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Project Management

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I) Introduction

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What is a Project?

Temporary endeavour undertaken to create a unique product, service, or result

Why Project Management?

On-time delivery
of project

Meeting goals
(all stakeholders)

Coordinating effort

Task prioritization

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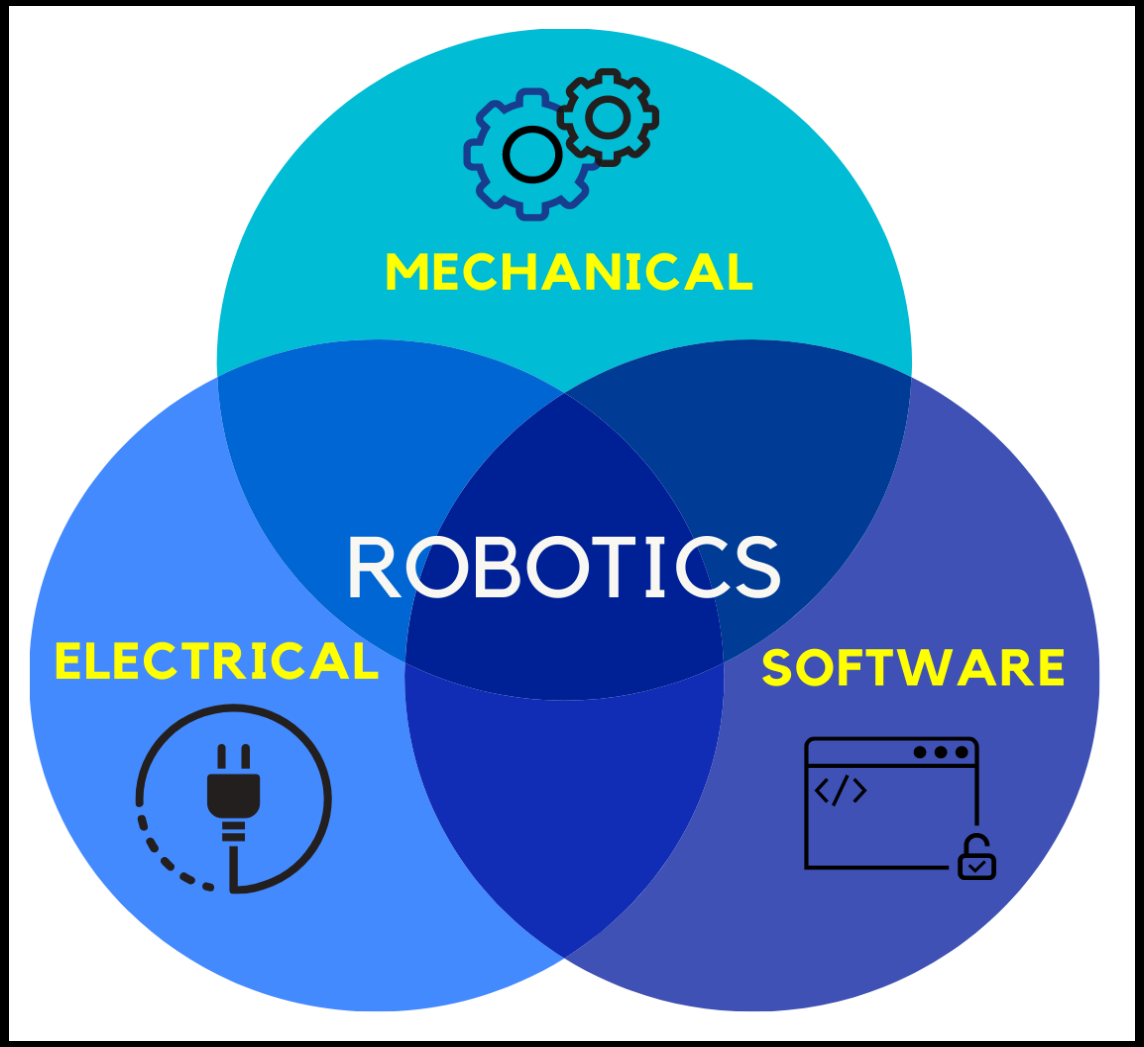
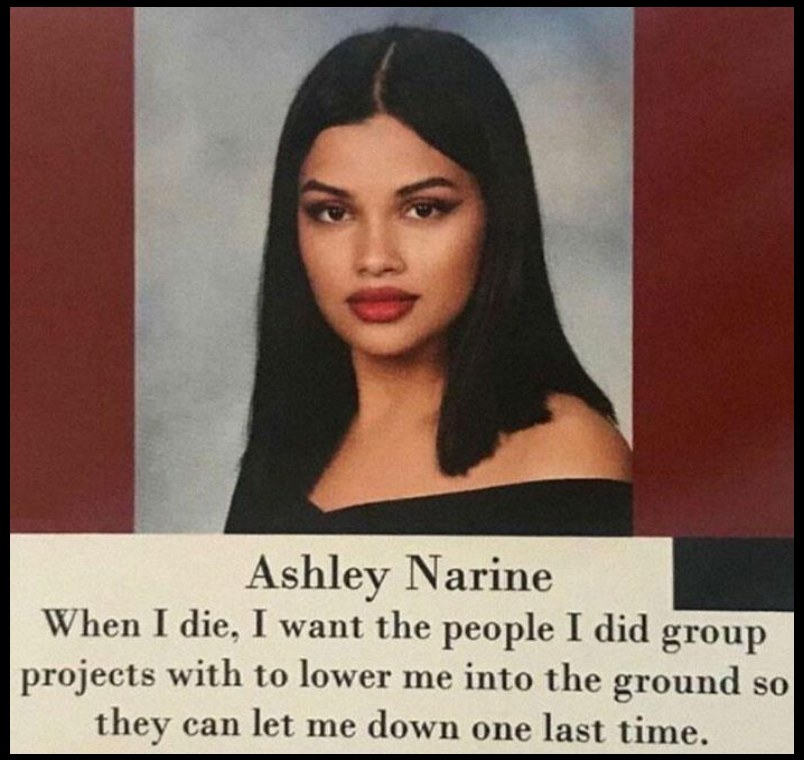
Interdisciplinary Nature of Robotics



And to prevent these...



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And because...

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II) Components

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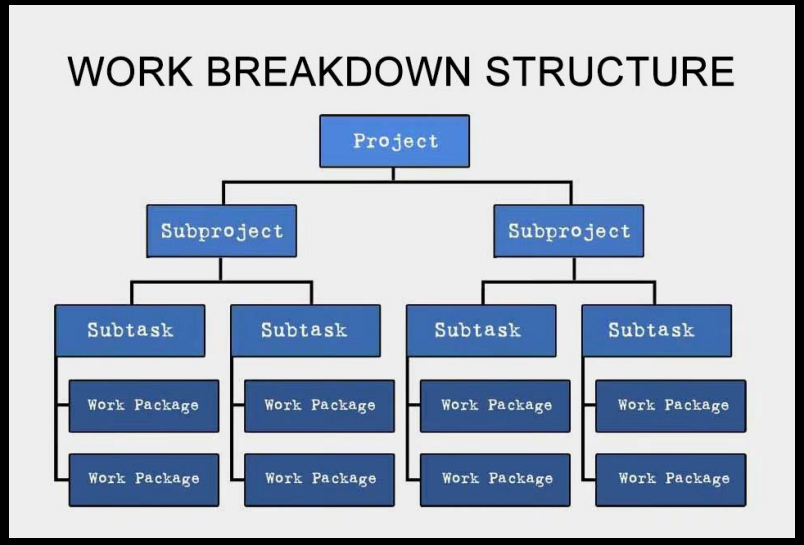
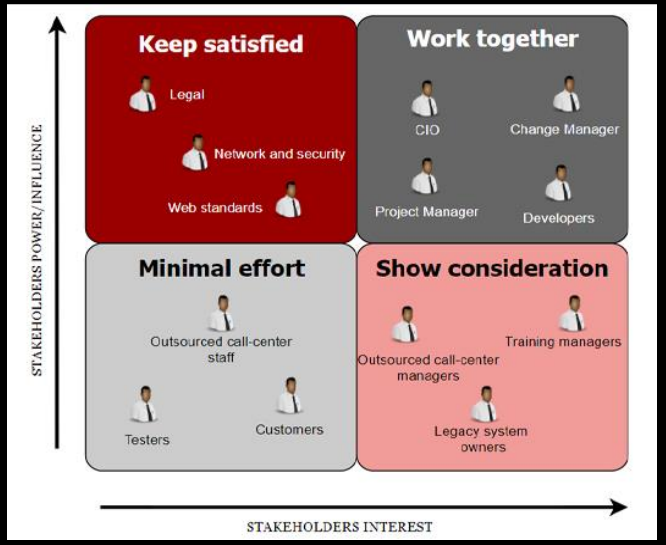
Components of Project Management



Work Breakdown Structure

Risk Management



Stakeholder Analysis

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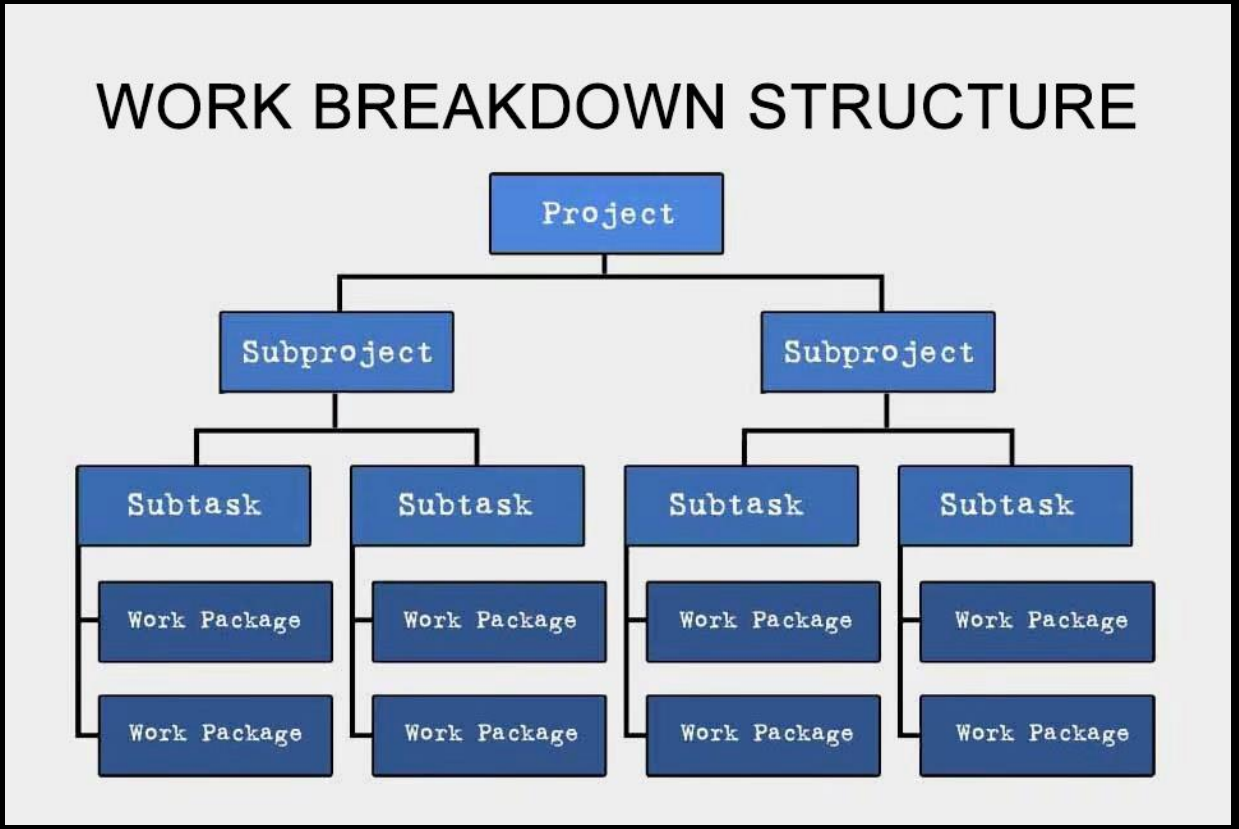
II) Components

Work Breakdown Structure



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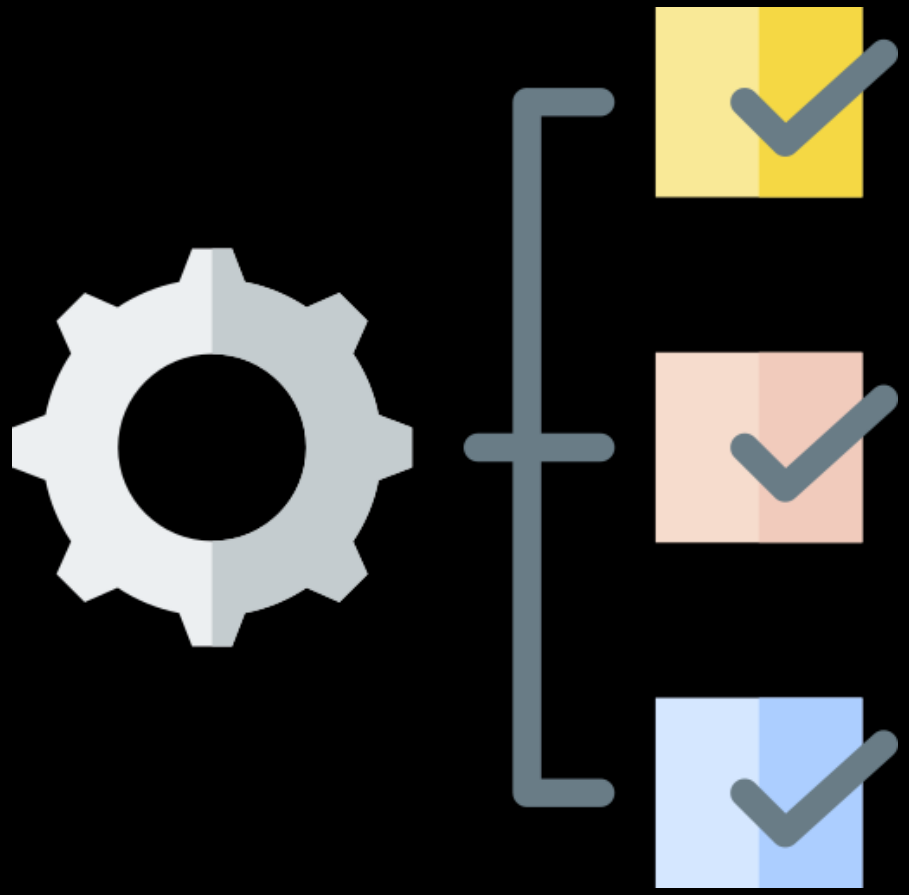
Work Breakdown Structure (WBS)

- Core of project management
- Definition:
  - Deliverable oriented
  - Hierarchical decomposition of work to be executed
  - Each level defines greater detail of project work
- Objective
  - Organize and define total scope of project

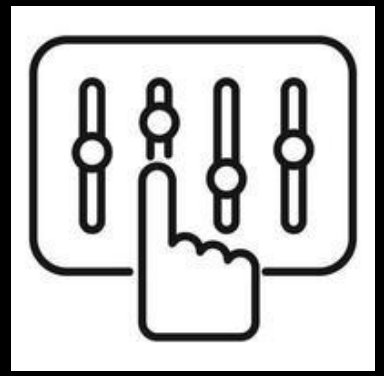


Properties of Work Package

Scheduled

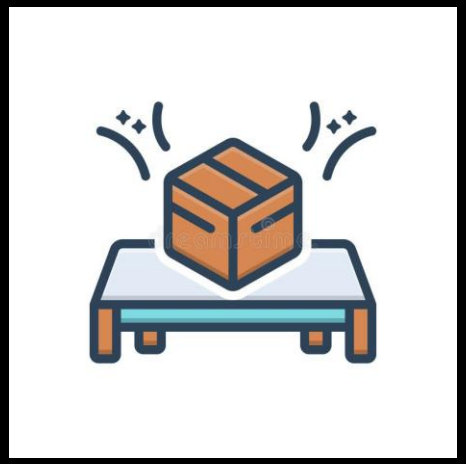
Cost-Estimated

Monitored



Controlled

Composition of Work Package

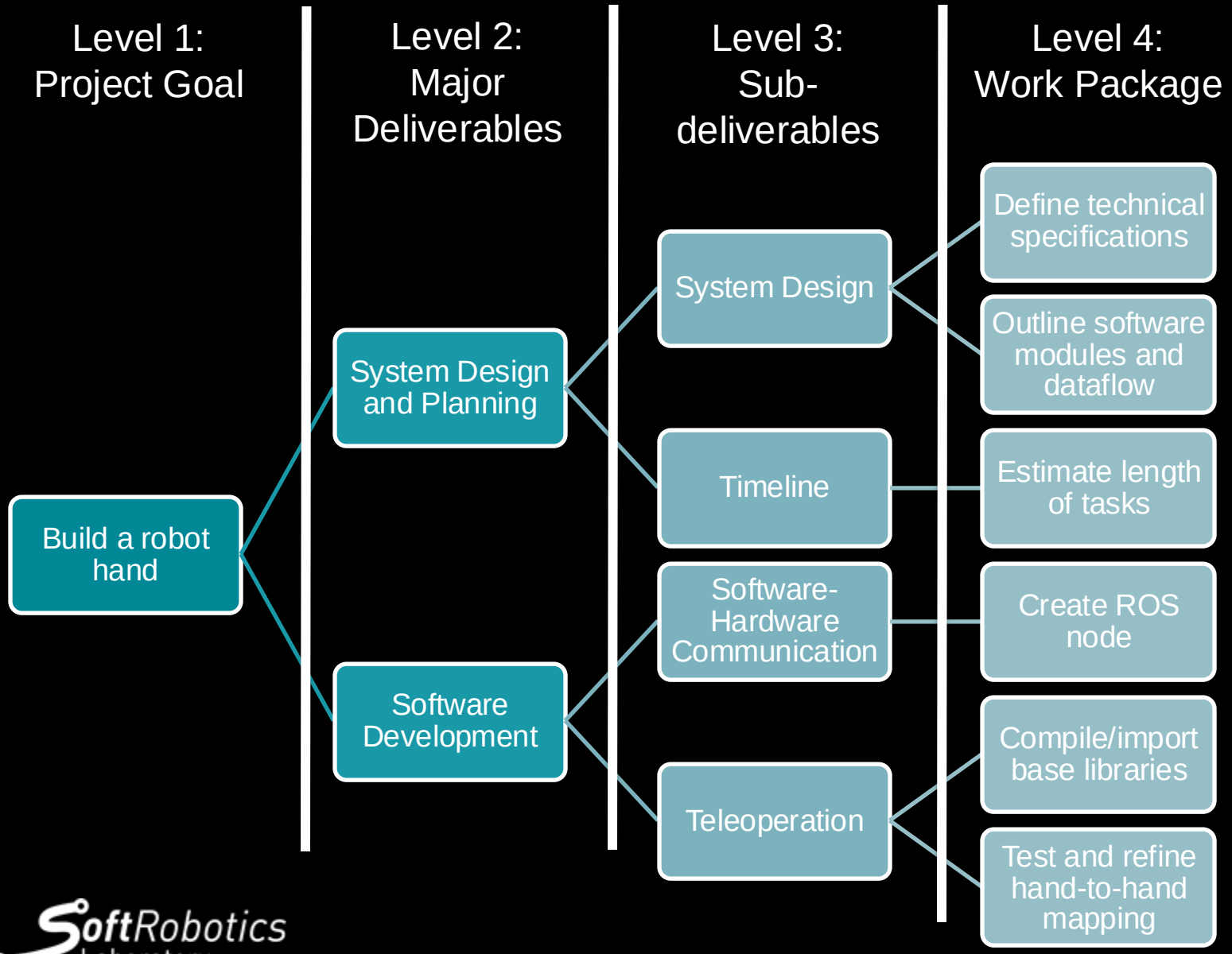


Product Breakdown Structure
(noun/product)

+

Activity Breakdown Structure
(verb/activity)

Example



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Example

Define a Work Package

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II) Components

Risk Management

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Risk Management

- Process of identifying, assessing, and controlling for potential problems that could impact successful completion of project
- Why
  - Minimizes surprises
  - Protects resources
- *Relevant for innovative and R&D projects*

Procedure

1 Identify

2 Analyze

3 Response Planning

4 Monitoring and Control

Risk Assessment Matrix				
	Severity			
Probability	Catastrophic - 4	Critical - 3	Marginal - 2	Negligible - 1
Frequent - 4	High (16)	High (12)	Serious (8)	Medium (4)
Probable - 3	High (12)	Serious (9)	Serious (6)	Medium (3)
Remote - 2	Serious (8)	Serious (6)	Medium (4)	Low (2)
Improbable - 1	Medium (4)	Medium (3)	Low (2)	Low (1)

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Example

Situation	Probability	Severity	Total	Mitigation/Solution
Team member dropping out of course	1	3	3	- Ensure that multiple people understand each other's work - Document extensively
A servo motor breaks	2	3	6	- Implement limits on system (ex. current) - Design system in way to quickly replace motors - Have backup motors
Team becomes hungry	4	4	16	- Have snacks on hand - Go eat ASAP

Activity

Perform Risk Assessment

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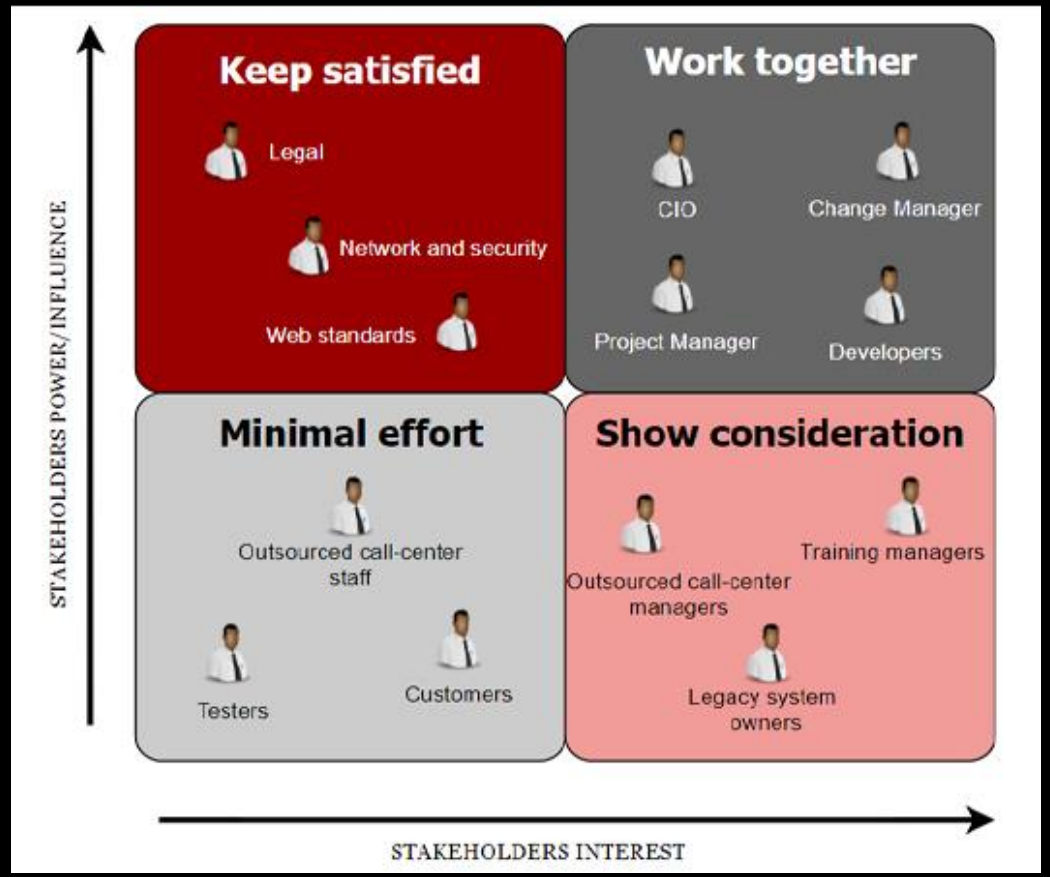
II) Components

Stakeholder Analysis



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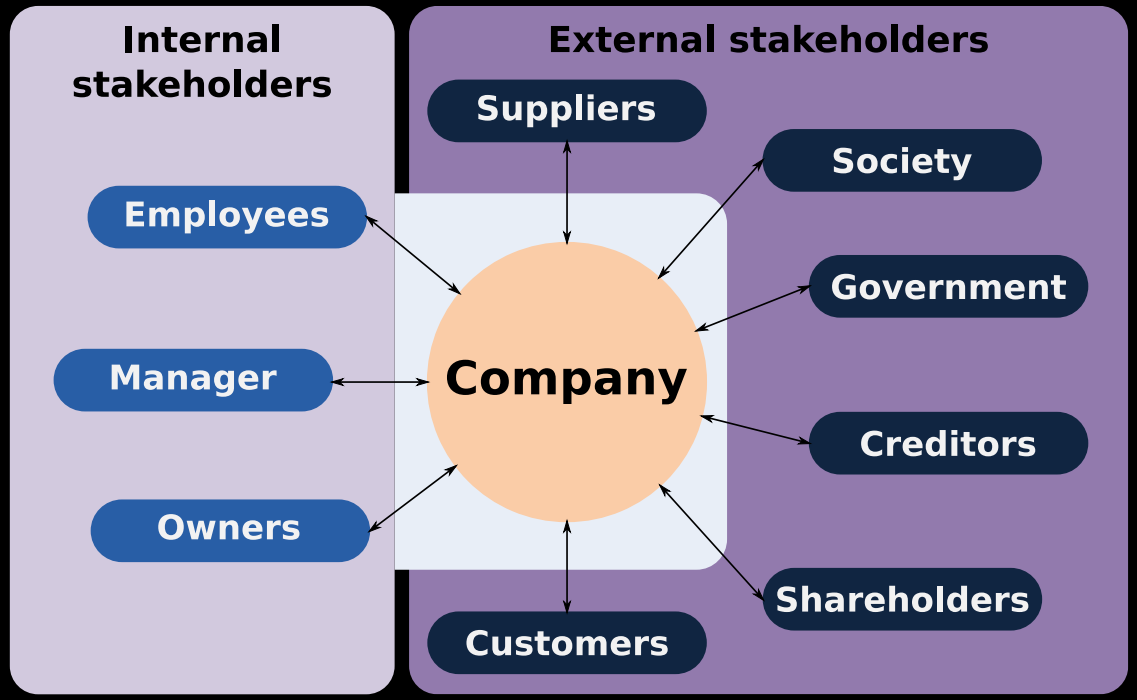
Stakeholder Analysis

- Identifying and understanding people, groups, or organizations that can or are affected by outcomes of a project and addressing their needs and concerns
- Why
  - Manages expectations
  - Enhances support
  - Reduces risks



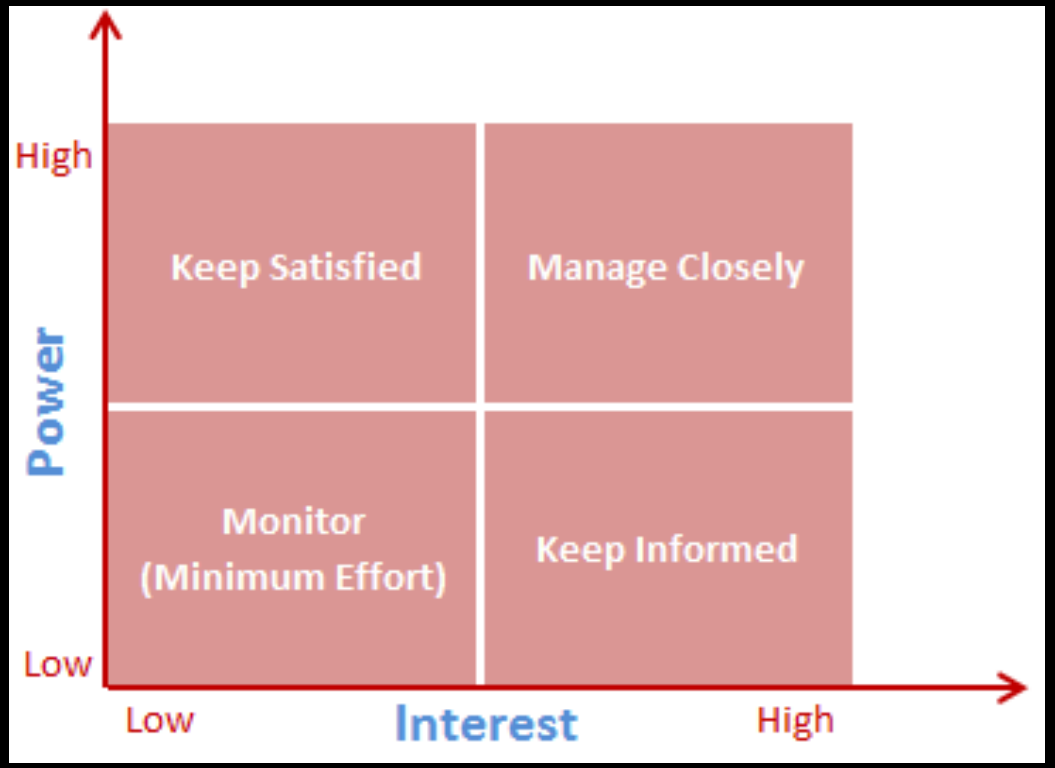
Procedures

1 Identify

2 Analyze

3 Prioritize

4 Strategize and Manage



Stakeholder Interest/Influence Grid

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Example

Stakeholder(s)	Power	Interest	Action	Strategy
RWR Course Staff	HIGH	HIGH	Manage closely	- Have preparations ready during check-points - Raise questions and concerns to staff
Mentors/advisors	LOW	HIGH	Keep informed	- Share updates about project
Flat mate(s)	LOW	LOW	Monitor (minimum effort)	- Have a meal together - Be kind

Activity

Perform Stakeholder Analysis

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II) Methodologies

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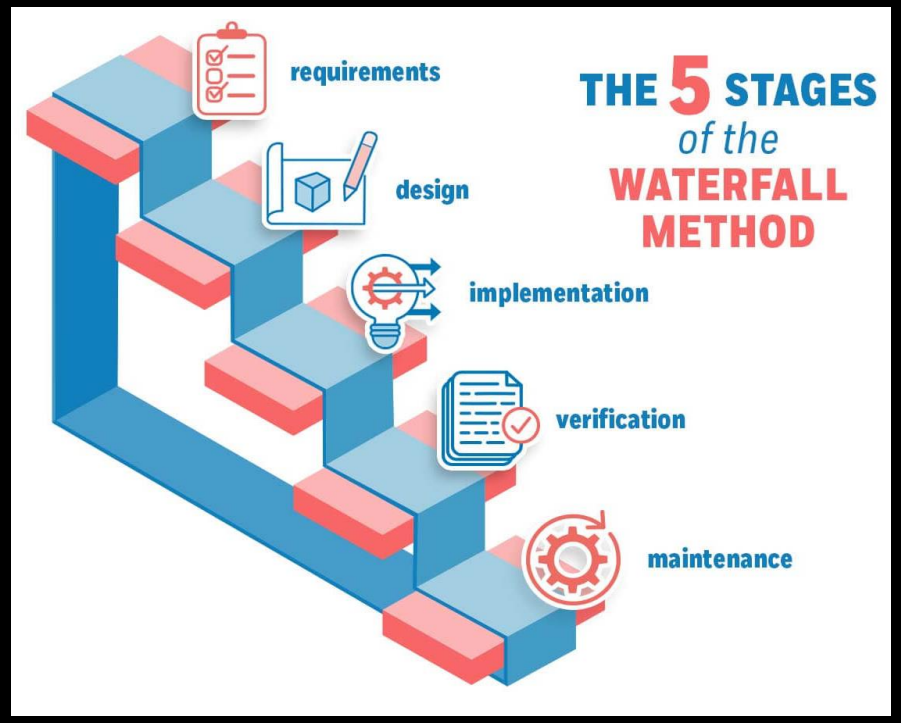
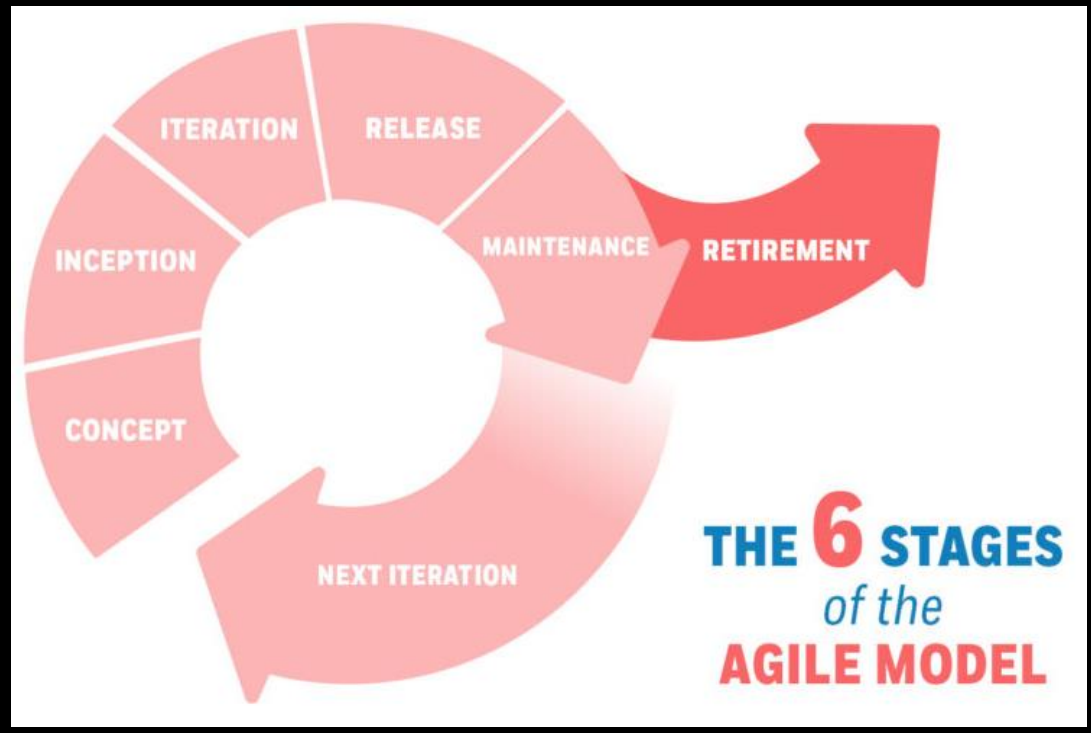
Methodologies



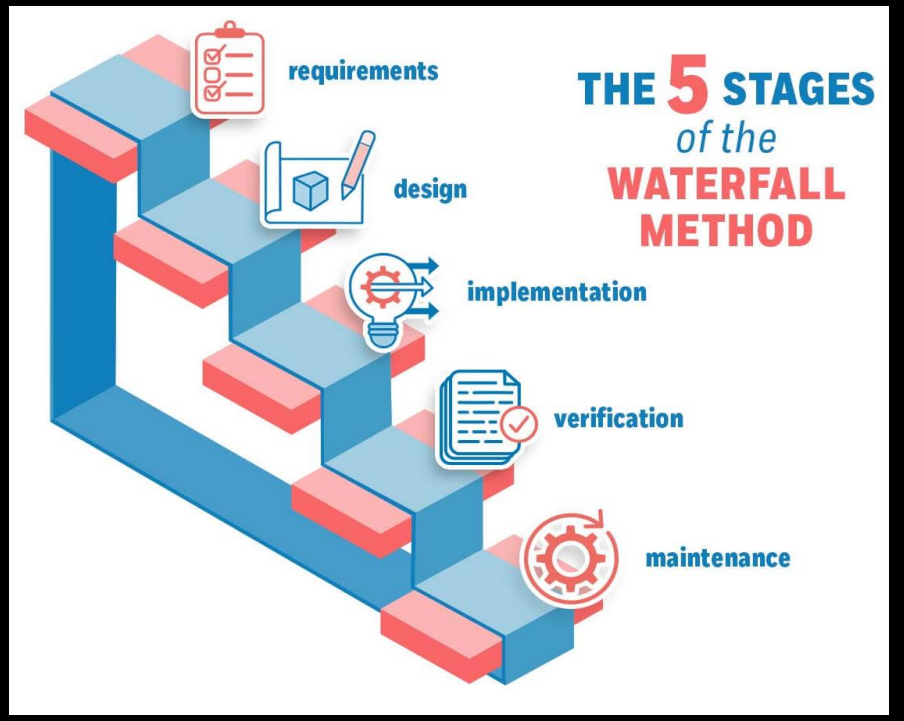
Waterfall



Agile

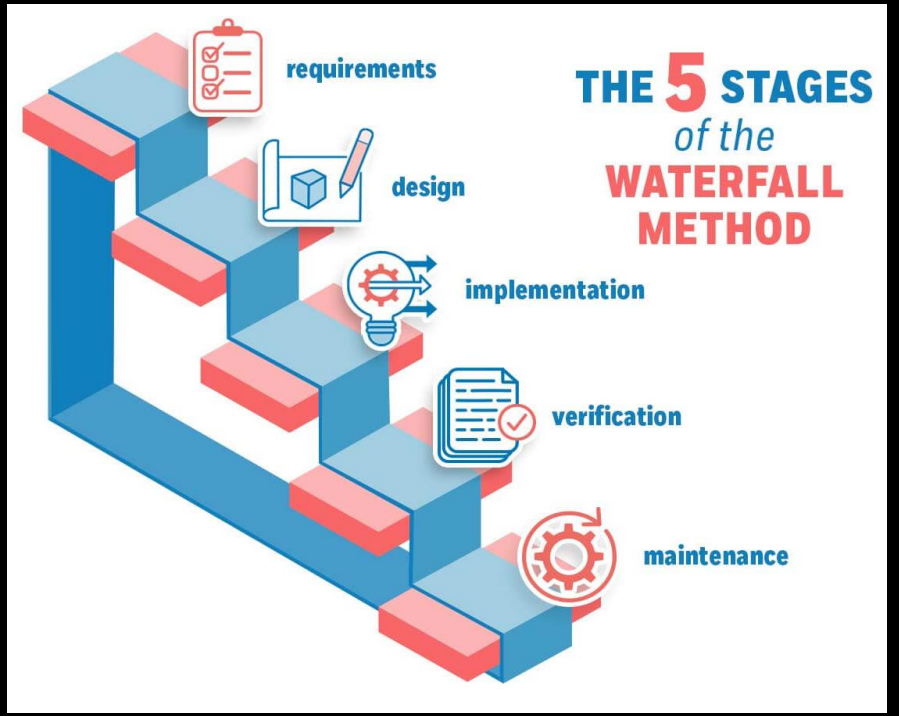
Waterfall

- Linear and sequential
- Use cases:
  - Construction
  - Defense and space projects



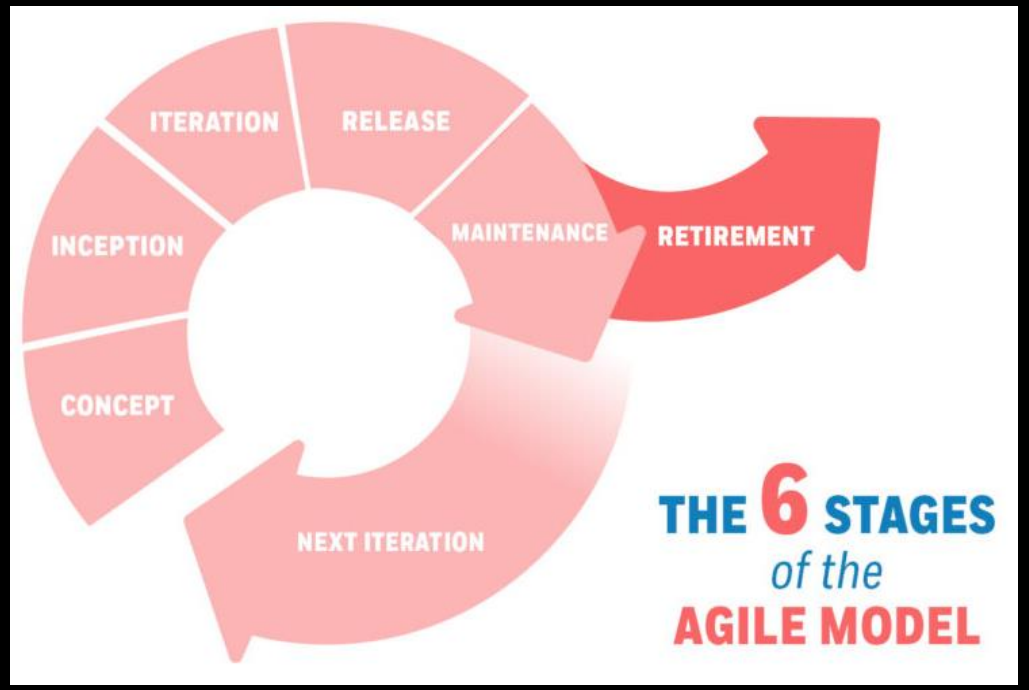
Waterfall: Pros and Cons

Pros (+)	Cons (-)
Less coordination needed	Harder to break up and share work
Clearly defines dependencies of work	Issues during phase transition (communication, delays)
Easier to estimate cost of project	More hiring for specialized roles



Agile

- Incremental and interactive
- Use cases:
  - Software Development
  - R&D projects



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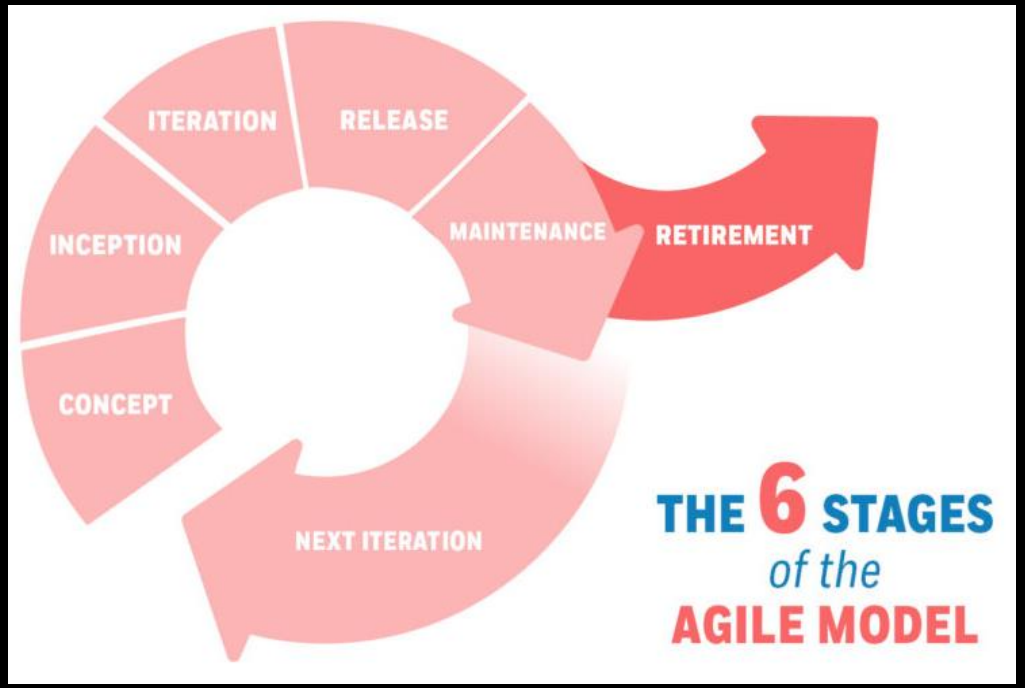
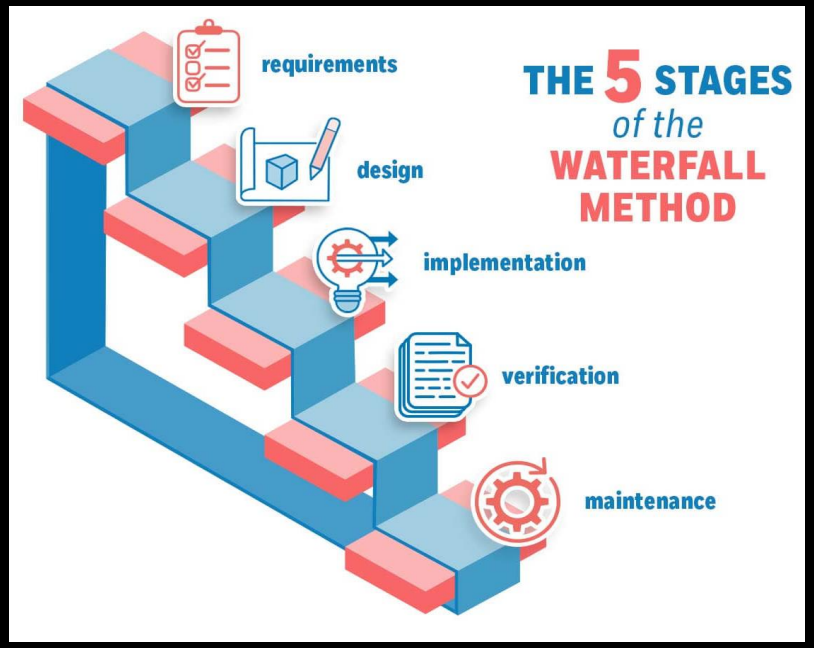
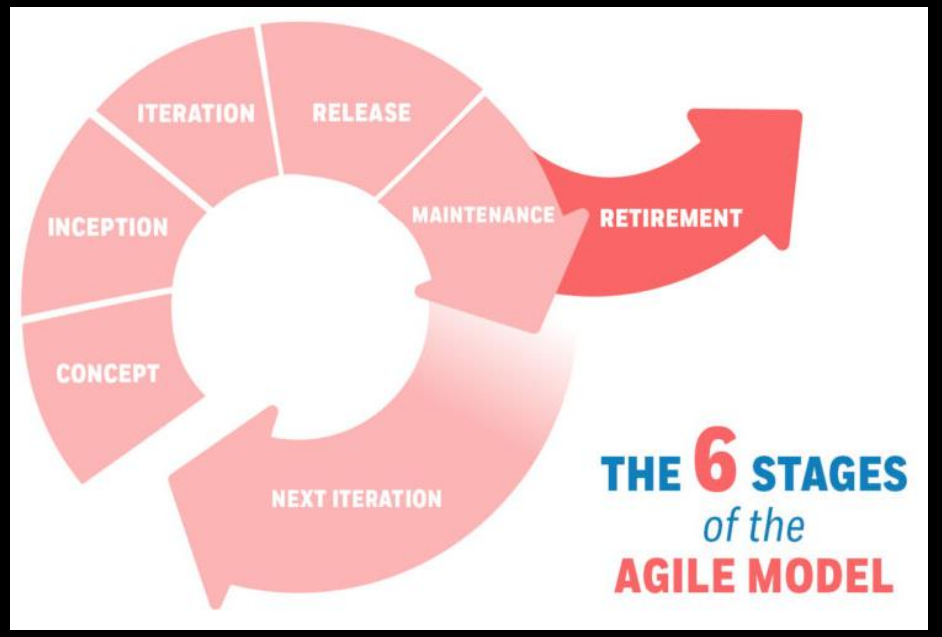
Agile

Pros (+)	Cons (-)
Faster feedback cycles	Critical path and dependencies not as well defined
Identifies problem early	Organizational learning curve
Prioritization based on value delivery	Accumulation of technical debt/costs



Hybrid Approach





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III) Implementation in Real World

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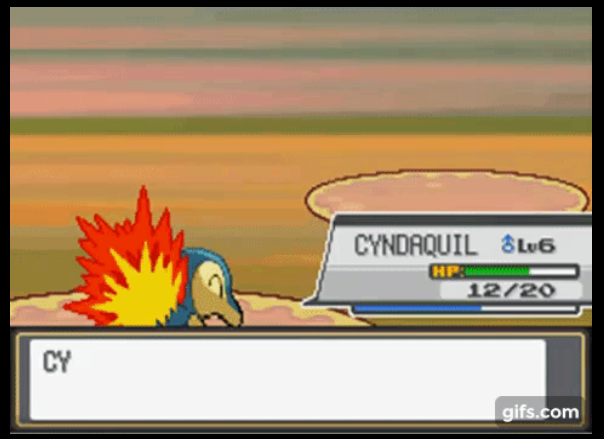
Project Management: "More Art than Science"

Project Management: "More Art than Science"

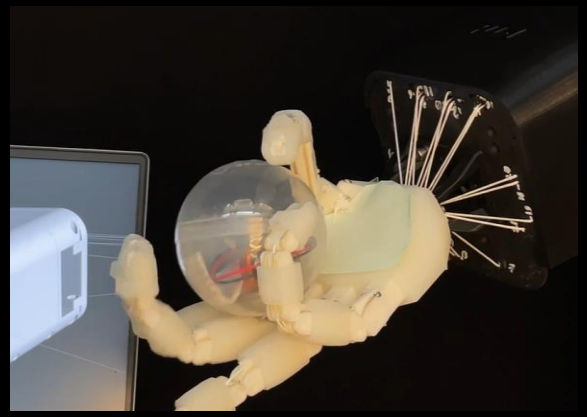
Randomness and Uncertainty



Experience matters

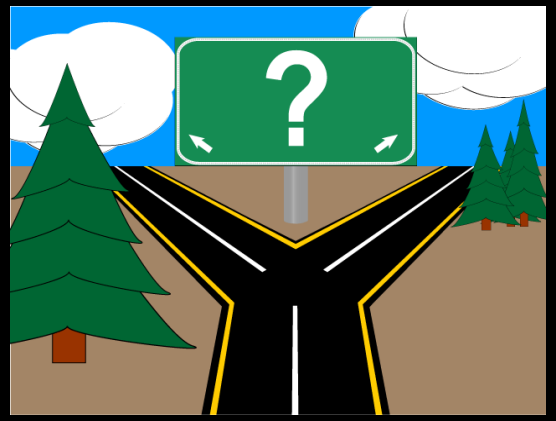
Dealing with people

Factors to Consider

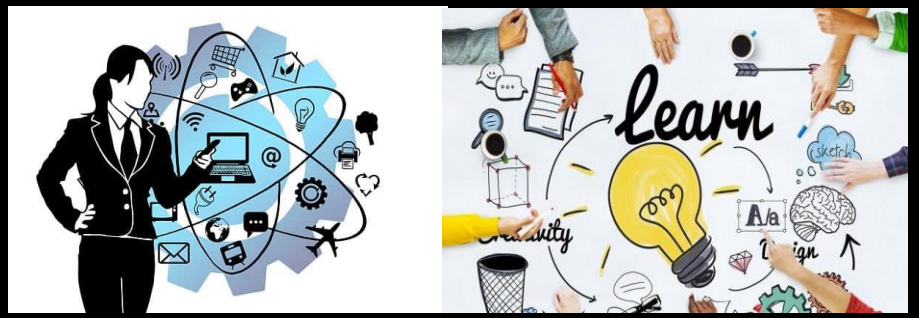


The Challenge

Constraints



Uncertainties



Skillsets

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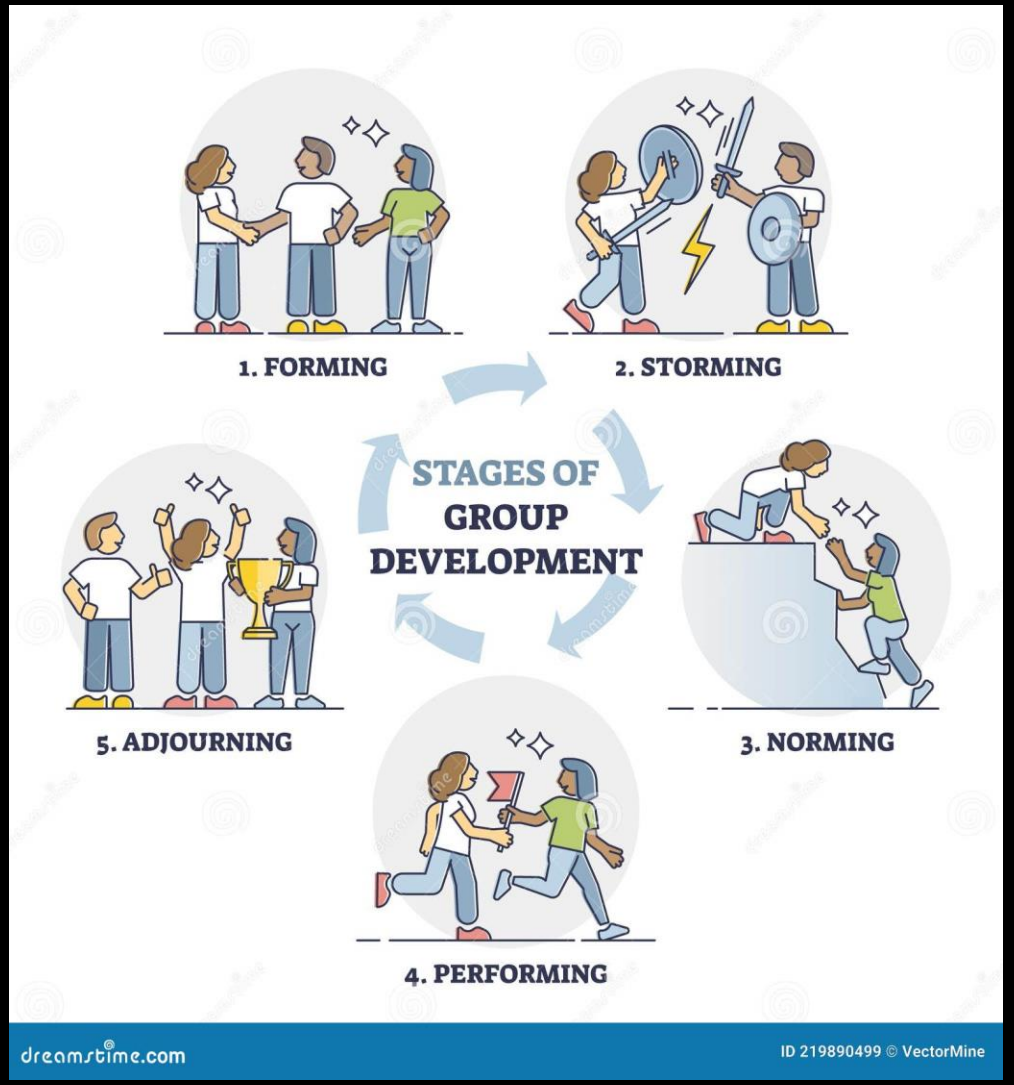
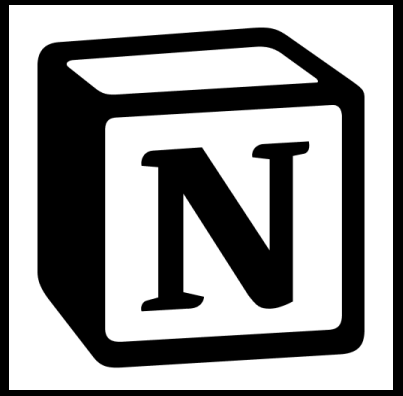
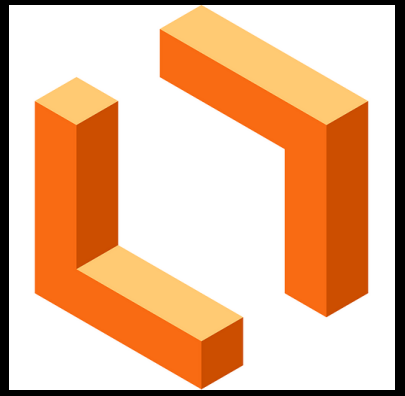
Team Dynamics Development



Project Management Tools



Notion



Lucid Chart

Drive

Trello

Microsoft Projects

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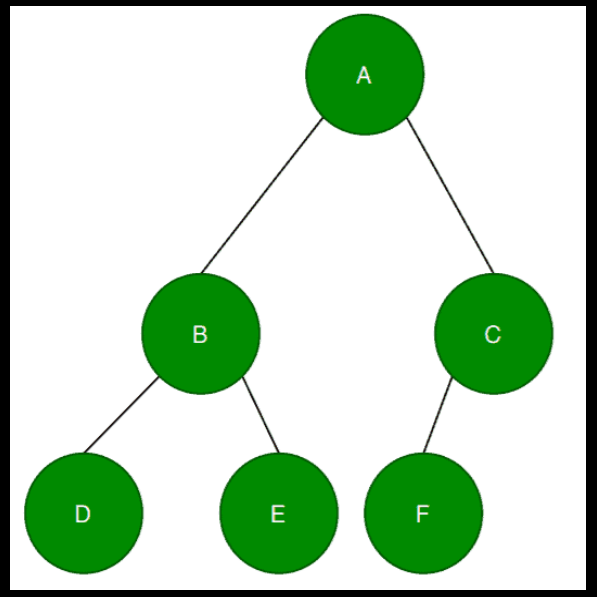
Key Takeaways for Project Management



Define Work Packages
(Divide and Conquer)

Respectfully
Communicate

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IV) Additional Material/Misc.

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Remarks

- Many thanks to lecturer Jeffery Hoffman (D-BAUG, Infrastructure Management group, retired) for providing the foundational material that was used!
    - Material was based off his course *Project Management for Construction Projects*
- Some content was generated by ChatGPT to help provide clearer and alternative explanations.

Additional Resources

- *How to Run Successful Projects III* by Fergus O'Connel
- *The Art of Project Management* by Scott Berkun
- *Project Management Absolute Beginner's Guide* by Greg Horine
- *Agile Project Management for Dummies* by Mark C. Layton, Steven J. Ostermiller, and Dean J. Kynaston
- *Project Management for the Unofficial Project Manager* by Kory Kogon

Note: These books are what popped up in the most recommended based on Reddit and LinkedIn.
https://www.linkedin.com/pulse/18-project-management-books-succeed-manager-fichtner-pmp-csm-gcyae/
https://www.reddit.com/r/projectmanagement/comments/jqlkyc/must_read_pm_books/