# Section 1
# Introduction to Software Engineering

1. Overview
2. Team project
3. UML notation

# Section 1.1
# Software Engineering Overview

1. Definitions
2. Technical aspects
3. Management aspects
4. Software development phases

# 1.1.1 Definitions

- Software engineering:
  - what is software?
  - what is engineering?
  - so what is software engineering?
  - what is NOT software engineering?

- System:
  - what is a system in software engineering?

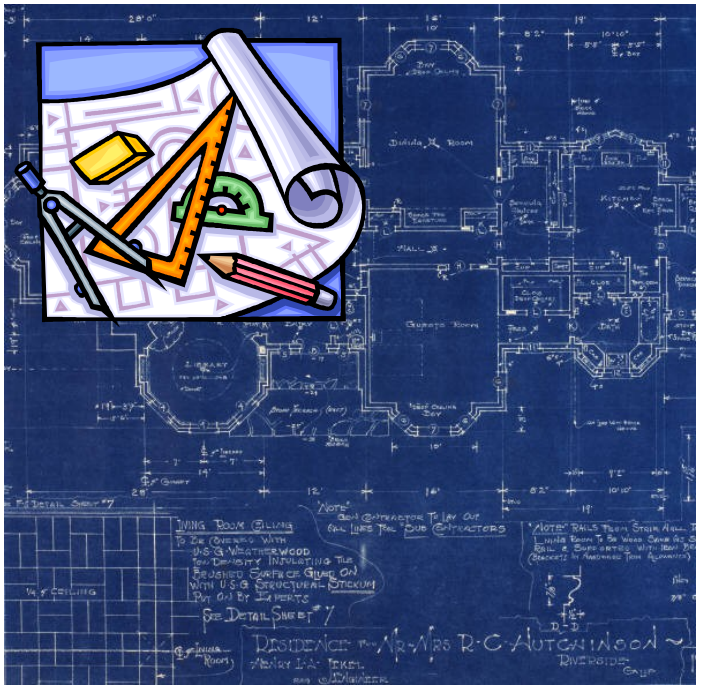
# Definitions (cont.)

- We need a reliable process for building software
  - what's a process? 
- Why?
- Wanted:  reliable, modifiable software systems

# How Do We Build a House?

# How Do We Build a House?

# We Need a Plan



# The Plan

- One software engineering recipe, two lists of ingredients:
  - technical
  - management

- Technical aspects:
  - understanding the problem
    - how do we do this?
  - figuring out an optimal solution

- Management aspects:
  - keeping things on track
  - planning for change
    - anything can change at any time

# 1.1.2 Technical Aspects

- Application domain
  - parts of the real world that are relevant to the problem
- Solution domain
  - everything related to the solution to the problem
- Building models
  - what is a *model*?
  - *what* do we model?

# Technical Aspects (cont.)

- How do we model the *application domain*?
  - describe the problem to be solved
  - describe the system requirements
  - identify objects required to model the requirements

- What activities are involved?
  - requirements elicitation
  - analysis

# Technical Aspects (cont.)

- How do we model the *solution domain*?
  - find a solution to the problem
  - identify objects required to model the solution
  - write the code
  - make sure it works as expected

- What activities are involved?
  - high-level system design
  - detailed object design
  - implementation
  - testing

# 1.1.3 Management Aspects

- Communication tools
  - notations, tools, programming conventions
- Configuration management
  - version control
- Rationale management
  - why did who make what decision, when, and how
- Software development processes
  - sequential, iterative, Agile

# Management Aspects (cont.)

- Change is good?

| | | Time detected | | | | |
|---|---|---|---|---|---|---|
| | | Requirements | Architecture | Construction | System test | Post-release |
| Time introduced | Requirements | 1× | 3× | 5–10× | 10× | 10–100× |
| | Architecture | - | 1× | 10× | 15× | 25–100× |
| | Construction | - | - | 1× | 10× | 10–25× |

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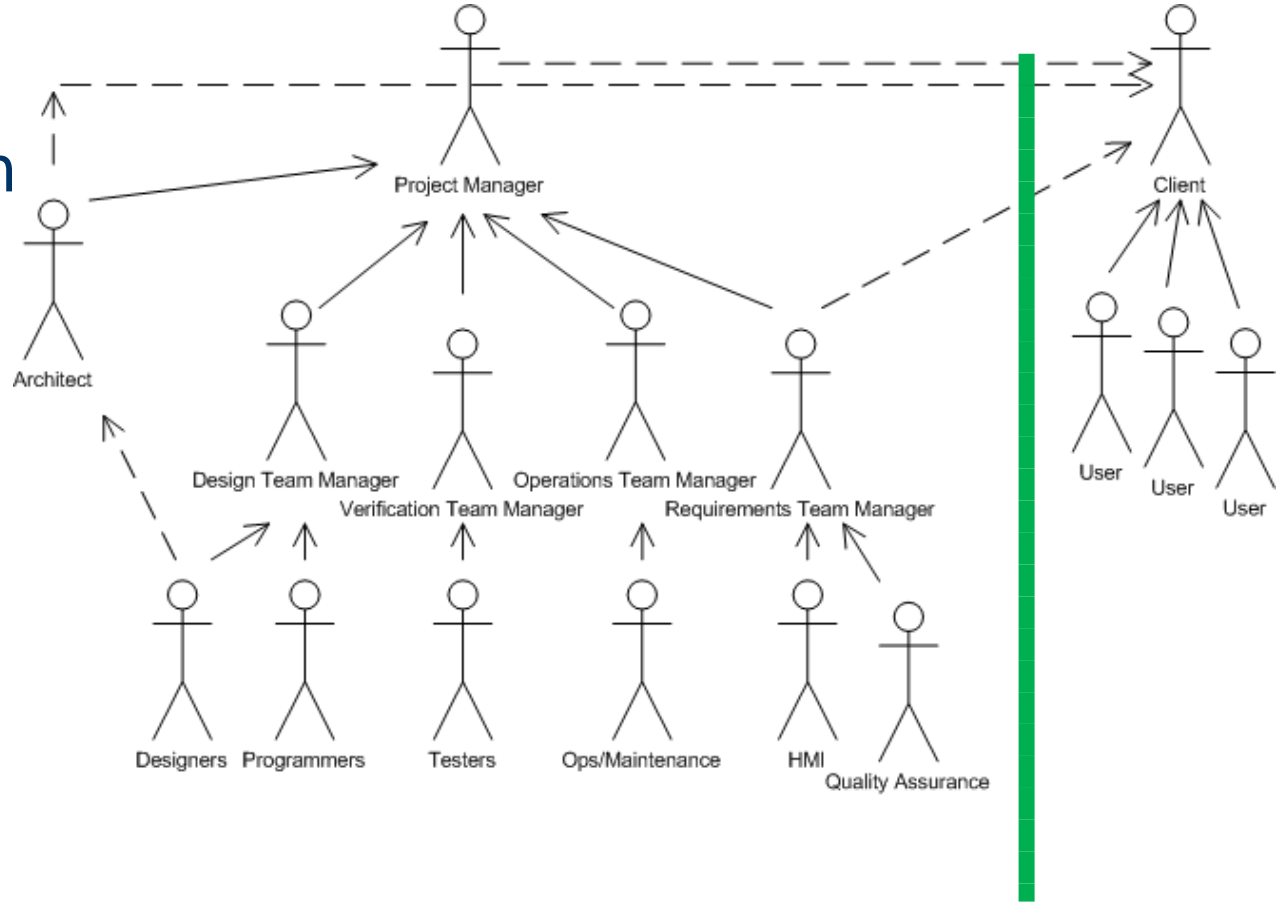
# The Stakeholders

- Client
  - users
- Development team
  - project manager
  - architect
  - analysts
  - designers
  - programmers
  - testers
  - operations



# 1.1.4 Software Development Phases

- Requirements analysis
  - requirements elicitation
  - analysis
- Design
  - high-level system design
  - detailed object design
- Implementation
- Testing
  - unit testing, integration testing
  - system testing
- Deployment and maintenance

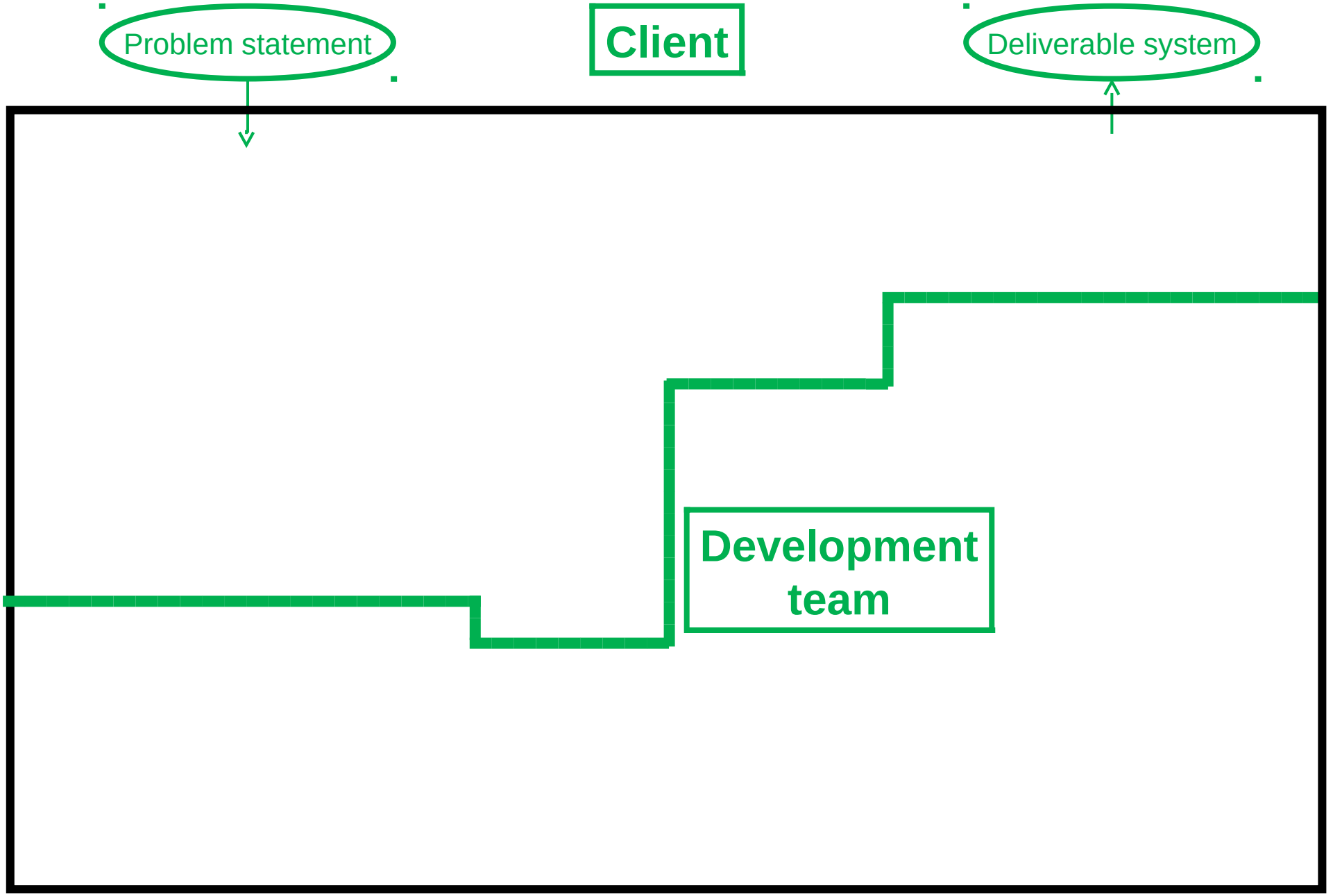
# Software Development Products

- Output of development process
  - *work product*
    - a unit of work
    - examples:  documents, diagrams, source code, test plan
  - *deliverable*
    - work product delivered to the client

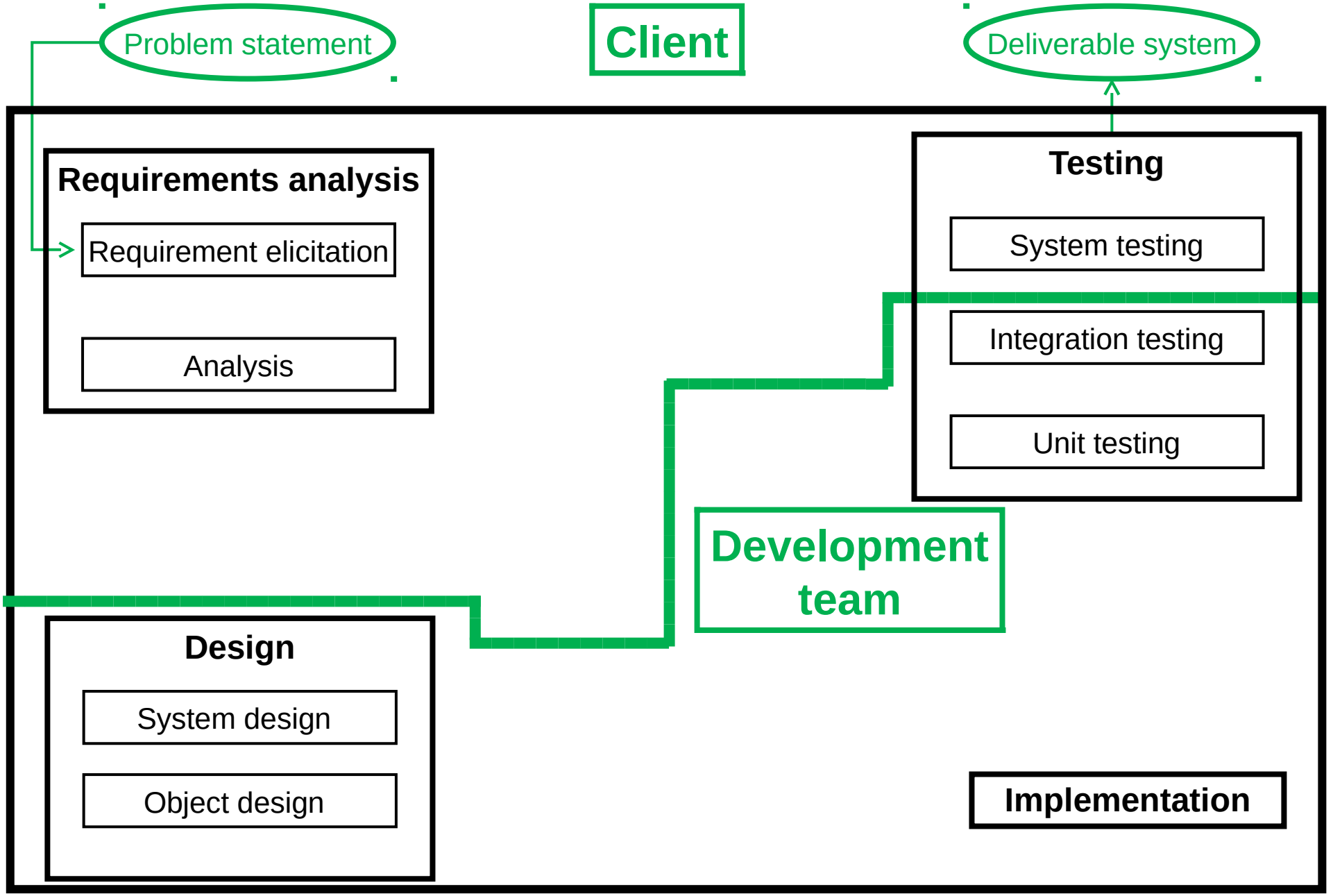
# Software Development Products (cont.)

- Important work products
  - *functional model*
    - describes the system from the user's point of view
  - *dynamic model*
    - describes the internal behaviour of the system
    - also from the user's point of view
  - *object model*
    - describes the system in terms of objects, attributes, operations

# Development Phases and Products



# Development Phases and Products



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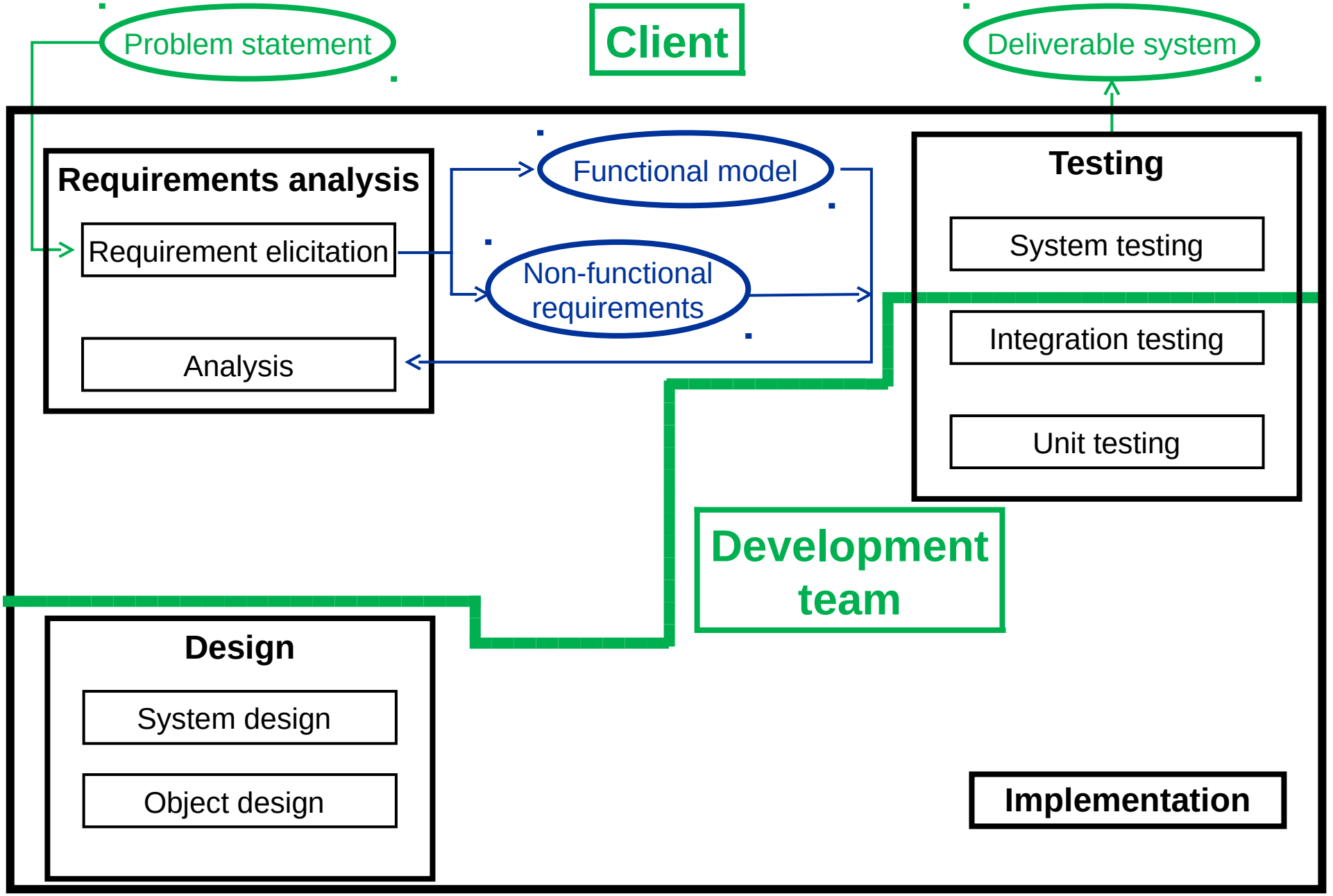

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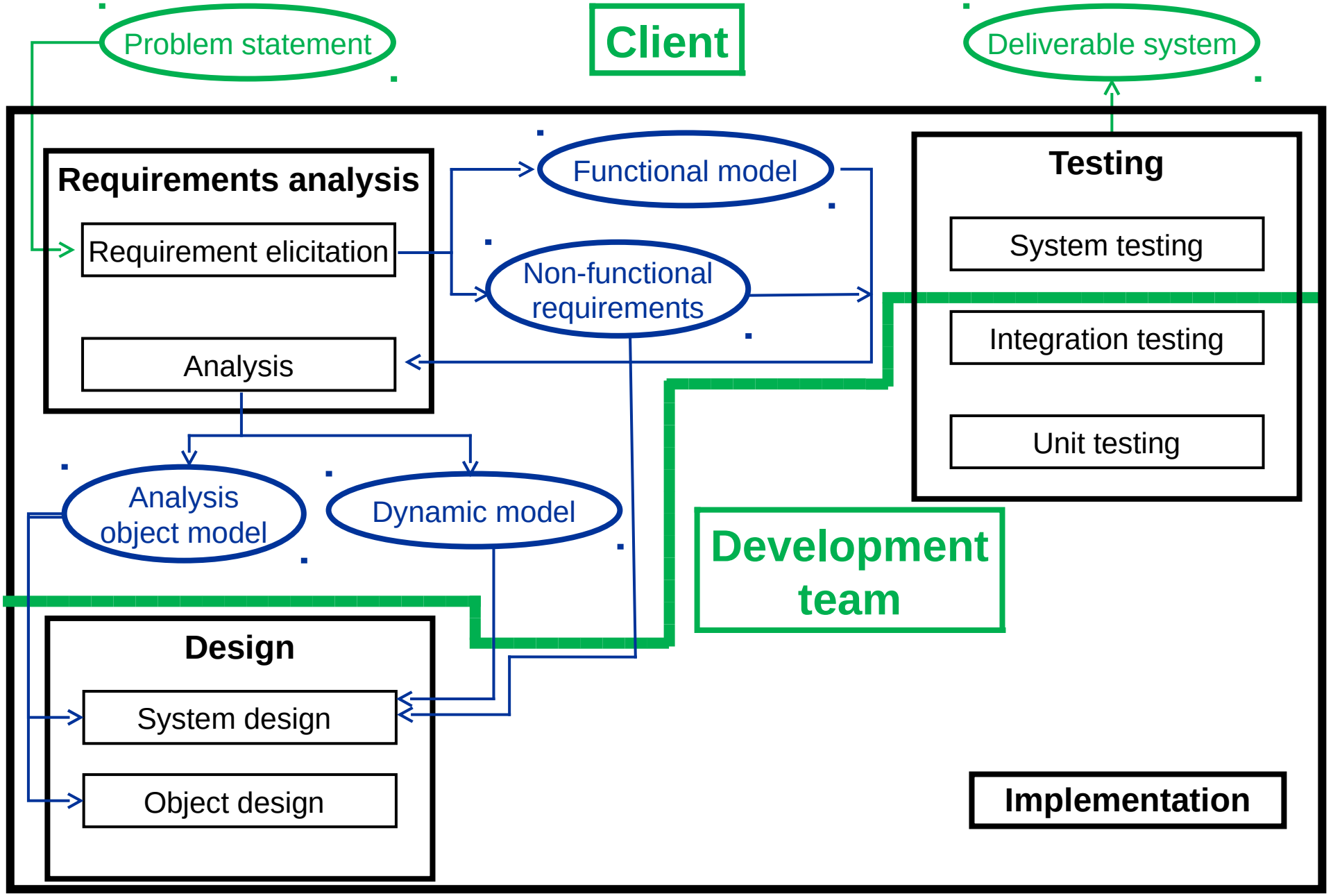

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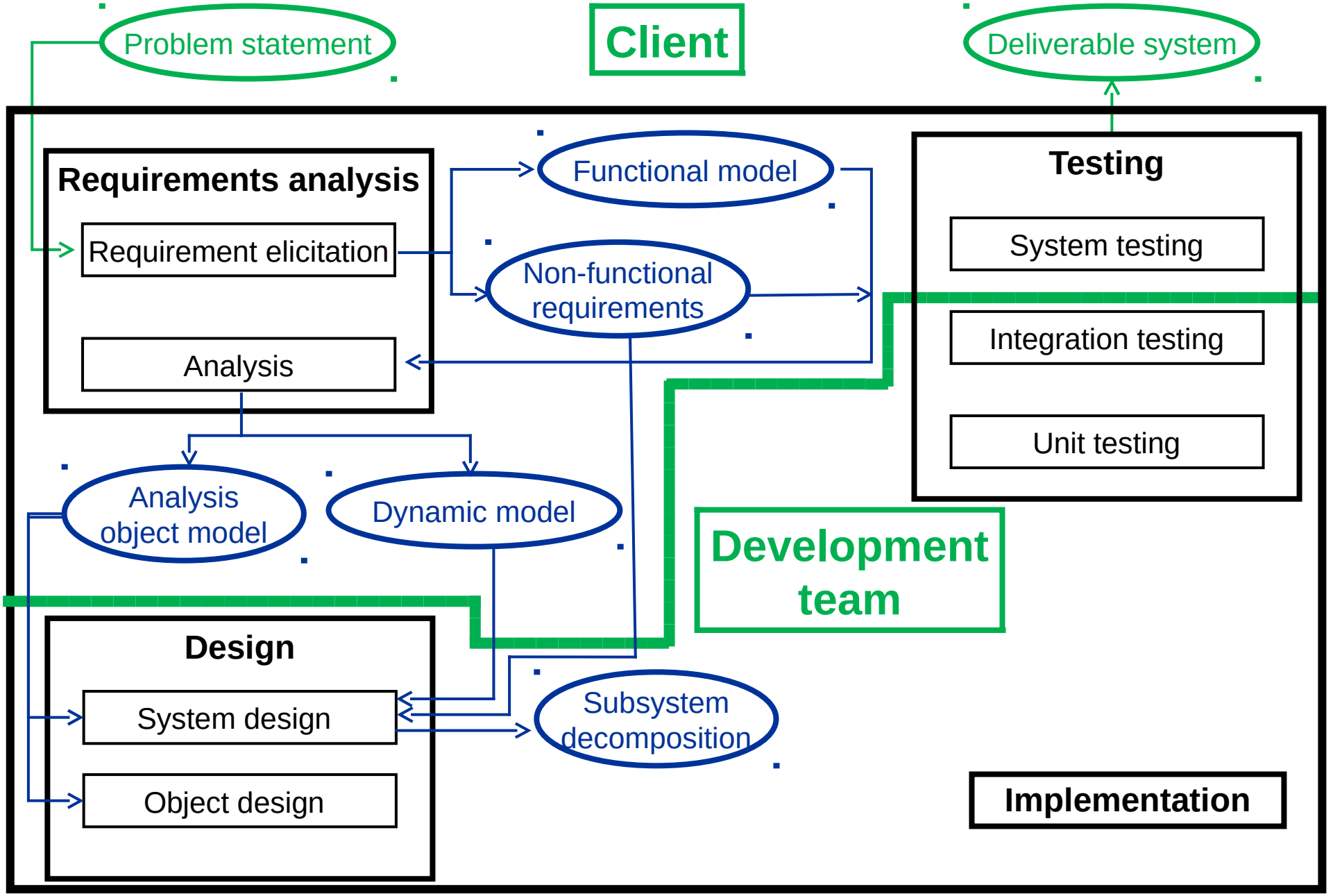

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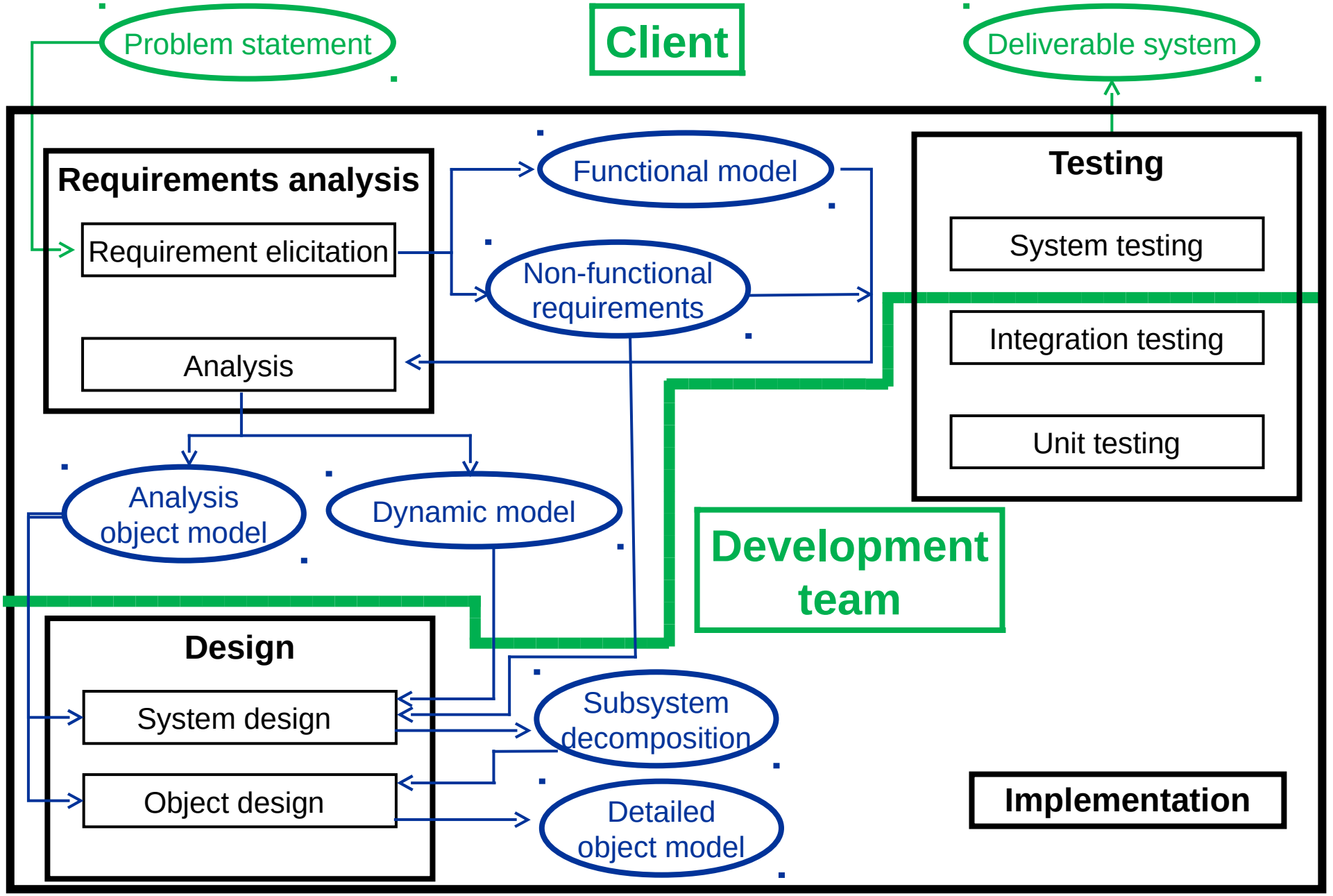

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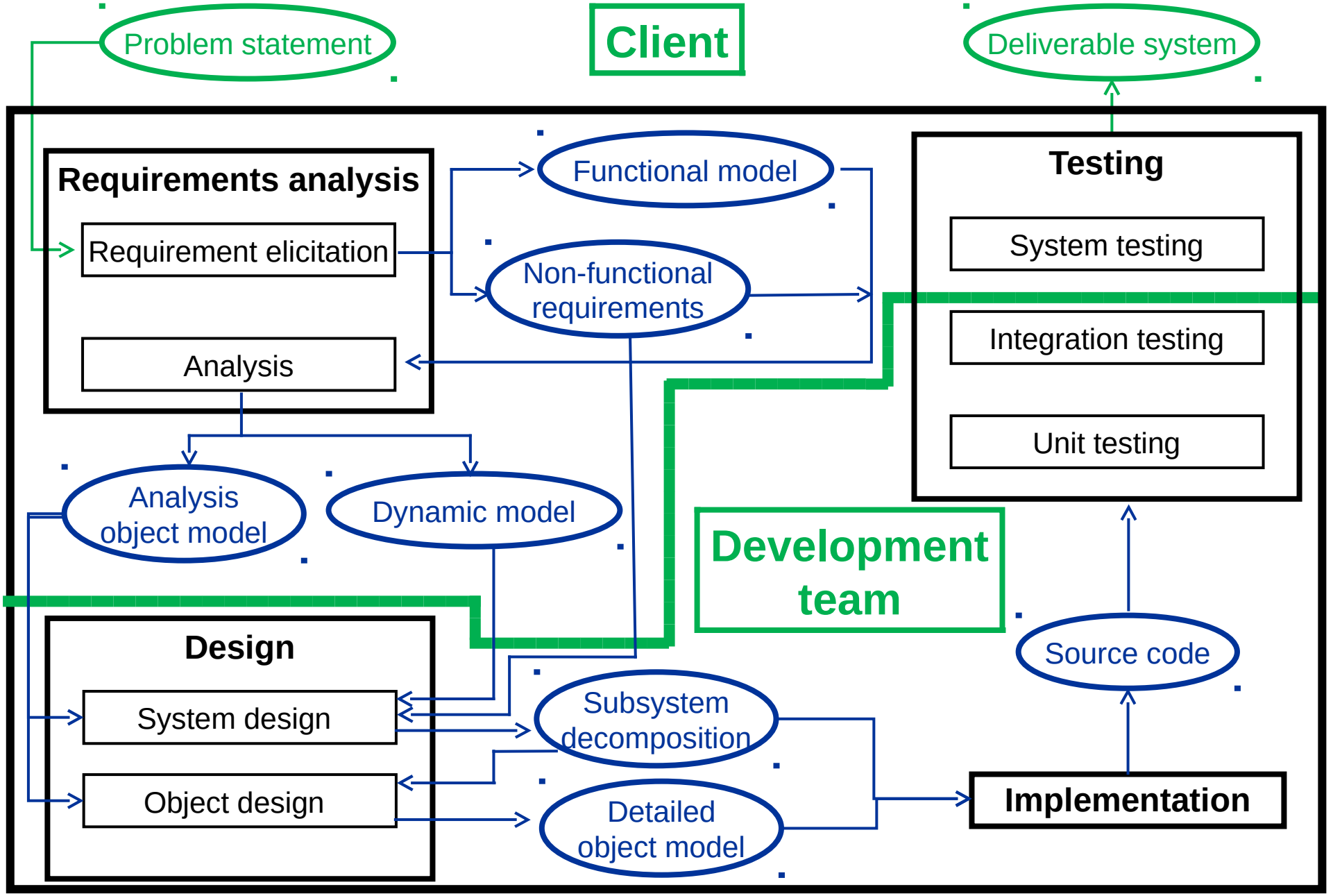

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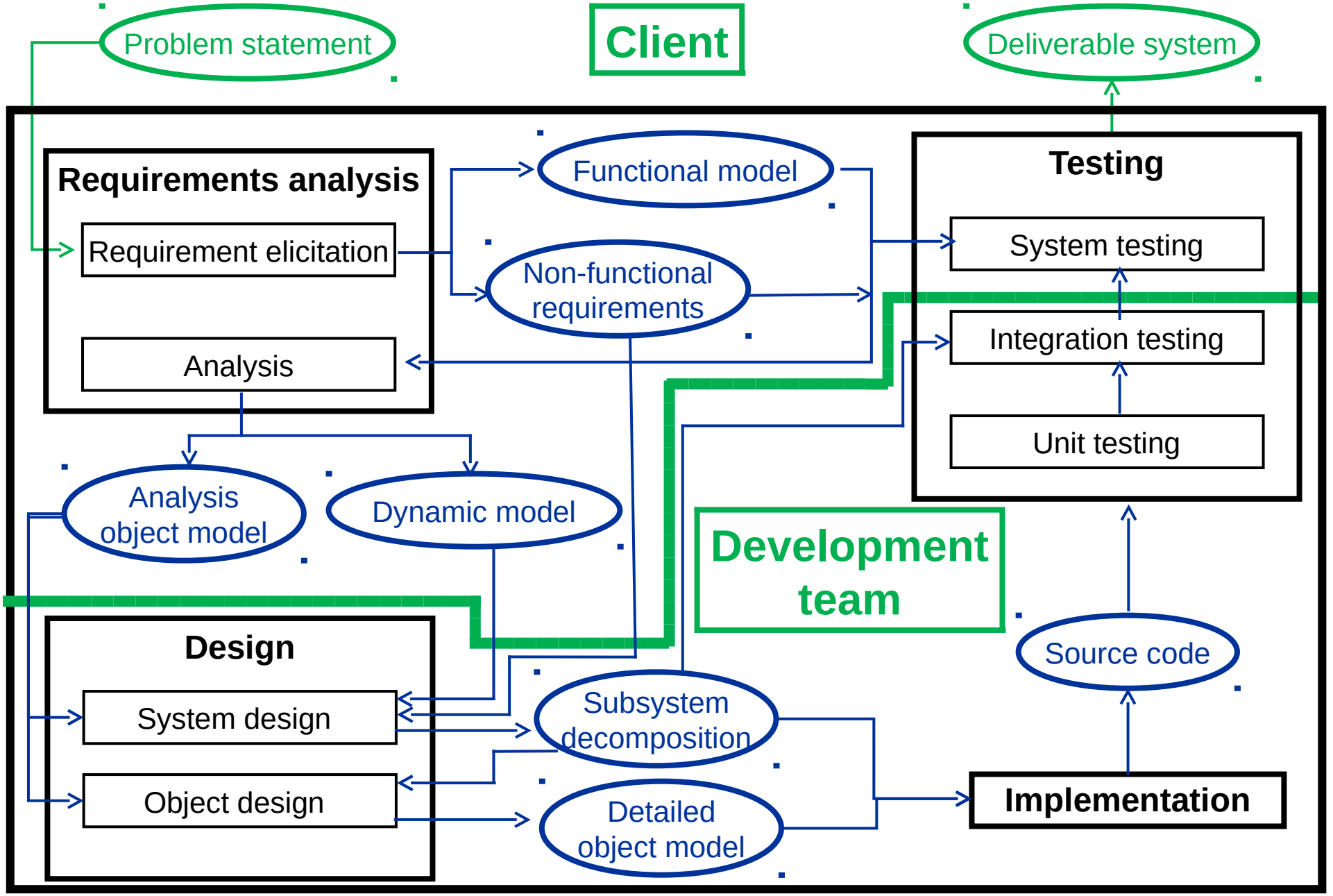

# Development Phases and Products