

What's different in Industrial Software Engineering

Dirk Taubner

Focus: Individual (custom built) software

<i>System software</i>	<i>Application software</i>	
	<i>Standard software</i>	Individual software
Data base system Operating system Network software Compiler Webserver ...	Financial & Accounting Supply Chain Mgmt Customer Relationship Webshop ...	All applications which cannot easily be implemented with standard software.



What's different

Relation of net code to gross code

- net code = lines of code for the straight forward logic to solve the problem
- gross code = net code
 - + data error handling
 - + system error handling
 - + help functionality
 - + authorization functionality
 - + journal/log functionality
 - + ...

Relation of net code to gross code

- quotient net/gross
 - typical academic exercises: = 1
 - typical industrial system: = 0.5 ... 0.25
- ⇒ consequences:
 - architecture: structuring of cross-sectional functions in separate modules/components
 - tools: support for generating schematic code portions

Industrial scale

- effort: measured in “person-years”
ranging from a few to more than a hundred
 - lines of code:
ranging from a hundred thousand to millions
- ⇒ consequences
- teams (not single persons) are needed
 - steering and organization is needed for
communication, management, quality assurance

Complexity caused by size and variety - not by profoundness

- size caused by complexity of applications (e.g. reservation system for tour operator, money transfer system for a bank)
- complexity does not come from deep or tricky algorithms but from permutation of many (simple) combinations

⇒ consequences:

- clear notions and definitions (as in academia)
- standard architecture for commercial information systems

Large data volumes

- 10 million travel bookings per year,
5 million car orderings per year,
5 million money transfers per day, ...

⇒ consequences:

- user interface efficiency
- mass data processing in batches is important
- performance is always a problem
- often many users (especially in web applications)
transaction monitors are necessary

There is a customer!

- industrial systems have to be paid for
 - system is ordered for a business reason (not for a technical reason)
- ⇒ consequences:
- confidence to be won
 - besides technical also business application expertise needed
 - psychological cleverness needed
 - there is an acceptance (test)
 - the system is wanted 😊

Real environment

- neighboring systems
- legacy systems replacement

⇒ consequences:

- net/gross quotient shrinks
- test to prevent malfunction of productive systems
- roll-out in steps
- parallel operation
- migration

Documented specification

- is needed
 - typically UML
 - in an academic sense not a formal specification
 - however the business client quickly rejects the formality and incomprehensibility
- ⇒ pragmatic compromise needed



Tests

- unit tests
- subsystem tests
- integration tests (including connection to neighboring systems)
- acceptance tests
- regression tests




Project management

- 10-20% of overall effort
- planning and steering
- estimation
- change request management
- peopleware [Tom DeMarco]

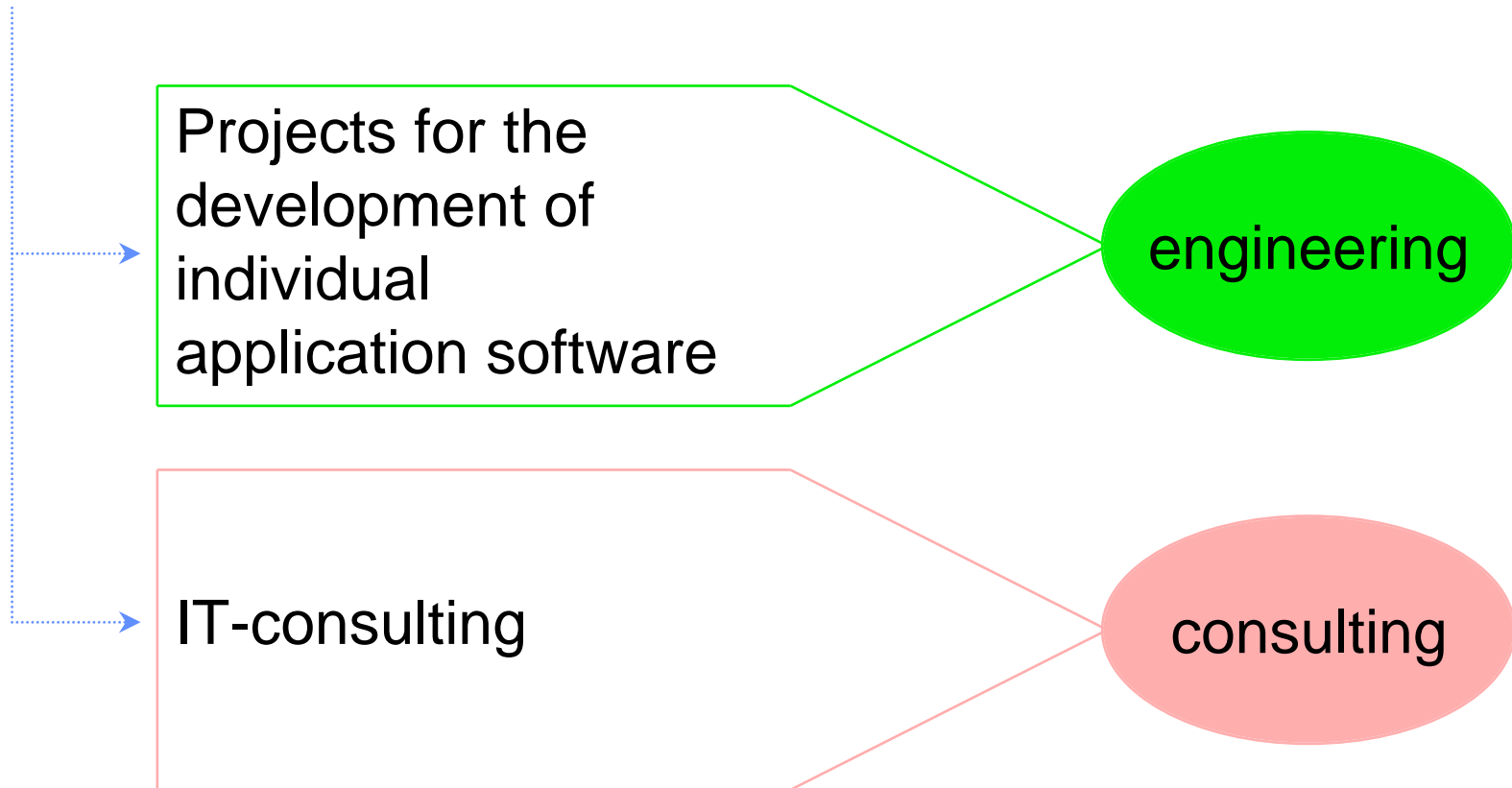


No difference: typical programming language

- today: Java
- 8 years ago:
 - academia: Pascal, Modula, Eiffel, ?
 - industry: Cobol, (C)

- 
- What's different
 - **Company profile**
 - Project approach
 - Peopleware
 - Technology

sd&m performs



sd&m AG

Facts

- Name:
sd&m
software design & management
- Legal form:
Corporation
- Founded:
1982
- Shareholder:
Cap Gemini Ernst & Young



Development Projects

person years

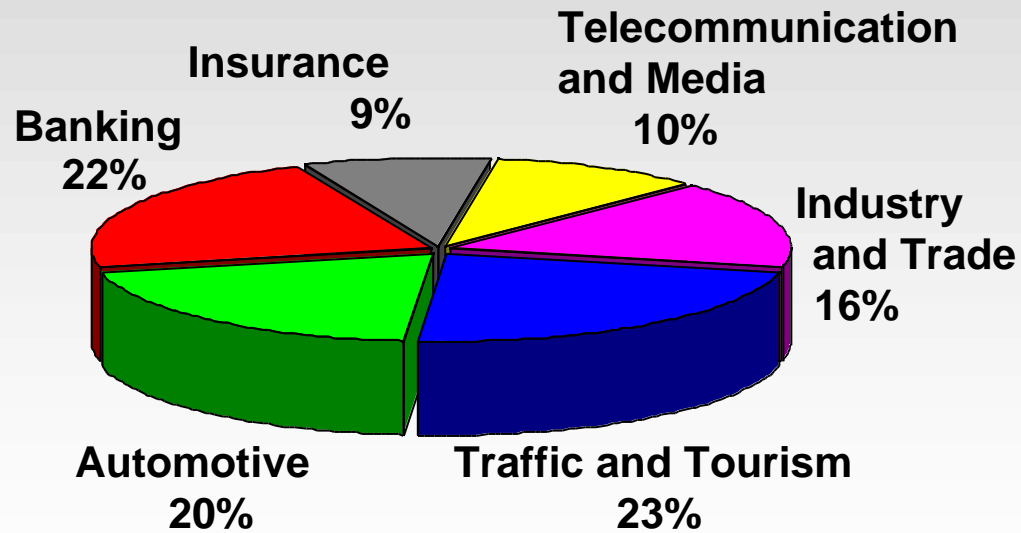
AKDB	Financial accounting and HR-Mgmt for local authorities	20
AOK Systems	Benefits management for healing aids	8 *
Bayerische Landesbank	Price calculation for financial instruments	20
BMW	Warranty system	28
C&N Touristic	Touristic processing system	170 *
Commerzbank	Payments clearing system	90
DaimlerChrysler	Global Ordering	200 *
DeTeMedien	Internet Telephone Book and Yellow Pages	15
DA Deutsche Allgem. Vers.	Internet consulting and quotation system	10
Deutsche Bahn	Rolling stock database	60 *
Deutsche Telekom	Network management	30
Dresdner Bank	Corporate banking	21 *
InFoScore	Collection processing	48 *
IZB SOFT	Payments clearing system for Bavarian savings banks	50 *
Landesbank Hessen-Thüringen	Securities processing	54
Lufthansa AirPlus	Financial and transaction management	32
Munich Re	Expert systems for tariffs	15
North Rhine-Westphalian Police	Investigations research system	60 *
RAG INFORMATIK	Data Warehouse	12
Reuters/HypoVereinsbank	Money-market and foreign-exchange trading	17
Roche Diagnostics	Laboratory Systems Manager	65
START AMADEUS	Business information system	40
Swiss Life	Life insurance policy migration	18
T-Mobil	Mobile telephone order processing	120
Thyssen Krupp Stahl	Integrated order processing	50 *
Versicherungskammer Bayern	Partner system	18 *
VIAG Interkom	SIM Card and Number Service	6 *

Success Factors

sd&m has a solid know-how in important industrial sectors and subjects


Industrial sectors

Subjects

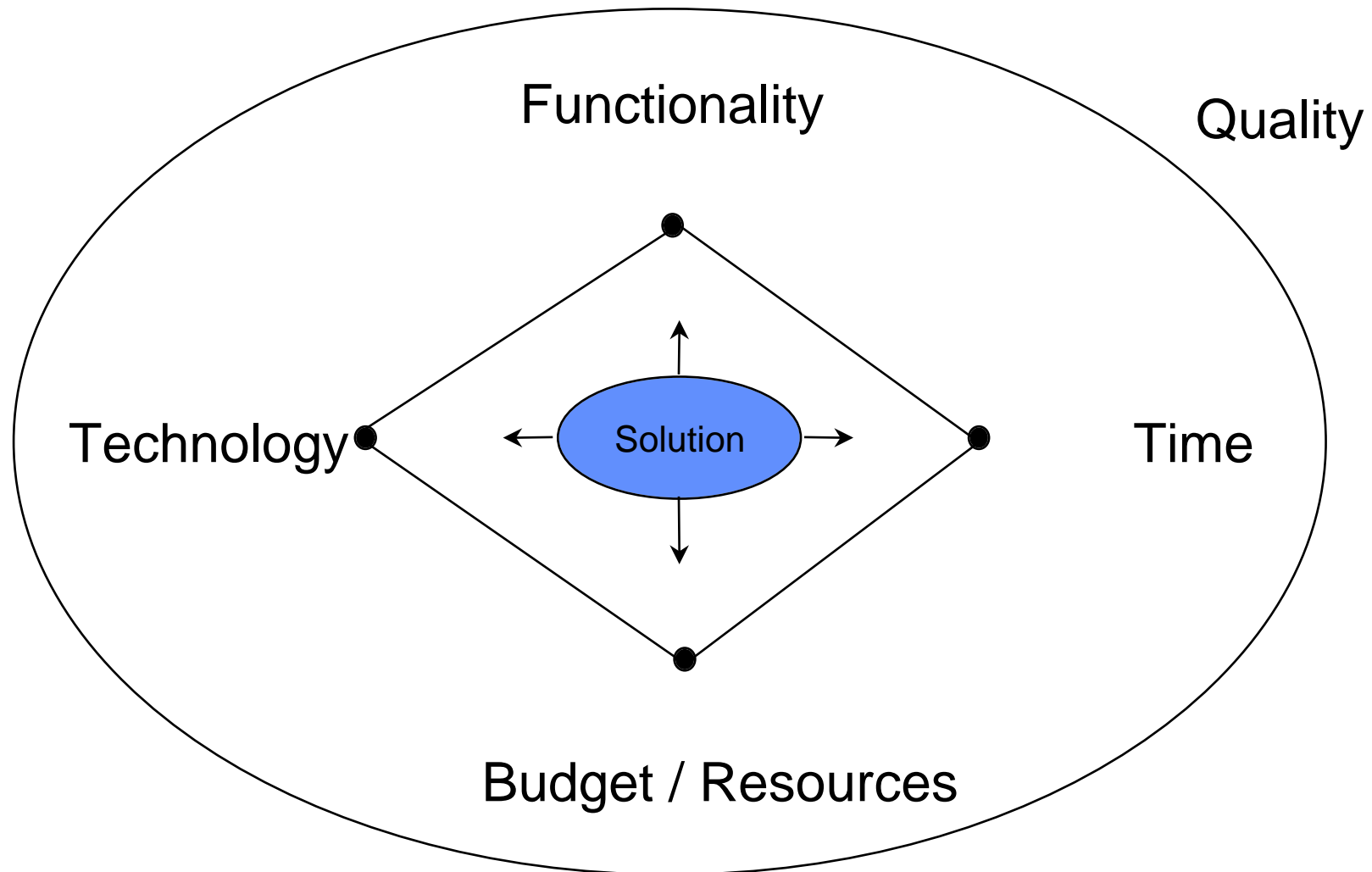


- E-Commerce
- Sales Support
- Order Processing
- Supply Chain

Values derived from the average of the past three years

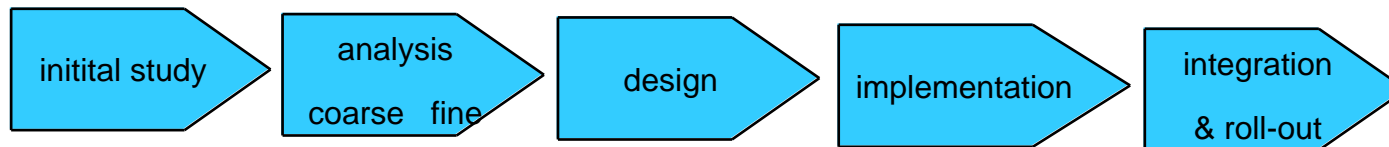
- 
- What's different
 - Company profile
 - **Project approach**
 - Peopleware
 - Technology

Software projects – General setup



Management

phase oriented



result documents & milestones
planning & controlling
estimation method

principles e.g.

20/80-rule

steps

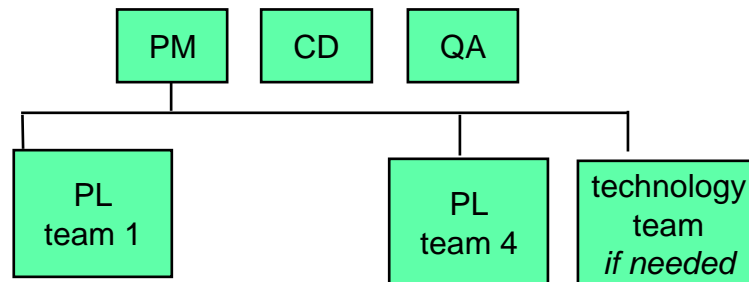
pioneer of *at most one new technology* per project

the people make the project

...

Management

clear project organisation



clear project steering

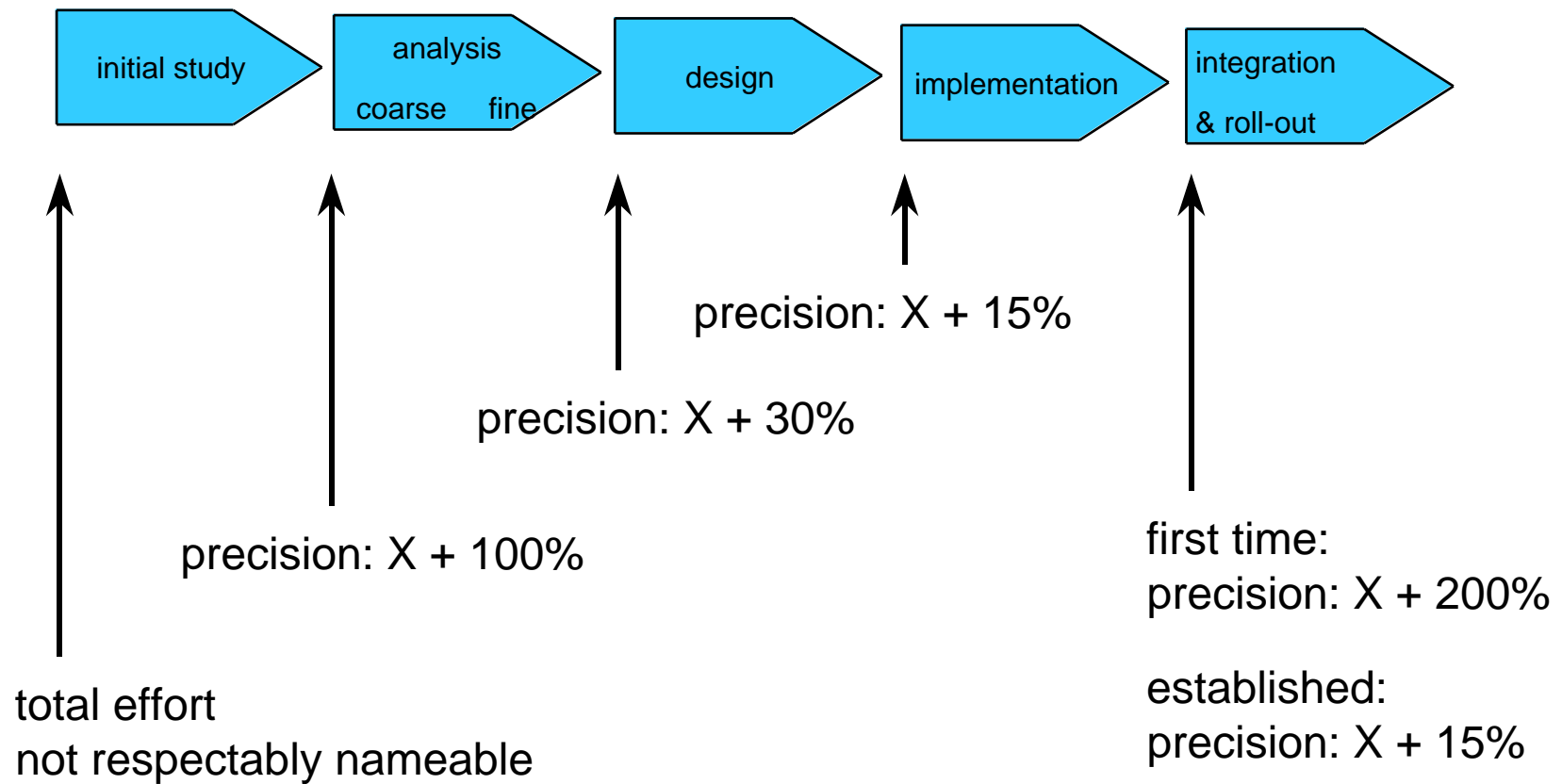


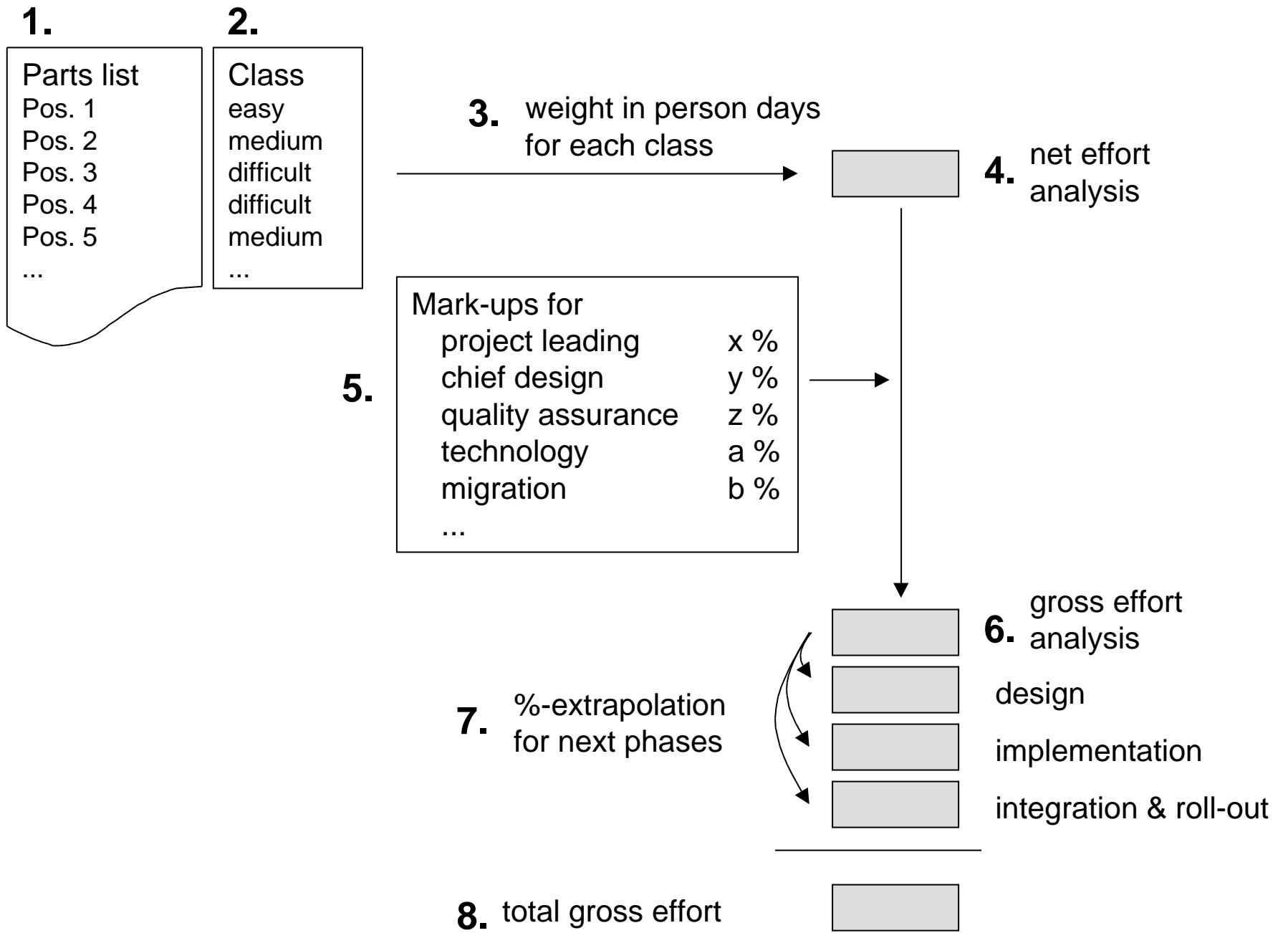
top representative
of customer
PM as supplier
approx. 4-6 x per year




small to large (> 50 people) projects
duration 1-3 years
often mixed teams (customer plus sd&m)

Estimation





- 
- What's different
 - Company profile
 - Project approach
 - **Peopleware**
 - Technology

Top relevant management areas¹⁾

Software product business

1. Strategy
2. Marketing and sales
3. Human resources
4. Software development

Professional services

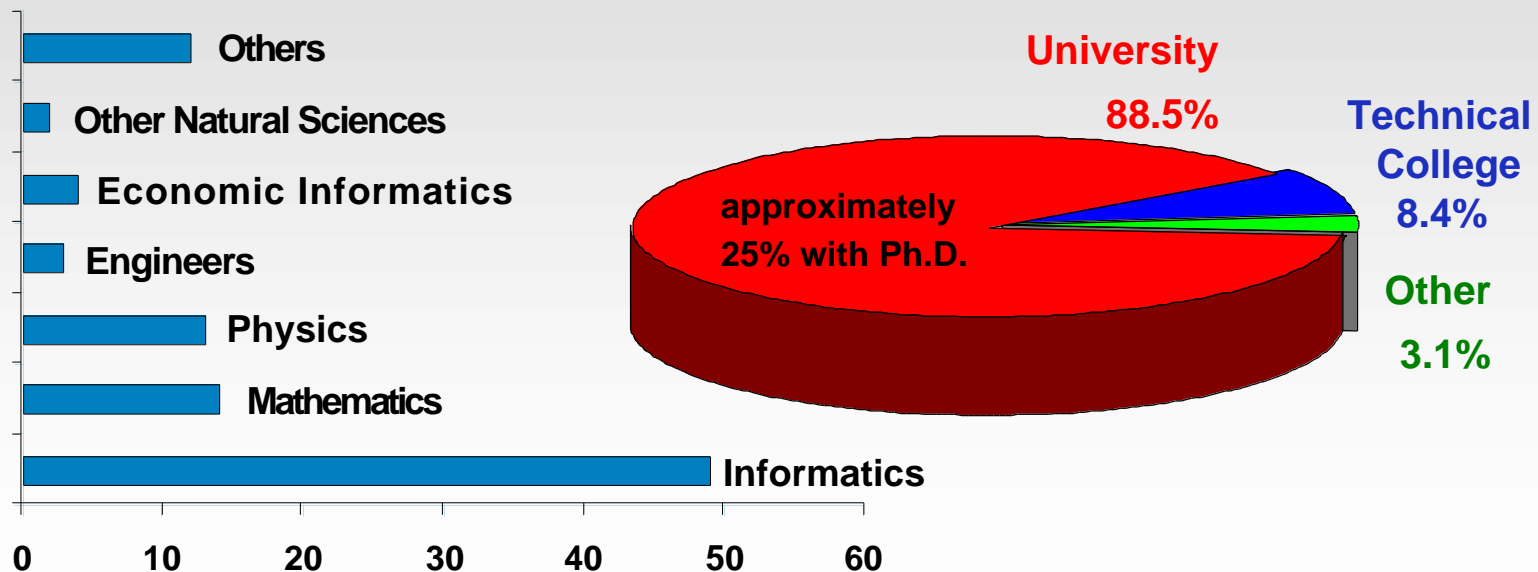
1. Human resources
2. Software development
3. Marketing and sales
4. Strategy

¹⁾ Source: Hoch et al. (McKinsey) *Secrets of Software Success*

Success Factors

sd&m has a highly qualified team

- The combination of subjects is well balanced.
- Almost all employees have a university degree, more than 25% with a Ph.D.



Development Paths

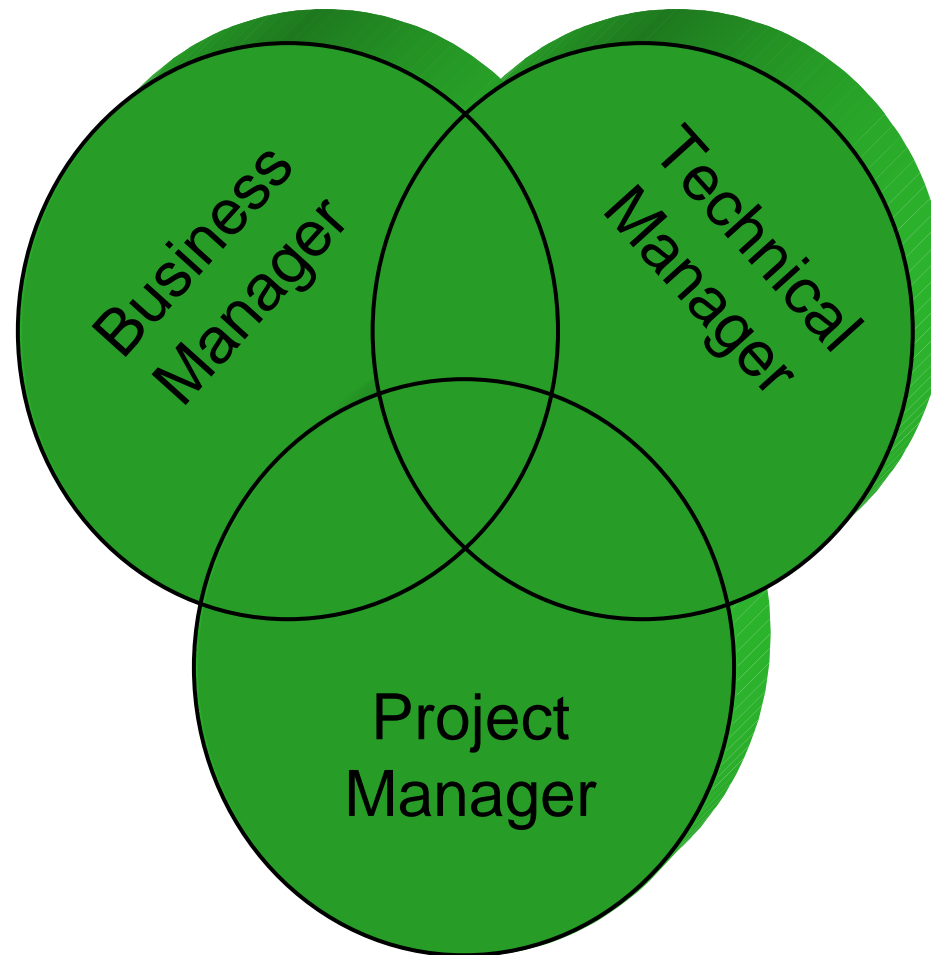
**Software
Engineer**

Technical Manager

Business Manager

Project Manager

Development Paths



Sidestep

High-quality education, to educate non-IT-people to software engineers

Almost all of core informatics in 1/2 year (“extreme education”)

Referents: Professors of TUM/LMU
Siedersleben and team

204 applications 71 interviews 29 very good participants
and software engineers

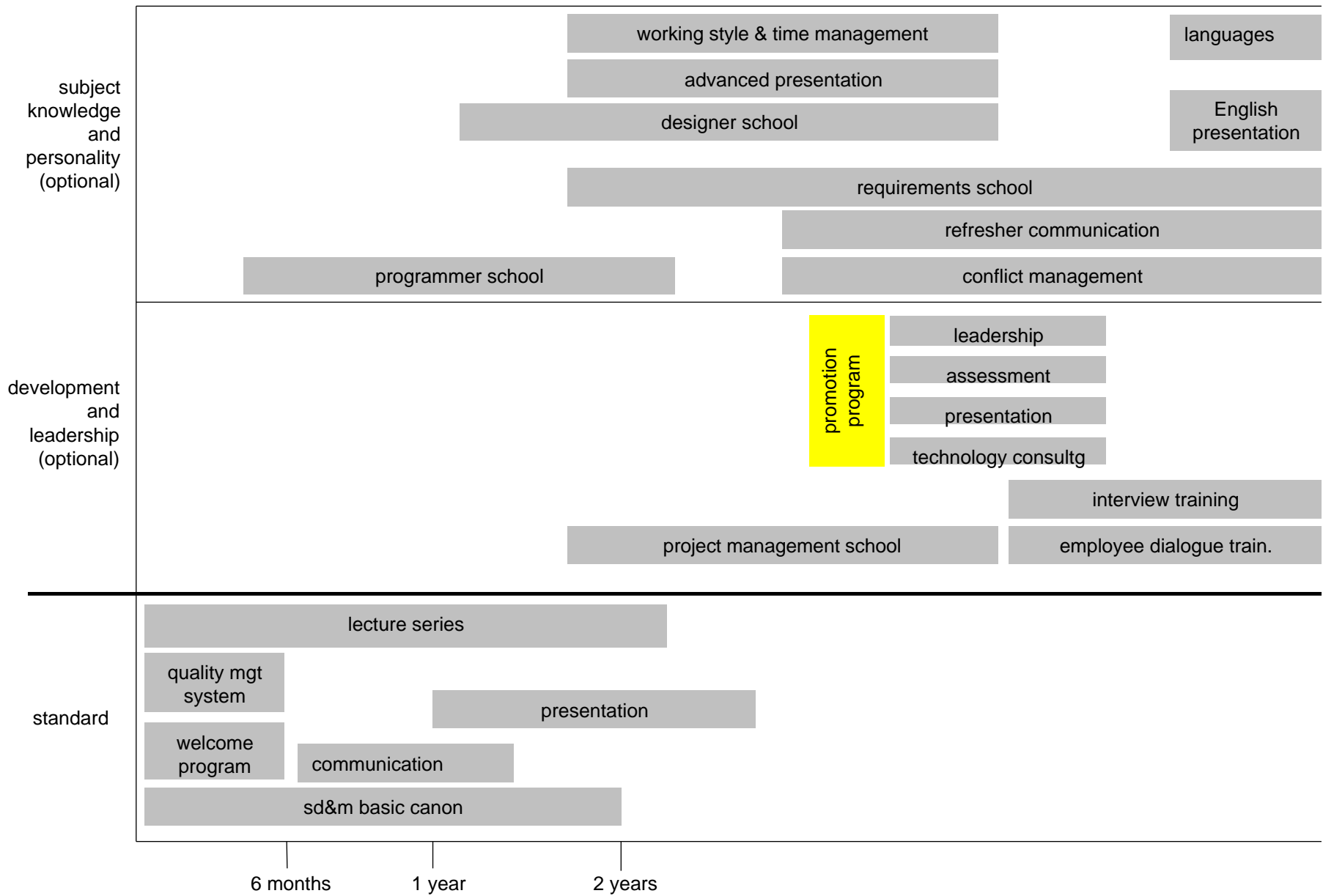
Field of education

Mathematics	10	<i>Total</i>	29
Physics	8	with Ph.D.:	10
Chemistry, Biology	6	with habilitation:	2
Engineers	1		
Other	4		



“Schools”

- “Programmer School”
 - 20 participants, 6 days in the monastery Zangberg
 - Java crash course, Quasar standard architecture
 - lectures, exercises, demanding mini-projects
 - very intensive, very exhausting, lots of fun
- other “Schools”:
 - project management, requirements engineering, OO design, user interface design, testing



sd&m-Conference 2001

Software-Pioneers

Bonn, Bundestag

28./29. Juni 2001






sd&m-Conference 2001 - Software-Pioneers

Friedrich L. Bauer	Stack and Algol
Fred Brooks	OS/360
Ole-Johan Dahl	Simula
Edsger Dijkstra	Structured Programming
Doug Engelbart (?)	Graphical User Interfaces
Dennis Ritchie (?)	Unix/C
Tony Hoare	Formal Verification
Rudolf Bayer	B-Trees relational DM (for Ted Codd)

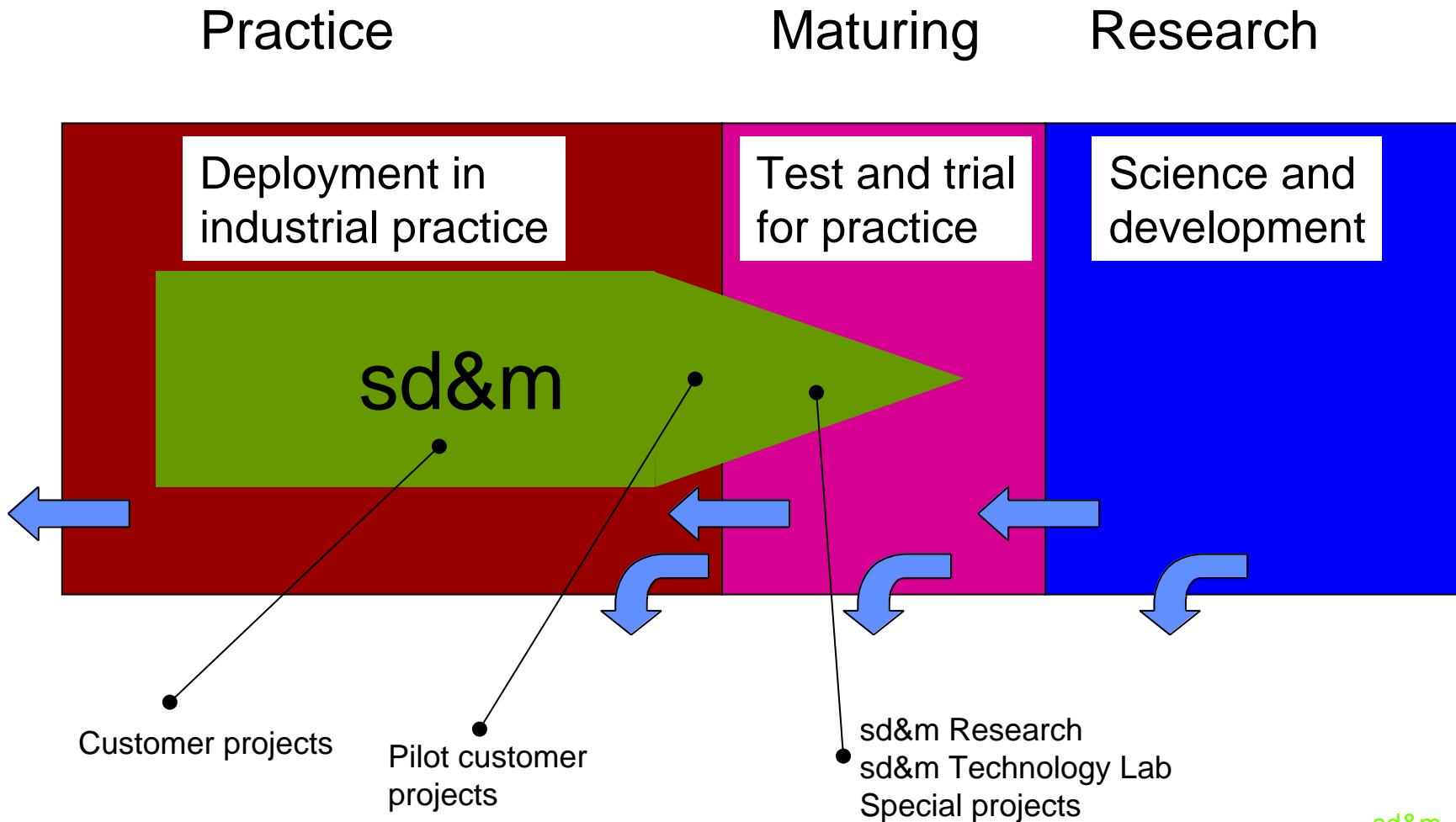


sd&m-Conference 2001 - Software-Pioneers

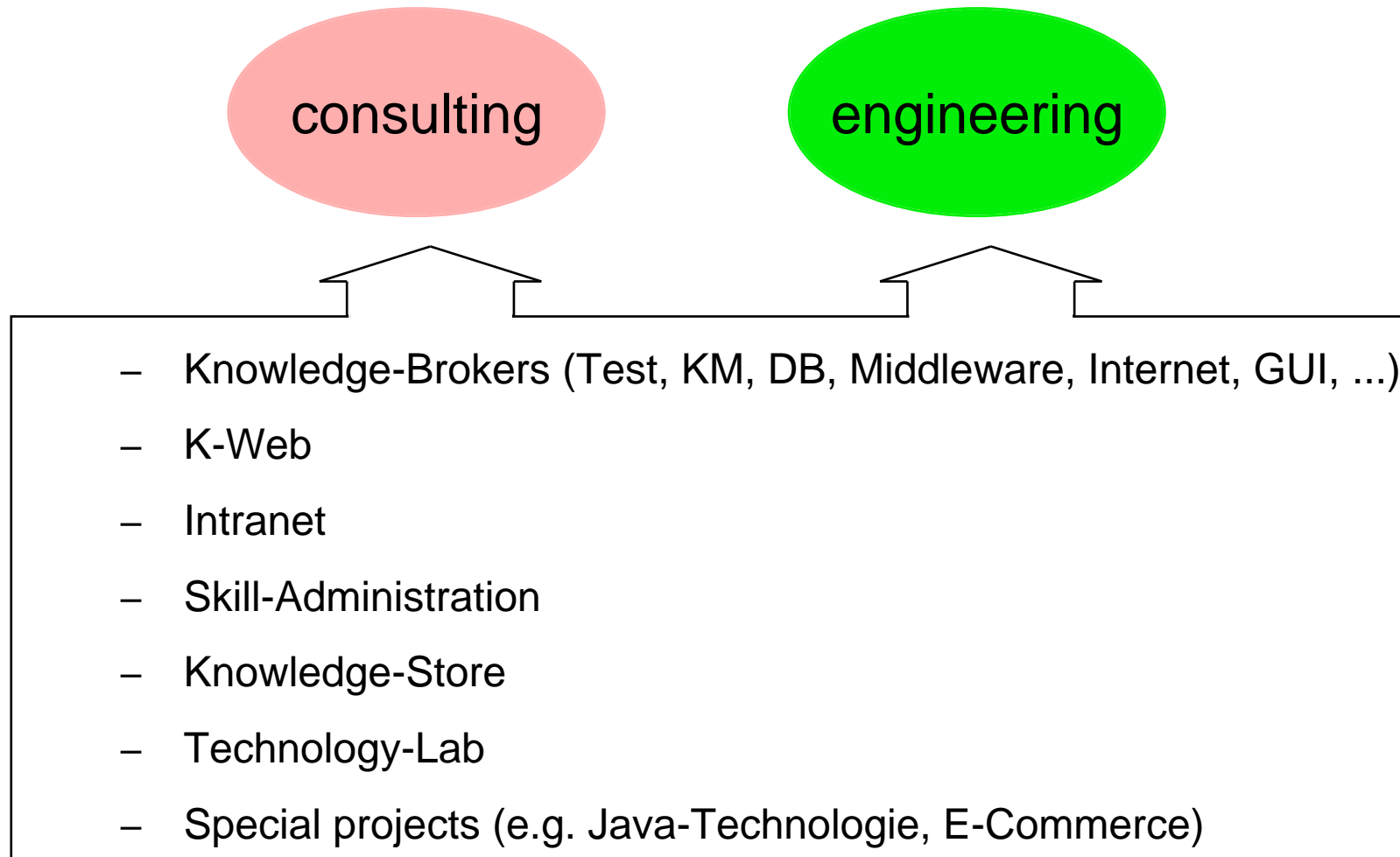
David Parnas	Modularization, Information Hiding
Niklaus Wirth	Pascal/Modula
Michael Jackson	Jackson Structured Programming
John Guttag	Abstract Data Types, Specification
Peter Chen	Entity-Relationship-Modeling
Michael Fagan	Inspections
Tom deMarco	Structured Analysis
Barry Boehm	Software Economics
Erich Gamma	Design Patterns

- 
- What's different
 - Company profile
 - Project approach
 - Peopleware
 - **Technology**

3 Windows of Technology Maturity



Knowledge-Management



Factors of Success

sd&m Research

sd&m Research GmbH is sd&m's R&D facility :

- New developments in sd&m software engineering
- Continuing education of sd&m employees
- Customer training
- Publications, presentations, teaching contracts and lectures
- Business and academic conferences
- Maintaining academic contacts
- Supervision of PhD and Masters candidates

Director: Prof. Dr. Johannes Siedersleben

Advisory Committee: Prof. Dr. Manfred Broy, Tom DeMarco
Prof. Dr. David Parnas, Dr. Gero Scholz

E-Business and Web-Architecture

References (1)



Concepts and project management for Daimler's Digital Sales Channel



Used car internet market place for end customers and dealers for BMW's subsidiary in Switzerland. Pilot project for corporate wide web architecture (Bea WebLogic, legacy connectivity via MQS)



Yellow pages in the Internet

teleauskunft.de

telefonbuch.de,

gelbe-seiten.de

das-oertliche-online.de



Internet trading platform for a start-up

E-Business and Web-Architecture

References (2)



Allianz 

Consulting on the re-launch of allianz.de and allianz.com: program management, master plan together with CGEY



GDV
Gesamtverband der Deutschen
Versicherungswirtschaft e.V.

Internet based data exchange to handle insurance cases



DBV-winterthur
Die Unkomplizierten.

Internet portal for health products



HypoVereinsbank

Internet market place for bond trading
hypovereinsbank.com

E-Business and Web-Architecture

References (3)

PreussenElektra

Internet portal B2C, eBusiness architecture together with CGEY
preussenelektra.de

T · · Mobil ·

Internet portal for sales partners and end customers
handel.t-mobil.de

InFoScore
Cresura AG

Collection and rating information via Internet
cresura.ch



VERBAND DER PRIVATEN
BAUSPARKASSEN

Concept, build and roll-out of extranet based business information system

Kreatives Software-Engineering in der Praxis

Inhalt:

- Vorstellung des Software- und Beratungshauses sd&m AG
- Einblick in 4 spannende Projekte
- Software-Technologie-Management

Zeit: 25.1.01 15.00-19.00 h
(anschließend Diskussion am Büffet)

Ort: sd&m AG, Thomas-Dehler-Str. 27,
U-Bahn: Neuperlach-Zentrum

Fahrtkostenzuschuss f. Auswärtige: DM 40,-

Tag der offenen Tür

www.sdm.com

Custom Software Creates Identity

Design and Development
Sound Project Management
High Quality Results
Predictability
On Time and in Budget

ABOVE ALL
STANDARDS

s | **d & m**
software design & management



A company of Cap Gemini Ernst & Young: sd&m Corporation • Town Center • Southfield • MI • (248) 351-3535