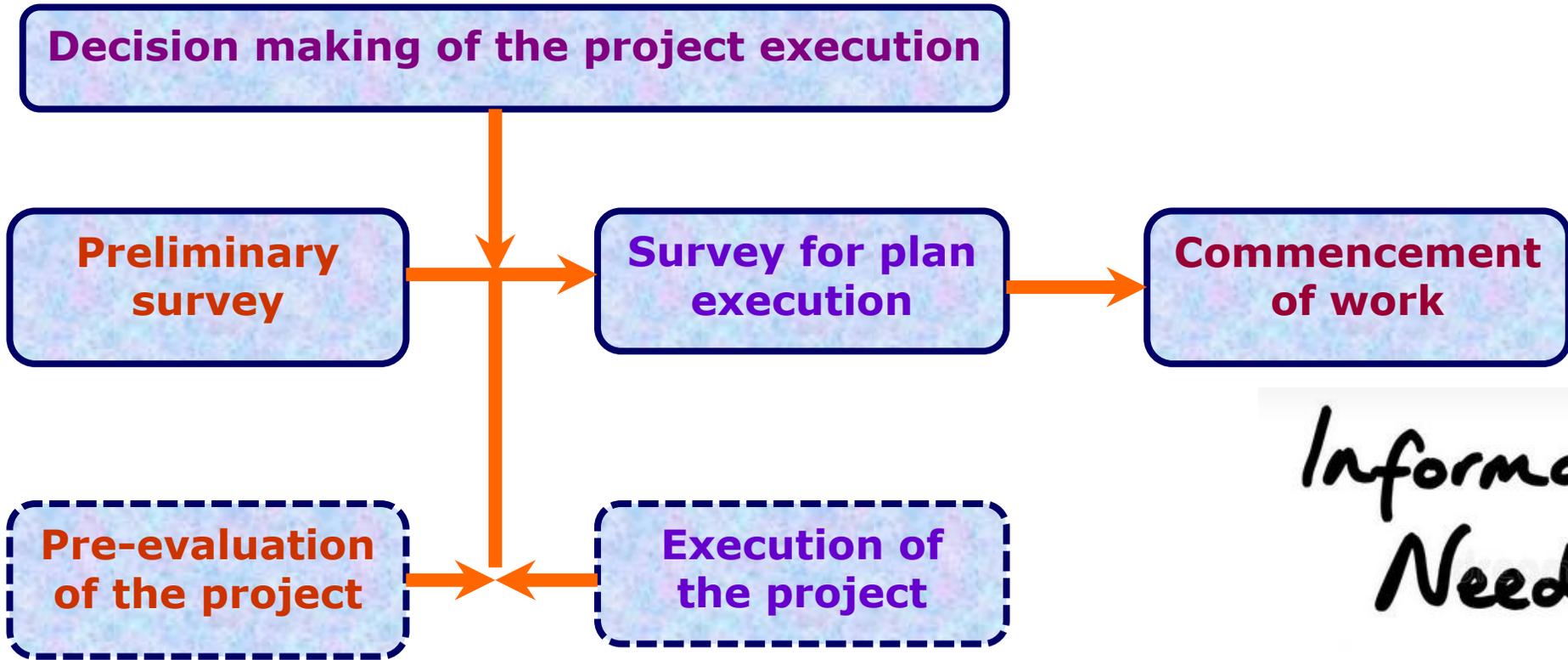


Aim: Definition Primary goal of Construction Object -> Project aims

# STAGE 2: PROJECT PLANNING



# STAGE 3: SURVEY



*Information Needed!*

# EXAMPLE: ROAD CONSTRUCTION PROJECT

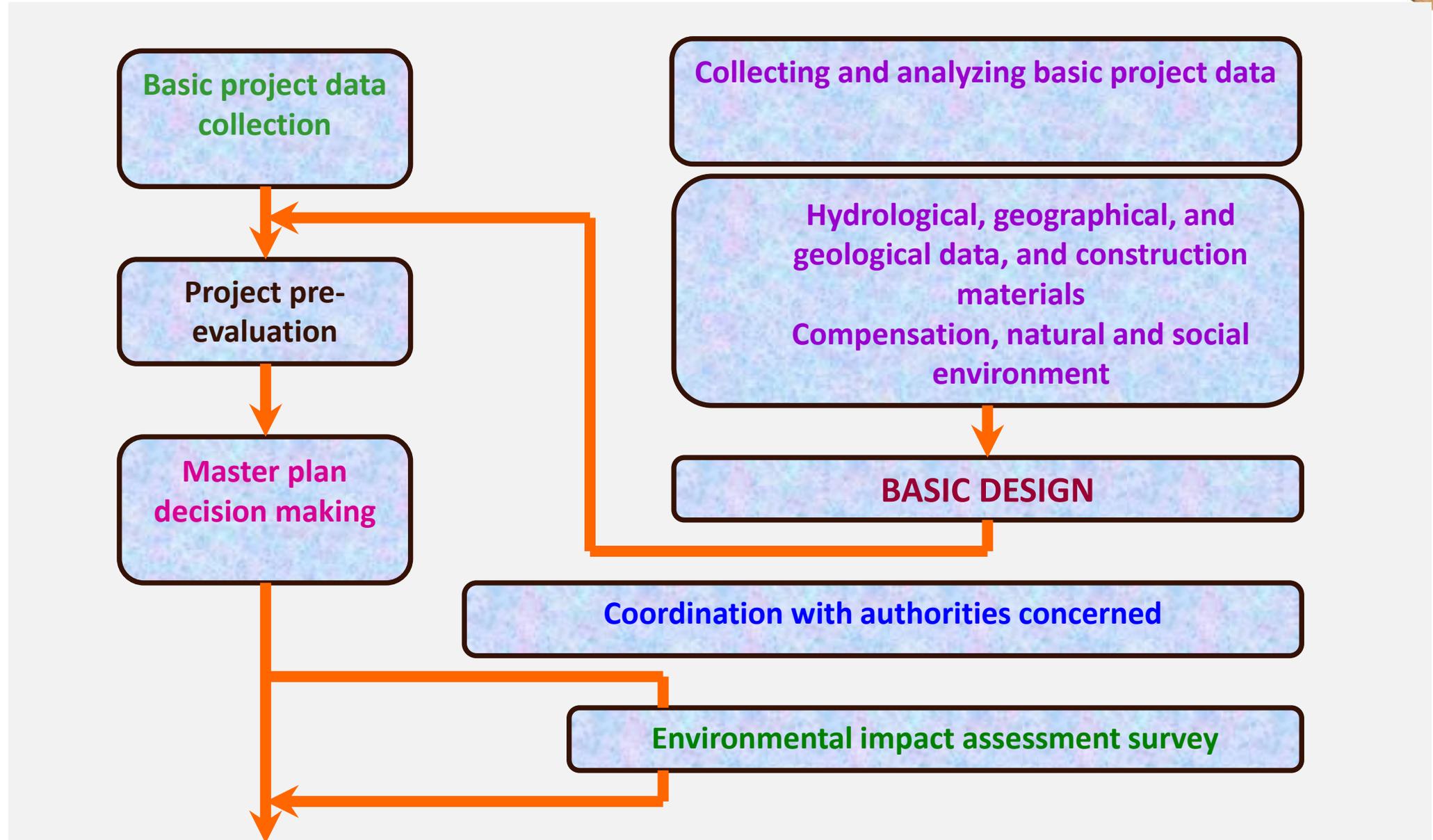


## Considerations

- What type of construction?
- What specifics?
- What technology applicable?
- What Client primary objectives?
- What society primary objectives?
- What are technical standards applicable?
- What are regulative and municipality requirements in place?
- What are exciting elements in place?

Specialisatiopn by .....

# STAGE 4: DESIGN (I)



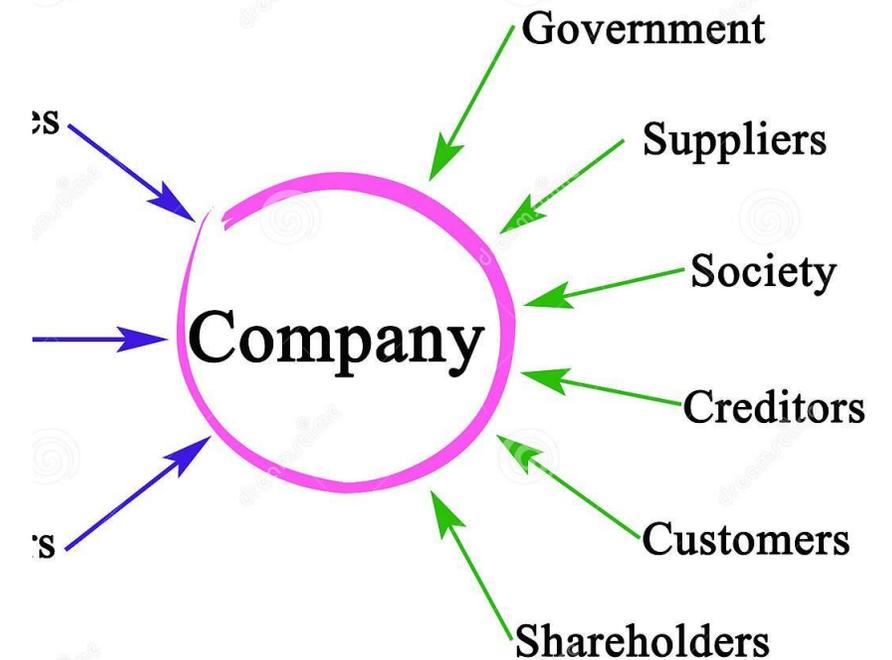


# KEY TO SUCCESSFUL IMPLEMENTATION OF PROJECT: DISCUSSIONS WITH STAKEHOLDERS

- 1. Stakeholders Identification**
- 2. Stakeholder`s requirement elicitation**
- 3. Degree of influence**
- 4. Degree of significance**
- 5. Methods of involvement**

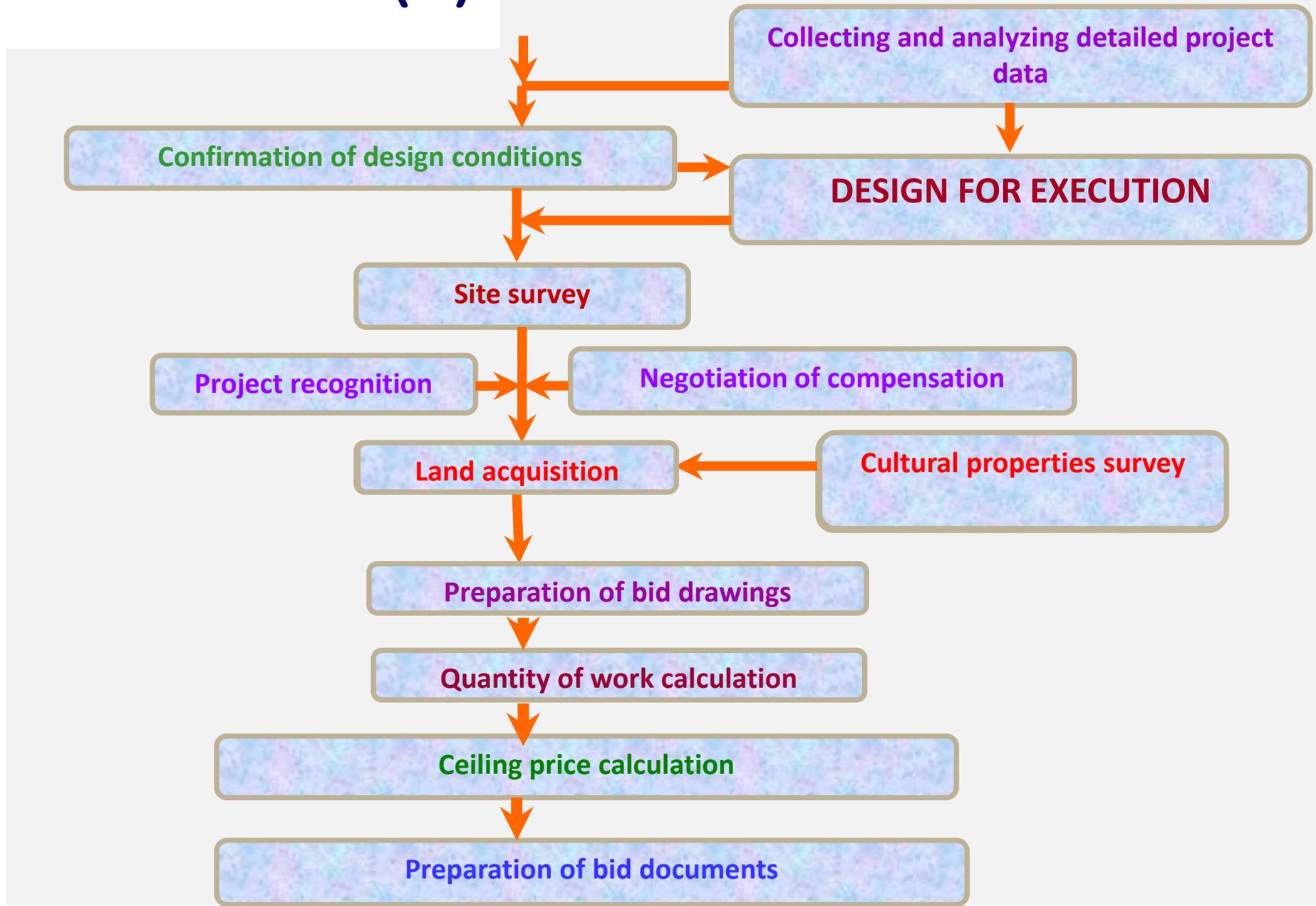
Internal Stakeholders

External Stakeholders

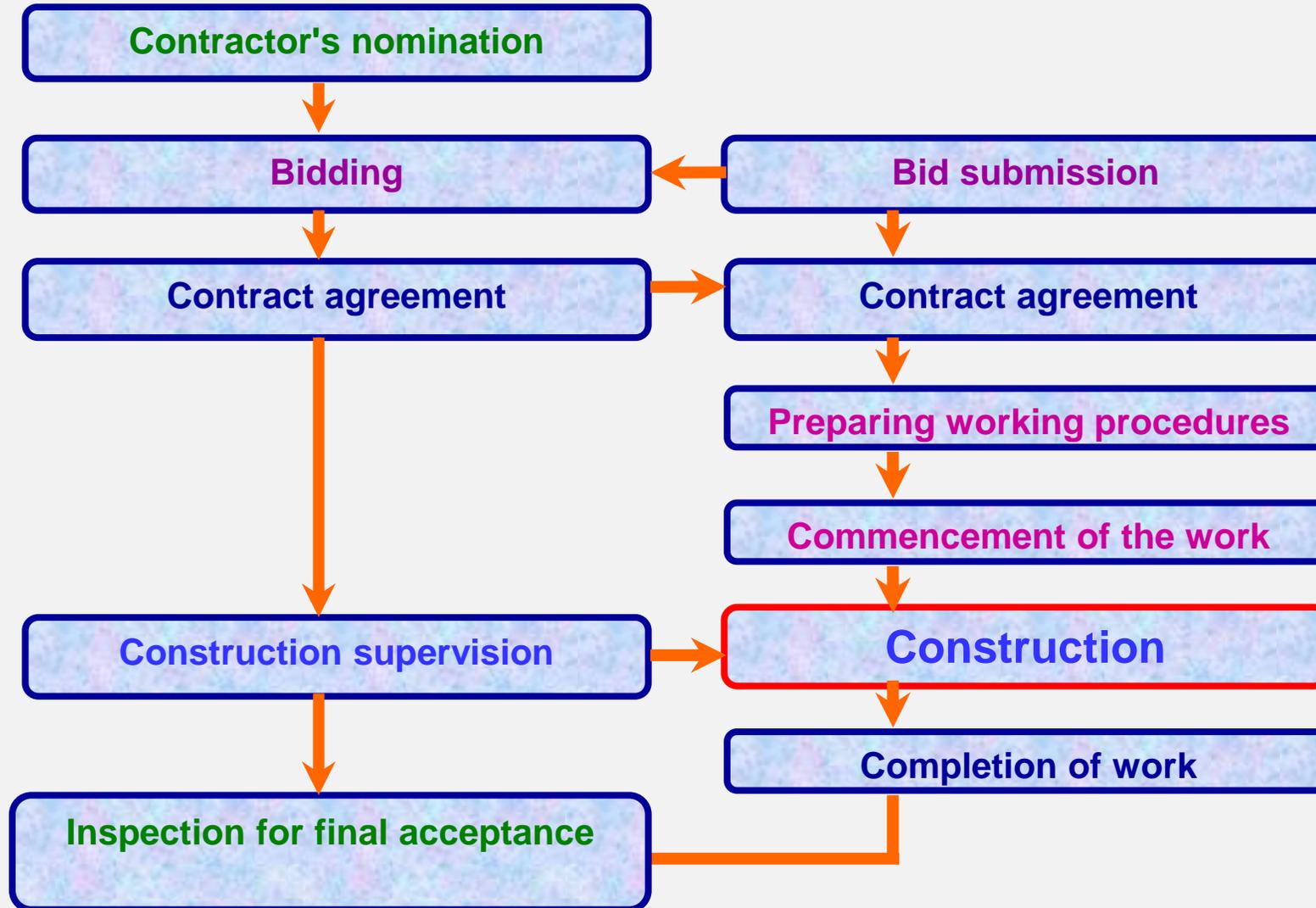


*Discussion: What are Relevant stakeholders*

# STAGE 4: DESIGN (II)



# STAGE 5: CONSTRUCTION & CONSTRUCTION SUPERVISION



# CONTROLLING: WHAT DO WE CONTROL?



Technical



Schedule



Safety

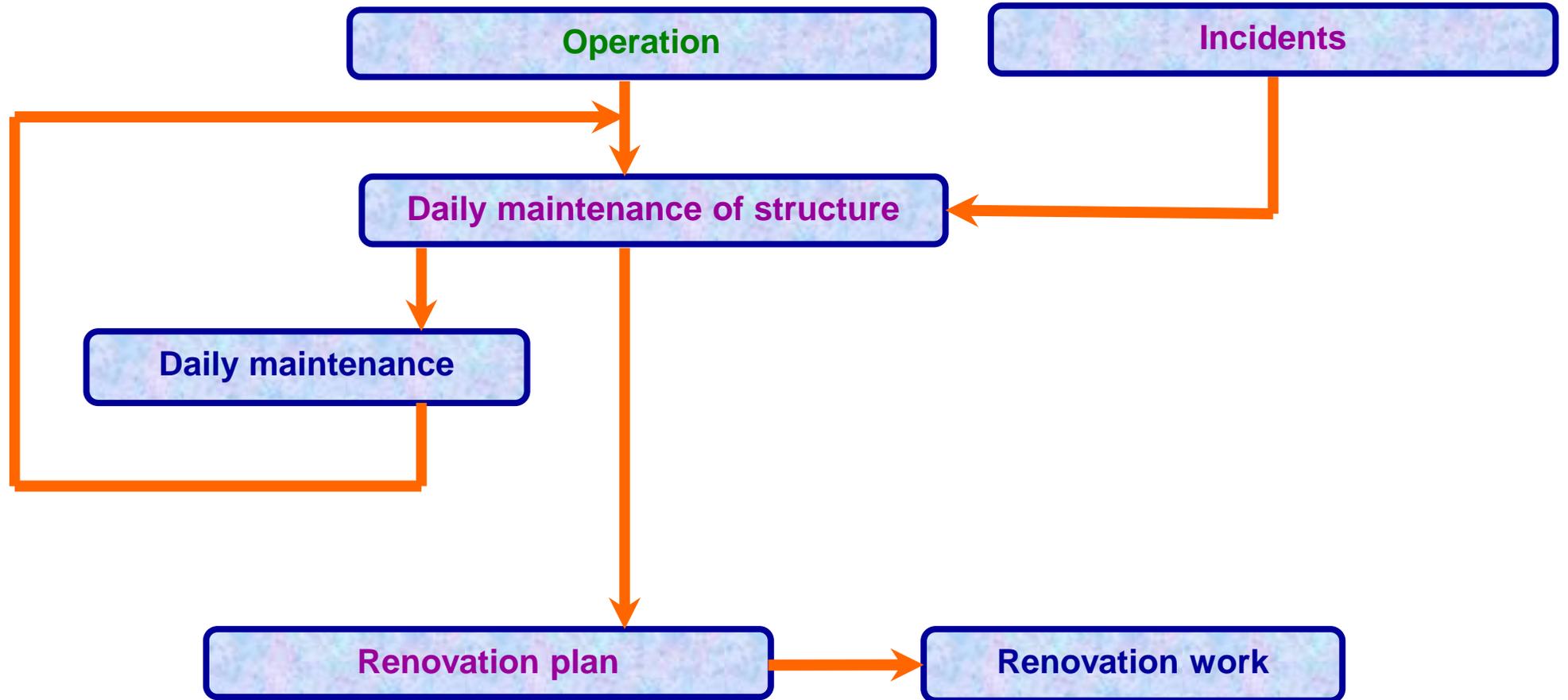


Finance

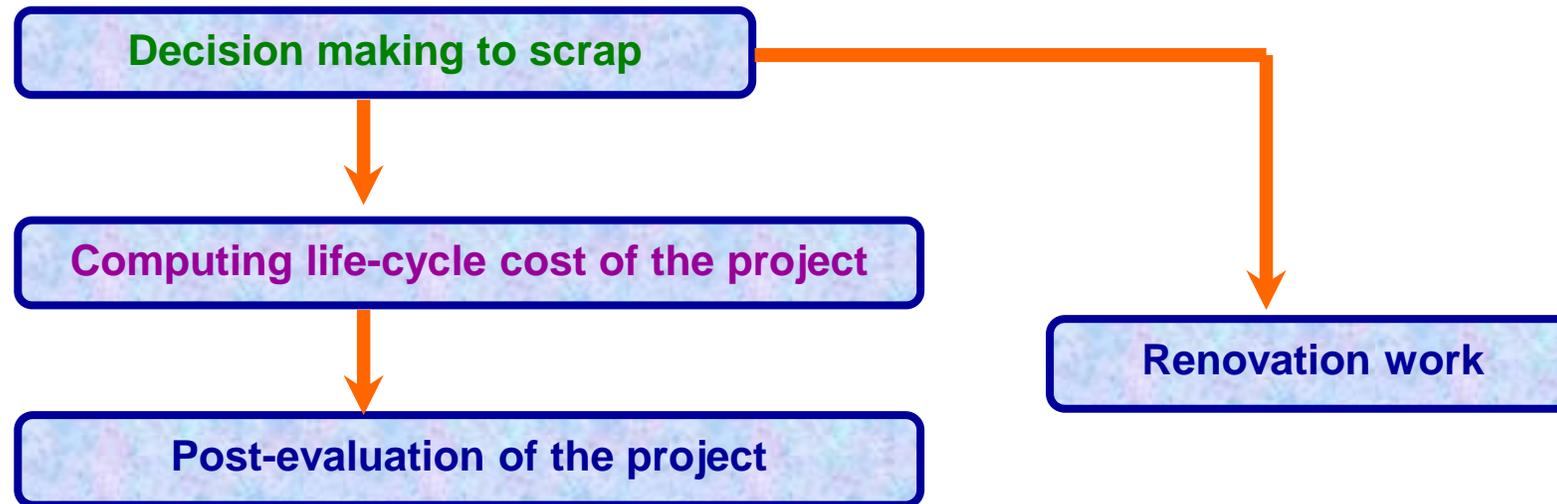


Environment  
Changes  
/impact

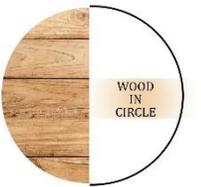
# STAGE 6: MAINTENANCE & OPERATION



# STAGE 7: SCRAPPING, DEMOLITION & REMOVAL



1. Demolition
2. Waste removal (Recycling)
3. Land restoration/another Construcion project



# THE ISSUE OF CONSTRUCTION BY-PRODUCT

## RENEWABLE RESOURCES

**(1) Waste that cannot be used as raw material**

**Hazardous waste, etc.**

**(2) Waste that may be used as raw material**

**Waste concrete blocks;  
Waste asphalt blocks;  
Waste wood generated during construction, etc.**

**(3) Waste that can be used as raw material**

**Soil generated during construction, etc.**

## WASTE

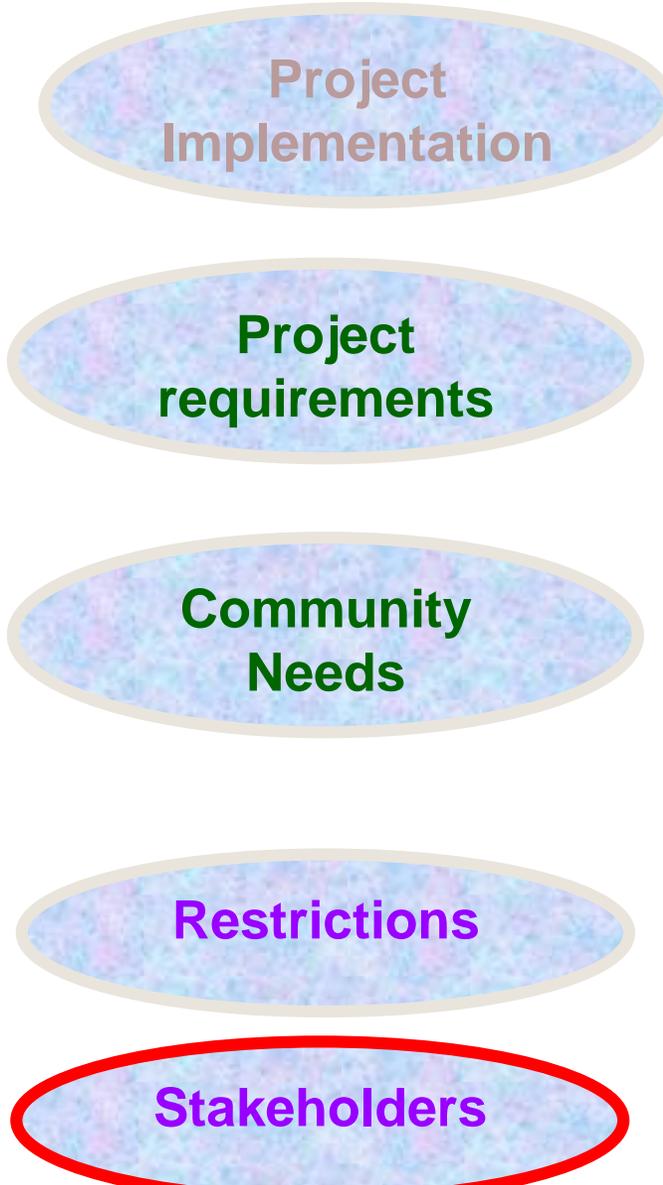
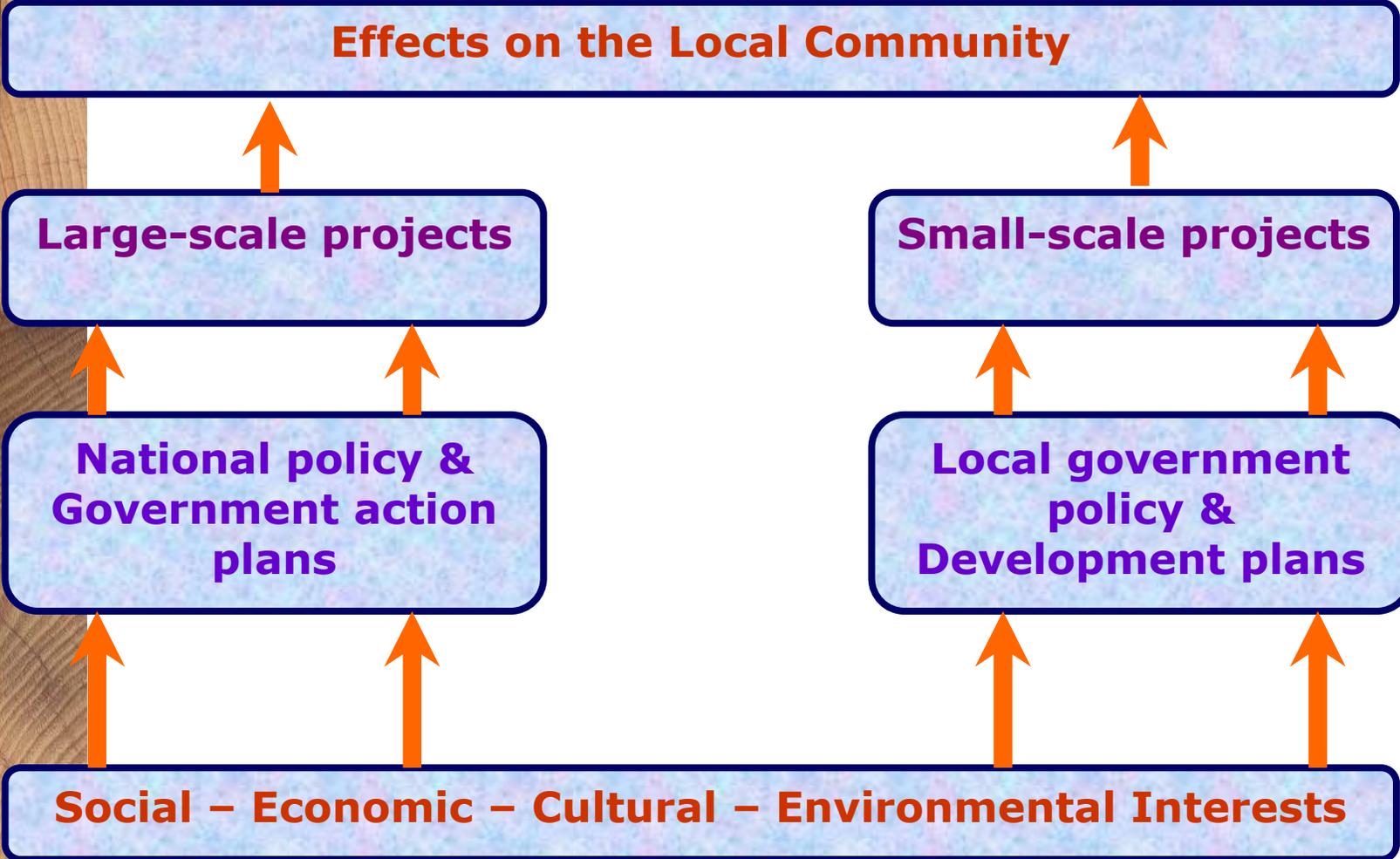
# **Construction Management System**

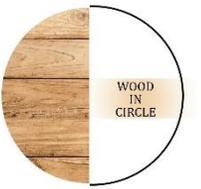


## THE MAIN TASK OF CONSTRUCTION MANAGEMENT

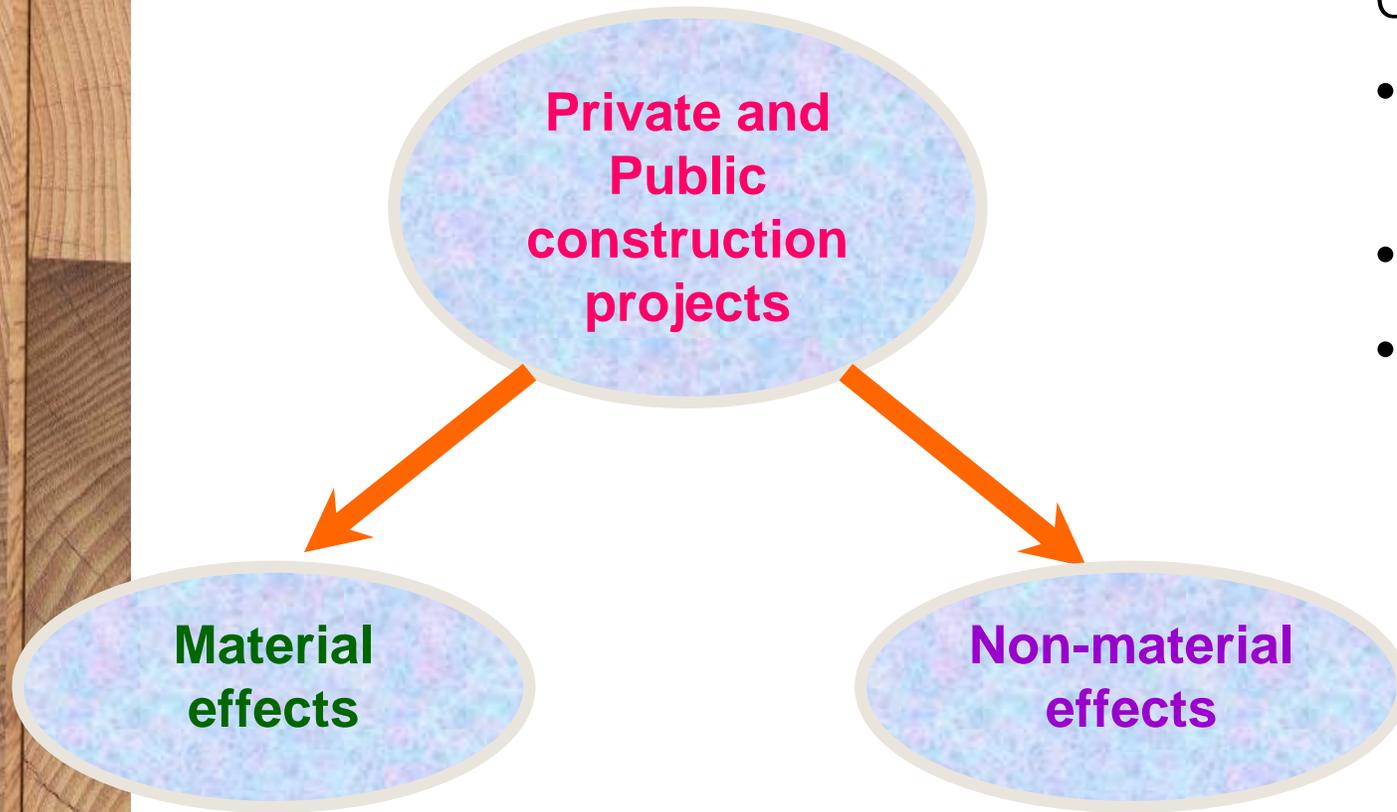


# Considerations for PROJECT FORMULATION





## Pre-evaluation of the project

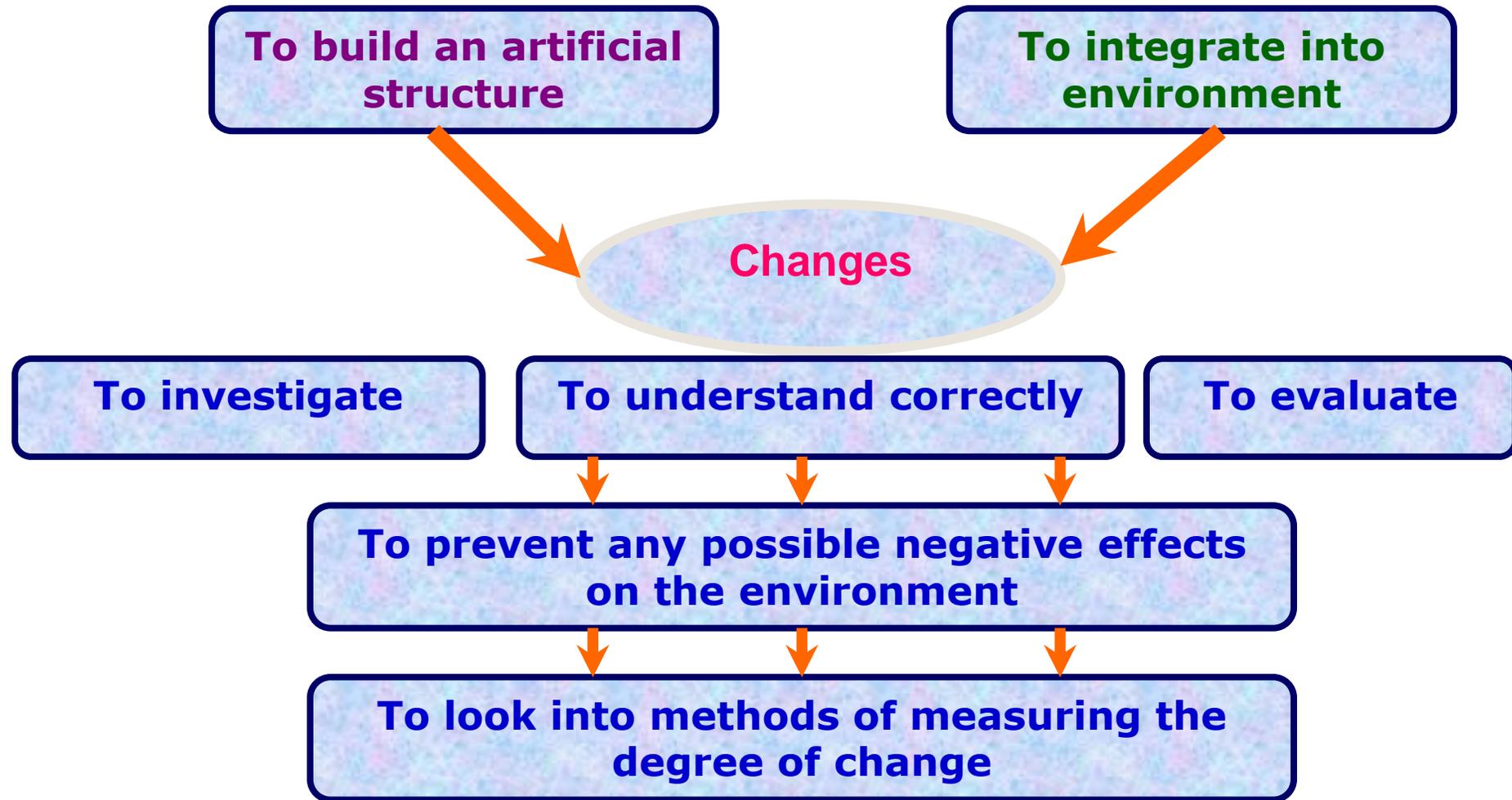


## Feasibility studies

Consideration domains:

- Construction (Project) phase vs. Lifecycle
- Long term vs. Direct (Project)
- Indirect Effects

# Environmental impact studies



\* One of methods - LCA

## Risk Assessment and Problem Solving (Issue/Incident) Concepts

# WHAT IS A RISK?





# DEFINING RISK...

- **Risk** can be defined as **any event that is likely to adversely affect the project`s ability to achieve its defined objectives**, which is: completing the project on time, within budget, at high quality, and with a satisfied client who is willing to give the construction manager/general contractor repeat business and a good reference
- Risk is the **uncertainty of the outcome of an event**, which can cause a **potential problem** to the project or project team.
- **Risk = Probability of threats (accidents) \* Consequence in lost quality, time, money, reputation, relations, client, etc.**



# CONSTRUCTION PROJECT RISK MANAGEMENT



Risk



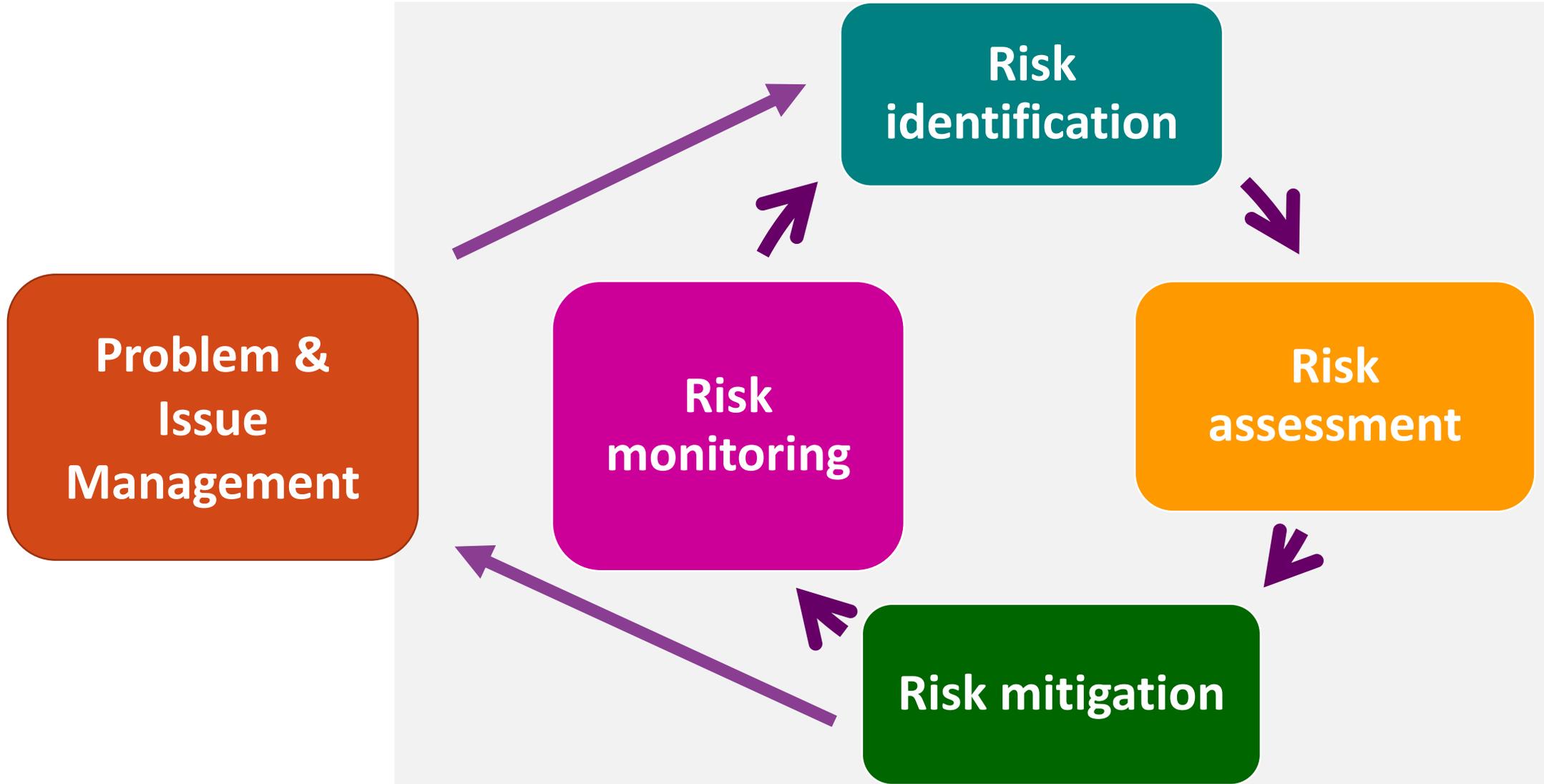
Issue/Problem



- Return to Approved plan
- Approve Changes



# RISK MANAGEMENT CYCLE



# CATEGORIES OF RISK for Construction



Small, re-occurring, routine risk



Accidental risk



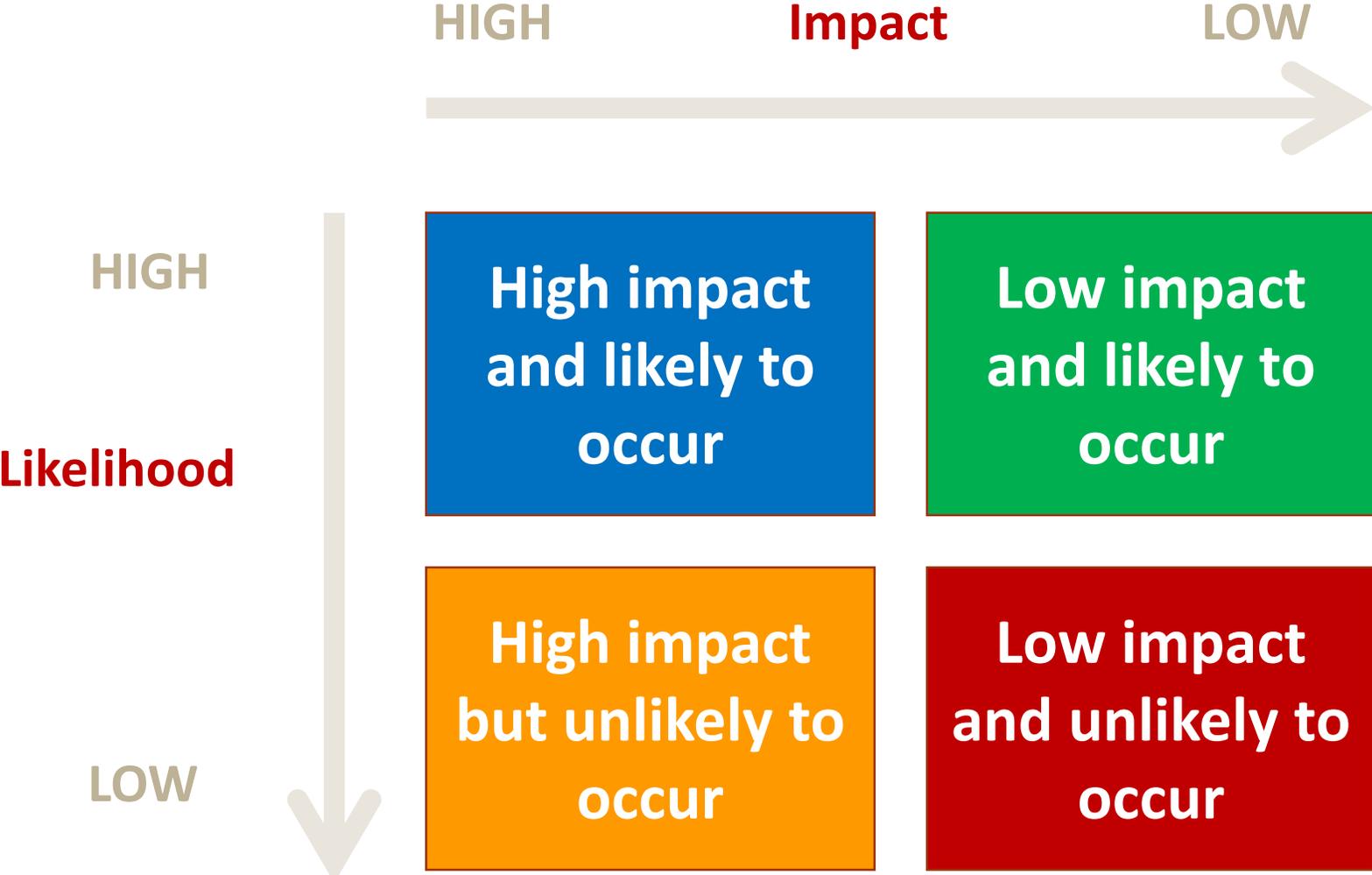
High Impact



Catastrophic risk



# DESCRIPTION OF RISK MATRIX



# RISK MITIGATION Principles



- **Risk *avoidance*** usually involves developing an alternative strategy that has a higher probability of success but usually at a higher cost associated with accomplishing a project task
- **Risk sharing** involves partnering with others to share responsibility for the risk activities
- **Risk reduction** is an investment of funds to reduce the risk on a project
- **Risk transfer** is a risk reduction method that shifts the risk from the project to another party

# TOOLS OF RISK MANAGEMENT



1. Contract language
2. Insurance
3. Administrative procedures
4. Operational procedures
5. Bonding and surety
6. Safety programs and loss prevention
7. Controlling claims and litigation
8. Risk management plan
9. Risk avoidance and mitigation
10. Risk transfer



Aim -> to Reduce Total Risk Exposure/Incidents

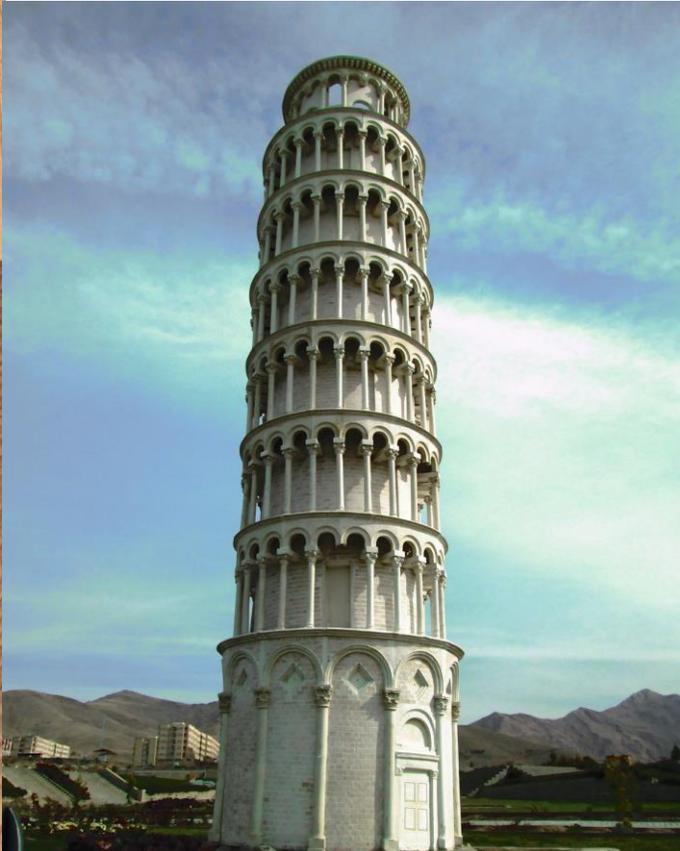
## Quality definition Concepts



# WHAT IS A Quality?



# HOW COULD WE DEFINE QUALITY?



- Criteria to determine quality
- Stakeholder expectations/requirements



Which object in pictures is better?

# How to not fall in trap of poor quality ?



Reducing quality might lead to:

1. Short term profit increase
2. Reducing time to «finish»
3. Formal fulfilment of Scope

\* *Drivers*

Trade-off of poor quality:

1. Reputation risk
2. Lost deals as considered poor builder
3. Risk of criminal/ monetary charges

\* *Risk /Results*

Important = Understanding Required Quality/Perceived Stakeholder Needs and expectations

For discussion: What is lowest required quality?



# Quality Management System (QMS)

- A Quality Management System (QMS) is defined as a formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives.
- A QMS **helps** coordinate and direct an organization's activities to **meet** customer and regulatory **requirements** and improve its effectiveness and **efficiency** on a **continuous** basis.

\* QMS is a good as implemented ... Not as well written ...



# TOTAL QUALITY MANAGEMENT CONCEPT

Primary causes for the decline of construction productivity directly or indirectly involved **poor management practices**

Total Quality Management philosophy focuses on continuously **improving the process** that makes the product, rather than attempting to inspect or test the product to achieve quality

- Fundamental **goals**:
  - Customer satisfaction
  - Continuous improvement

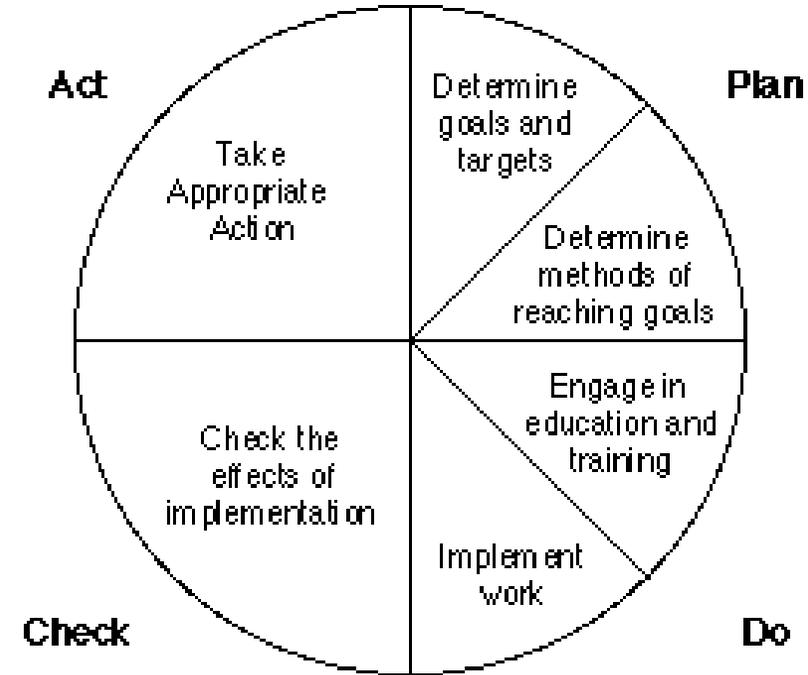
*Stakeholder relevance*

\* What You define - You get !

# TOTAL QUALITY MANAGEMENT SYSTEM MODEL



- **Management System model –Plan –Do – Check –Act Cycle (PDCA) created by an American professor, author and lecturer William Edwards Deming in the 1950s**





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# Requirement management principles



# What are Requirements?

- A **requirement** is a **statement** about an intended product/Object that **specifies** what it should do or how it should **perform or look**.
- Goal: To make as specific, unambiguous, and clear as possible.

# What is a Need?



While **articulating** your organization's **needs** is a great **starting** point, if you give this list to your project management, they **aren't** going to be able help you complete your **project successfully**.

Some of the problems we commonly see with needs are:

- Lack of specificity –the need is not clearly defined
- Unable to be measured –we won't be able to tell whether or not the need has been met
- Items that aren't relevant–nice-to-have items that don't directly relate to the success of the project.

# Main Requirement types



- **Functional:** What the Object/system should do (Measurable)(How many people would live in this building? )
- **Non-Functional:** what constraints there are on the Process in the development. (Example –nice Neighbours)

*What is «Nice»? .....*

# What requirements should be gathered?



- 1. Functional:** What the product/Object should do, Technical specifics.
- 2. Data requirements:** Capture the type, volatility, size/amount, persistence, accuracy and the amounts of the required data.
- 3. Environmental requirements:** a) context of use b) Social environment (eg. Collaboration and coordination) c) how good is user support likely to be d) what technologies to use
- 4. User Requirements:** Capture the characteristics of the intended use.
- 5. Usability Requirement:** Usability goals associated measures for a particular object/product.

Requirements represent all Lifecycle phases and needs to be managed  
Requirement Stability -> Technical change for Construction project

# So, it's a slippery slope...

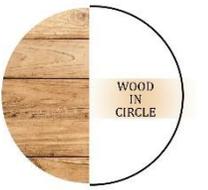
- Engineer knows the customer better than the developers .....
- His/her role is to translate what the customer really wants into something the developers can understand ....
- Every aspect of that role is critical!

Different Stakeholders have different requirements (Also often conflicting! )



Here's your development team executing from the requirements, in a perfectly synchronized interpretation!

# Key Performance Indicators (KPIs)



- **Key Performance Indicators (KPI)** - *“Measurable indicators that will be used to report progress that is chosen to reflect the critical success Strategic*
- **Critical Success Factors (CSF)**-*“A factor considered to be most conducive to the achievement of a successful*
- **Strategic Aims-**” Are the tools we use to organise and focus our diverse activities (for a Project scope). Through the Management plans define specific objectives and targets relating to each Strategic Aim (Project goal)



# 7 Common Challenges for Construction Project

1. Undefined Goals (Proorly, «not fixed» )
2. Unrealistic Expectations (Stakehodler management/Requirement management)
3. No Accountability (Stakeholder management fails)
4. Changing Scope (Requirements)
5. Lack of propper Risk Management (Risk managment)
6. Poor Communication (Stakeholder management)
7. Stakeholder Indifference (Stakeholder management)



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Thank you!  
Questions?