Software Engineering & Project Management

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Module 4

Introduction to Project Management: Introduction, Project and Importance of Project Management, Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, some ways of categorizing Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, Management and Management Control, Project Management life cycle, Traditional versus Modern Project Management Practices.

Project Management

Project Management – Defining and achieving targets while optimizing the use of resources over the course of project.

Resources: Time, Money, People, Materials, Energy, Space etc.

Project Course: Set of activities with finite duration

Importance of Project Management

Large amount of money invested in ICT

Project often fail – Exceeding Schedule or Money

Project Control Variables

Time – Amount of time required to complete the project

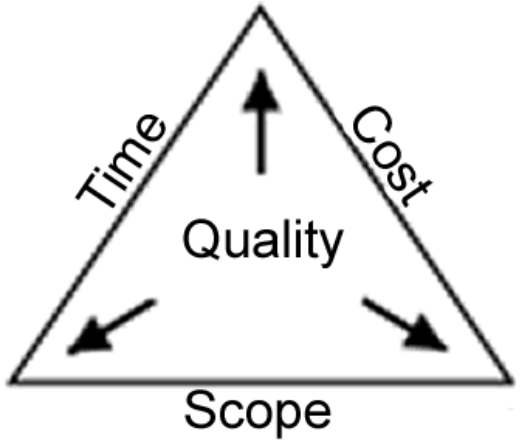
Cost – Proportional to time and resources employed for the project

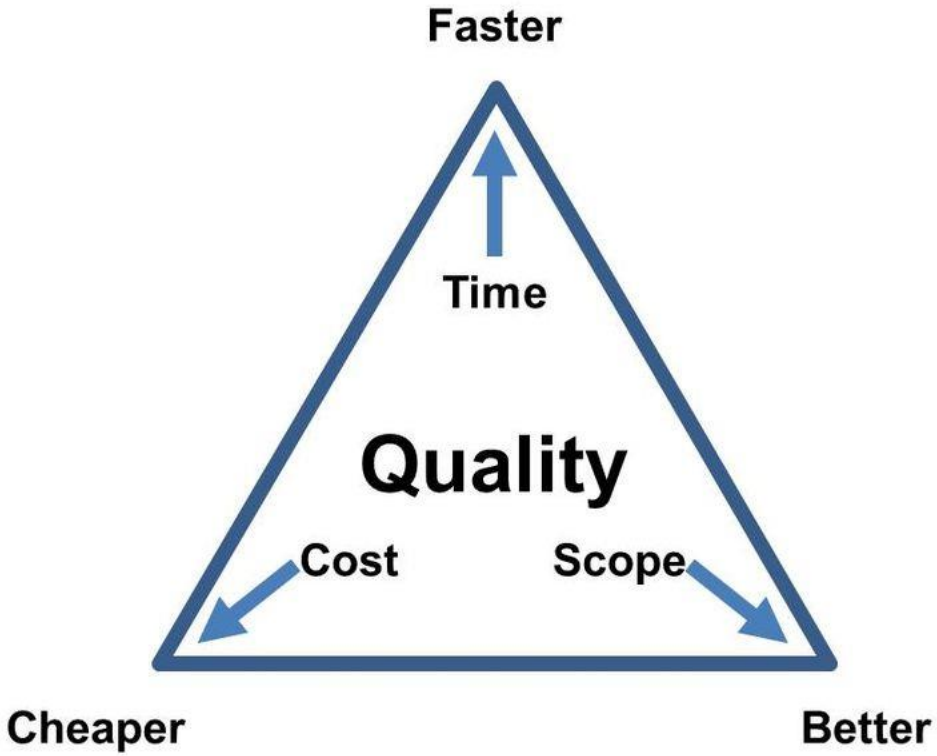
Quality – Accuracy of results

Scope – Requirements specified

Risk – Potential points for failure

Trade-Off





Contract Management

- Contract management is the process of managing contract creation, execution, and analysis to maximize operational and financial performance while minimizing risk.
- Ensures that contractual obligations are met, tracking performance, and making necessary adjustments to achieve project goals.

Types of Contracts:

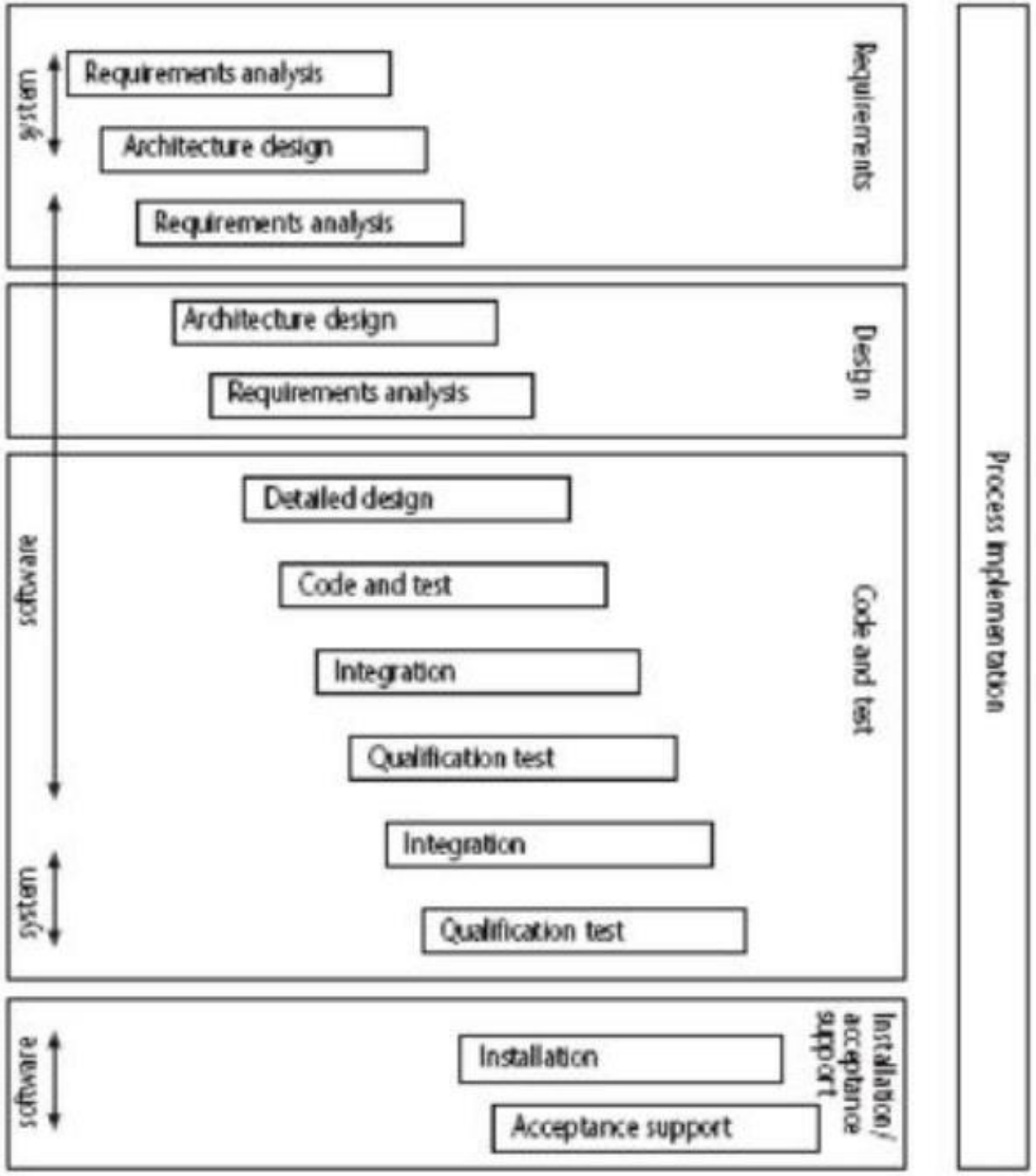
- *Fixed Contracts* - A set price is agreed upon for the entire project or specific deliverables.
- *Time and Material Contracts* - The client pays for the actual time spent by the contractor and the materials used.
- *Cost-Reimbursement Contracts* - The client reimburses the contractor for allowable costs incurred during the project, plus a fee.

Activities Covered by Project Management

- Feasibility Study
  - Technical feasibility for project delivery and worthwhile from a business point of view?
- Planning
  - Schedule, Monitor
- Execution
  - Implementation / Development

Software Development Lifecycle

- Requirement Analysis
  - *Requirements Elicitation* - What does the client needs
  - *Analysis* – Convert client facing requirements into developer understandable requirements
  - Requirements – Functions, Quality, resource constraints (i.e. costs)



Software Development Lifecycle Cont..

- Architectural Design
  - Developed based on requirements
  - Components – Hardware, Software, Organizational entities
- Code and Test
  - Component wise implementation
  - Unit testing
- Integration
  - Combine the components + integration testing
- Qualification Testing – System Testing

Software Development Lifecycle Cont..

- Installation – Deployment
  - Getting the system operational
  - Setting Up – Standing Data + Initializing Parameters + Installing h/w and s/w + User Training (KT- Knowledge Transfer)
- Acceptance Support
  - Acceptance Testing
  - Feedback
  - Maintenance + Support

Plans, Methods and Methodologies

Plans:

A detailed proposal for achieving specific objectives.

Purpose: Provides direction, aligns resources, and sets timelines.

Examples: Project plan, risk management plan, quality plan.

Methods:

Specific procedures or techniques used to accomplish tasks.

Purpose: Ensures tasks are carried out systematically and consistently.

Examples: Waterfall, Agile, Scrum.

Methodologies:

A system of practices, techniques, procedures, and rules used by those who work in a discipline.

Purpose: Provides a framework for managing projects, ensuring consistency and quality.

Categorizing Software

Categorization is important as different types of tasks need different project approaches

- **Information Systems vs Embedded Systems**

Information Systems:

- *Focus:* Data management, software applications, user interface.
- *Approach:* Agile methodologies, rapid prototyping, continuous integration.
- *Examples:* CRM systems, ERP software, online banking systems.

Embedded Systems:

- *Focus:* Hardware-software integration, real-time processing, system reliability.
- *Approach:* V-Model, waterfall model, thorough testing, and validation.
- *Examples:* Automotive control systems, medical devices, IoT devices.

Categorizing Software Cont..

- Objective-Based vs Product-Based

Objective-Based Projects:

- *Goal:* Achieve specific outcomes or performance targets.
- *Approach:* Milestone tracking, performance metrics, adaptive planning.
- *Examples:* Website performance optimization, cybersecurity enhancement, sales process improvement.

Product-Based Projects:

- *Goal:* Develop a tangible product or deliverable.
- *Approach:* Stage-gate process, detailed requirements analysis, user feedback loops.
- *Examples:* New mobile app development, consumer electronics, e-commerce platform.

Categorizing Software Cont..

- Voluntary Systems vs Compulsory Systems

Voluntary Systems:

- Systems where participation is optional and based on individual or organizational choice.
- *Examples:* Open-source software development.

Compulsory Systems:

- Systems where participation is mandatory and enforced by laws, regulations, or organizational policies.
- *Examples:* Mandatory safety regulations.

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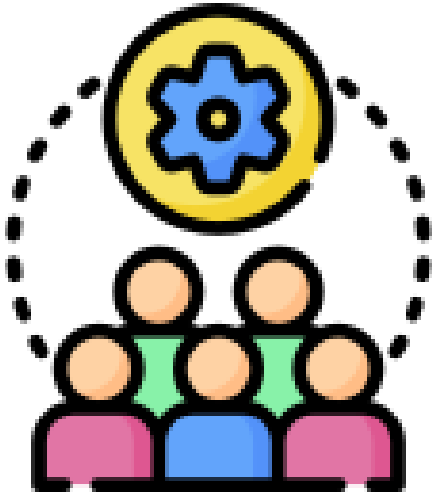
Stakeholders 



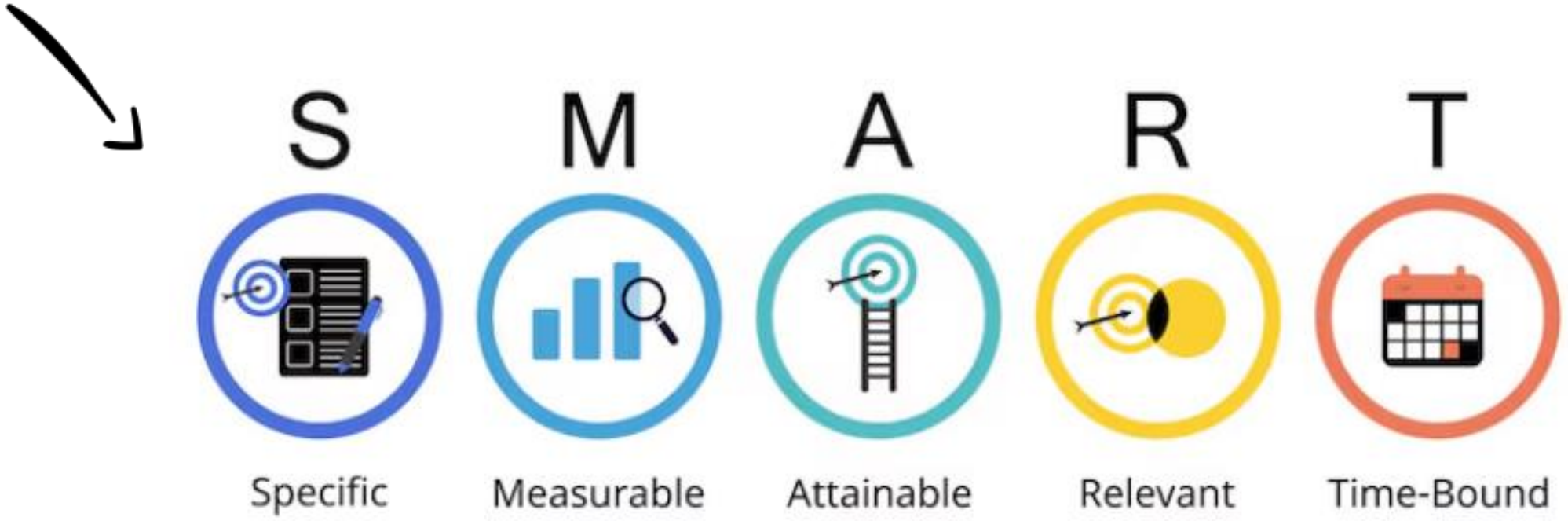
- People who have a stake or interest in Project
- Stakeholders can be,
  - Within the project team
  - Outside the project team but within the same organization
  - Outside both the project team and the organization
- Example: Clients / Users, Developers / Implementers

Setting Objectives

- What do we have to do to have a success ?
- Need for Project Authority (Control Finance + Monitor/Modify Objectives)
  - Sets the project scope
  - Allocates / Approves Costs
- Could be one person or group
  - Project Board
  - Project Management Board
  - Steering Committee

Objectives

- Project objectives define the critical steps that must be taken to successfully execute a *project plan*.



Objectives – Need to be SMART

- *Specific:* Speak with stakeholders and get them to give you all the requirements so that you're not surprised down the line when they say they've forgotten something.
- *Measurable:* Be sure that each of the requirements from stakeholders can be measured. That is, each requirement should be tested and then checked off the list.
- *Achievable:* Look over the list of requirements. If some are not realistic then go back to the stakeholder and tell them why it's not feasible considering the time and costs involved.
- *Relevant:* Again, look over the list of requirements you received from your stakeholders and make sure each is relevant to the product. If it's not, it's got to go.
- *Time-Related:* Can the requirements requested be completed by the deadline? Will the requirement lead to overspending the budget? Unless the requirement can be delivered on time and within budget it should be removed.

Goals / Sub-Objectives

- *Steps along the way to achieving objective.*
- *Goal can be allocated to an individual but not the objective.*

Consider,

Objective: *User satisfaction with software product*

- Analyst Goal: Accurate Requirements
- *Developer Goal:* Reliable Software

Measure Effectiveness:

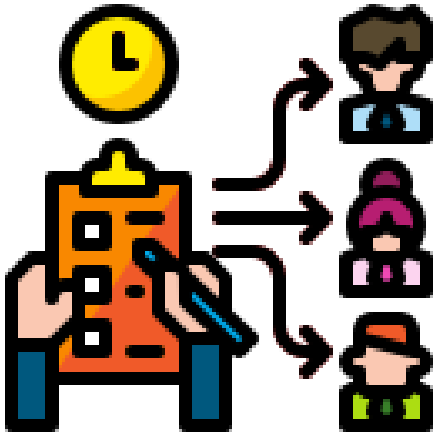
- How do we know that the goal or objective has been achieved ?
  - Practical Tests to measure
  - Repeat Business or Low Number of Complaints

Business Case

- Benefits of project must outweigh costs incurred
- Project Costs:
  - Development
  - Operation
- Benefits:
  - Quantifiable
  - Non-Quantifiable

Management

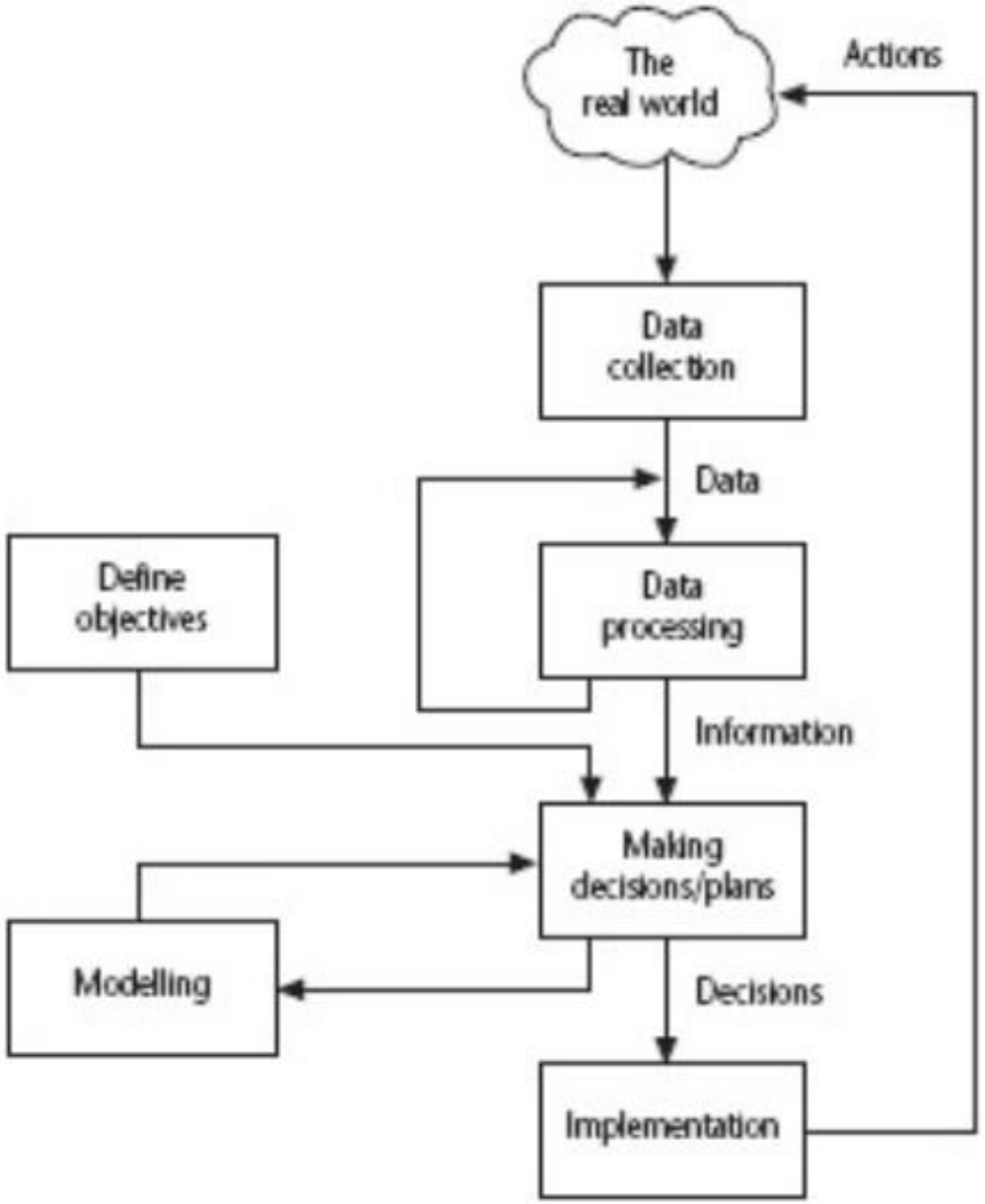
What is management ?



- *Planning* – Scheduling, deciding what needs to be done
- *Organizing* – Making arrangements
- *Staffing* – Resource Allocation (Selecting right people for the job)
- *Directing* – Giving instructions
- *Monitoring* – Review progress
- *Controlling* – Taking action to remedy holdups
- *Innovating* – Solutions to solve the problem
- *Representing* – Liaising with clients, users, developers and other stakeholders

Project Control Cycle / Management Control

- *Data* – Raw Fact
- *Information* – Processed data / meaningful
- *Comparison with objectives/goals* – Met or Not
- *Modelling* – Sketch / Design
- *Implementation* – Development + Test

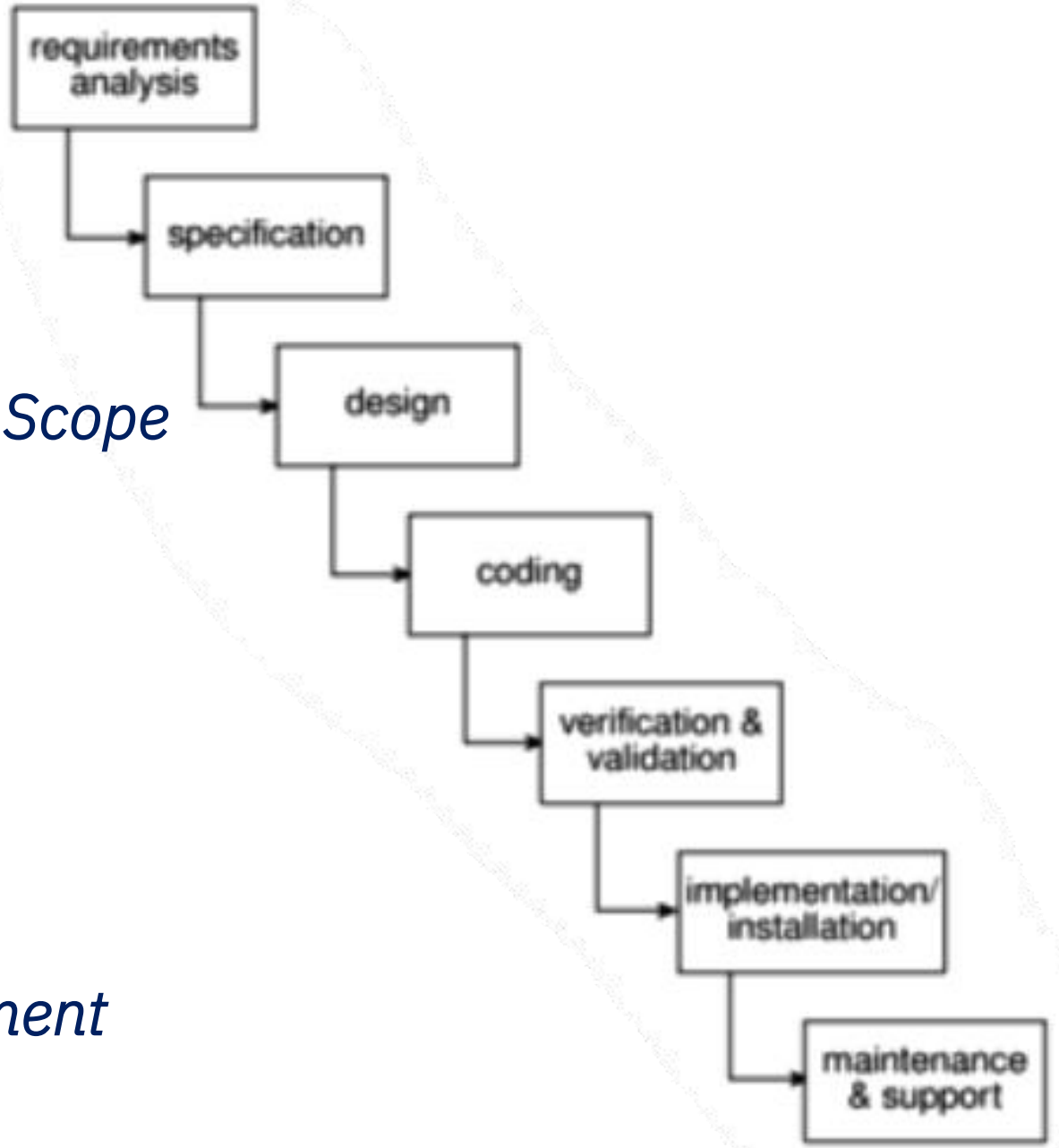


Traditional versus Modern Project Management Practices

- Planning Incremental Delivery
  - Traditional long-term planning has given way to short term planning – Incremental Delivery with Evolving Functionalities
- Quality Management
  - Focus on quality management keeping customer focus rather than only delivery
- Change Management
  - Changes are rarely entertained after sign-off in traditional systems
  - *Incremental Delivery with Customer Feedback:* To accommodate customer changes
  - *Version Control:* Crucial since incremental delivery leads to multiple versions of project

Project Life Cycle

- *Requirement Analysis*
- *Specification – Feasible Requirements / Scope*
- *Design – Model / Sketch*
- *Coding - Construction*
- *Verification & Validation – SIT, UAT*
- *Implementation / Installation – Deployment*
- *Maintenance & Support – Feedback, Hypercare*



A Typical Project Life Cycle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