Quality Management of Software and Systems

Processes and QM

Contents

□ V-Model XT

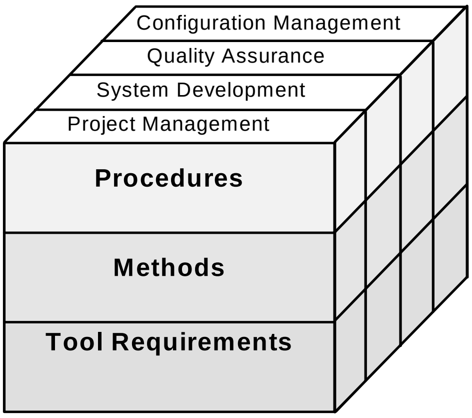
□ Rational Unified Process (RUP)

□ Extreme Programming (XP)

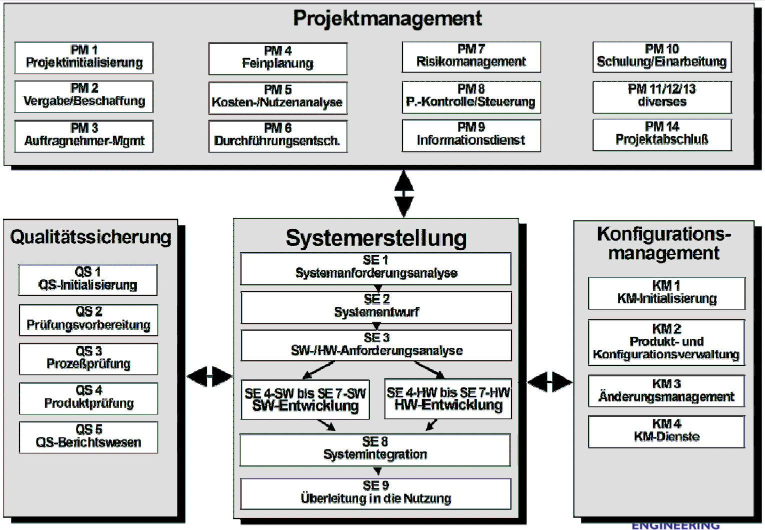
□ Processes

V-Model XT
Starting point: V-Model 97

- □ Broadened guideline for performing IT-projects
  - Generally binding for IT-projects in public and military domains
  - Increasingly applied in business, partially in SMBs, too
- □ 07/1997: update and release of V-Model ´97
  - No further development since that time
  - V-Model ´97 is not state of the art in all fields



V-Model XT
Starting point: V-Model 97



V-Model XT
Goals of V-Model XT development

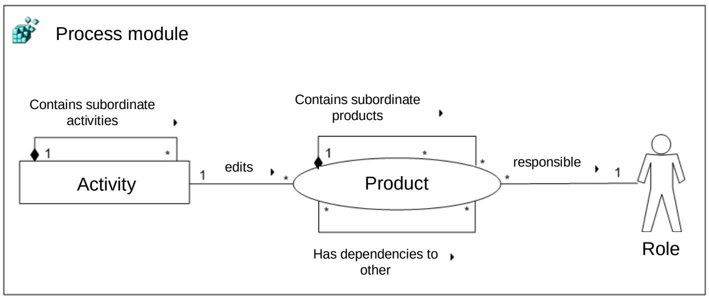
- □ Enhance support for adaptability, practicability, scalability, changeability and expandability of V-Model
- □ Consider state of the art and adapt actual regulations and standards
- □ Expand application range with respect to consider the whole system lifecycle in scope of development projects
- □ Introduce a process of organizational improvements for process models

V-Model XT
Process model and objectives

- □ V-Model XT is a process model
  - Development model for the customer
  - Development model for the contractor
  - Quality model for companies
- □ Objectives of the V-Model XT
  - Minimizing project risks
  - Quality improvement and quality guarantees
  - Budget containment for the whole project and system life-cycle
  - Communication improvements between all participants

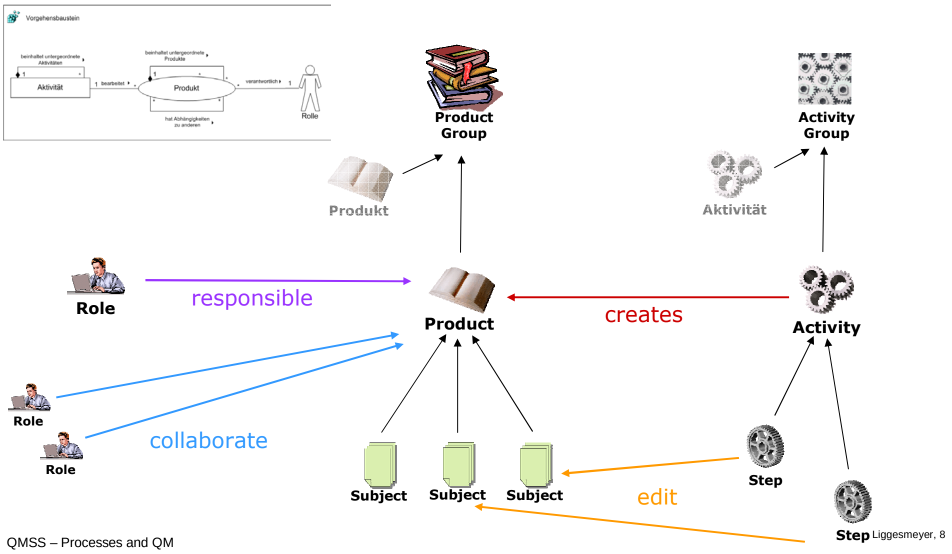
V-Model XT
Process modules as modular elements

- The V-Model is composed of modular blocks, so called process modules


Process module
Contains subordinate activities
Contains subordinate products
1
*
1
*
Activity
1
edits
*
Product
*
responsible
*
1
*
*
Has dependencies to other
Role

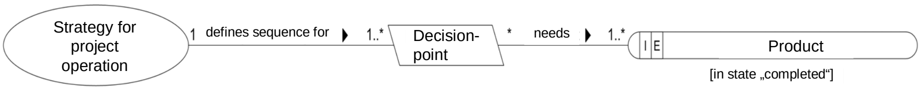
- A process module
  - encapsulates **roles**, **products** and **activities**
  - is a unit, which can be independently used
  - is a unit, which can be updated or extended independently

V-Model XT
Model element dependencies

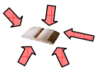


V-Model XT
Project Execution Strategies and Decision Points

- □ Process components, products and activities do NOT constrain or suggest any order of execution
- □ A **strategy for project operation** defines the sequence in which the project-progress-levels have to be reached
- □ A **decision-point**
  - defines a date, which is determined by the project plan, at which a „progress-decision“ (GO/NOGO) will be made
  - Defines a set of products, which have to be completed at the decision-point such that the progress-decision can be made

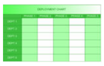


V-Model XT
Philosophy - Goal and result oriented approach



- □ Products take center stage, they are the project results

- □ Strategies for project operation and decision-points define the sequence of product completion and thus the elementary structure of the project‘s progress



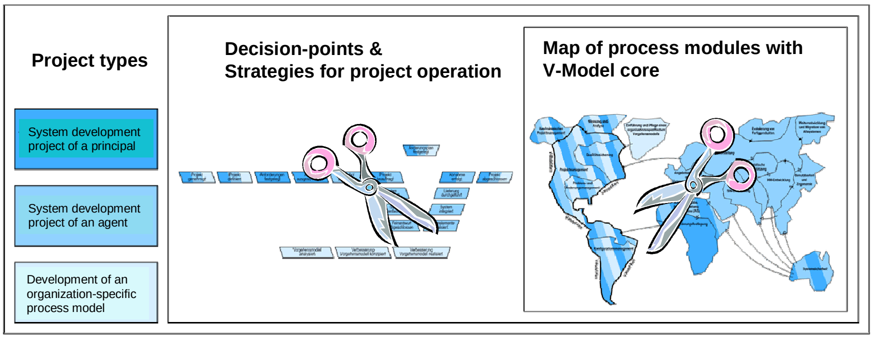
- □ Detailed planning and controlling will be performed based on development and completion of products

- □ Exactly one role is responsible for each product, which correlates to one person which is assigned to that role in a specific project

- □ Quality of products is checkable via defined requirements for products and explicit descriptions of dependencies of products

V-Model XT
Types of projects and tailoring

- □ Choice of project type
- □ Choice of process modules which will be used (products, activities, roles)
- □ Choice of strategies for project operation including decision points



Project types

System development project of a principal

System development project of an agent

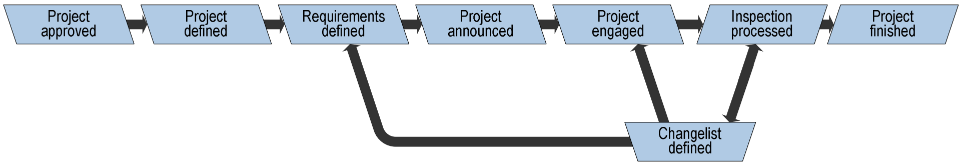
Development of an organization-specific process model

Decision-points & Strategies for project operation

Map of process modules with V-Model core

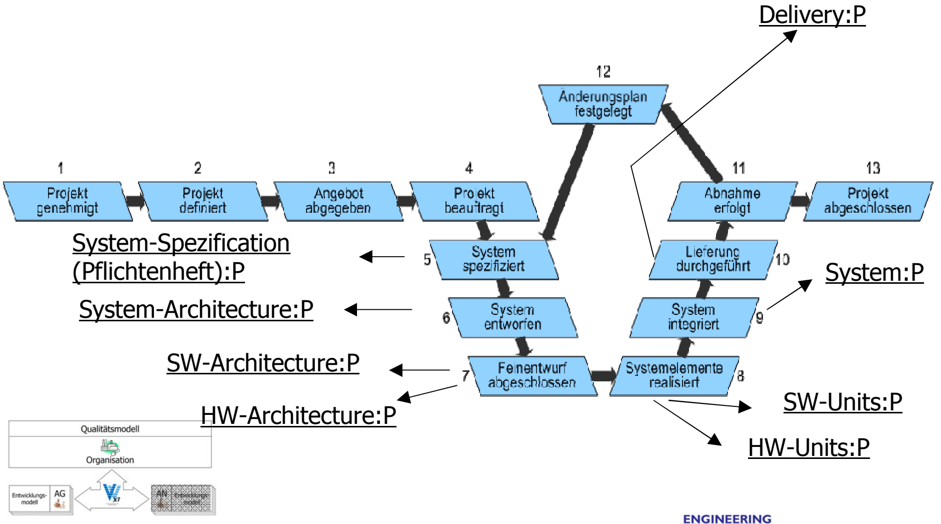
V-Model XT
Project Execution Strategy for Client

- □ Tailoring delivers
  - Strategy for project operation
  - Process modules (if necessary supplemented)



- □ Process modules define the projects activities and products
- □ The strategy of project operation has to be concretely instantiated for a specific project

V-Model XT
Project Execution Strategy for Contractor



Delivery:P

System-Spezification (Pflichtenheft):P

System-Architecture:P

SW-Architecture:P

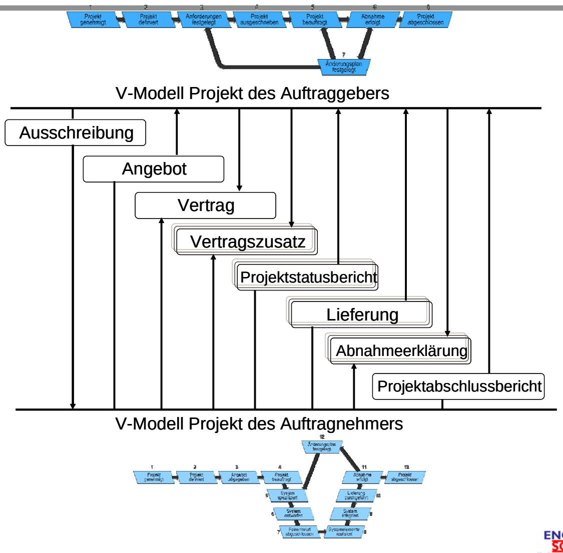
HW-Architecture:P

System:P

SW-Units:P

HW-Units:P

V-Model XT
Interface between Client and Contractor



V-Modell Projekt des Auftraggebers

Ausschreibung

Angebot

Vertrag

Vertragszusatz

Projektstatusbericht

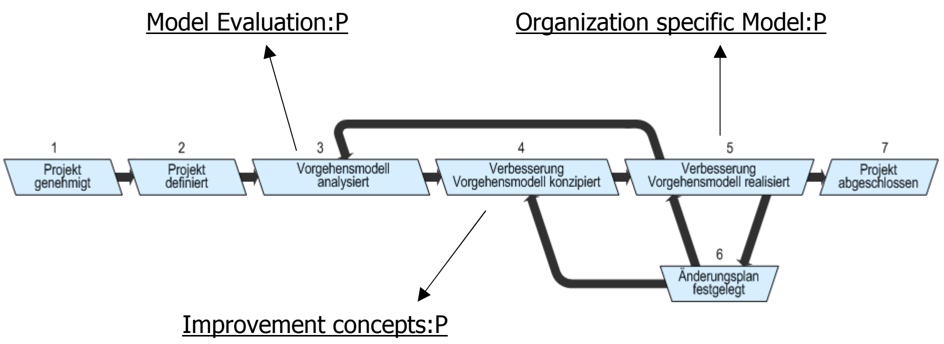
Lieferung

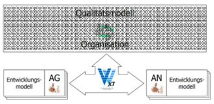
Abnahmeerklärung

Projektabschlussbericht

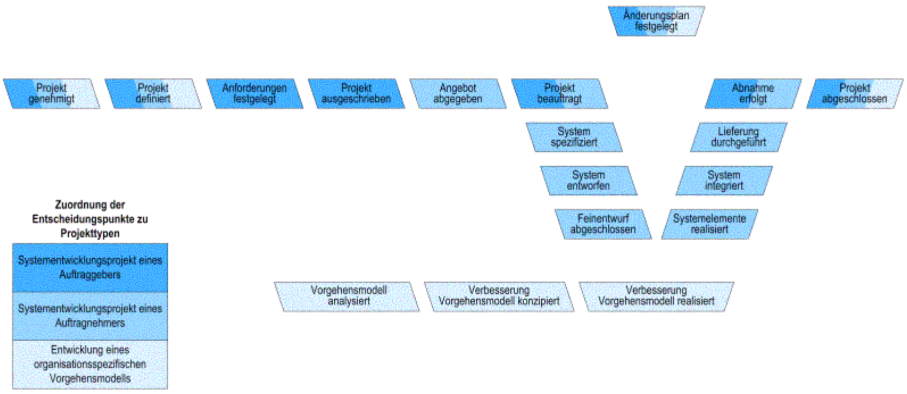
V-Modell Projekt des Auftragnehmers

V-Model XT
Project Execution Strategy – Organization Specific Model

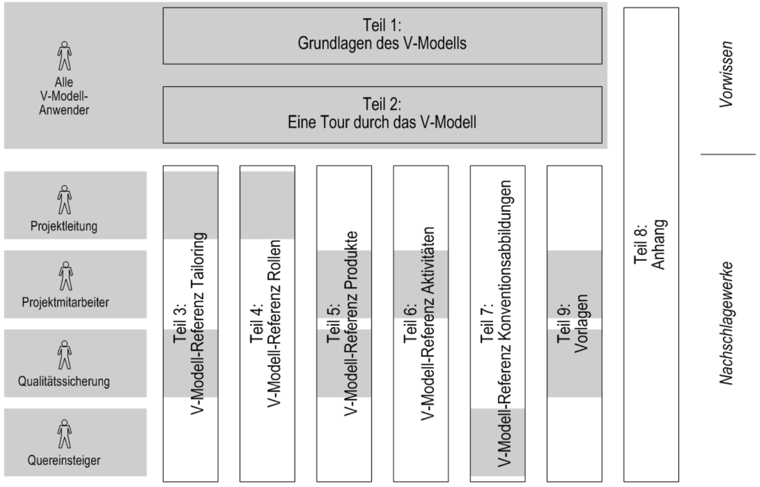

Model Evaluation:P
Organization specific Model:P
1
Projekt genehmigt
2
Projekt definiert
3
Vorgehensmodell analysiert
4
Verbesserung Vorgehensmodell konzipiert
5
Verbesserung Vorgehensmodell realisiert
7
Projekt abgeschlossen
6
Änderungsplan festgelegt
Improvement concepts:P



V-Model XT
Decision Points


Änderungsplan festgelegt
Projekt genehmigt
Projekt definiert
Anforderungen festgelegt
Projekt ausgeschrieben
Angebot abgegeben
Projekt beauftragt
Abnahme erfolgt
Projekt abgeschlossen
System spezifiziert
Lieferung durchgeführt
System entworfen
System integriert
Feinentwurf abgeschlossen
Systemelemente realisiert
Vorgehensmodell analysiert
Verbesserung Vorgehensmodell konzipiert
Verbesserung Vorgehensmodell realisiert
Zuordnung der Entscheidungspunkte zu Projekttypen
Systementwicklungsprojekt eines Auftraggebers
Systementwicklungsprojekt eines Auftragnehmers
Entwicklung eines organisationsspezifischen Vorgehensmodells

V-Model XT
Document Size


Alle V-Modell-Anwender
Teil 1: Grundlagen des V-Modells
Teil 2: Eine Tour durch das V-Modell
Projektleitung
Projektmitarbeiter
Qualitätssicherung
Quereinsteiger
Teil 3: V-Modell-Referenz Tailoring
Teil 4: V-Modell-Referenz Rollen
Teil 5: V-Modell-Referenz Produkte
Teil 6: V-Modell-Referenz Aktivitäten
Teil 7: V-Modell-Referenz Konventionsabbildungen
Teil 9: Vorlagen
Teil 8: Anhang
Vorwissen
Nachschlagewerke

V-Model XT
Availability

- □ V-Model
  - Hardcopy, PDF, Word und HTML, (XML)
  - Training material
  - Tutorial
  - Example Projects
- □ Product Templates (RTF)
- □ V-Model XT Editor: Open Source Tool for editing and enhancing V-Model XT
- □ V-Model XT Project wizard: Open Source Tool for Tailoring of V-Model XT
- □ Open Source: http://now-portal.c-lab.de/projects/foureveredit/
- □ Binary: http://www.v-modell-xt.de

V-Model XT

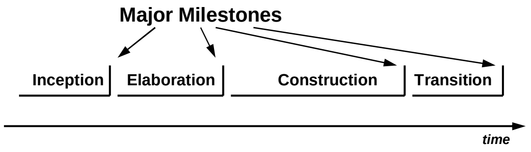
For more information visit
http://www.v-modell-xt.de

Rational Unified Process (RUP)

- □ Software development process
- □ Customizable and expansible framework
- □ Language used is UML
- □ Use-Case driven
  - ▪ Use-cases are the starting point and the base for the development
- □ Architecture centered
  - ▪ The System is divided in components und subsystems through the architecture
- □ Iterative and incremental process
  - ▪ Segmentation in smaller projects
  - ▪ Iterations are steps within the workflow
  - ▪ Increments are extensions and improvements of the product

Rational Unified Process (RUP)
Overview

- □ Development consists of multiple cycles
- □ Each cycle finishes with a product release, i.e. after each cycle a product is delivered to the customer
- □ Each cycle consists of four phases
  - ▪ Inception
  - ▪ Elaboration
  - ▪ Construction
  - ▪ Transition



- □ Each of these phases in divided in nine workflows

Rational Unified Process (RUP)
Best Practices

- □ Iterative development
- □ Requirements management
- □ Architectural centered development
- □ Visual modeling (with UML)
- □ Quality assurance
- □ Change management (configuration management)

- □ The „Best Practices“ are the design principles for RUP and can be found within the workflows

Rational Unified Process (RUP)
Inception Phase - Conceptualization

- □ Formulation of the product idea, the vision
- □ Specification of essential business use cases
- □ Definition of project size
- □ Prediction of costs and risks
    - ▪ Simplified cost estimate

- □ **Life Cycle Objective Milestone**

Rational Unified Process (RUP)
Elaboration Phase – Analysis/Design

- □ Specification of product features
- □ Architectural design
- □ Scheduling of necessary activities and resources

- □ **Life Cycle Architecture Milestone**

Rational Unified Process (RUP)
Construction phase - Implementation

□ Product creation

□ Development of the architecture

□ Result: finished product

□ **Initial Operational Capability Milestone**

Rational Unified Process (RUP)
Transition phase – Market release

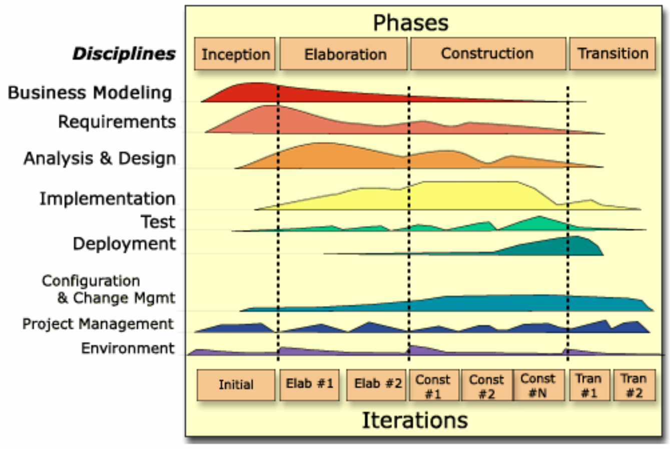
□ Product release to the customers

□ Examination of quality level

□ Delivery, training, service support, maintenance

□ **Release Milestone**

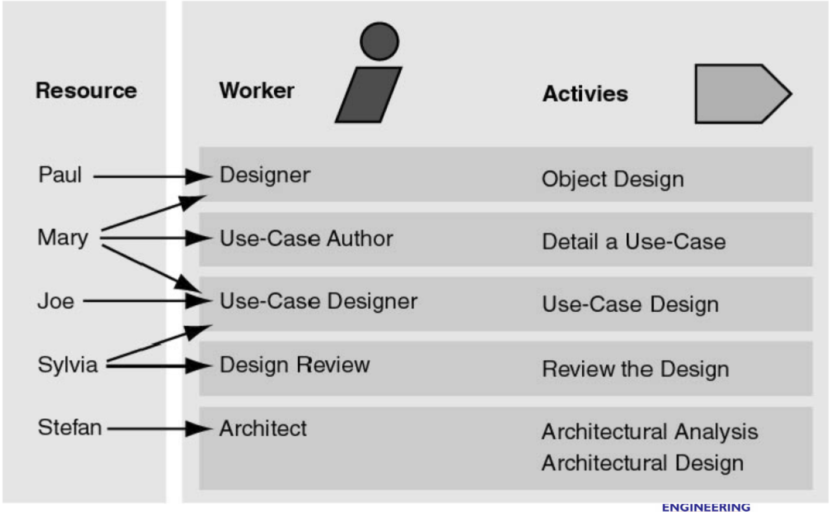
Rational Unified Process (RUP)
Process structure



Rational Unified Process (RUP)
Process structure

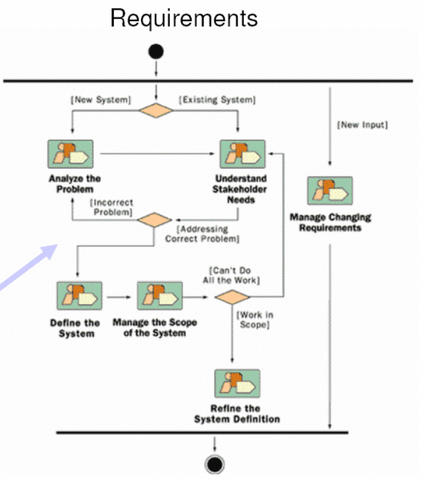
- □ Each phase consists of at least one iteration
- □ Each iteration is composed of workflows
- □ Workflow elements are roles („*Workers*“), activities, and artifacts
  - Worker: „who“
  - Artifact: „what“
  - Activities: „how“
  - Workflows: „when“
- □ Thus, it is specified who does what, when and how for the whole process

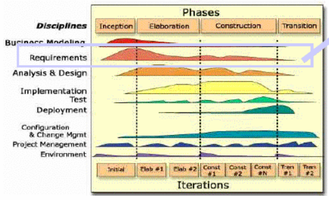
Rational Unified Process (RUP)
Persons and Workers



Rational Unified Process (RUP)
Workflows

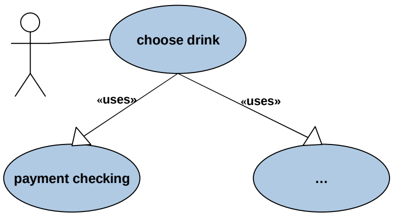
- □ For each workflow, starting from business modeling, the implementation, up to the project management, RUP provides tool supported procedures





Rational Unified Process (RUP)
Use-case based

- □ User interacts with system, system executes a series of activities
- □ A use-case is the description of an interaction and specifies the **functional requirements the users have**
- □ Initiated through an actor and consists of several activities
- □ A set of use-cases specifies the requirements for the whole system
- □ Use-cases are modeled using UML
- □ Use-cases are the basis for all subsequent parts of RUP

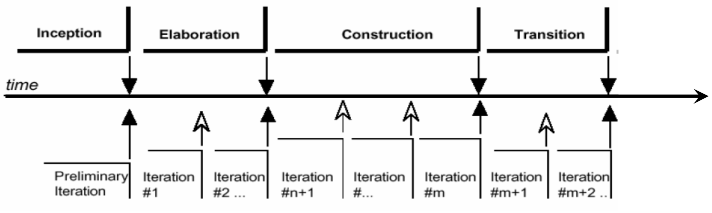


Rational Unified Process (RUP)
Architecture centered

- □ The architecture structures the system, using components and subsystems
- □ Provides ‘views’ for the static and dynamic system aspects
  - Logical view
  - Implementation view
  - Process view
  - Allocation view
  - Use-case view
- □ Affected by
  - Important use-cases (functional requirements)
  - Platform (OS, …)
  - Reusable components (Frameworks,…)
  - Existing applications (Integration of Legacy Systems,…)
  - Non-functional requirements (Performance, reliability, …)
- □ The most important use-cases constitute subsystems, classes, or components

Rational Unified Process (RUP)
Iterative and incremental

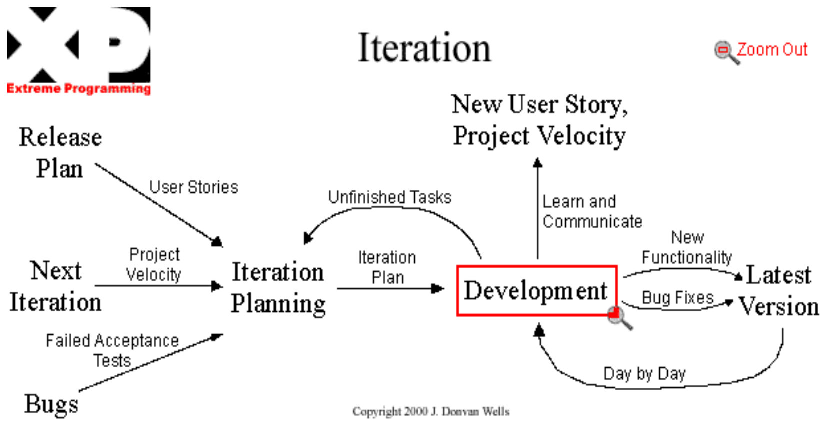
- □ Project is splitted in several mini projects
- □ Each mini project is an iteration
- □ Iterations are steps within the workflows
- □ Each iteration leads to a product growth
- □ Each phase consists of at least one iteration



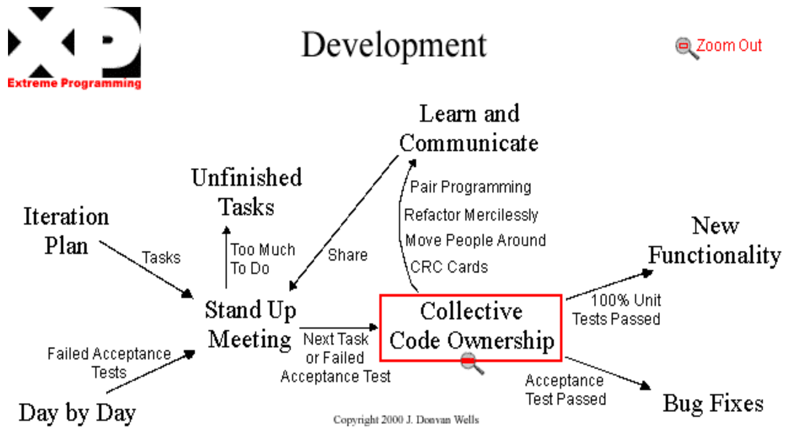
Rational Unified Process (RUP)
Adaptable Framework

- □ Realizing RUP is very complex
  - > 30 roles
  - > 130 activities
  - > 100 result types (artifact types)
- □ But RUP can be adapted to a company's or project's needs
- □ Workflows can be shortened or left out, if they are not required

Extreme Programming (XP)



Extreme Programming (XP)

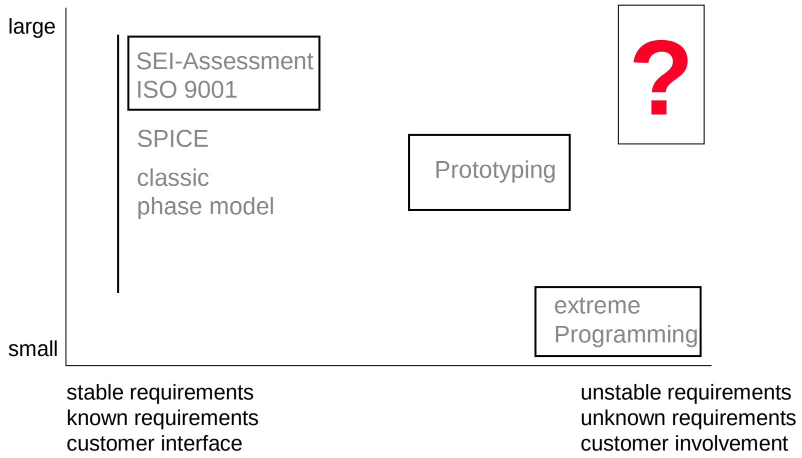


Extreme Programming (XP)

- □ Small projects (approx. 10 collaborators)
- □ Unstable or unknown requirements
- □ Contributory customers
- □ Strong focus on the customer
- □ Strong focus on quality

- □ Danger of leading to chaos (legitimating ad-hoc working procedures)

Processes



large

SEI-Assessment
ISO 9001

SPICE

classic
phase model

Prototyping

?

extreme
Programming

small

stable requirements
known requirements
customer interface

unstable requirements
unknown requirements
customer involvement

Processes
Prediction

- □ Assessments will play a major role in large companies
- □ The DIN ISO 9001 certificate will be considered necessary, but not sufficient
- □ Waterfall models will remain
- □ Waterfall models will be supported by prototyping, to deal with unclear requirements
- □ Extreme Programming can be used for small projects, if the customer is willing to collaborate and if certain documents are not necessary