IT QM Part 2 Lecture 3

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Dr. Withalm Mar 3, 2009

IT QM Bratislava

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Lectures at the University of Bratislava/Spring 2008

21.02.2008	**Lecture 1 Impact of Quality-From Quality Control to Quality Assurance**
28.02.2008	**Lecture 2 Organization Theories-Customer satisfaction-Quality Costs**
06.03.2008	**Lecture 3 Leadership-Quality Awards**
13.03.2008	**Lecture 4 Creativity-The long Way to CMMI level 4**
03.04.2008	**Lecture 5 System Engineering Method-Quality Related Procedures**
10.04.2008	**Lecture 6 Quality of SW products**
17.04.2008	**Lecture 7 Quality of SW organization**

Vorlesungen am Technikum - Wien Winter 2008

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30.09.2008	**Vorlesung 1 Der weite Weg zu CMMII-Level 4**
07.10.2008	**Vorlesung 2 System Entwicklungsprozess + Planung**
14.10.2008	**Vorlesung 3 Verfahren 1 (CM, Reviews, Aufwandsabschätzung (Function Point))**
16.10.2008	**Vorlesung 4 Verfahren 2 (Wiederverwendung, Dokumentation, Case- Tools)**
13.11.2008	**Vorlesung 5 Qualität von SW 1 (Testen, Q-Bewertung, Quality in Use,)**
27.11.2008	**Vorlesung 6 Qualität von SW 2 (Quality Function Deployment, Zertifizierung von Hypermedia-Links bei InternetApplikationen, Technology Management Process)**
11.12.2008	**Vorlesung 7 Qualität einer SW-Organisation (ISO 9001, CMMI, BSC)**
	CMMI: Capability Maturity Model
	BSC: Balanced Scorecard

Conclusion of Part 1/1

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- Impact of Quality
  - Quality wins
  - Quality deficiencies
- Standards
  - Quality definition
- Evolution from quality control to TQM
  - Shewhart, Deming, Juran, Feigenbaum, Nolan, Crosby, Ishikawa
- Evolution of organization theory
  - i.e. Taylorism, System Dynamics, System Thinking, Quality Assurance
- Product liability
- Customer satisfaction
  - Criteria, two-dimension queries, inquiry methods

Conclusion of Part 1/2

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- Quality costs
  - Failure prevention, appraisal, failure, conformity, quality related losses, barriers
- Leadership
  - Behavior, deal with changes, kinds of influencing control, conflict resolution, syndromes to overcome when introducing changes
- Audits
- Quality awards
- Creativity techniques
  - Mind Mapping, Progressive Abstraction, Morphological Box, Method 635, Synectics, Buzzword Analysis, Bionic, De Bono
- Embedded Systems
- FMEA-Failure Mode Effect Analysis

Today's Agenda

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- CM
  - Configuration Identification
  - Configuration Control
  - Configuration Status Accounting
  - Configuration Auditing
  - Interface Control
- Reviews
  - Review techniques
  - Quality of reviews
  - Intensive inspections (Size, Roles, Expenditures, Classification of Errors)
- Expenditure Estimation
  - Estimation Methods
  - Function Point
  - Effort Estimation Meeting
  - Tools and further Methods

Configuration Management/1

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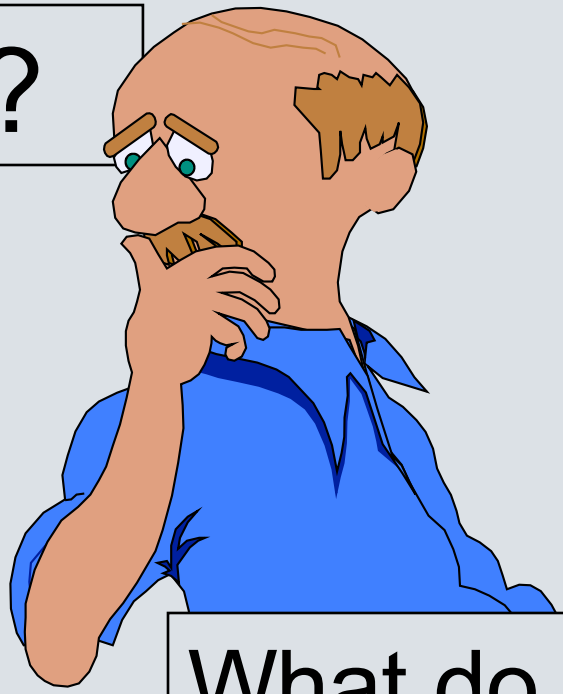
What is CM ?



What do we need CM for?

Configuration Management/2
What is CM today?

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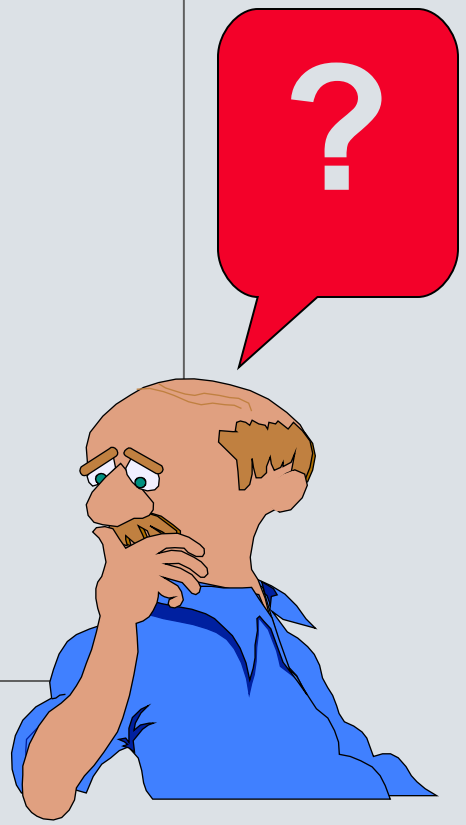
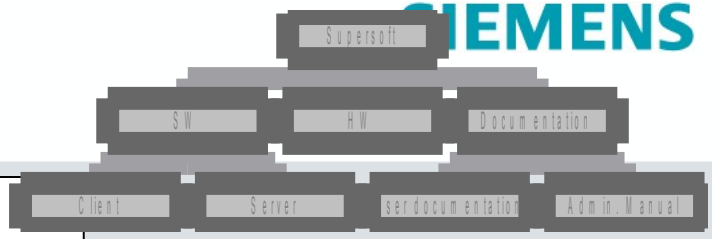
ANSI / IEEE Standard 1983, 1990, 1998

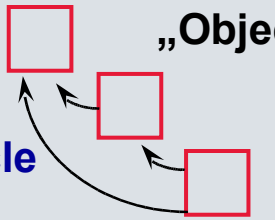
- Configuration Identification
- Configuration Control
- Configuration Status Accounting
- Configuration Auditing
- Interface Control

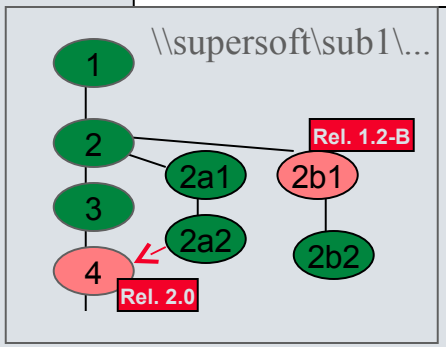


Configuration Management/3
Configuration Identification



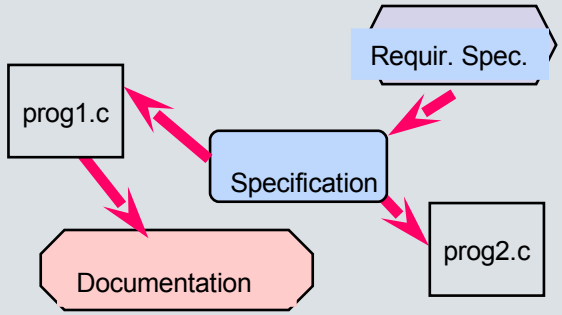
Structure of
- the software system
- the engineering process





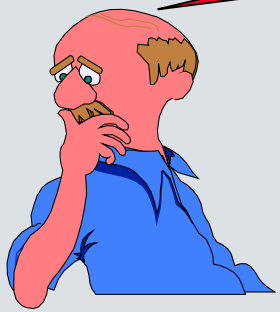
- **Unique identification of all configuration items (CIs) and their versions, baselines, ...**

- **Relations between CIs, SW systems, versions,... (traceability, which customer has ..., ...)**



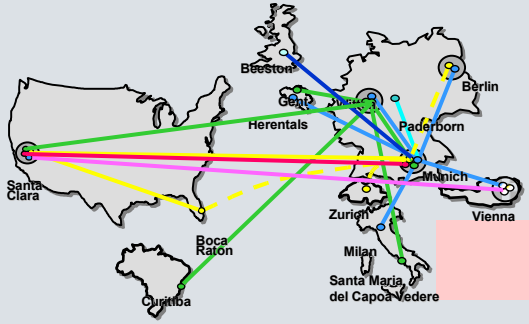
Configuration Management/4
Configuration Control

Control,
not just checks !

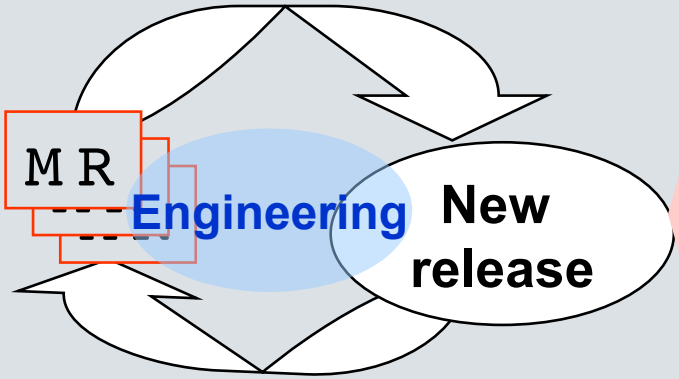


Who is allowed to/should ?
When ?
What?
How?
By which means?
Under which circumstances?

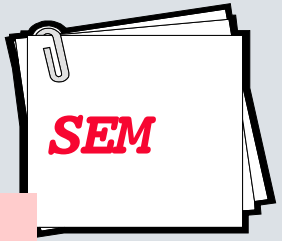
- traceable
- reproduceable
- plannable
- value-for-money



Project situation

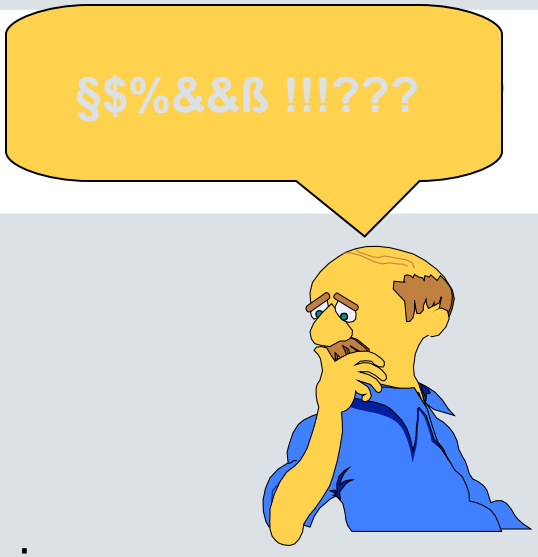


Change Management

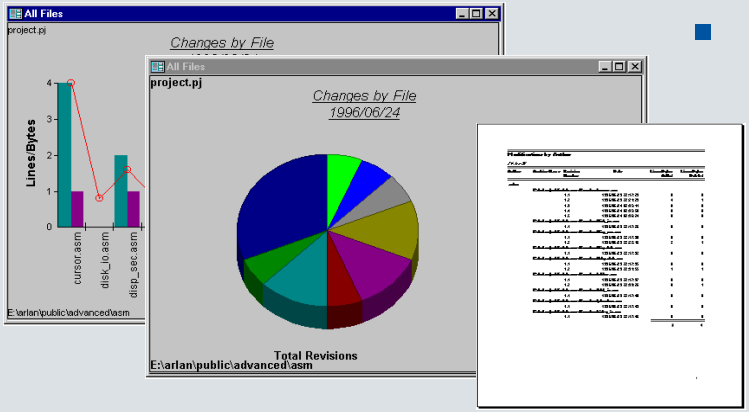


Other specifications
- information security,
- ....

Configuration Management/5
Configuration Status Accounting



- (Version) parts lists
- Change notes???
- Release notes
- Change impact analysis
- Fault lists, CR lists, ...
- Evaluations, ...
- Status reports, ...
- ....



Configuration Management/6
Configuration Auditing

Comparing the actual state of configuration items with a previously planned state.

- Functional Configuration Auditing
  Does the product comply with the requirements, standards and specifications defined for it?
- Physical Configuration Auditing
  Compliance of product and production process with the planning documents (consistency, co

Configuration Management Audit

- verify that the CM system is effective and complies with requirements (CM plan)
- verify that the CM plan is put into practice

Configuration Management/7
CM is much more than version management!

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Team work support, coordination

Version management for files, documents, ...

Implementation of the process model

Change management (MR procedure, ...)

Projectmanagement support

Production support automation

Version planning, release management

Basis for efficientquality management

Configuration Management/8
CM is the "logistics turntable" of a project

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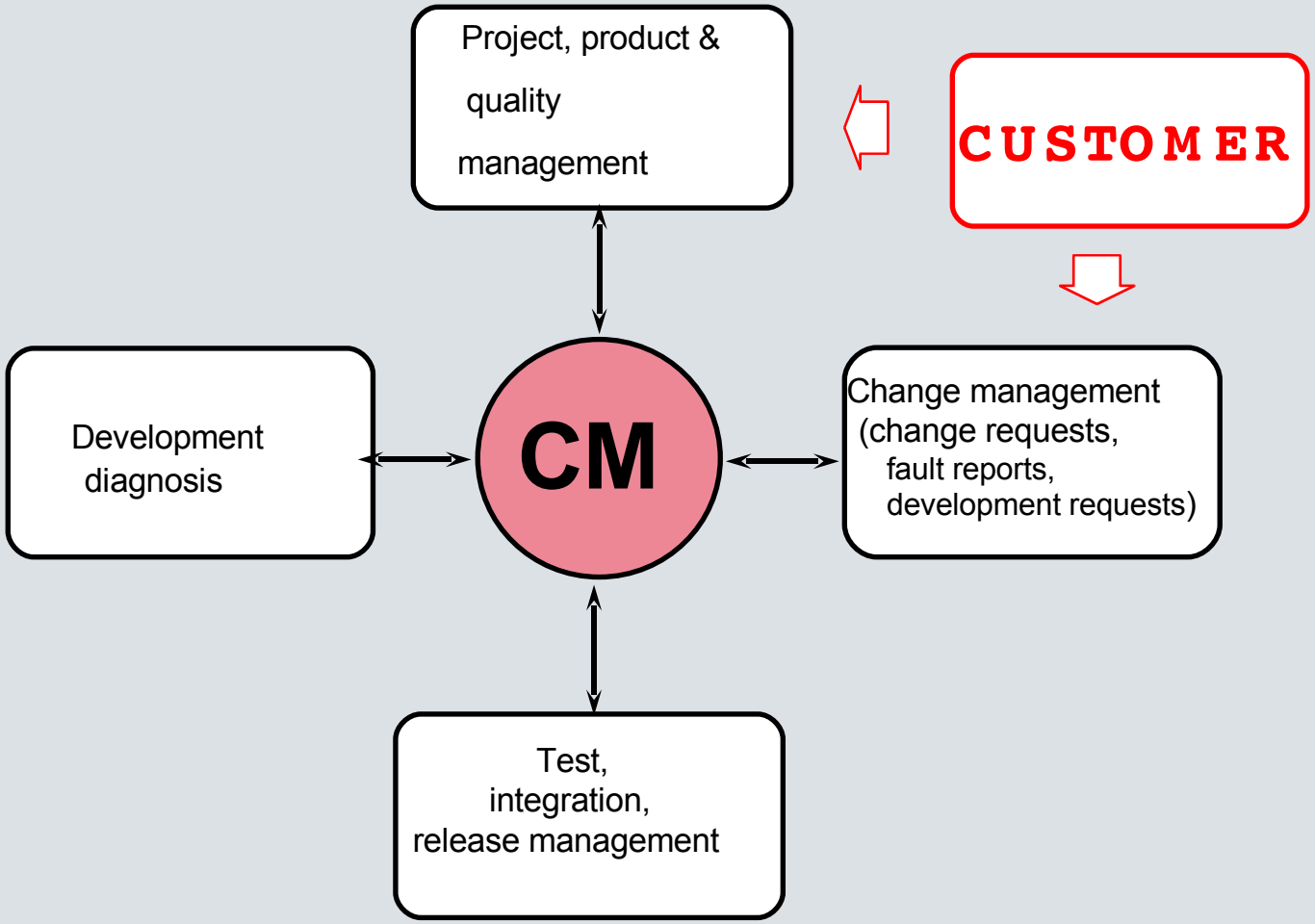

CM-Plan

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- **Purpose**
  Regulating the tasks to manage all the components generated or required during the course of the project.
- **Content**
  The CM plan must take into account the following themes:
  - CM strategy, responsibilities, CM activities
  - Tools and hardware used for CM
  - Configuration items and versions (what has to be managed, name conventions, etc.)
  - Configuration item control (changes, integration, production, release)
  - Change management and error reporting procedure

Table of Contents for CM Plan

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- **Introduction**

  1.1 Purpose of the document

  1.2 Validity of the document

  1.3 Definitions of terms and abbreviations

  1.4 Relationship with other documents

- **CM Overview**

  2.1 CM strategy

  2.2 CM responsibilities

  2.3 CM activities

  2.3.1 Setting up the CM

  2.3.2 Current CM activities

  2.3.3 Migration of existing data (if necessary)

- **Tools and hardware**
- **Configuration items and versions** (configuration identification)

  4.1 Configuration items

  4.1.1 Selection and definition of configuration items

  4.1.2 States and attributes of the configuration items

  4.2 Name conventions and filing schemes

  4.3 Relationships between configuration items

  4.4 Procedure with version planning
- **Controlling the configuration items** (configuration control)

  5.1 Incorporating changes

  5.2 Integration and production procedures

  5.3 Release procedure
- **Change management and error reporting**
- **Data backup**
- **Literature**

CM today: From Version Control to Application Lifecycle Management

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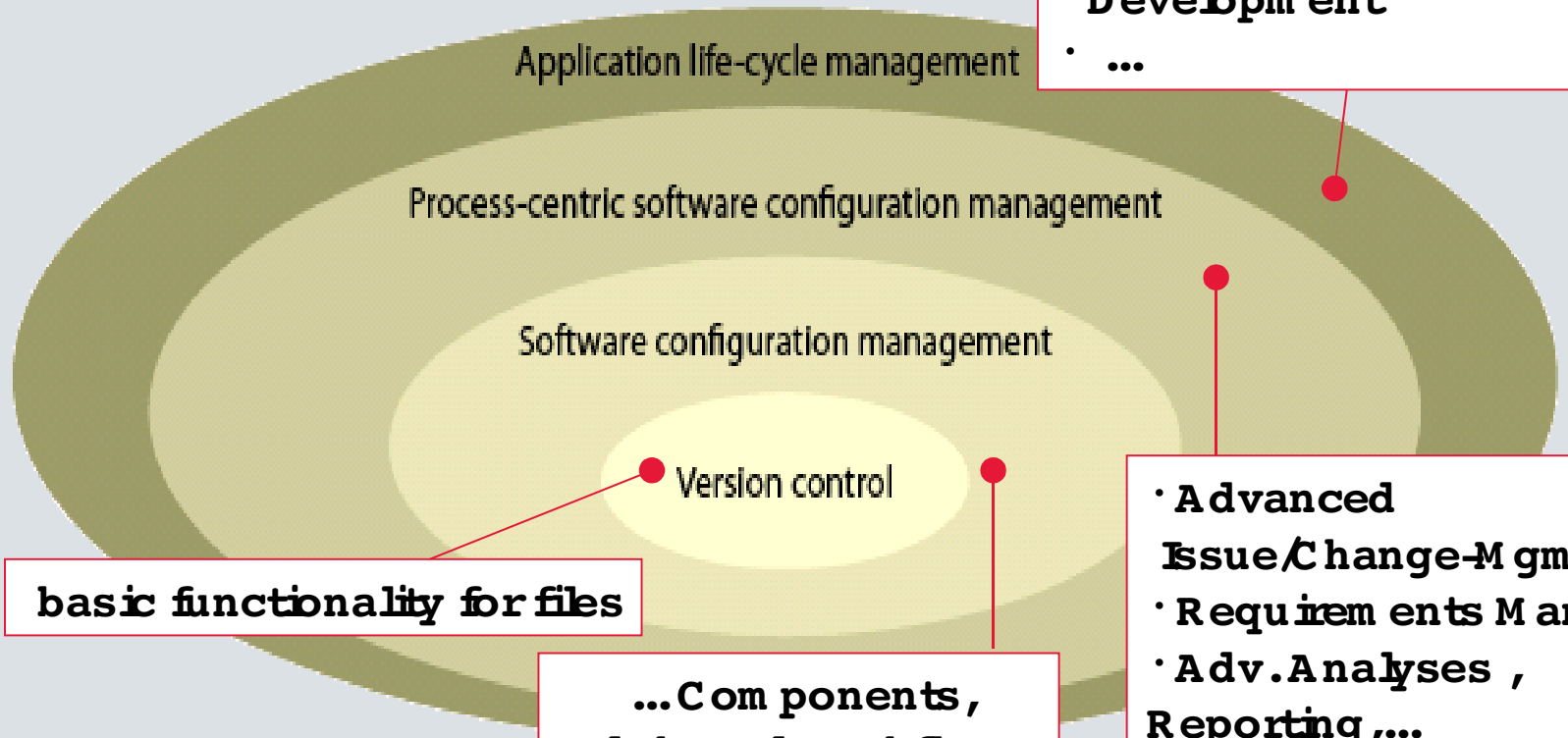

Tight Integration with tools for
- Requirements Engineering
- Design
- Development
- ...

- Advanced Issue/Change-Mgmt
- Requirements Management
- Adv. Analyses, Reporting,...
- .....

basic functionality for files

...Components, rule based workflows ...

Tool overview by Forrester Research:

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1-2 Each SCM solution segment has distinguishing features and constituent tools

Segment	Core capabilities	Tools
Version control	• Versioning of binary and text files • Elementary merging and differencing • Branching and branch labeling • Reserved and unreserved checkouts • Command line and desktop client interfaces	• CVS • Microsoft Visual SourceSafe • Perforce • Subversion
Software configuration management	• Management of groups of assets (configurations) • Advanced merging and differencing • File transparency • Automated workspace management • Rule-based workflows, pre- and post-event triggers • Build and release management	• Borland StarTeam Standard • IBM Rational ClearCase • MKS Source Integrity • Serena ChangeMan Professional
Process-centric SCM	• Process templates, design, and implementation • Issue management and requirements management • Task-based change sets and task management • User-, group-, and process-based access control • Project analytics, querying, and reporting	• Borland StarTeam Enterprise • CA AllFusion Change Management Suite • MKS Integrity Suite • Serena ChangeMan Dimensions and RTM
Application life-cycle management	Tight integration with tools in these categories: • Design • Development • Testing	• Borland StarTeam Enterprise Advantage • IBM Rational ClearCase Change Management Solution • Microsoft Visual Studio 2005 Team Foundation Server • Telelogic SYNERGY

Source: Forrester Research, Inc.

Introduction to intensive inspections/1
Overview

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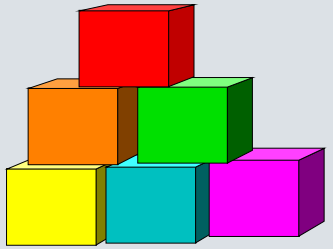
- **Reviews and intensive inspections (definitions)**
- **goals of the intensive inspection –**
  - **find errors in former times**
  - **uncover weaknesses during the development process**
- **Conditions for intensive inspections**
- **use of intensive inspections**
- **methods in comparison:**
  - **intensive inspections versus tests**
  - **intensive inspections versus other Review techniques**
  - **validating and verifying**
  - **quality according Crosby**



Introduction to intensive inspections/2
Review techniques

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Reviews

Comment technique

- many participants possible
- smaller date problems
- and fewer co-ordination expenditure
- average error detection rate a

special method:

Development Document Control (DDC)

Session technique

- higher error detection rate enabled by dialogue
  - synergy effect
- promotes know-how exchange and communication

special method:

Intensive inspection

Introduction to intensive inspections/3
Quality of Reviews

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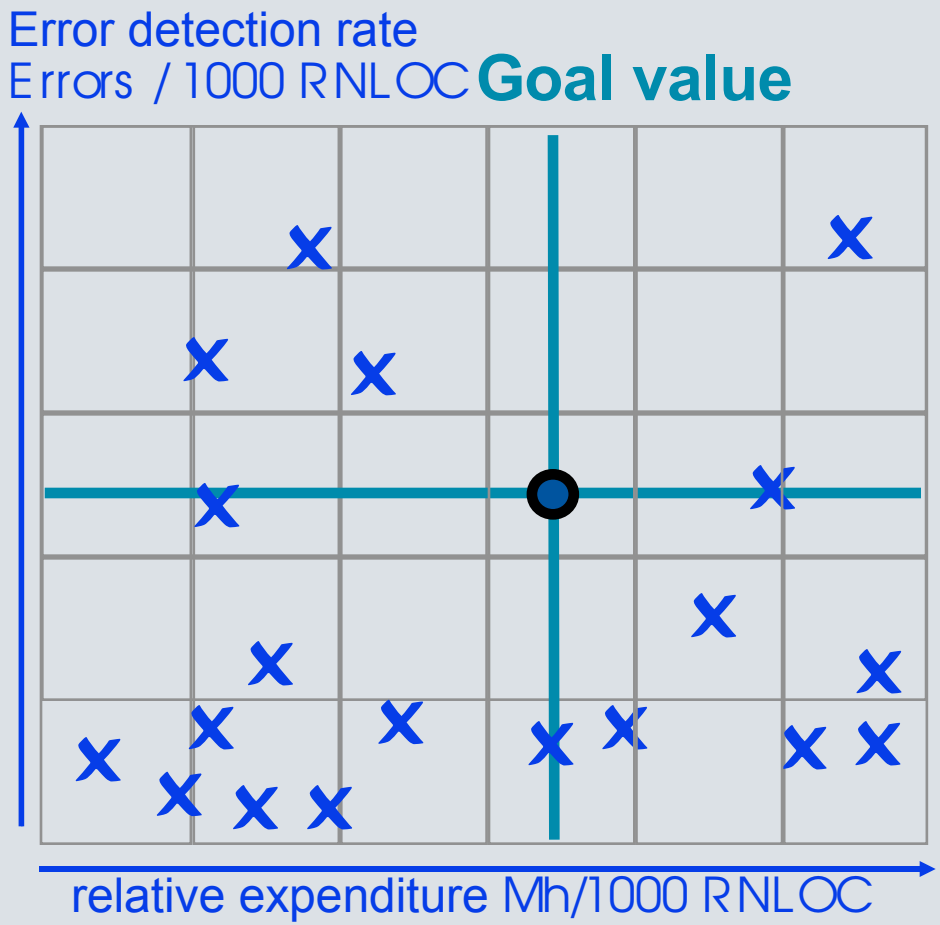

Reviews:

- Quality of execution is often very different:
- Speed
- Quantity
- Reference material
- Participants
- Preparation .....

Quality of the result is very different

Introduction to intensive inspections/4
Characteristics of the intensive inspection

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- Intensive inspections have (contrary to conventional Review techniques) the following characteristic :

  - number of participants,
  - limitation of examined quantity
    - and meeting duration
  - game of roles of the participants
  - obligation to the preparation
  - analysis
  - Follow UP
  - principle of continuous improvement

→

- ❑ Constant high quality of the inspection
- ❑ Defect Prevention

The Inspections team/1
Overview

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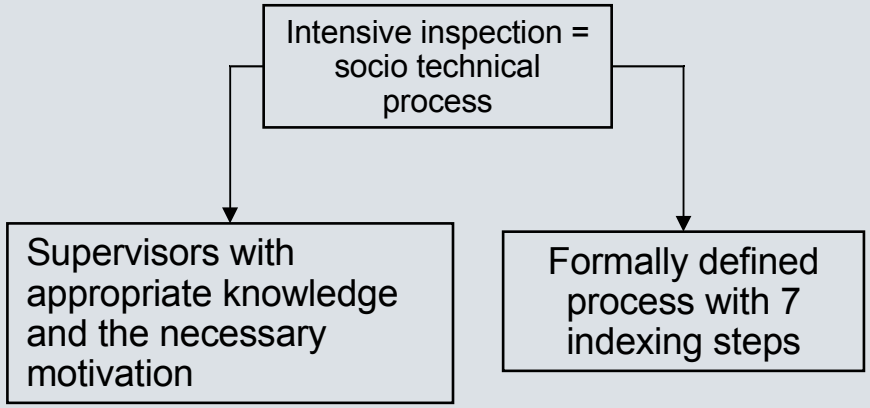
- Size of the team
- General rules
- The participants and their roles
- The 4. Supervisor
- Facilitator
- Author
- Reader
- Further supervisors and their tasks
- Appendix: Human Relations



The Inspection Team/2
Size of the team

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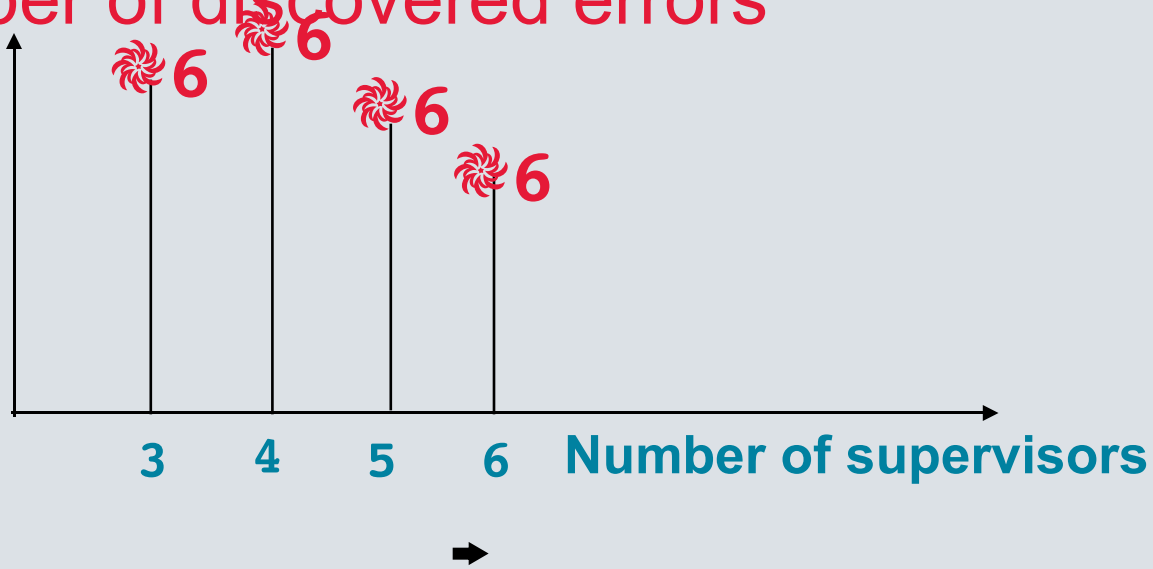
- Number of discovered errors



- If the group is too large
  - nobody feels responsible for the result
  - in such a way the group is to moderate with difficulty

The Inspection Team/3
Participants in an intensive inspection - overview

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Inspection will be performed by inspectors/supervisors with exactly defined roles:

The Author of the Object	The Moderator of the Inspection
• arranges the Inspection • makes documents available • gives an overview • repairs errors and defects	• organizes and leads the Inspection • draws up minutes • pursues the correction of errors • is responsible for the effectiveness
The Reader	**The 4th Inspector (perhaps Tester)**
• leads through the document during the meeting • reads out and repeats contents step by step with own words · • should be technically close acquainted with the inspection object	• examines the document according his role (i.e.: testability)

The Inspection Team/4
The 4th Inspector

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As a function of the inspection object the 4th inspector/supervisor can take over its role as

- Tester
- CM expert
- SW architect
- Implementer
- User
- Service coworker
- System planning coworker
- System integrator.

The Inspection Team/5
The Moderator

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- organizes and supervises the entire inspection process
- leads the inspection meeting
- is at the same time active supervisor

Personal conditions:
- recognized specialist (e.g. project manager)
- diplomatic skills, tact and ability of getting through

Tasks:
- Co-ordination and moderation of the meeting
- analyze the semantics of the inspection object
- prevents bare reading out
- provides for the attention of the question: "which did not become yet mindfully?"
- limits discussions

The Inspection Team/6
The Author

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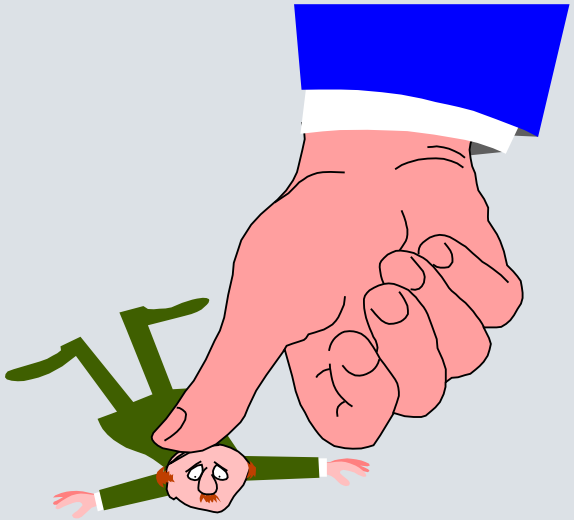
- is the author of the inspection object
- Has a personal interest in finding errors and defects



Personal conditions:
- wants really to find errors
- does without justifications

Tasks:
- makes the inspection objects at the disposal
- leads the supervisors into the inspection object
- answers questions
- supports actively all supervisors with the interest
  - to find as much as possible errors, defects and ambiguity
- accomplish the correction of the errors and defects

The Inspection Team/7
The Reader

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- **represents** the inspection object during the meeting

Personal conditions:

- technical authority, if possible a developer
  - who at least knows the surrounding field of the object
    - which will be examined
- can formulate errors and defects objectively, without reproach

Tasks:

- describes the document sequentially, i.e. line for line, sentence for sentence
  - read out, explaining with own words

The Inspection Team/8
Further Inspectors and their tasks

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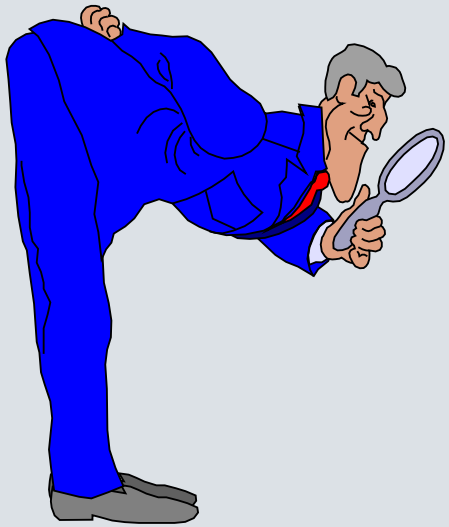
- examines from a certain view,
  - i.e. test, a user documentation or a software maintenance



Personal conditions:
- technical authority in accordance with its special role
- can formulate errors and defects objectively and without reproach

Tasks:
- Examines inspection object in accordance with its role (point of view)
  - i.e.: on testability and maintainability
  - agreement with standards..

The Inspection Team/9
Potential further inspectors/1

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- Designer
  - Is the document complete, overloaded...?
  - Is the draft correct in the sense of the specification?
  - Are the interfaces correct?
- Implementer
  - Is the document sufficient basis for the coding?
  - Is the document detailed and precise enough?
  - Is the document clear?
- Tester
  - Is the code to be understood?
  - Can the constructs of the code be tested?
  - Is the code expandable?
  - Which problems are to be expected in the interaction of the program with the run time environment?

The Inspection Team/10
Potential further inspectors/2

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- User
- System planner
- System integrator

The 7 steps of the intensive inspection
Overview

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Step	Purpose
Planning	Expenditure, supervisors and dates are planned, all conditions and the inspection object are examined.
Overview	The author gives an introduction to the inspection object.
Preparation	Each participant completes the inspection object in accordance with his role and notes defects/errors/open points.
Inspection	The inspection object is interpreting represented by the reader. The supervisors follow the rendition of the inspection object and interrupt when errors, defects or ambiguity occur.
Analysis	Which error causes + possibilities for improvement are there?
Faultclearance	the author removes defects
Verification	The defect removal is examined and completed if necessary statistics data are collected

Planning and Execution of Intensive Inspections/1
Guideline of expenditure: Code-Inspection

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Expenditure for 250 NLOC in MH	Moderator	Author	Reader	4th Inspector.
Planning	0,5	1		
Overview	0,5	0,5	0,5	0,5
Preparation	2		2	2
Inspection	2	2	2	2
Analysis	0,5	0,5	0,5	0,5
Complete minutes	1			
Fault clearance		x		
Verification	0,5	0,5		
Total	7,0	4,5 + x	5,0	5,0

Total (4 Insp.): (21,5 + x) MH + 5 MH / further inspector

Planning and Execution of Intensive Inspections/2
Guideline of expenditure: Document-Inspection

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Expenditure for 20 pages in MH	Moderator	Author	Reader	4th Inspector.
Planning	1	1		
Overview	1	1	1	1
Preparation	3		3	3
Inspection	2	2	2	2
Analysis	0,5	0,5	0,5	0,5
Complete minutes	1			
Fault clearance		x		
Verification	1	1		
Total	9,5	5,5 + x	6,5	6,5

Total (4 Insp.): (28 + x) MH + 6,5 MH / further inspector

Planning and Execution of Intensive Inspections/3
Guideline of expenditure: Code-Inspection

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Expenditure for 1 kLOC in MH	Moderator	Author	Reader	4th Inspector.
Planning	2	4		
Overview	2	2	2	2
Preparation	8		8	8
Inspection	8	8	8	8
Analysis	2	2	2	2
Complete minutes	4			
Fault clearance		x		
Verification	2	2		
Total	28	18 + x	20	20

Total (4 Insp.): (86 + x) MH + 20 MH / further inspector

Planning and Execution of Intensive Inspections/4
Critical step: Assessment of defects and categorizing

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When assessing errors and defects take into account consistency and uniformity

- ⇨ to compare results of inspections,
- ⇨ to recognize trends (frequent errors and error causes)
- ⇨ in order to accomplish purposeful counter measures

Not each error is nevertheless an open problem and each defect is on the other hand not a harmless crime.

- ➡ it must be strived for uniform evaluation guidelines
  - ➡ which will be observed by
    - ➡ moderators, supervisors and projects manager during the inspection process.

Planning and Execution of Intensive Inspections/5
Critical step: Weight of Errors

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Error "must be repaired immediately"

- *Code*
  - *malfunctioning*
- *Design*
  - *malfunctioning, if in that way implemented*
- *Requirement*
  - *malfunctioning if implemented in such a way*
  - *missing information*
- *Test case/test plan*
  - *test does not run in such a way*
  - *function is not correctly tested*
  - *not repeatable*

Defect "must be repaired not immediately"

- *Code*
  - *dead code*
- *Design*
  - *missing abbreviation listing*
- *Requirement*
  - *unclear description*
- *Test case*
  - *unclear information*
  - *wrong degree of detail*
  - *redundancies*
- *Test plan*
  - *information, which makes unnecessary trouble for the tester*

Planning and Execution of Intensive Inspections/6
Classification of Errors/1

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Degree of difficulty

· operational errors · defect · open

Class (type of the error/defect)

- Logic, control data flow, interface
- Error handling, maintenance
- Conventions
- Other to describe (more in detail)
- Data flow
- Programming languages
- Compatibility
- Performance

Source

Document (specification, draft, code...)

Type

incompletely · wrongly · redundantly

Planning and Execution of Intensive Inspections/7
Classification of Errors/2

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To each Review statement:
-Error weight
-Error class
-Type of recovery

Error weight	**Error class**	**Type of recovery**
F error	F formal	+ to formally supplement
M defect	T technical	x to change
W repetitive error		- to delete
- no error		? to clarify
		F error in foreign document

Status

✓ Settled	u not repaired
a rejected	- defect still open

Planning and Execution of Intensive Inspections/4
Critical step: Analysis

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Example: Errorlist

#.	Line	Description of error	Weight	class	....
1	1023	Missing Exception	F	T	.....

Example: Minutes of Analysis

Are the cause in the development process ?
How and why arised the error

Nr.	Description of error cause(n)	Phase	Category	Y/N	Recommended Preventive measure
1	Insert late features	Implementation	Guidelines	Y	Add Checklists, point out that late features are a great source for errors

Planning and Execution of Intensive Inspections/5
Global Analysis

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Error causes can be assigned for example following categories

Information flow

- What wasn't passed on? ·
- From whom to whom why not?

Lacking of Know How

- What was wrongly understood?
- Which experience/training is missing?

Guidelines for the development process

- What is missing in the guidelines, leads to misunderstandings?

Unsatisfactory development defaults

- What was surveyed and/or wasn't thought through?
- Which requirements and/or technical directions were missing or were not goal-oriented
  - Unclearly
  - Redundantly
  - Superfluously

other

to be precise

Hints concerning the introduction of intensive inspections
Expenditures with and without inspections

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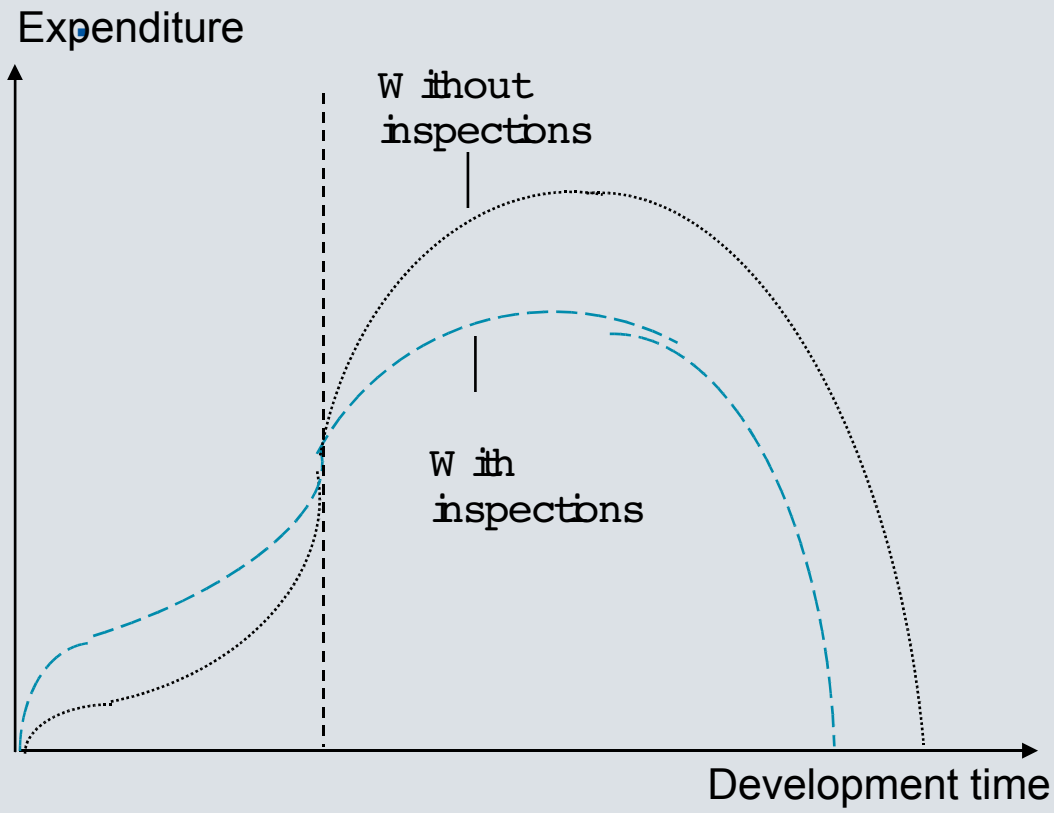
- What are the costs of intensive inspections ?



Investigation in Intensive inspections

- In early phases: additional expenditure
- In late phases: Economy

Economy in total

Verification versus Validation

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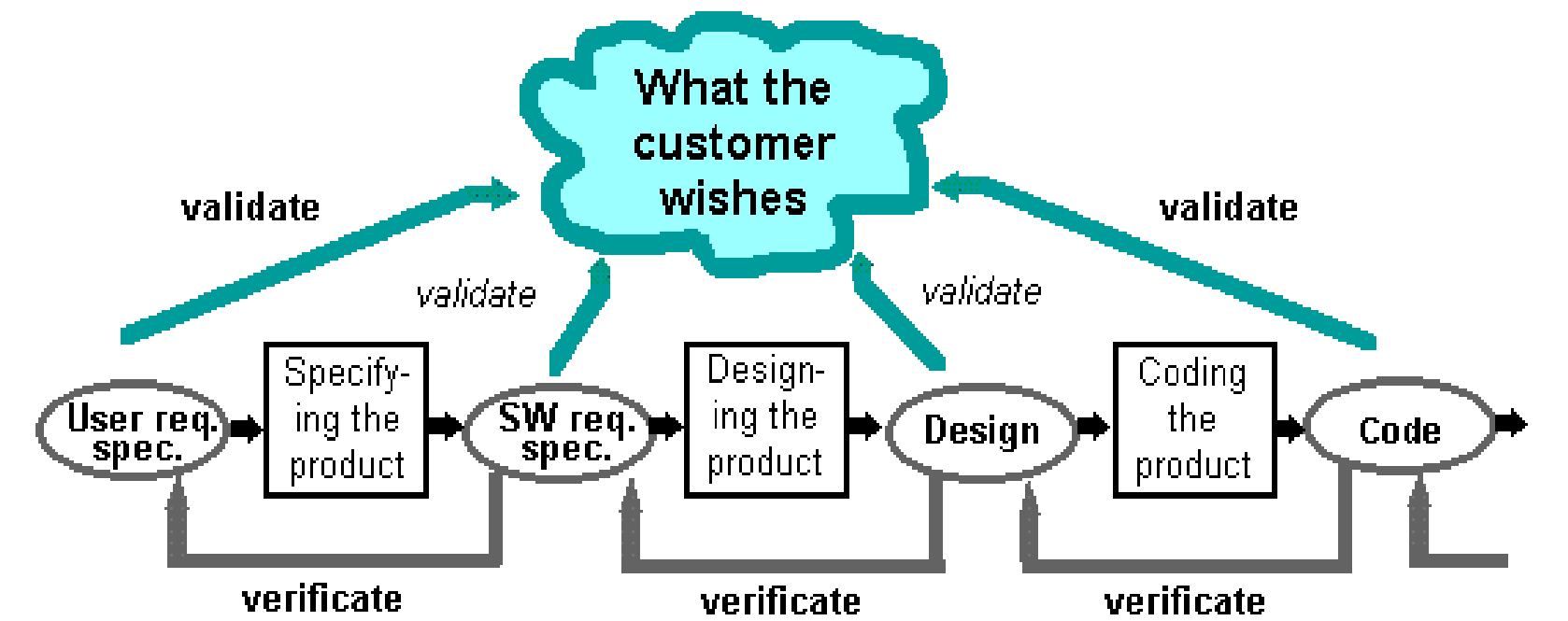

verificate = Am I creating the product correctly?
validate = Am I creating the right product?

Expenditure Estimation

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- Three things will never return:

  an arrow once shot,

  a word once spoken,

  a day gone by

Accuracy of Estimation

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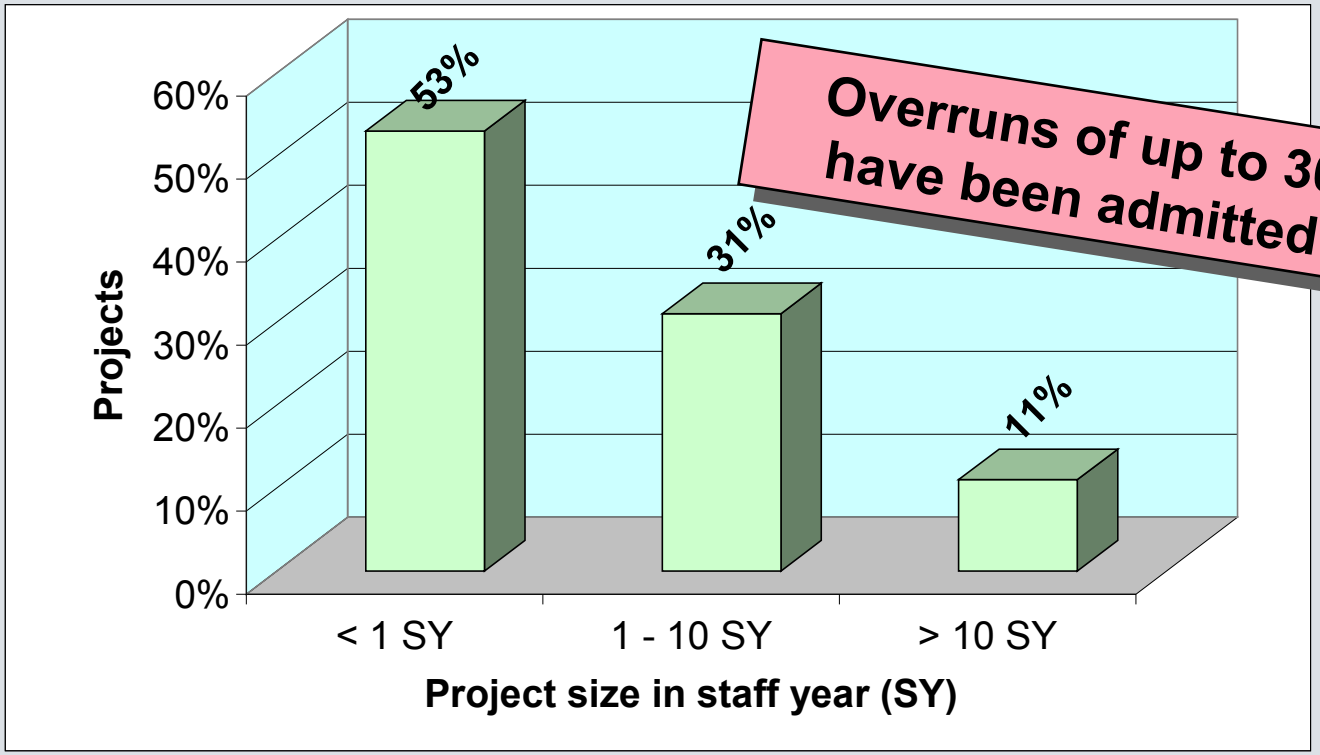
Question:
How many products are completed with a <25% variance from the expected effort?



Source: Study carried out by the University of Osnabrück in the late 1980ies

Determining the Effort During a Project's Runtime

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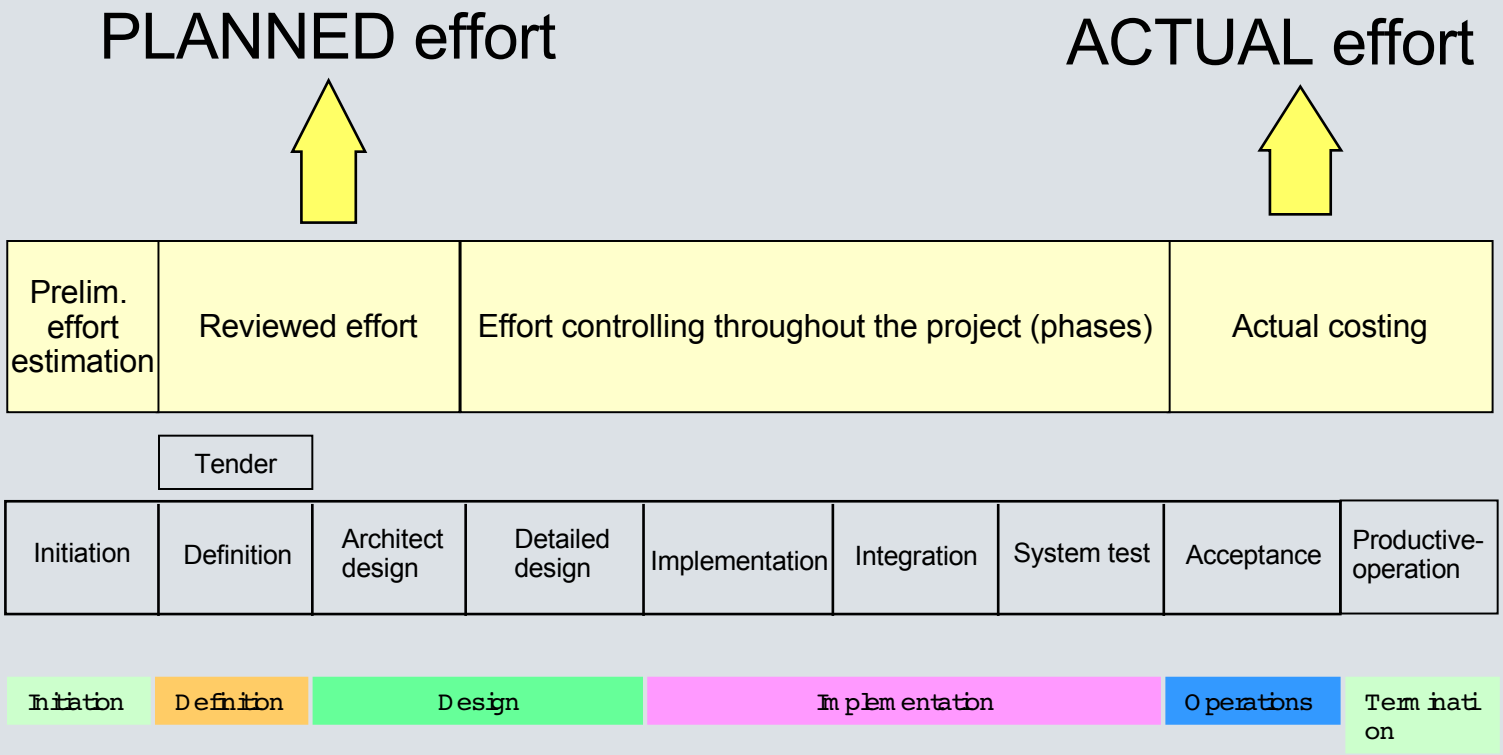

Determining the Effort – Estimation Only?

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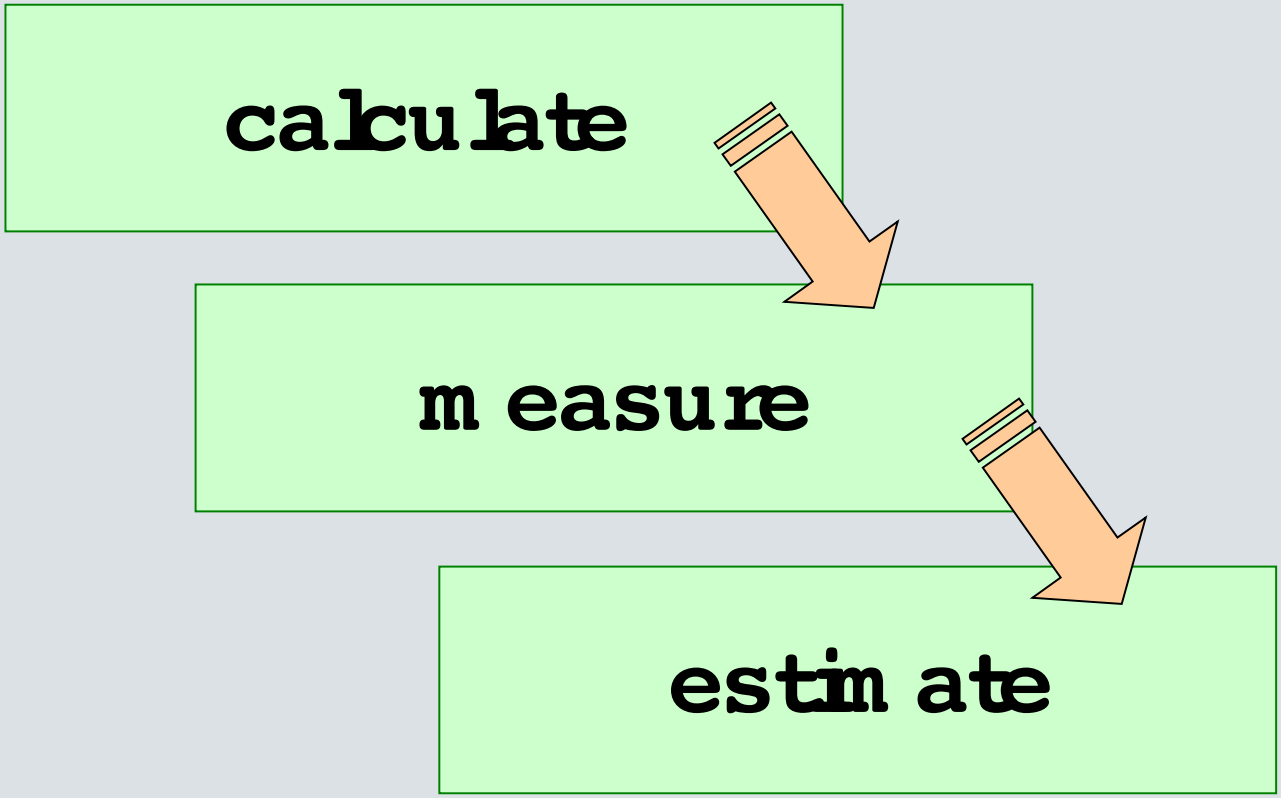

Estimate only in case it is not possible to measure or calculate

Classification of effort estimation methods

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- **Algorithmic methods**
  are based on mathematical models whose formulas and constants have been determined empirically
- **Relation methods**
  compare earlier projects (historical data) with the current project
- **Indicator methods**
  use indicators from earlier projects as a basis for assessing estimated values for the planned project
- **Expert estimations**
  make use of the knowledge of project experts with adequate domain know-how

Overview of effort estimation methods

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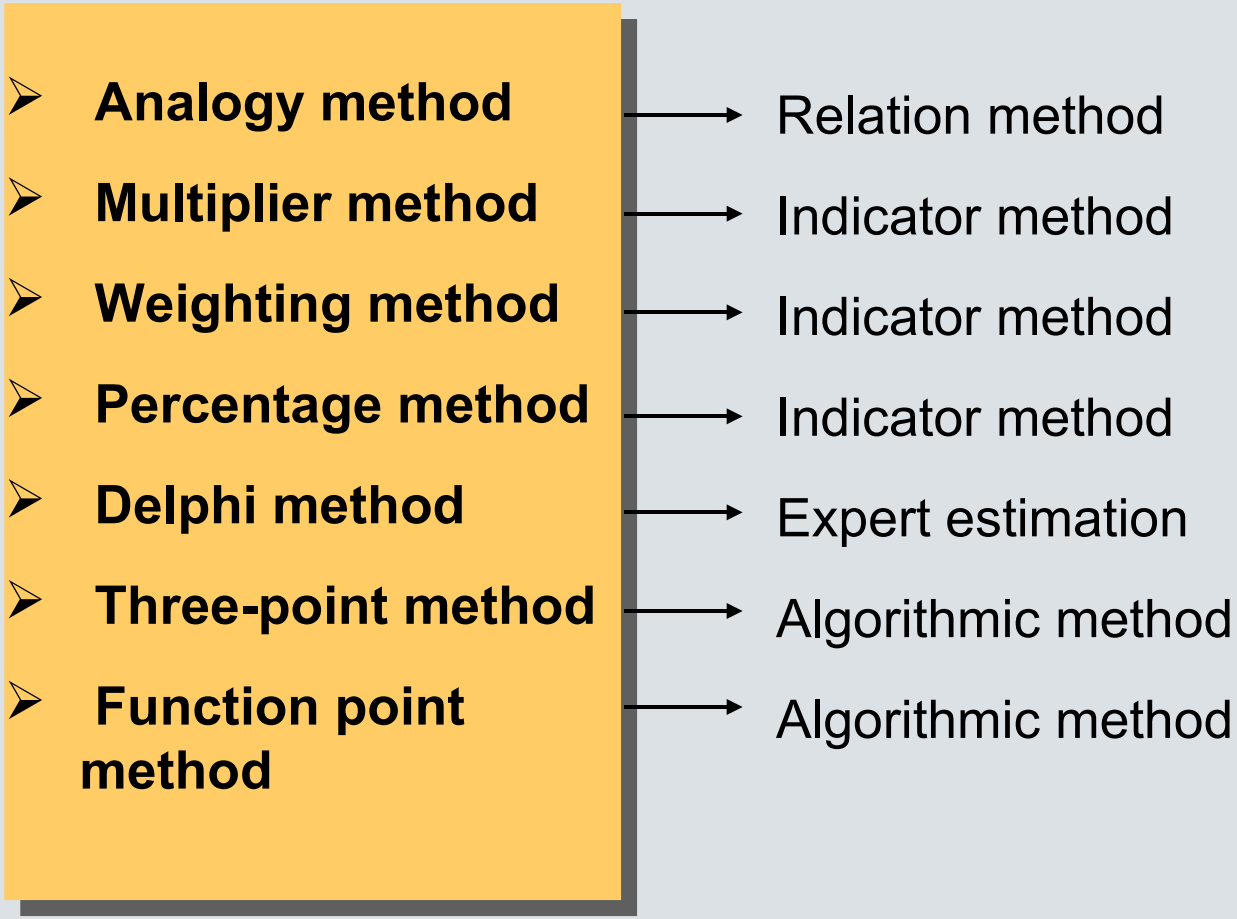

Basic Effort Estimation Methods

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- **Analogy method**
  - Effort estimation based on similar projects (evaluation of differences)
- **Multiplier method**
  - Breakdown and classification in uniform parts; estimation for only a few parts, followed by multiplication
- **Weighting method**
  - Identifying and assessing effort drivers; calculated by means of a formula
- **Percentage method**
  - Detailed estimation of a phase; extrapolation

Analogy method

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- The analogy method is a **relation method**. A **similar project** is used as the basis for drawing conclusions about the effort to be expected for a **new project**.
- **Identification of influencing factors** for the planned project
- The **differences** in **influencing factors** between the analogy project and the planned project are identified
- The estimated **effort** for the planned project is determined **on the basis of the effort needed for the analogy project**, taking into account the differences.

Multiplier method

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- The multiplier method is an **indicator method**. A conclusion regarding the expected effort is drawn on the basis of the **values estimated for comparable parts**.

➢ **Breakdown** of the project into parts with **comparable characteristics** (size, complexity, ...)

➢ **Determination of individual effort** for specifically selected parts (determination of indicators)

➢ The total effort is the result of **individual estimations multiplied** with the **number of identical parts**.

Weighting method

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- The weighting method is a mixture of the **indicator and algorithmic methods**. A conclusion regarding the total effort needed is drawn from **effort-influencing factors** (functionality, domain, technology, experience, organization, etc.).

- **Determination of influencing factors** that are critical for effort estimation
- **Weighting** of **influencing factors**
- **Determination** of the concrete **values of the factors** for the project to be estimated
- **Summing up** of the individual values

Percentage method

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- The percentage method is an **indicator method**. Relying on the data available **from already completed phases**, an extrapolation to arrive at the **total effort** is made based on how **effort is distributed** on average over the phases of development process.

➢ Detailed **estimation** or **determination** of effort for at least one **phase**

➢ **Extrapolation** of the **total effort** based on given (method-based) percentages relating to the **distribution** of effort **by phases**

Function point method

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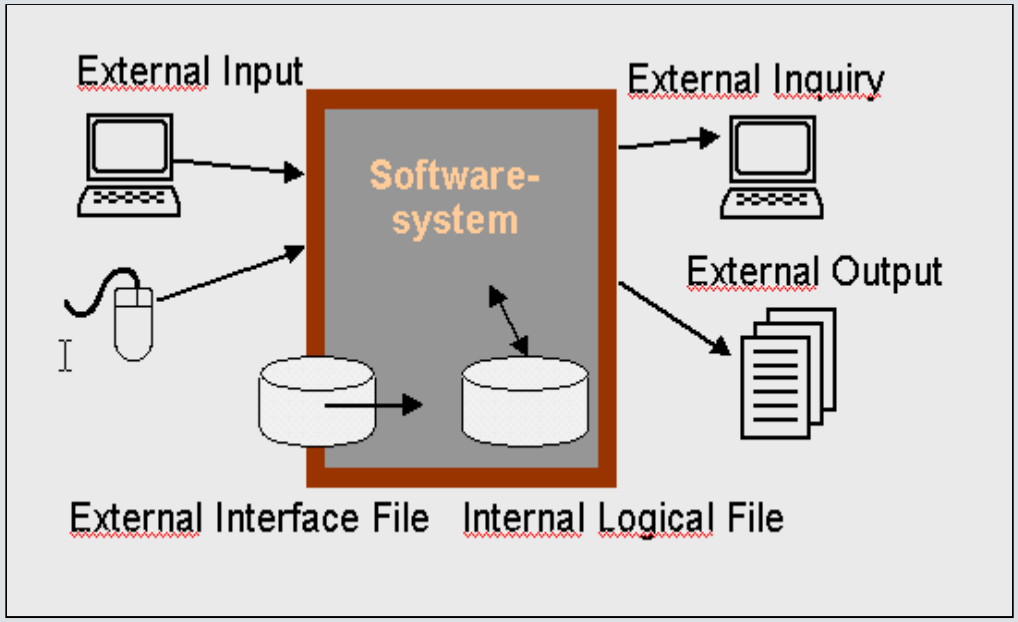
- The function point method is an **algorithmic method** for **measuring the size and/or the scope of an application** from the user's point of view.
- First presented by A.J. Albrecht (IBM) in 1975.

Function points

Internationally standardized measure for the functional scope of a SW product from the user's point of view



Function Point Analysis in the Planning Process

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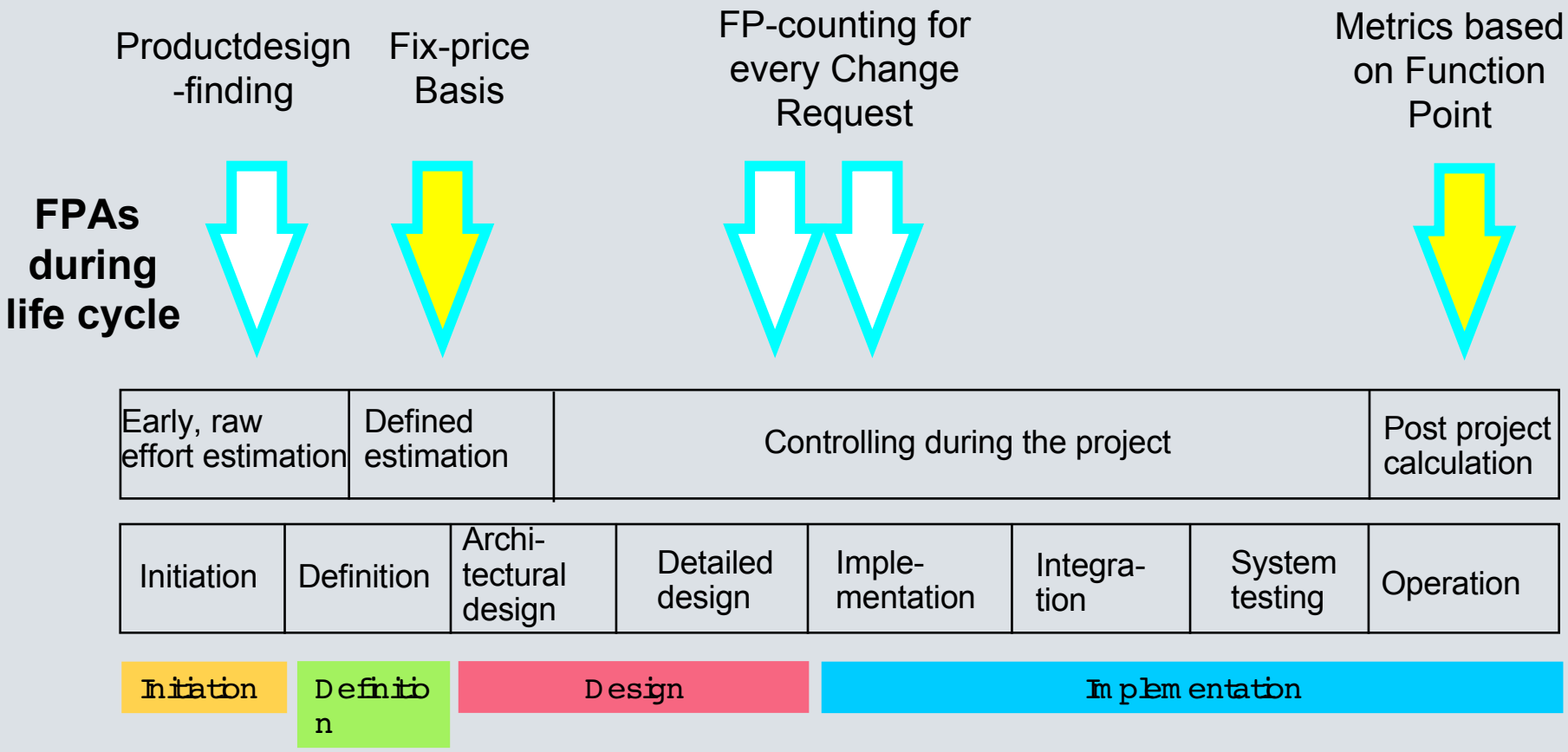

Effort estimation at PSE

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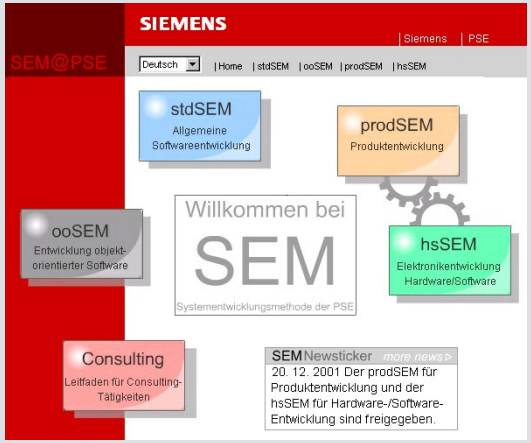
- Approx. 1000 active development projects / year, with
  - different domains
  - different development processes
  - different types
    (e.g. solution, integration, development, maintenaince, ...)
- Effort estimation:
  Two independent ways of
  effort estimation are recommended:
  - Expert estimation
    (effort estimation meeting)
  - Function point method
- Support Center Project Management:
  Network of function point experts



Principles of the Function Point Analysis (FPA)

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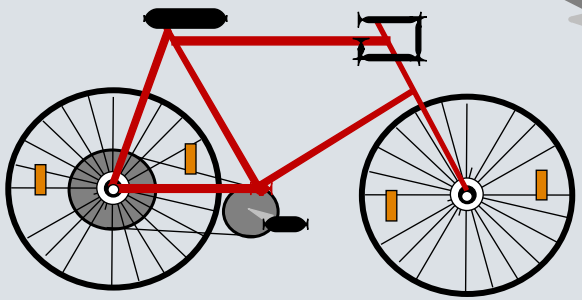
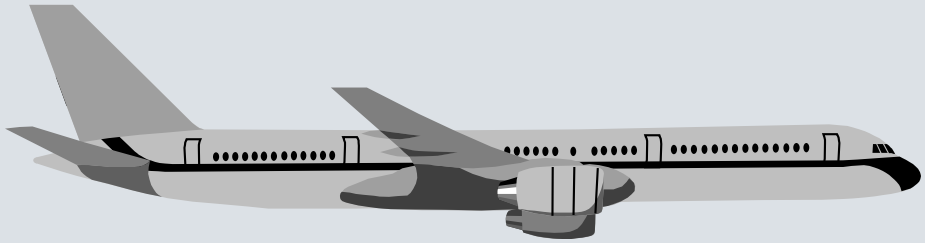
- Functionality provided to end-users (black box)
- Simple external interfaces – simple processing, complex external interfaces – complex processing
- Statistical average of very simple and very complex elements





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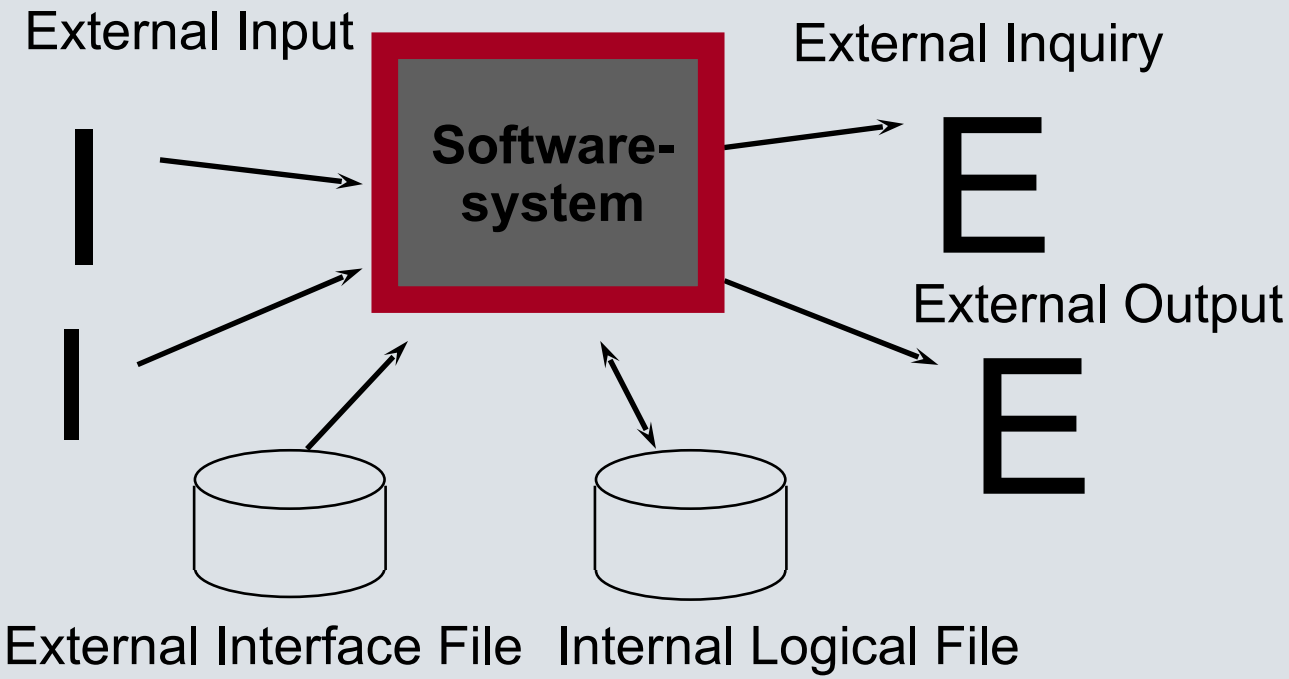
Function Points

international accepted standard for the measurement of software size

independent of methodology and technology

represents the functionality that the end user requests

Identification of Data Functions and Transactional Functions



The arrows show the “Primary Intent“ !

Steps of Function Point Analysis

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Determine the type of Function Point Count

- Development Project
- Enhancement Project
- Product (Application)

Defining the Boundary

- Identify the application boundary

Identify all data function type

- Internal Logical Files
- External Logical Files

Identify all transaction function types

- External Inputs
- External Outputs
- External Inquiries

Value Adjustment Factor

Result:

Adjusted Function Point Count

(measurement of software size)

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Identifying the Data Functions

- Identify all logical files
- Determine the file type
  ILF...Internal Logical File (read and write)
  EIF...External Interface File (only read)
- Find all data element types and all record element types
  DET...Data Element Type
  RET...Record Element Type
- The complexity of the file is determined by the number of DETs and RETs (rules defined by IFPUG)
  (Low, Average, High)
- The number of Function Points is determined by the complexity and the file type (rules defined by IFPUG)

Identifying the Transactional Functions

SIEMENS

- Identify all transactions
- Determine the transaction type
  EI...External Input
  EQ...External Inquiry
  EO...External Output
- Determine the number of data element types and file types referenced
  DET...Data Element Type
  FTR...File Type Referenced
- The complexity of the transaction is determined by the number of DETs and FTRs (rules defined by IFPUG) (Low, Average, High)
- The number of Function Points is determined by the complexity and the transaction type (rules defined by IFPUG)

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Unadjusted Function Point Count

According to IFPUG CPM 4.2:

Function type / Complexity	Low	Average	High
Internal logical File **ILF**	7	10	15
External Interface File **EIF**	5	7	10
External Input **EI**	3	4	6
External Output **EO**	4	5	7
External Inquiry **EQ**	3	4	6

14 GSCs ⇒Value Adjustment Factor VAF

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1. Data Communications
2. Distributed Data Processing (incl. distributed data)
3. Performance (response time)
4. Heavily Used Configuration
5. Transaction Rate
6. Online Data Entry
7. End-User Efficiency
8. Online Update
9. Complex Processing
10. Reusability
11. Installation Ease
12. Operational Ease
13. Multiple Sites
14. Facilitate Change

Relationship: FPA ⇔ Effort Estimation

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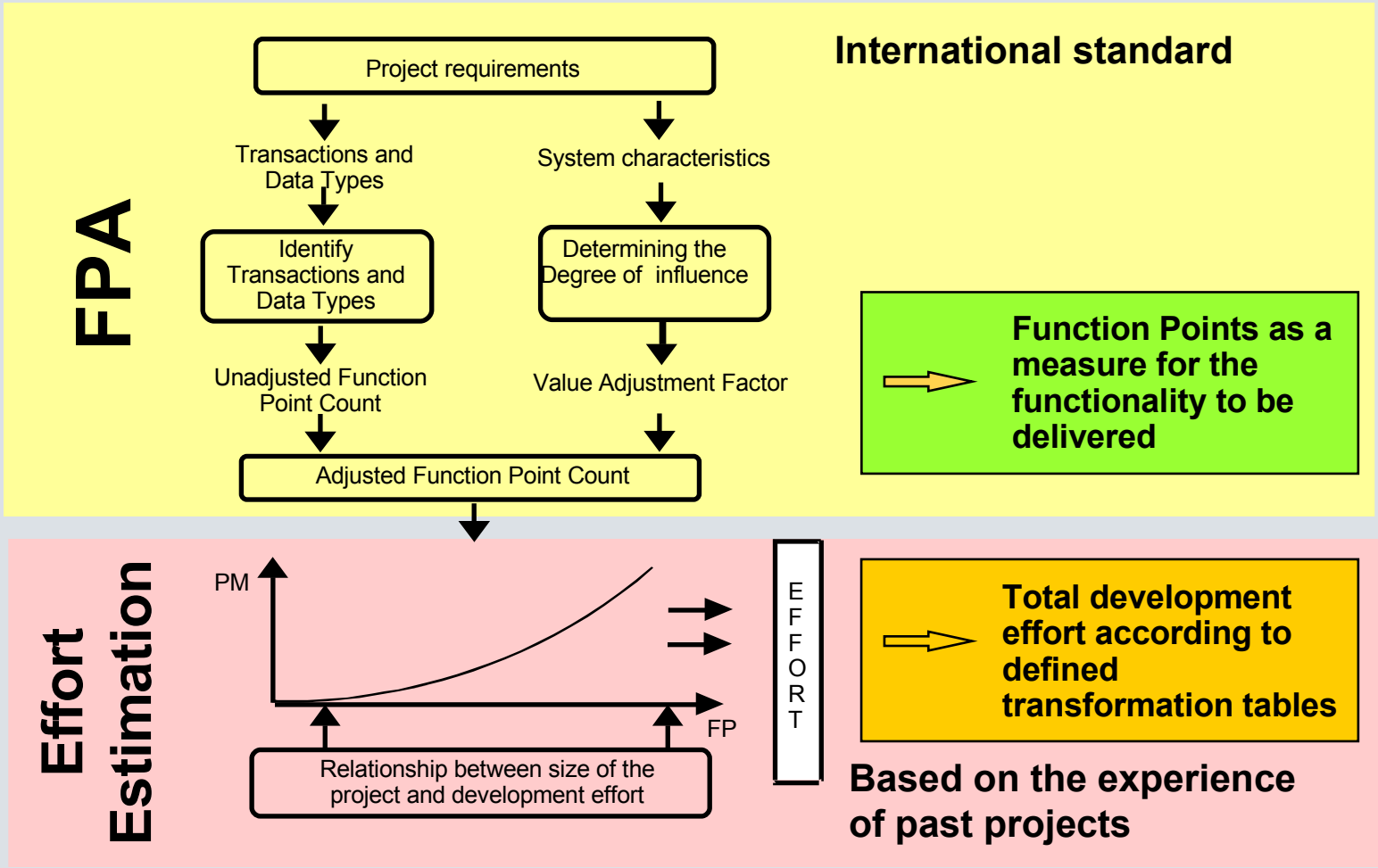

Function Point Based Estimation Model

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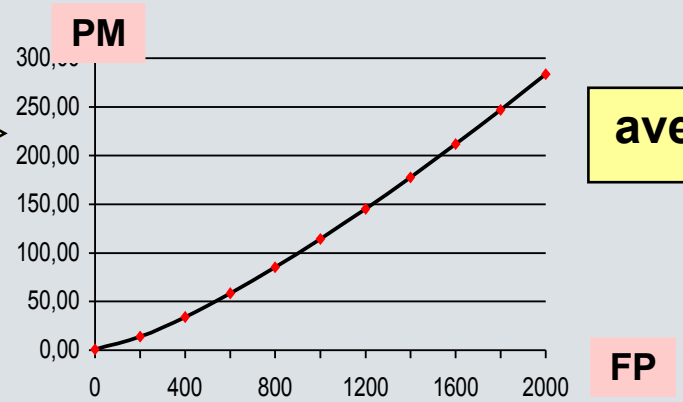
Transformation table *(specific to application domain and development environment)*

FP- Count



average effort

Estimation Modelling

estimated project costs

Check with second estimation method

Project Specific Factors

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- Stability of requirements and design specifications
- Experience of teams
  - trade knowledge in specified business area (Domain)
  - technical knowledge (e.g. CASE tools, OS, etc.)
- Team productivity
  - Team size and structure, distributed development teams, ...
  - Deadline pressure, Rapid Application Development, ...
- Tools and Methods
- Re-use issues
- Special risks
  - Availability of resources, key personal, ...
  - Information access
  - Third-party software or deliveries
  - ...

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The Function Point Process

- A short presentation of the Function Point Process
- Project overview
- Function Point Counting (according to IFPUG-Standards)
  - o Identify Counting Boundaries
  - g Count Data Functions (user view)
  - i Count Transactional Functions (user view)
  - n Determine the general system characteristics
- Transformation of Function Points to effort (baseline curve)
- Effort estimation for the complete project
  - n increasement/decreasement of the personnel effort
  - r additional deliverables
  - e HW-/SW-Costs, computing costs, travel expenses ,...

Advantages of FP based Effort estimation/1

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- Cheap (less than 0,05% of development costs)
- proofed
  - International: hundreds of companies all over the world use FP
  - International standard since 2003
  - MED SW, MED CT
  - more than 1100 FPAs from PSE FP experts
- suitable for early estimates
- excellent modeling of requirement changes
- based on your own data

Thinking Twice!

Expert estimation combined with FPA

- bottom-up and top-down estimate
- project external FP expert involved
- more reliability through method combination

Advantages of the Function Point Analysis/2

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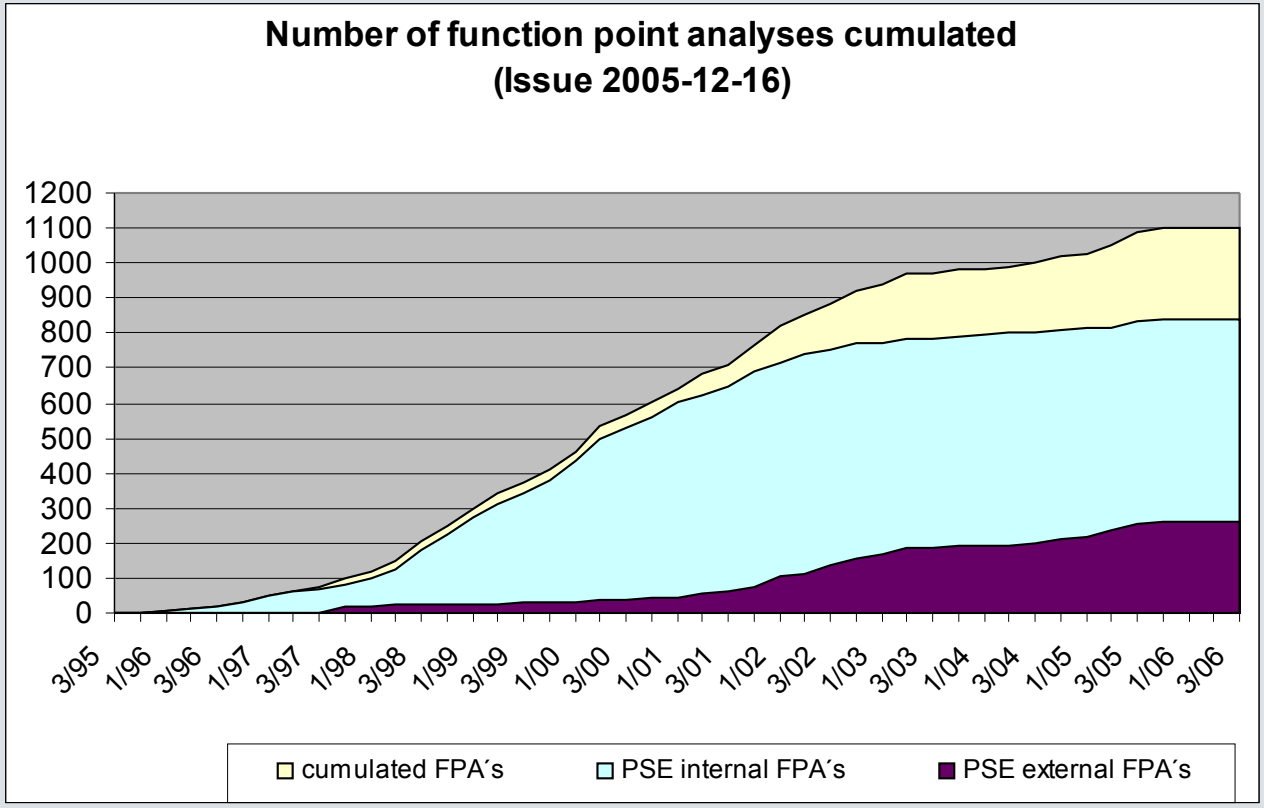
- counting instead of estimating
  - internationally accepted standard
  - hardly influenced by expectations and constraints
- FP are independent of design and implementation
  - (architecture, language, tools, team productivity, ...)
- also useable in early phases
  - as soon as the requirements are defined
  - easy assessment of requirement changes
- Comparable within the PSE and internationally
  - ISO-Draft, IFPUG-counting practice
  - international Benchmarking
  - FP Count required by the customer (e.g. German Telekom)

PSE‘s Function Point Experience

- 1101 FPA‘s per 2005-12-16
- approx. 200.000 FPs counted since 2001



Abbreviations

SIEMENS

FP	Function Point
FPA	Function Point Analysis
ILF	Internal Logical File
EIF	External Interface File
EI	External Input
EQ	External Inquiry
EO	External Output
DET	Data Element Type
RET	Record Element Type
FTR	File Type Referenced
UFP	Unadjusted Function Points
GSC	General System Characteristics
VAF	Value Adjustment Factor

Effort estimation meeting – characteristics

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- Typical bottom-up method
- Based on project structure and work packages
- Carried out by a team of project experts
- Reflects the development view of the project
-

Results:

- ☺ Estimated effort per work package
- ☺ Effort for PM, QM, CM
- ☺ Total effort + incidental expenses
- ☺ List of unresolved items
- ☺ List of assumptions made
- ☺ List of risks identified

Factors influencing the estimation

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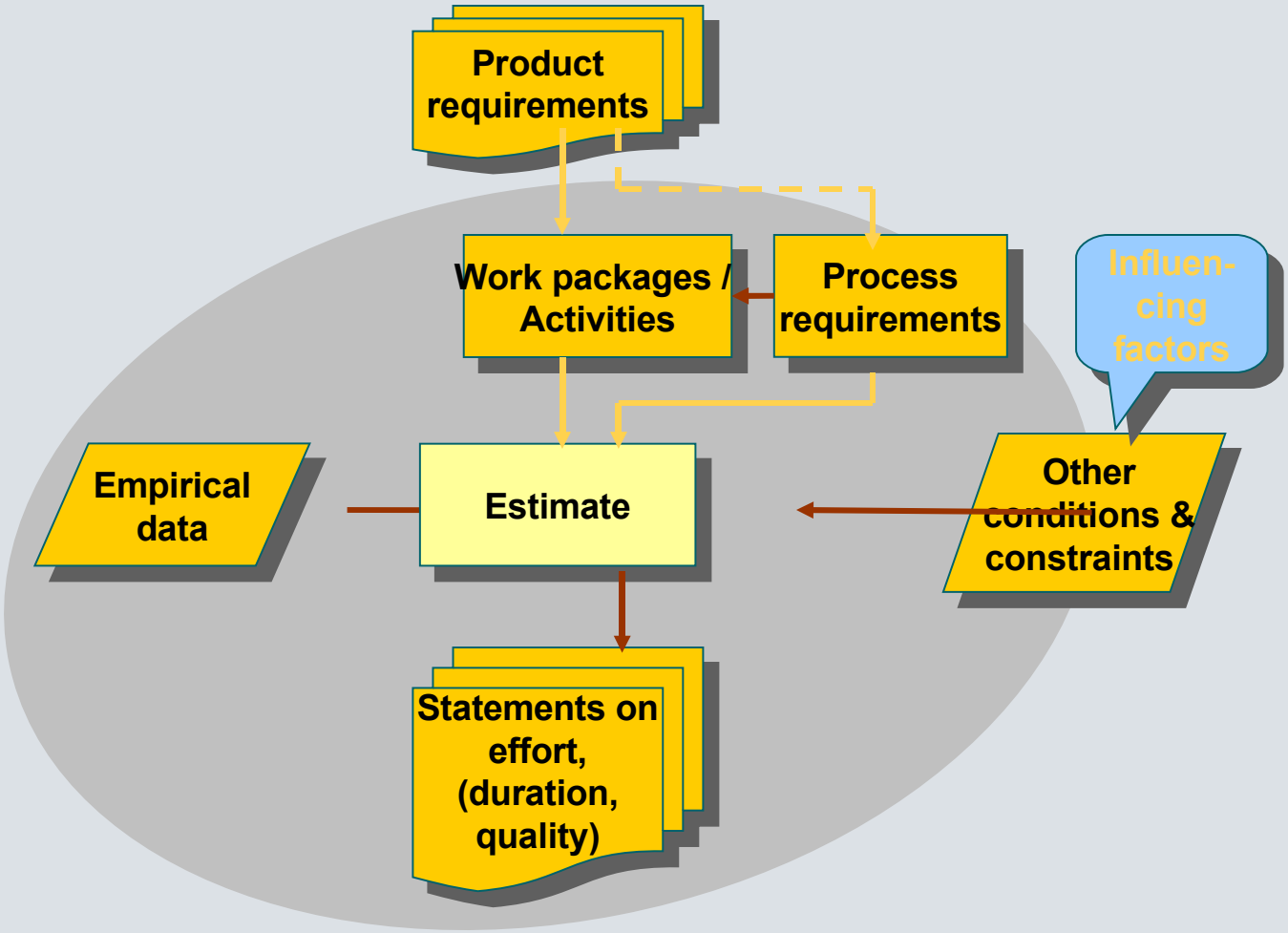

Pros and cons of effort estimation meetings

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Pros:

- Project view
- Consideration of technical aspects
- Immediate experience of those concerned
- Participants gain an overview of the whole project
- Effort per work package = basis for time schedule and for costing
- Consistency check for WPs
- Commitment of those involved

Cons:

- Hidden risk markups in particular in larger and insecure work packages
- Possible overrating of implementation phases
- Personal bias
- Influencing factors may not be explicitly taken into account

How to Estimate Effort by Means of an Expert Estimation (Meeting)

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- “Bottom-up” procedure for effort estimation
- Structure based on project structure (down to work package granularity – depending on the implementation)
- Carried out by a team of (project) experts, with the help of a moderator
- Recommended as an alternative to other methods, such as a function point analysis
- Ensures methodological approach and recording of estimations

Results:

- Estimated effort per work package
- Effort for PM, QA, CM
- Total effort
- List of unresolved issues, assumptions made, and risks discovered

Basic Sequence of Activities in an Effort Estimation Meeting

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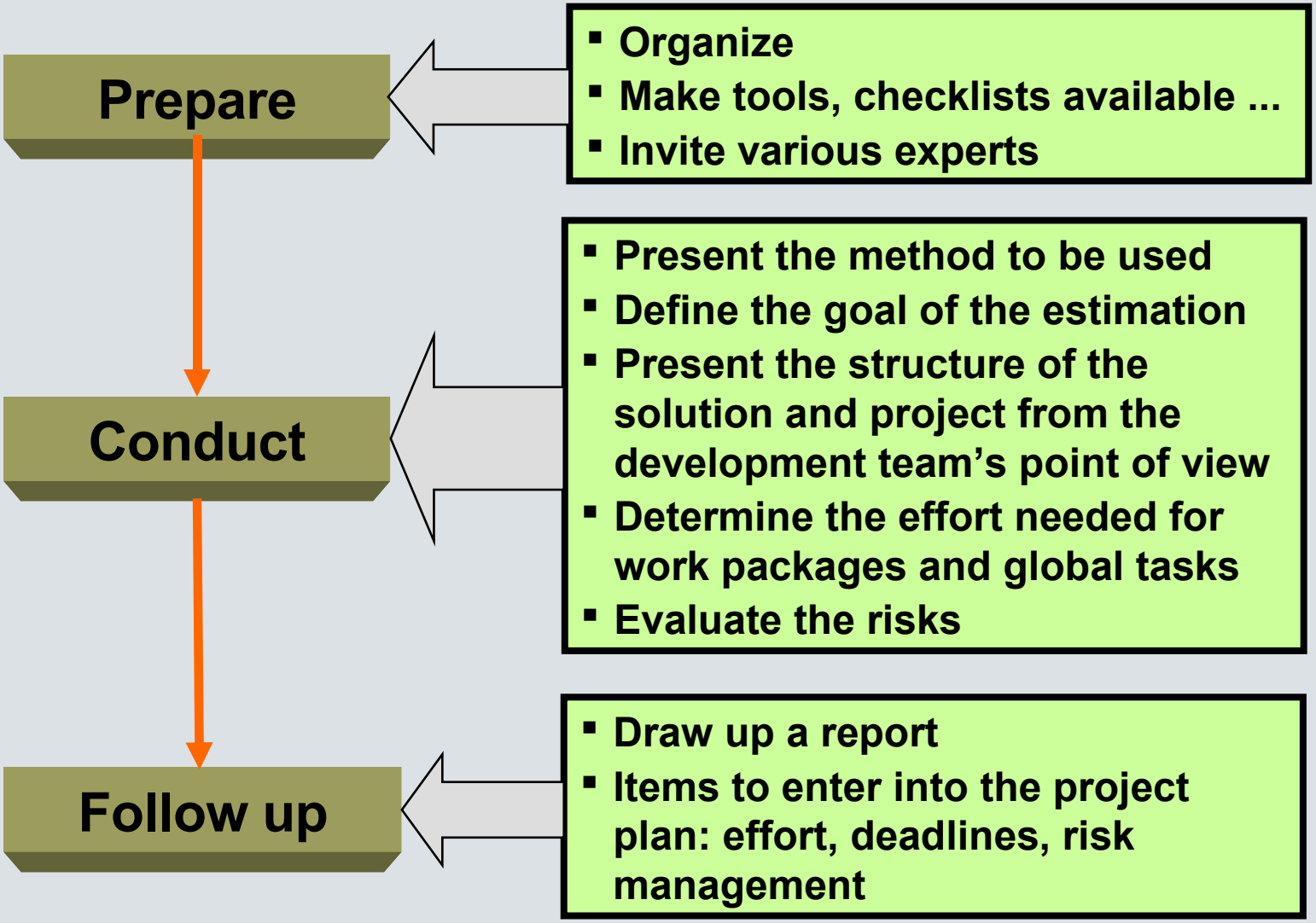

Other Methods for Estimating the Effort

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- Bottom-up estimation of the development effort
- MARK II-method (derived from FP-method)
- Data Point-method (ESPRIT-Project: data flow, entities, external interfaces, quality characteristics)
- Object Points (derived from FP Analysis)
- Feature Point-Method (derived from FP Analysis)
- COCOMO (Constructive Cost Model by B. W. Boehm)
- COSMIC Full Function Points
- ATMOSPHERE (method based on SDL - Tasks and transactions)

Bottom-up Estimation of Development Effort

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- Separate estimation of the development effort by each participant (Project manager, technical experts, ...)
- Take the mean value, when estimations are similar
- Discuss the affected components, when there are big discrepancies

PROs:

☺ Flexible method; no given influencing factors

☺ Large basis of experiences

☺ Easy to introduce other methods

CONs:

☹ No given influencing factors

☹ No given algorithm

☹ Detailed planning process necessary (object structure, project structure)

☹ Time-consuming

Tips and Tricks (1/2)

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Problem	Tip
Almost everybody overestimates his or her own capacity	What will it cost if somebody else does it? Take account of human resource assignments and dependencies
People will often exert pressure upon those making the estimation.	Use a tried and tested method; rely on experts from outside the project; provide accurate documentation of the estimation process function point analysis
Estimations made by others tend to be accepted without questioning (no verification, no weighting)	Verify the estimation through the established method of function point analysis; beware of analogies; take account of circumstances and constraints

Tips and Tricks (2/2)

SIEMENS

Problem	Tip
An estimation is made where it would be possible to calculate (e.g., percentage method after the end of a phase).	Use adequate methods; function point analysis and a 2nd method (estimation based on experience or percentage method)
Frequently, off-the-cuff estimations are given in personal contact with the client.	Communicate only verified estimations
If estimated values are very high, people do not try to verify them, but simply decrease them.	Verify the estimate – reduce the requirements, if possible; “design to cost” on the basis of function point work breakdown
Often nobody knows where an estimated value came from	Estimation report and maintain it in a Configuration Management system

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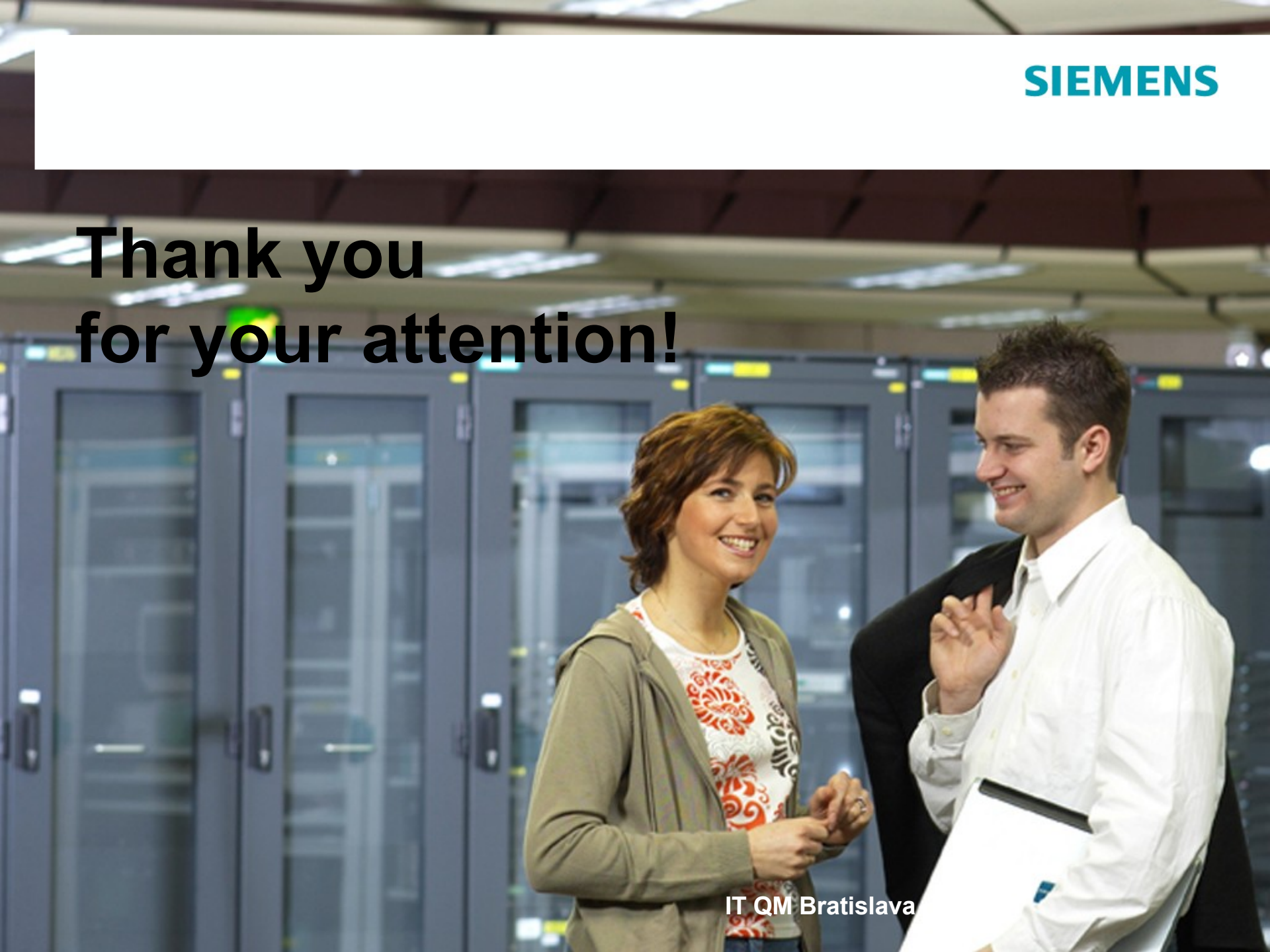
Thank you for your attention!



Farbpalette mit Farbcodes

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Primäre Flächenfarbe:

R 255 G 255 B 255

Sekundäre Flächenfarben:

R 215 G 225 B 225	R 170 G 190 B 195	R 130 G 160 B 165
R 220 G 225 B 230	R 185 G 195 B 205	R 145 G 155 B 165

Akzentfarben:

R 255 G 210 B 078	R 245 G 128 B 039	R 229 G 025 B 055	R 000 G 133 B 062	R 000 G 084 B 159	R 000 G 000 B 000
R 255 G 221 B 122	R 248 G 160 B 093	R 236 G 083 B 105	R 064 G 164 B 110	R 064 G 127 B 183	R 064 G 064 B 064
R 255 G 232 B 166	R 250 G 191 B 147	R 242 G 140 B 155	R 127 G 194 B 158	R 127 G 169 B 207	R 127 G 127 B 127
R 255 G 244 B 211	R 252 G 223 B 201	R 248 G 197 B 205	R 191 G 224 B 207	R 191 G 212 B 231	R 191 G 191 B 191
R 255 G 250 B 237	R 254 G 242 B 233	R 252 G 232 B 235	R 229 G 243 B 235	R 229 G 238 B 245	R 229 G 229 B 229