

# Development and Validation of Subscriber Database Applications

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## Telecommunication and its requirements are changing

- Distributed Databases
  - Every node has its own
- Centralized Databases
  - One logical database
  - Communicate via Front Ends with the nodes
- Future – ?
  - Requirements of Machine to Machine communication

# Background – Distributed Databases

## ■ Advantages

- Data can be stored differently
- Safety
- Security

## ■ Disadvantages

- Maintenance
  - OPEX
- Every node has its own database
  - Multiplied identifiers, keys
  - Slower communication

# Background – Centralized Databases

## ■ Advantages

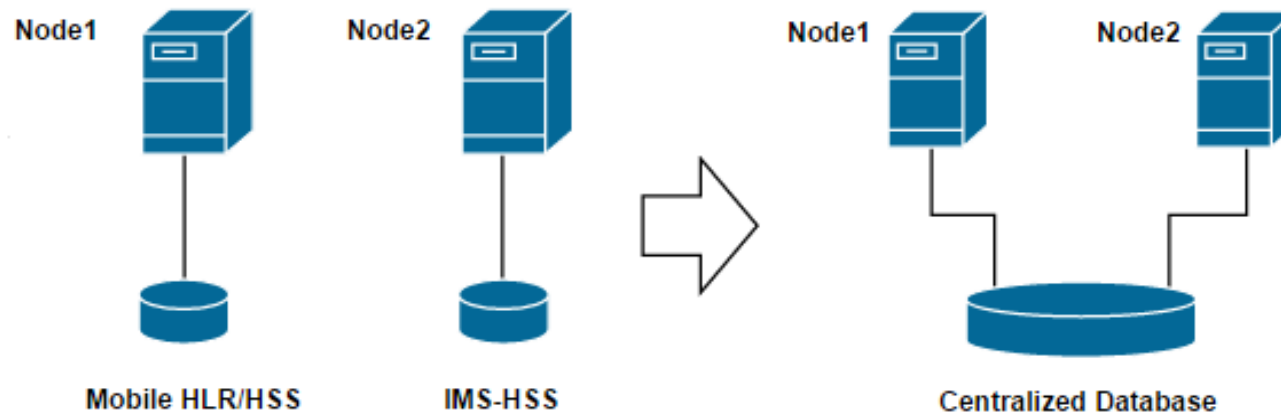
- Data Integrity
  - No duplication
- The Development is easier
- Ease of training
- Maintenance and Support

## ■ Disadvantages

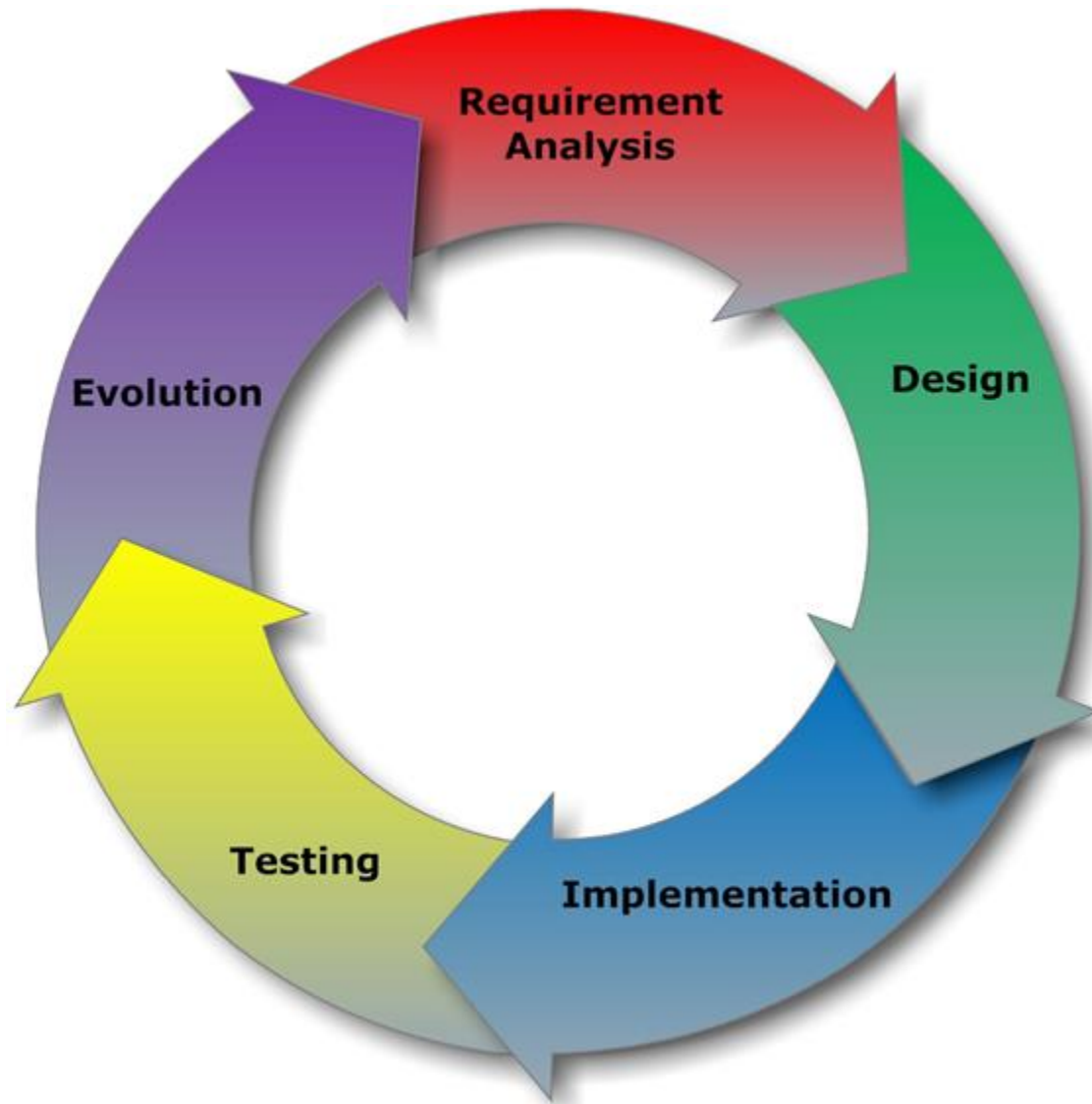
- Response Time
  - The size of a centralized database could cause data retrieval delays
- Security and Safety
  - Easier to cause big damage

# Background – Subscriber Data Management

- **Centralized Databases → Subscriber Data Management**
  - Centralized User Data
  - Handle of different Network Technologies (2G/3G/LTE/IMS...)
  - Single Point of Provisioning
  - Communicate via Front Ends with the Applications (Nodes)
  - Save cost
  - Faster Time-to-Market



# Software Development Life-Cycle



# Requirement Analysis

## ■ Customer

### ○ Task

- Define the Request

### ○ V&V Methodology

- Checking list based on the Requirements or manually

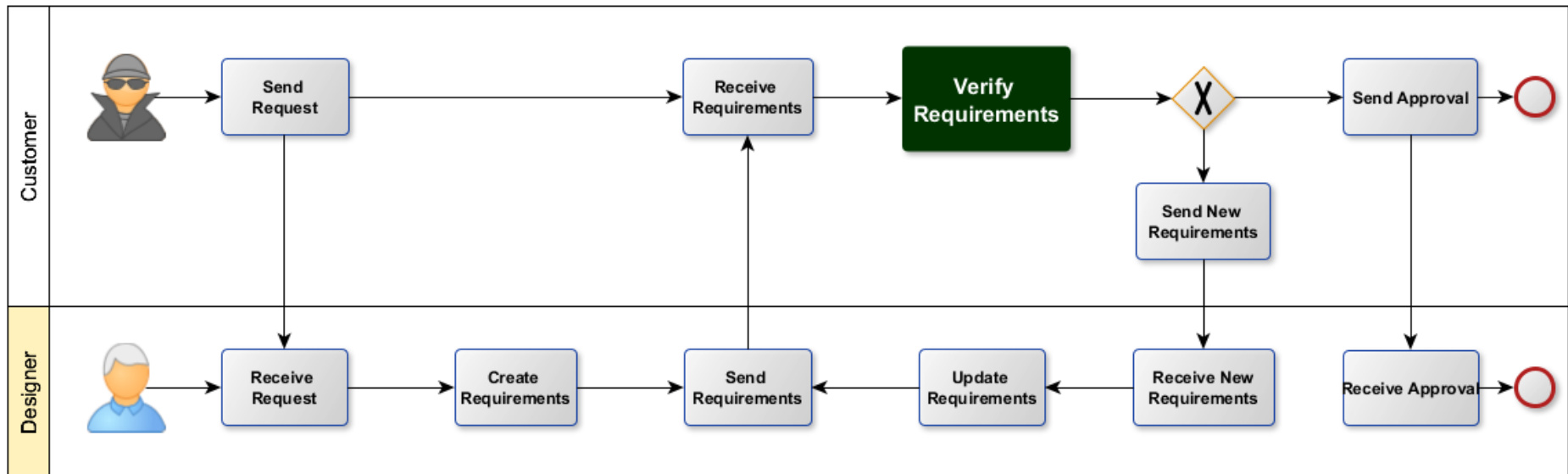
## ■ Designer

### ○ Task

- Create the Requirements
  - Use cases, main parts

### ○ V&V Methodology

- Manually based on the Request



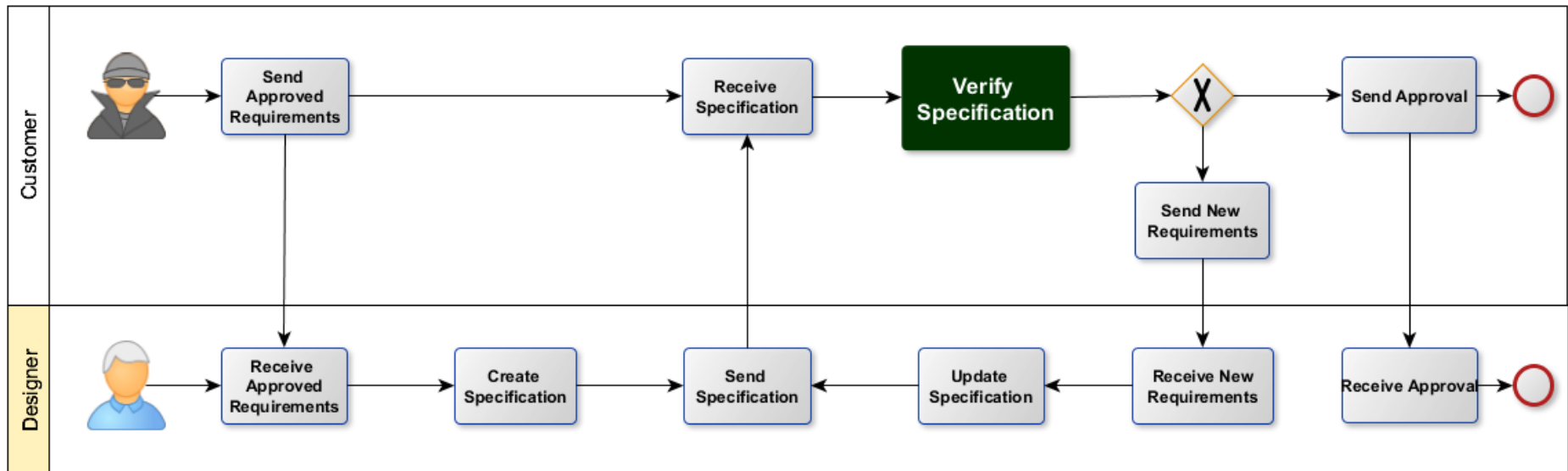
# Create Specification

## ■ Customer

- Task
  - Check the Specification
- V&V Methodology
  - Manually based on the Requirements

## ■ Designer

- Task
  - Create the detailed Specification
- V&V Methodology
  - Manually based on the Requirements





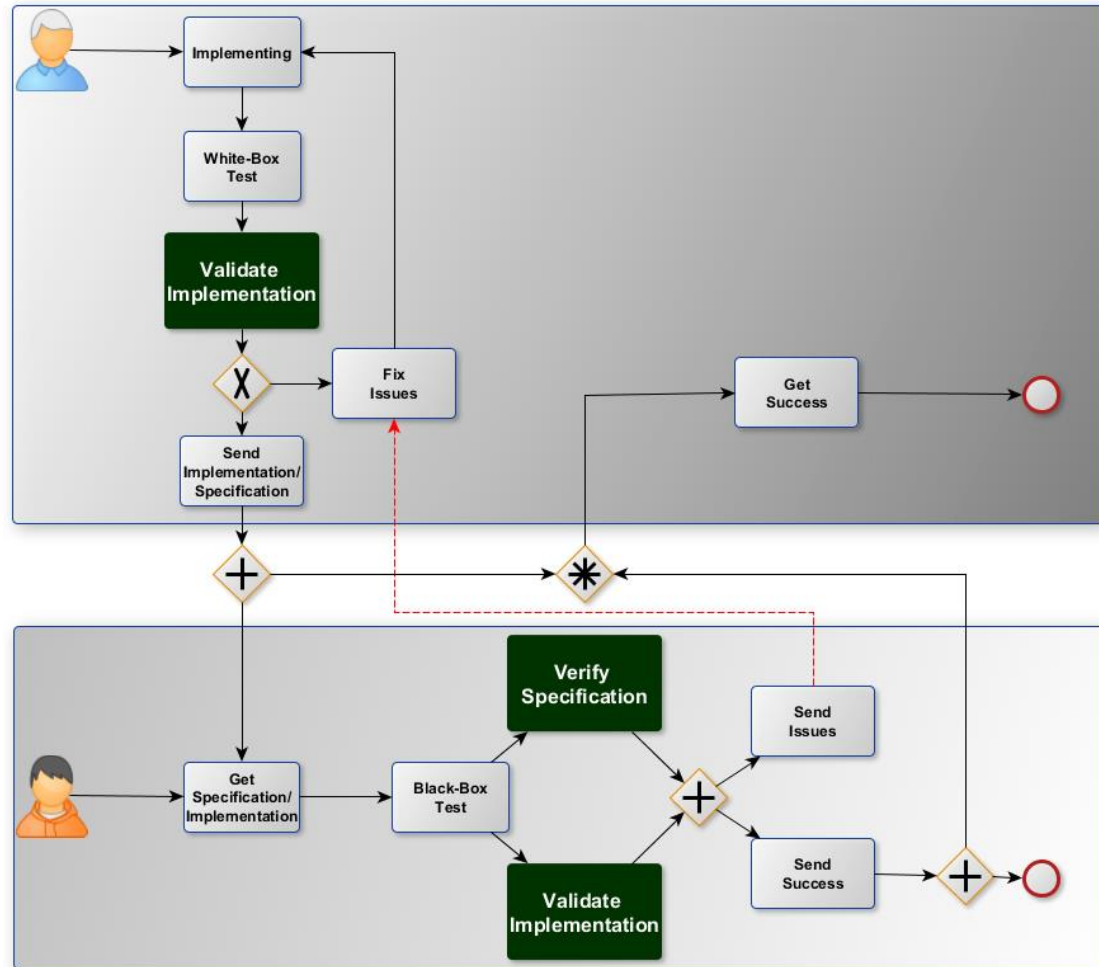
# Testing Specification

## ■ Designer

- Focus
  - Implementing the specified definitions
- V&V Methodology
  - White-Box testing locally
  - Type: unit, installation

## ■ Tester

- Focus
  - Verify and validate the implementation based on the Specification
- V&V Methodology
  - Black-Box testing on the Test System
  - Type: unit, integration, installation (+*regression*)



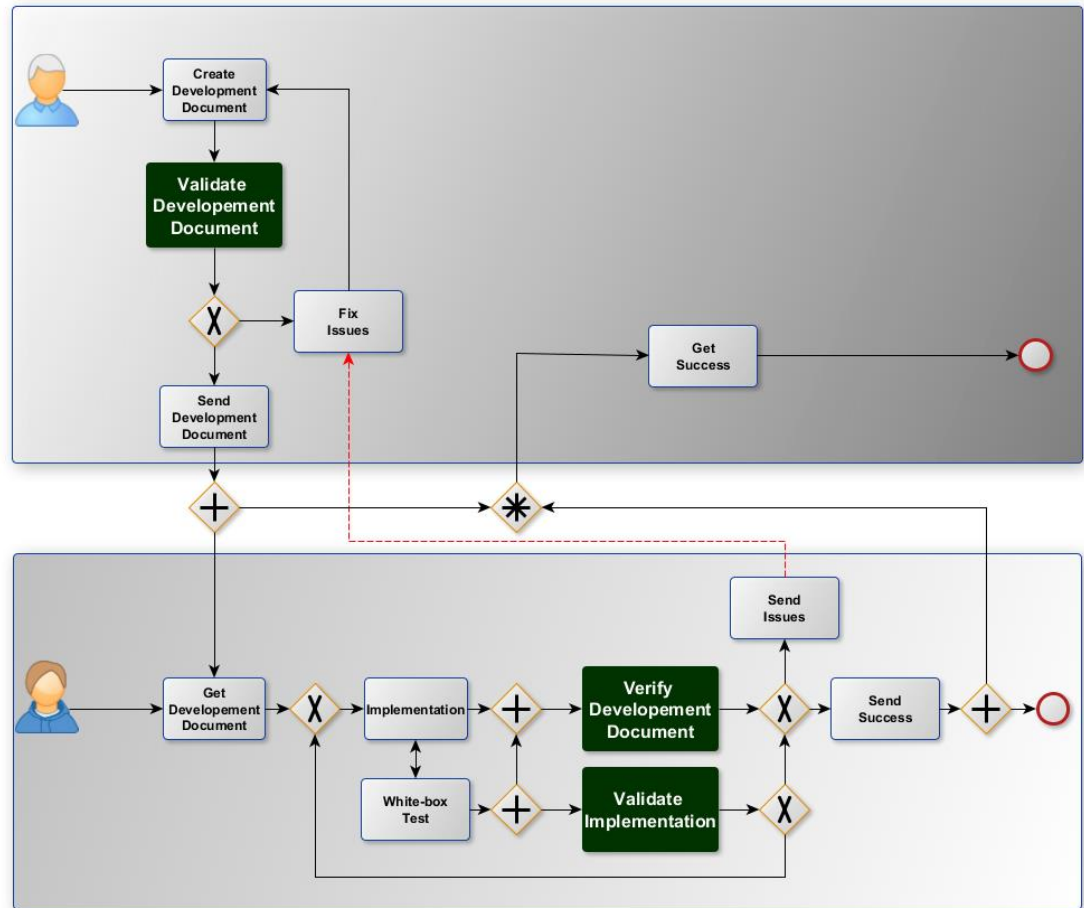
# Implement Application

## Designer

- Focus:
  - Implementation of the specified definitions
- V&V Methodology
  - manually

## Developer

- Focus:
  - Implement the Specification
  - Verify and validate the implementation based on the Specification
- Methodology (V&V):
  - White-box Testing locally
  - Type: Unit, Integration (+regression)



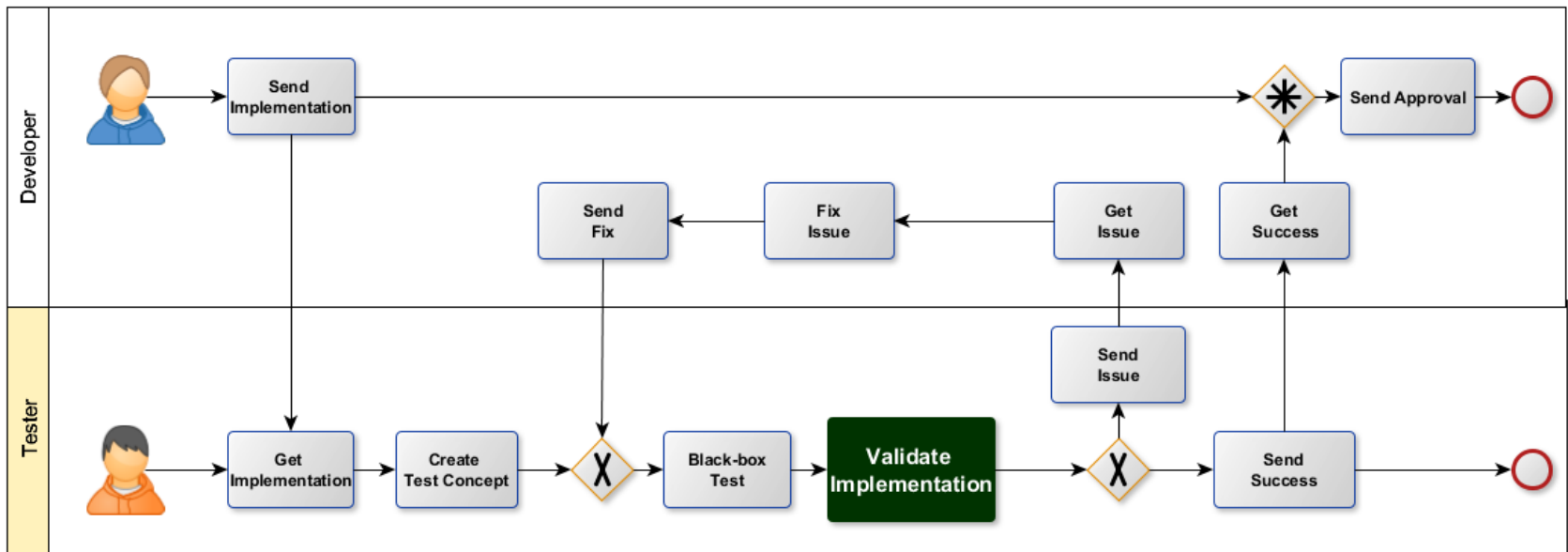
# Testing Application

## ■ Developer

- Task
  - Fix bugs (if it is necessary)
- V&V Methodology
  - White-Box testing locally
  - Type: unit, regression, integration

## ■ Tester

- Task
  - Check the Implementation
- V&V Methodology
  - Black-box testing on Test-System
  - Type: unit, integration, regression, installation)



# Summary

- Overview of databases
- Software Development Life-Cycle
- Activities
  - Designer
  - Developer
  - Tester
- Verification and validation of a database specific application

# Questions?

# Thank you!

# References

## Pictures

[1] Web and Software Mobile Application development (*slide 6*)

URL: <https://customwebsoftwaredevelopmentservices.wordpress.com/2013/05/31/what-are-the-software-development-phases/>