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# New ICT Technologies

## Software Engineering

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# Introduction

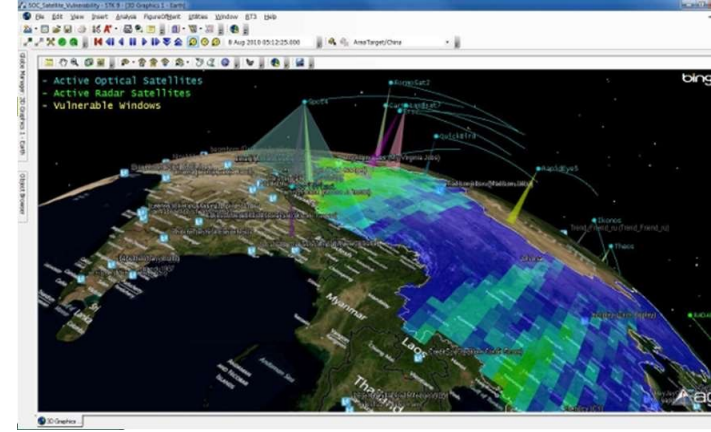
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- » **Engineering** is the use of scientific principles to **design** and **build** machines, structures, and other items, including bridges, tunnels, roads, vehicles, and buildings.
- » The discipline of engineering encompasses a broad range of more specialized fields of engineering, each with a more specific emphasis on **particular areas** of applied mathematics, applied science, and **types of application**.

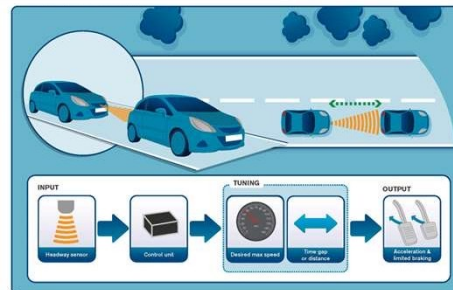
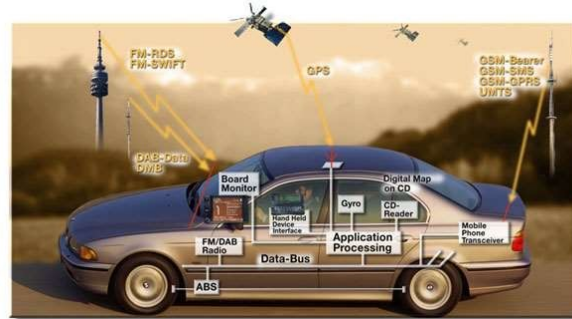
# Software Engineering (working def.)

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Set of **automated** methods  
to **systematically** develop **quality** software  
that fulfils **customer needs**  
while satisfying **existing constraints**



Let us put the pieces together,  
on...



# A software system is not only software, not only programming

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**Programming is NOT enough!**

It is not enough to do your best: you must  
Know what to do, and THEN do your best.  
-- *W. Edwards Deming*

# Software Engineering (working def.)

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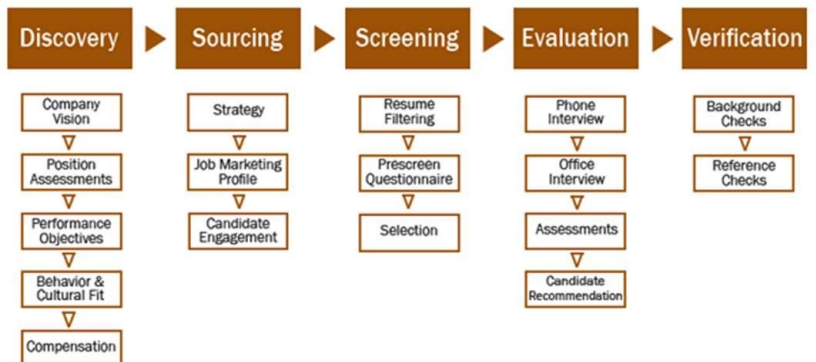


# Software Engineering: What

## Automated methods



## Systematic



Set of **automated** methods

to **systematically** develop **quality** software

that fulfils **customer needs**

while satisfying **existing constraints**

Computer Science Theories and Technologies – Prof. Romina Eramo

# Software Engineering: What

- Quality Software..



- ... to mitigate failures



Set of **automated** methods  
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# Software Engineering : What

## ■ Customer needs

Set of **automated** methods  
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while satisfying **existing constraints**



# Software Engineering: What

## ■ constraints



Set of **automated** methods  
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# Well Engineered Software

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- » It does what expected by the customer/user +
- » It implements the «wanted» qualities +
- » It satisfies existing constrains +
- » It can be easily revised, extended, evolved ...
- » ... and more!

Set of **automated** methods  
to **systematically** develop **quality** software  
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while satisfying **existing constraints**

# Software Engineering: When

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- » Field of computer science dealing with software systems that are:
  - large and complex =complex? large?
  - built by teams = **people!, communication, ...**
  - exist in many versions =version control
  - last many years =engineered to be sustainable
  - Undergo changes =evolves

# Major points

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1. Why it is important to design
2. Definition of Software Engineering
3. Principles that guide design
4. Collaboration and soft skills and complementarity
5. Common problems and causes of failure
6. Importance of user experience
7. Difference between engineering and SW engineering
8. The importance of the term "systematic"
9. Importance of documentation
10. Personal experience/encounters with the reality

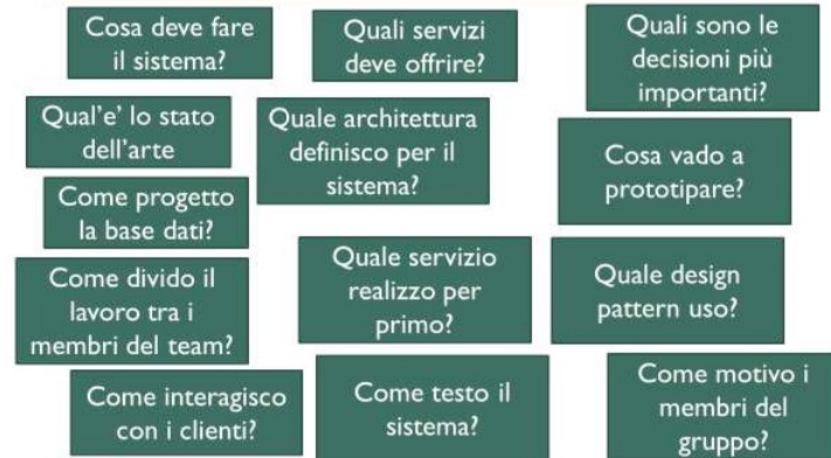


# Software development process

» What is a process?

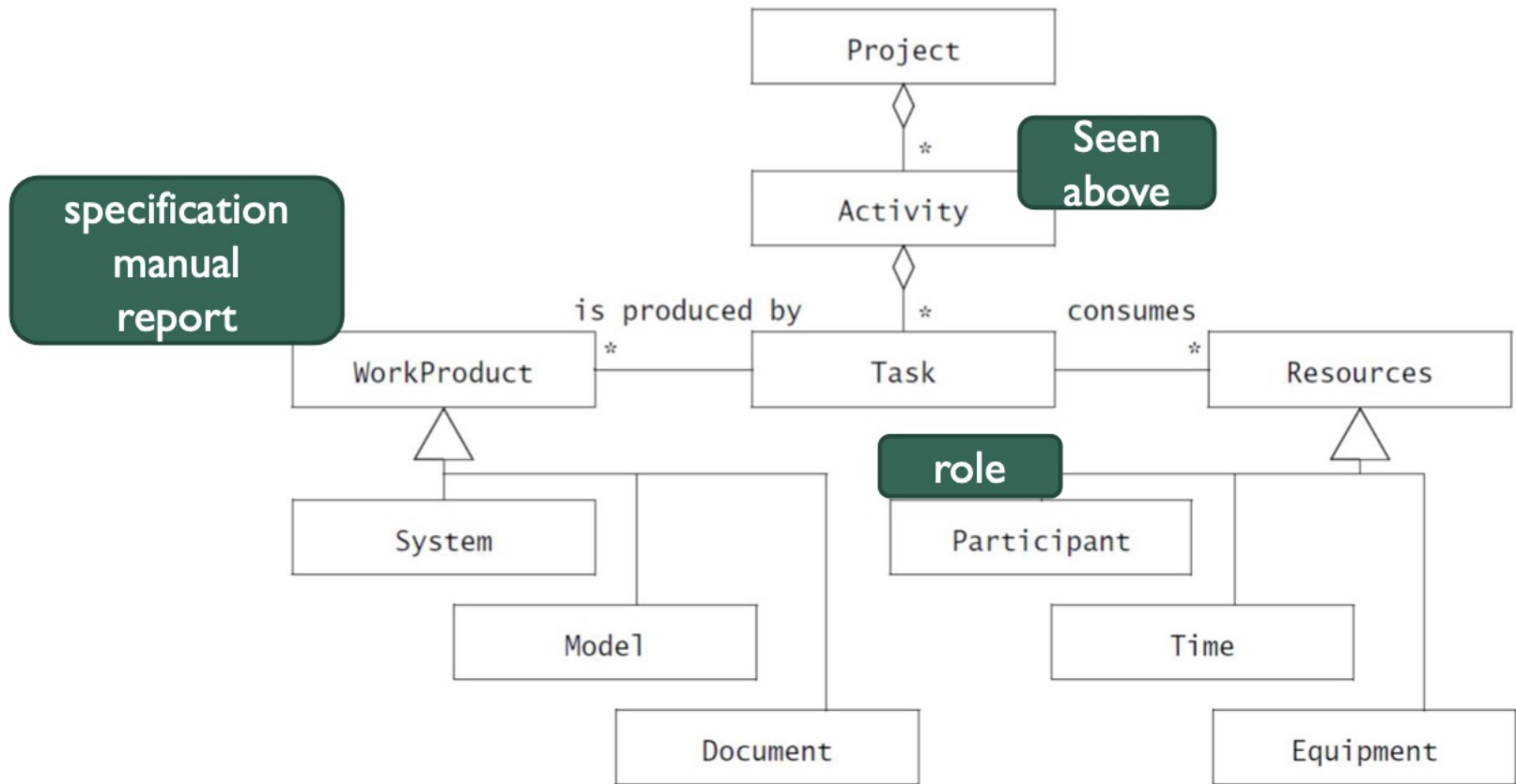
- A process defines who does what, when, and how to achieve a given goal
- In SW engineering, the goal is to produce SW products or improve existing ones

## Software Engineering Activities



## ATTIVITÀ DI PROGETTAZIONE





**Figure 1-1** Software engineering concepts depicted as a UML class diagram [OMG, 2009].

# An effective process.....

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- » Provides guidance on the **sequence of activities** within a working group
- » **Specifies which deliverable is to be developed and the appropriate time to do so**
- » Guides the tasks of individual developers and the entire working group
- » Provides **criteria for controlling and measuring project deliverables and activities**

# Software Engineering (in practice)

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- » Software engineering is a systematic engineering approach to software development
  - Focus on design, development, maintenance, testing, and evaluation of software
  - Use of engineering principles and methods to create reliable, efficient, and high-quality software
- » Software engineers use programming languages to write and test code, and tools and frameworks to manage the software development process
  - Wide range of software projects, including applications for desktop and mobile devices, operating systems, and embedded systems

# Software Development Life Cycle

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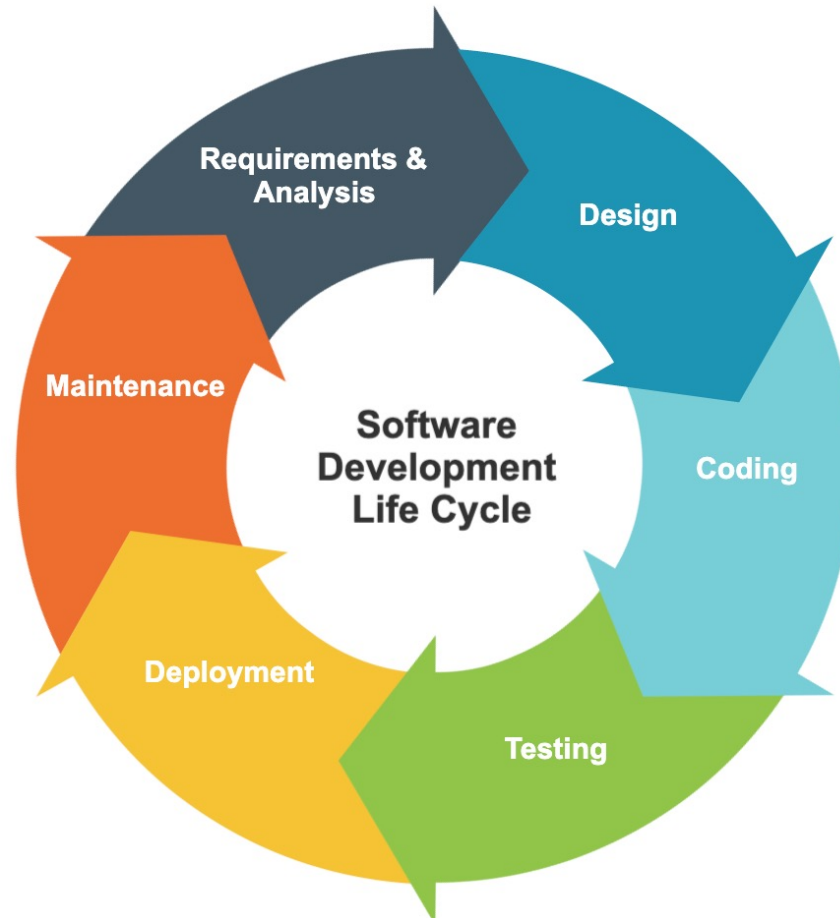
- The *systems development* life cycle is a process for planning, creating, testing, and deploying an information system





# Software Development Life Cycle

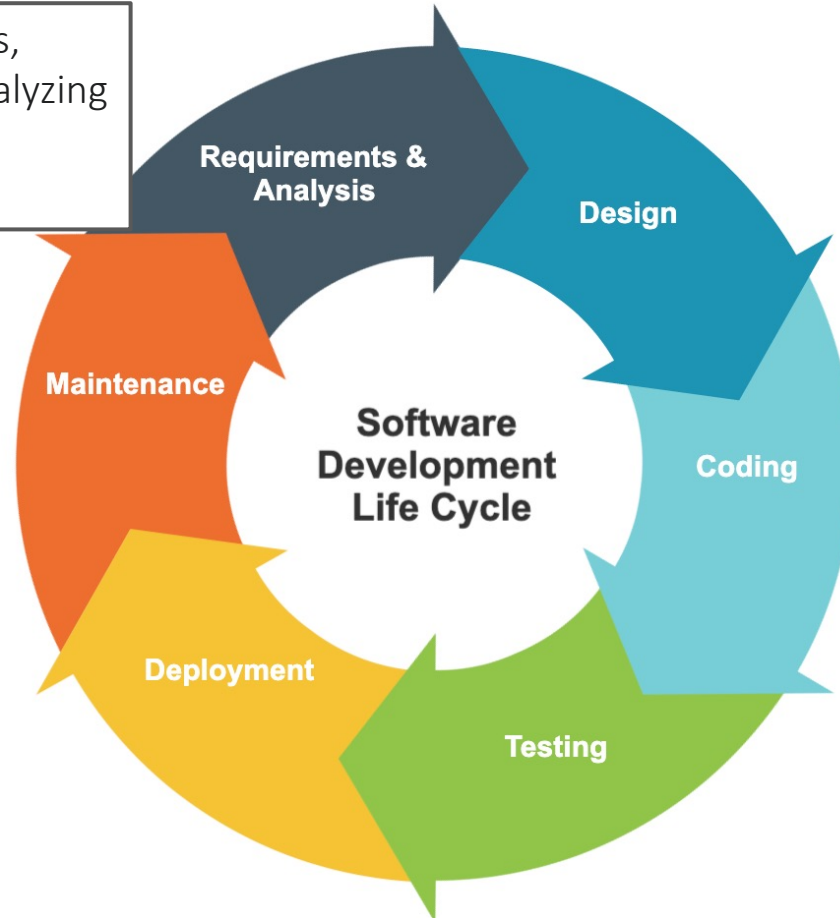
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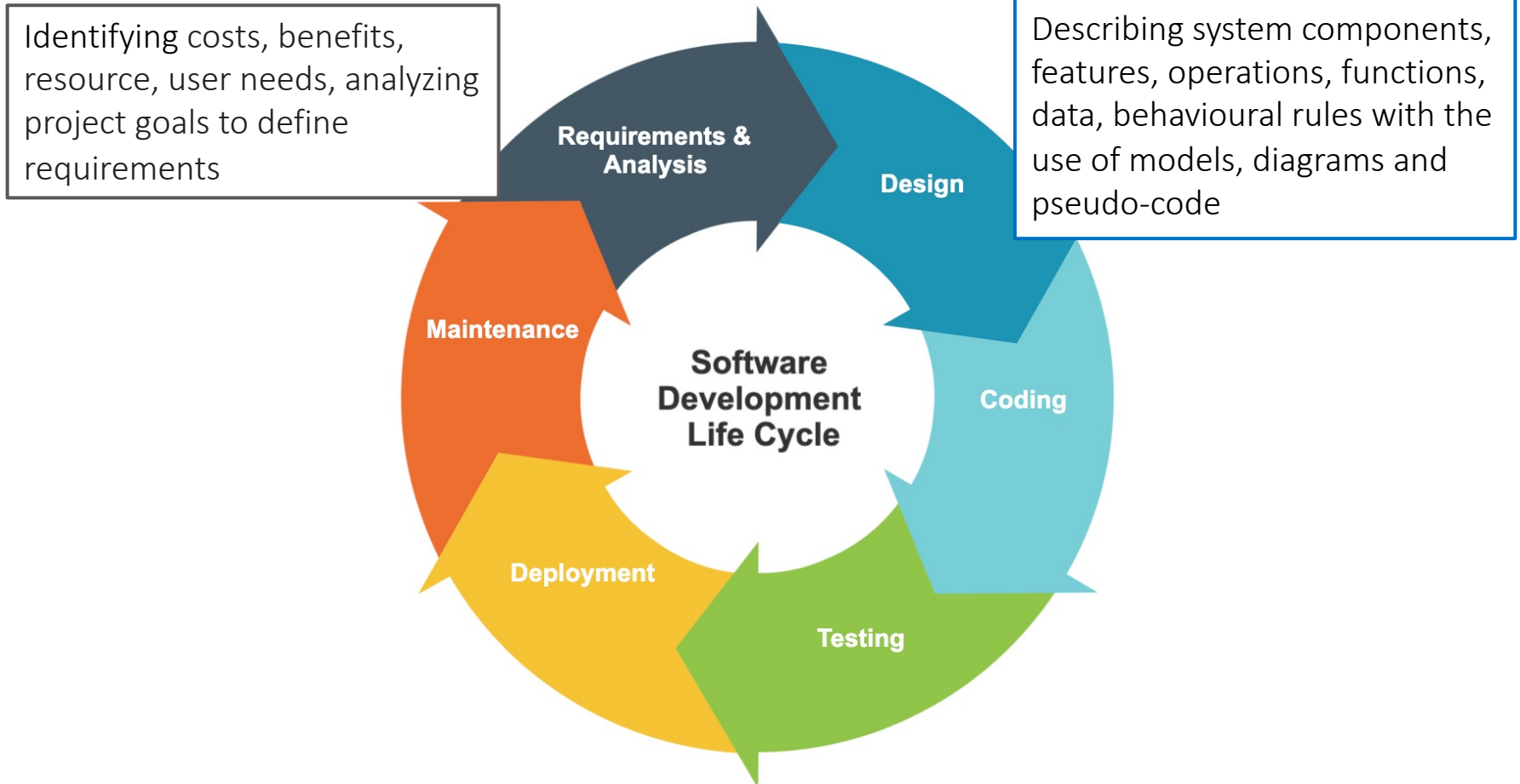
# Software Development Life Cycle

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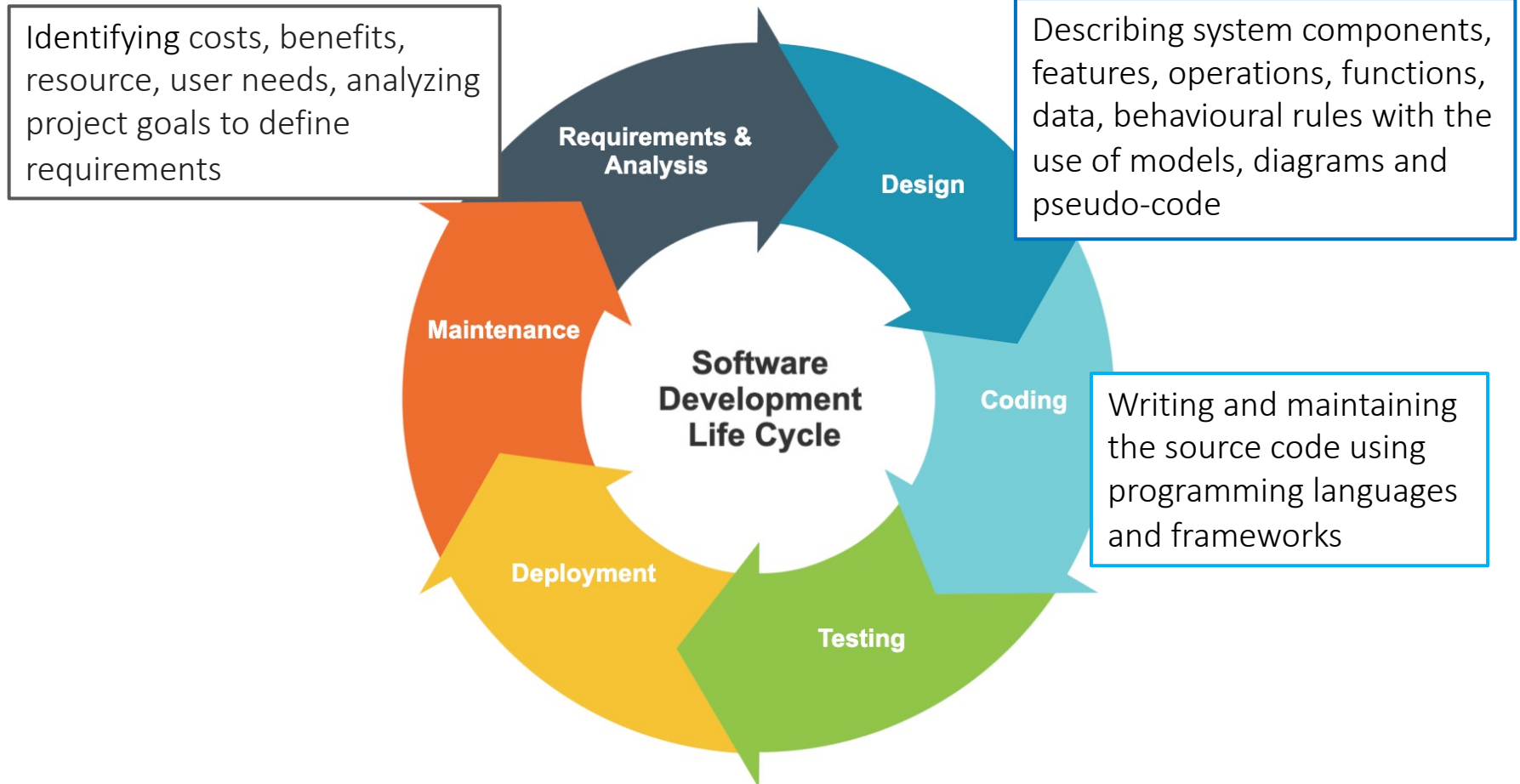
Identifying costs, benefits, resource, user needs, analyzing project goals to define requirements



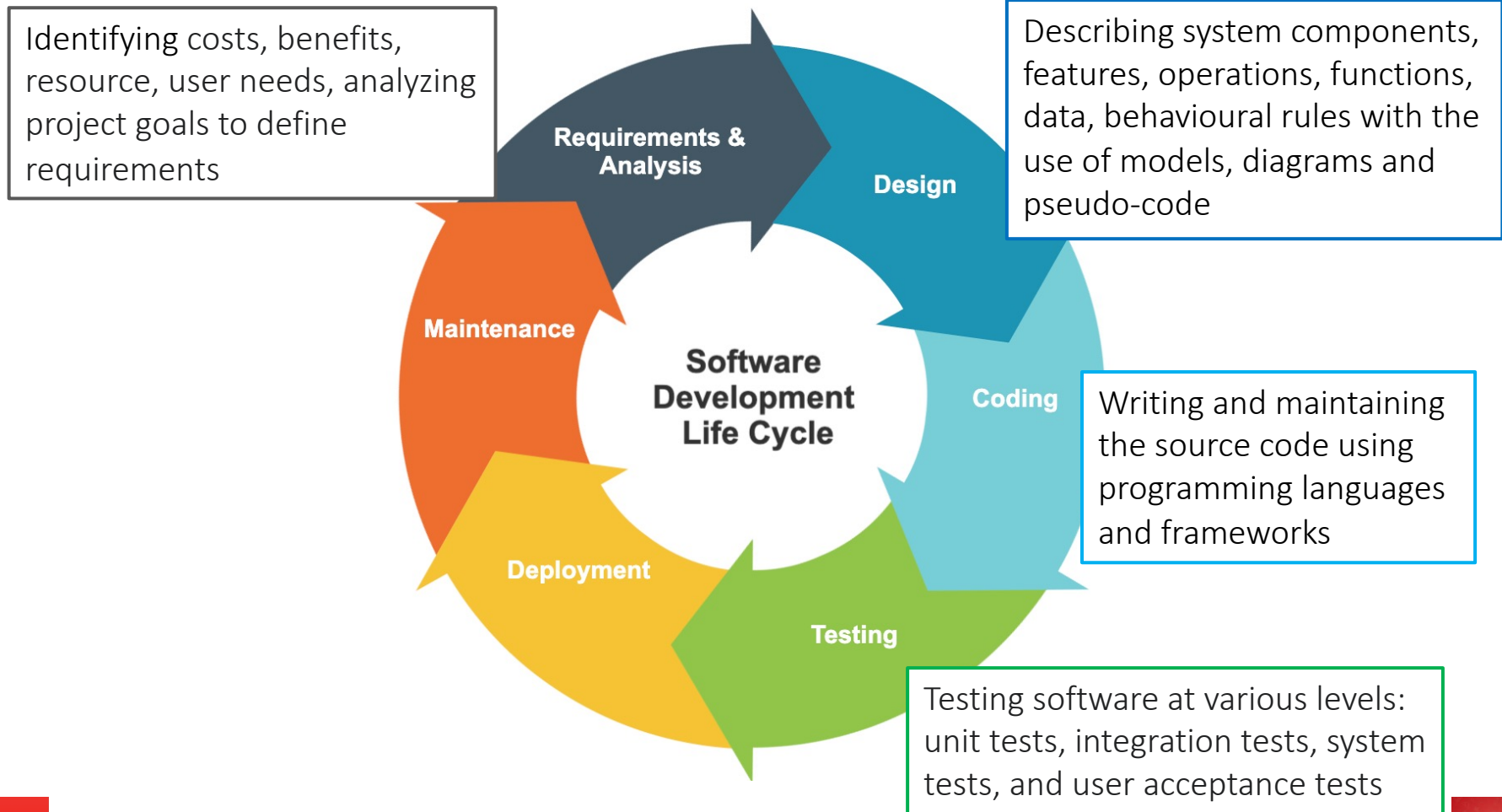
# Software Development Life Cycle



# Software Development Life Cycle

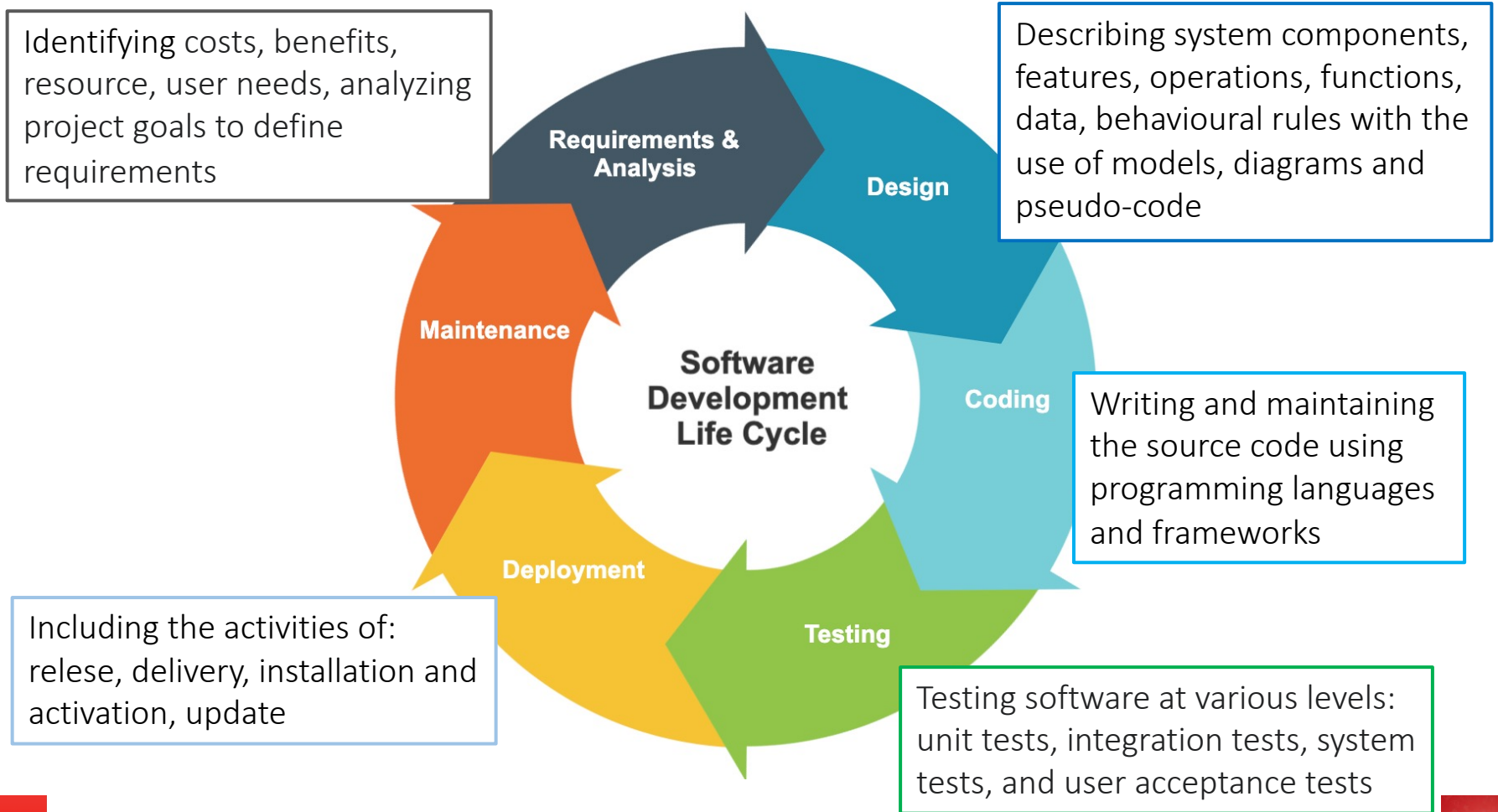


# Software Development Life Cycle

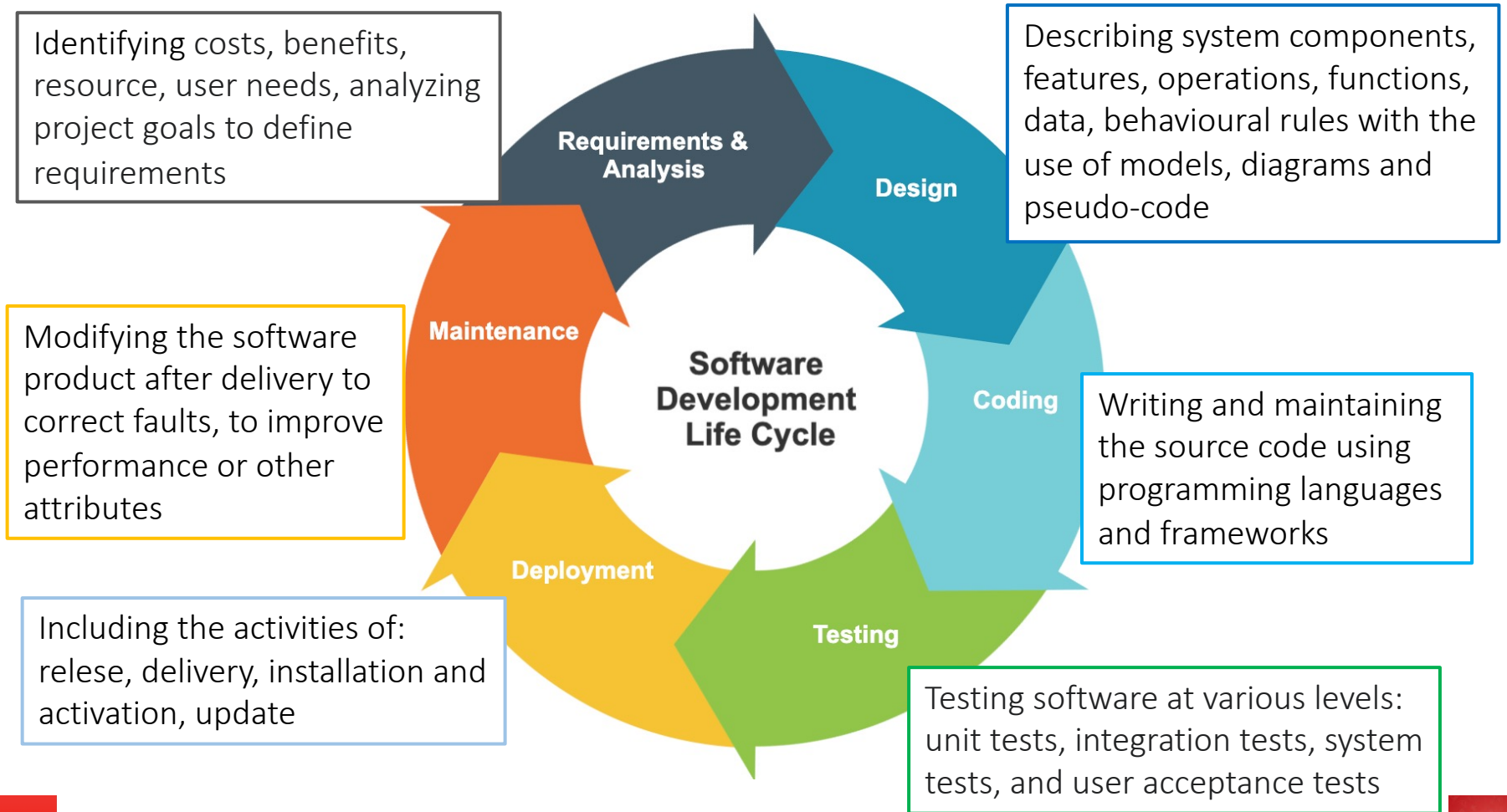




# Software Development Life Cycle



# Software Development Life Cycle



# Mobile Development Life Cycle

Defining project goals, target audience, and scope

Planning

Defining project goals, target audience, and scope. Creating wireframes, mockups, and prototypes to visualize how the app will look and function

Design & Prototype

Even after the app has been deployed, it needs to be continuously updated to fix bugs, add new features, and keep it running smoothly

Maintenance

Writing the code for the app, using programming languages and frameworks, depending on the platform you are targeting (e.g. iOS, Android)

Coding

Mobile Development Life Cycle

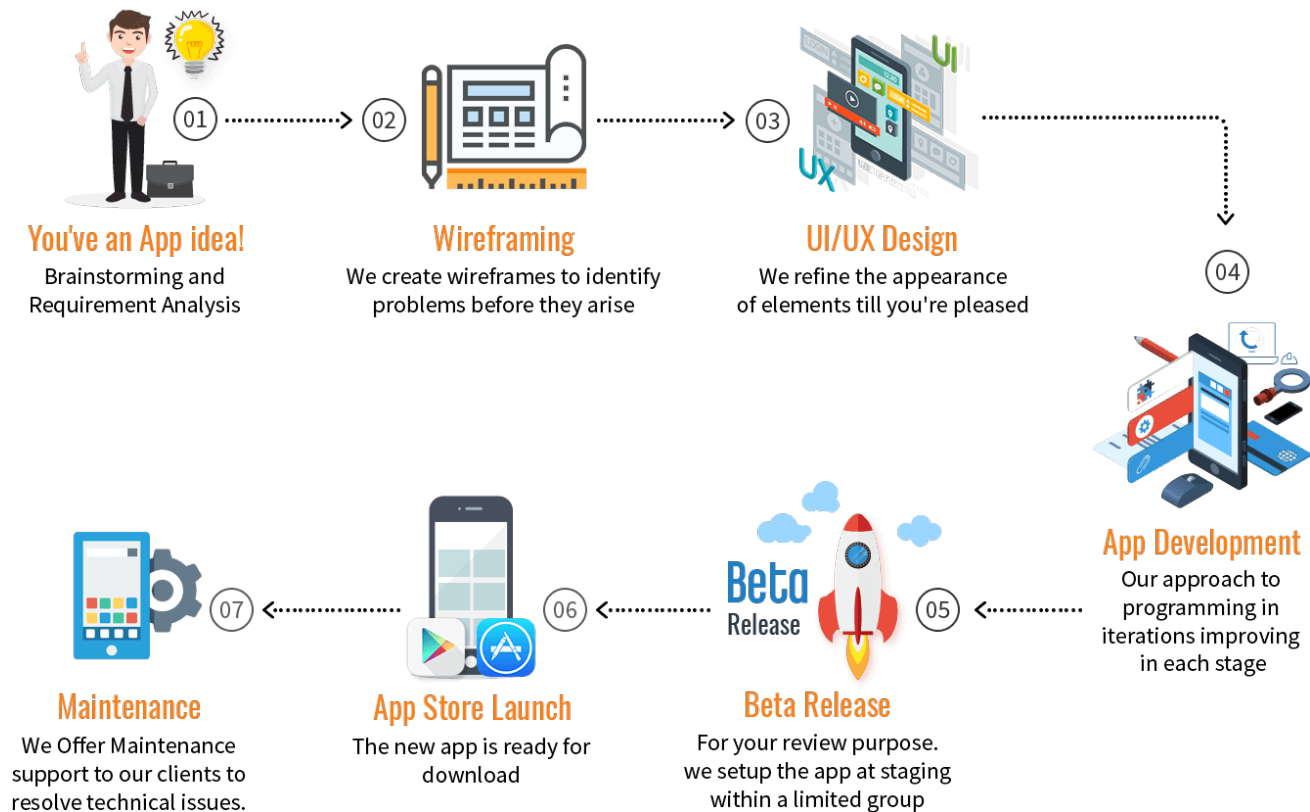
Once the app is complete and has been tested, it is ready to be published and made available to users

Release & Deployment

Testing the app to ensure it is stable, performs well, and meets the requirements defined in the planning phase. Also feedback from users can identify issues or improvements.

Testing

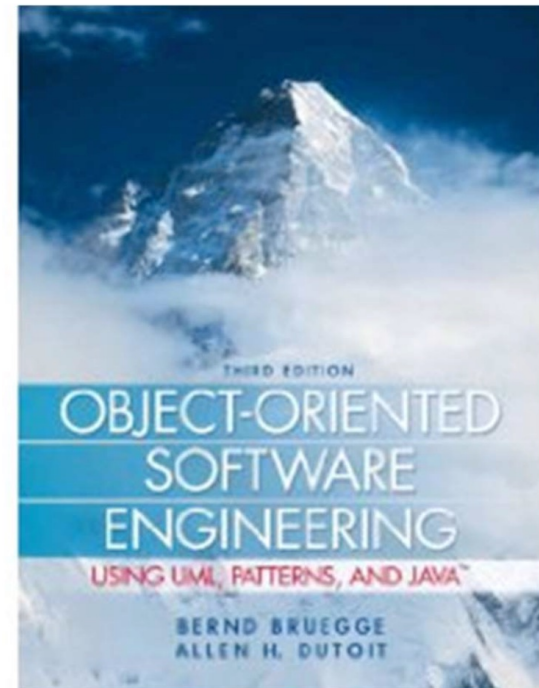
# MOBILE APP Development



# References

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Bernd Bruegge, Allen H. Dutoit, Object-Oriented Software Engineering: Using UML, Patterns and Java, 3rd Edition, Publisher: Prentice Hall, Upper Saddle River, NJ, 2009; ISBN-10: 0136061257 ISBN-13: 978-0136061250 (Preface)



# Acknowledge

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