

# IT QM Part1 Lecture 4

SIEMENS



## Lectures at the University of Bratislava/Spring 2009

- 12.02.2009**                      **Lecture 1 Impact of Quality-From Quality Control to Quality Assurance**
- 05.03.2009**                      **Lecture 2 Organization Theories-Customer satisfaction-Quality Costs**
- 12.03.2009**                      **Lecture 3 Leadership-Quality Awards**
- 26.03.2009**                      **Lecture 4 Creativity-The long Way to CMMI level 4**
- 02.04.2009**                      **Lecture 5 System Engineering Method-Quality Related Procedures**
- 16.04.2009**                      **Lecture 6 Quality of SW products**
- 23.04.2009**                      **Lecture 7 Quality of SW organization**

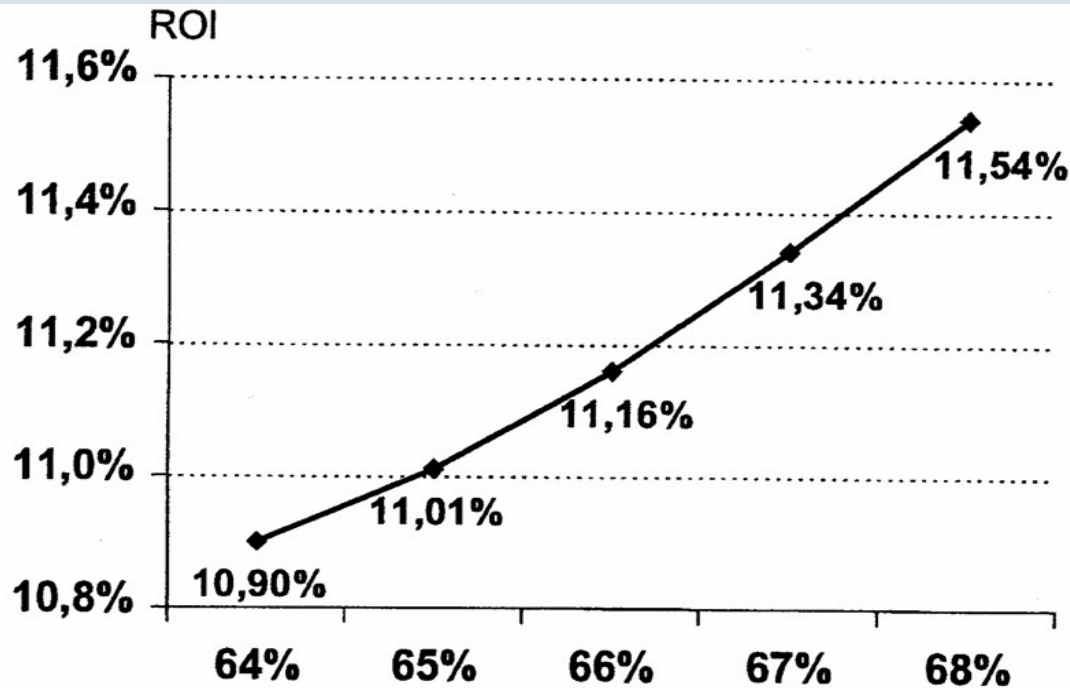
- 04.03.2008**                      **Lecture 1 Impact of Quality-Quality Definition-Standards**
- 11.03.2008**                      **Lecture 2 From Quality Control to Quality Assurance**
- 01.04.2008**                      **Lecture 3 Organization Theories-Product Liability-Emphasis from Quality Control  
to Prevention**
- 08.04.2008**                      **Lecture 4 Customer Satisfaction-Quality Costs**
- 15.04.2008**                      **Lecture 5 Team Work-Leadership Behavior-Deal with Changes-Kind of Influencing  
Control-Conflict**
- 27.05.2008**                      **Lecture 6 Tasks &Responsibility of Leading Personnel-Audits-Quality Awards**
- 10.06.2008**                      **Lecture 7 Management Science-Creativity Techniques-Embedded Systems-FMEA**

- Customer satisfaction
- Quality Costs

- 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

- 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

# Customer satisfaction/1



Improvement only by increasing of index

Index of customer satisfaction \*)

Data collection (1989-1993) at 77 important Swedish enterprises from 14 domains (i.e. automotive, retail, computer)

Source: University of Michigan, Stockholm School of Economics

\*) Index definition: see source

**Customer satisfaction/2**

**Higher customer satisfaction**



**higher ROI**

ROI . . . Return on Investment



## TQM

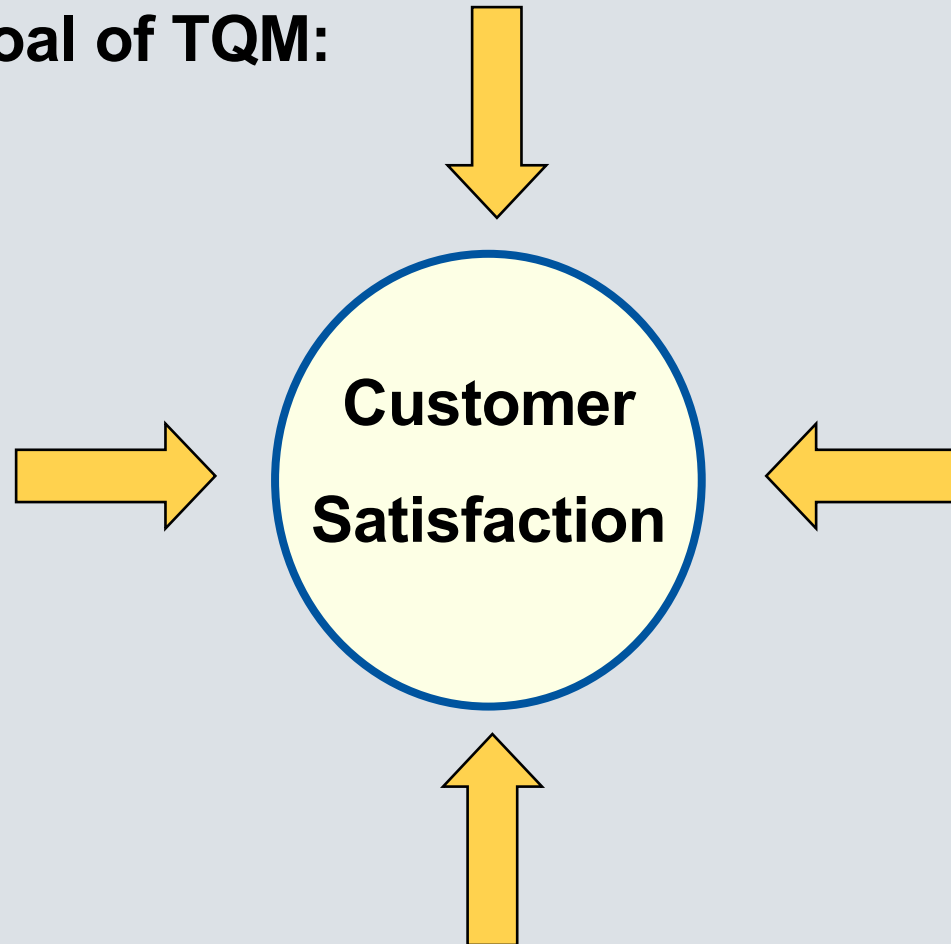
The adjustment on the customers is common  
To all Total Quality Management Models

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**NOT SO:**  
**"the customer is king, but the boss is emperor"**

**Goal of TQM:**



## Customer satisfaction/5

TQM/3

### **Problem:**

Customer expectations are subject to a general temporal advancement

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### **Solution:**

Keep in mind dynamics

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### **How:**

CIP = continuous improvement process

supports the advancement of the own abilities and achievements

## **Important components:**

- **dynamic component**
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- **process orientation**
- **Team spirit**
- **indicators**

# Customer satisfaction/7

## TQM/5



# Customer satisfaction/8

## Criteria/1



Service offering	Supporting services	Organization	Employee	Loyalty
Price	Logistic	Attitude of organization	Expertise	Readiness to repurchase
Material product/ provision of service	Warranty / client service	Customer Care	Personal Qualities	Readiness to Cross Buying
Product quality	Advertisement/ Sales promotion training	Process Quality Communication		Recommendation
		Decision Making Competency		
		Distribution Channel		

Hard facts: white elements

Soft facts : grey elements

In the future above all the soft factors will constitute the difference between organizations.



substantial drivers in the feeling of the customers

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The soft factors are deeply in the organization embodied  
to improve more with difficulty

Enterprises, which control the soft factors, secure themselves a strategic competition advantage, which cannot be simply caught up by copying, adapting (as with the product) by competitors.

Thus secure themselves

## Customer satisfaction: Due-dimensional queries

First dimension: importance of capability characteristics.

Second dimension: satisfaction with this capability characteristics .

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This information is suitable, to be represented in one level to become around

- dangers/chances,
- potentials/resources employment
- good achievement



**High Importance + poor satisfaction**



**Danger / Chance**

The danger consists of the fact that a potential competitor faster occupies this field and existing or potential customers move to the competitor.

Turned around the chance exists to occupy this field and to take off and actually bind from competitors customers.

**minor importance + high satisfaction**



**Potential / Assignment of resources**

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**Possibility to better marked out the own good achievement by advertisement**

**Possibility, resources which are necessarily for the production of capability characteristics should be examined critical and shift.**

### Diagonal situation



**Is promising at most**

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Satisfaction and importance set to the coincide.

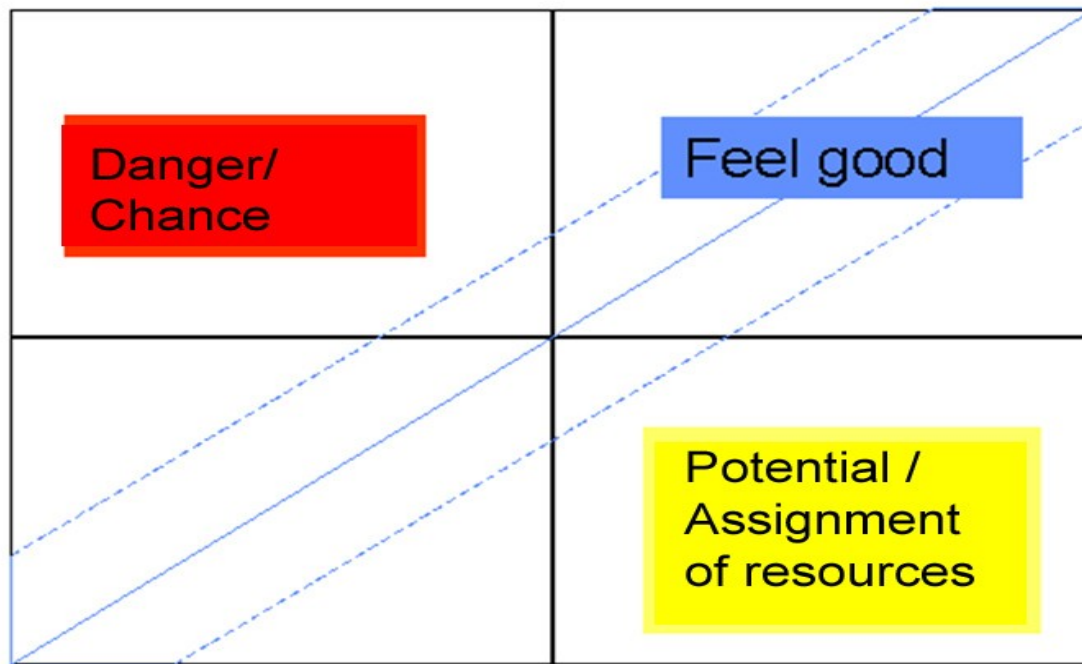
During exact consideration this applies however only in the right upper quadrant. What makes an organization in left lower - small satisfaction - small importance?

critical examination of this position and possibly abandonment of this position seems probably

# Customer satisfaction/14

## Criteria/7

Importance



Satisfaction

## Accomplishment of query:

**Query of importance and satisfaction should not  
performed by the same persons**

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The asked ones are inclined to the association:

- Topics with small satisfaction are more importantly,
- Topics with high satisfaction are more unimportantly

## **Basic structure: Definitions of criteria for**

### **Retailer**

Product

Field service

Indoor service

Customer relationship

Delivery service

Customer service

### **User**

(analogue to retailer)

## **Structure for retailers:**

### **Product (7)**

- High product quality and long life span?
- Good cost-performance ratio?
- Regularly successful new introductions?
- Products on newest technical conditions?
- Extensive accessories program?
- Repair-friendly products?
- Convenient products?

## Structure for retailers:

### Field service (5)

- Good sales promotion material?
- Satisfying attendance frequency of FS-E?
- Good market and product knowledge of FS-E?
- Helpful one, the trade supporting FS-E?
- Trustworthy FS-E?



## **Customer satisfaction/19**

### **Inquiry Method/1**

**Written questioning**

**Telephone interview**

**Personal interview**

**Workshop**

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Adapt expenditure for collection to customer structure

- Different customer
- Different selling way.

## Customer satisfaction/20

### Inquiry Method/2/Written Questioning

#### Advantage:

- Large number within a short time
- Security and representativeness of the results
- Answer ratio influenceable by preparation/Follow UP
- Small cost and binding of personnel resources
- Objectiveness of the results
- Without external support feasible

#### Disadvantage:

- Danger of lacking return ratio
- Pure quantitative data acquisition
- Understanding problem at the asked
- Uncontrollableness of the result situation
- Questionnaire organization is success critical

## Customer satisfaction/21

### Inquiry Method/3/ Telephone interview

#### **Advantage:**

- Data can be partially analyzed
- Elucidation becomes possible
- Data are raised in the dialogue
- High answer ratio

#### **Disadvantage:**

- Open asking only to reduced extent possible
- Duration of the interview (max. 20 min.)
- Well trained personnel necessarily
- Readiness of asked person
- Risk of the discussion abort through asked person
- High costs
- Danger of the influence by interviewers

#### **Advantage:**

- Data can be analyzed - background informations
- Relations care
- Open questions
- Questioning of partners in different functions
- High answer ratio

#### **Disadvantage:**

- High binding of personnel resources
- Cost-intensively
- Interviewer training
- Evaluation very complex
- Danger of the influence by interviewers

### **Advantage:**

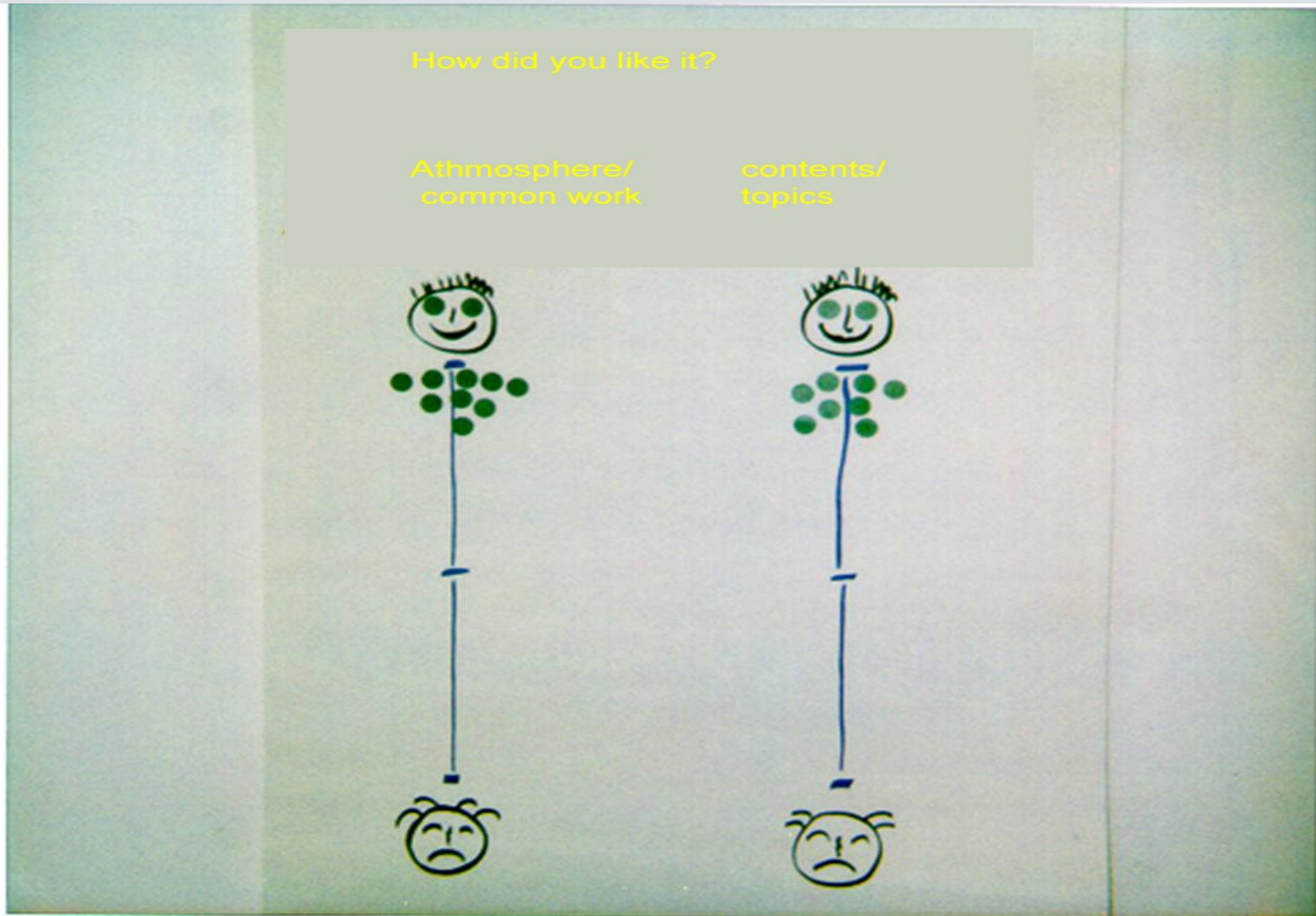
- Integration of selected key persons of the enterprise
- Different aspects can be stated
- Common compile - team feeling
- Relationship deepens
- Alignment in the customer team
- Cognition: Self-picture - foreign picture
- Receive Benchmarking information

### **Disadvantage:**

- Limited number of participants
- Mutual influence participates
- Consent identification necessarily
- Good moderator must be available
- Listen actively (not to defend)

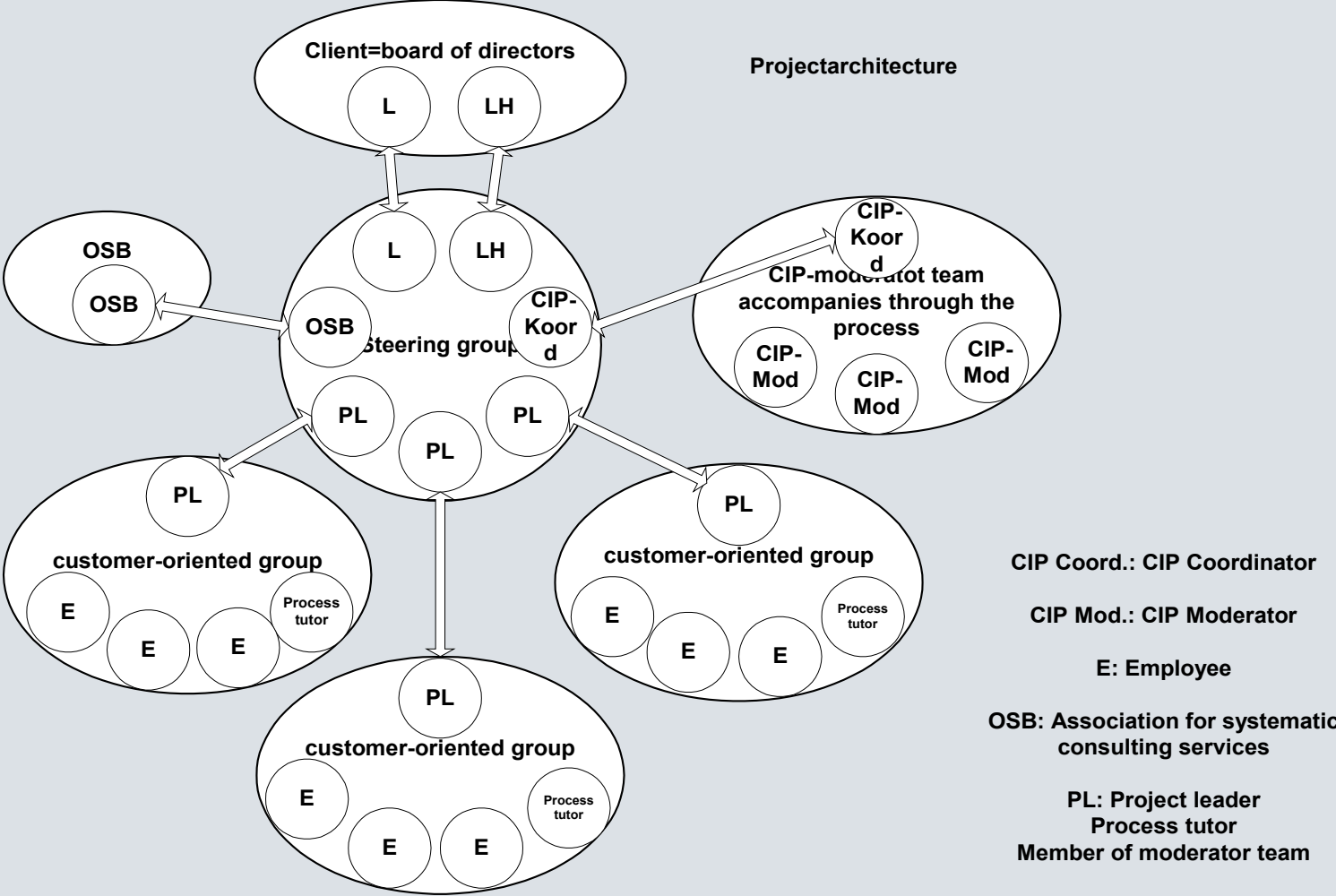
# Customer satisfaction/24

## Inquiry Method/6



# Customer satisfaction/25

## Inquiry Method/7



**Introductory Questions**

**Topics**

Supporting Services  
Logistics  
Warranty/Client Services  
Communication of accomplishment

**Employee**

Expertise  
Personal Qualities

**Organisation**

Corporate culture  
Customer Care  
Process Quality  
Decision making competency  
Distribution channel  
Employee

**Service offering**

Product/provision of service  
Product Quality  
Price/cost



## Quality costs/1

**In order to recognize the cost effectiveness of the quality management,**

- **quality-effective costs are defined.**
- **These can be used for control functions.**
- **Beyond that**
  - **quality-effective costs can manufacture an entrance**
    - **to cost-oriented Top managers,**
  - **since mid until long-term considered**
    - **more quality costs less.**

## Quality costs/2

### **Failure prevention costs:**

- Costs which develop by measures, which serve the fault prevention.

### **Appraisal costs:**

- Costs which develop by examinations.

### **Failure costs (internally/externally):**

- Costs, which result internally, due to errors - or which result externally.

## Quality costs/3

### **Weak points of the classical quality cost collection:**

Division in three parts is leaning to production

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With the summation reactive costs and per-active costs are summed up

## Internal failure costs

Are to be raised at first sight clearly

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During more exact view frequently subsequent costs are not seized

Internal error costs often do not develop at the place, where these are caused: Allocation of these costs is problematic

## Quality costs/5

### External failure costs

**Develop, if an incorrect unit (material product or service) is recognized at the customer site as incorrect.**

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Warranty costs, guarantee costs, material costs, way times and work times are mostly accurately raised and assigned.

Costs of the internal completion (bookkeeping, logistics....) are not to be regained always, whereby this representation is "sugarcoated" tendentious.

The discontent of the customer, negative effects are not considered.  
i.e.:

- Repurchase behavior,
- Mark loyalty,
- Negative mouth propaganda

## Quality costs/6

### Appraisal costs

Straight on with appraisal costs the leaning to manufacturing of the classical error costs comes dramatically to the expression.

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Testing times, test personnel of the manufacturing and expenditures for building of inspection devices and/or inspection device acquisition as well as costs of the calibration service accurately raised –

on the other hand extensive audits, internal revision, costs of the execution of Mystery Shopping or Mystery calls are looked for in vain in the appraisal costs lists

## Quality costs/7

### Failure prevention costs

The failure prevention costs represent the most innovative cost block in the classical organization of the quality-referred costs. Here all costs are seized which develop by preventive measures, e.g.

- Review with customers concerning the requirements
- Quality Function Deployment
- Design Reviews
- Suggestion scheme
- .....

## Quality costs/8

### Assignment problem

Example: A company decides to distribute a development version before series release to  $\beta$ -sites, in order to verify the adequacy in a surrounding field as real as possible.

Which of the cost category specified above are the costs to assign for:

- Identification of the possible  $\downarrow$ -sites,
- Clarifying/negotiation with that  $\beta$ -sites,
- Training of the personnel,
- Distribution of the development version,
- Implementation,
- Start-up,
- Monitoring,
- Reporting,
- Evaluation of the reports



## Quality costs/9

### View period problem

The classical quality-referred cost term is leaning to production. Thus also the temporal view window is strongly limited

- focuses on the production period;

Before that some

- fault prevention measures are appropriate
- temporally thereafter the external error costs
  - e.g. for guarantee and warranty costs

Guarantee -- 0.5 years for mobile goods

and 3 years for stationary goods

-so that the time window itself still postpones 3 years after the production period (and the distribution time)

**-only a small part of the product life cycle is considered**

## Quality costs/10

### Representation problem

**Straight the failure prevention costs represent an investment into the future of the enterprise:**

They improve the competitive ability

They improve the chances of success of the enterprise.

The monetary amounts are seized nevertheless and called costs, what means a falsification of the representation (further examples:

Training courses)

## Quality costs/11

### Representation problem

#### Goal:

To seize cost categories



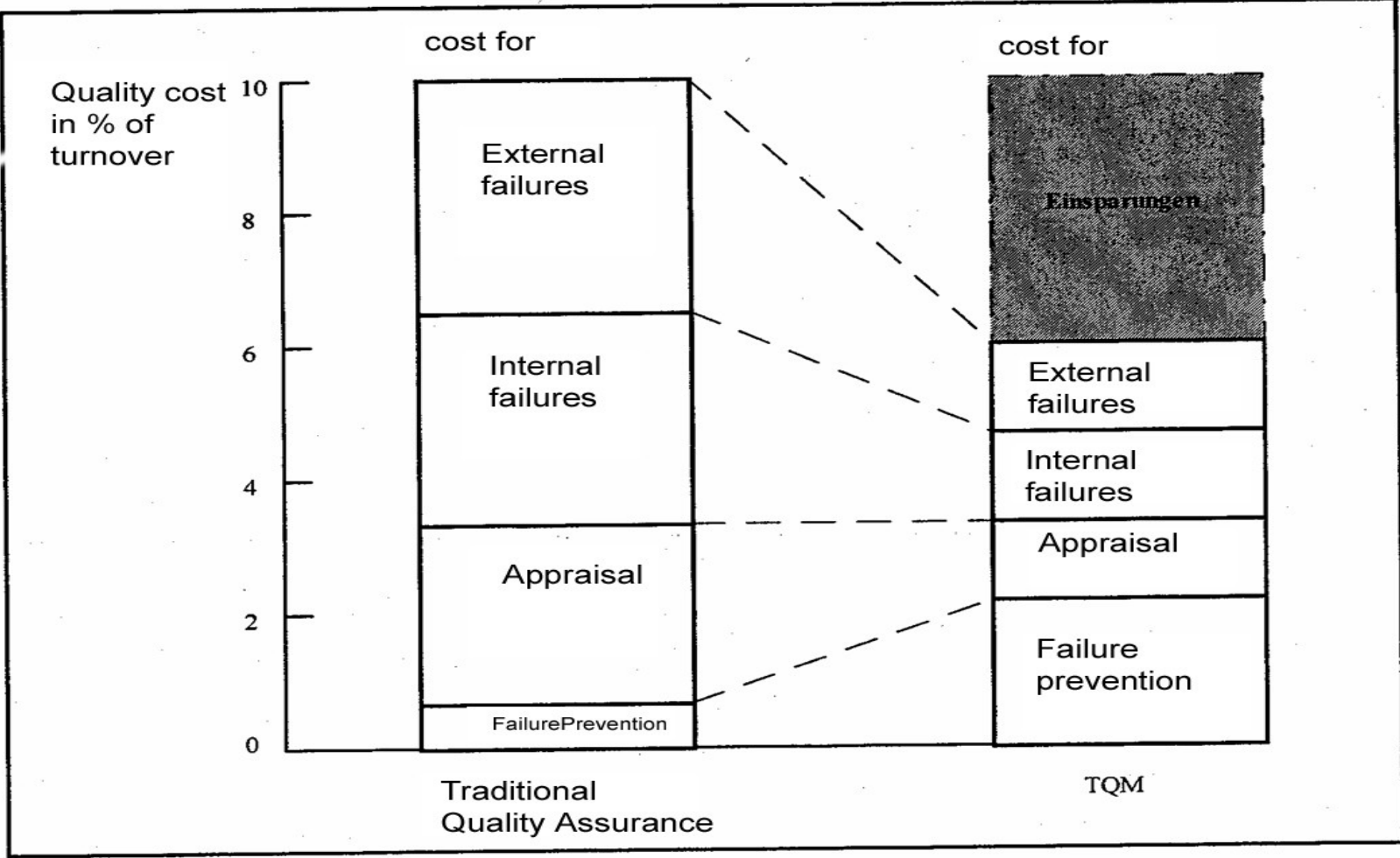
to increase mid to a long-term basis the preventing costs efficiently



so that

test and error costs are reduced disproportionately high and **net saving develops.**

# Quality costs/12



## Quality costs/13

### **Non conformity costs**

(= discrepancy costs) more generally result from a deviation in relation to a specification and/or in relation to a requirement.

Thereby all multi-expenditures are determined, which lead not only to a disturbance of the product but also in addition, the operations.

### **Conformity costs**

(= agreement costs) due to the small portion are not explicitly raised at present.

## Quality costs/14

### Advantages over classical error cost model

- is more extensively
- offers to the enterprise also the flexibility during the own arrangement.
- must be integrated in an existing controlling or management information system
  - temporal consistency = comparability!;
- by automatic collection consistency and completeness are guaranteed.

- Inform all involved ones of sense and purpose –
  - and carry out in open form conviction work, in order to win directly colleagues which take part particularly within the implementation.
- Definition of the important items
  - if possible focused,
  - but expandable
  - and despite extension comparably
- Determination of the data sources.
  - Also the procedure of acquisition is to be defined



# Quality costs/16

## Proceeding during the introduction/2



- Explanation and demarcation of quality cost contents
- Definition of: Cost categories, cost centers.... (deal with estimations)
- Define allocation
  - cost unit accounting
- Define report form
  - independent report -integrated numbers



# Quality costs/17

## Collecting of quality costs/1

Quality cost element	Cost category	Cost centre
<b>Appraisal costs</b>		
First sample examination	R	F
Qualifications	R	F
Receiving inspections	F	F
Intermediate tests	F	R
Final inspections	F	R
Acceptance checking	F	R
Inspection device	F	F
Inspection documentation	R	R

F.....frequently seized

R....rarely seized

# Quality costs/18

## Collecting of quality costs/2

Accounting system	Quality department
	Definition of the quality-referred costs
Collection of the resulting cost	Compilation of the quality-referred costs
	Analysis, cooperation on improvements of the quality-referred costs and the overall economicness
Control and planning of all costs resulting in the enterprise	
	Supply of documents for planning and cost calculation
	Supply of documents for the evaluation of the management system by the top management
	Support the investment calculation expense by view of the influence of the quality-referred costs

## Quality costs/18

### Barriers with the implementation/1

- Objective is incompatible with the use, which quality-referred costs can supply.
- Doubting the topic dominates – there is not enough energy for going the first steps clearly.
- A half baked collection (too details or not suitably to existing report systems) leads to the refusal by the potential users.



## Quality costs/19

### Barriers with the implementation/2

- Small understanding - no motivation with the coworkers concerned
  - "already again a report more - however none makes the actual work"
- Too small transparency of the entire report
  - costs appear deferred and locally transferred from the causers
    - leads to the refusal by the highest line,
    - and makes thereby the whole thing an alibi action for the external audit.

# Quality costs/20

## Barriers with the implementation/3

- No comprehensive view –
  - it leads to the fact that nevertheless the report system as one-sided (and using chicanery) is felt by the concerning
  - and collect all possible arguments,
    - in order to move the distortion of the report into the foreground and with it the quality-referred cost are brought in discredit.
- Tuning problems between the raising department (account system) and the operational departments concerned
  - lead to distrust and refusal.

## Quality costs/21

### Barriers with the implementation/4

- Nevertheless unclear costs are assigned to a cost unit (cost centre)
  - which leads to the open discussion with the cost centre, since this is made responsible for errors of others.
- Discipline lacking during the collection and the verification
  - lead to time delay and unclear allocations
  - and thus to internal frictions.
- Over accuracy leads to feigning wrong precision.

Quality costs/22

Barriers with the implementation/5

## The most frequent problems

%	Problem ( repeated denomination possible)
58	Too large work and cost
34	Lack of time
28	Unclear proceeding
21	Advantages are not convincing

- Optimization of overhead costs
  - particularly administration/selling
- Reduction of the product, manufacture and process costs
- Indicator of blunder and trigger for introducing improvement measures.



# Quality costs/23

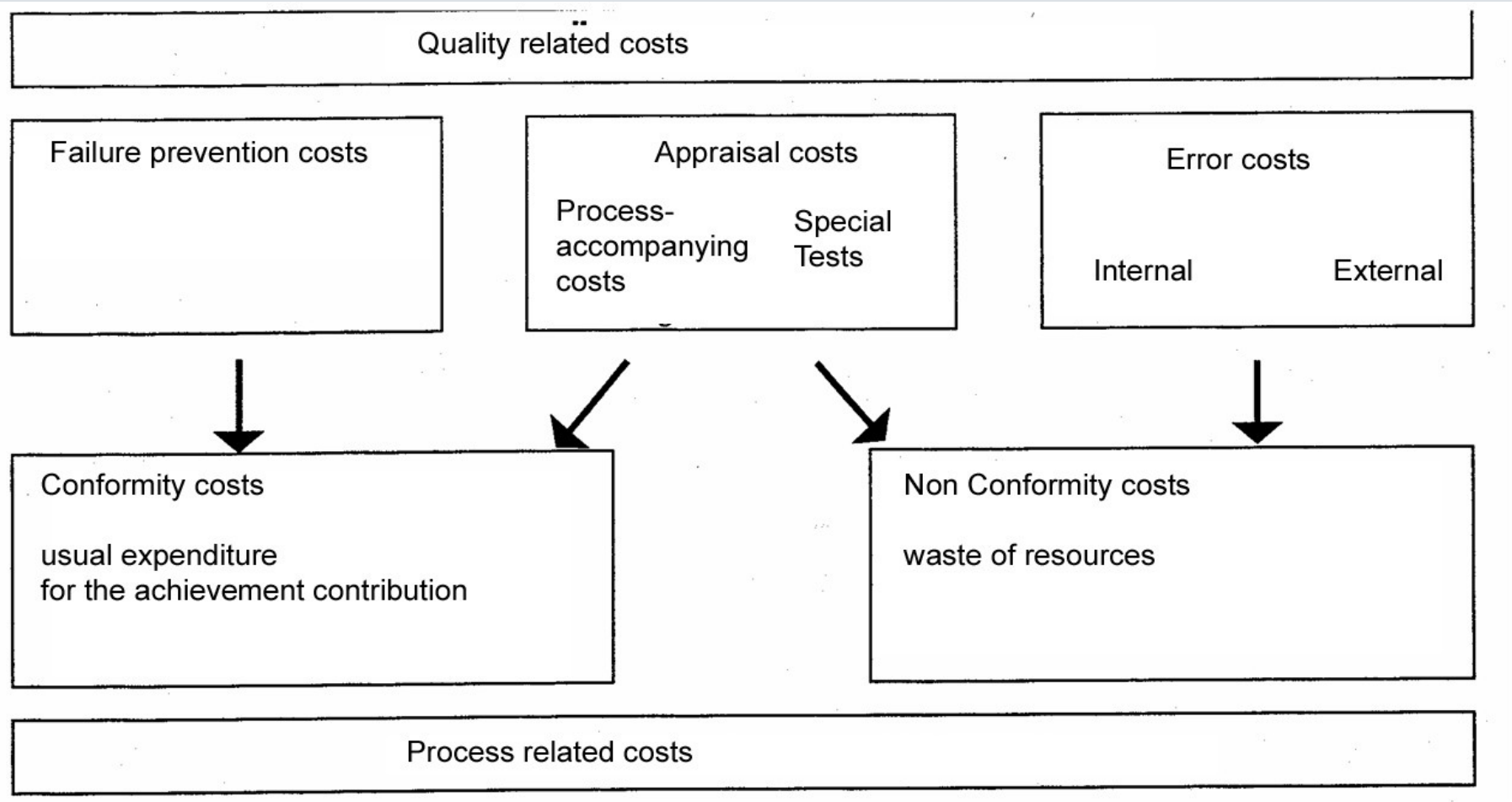
## Arrangement of the quality cost term/1



<b>Quality related costs</b>	<ol style="list-style-type: none"><li>1. Failure prevention costs</li><li>2. Appraisal costs</li><li>3. Internal error costs</li><li>4. External error costs</li></ol>
<b>Process related costs</b>	<ol style="list-style-type: none"><li>1. Conformity costs</li><li>2. Non Conformity costs</li></ol>
<b>Quality related loss</b>	Loss function

# Quality costs/24

## Arrangement of the quality cost term/2



**What costs a dissatisfied customer?**



**What costs a lost customer?**

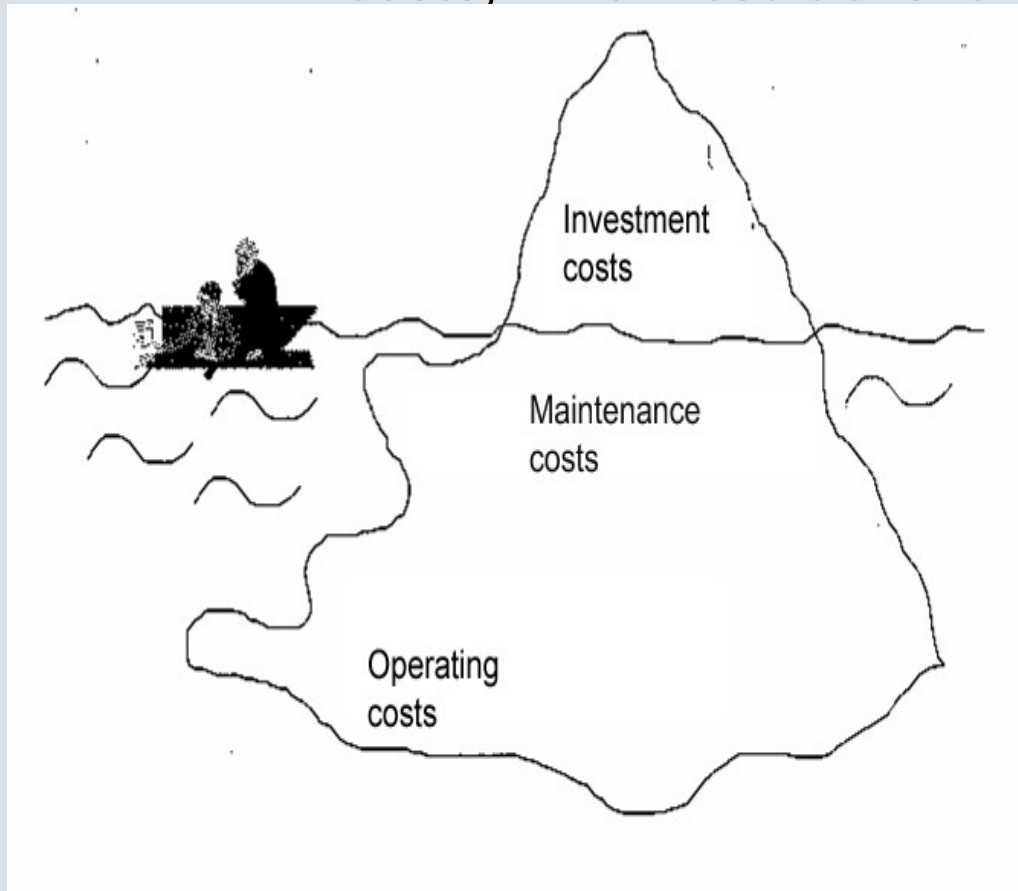


**What costs a lost order?**



**What costs declining image?**

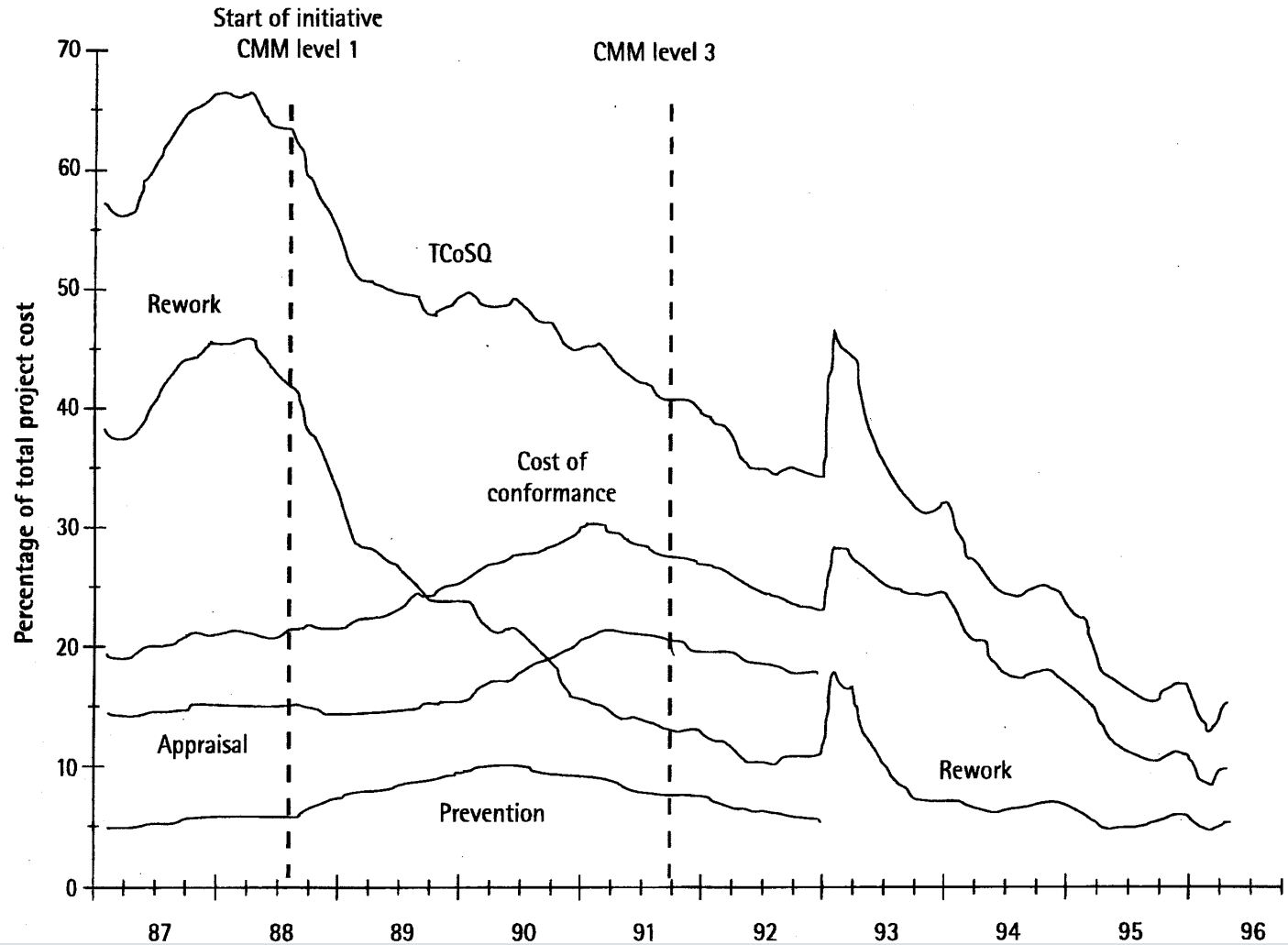
All costs, which result over the entire life span of a plant.



- Investment costs
- Maintenance costs
- Operating costs

# Quality costs/27

## Cost of Software Quality



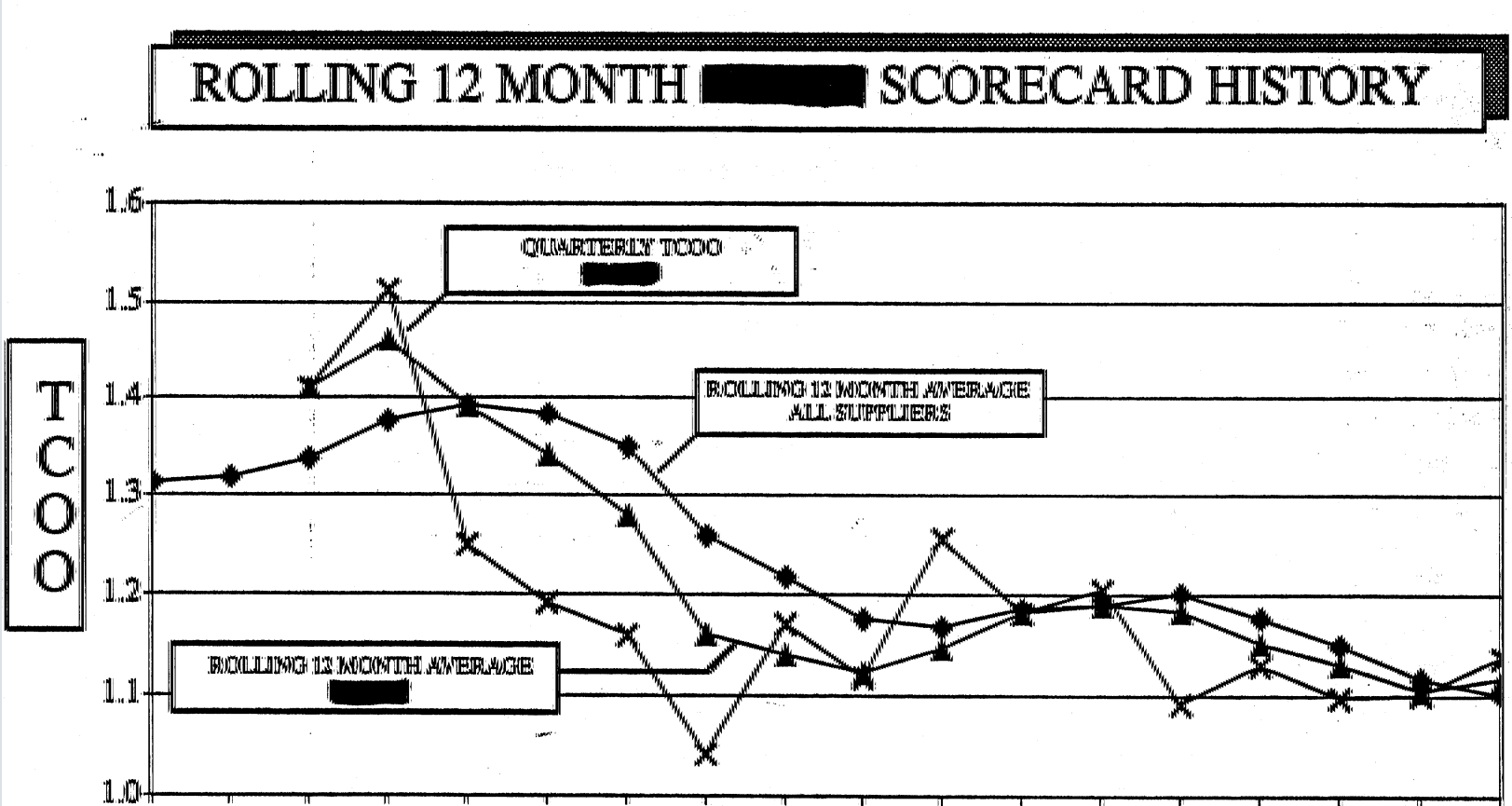
# Quality costs/28

## Total Cost Of Ownership/1

	Data or Comments	Max Pts	Actual Pts	Score
<b>Quality Performance</b>				
Total Failure Rate (DPM)	675 DPM (Target = 1000)	25.0	23.7	
Failure Analysis		5.0	5.0	
Field issue, purge, stop ship		(15.0)	(5.0)	
<b>Quality Subtotal</b>		<b>30.0</b>		<b>23.7 pts</b>
<b>Leadtime/Delivery/Flex Performance</b>				
Leadtime	On Target	10.0	10.0	
On-Time Delivery	100% On-time Delivery	15.0	15.0	
Flexibility	Provided Required Flexibility	5.0	5.0	
<b>L/D/F Subtotal</b>		<b>30.0</b>		<b>30.0 pts</b>
<b>Technology Performance</b>				
Product Technology		12.5	6.5	
Process Technology		12.5	11.0	
<b>Technology Subtotal</b>		<b>25.0</b>		<b>17.5 pts</b>
<b>Support Performance</b>				
Materials/Purchasing Support		10.0	10.0	
Sustaining Technical Support		5.0	5.0	
<b>Support Subtotal</b>		<b>15.0</b>		<b>15.0 pts</b>
<b>Performance Matrix Total</b>		<b>100.0</b>		<b>86.2 pts.</b>
<b>Price Index</b>		<b>1.0</b>		<b>1.000</b>
<b>SCORE = PERFORMANCE MATRIX x PRICE INDEX</b>		<b>100.0</b>		<b>86.2 pts</b>
<b>TOTAL COST OF OWNERSHIP = <math>(\frac{100 - \text{SCORE}}{100}) + 1</math></b>			<b>GOAL: 1.0</b>	<b>1.138</b>
Prior Performance Matrix Score:		90.2		
Prior Price Index:		1.000		
Prior Total Cost of Ownership:		1.098		



Quality costs/29  
Total Cost Of Ownership/2



**Thank you  
for your attention!**





## 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