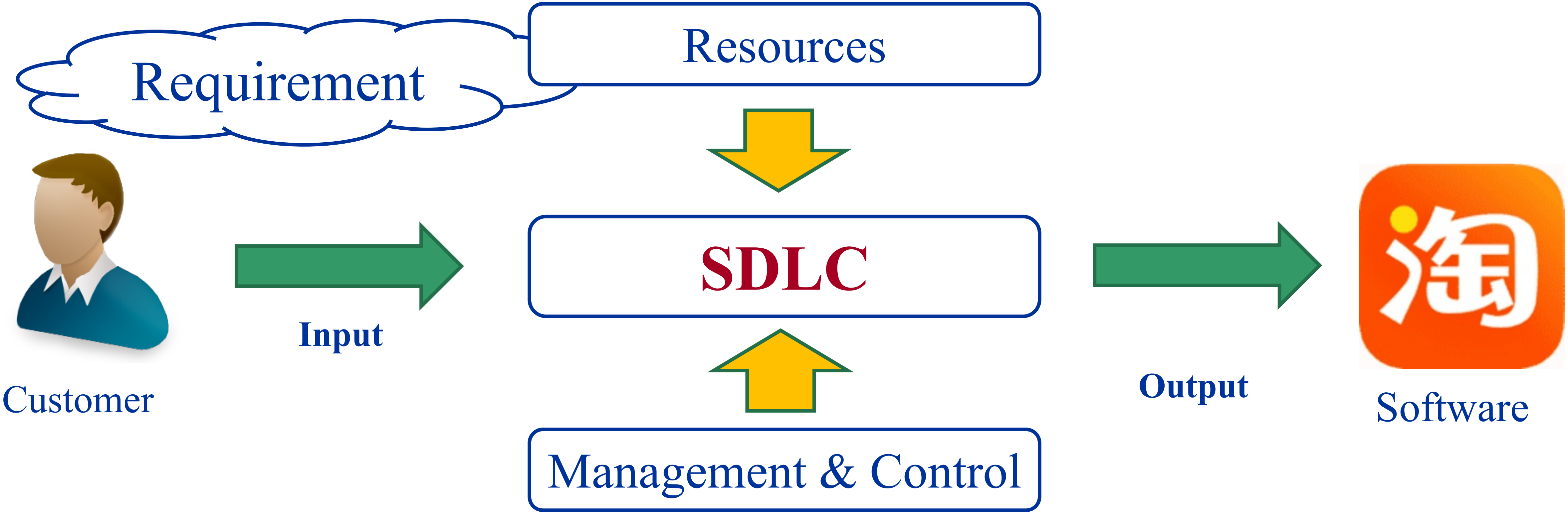
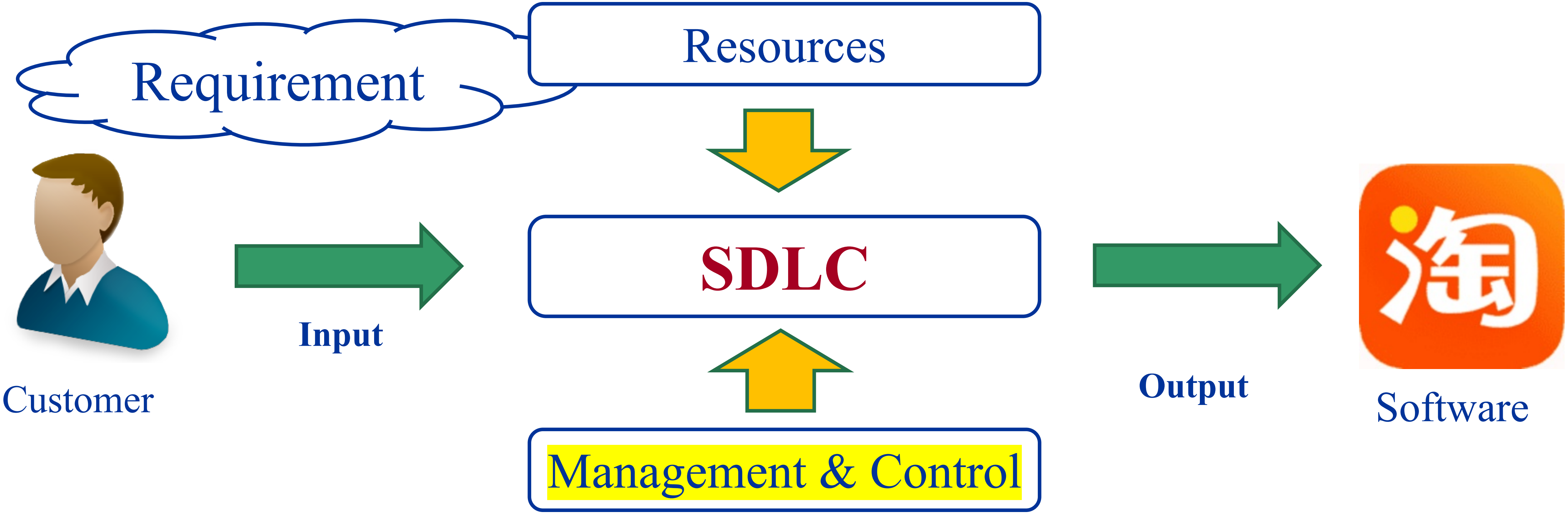
Software Development Life Cycle (SDLC)



Software Development Life Cycle (SDLC)



Lecture 4: Software Project Management (1)

Outline

- What is a Project?
- How to Make Software Projects Fail?
- What is Software Project Management?
- The Role of the Software Project Manager
- Project Scope Management

What is a Project?

What is a Project?

- A project is a temporary endeavor undertaken to create a unique product, service, or result.

-source PMBoK, p368

Examples of IT Projects

- Projects can be large or small and involve one person or thousands of people. They can be done in one day or take years to complete.
  - A large network of healthcare providers update its information systems and procedures to reduce hospital acquired diseases.
  - A team of students creates a smartphone application and sells it online.
  - A company develops a driverless car.
  - A college upgrades its technology infrastructure to provide wireless Internet access across the whole campus as well as online access to all academic and student service information.

Project Attributes

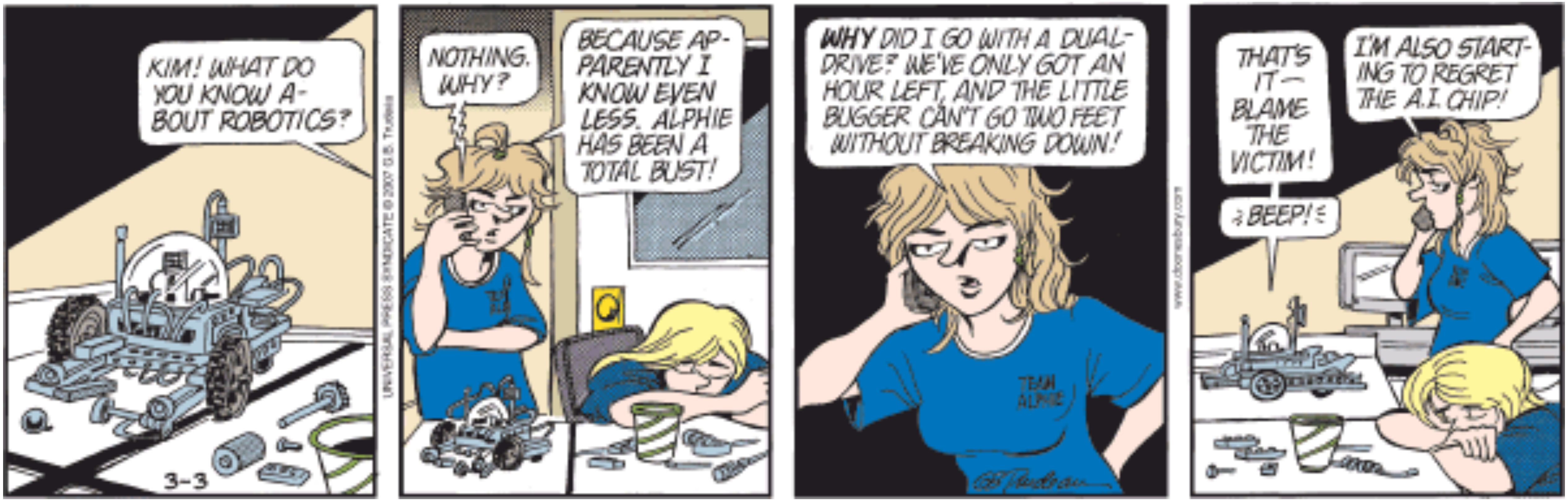
- A project has a unique purpose.
  - Every project should have a well-defined objective.
- A project is temporary.
  - A project has a definite beginning and end.
- A project is developed using progressive elaboration
  - Projects are often defined broadly when they begin, and as time passes, the specific details of the project become clearer.
- A project requires resources, often from various areas
  - Resources include people, hardware, software, and other assets.
  - Marketing, sales, IT, etc.

Project Attributes (2)

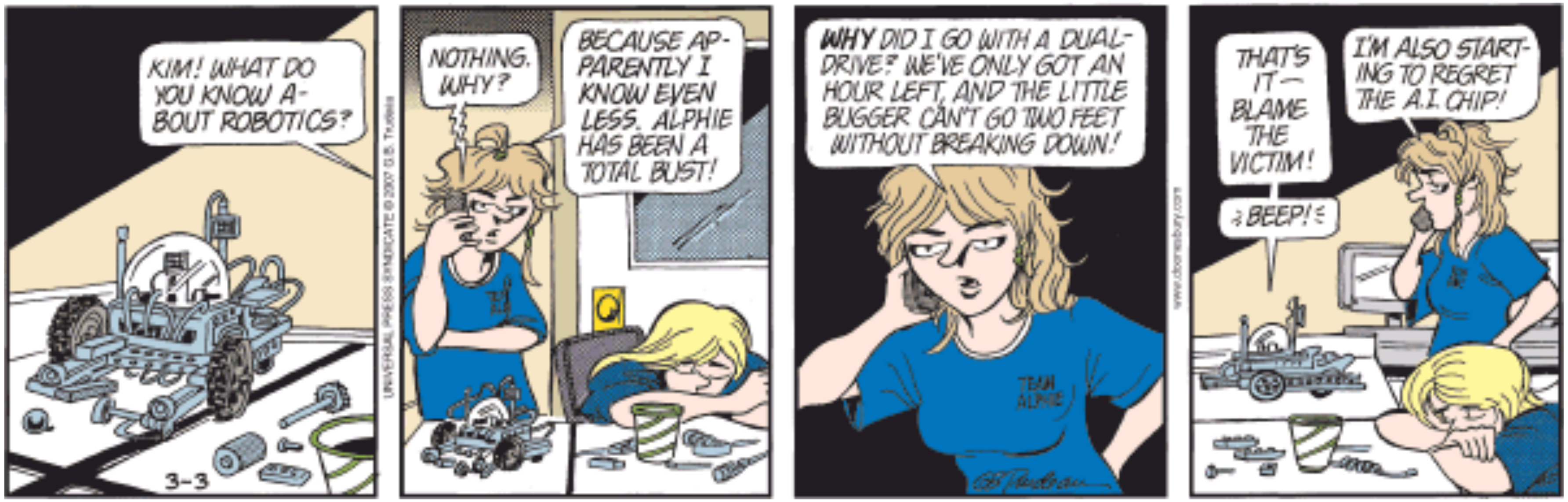
- A project should have a primary customer or sponsor.
  - Most projects have many interested parties or stakeholders, but for a project to succeed someone must take the primary role of sponsorship.
- A project involves uncertainty.
  - Because every project is unique, it is sometimes difficult to define its objectives clearly, estimate how long it will take to complete, or determine how much it will cost.

How to Make Software Projects Fail?

How to have an unsuccessful project


KIM! WHAT DO YOU KNOW ABOUT ROBOTICS?
3-3
NOTHING. WHY?
BECAUSE APPARENTLY I KNOW EVEN LESS. ALPHIE HAS BEEN A TOTAL BUST!
UNIVERSAL PRESS SYNDICATE © 2007 G.B. Trudeau
WHY DID I GO WITH A DUAL-DRIVE? WE'VE ONLY GOT AN HOUR LEFT, AND THE LITTLE BUGGER CAN'T GO TWO FEET WITHOUT BREAKING DOWN!
TEAM ALPHIE
www.doonesbury.com
THAT'S IT — BLAME THE VICTIM!
BEEP!
I'M ALSO STARTING TO REGRET THE A.I. CHIP!

How to have an unsuccessful project (2)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- Team dynamics: team mate is crashed out
- Scheduling: only an hour left?
- Overambitious: dual drive? AI Chip?

How to have an unsuccessful project (3)

- Team dynamics: team mate is crashed out
  - Time & Scope Problem, Quality suffers
- Scheduling: only an hour left?
  - Time & Scheduling Problem
- Overambitious: dual drive? AI Chip?
  - Scope: Vague requirements

Common Problems with Software Projects

- Lack of quality standards and measures
- Lack of measurable milestones
- Difficult to make the progress visible
- Poor communications
- Poor documentation
- Frequent changes of requirements
- Over budget and late delivery of software

Project Success

- The project met scope, time, and cost goals.
  - Scope refers to all the work involved in creating the products of the project and the processes used to create them. It defines what is or is not to be done.
- The project satisfied the customer/sponsor.
  - E.g., never return calls, customer not happy with important aspects of the project
- The results of the project met its main objective.
  - E.g, making or saving a certain amount of money, providing a good return on investment, or simply making the sponsors happy

What helps Projects Succeed?

- 1. Executive support
- 2. User involvement
- 3. Clear business objectives
- 4. Emotional maturity
- 5. Optimizing scope

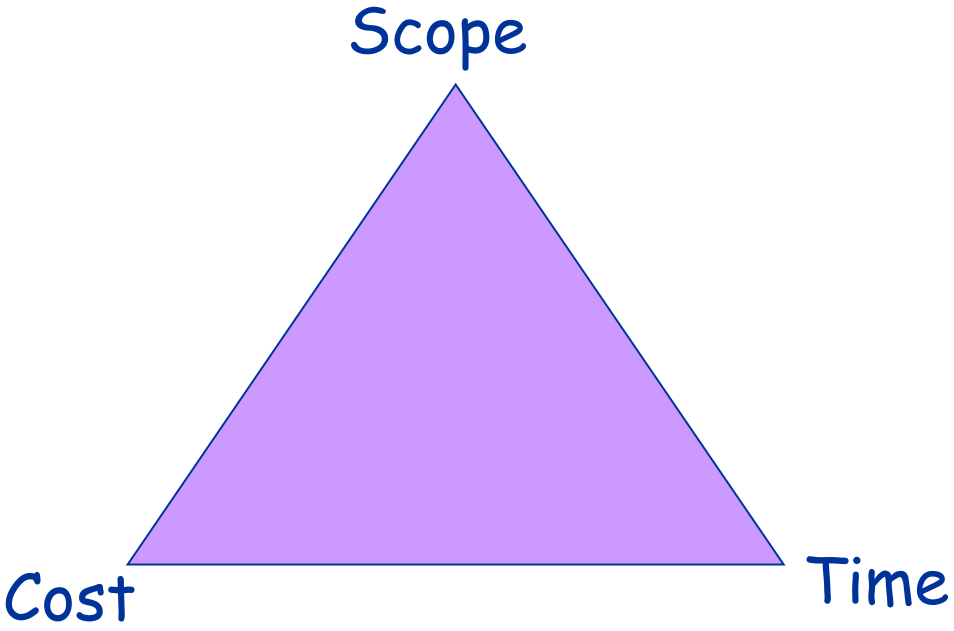
What helps Projects Succeed? (2)

- 6. Agile process
- 7. Project management expertise
- 8. Resources
- 9. Execution
- 10. Tools and infrastructure

Software Project Management

Software Project Management

- Software Project Management: the application of knowledge, skills, tools, and techniques to project activities to meet project requirements.
- Project Management triple Constraints:

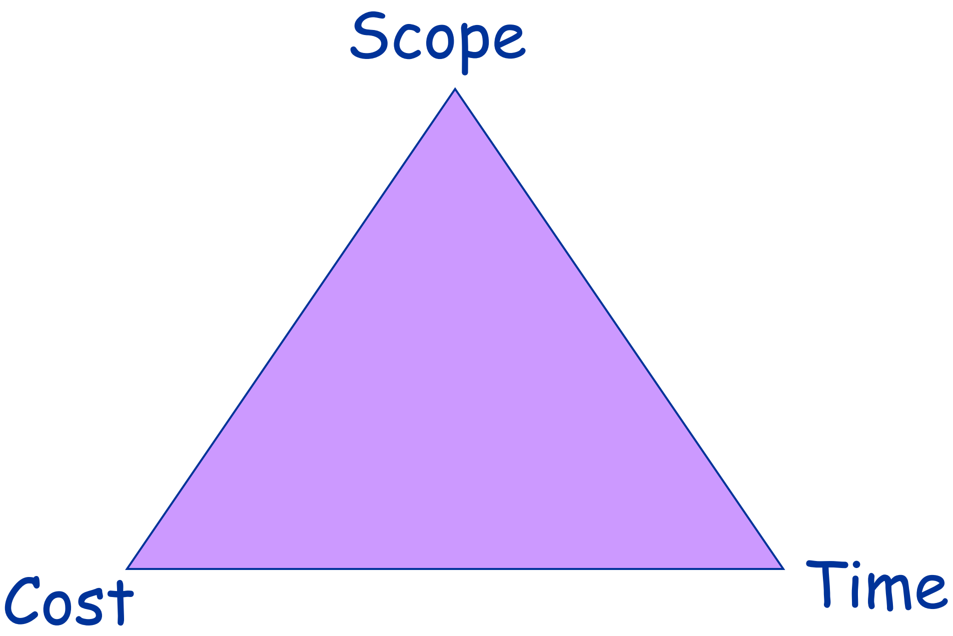


Software Project Management (2)

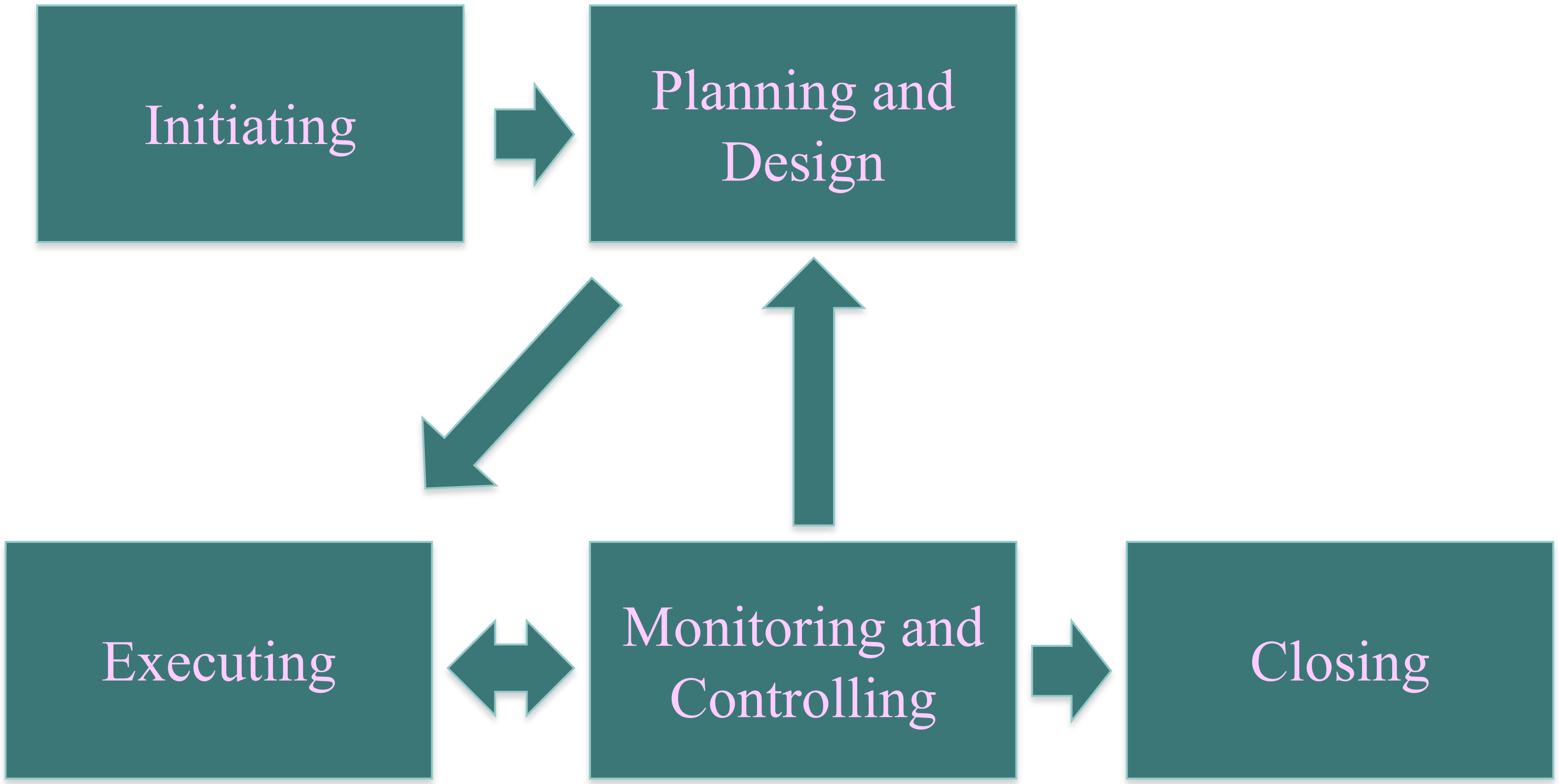
Q: What is a project?

A: “A temporary endeavor undertaken to create a unique *product*, *service* or *result*”

Where are time, cost, scope?



Software Project Management Phases



Initiating

Planning and Design

Executing

Monitoring and Controlling

Closing

Important Goals

The success criteria for project management vary from project to project, but for most projects, important goals are:

- to deliver the software to the customer at the agreed time;
- to keep overall costs with in budget;
- to deliver software that meets the customer’s expectation;
- to maintain a coherent and well-functioning development team;

Factors that Affect Project Management

Some of the most important factors that affect how software projects are managed are:

- Company size;
- Software customers;
- Software size;
- Software type;
- Organizational culture;
- Software development model;

Factors that Affect Project Management (2)

- Company size
  - Small company
    - Informal management and team communication;
    - Do not need formal policies;
    - Do not need management organization;
  - Large company
    - Management hierarchies;
    - Formal reporting and budgeting;
    - Approval processes must be followed;

Factors that Affect Project Management (3)

- Software customers
  - Internal customers
    - Informal communication
    - No need to fit in with the customer’s ways of working
  - External customers
    - Formal communication channel
    - Try to fit in with the customer’s ways of working
  - Government agency
    - Formal communication channel
    - Must operate according to the agency’s policies and procedures

Factors that Affect Project Management (4)

- Software size
  - Small systems
    - Small team;
  - Large systems
    - Multiple development teams;
    - Teams may be geographically distributed and in different companies;
    - Project manager has to coordinate the activities of these teams and arrange for them to communicate with each other;

Factors that Affect Project Management (5)

- Software type
  - Consumer product
    - Formal records of project management decisions are unnecessary.
  - Safety-critical system
    - Project management decisions should be record and justifies as these may affect the safety of the system.

Factors that Affect Project Management (5)

- Organizational culture
  - Different companies may have different project management culture;
  - CompanyA: supporting and encouraging individuals;
  - CompanyB: group focused;
  - CompanyC: take risks;
  - CompanyD: risk averse;

Factors that Affect Project Management (6)

- Software development model
  - Agile
    - “lightweight” management
  - Waterfall
    - More formal processes
    - Project management monitoring

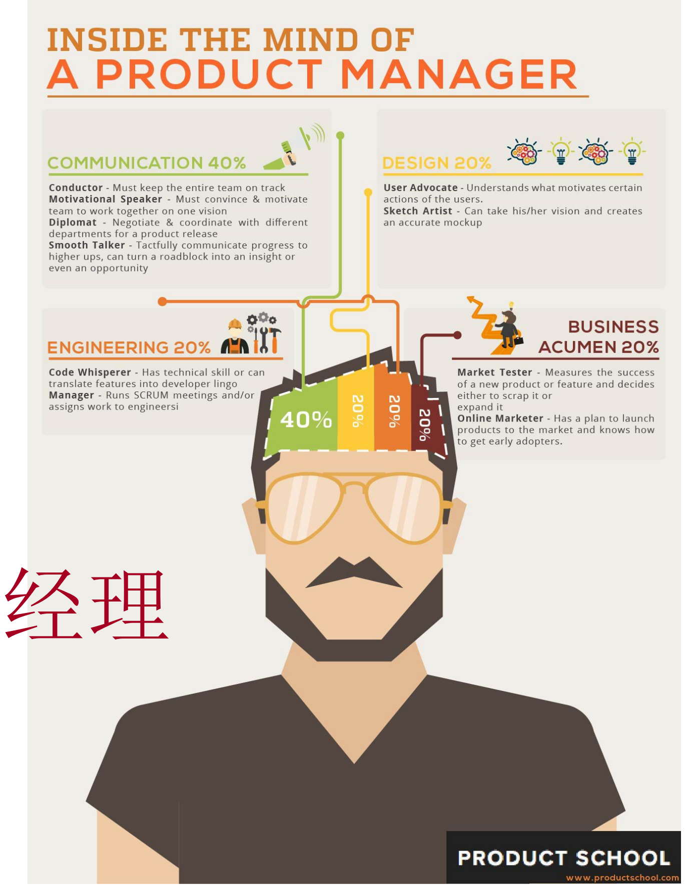
The Role of a Project Manager

- Project managers coordinate the efforts of project teams, functional groups, suppliers, and operations staff supporting the projects to ensure that products and processes are implemented to maximize benefits.
- Project managers are responsible for more than the delivery of project results; they are change agents responsible for the success of products and processes developed by those projects.

Skills for Project Managers

- The Project Management Body of Knowledge.
- Application area knowledge, standards, and regulations.
- Project environment knowledge.
- General management knowledge and skills.
- Soft skills or human relations skills.

Product Manager vs. Project Manager



INSIDE THE MIND OF
A PRODUCT MANAGER

COMMUNICATION 40%

Conductor - Must keep the entire team on track
Motivational Speaker - Must convince & motivate team to work together on one vision
Diplomat - Negotiate & coordinate with different departments for a product release
Smooth Talker - Tactfully communicate progress to higher ups, can turn a roadblock into an insight or even an opportunity

DESIGN 20%

User Advocate - Understands what motivates certain actions of the users.
Sketch Artist - Can take his/her vision and creates an accurate mockup

ENGINEERING 20%

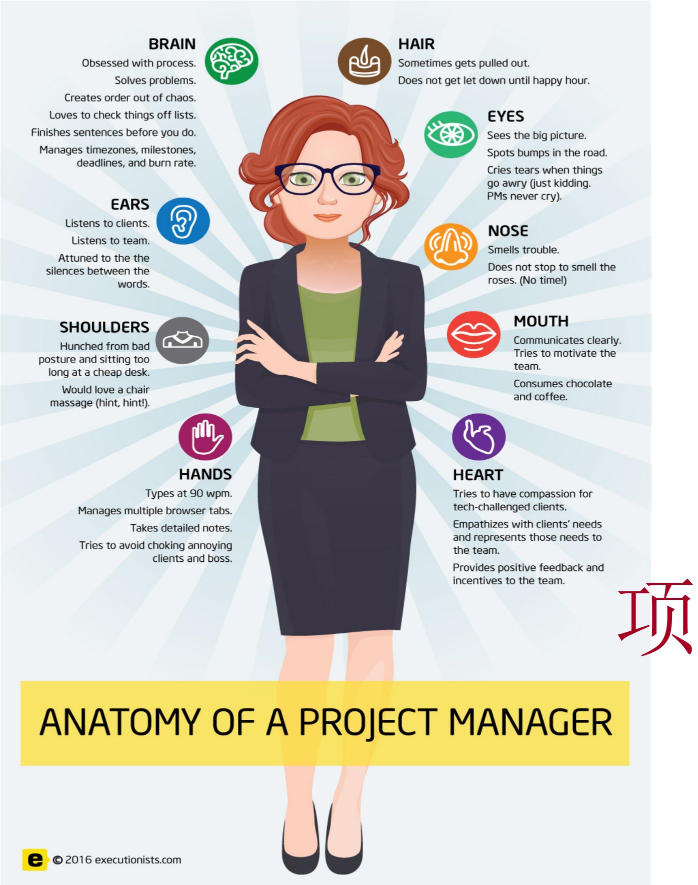
Code Whisperer - Has technical skill or can translate features into developer lingo
Manager - Runs SCRUM meetings and/or assigns work to engineersi

BUSINESS ACUMEN 20%

Market Tester - Measures the success of a new product or feature and decides either to scrap it or expand it
Online Marketer - Has a plan to launch products to the market and knows how to get early adopters.

PRODUCT SCHOOL
www.productschool.com

产品经理



BRAIN
Obsessed with process.
Solves problems.
Creates order out of chaos.
Loves to check things off lists.
Finishes sentences before you do.
Manages timezones, milestones, deadlines, and burn rate.

HAIR
Sometimes gets pulled out.
Does not get let down until happy hour.

EYES
Sees the big picture.
Spots bumps in the road.
Cries tears when things go awry (just kidding. PMs never cry).

EARS
Listens to clients.
Listens to team.
Attuned to the the silences between the words.

NOSE
Smells trouble.
Does not stop to smell the roses. (No time!)

SHOULDERS
Hunched from bad posture and sitting too long at a cheap desk.
Would love a chair massage (hint, hint!).

MOUTH
Communicates clearly. Tries to motivate the team.
Consumes chocolate and coffee.

HANDS
Types at 90 wpm.
Manages multiple browser tabs.
Takes detailed notes.
Tries to avoid choking annoying clients and boss.

HEART
Tries to have compassion for tech-challenged clients.
Empathizes with clients' needs and represents those needs to the team.
Provides positive feedback and incentives to the team.

ANATOMY OF A PROJECT MANAGER

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项目经理

Product Manager vs. Project Manager (2)

- Product Manager (产品经理)
  - A product manager’s role is strategic, much like a CEO but for the product

做正确的事情

- Project Manager (项目经理)
  - A project manager’s role, on the other hand, is more tactical, focusing primarily on the execution side.

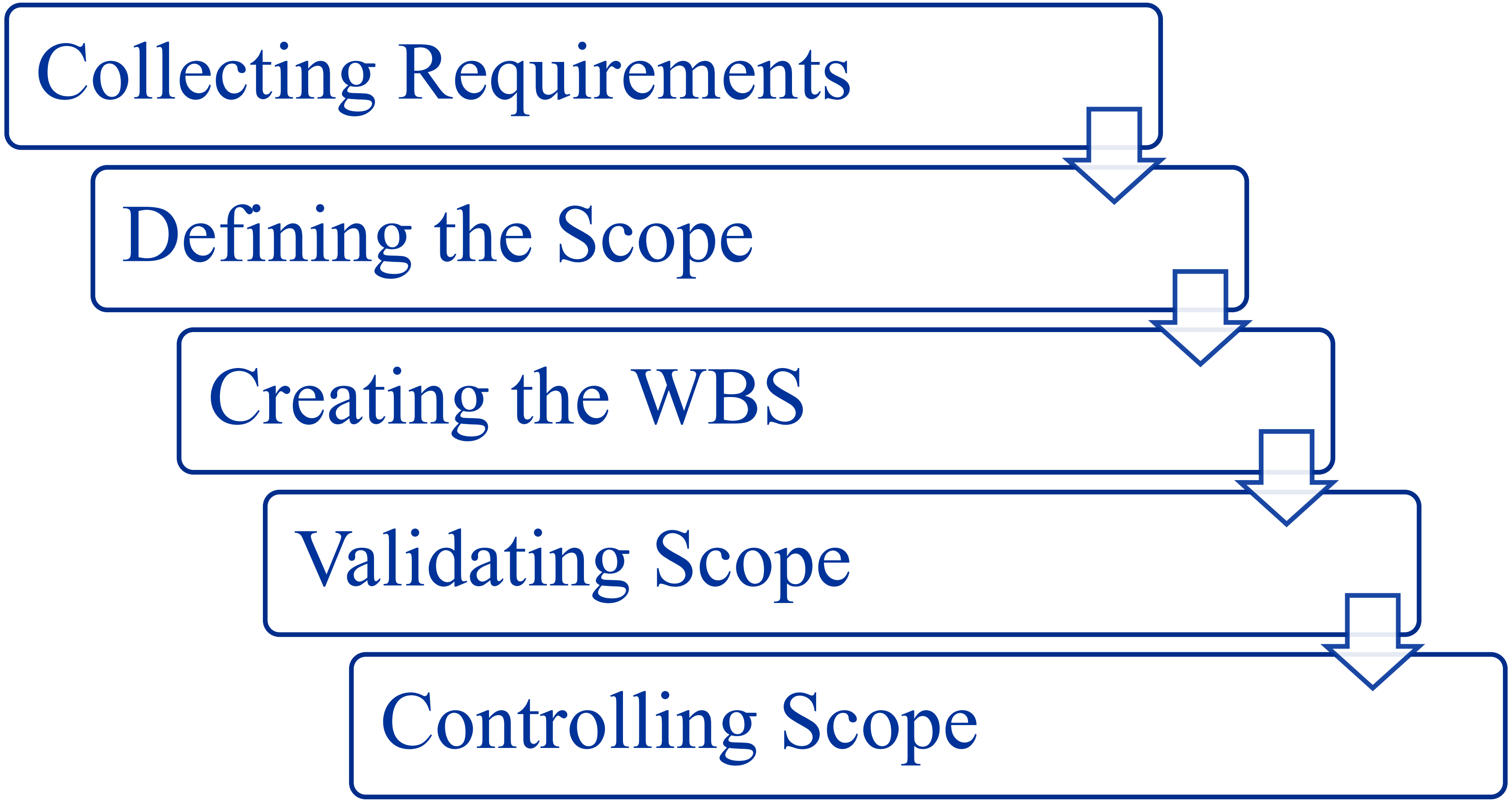
把事情做对

Project Scope Management

Project Scope Management

- Scope refers to all the work involved in creating the products of the project and the processes used to create them. It defines what is or is not to be done.
- Deliverables are products produced as part of a project, such as hardware or software, planning documents, or meeting minutes.
- Project stakeholders must agree
  - What the deliverables of project are;
  - How they should be produced.

Workflow of Project Scope Management


Collecting Requirements

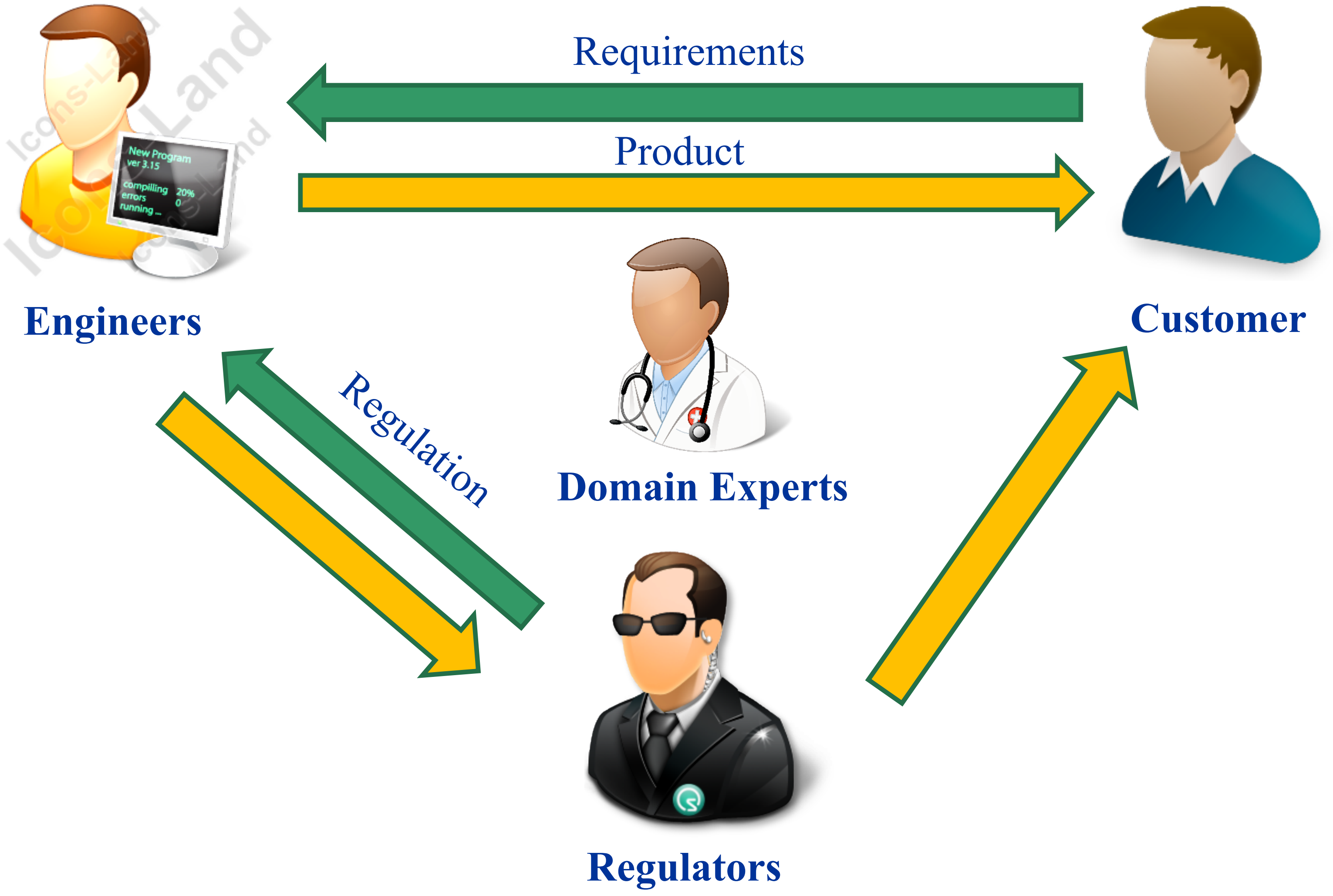
Defining the Scope

Creating the WBS

Validating Scope

Controlling Scope

Collecting the Requirement



Requirements

Product

Engineers

Customer

Domain Experts

Regulation

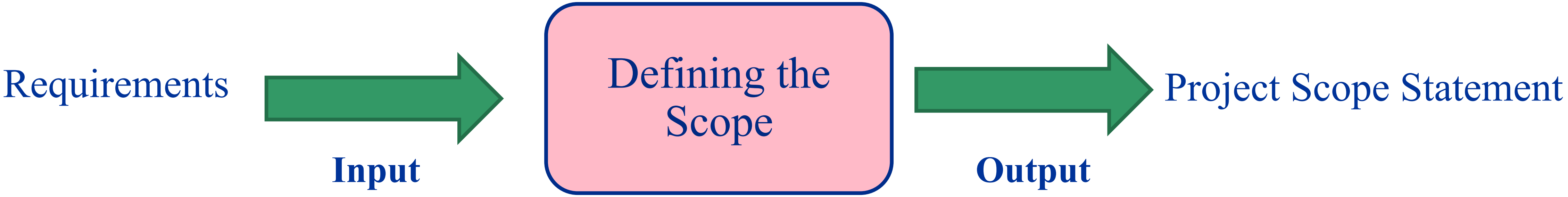
Regulators

Defining the Scope

- This step provides a detailed definition of the work required for the project.

- Good scope definition is very important to project success because
  - Improve the accuracy of time, cost, and resource estimates;
  - Define a baseline for performance measurement and project control;
  - Aids in communicating clear work responsibilities.

Defining the Scope (2)



Defining the Scope (3)

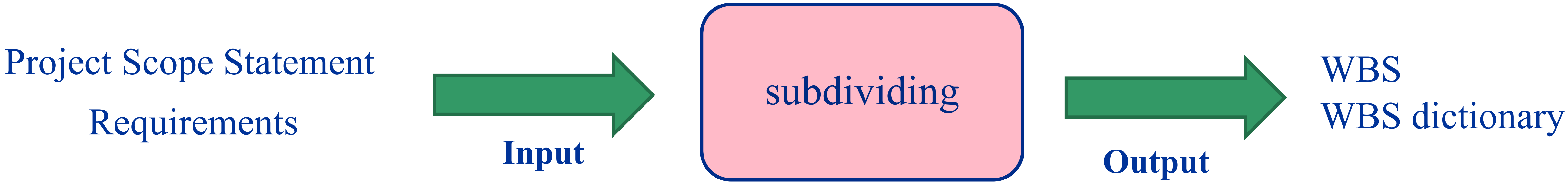
- To develop an effective project scope statement, you should:
- Outline project scope description
  - Objectives, feature, specifications, details about the project
- Select major deliverables
  - Document, software, source code, data, …
- Identify key milestones
  - A key milestone indicates when stakeholders can expect a particular deliverable to be completed.

Defining the Scope (4)

- Identify major constraints
  - Personnel, resources, schedule, or other requirements
- List scope exclusions
  - The list consists of deliverables that a project sponsor may assume are included in the scope of the project but are not, in fact, included.

Creating the WBS

- Work Breakdown Structure (WBS)
- WBS: the process of subdividing project deliverables and project work into smaller, more manageable components.



Project Scope Statement

Requirements

Input

subdividing

Output

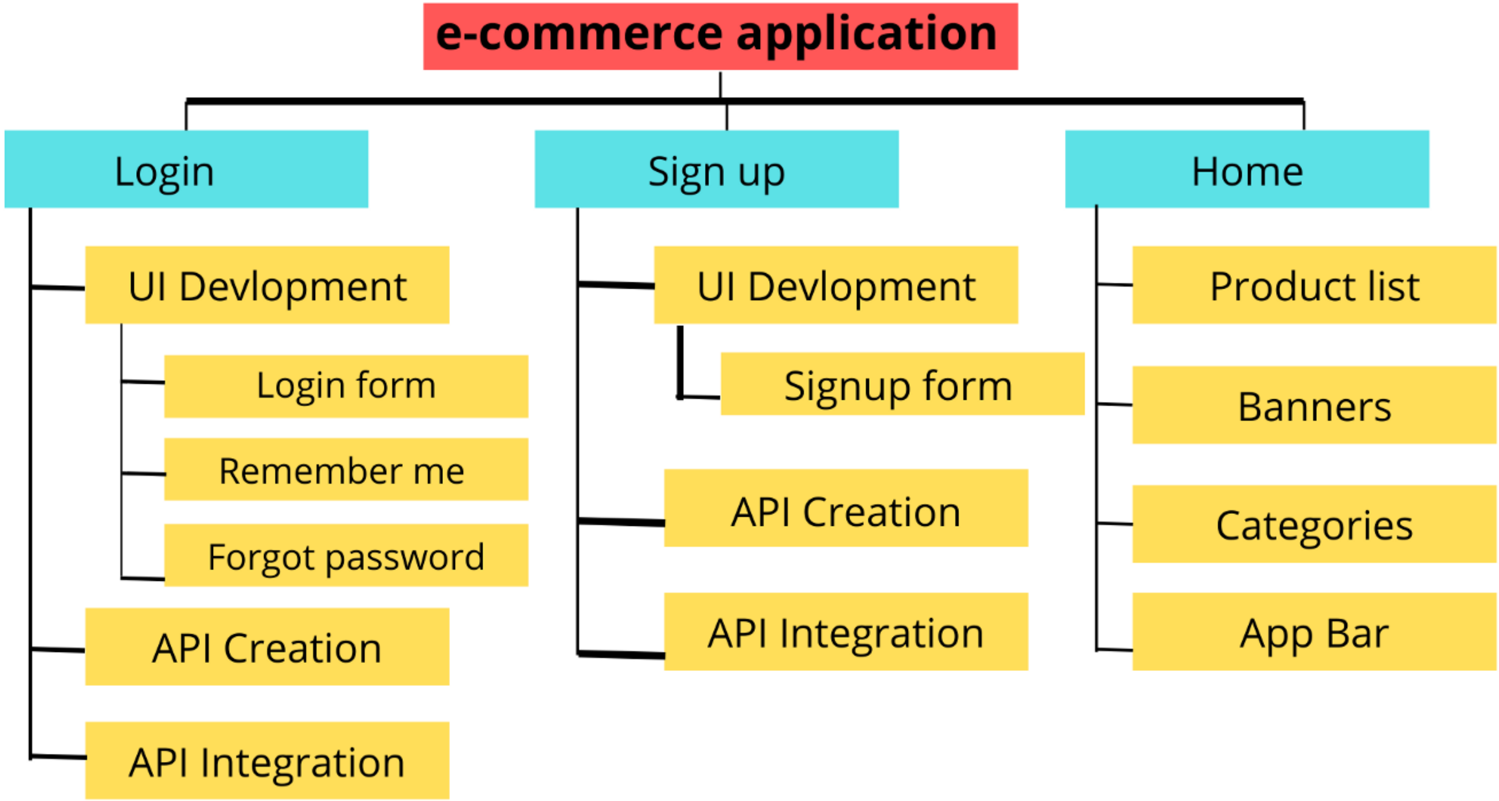
WBS

WBS dictionary

Creating the WBS: Example

Design an E-commerce app

WBS



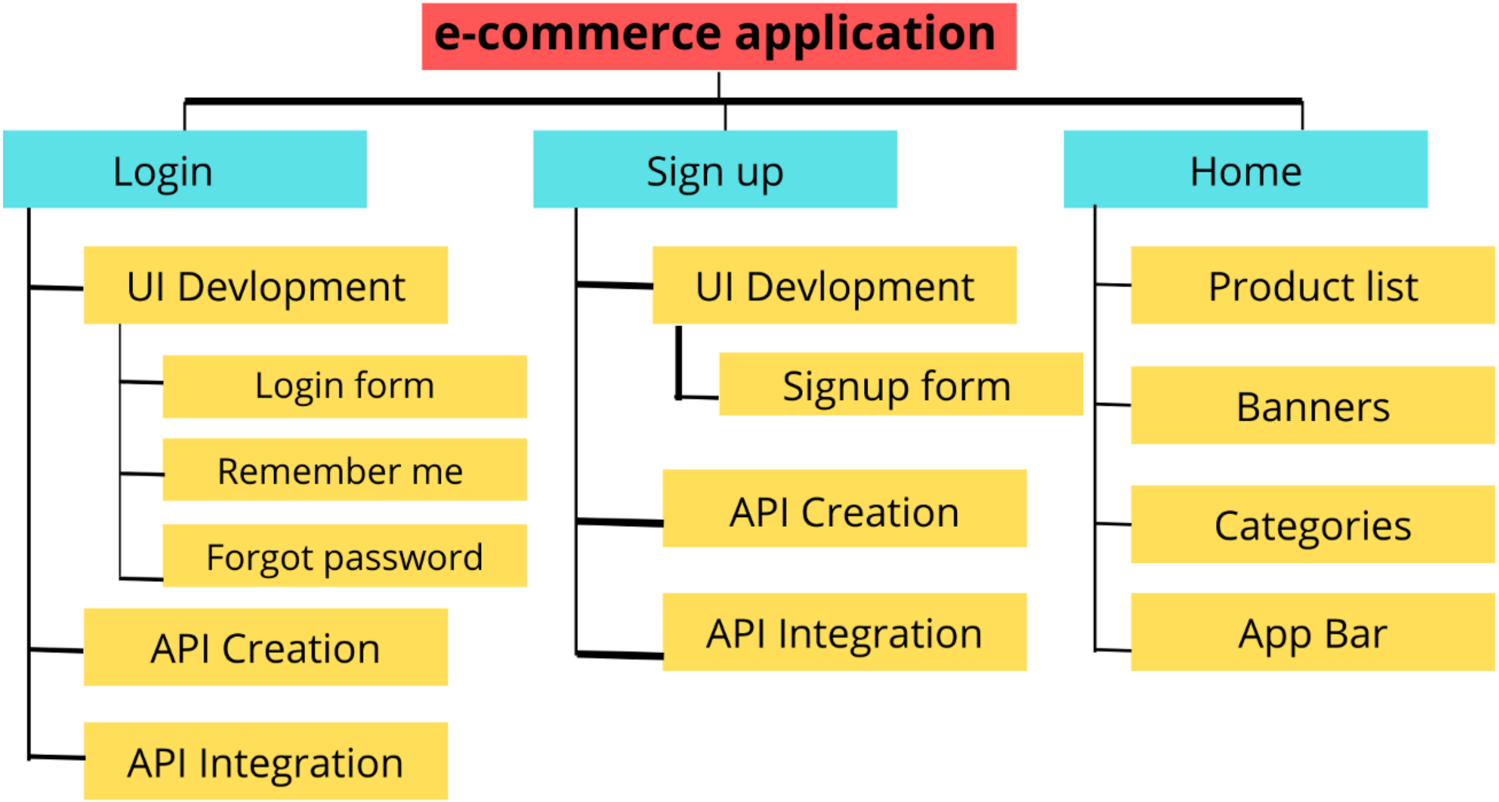
- e-commerce application
  - Login
    - UI Devlopment
      - Login form
      - Remember me
      - Forgot password
    - API Creation
    - API Integration
  - Sign up
    - UI Devlopment
      - Signup form
    - API Creation
    - API Integration
  - Home
    - Product list
    - Banners
    - Categories
    - App Bar

Creating the WBS: Example (2)

Level 1 (Entire Project)

Level 2 WBS

Level 3 WBS



e-commerce application

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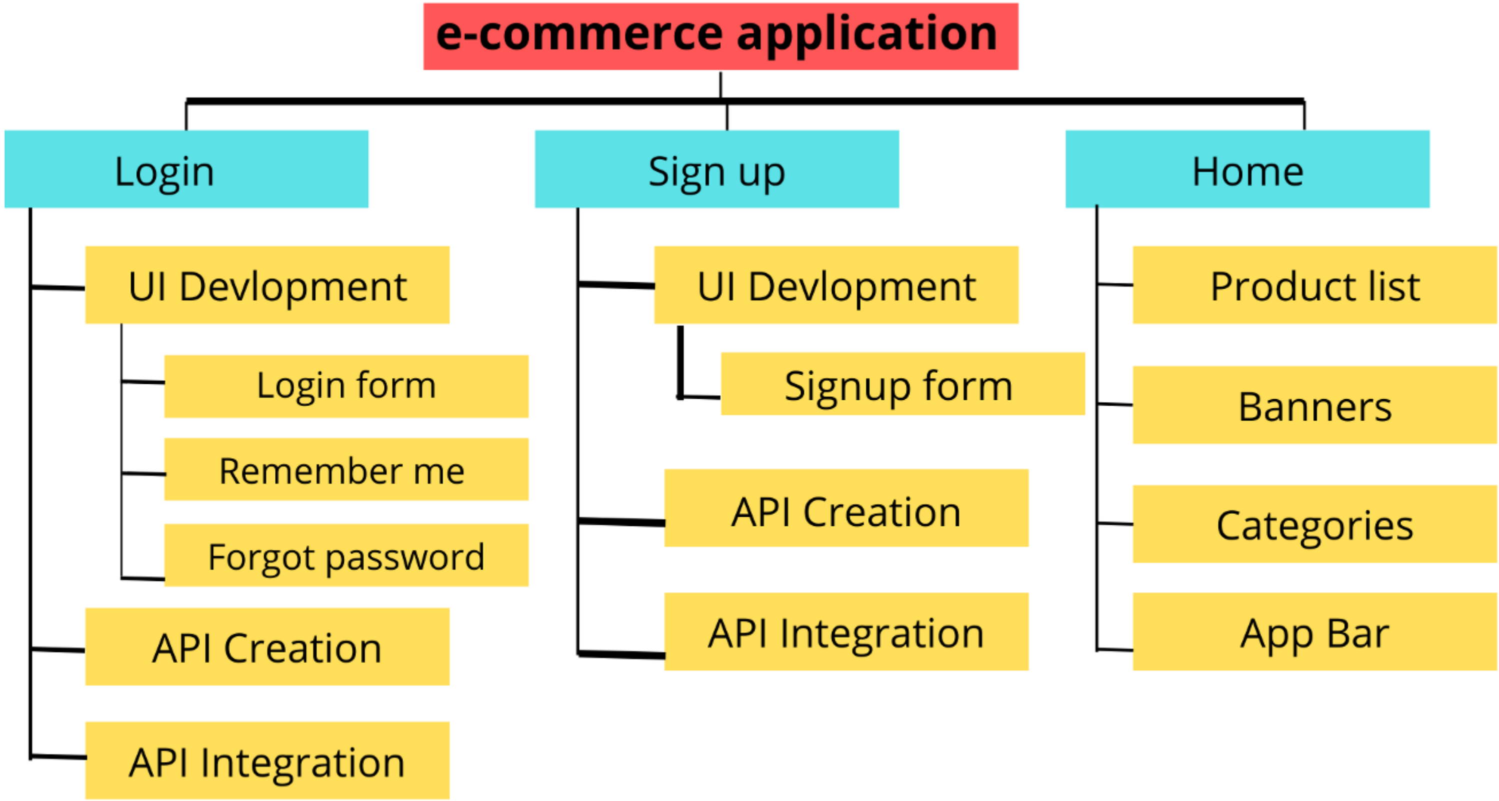
Defining Scope vs WBS



Defining Scope vs WBS

Defining Scope

Login

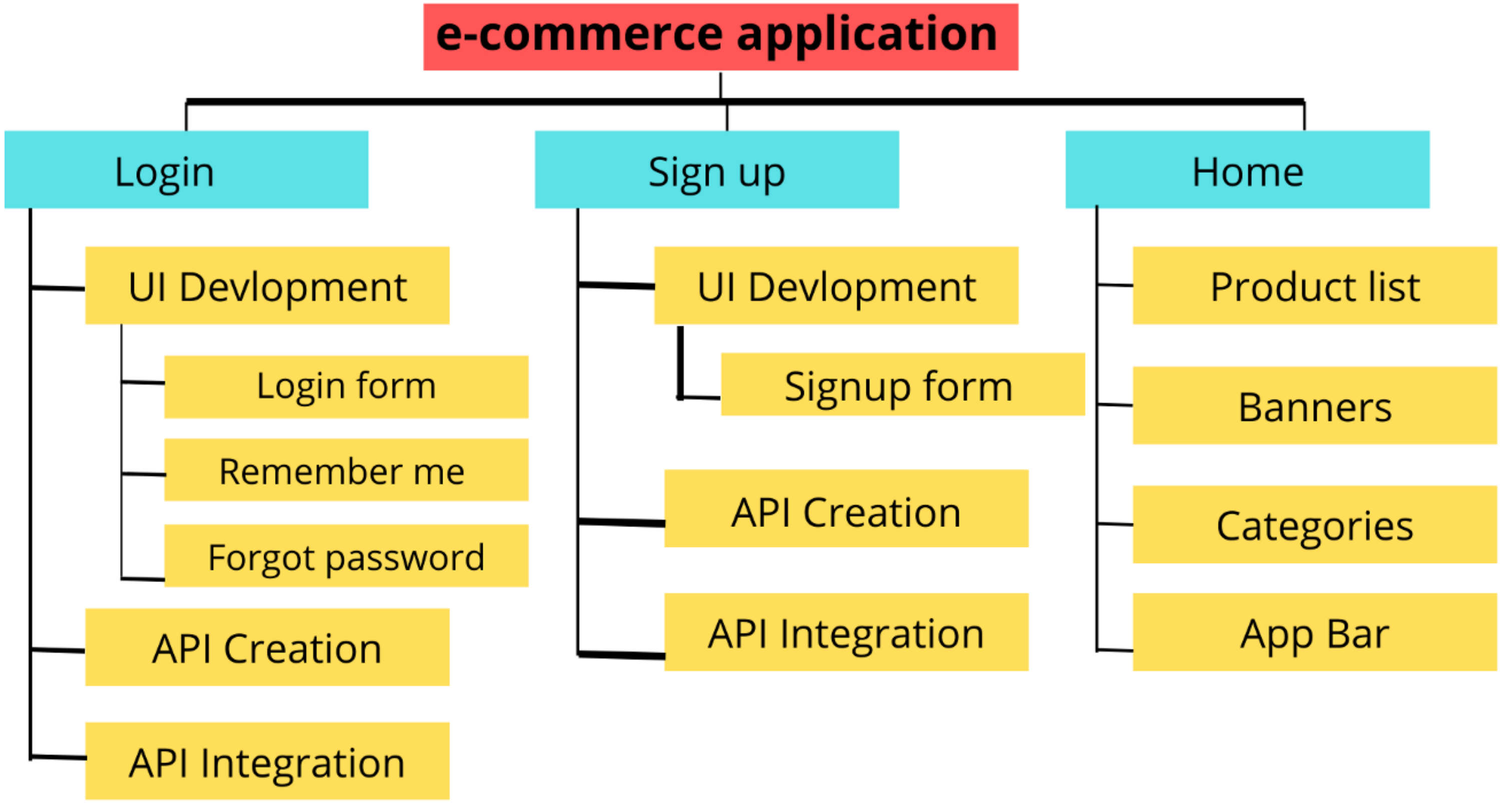
Sign up

Home

Product List

(collecting requirements)

WBS



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- API Integration

Home
- Product list
- Banners
- Categories
- App Bar

Approaches to develop WBS

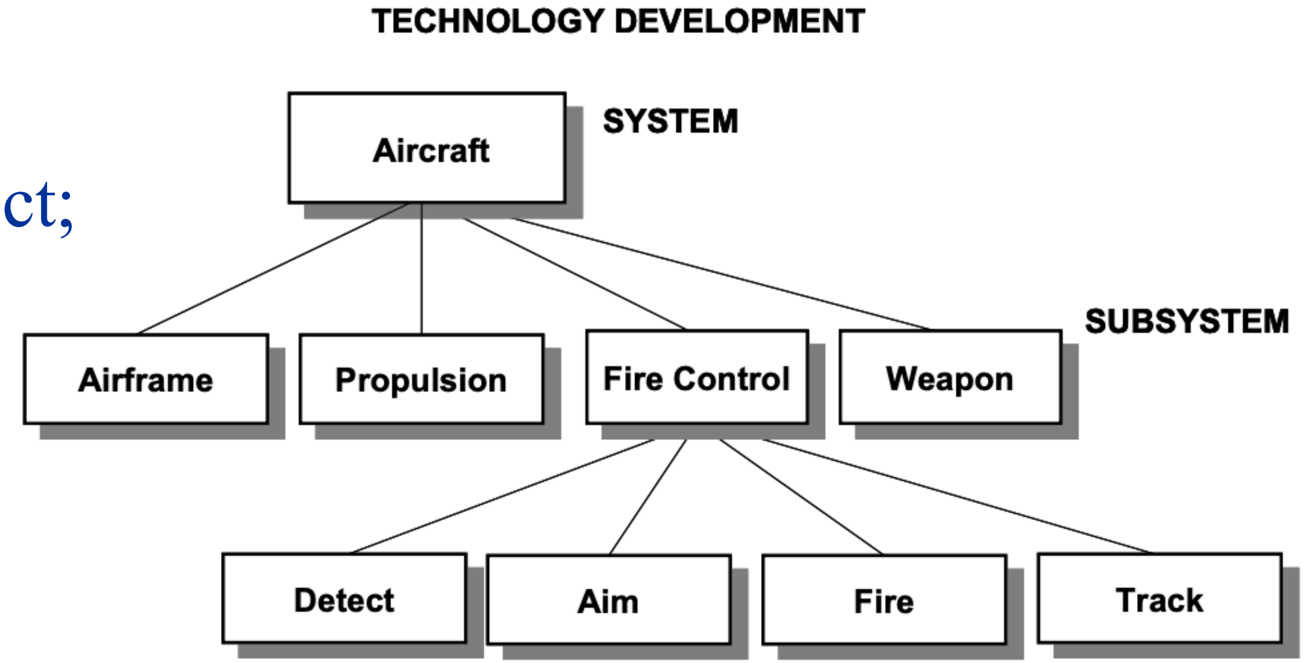
- There are several approaches to develop a work breakdown structure:
  1. Using guidelines
  2. The analogy approach
  3. The top-down approach
  4. The bottom-up approach
  5. The mind-mapping approach

Using Guidelines

- If guidelines exist for developing a WBS, it is very important to follow them.
- Example:

➢ USA DOD Handbook;

➢ WBS Templates in MS Project;



The Analogy Approach

- In the analogy approach, you use a similar project’s WBS as a starting point.
- Example

➢ Boeing, provides an example of using an analogy approach when creating WBSs.

➢ When creating a WBS for a new aircraft design, it started by using 74 predefined subsystems for building fighter aircraft based on past experience.

The Top-down Approach

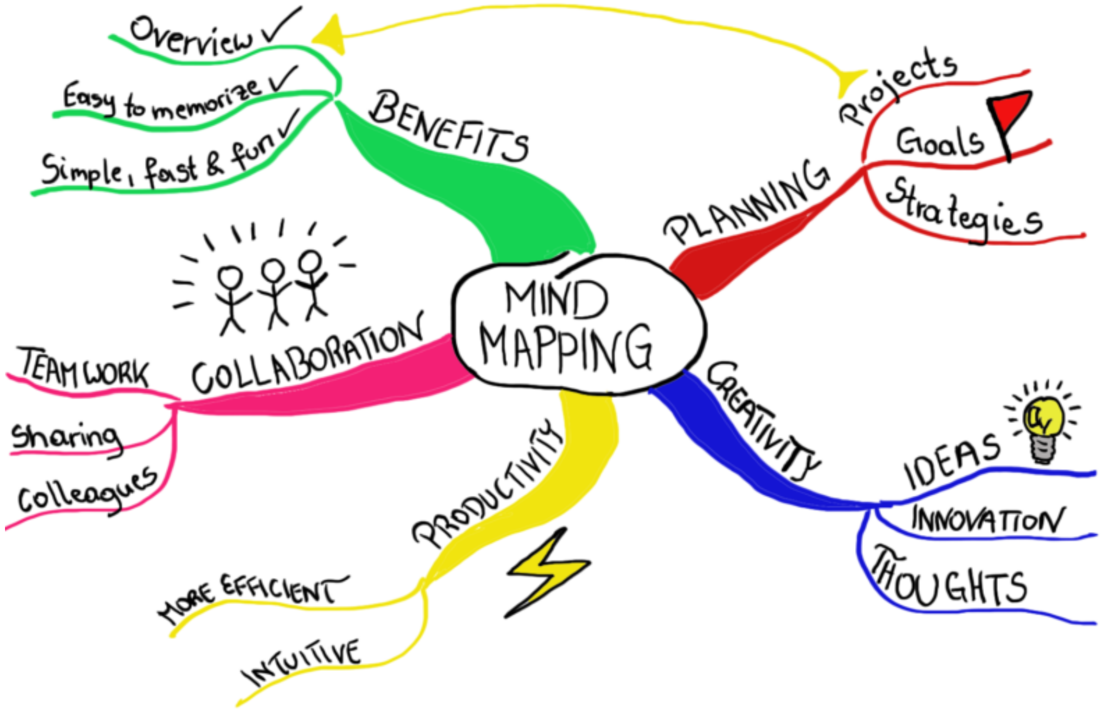
- To use the top-down approach, start with the largest items of the project and break them into subordinate items.
- This process involves refining the work into greater and greater levels of detail.

The Bottom-up Approach

- In the bottom-up approach, team members first identify as many specific tasks related to the project as possible.
- They then aggregate the specific tasks and organize them into summary activities, or higher levels in the WBS.

The Mind-mapping Approach

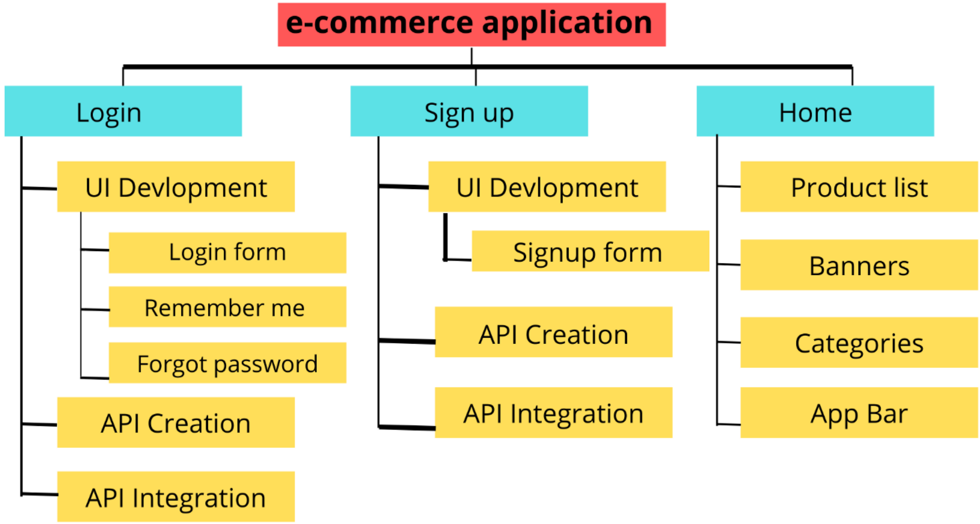
- Mind mapping is a technique that uses branches radiating from a core idea to structure thoughts and ideas.



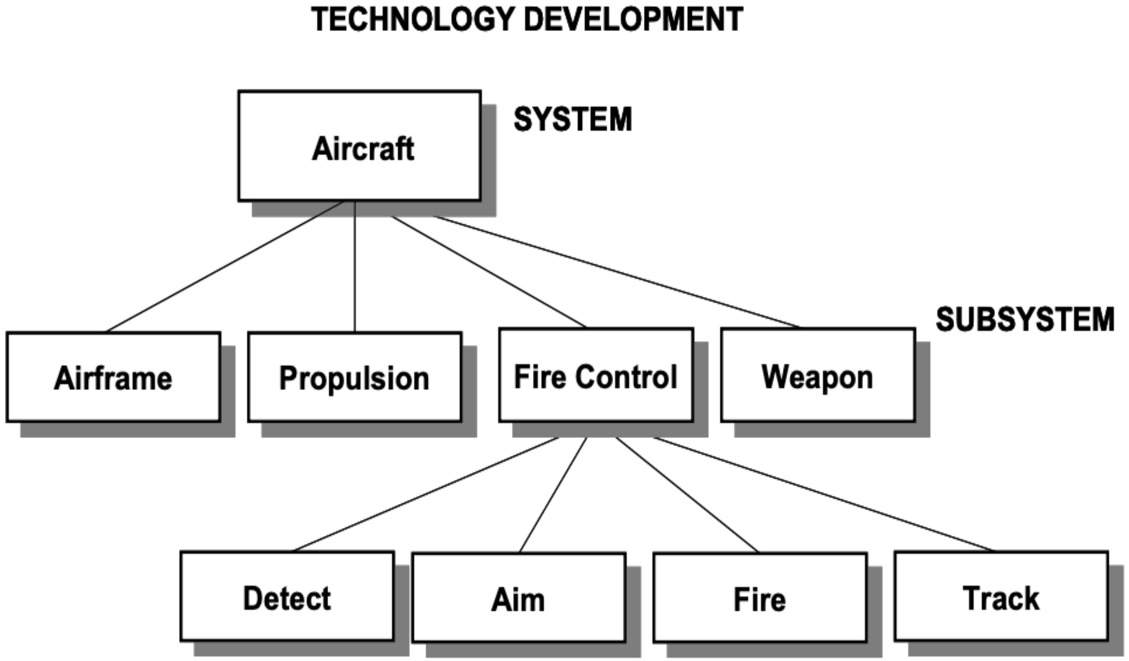
Recap

Design an E-commerce app

Using Guidelines
Analogy Approach
Mind-mapping Approach
Top-down Approach
Bottom-up Approach



WBS vs Task List (Todo List)

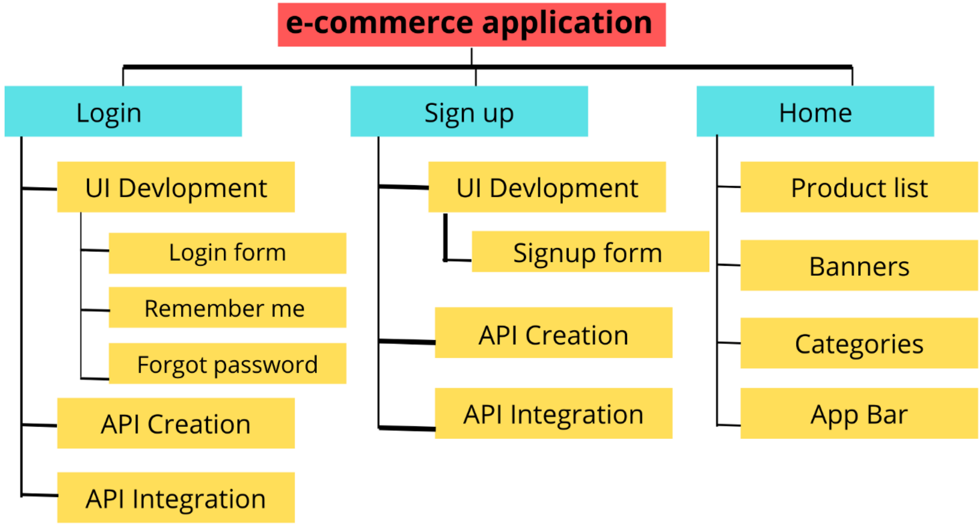


WBS vs Task List (2)

- A task list focuses on “how”, “who”, and “when” of specific tasks.
- WBS focuses on the deliverables of the project.

WBS Dictionary

- Many of the items listed on the WBSs are rather vague.
- For example, what exactly does "UI Development" mean?
- A WBS dictionary is a document that provides detailed information about each WBS item.



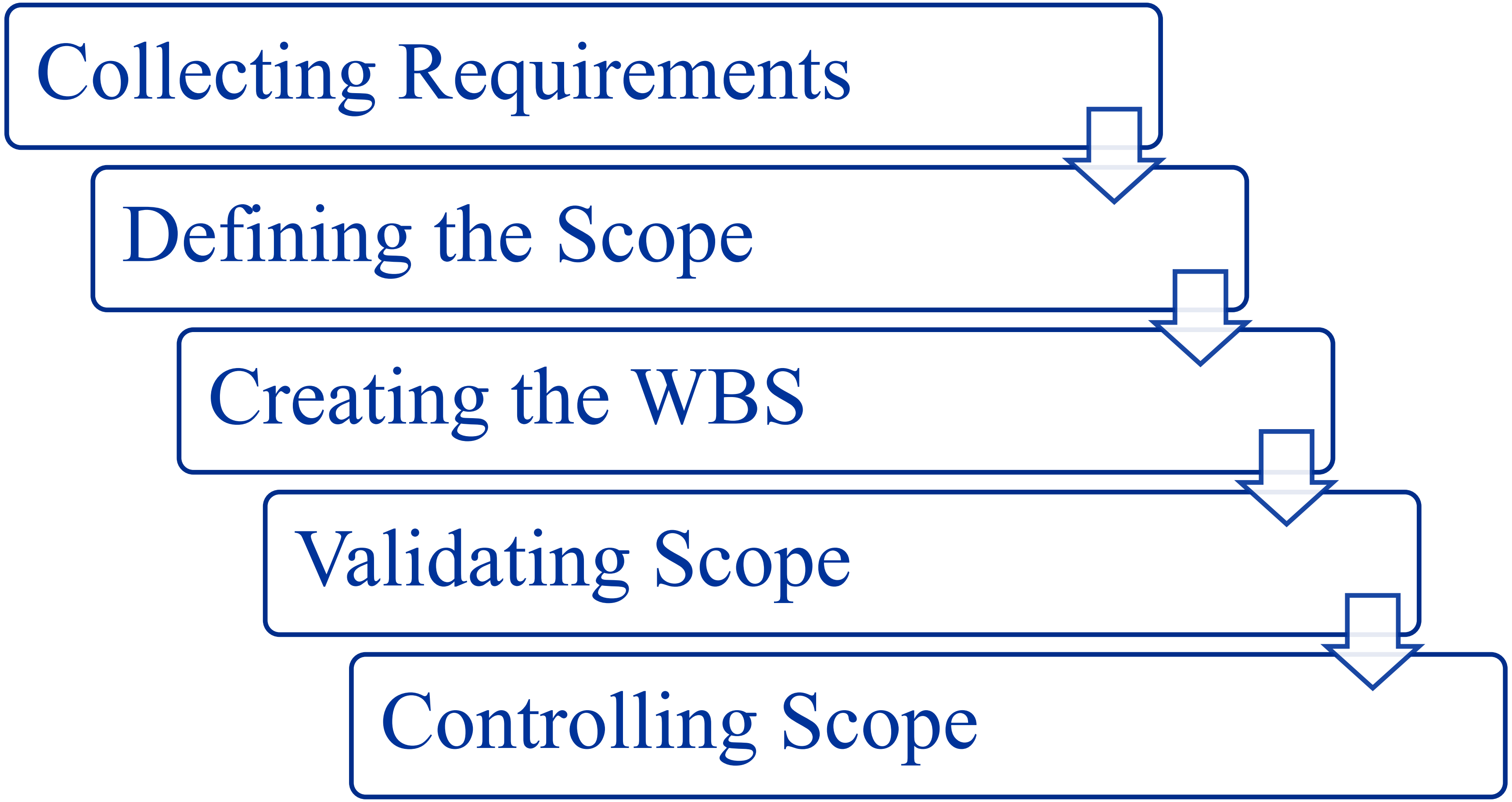
Validating Scope

- Scope validation involves formal acceptance of the completed project deliverables.
- This acceptance is often achieved by
  - a customer inspection;
  - a customer sign-off on key deliverables.

Controlling Scope

- Change is inevitable on projects, especially changes to the scope of IT projects.
- Users often are not sure
  - How they want screens to look;
  - What functionality they will need;
  - ...
- You cannot do a good job of controlling scope if you do not first do a good job of collecting requirements, defining scope, and validating scope.

Recap: Project Scope Management



Collecting Requirements

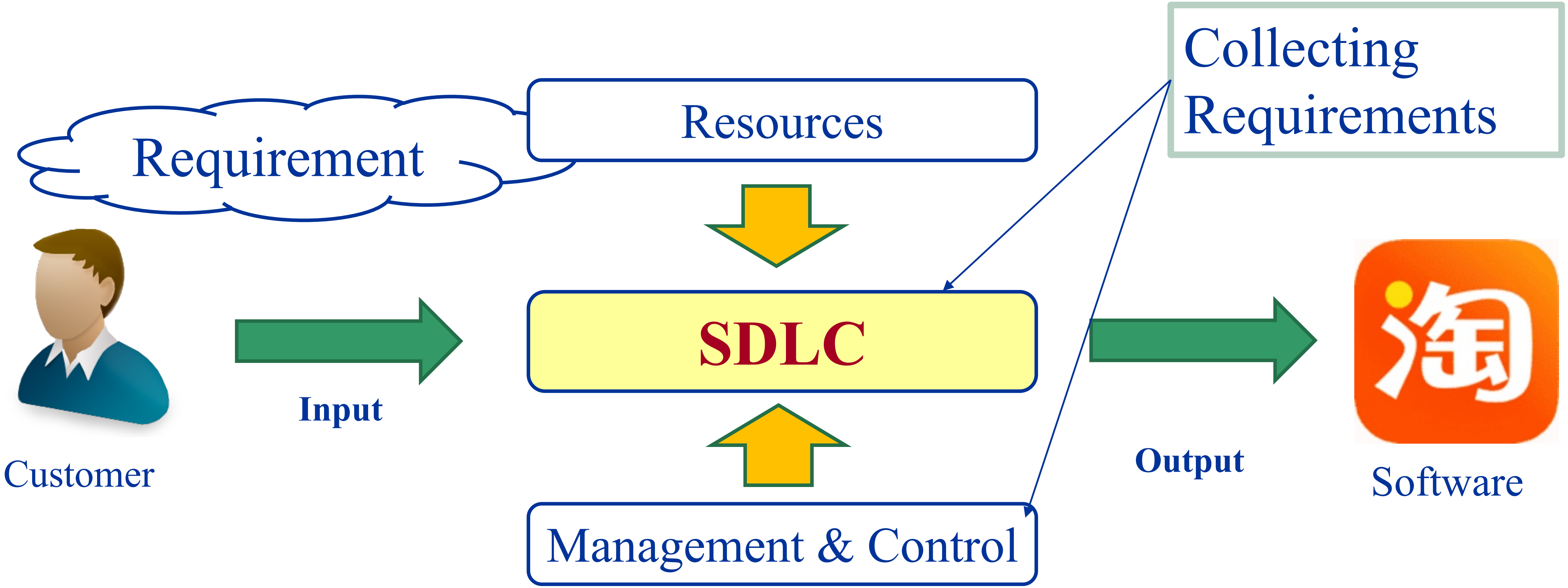
Defining the Scope

Creating the WBS

Validating Scope

Controlling Scope

Software Development Life Cycle (SDLC)


Collecting
Requirements
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Management & Control
Output
Software