

# IT QM Part1 Lecture 3

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**

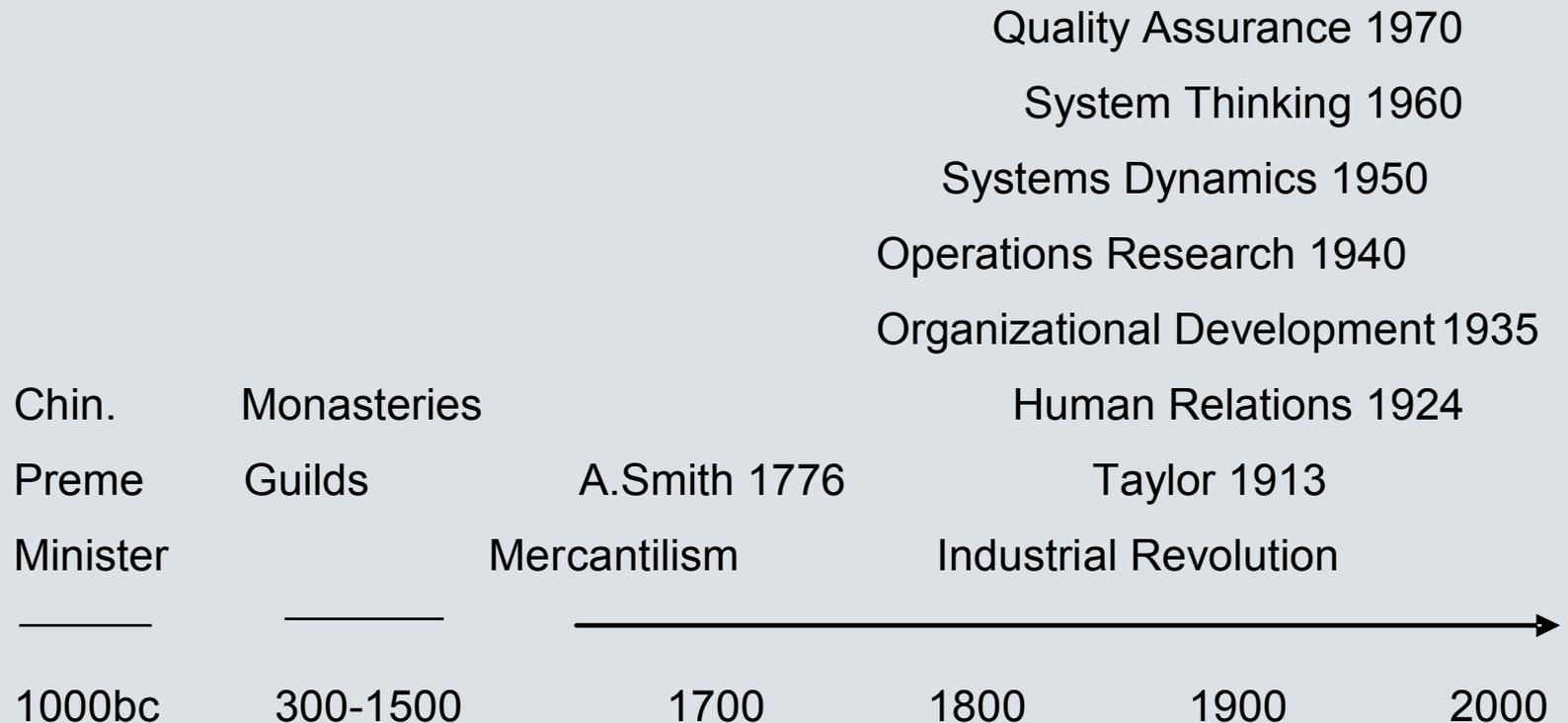
- 04.03.2008**                      **Lecture 1 Impact of Quality-Quality Definition-Standards**
- 11.03.2008**                      **Lecture 2 From Quality Control to Quality Assurance**
- 01.04.2008**                      **Lecture 3 Organization Theories-Product Liability-Emphasis from Quality Control  
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**

- Organization Theories
- Product Liability
- Emphasis Quality Control
- Emphasis Prevention

- 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

## Milestones in the area of Organization Theory



## Practical Example: Construction of the Cheops pyramid

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A more widely accepted theory in the modern era, however, suggests that the Great Pyramid of Egypt was built by hundreds of skilled workers who camped near the pyramids and worked for a salary or as a form of paying taxes until the construction was completed



Principles for organizing an empire directed to a Chinese prime minister about 1100 B.C. :

Eight methods are at hand to govern an empire:

1. Ordinance and worship for controlling people's mind
2. Byelaws and rules to control higher public servants
3. Hiring and firing to control minor public servants
4. Salary and status to control scientists
5. Taxes and grants to control resources
6. Ceremonies and traditions to control the crowds
7. Punishment and rewards to show the straight of the empire
8. Agriculture and other occupations to maintain the people

Former precursor of division of labor → Platons „Politeia“

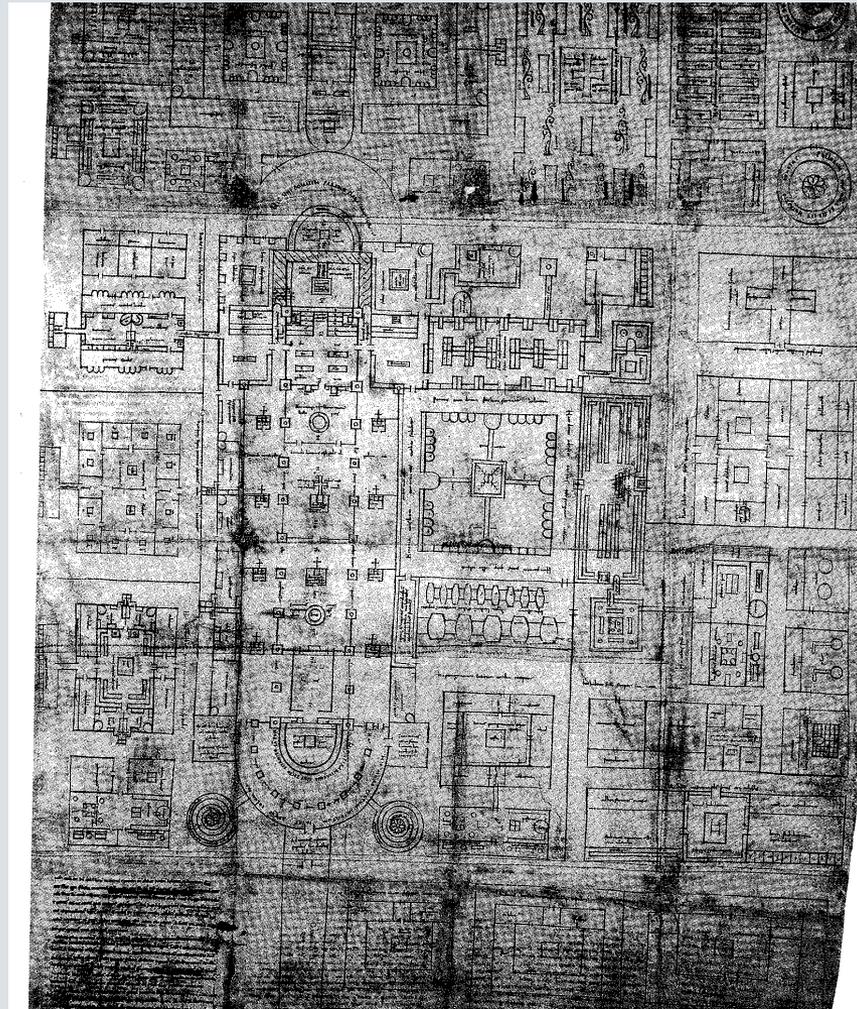
“...each individual has different talents and is different.  
i.e. not each individual is suited for the same profession:

- Get the right man to the right rifle

So also the farmer will not be able to build neither a plough nor a heel with a given quality ”

# Organisation Theories/4

## Ancient Egypt, China, Europe/4



## **Europe, 4th century to 15th century**

Organizational rules and structures within  
monasteries  
(division of labor –schedules)

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Guilds derive “best practice“ from tradition but not  
because of economic requirements

Mercantilism( 16th century - 18.th century )

### Essential target:

- Cease of

- prosperity of people

- Financial power of the sovereign

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- These areas were applied to reach target

active development of population

Active trade politics

Active foreign trade politics

## **Adam Smith; 1776**

*“Investigation into nature and causes of the prosperity  
of people”*

### **Benefits of division of labor-three factors:**

1. Increased skillfulness of laborers
2. Saving of transitional period (reset time)
3. Invention and employment of engines

.

## Industrial Revolution, 19th century

Increased need for organization and management guidelines.



1832 Babbage “ On the Economy of Machinery and Manufactures”

1835 Ure “The Philosophy of Manufacturers”

*„to reach predictability some way of formalism is necessary.“*

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**Henry Fayol : “Administration Industrielle et Generale” 1916**

**14 principles of management**

- |   |                              |
|---|------------------------------|
| 1 Division of labor,  | 8 Centralization,            |
| 2 Authority,  | 9 Hierarchical organization, |
| 3 Discipline,   | 10 Rules,                    |
| 4 Unity of giving instructions,   | 11 Balancing justice,        |
| 5 Unity of leadership,  | 12 Loyalty of employees,     |
| 6 Subordination of individual<br>interests in favor of interests of the<br>whole, | 13 Initiative,               |
| 7 fair wages,   | 14 Spirit of community.      |

**Gulwick and Urwick derive 1937 from Fayol's principles:**

**7 main functions of management:**

1. Planning,
2. Organization,
3. Occupation of jobs,
4. Leadership,
5. Coordination,
6. Reporting,
7. Budgeting.

## Taylorism

### Focusing on the methodology

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Experience was Taylor's essential element  
For optimization of one parameter all others were kept constant.

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Due to his opinion laborers were convinced

- that overtime of one of them would replace another one
  - in that way making him unemployed
- and on the other hand nature of human being impacts him
  - not to work more than is absolutely necessary.

**Some of Taylor's principles are:**

Specializing of tasks

Keep tasks simple

Fixation of work place

Timing device and time studies

Distribution of work and studies of capacity by the office of labor (also for intellectual and paper work)

**Further ideas which Taylor implemented:**

Pensum

Bonus

Elite

Adaption

## **Capacity Mastership:**

1. route clerk
2. instruction clerk
3. cost and time clerk
4. gang boss
5. speed boss
6. inspector
7. repair boss
8. shop disciplinarian

**costs:**

*Taylor was forced to compensate*

- *Increase of costs caused*
  - *by unproductive overheads*
- *In reducing of required qualification of workers*
- *And raised exploitation of service provision of workers*

## **Henry Ford:**

His impact was much greater than that of Taylor

• On the American economy in the beginning of the twenties of the last century

### **Ford principles:**

- Maximal division of labor
- Maximal Standardization
- Maximal Timing device

## **Frank Bunker Gilbreth ( 1868 – 1924 )**

Time and motion studies are basics for determination the time allowed (assembly line!!!)

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## **Harrington Emerson**

Investigation of structural organization:

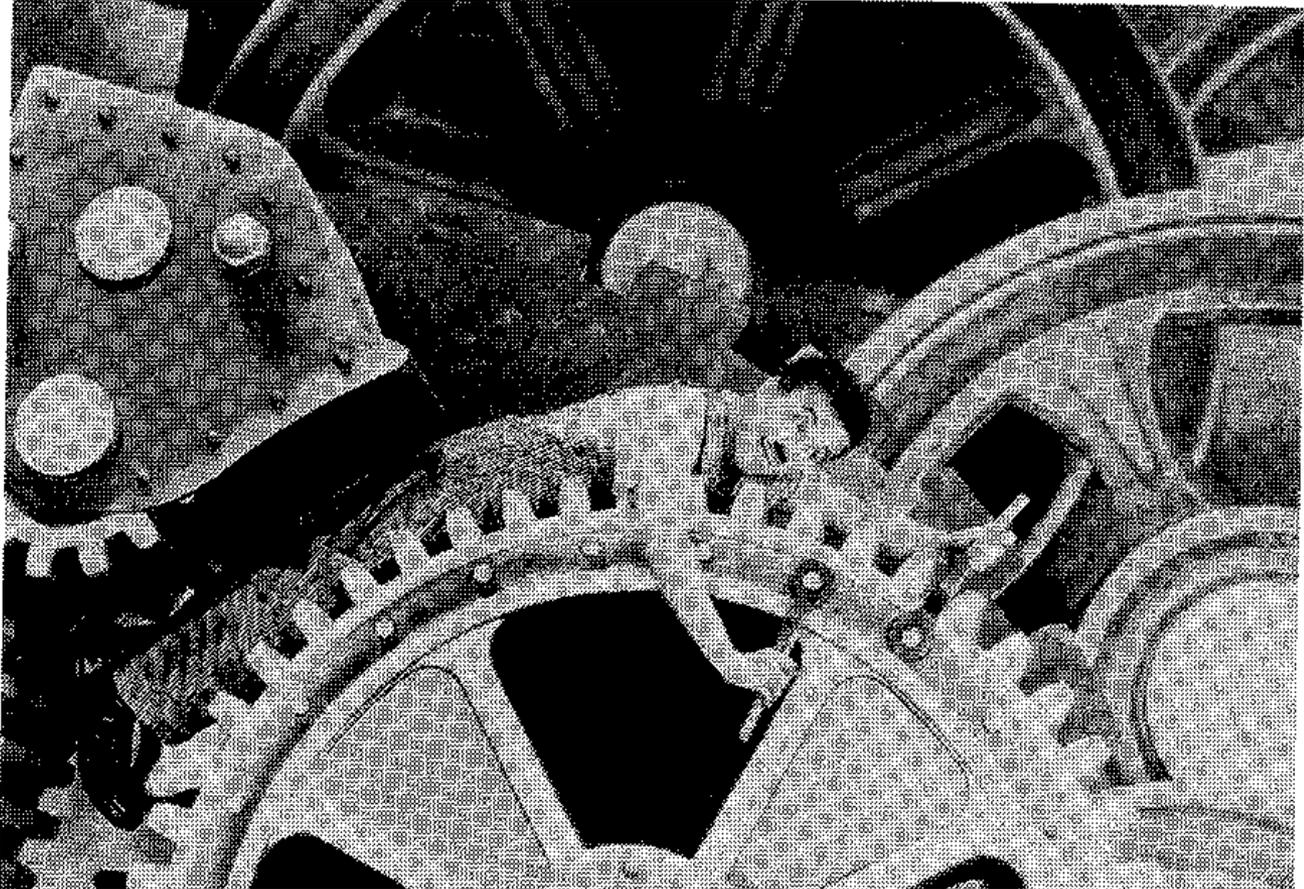
Conception of organization was transferred from army to industry

- Necessity of staff units

# Organization Theories/18

## Industrial Revolution/10

Taylor's principles had some weaknesses.



**Weak points:**

**Principle: Specialization**

Monotony

Poor flexibility

Poor motivation

**Principle: Fixation on site**

Poor flexibility

Weak points:

**Principle: simplified tasks**

Labor dispute because of high pressure to perform  
Skills are not necessary

**Principle: distribution of work by distribution office**

Coordination problems :

- Increasing of business dimension
- Too large standard values

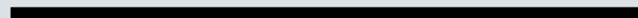
**Weak points:**

**Principle : note for job instructions**

- Bureaucracy
- Lack of cooperation between employees

## **Human relations school of management**

Informal groups form work climate, motivation, and attitude  
Social prestige and reputation are important for each employee



## **Kurt Lewin: Introduced the model for participation**

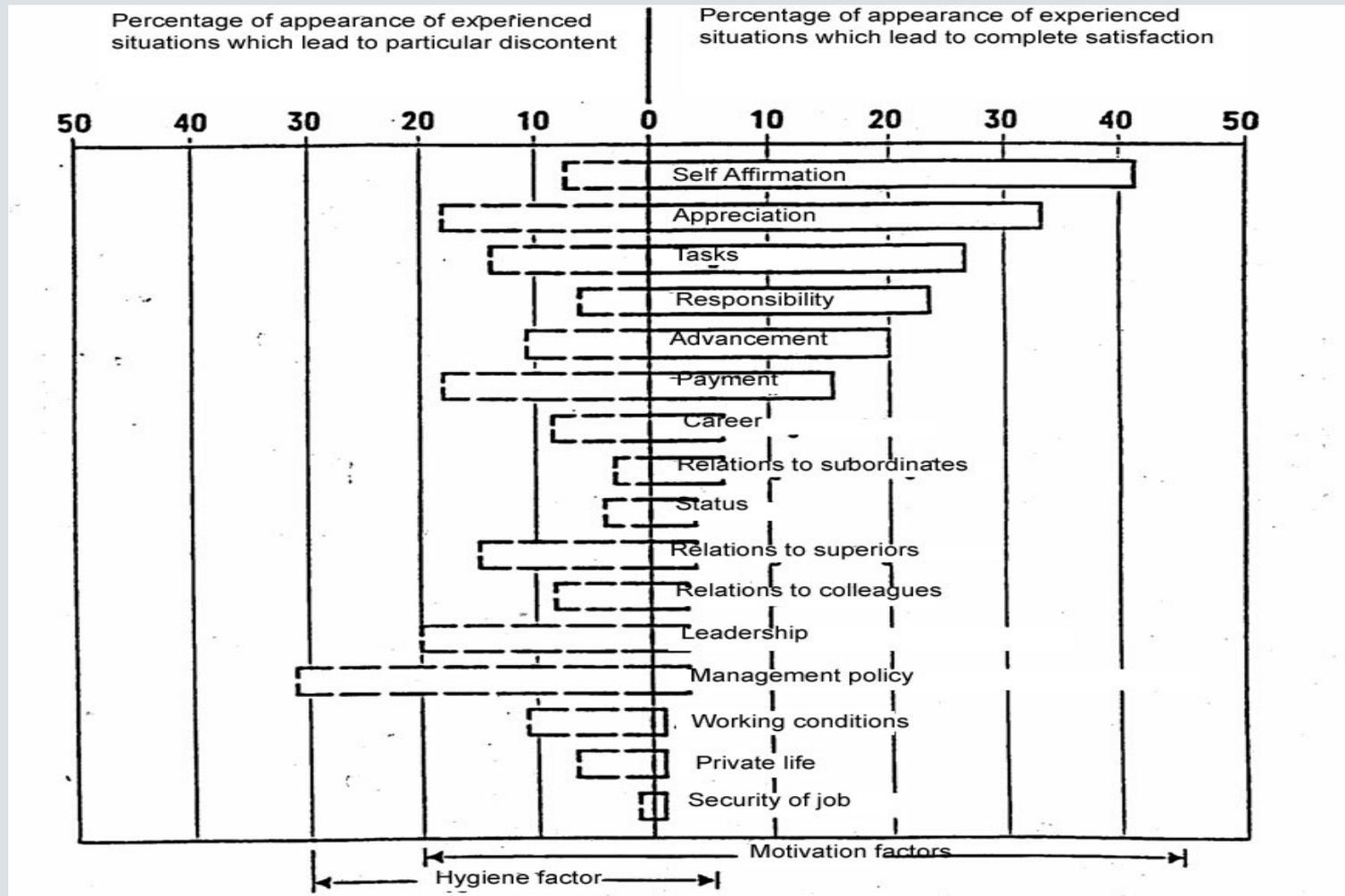
- defrost
- change
- refreeze.

## Maslow's Hierarchy of Human Needs



# Organization Theories/24

## Industrial Revolution/16



## Study:

Comparison of situations in job:  
Positive or negative attitude to work

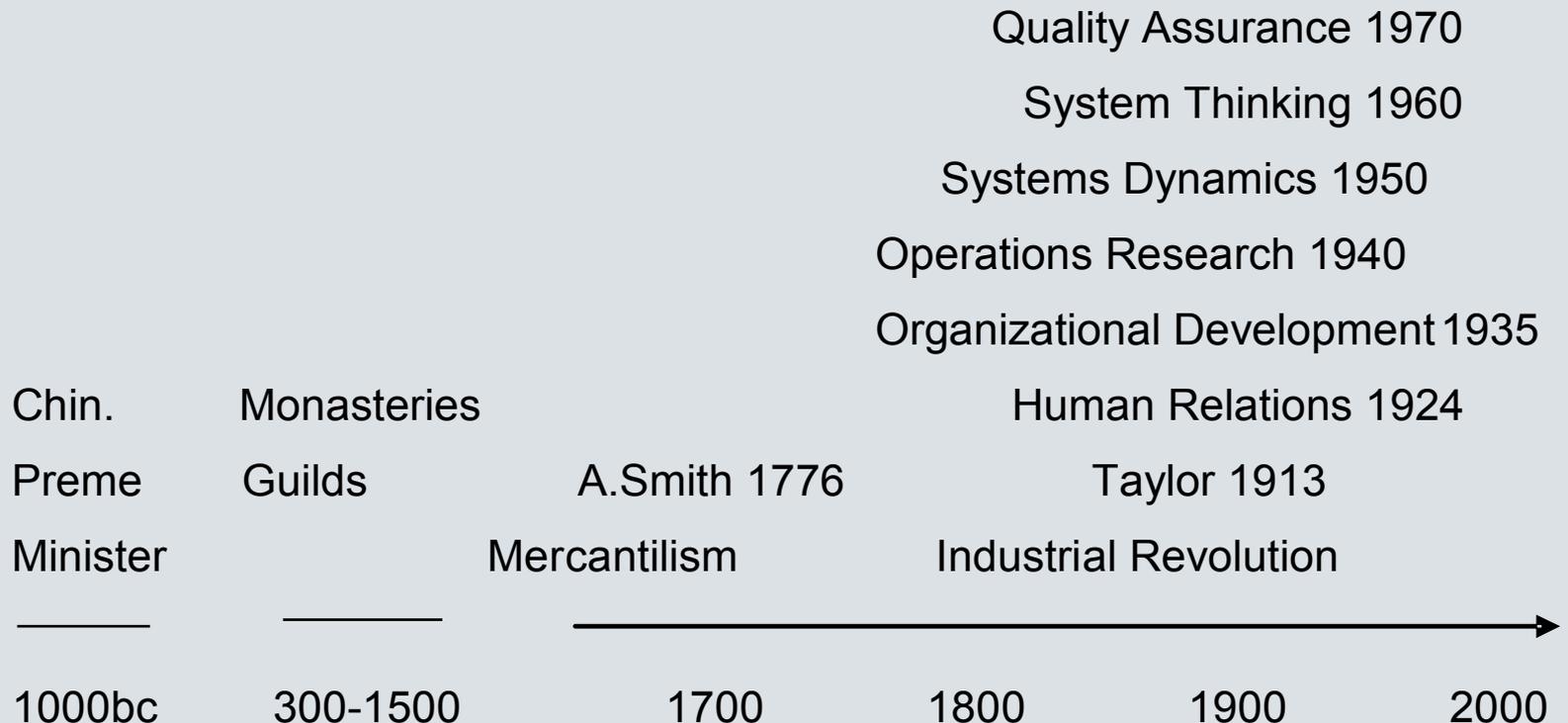
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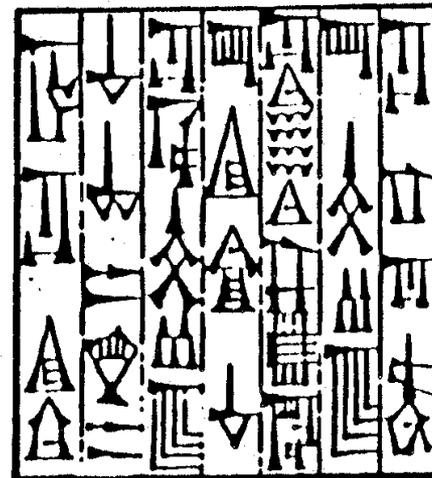
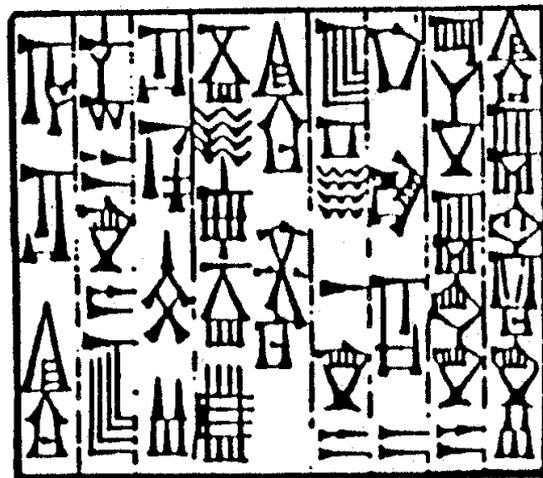
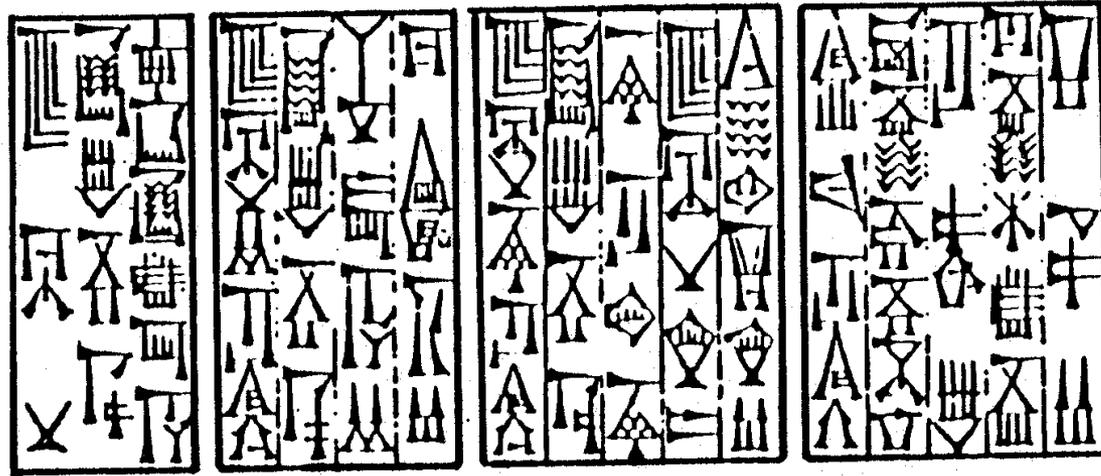
## Approach:

Hygiene Factors	Motivation Factors
Working conditions	Achievement
Salary	Achievement Recognition
Status	Responsibility
Security	Advancement
Interpersonal relations	Growth

(according Herzberg.)

## Milestones in the area of Organization Theory





"if a building master a house builds for a man and it for him with perfection, then this is to give him as wages two Shekel silver for one Sar (1 Shekel silver = 360 grains of wheat; 1 Sar = 14.88 square meters)

If a building master builds a house for a man and its construction does not make strongly, so that it collapses and causes the death of the owner, this building master has to be killed.

If the collapse causes the death of the son of the owner, then they are to kill a son of the building master.

**Root of Quality Assurance“: code of Hammurabi/3**

If a slave of the owner dies thereby, then the building master give slaves of same importance.

If property is destroyed during the collapse, then the building master should restore, which was always destroyed: Because he did not build the house firmly enough, he must rebuild it at own expense.

If a building master builds a house and the construction was not strongly enough, so that a wall collapses, then he is strengthened again to develop it at own expense.

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**Today this rule is called product liability standard.**

In the Middle Ages the quality of the products of the handicraft was examined; if bread did not fulfill the necessary requirements, the baker was punished: Baker was shacked.



The special attention was thereby the examination by the customer, with the acquisition of the commodity.

- In the case of larger supply of grain
  - Which was transported and supplied in bags
  - A handful grain for examination was inferred
    - By in-stung with a measurer (knife!) in the center of the bag.
  - Thus it was prevented that a bag fully of bad grain
    - where on top was up-strewn a layer of good grain
    - And the bad was not recognized.
- From this stinging into the bag the word **sample** is derived
  - which is still used in further development especially for statistically issues
  - planned withdrawal of a subset to finding out statements regarding
    - i.e. quality .

## Checking:

The thought of examining appears also within the range of the training: After completion of the learning and wandering years he will compete in the mastership examination .



It is decided by examination of the made masterpiece who a master is actual.

## Mercantilism

### Division of labor forced.

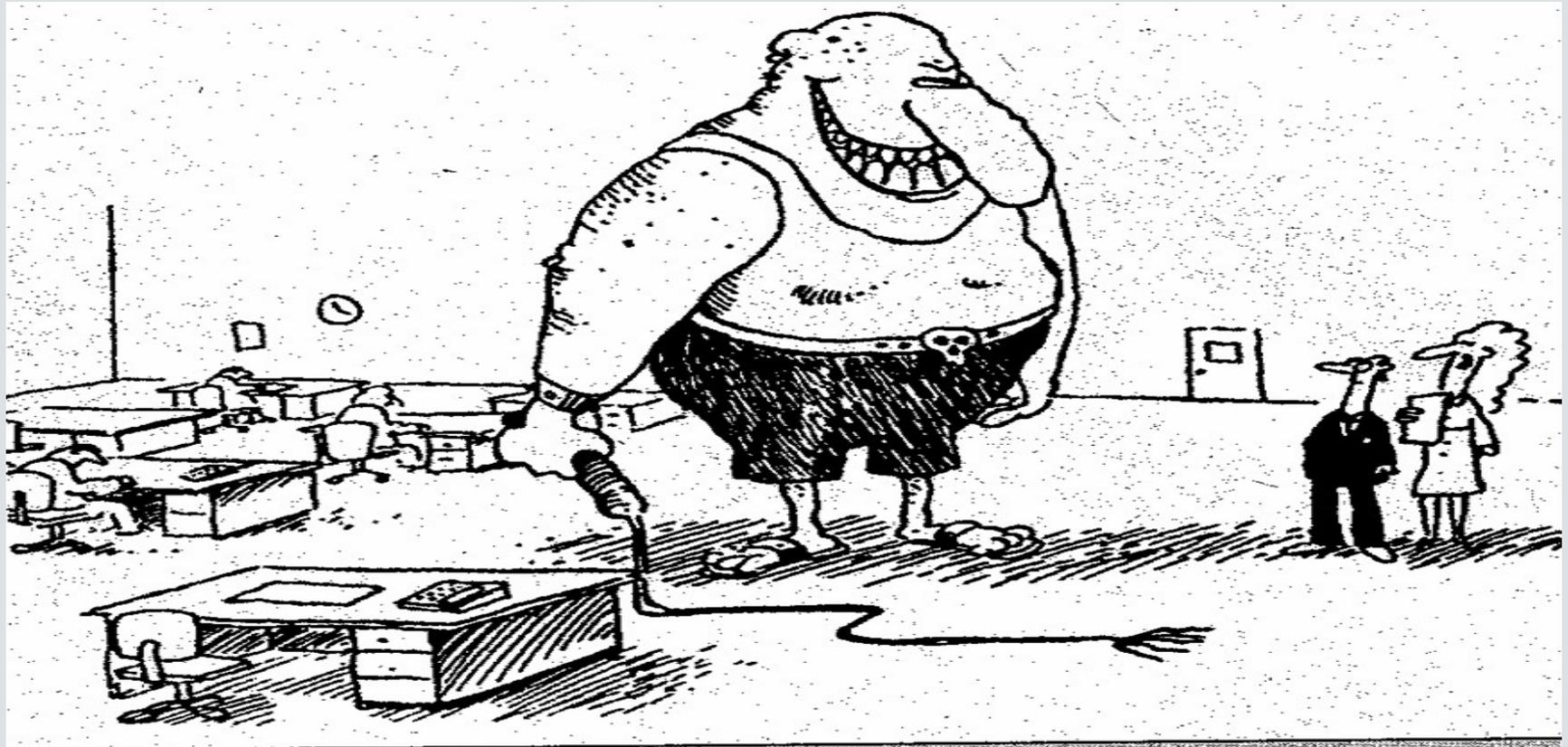
→ systematic validation steps introduced .  
(i.e. by supervisor in factory)

## Industrial Revolution, Taylorism

- Separation between "hand and head work"
- responsibility for products on superiors and specialists
- the quality assurance as technical function
- quality in-controlled into the product

Distortion of the responsibility between manufacturers and examiners

# Emphasis Quality Control/4



Mr. Bruto is responsible for quality control

## Quality Assurance / Quality - Control ( = Shewhart )

By quality assurance Shewhart understands a condition, with which specified quality criteria are within specified borders..

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During the statistic quality assurance a desired final state must be achieved, in order to carry after Shewhart the designation "in statistical quality control" by means of statistic methods.  
(the bare application of statistic methods is not sufficient)

# Emphasis Prevention/1

## Deming

Deming applies as for one of the strongest activators of the basic idea of prevention. To the topic "examining" gives it from Deming a winged quotation:

**“100% inspection will guarantee trouble”**

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Improvement beginning

**“Build quality in”**

## Emphasis Prevention/2

### Juran

**Systematic for the setting up of an improvement process**

- **Proof of the relevance of the quality topic**
- **Project identification**
- **Organization and controlling of the projects**
- **Diagnosis**
- **Therapeutic measures**
- **Overcoming of resistances in relation to changes**
- **Monitoring of the new level**

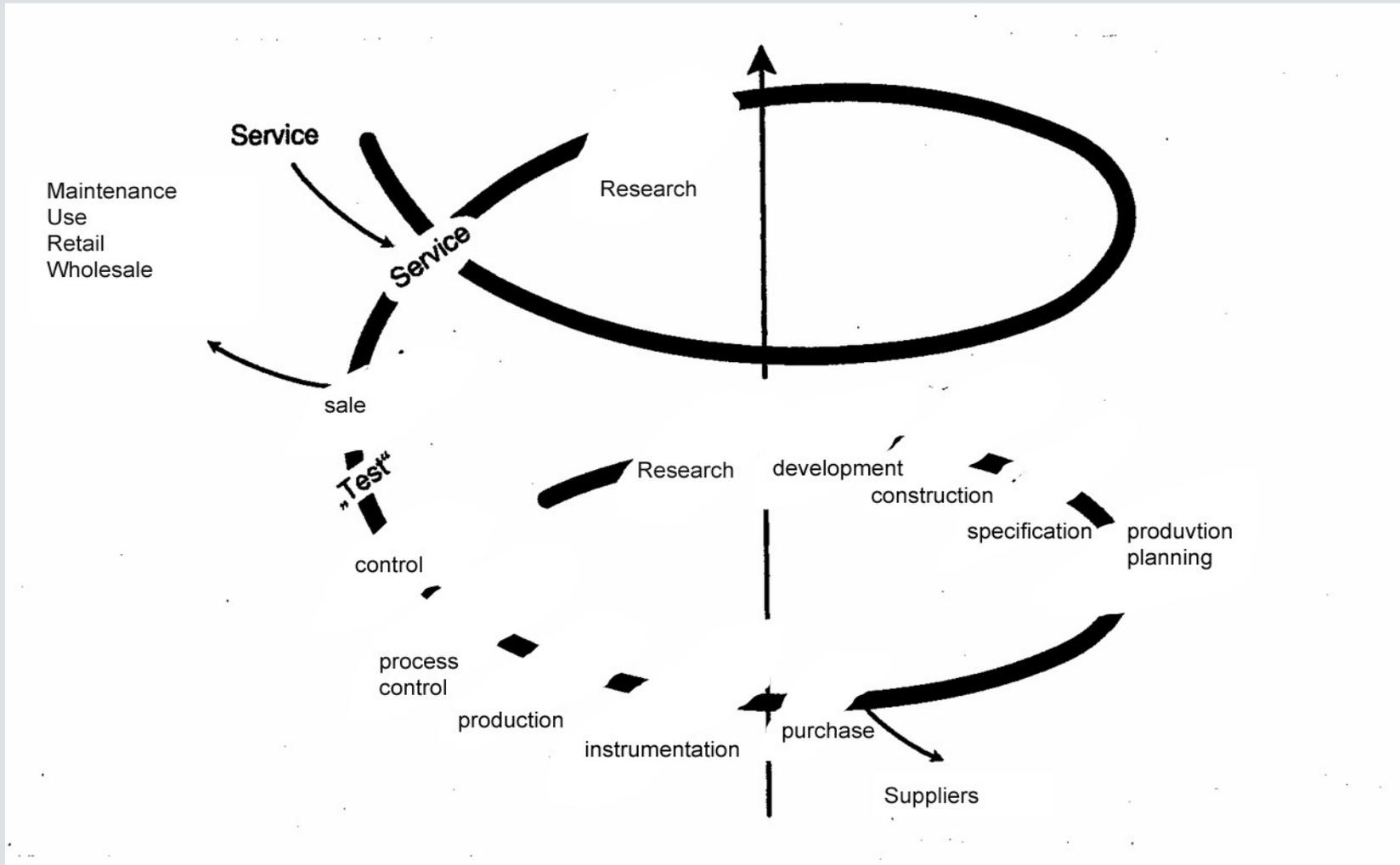
### Juran

*continuous and steady improvement process*

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While both Shewhart and Deming speak of cycles, Juran develops the model further with consideration of the time axis, in order to express the progress still more clearly.

# Emphasis Prevention/3



## Emphasis Prevention/5

### Feigenbaum

Defines as first the item

**“Total Quality Control”:**

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„An effective system for integrating the quality-development, the quality-maintenance and quality improvement efforts of the various groups in an organization so as to enable

◀ ~~marketing,~~

◀ ~~engineering,~~

◀ ~~production and~~

◀ ~~service~~

at the most economical levels which allow full customer satisfaction.“

## Emphasis Prevention/6

### Nolan

Not all users recognize objective, sense and purpose of the improvement activities

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Danger that a formulation of goal is selected, which is not optimally adapted to superordinate aiming.

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Range of topics  
"which we want to reach"  
as launching field implemented

## Emphasis Prevention/7

### Nolan

critical analyzing



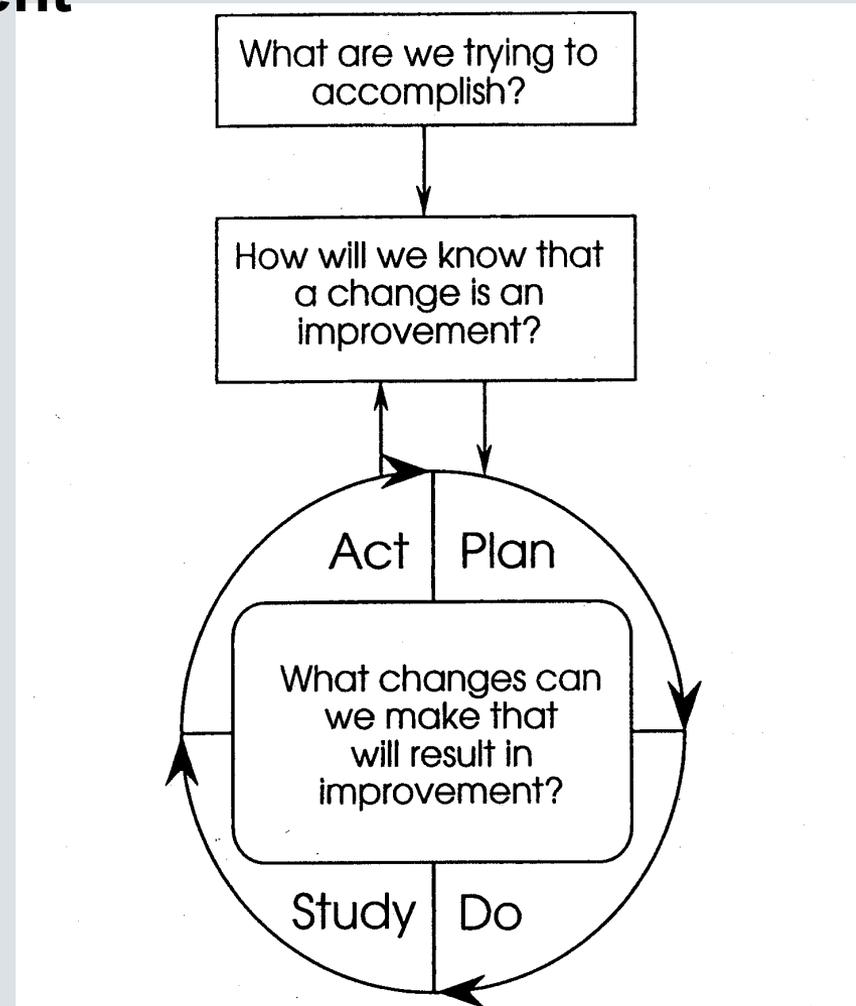
recognize whether change represents also an improvement.

Use of appropriate indicators/characteristic numbers



Only so actionism can be prevented

## Emphasis Prevention/8

„model for improvement”  
(Nolan)

## Emphasis Prevention/9

**Crosby**

**"vaccine quality" which immunizes organizations against deviations from demands for quality**

**The vaccine consists of:**

- Reliability
- Systems
- Communication
- Operational measures
- Guidelines

## Emphasis Prevention/10

### Reliability

- Unconditional employment that customer receives the promise
- Take demands for quality seriously.

### Systems

- Quality management system
- Quality training course system
- Evaluation of working processes
- Probation in practice - measures for error correction
- High value of error prevention

## Emphasis Prevention/11

### Communication

- Held all coworkers regularly up to date
- Acknowledgment programs for all levels
- Each employee can address the enterprise top management
- Each situation discussion of management begins with a
  - Quality stocktaking

## Emphasis Prevention/12

### Operational measures

- Suppliers are instructed exactly
- manufacturing processes, systems and products
  - are exactly described and examined steadily
  - then amended officially,
    - as soon as possibilities for improvement appear
- advanced training are naturally

### Guidelines

- Quality guidelines are clearly and unmistakably
- Quality responsible employees are subordinated to the same management level, as implementing ones
- advertisement and all reports outside agree with the requirements

## Crosby

profile of a quality-disturbed enterprise

typical characteristics	applies accurately to us	some applies	does not apply to us
1. our services and/or products normally contain liability exclusions, deviations and other signs for the fact that they do not correspond to the requirements	5 points	3 points	1 point
2. we have rework-oriented field service and/or dealer organization			
3. our coworker have no clear conception of the claims of quality of top management			
4. management is not itself over it in clear which deviations from the requirements effectively cost			
5. management is the view that quality depends on other factors than on measures of management			

scoring evaluation	
21-25 critical	immediate intensive care
16-20 serious	artificial respiration and artificial nutrition
11-15 stable	medicines and medical treatment
6-10 rekonvaleszent	regular control investigation
5 healthy	consultation

## Emphasis Prevention/14

### Ishikawa

Activator of the statistic methods,  
in order to promote the productivity

- Data gathering
  - Histograms
  - Cause - effect – diagram
  - Test elbow
  - Pareto of diagrams
  - Graphs
  - Control Chart
  - Dispersion diagrams
  - Binomial paper
  - Samples -extract
  - Samples -examination
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Quality circle for common learning

## Emphasis Prevention/15

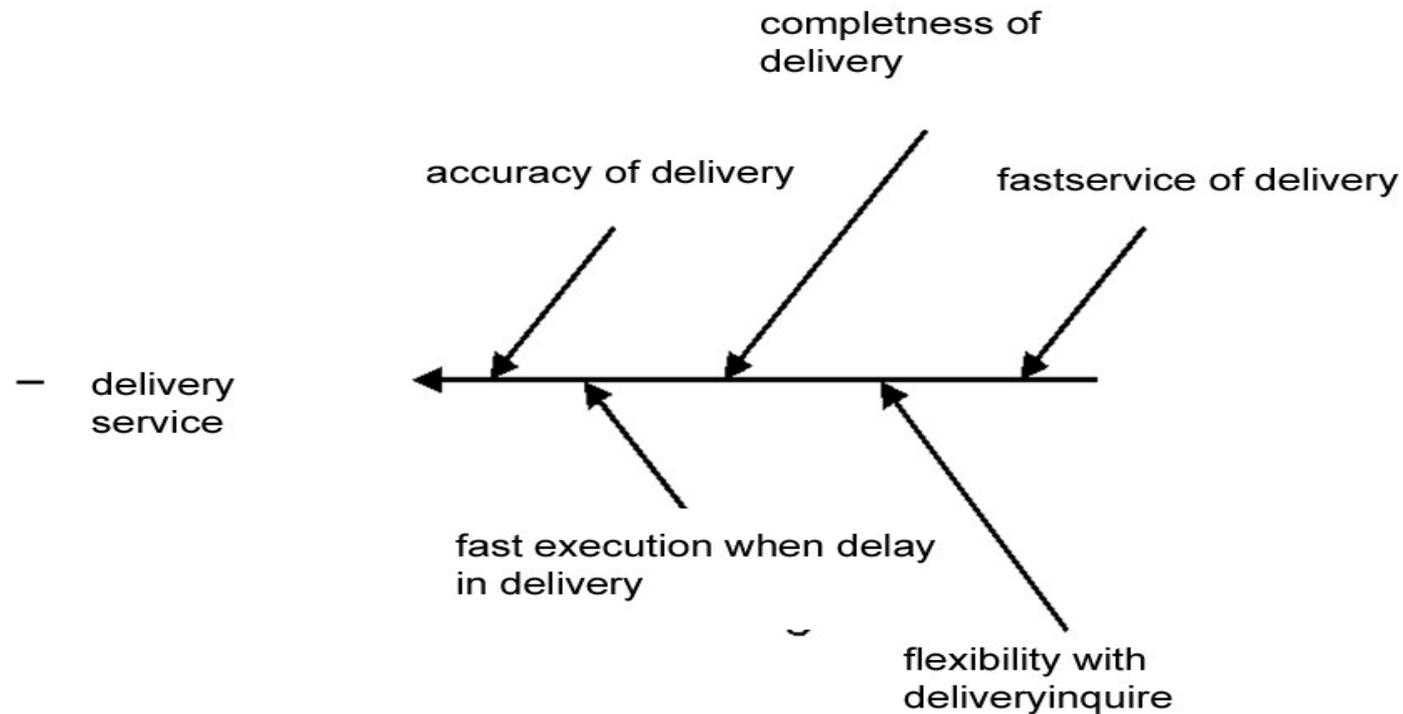
**Ishikawa:** Cause - effect – diagram

***Assigns an effect main causes-the outcome of the refining:***

- a problem definition completely described
- the different possibilities of causing structured
- the concatenation of several causes recognized
- the platform produced, for the identification of the most probable/most frequent causes
- the platform created, for prioritization
- the basis for test planning created
- the basis for action plans created

## Emphasis Prevention/16

Ishikawa: Cause - effect – diagram :



## Emphasis Prevention/17

### **Cause - effect – diagram :**

- increases insight into a problem situation
- creates new cognitions
- can the learning process accompany

**It helps to meet decisions due to from facts .**

### **As development method: Group works**

- lighting from several points of view
- common focusing on the main cause
- high motivation

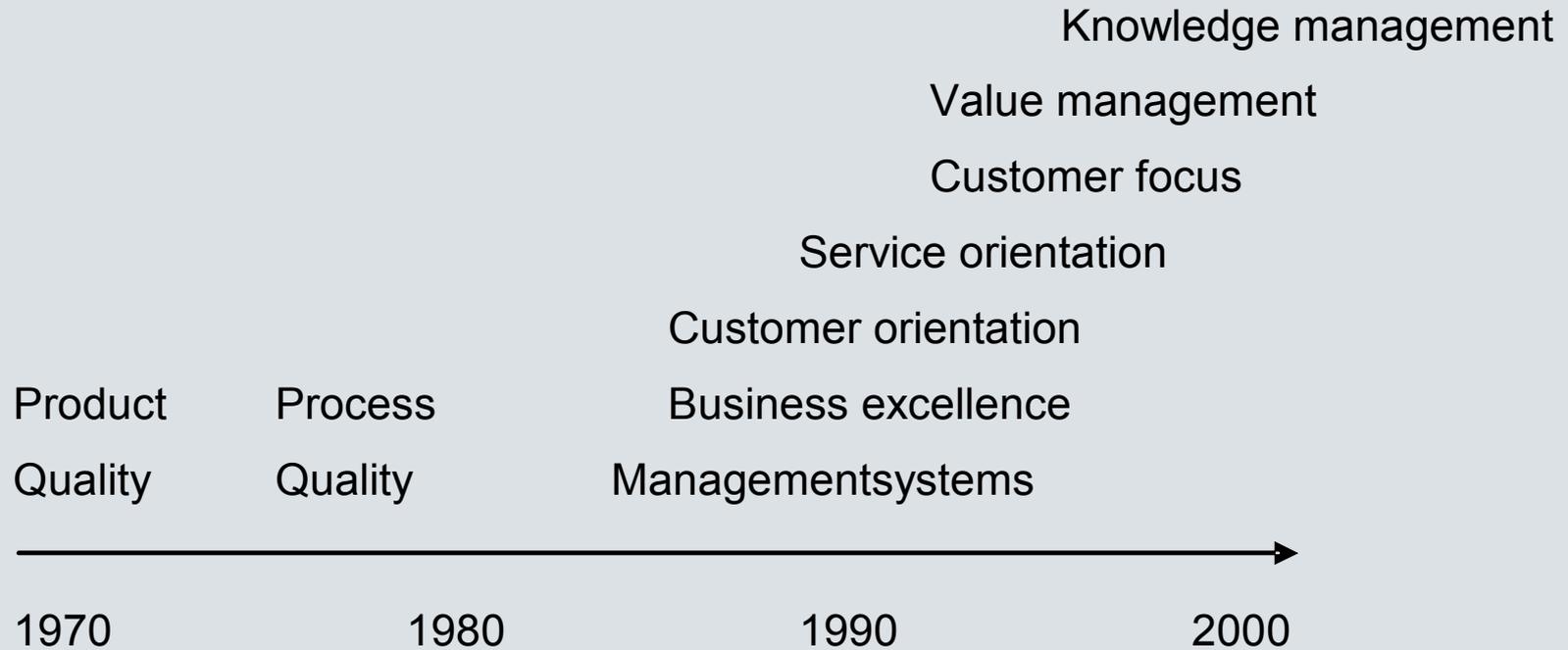
## Emphasis Prevention/18

### Ishikawa

Ishikawa shows:

Only the combination develops the full effect of the tools

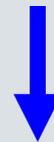
# Milestones in the area of Quality Assurance/1



## Milestones in the area of Quality Assurance/2

### Quality Assurance:

- Development of reactive beginnings (product oriented)
- Further to process orientation.
- Change of the role understanding
- Advisor for the organization
- Advisor for the Top Management



holistic management systems;  
(frequently the word quality is abdicated)

**Thank you  
for your attention!**

**SIEMENS**



IT QM Bratislava

## 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