


# 8 Development Process for Multimedia Projects

- 8.1 Classical models of the software development process 
- 8.2 Special aspects of multimedia development projects
- 8.3 Example: The SMART process
- 8.4 Iterative development of multimedia projects

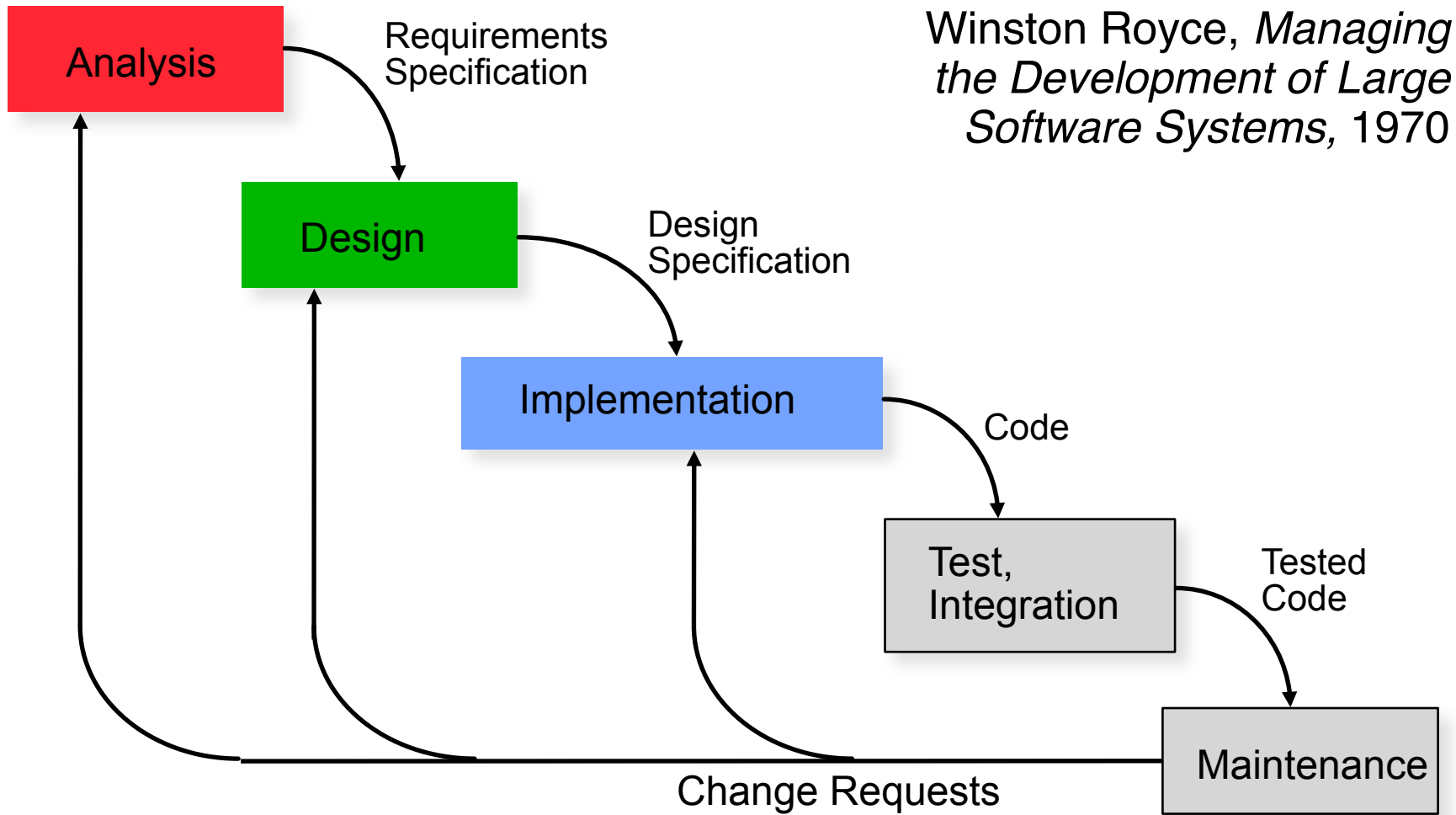
## Literature:

- Ian Sommerville: Software Engineering, 8. Auflage. Pearson 2007
- K. Osswald: Konzeptmanagement. Interaktive Medien – interdisziplinäre Projekte, Springer 2003

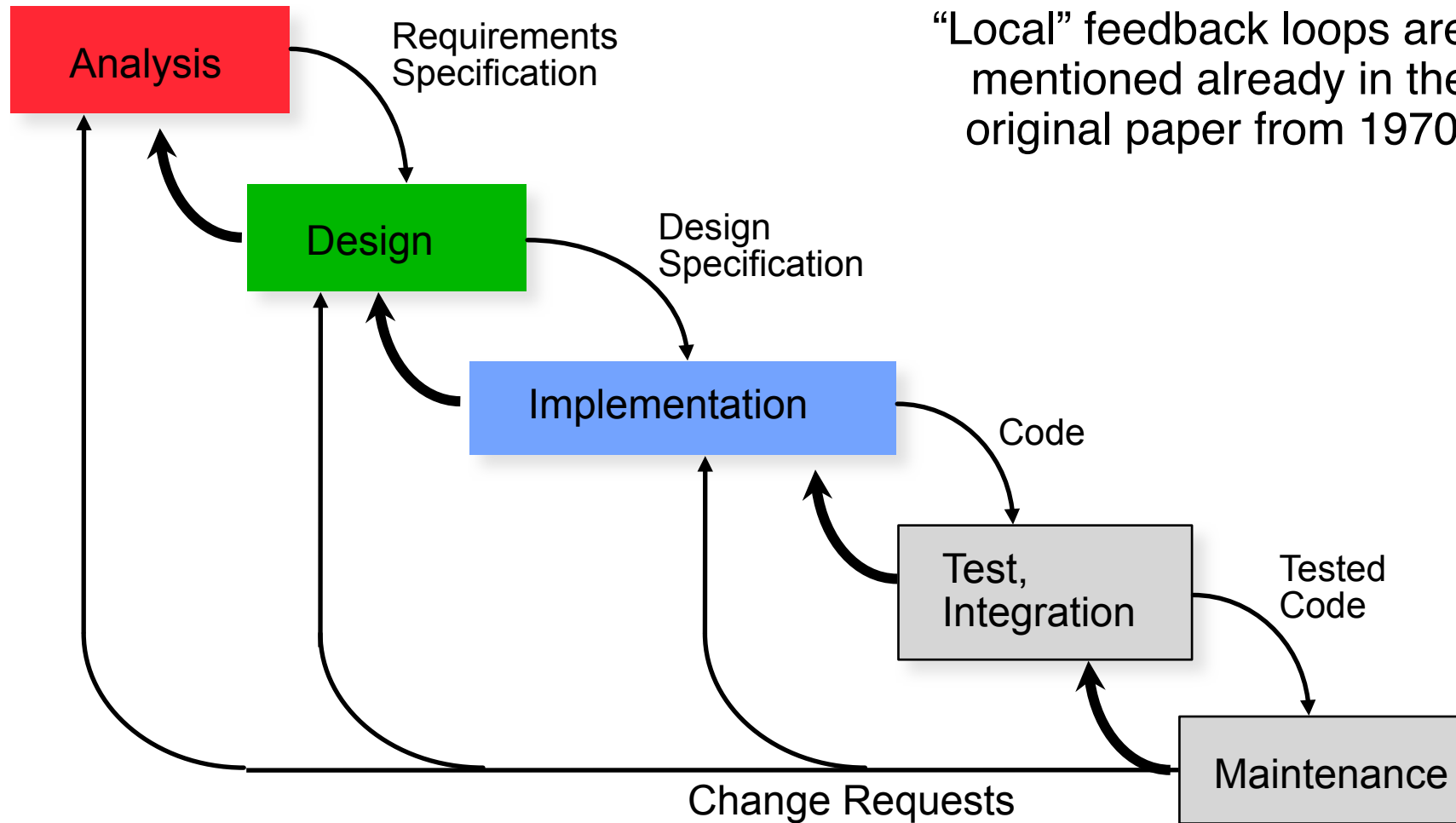
# Models of the Development Process

- Which workflows and activities take place?
  - In which order?
- What are the results (artefacts) produced in the activities?
  - Which are the dependencies between activities?
- Related issues:
  - Project management
    - » How to plan a project
    - » How to control a project
  - Quality assurance
    - » How to ensure that goals are met
- Process models:
  - Often rather informal sketches
  - Sometimes formal documents used as input to development support tools

# The “Waterfall” Model - Textbook Version

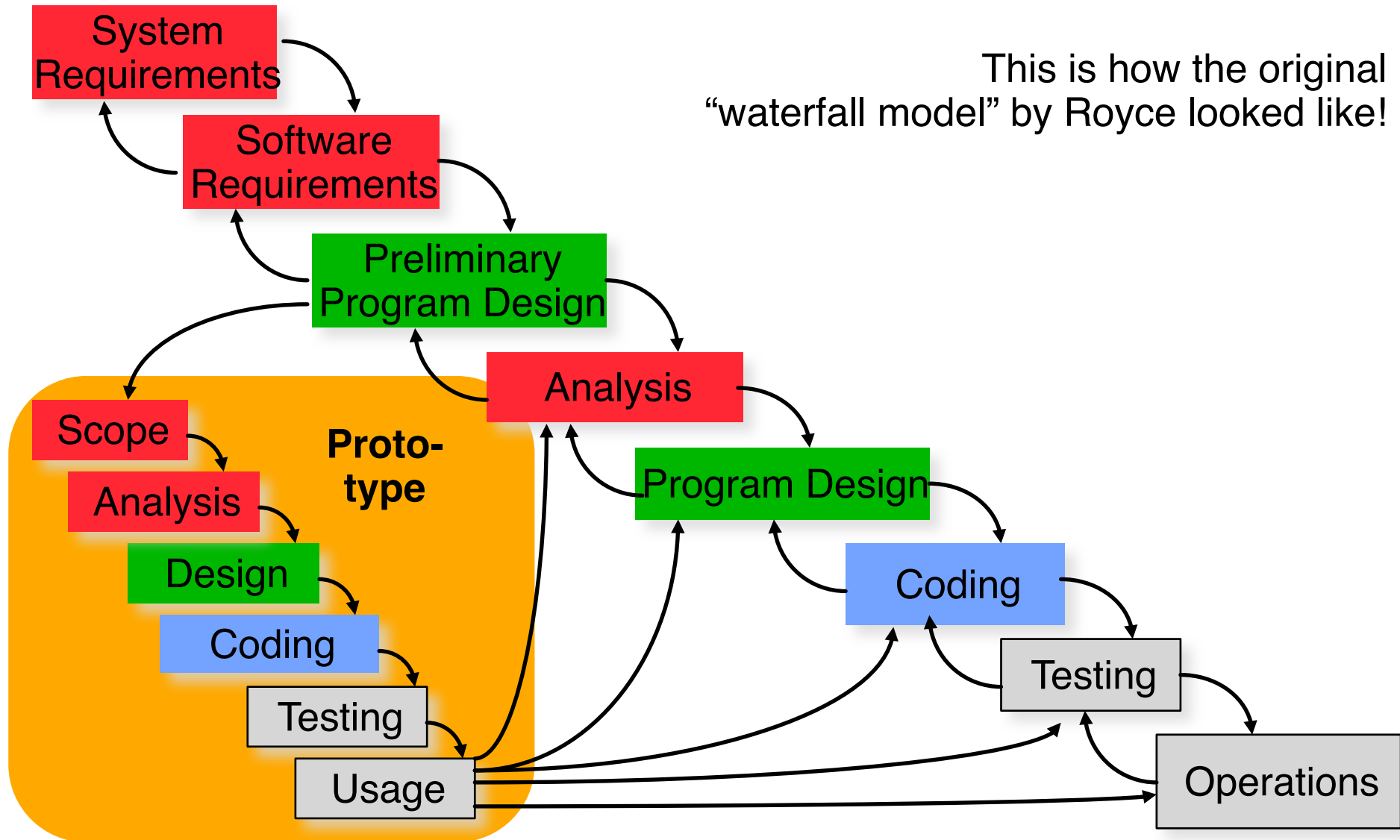


# “Waterfall” Feedback Loop #1: Quality Control

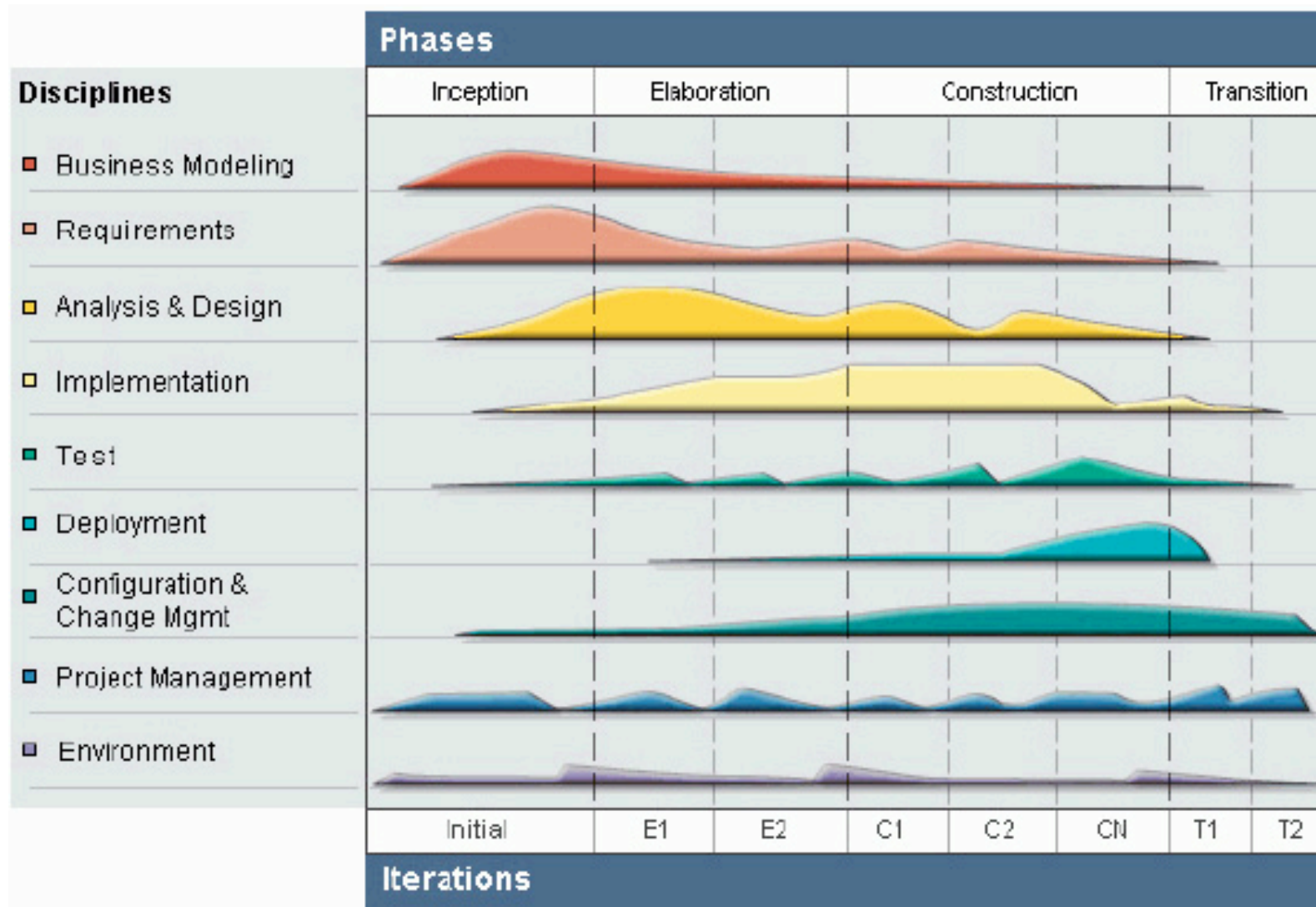


# “Waterfall” Feedback Loop #2: Prototyping

This is how the original “waterfall model” by Royce looked like!



# A Modern Iterative/Incremental Process: Rational Unified Process



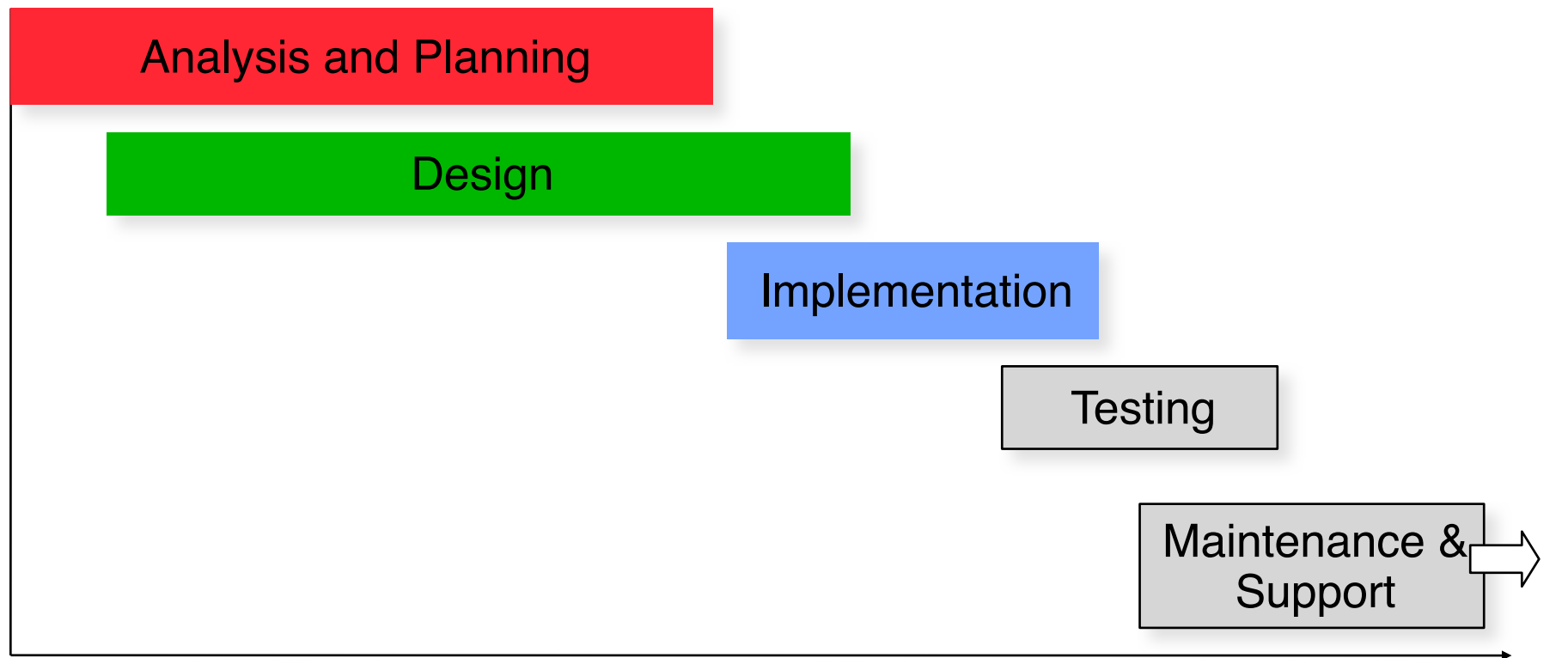
Source:  
IBM

# Current Practice in Multimedia Industry?

- K. Osswald, 2001: Systematic interviews with companies from the German multimedia (interactive media) sector
  - Out of a basis of 3000 enterprises, 30 were selected and asked (the most successful enterprises according to rankings)
  - 22 enterprises took part in the study
- Results regarding the development process:
  - More than 80% of the companies apply the “waterfall model”
    - » In almost all cases, there is a large overlap between neighbouring project phases
  - Frequently used technique: Prototyping
  - More than 80% of the interviewed specialists complain that customers demand changes at a very late point in project time, regarding information architecture and concrete content
  - 18% of the companies are working on the introduction of an iterative incremental process model (similar to the Rational Unified Process)
    - » None had completed the transition by 2001


# Waterfall Model as Used in Multimedia Industry

- Roy Strauss: Managing Multimedia Projects, Focal Press 1997
- Waterfall model adapted to multimedia projects
  - Highly consistent with the result of the interviews with German companies





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- P. A. Henning, Taschenbuch Multimedia, Fachbuchverlag Leipzig 2001 (Kap. 9)
- E. England, A. Finney: Project Management for Interactive Media (2nd edition), Addison-Wesley 1998

# Multimedia Development

- Scope: Interactive multimedia applications, including distributed applications
- Typically carried out by “multimedia agencies” (Multimedia-Agenturen)
  - Main target distribution media:
    - » CD/DVD-ROM
    - » Web presentations (HTML technology, Flash technology)
    - » Movie clips distributed via TV, cinema, Web
- Position in the value chain:



- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"><li>• Media industry</li><li>• Traditional industry (e-commerce)</li></ul> | <ul style="list-style-type: none"><li>• Multimedia agencies</li><li>• System integrators</li></ul> | <ul style="list-style-type: none"><li>• Telcos</li><li>• ISPs (Internet Service Provider)</li></ul> |
|--|--|---|

# Multimedia Development Team

- Executive Producer
- Producer
- Production assistant
- Creative director
- Interactive designer
- Instructional designer
- Industrial designer
- Project manager
- Copywriter/editor
- Content specialist
- Researcher
- Artistic Director
- Graphic designers
- Sound engineer
- TV crew
- Photographer
- File-transfer/network manager
- Programmer

A mixture of roles known from  
movie production & roles known  
from software projects

# The Design Dilemma

There are at least three different kinds of *design* involved in a multimedia project:

## Media Design

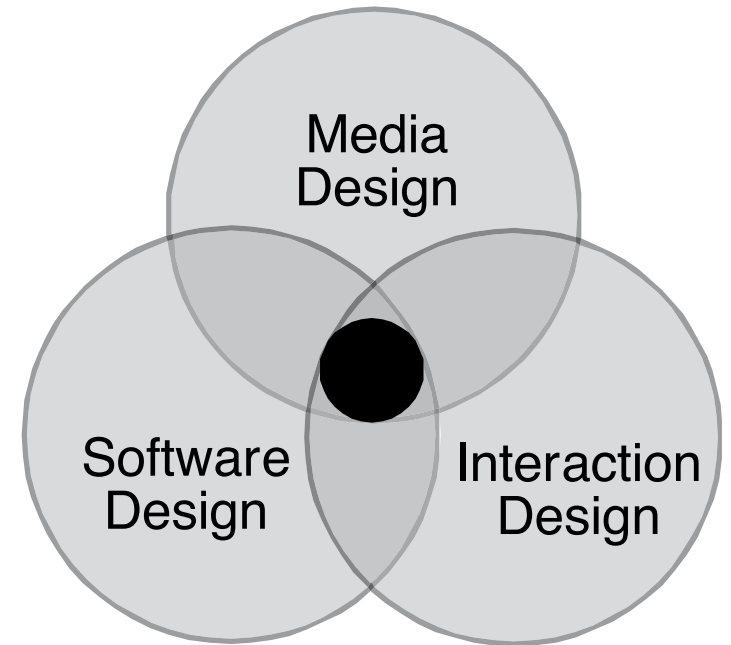
- » Visual Design (still image & video), Audio Design
- » Extremely complex, specialists available

## Software Design

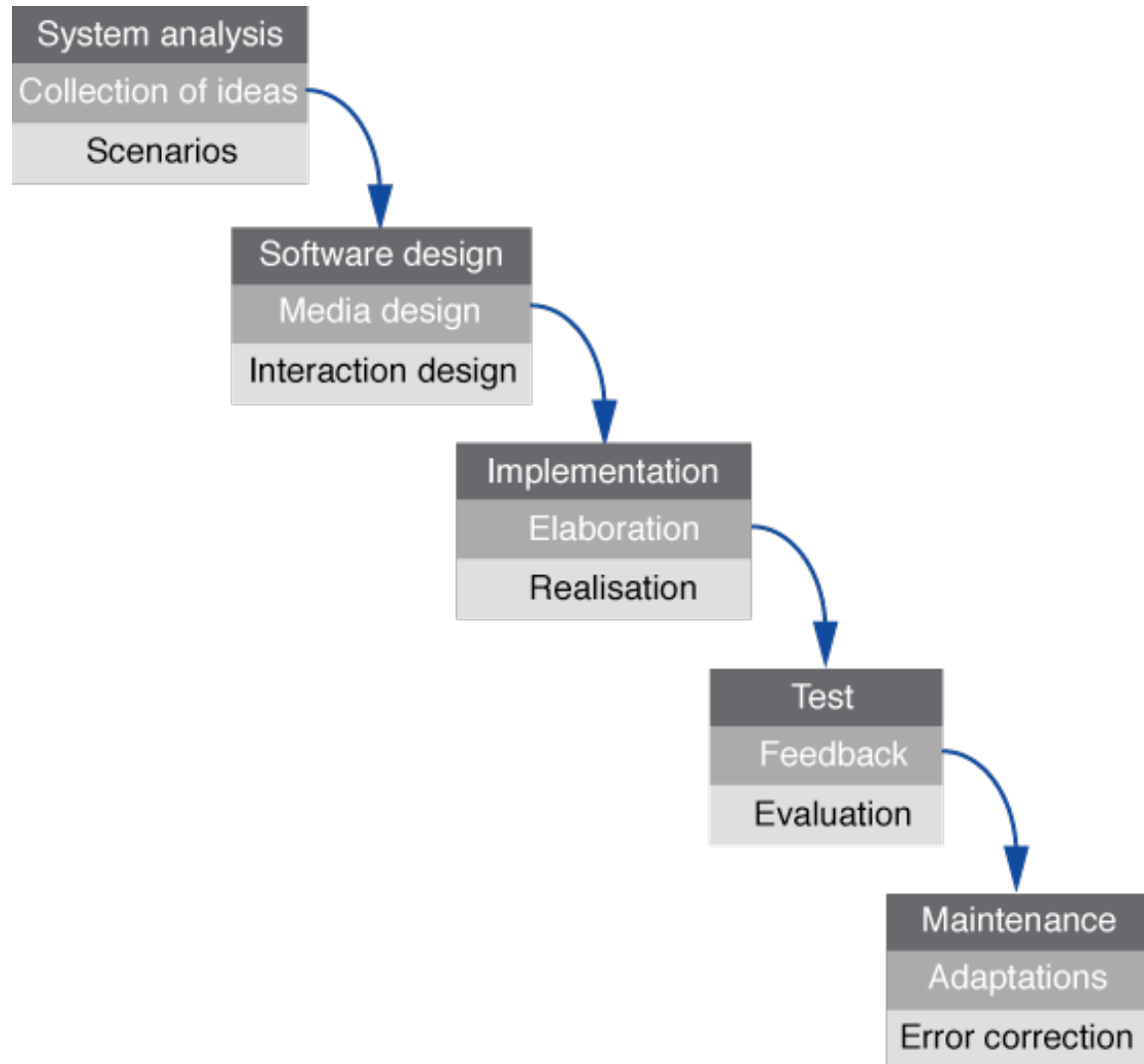
- » Software architecture, standard frameworks, design patterns
- » Extremely complex, specialists available
- » Intersection with media design specialists: almost zero

## Interaction Design

- » Man-machine interaction, usability, accessibility
- » Complex, but only a few specialists available
- » Intersection mostly *either* with Media Design *or* with Software Design specialists

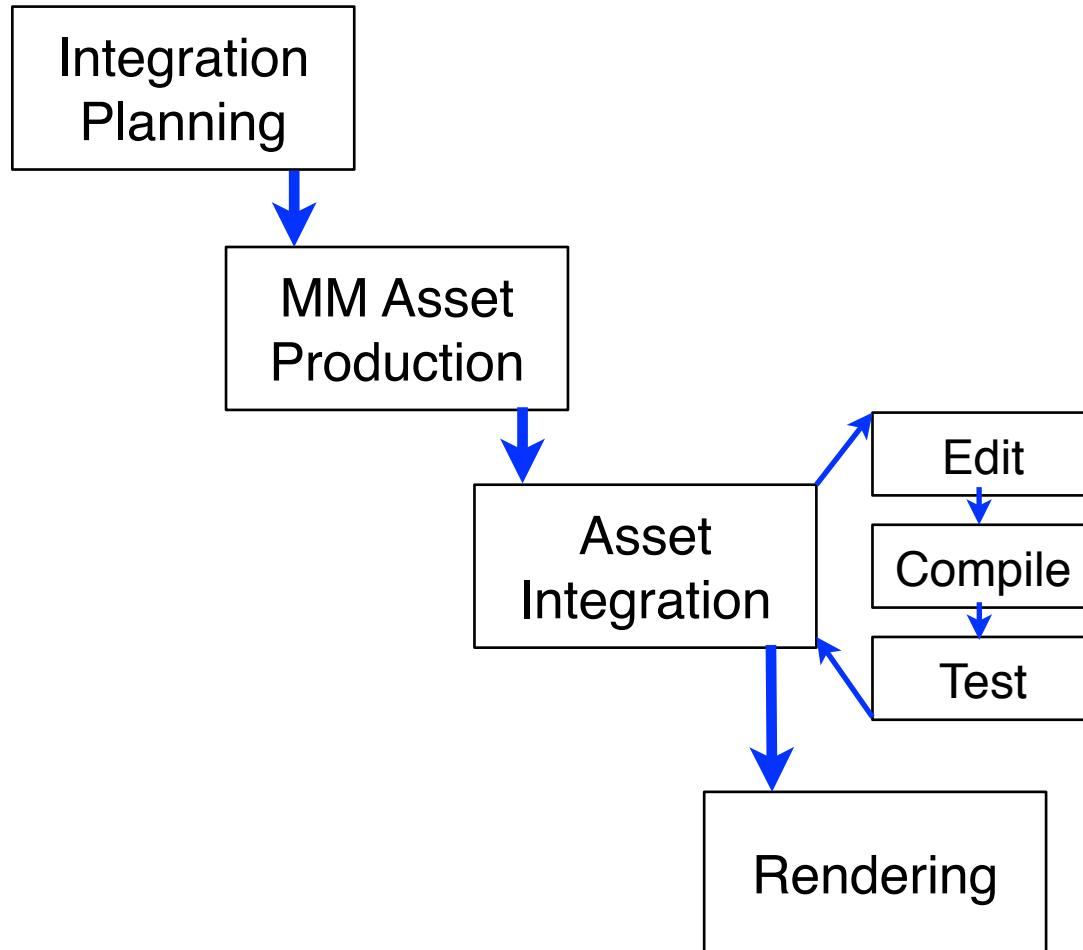


# Three-Way Parallel Waterfall



- Idealized view
- Emphasis on similarities among activities
- In practice, different running times of parallel activities within one phase
- Waterfall model is not necessarily applied in all three activities

# Multimedia Waterfall Process



- Henning 2001 (adapted) "Four-Phase Model"
- Assets may be images, video, music, animations, ...
- Integration planning means analysis&design
- Rendering phase is only needed where complex (3D) graphics is involved

# Multimedia Assets and Products


- Adopted from Henning 2001 (“Four-Phase Multimedia Design Process”)
- Process for a relatively detailed (micro) level, higher levels see later
- **Multimedia Asset**
  - Informational unit that occupies one or more perception channels of the human being
  - E.g. text object, picture, audio sequence, video clip, VR object
  - Usually produced in separate specialized workflows
    - » Using specialized tools
- **Multimedia Product**
  - Combined and integrated set of multimedia assets
  - Creates an interactive stream of information using several perception channels of a human being
  - Process of combining and integrating media objects:  
*media integration, composing*
    - » Using integration platforms/tools (e.g. Flash, SMIL etc.)

# How to Compare Process Models

- Abstraction Level of Models
  - Example: Waterfall model - just shows the principle
- Scope of Models
  - Holistic view of development from idea to product (e.g. Waterfall, Rational Unified Process) vs.
  - Special emphasis on certain development phases (e.g. Henning 4-Phase Model: Implementation/Elaboration)
- Coverage of Design Aspects (Media/Software/Interaction Design)
  - E.g. emphasis on media design in Henning 4-Phase Model
- Application Area
  - E.g. Henning 4-Phase Model for small projects with clear requirements
  - What to do in the case of unclear requirements?
    - » SMART model



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(Since this source is in German, the following slides are in German language as well.)

# Schlüsselbegriff: Konzept

- „*Konzept*: 1. [stichwortartiger] Entwurf, erste Fassung einer Rede oder einer Schrift. 2. Plan, Programm“  
(Duden-Fremdwörterbuch, 1994)
- Begriff aus der Literaturwissenschaft, übertragen auf die Medien- und Werbebranche
- Konzeption = Erstellen eines Konzepts:
  - Aufbauend auf nur wenigen Grundinformationen
  - Kernaspekte einer konkreten Anwendung festlegen und veranschaulichen
  - Beschreibung aller Komponenten, die für die Realisierung notwendig sind
- Formalisierung:
  - Konzept kann „in den Köpfen“ der beteiligten Mitarbeiter existieren
  - Konzept kann detailliert, z.B. als Antwort auf eine Ausschreibung, ausgearbeitet sein
- Erfolgreiche Konzeption ist nur im Zusammenspiel der verschiedenen Design-Arten möglich!

# Nicht-technische Tätigkeitsfelder in Multimedia-Projekten

- Konzeption
  - Hoch kreative Tätigkeit
  - Grobkonzept entwickeln und Umsetzung in Feinkonzept betreuen
  - Typische Aufgabe für ein interdisziplinäres Team
- (Medien-)Design
  - Gestalterische Umsetzung der Anwendung in Bild und Ton
  - Durch moderne Interaktionstechnologien Grenze zum Interaktions- und Softwaredesign verschwimmend
- Redaktion
  - Verfassen und Zusammenstellen von Content-Bestandteilen
  - Content-Akquisition, Lizenzierung
- Information Broking
  - Recherche von spezifischen Fragestellungen in Datenbanken und Bibliotheken

# Technische Tätigkeitsfelder in Multimedia-Projekten

- Projektmanagement
  - Koordination und Abwicklung einer Produktion
  - Management und Controlling
  - Schnittstelle zwischen Kunde und Produktionsteam
  - Häufig auch intensiv an der Konzeption beteiligt
- Programmierung
  - Umsetzung der Konzepte in Programmiersprachen und Autorensystemen
  - Klassischer (und eher für Großunternehmen geeigneter) Ansatz:
    - » Technische Spezialisten erst in späten Projektphasen beteiligt
  - Trend:
    - » Technische und grafische Sichtweisen möglichst früh in die Konzeptarbeit integrieren (Osswald S. 29)

# SMART-Modell

- Rahmenwerk zur Vorgehensplanung bei Multimedia-Projekten  
(Kerstin Osswald 2003)
- **Skalierbar**
- **Multimedia**
- **Aufgabenplanung**
- **Ressourcenplanung**
- **Tool**
- Iterative Entwicklungsmethode, am Rational Unified Process orientiert

# SMART: Phasen

- Idee der Trennung von Grob- und Feinentwurf wegen laufender Änderungswünsche nicht realisierbar
- Bessere Trennung: Ziele, kreative Idee, Erarbeitung von Inhalten
- **Strategie:**
  - Abstraktion, Zerkleinerung
  - Definition des (über die Projektlaufzeit stabilen!) Problems
  - Strukturierung, Hypothesenbildung
- **Kreation:**
  - Produktion möglichst vieler verwertbarer Ideen (unabhängig vom Kunden!)
  - Entwicklung einer interdisziplinären Vision für den Projektverlauf
- **Konzeption:**
  - Kritische Prüfung entstandener Ideen
  - Disziplinübergreifende Ausarbeitung von ausgewählten Ideen

# SMART: Workflows

- Anforderungsmanagement
- Strategieentwicklung
- Ideenfindung auf Metaebene
- Definition der Funktionalitäten
- Redaktion
- Informationsarchitektur
- Grafisches Konzept
- Technisches Konzept
- Zeit- und Kostenmanagement
- Qualitätsmanagement

(prinzipiell anpassbar an spezifische Gegebenheiten)

# SMART: Zuordnung von Workflows zu Phasen

	Phase 1: <b>Strategie</b>	Phase 2: <b>Kreation</b>	Phase 3: <b>Konzeption</b>		
<i>Iteration</i>	1	2	3	4	5
Anforderungsmanagement	█		█	█	█
Strategieentwicklung	█		█		
Ideenfindung auf Metaebene		█	█		█
Definition der Funktionalitäten			█	█	█
Redaktion			█	█	
Informationsarchitektur				█	█
Grafisches Konzept				█	█
Technisches Konzept			█		█
Zeit- und Kostenmanagement	█	█	█	█	█
Qualitätsmanagement	█	█	█	█	█

Beispielhaft, aber typisch!



# SMART: Typische Rollen (Auswahl)

- Art Director:
  - Überwacht Konzeption und Gestaltung, erstellt Interaktionskonzepte
  - Arbeitet eng zusammen mit Screendesigner, Konzepter, Softwareentw.
- Creative Director:
  - Überwacht die Stimmigkeit aller Konzepte und hinterfragt Entscheidungen
  - Inhaltliche Verantwortung für kreative Arbeit, sorgt für innovativen Input
- Screendesigner:
  - Entwickelt „Masterscreen“-Beschreibung und „Look and Feel“
  - Erstellt visuelle Konzepte und grafische Content-Elemente
  - Setzt Corporate Design des Kunden um
- Frontend/Backend Programmierer:
  - Frontend: Clientseitige Programmierung, meist Dialogdummies
  - Backend: Anwendungslogik, Datenbankanbindung, Middleware

# SMART: Artefakte (1)

- Angebot
- Anwendungsfallprotokoll
- Anwendungsfallübersicht
- Benchmark-Analyse
- Benutzerprofil
- Brand Bible
- Change Request
- Containerprofil
- Content Management Plan
- Contentogramm
- Content Writing Styleguide
- Creative Brief
- Datenbankarchitektur
- Designvorschlag
- Modulprofil
- Moodboard/Komposition/Skizze
- Navigationskonzept
- Phasenplan
- Production Board
- Prototyp
- Programmierspezifikation
- Rebriefing/Strategic Brief
- Risikoanalyse
- Screenverzeichnis
- Seitengrundraster
- Seitentypdefinition
- Site Map
- Storyboard/Drehbuch
- Dialogdummy
- Dienstleistermotivation

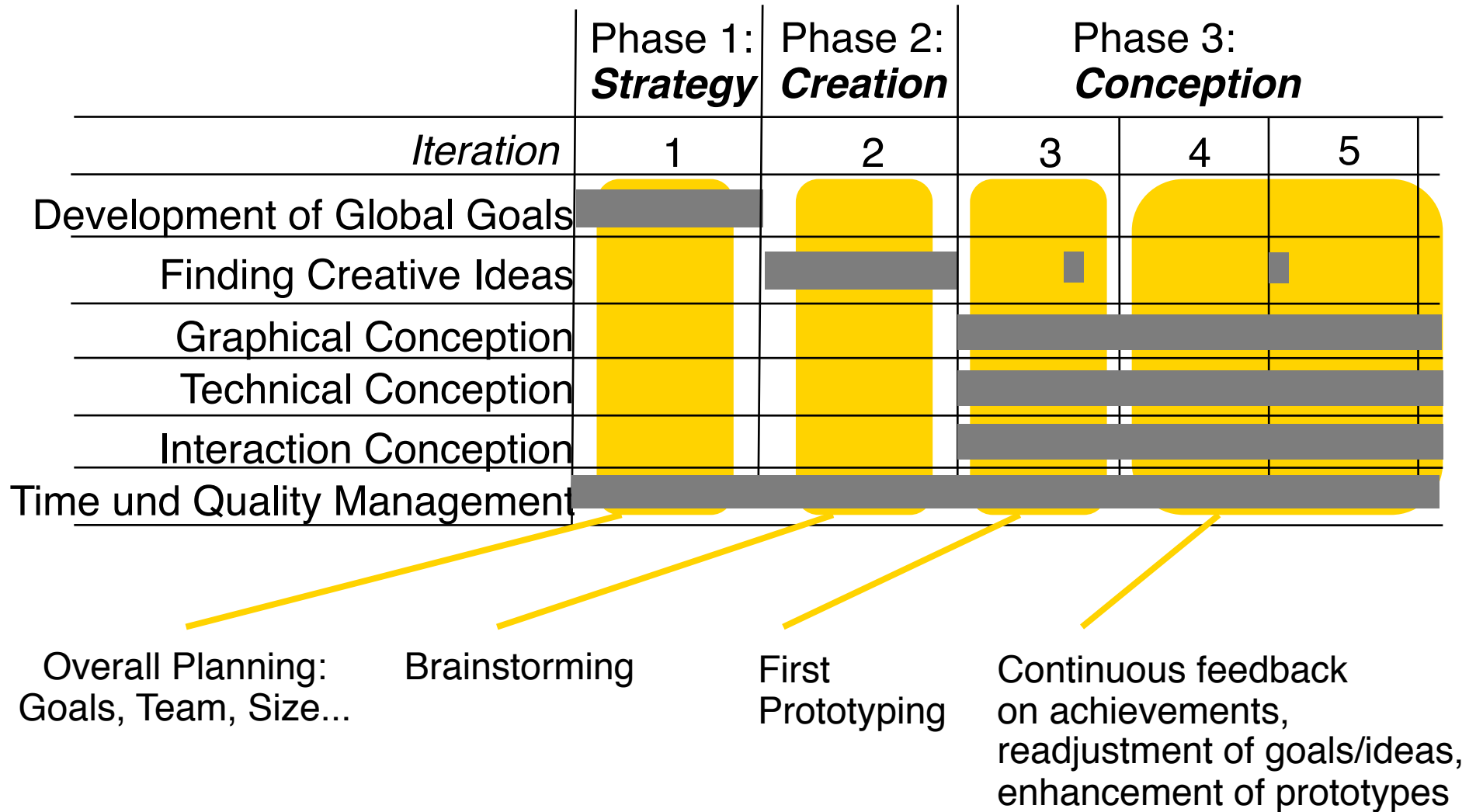
## SMART: Artefakte (2)

- Erfolgsmatrix
- Feasibility-Analyse
- Flussdiagramm
- Funktionsspezifikation
- Geschäftszieltabelle
- Graphical Strategic Brief
- Interactive Media Storyboard
- Investitionsempfehlung
- Iterationsplan
- Kostenvoranschlag
- Mission Statement
- Mitarbeitermotivation
- Szenario
- Technical Strategic Brief
- Technischer Überblick
- Technische Spezifikation
- Usability-Analyse
- Vision
- Visual Design Styleguide
- Zieldefinition

# SMART-Konfiguration

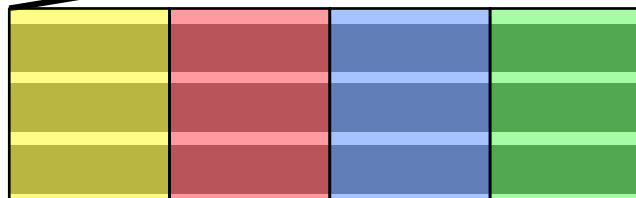
- Für eine Organisation bzw. ein Projekt werden festgelegt:
- Welche Artefakte werden benötigt?
  - Abhängig von Anwendungsgebiet und Komplexität in den verschiedenen Aspekten
  - Beispiele von Projektcharakteristika: Statisch/Dynamisch/Prozesse/Bewegtbild
- Welche Rollen werden benötigt?
  - Jedes Artefakt ist (fest definiert) mit bestimmten Qualifikationen zu seiner Herstellung verknüpft.
- Definition der Zuordnung von Workflows zu Phasen
  - Anpassung des beispielhaften Basis-Modells (siehe oben)
  - Berücksichtigung der zu erstellenden Artefakte
- ... Für Details siehe Osswald 2003!

# Practical Conclusion: A Simple Multimedia Development Process




# Integration with Four-Phase Development Process

	Phase 1: <b>Strategy</b>	Phase 2: <b>Creation</b>	Phase 3: <b>Conception</b>		
<i>Iteration</i>	1	2	3	4	5
Development of Global Goals	[Yellow bar]		[Yellow bar]	[Yellow bar]	[Yellow bar]
Finding Creative Ideas	[Yellow bar]	[Yellow bar]	[Yellow bar]	[Yellow bar]	[Yellow bar]
Graphical Conception	[Yellow bar]	[Yellow bar]	[Yellow bar]	[Yellow bar]	[Yellow bar]
Technical Conception	[Yellow bar]	[Yellow bar]	[Yellow bar]	[Yellow bar]	[Yellow bar]
Interaction Conception	[Yellow bar]	[Yellow bar]	[Yellow bar]	[Yellow bar]	[Yellow bar]
Time und Quality Management	[Grey bar]				



Integr. planning    Asset production    Integration    Rendering

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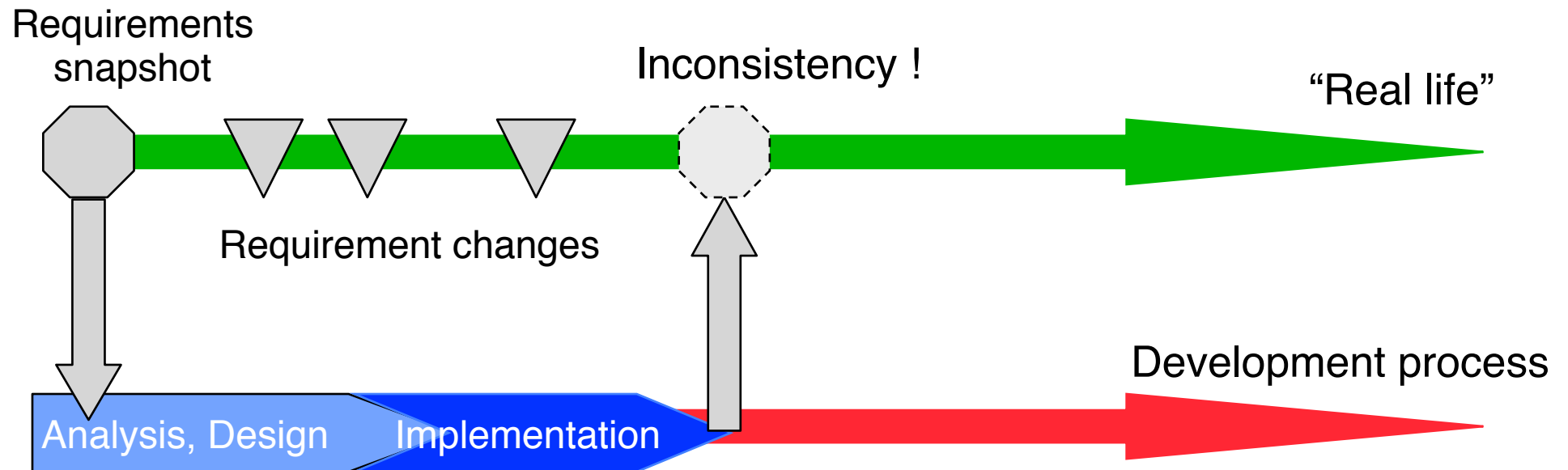
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# Changing Requirements

- Key problem in software development
  - Requirements change during course of project



Specific drivers for requirement changes in multimedia projects:

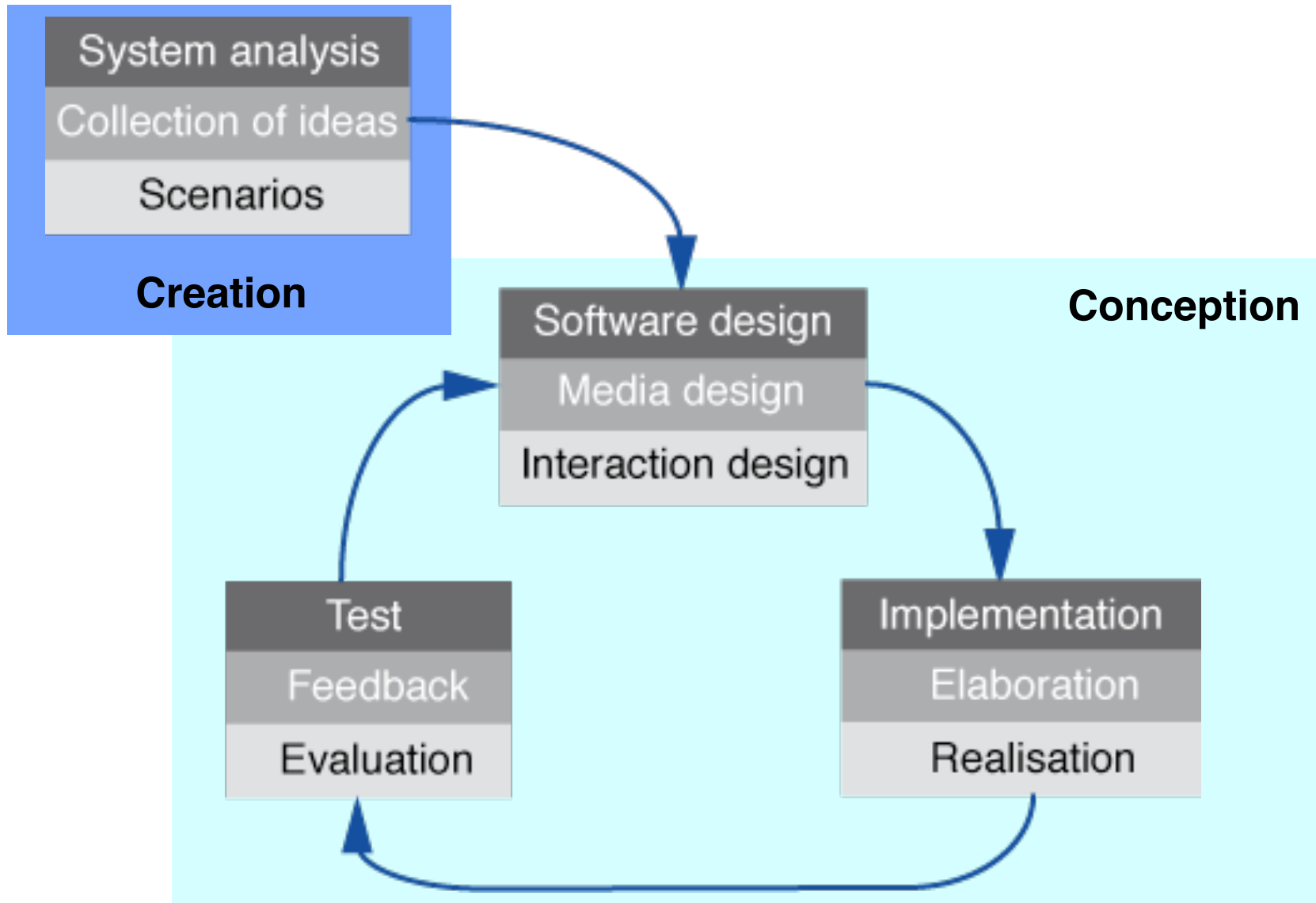
- New technologies & devices, new (corporate) design rules, new services, ...
- Feedback from non-technical reviewers (designers, customers)



# Planning for Change

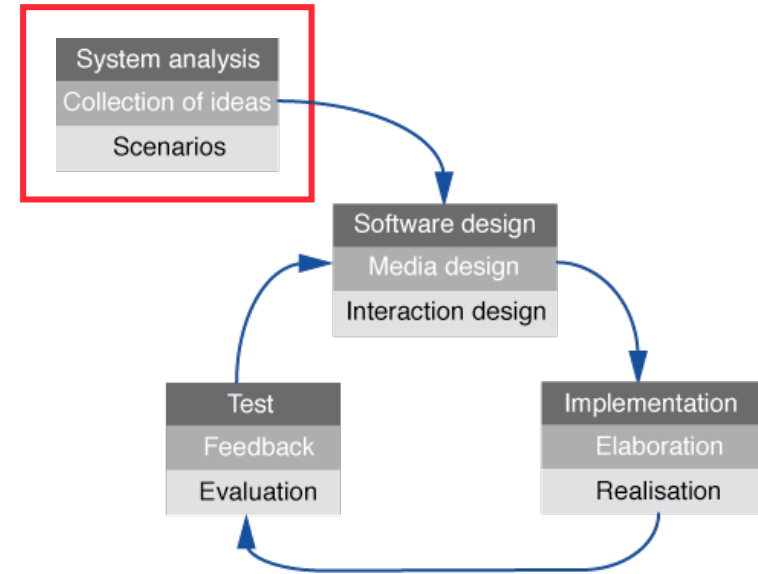
- Fred Brooks, 1975: “Plan to throw one away; you will anyhow.”
- David Lamb, 1988: Software engineering is “planning for change”
- Berry Boehm, 1988: “Spiral model” of development
- Lessons learnt from traditional software engineering at this point:
  - *Iteration* is a key principle in all variants of the development process (from waterfall to modern process definitions)
  - *Continuous feedback* is important
  - *Incremental* development is suitable for small projects with volatile requirements
- “Extreme” continuation of the idea of iterative development: Agile Development/Extreme Programming
  - Mainly suitable for volatile requirements and small projects
    - » Of which kind is the *majority* of projects?

# Iteration in Three Parallel Activities



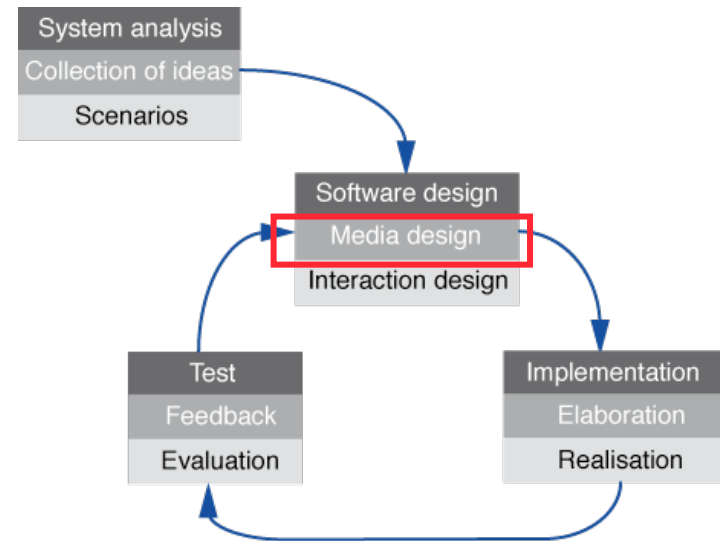
# Problems in Iterative Multimedia Development (1)

- Change of general requirements
- Examples (functional):
  - Introduction of new use cases
  - Introduction of new user types
- Examples (non-functional):
  - Change of platform
  - New security requirements
- Changes of most functional and some non-functional requirements may be dealt with by **agile development**:
  - Radical deviation from waterfall idea
  - Continuous update of integrated and executable prototype
- Details see “Praktikum Multimediamprogrammierung”



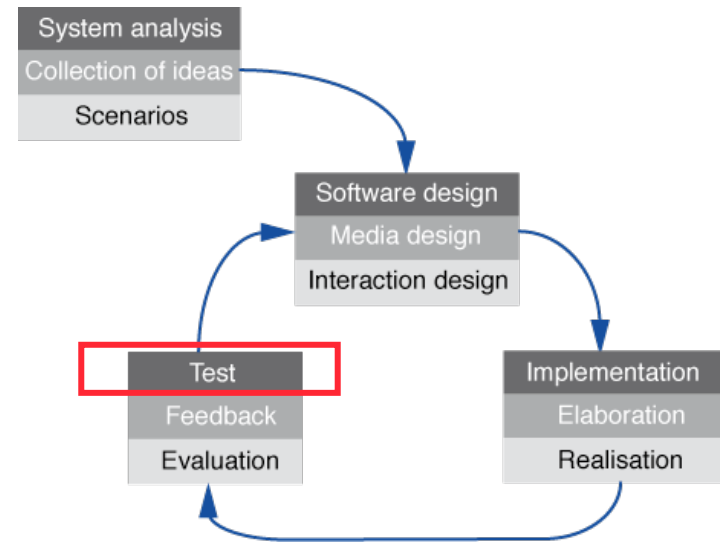
# Problems in Iterative Multimedia Development (2)

- Updates in media assets (audio, video, photography, external graphical work)
- Examples:
  - Introduction of new corporate design
  - Change to different location in scenes
  - Change to different language
  - Change of device brand
- Already produced media assets are difficult to change or cannot be changed at all
- Only way out:
  - Delay media asset production until requirements are stable (waterfall!)



# Problems in Iterative Multimedia Development (3)

- Testing of multimedia interaction (animations, interactive controls, visual/auditive feedback)
- Examples:
  - Testing an interactive game
  - Testing sound feedback (sound mix)
- Testing involves using interface channels (graphics card, sound card, operating system)
- Testing involves human activity
- Fully automatic testing is difficult to achieve
- Research area: Using image/sound analysis techniques



# How To Choose a Development Process? (1)

- Waterfall style process
  - Traditional engineering approach
- Waterfall process with multimedia adaptation
  - e.g. 4-Phase process by Henning
- Integration of design activities in waterfall model
- Iterative process with pre-planned and rare iterations
  - e.g. SMART process
  - High degree of flexibility
- Integration of design activities in iterative model
- Radically iterative ("agile") process

# How To Choose a Development Process? (2)

- How big is the project?
  - Really big project means waterfall style
  - Radically incremental process works only with small projects
- How is the mix of design activities?
  - Bigger scope of design activities means additional dependencies
- How alterable are the design artifacts?
  - Unalterable design artifacts mean waterfall style (at least for parts of project)
- How stable are the requirements?
  - Unstable requirements mean radically iterative development
- How easy is it to test intermediate products (prototypes)?
  - The better/automated the test, the better the chances for radically iterative development (agile development)