Software Quality Management

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Last QOT: What is the difference between validation and verification?

"Verification: product/code against requirements
Validation: stakeholder expectations against product"

"Verification: Is the developed product right?
Validation: Whether it is the right product"

Both explanations are possible.
The first one is more concrete as it includes what is checked against what.

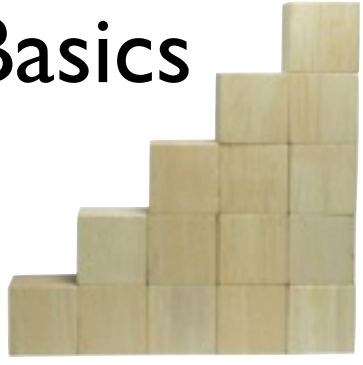
Approaches

Quality assurance planning

Review of last week's lecture.

Upper picture by Ulrik De Wachter
Lower picture by Trine de Florie

Basics



Product

Quality

Metrics and

Measurement

Process

Quality

Quality

Management

Certifi-
cation

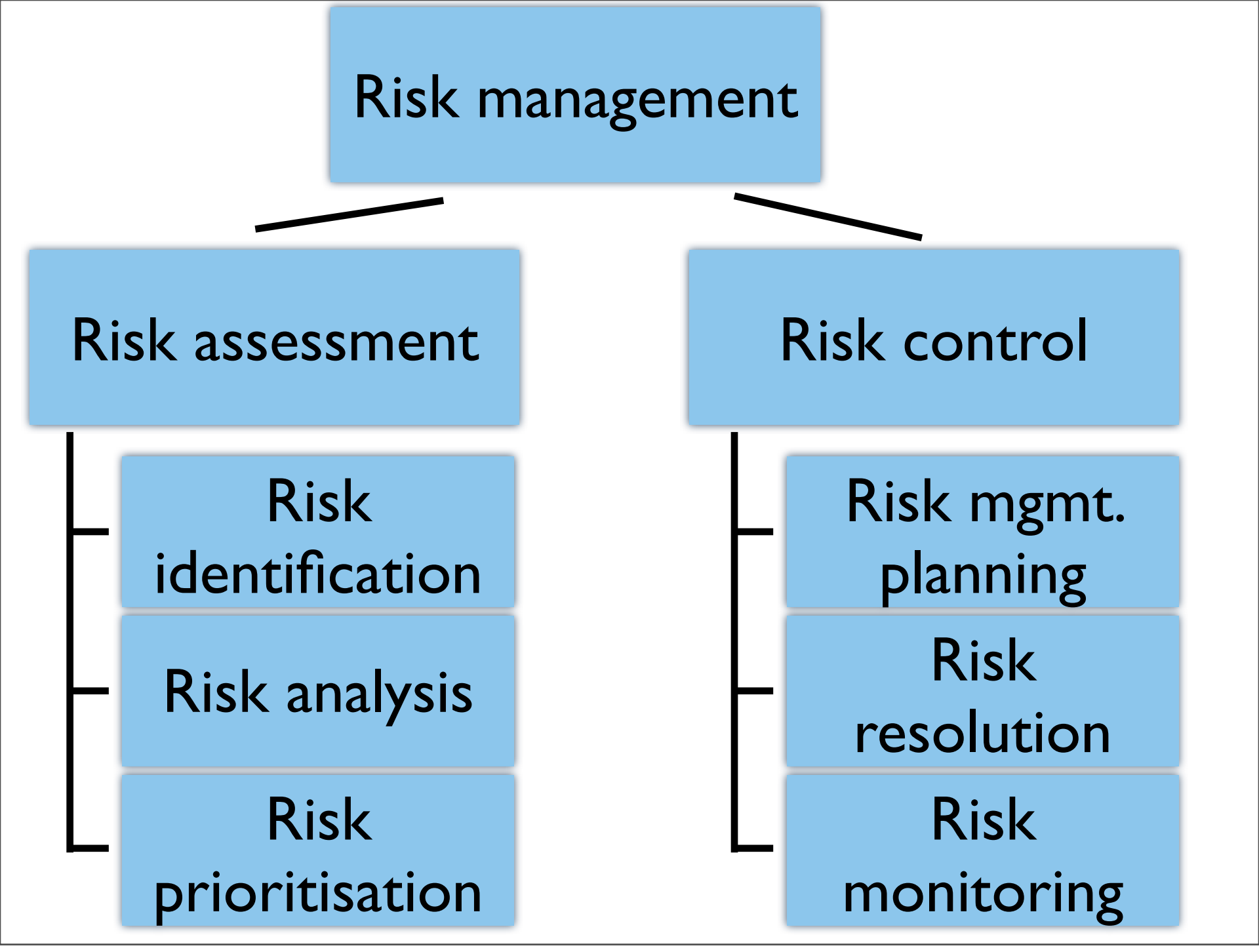
We are in the part "Quality Management".

Quality management methods

We will discuss a set of methods that are used in quality management.

What can go wrong in your project?

Risk management is a way to thing about potential problems in your project in a structured way.



It consists of the two parts risk assessment and risk control.

Risk identification

- Checklists
- Decision-driver analysis
- Assumption analysis
- Decomposition

Risk analysis

- Performance models
- Cost models
- Network analysis
- Decision analysis
- Quality-factor analysis

Risk prioritisation

- Risk exposure
- Risk leverage
- Compound risk reduction

Risk management planning

- Buying information
- Risk avoidance
- Risk transfer
- Risk reduction
- Risk element planning
- Risk plan integration

Risk resolution

- Prototypes
- Simulations
- Benchmarks
- Analyses
- Staffing

Risk monitoring

- Milestone tracking
- Top 10 tracking
- Risk reassessment
- Corrective action

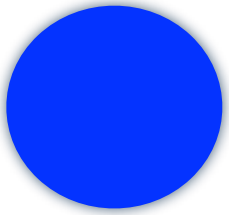
Top-3 risk item list for satellite experiment software

Risk item	Monthly ranking			Risk resolution progress
	This	Last	No. of month	
Replacing sensor-control software developer	1	4	2	Top replacement candidate unavailable
Target hardware delivery delays	2	5	2	Procurement procedural delays
Sensor data formats undefined	3	3	3	Action items to software, sensor teams; due next month

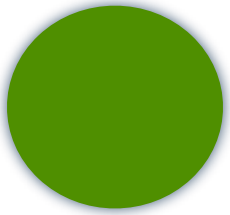
This is an example from Boehm (1991) of a Top-3 list of risks.

Group work: Expert + Puzzle

- Quality management methods
  - Statistical process control
  - Six sigma
  - Balanced scorecards
  - Quality function deployment
  - Seven basic tools of quality
- Each group works on one method
- Read provided material individually
- Discuss and design poster in group
- Then form group puzzles and teach the others
- Finally: reflection

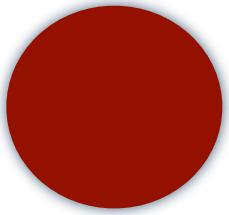


Statistical process control

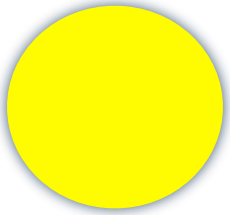


Six sigma

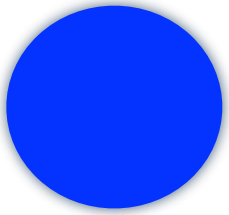
Balanced scorecards



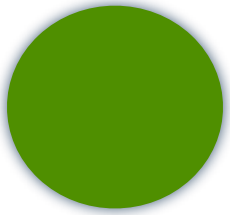
Quality function deployment



Seven basic tools

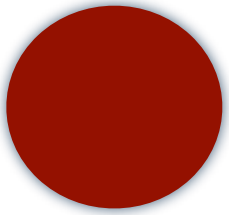


Statistical process control



Six sigma

Balanced scorecards



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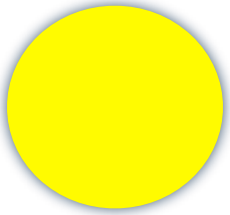

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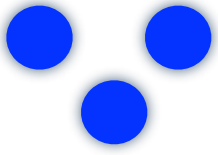
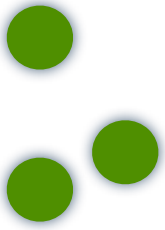
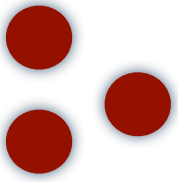


EG 1

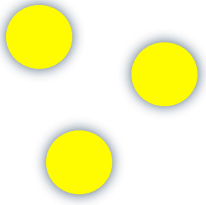


EG 2

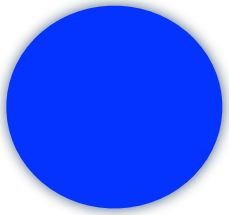
EG 3



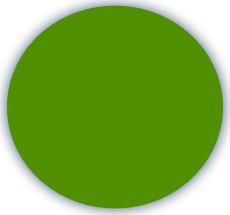
EG 4



EG 5

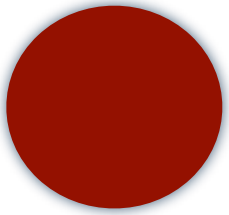


Statistical process control

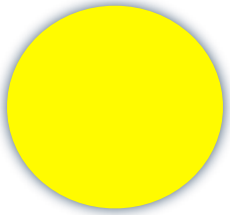


Six sigma

Balanced scorecards



Quality function deployment



Seven basic tools

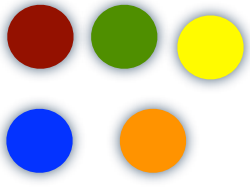
EG 1

EG 2

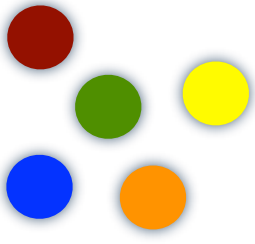
EG 3

EG 4

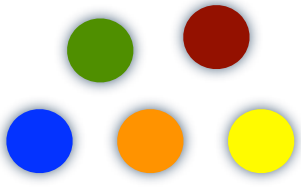
EG 5



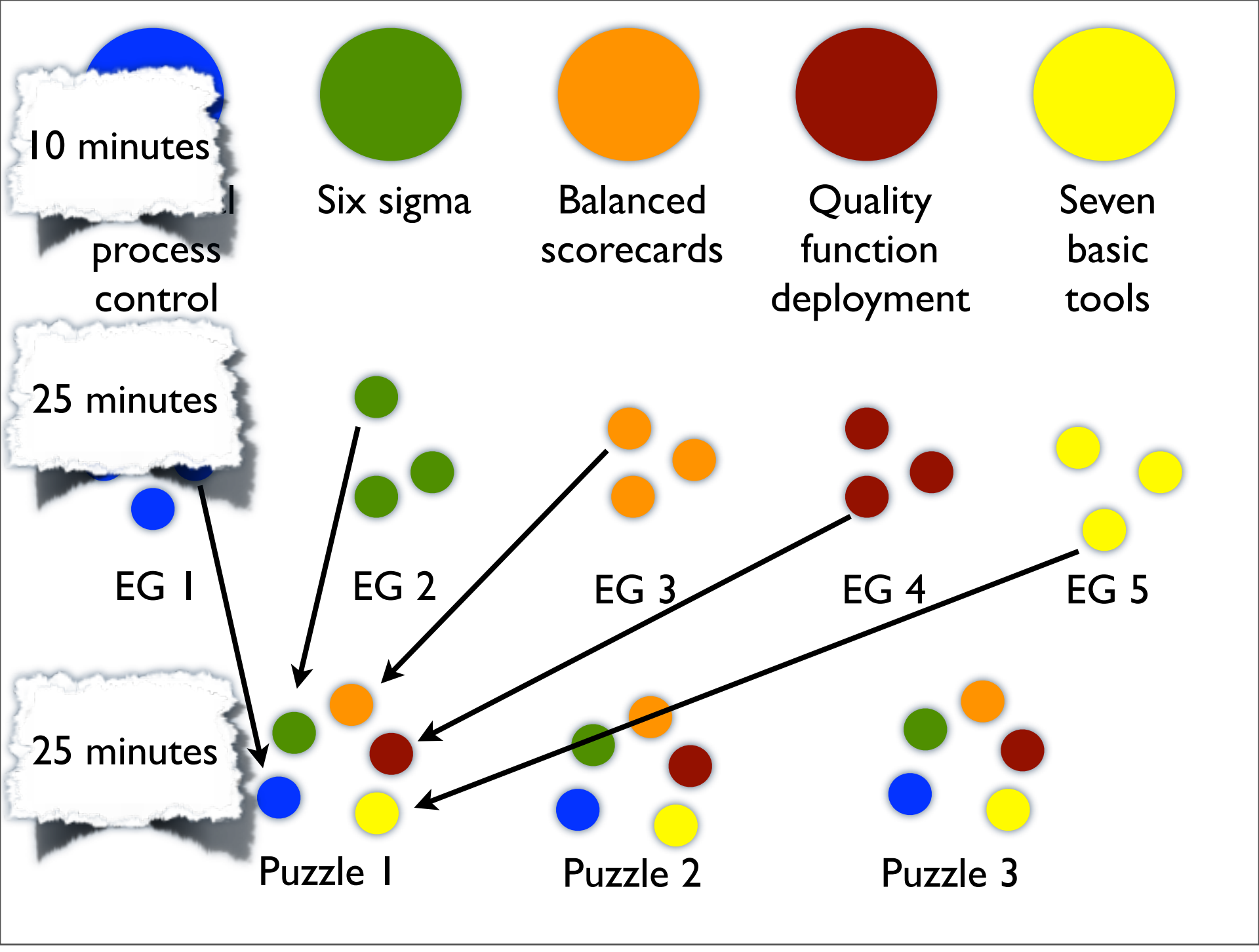
Puzzle 1



Puzzle 2



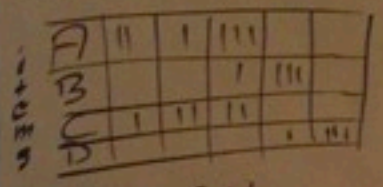
Puzzle 3


10 minutes
process control
Six sigma
Balanced scorecards
Quality function deployment
Seven basic tools
25 minutes
EG 1
EG 2
EG 3
EG 4
EG 5
25 minutes
Puzzle 1
Puzzle 2
Puzzle 3

Seven Basic Tools of Quality

- fixed set of graphical techniques
- "Basic": needs little formal training

Check Sheet

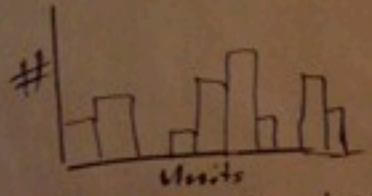


- gathering of data

Pareto Diagram

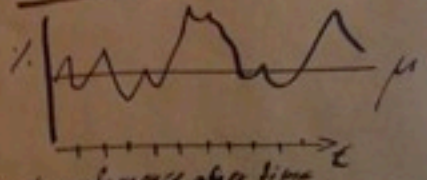
- frequency chart
- ordered by frequency
- identify the few causes that account for the majority of defects

Histogram



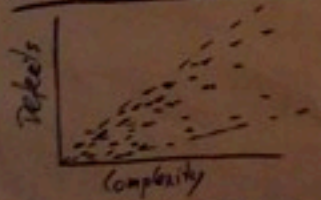
- show distribution characteristics tendency, grouping, shape, ...

Run chart



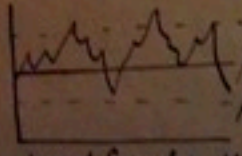
- track performance over time
- trend analysis

Scatter Diagram



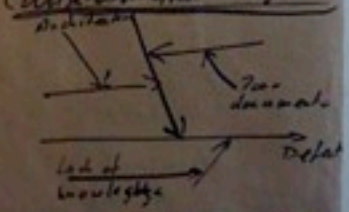
- cause-effect relationship

Control Chart

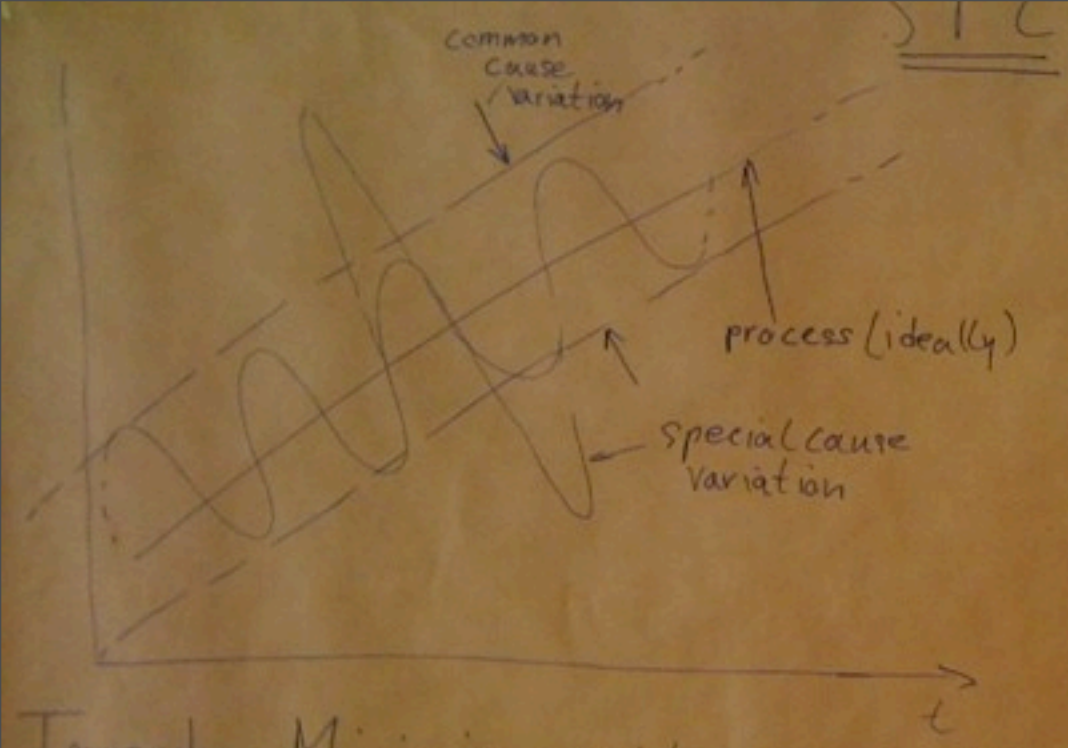


- advanced form of a run chart
- defines control limits

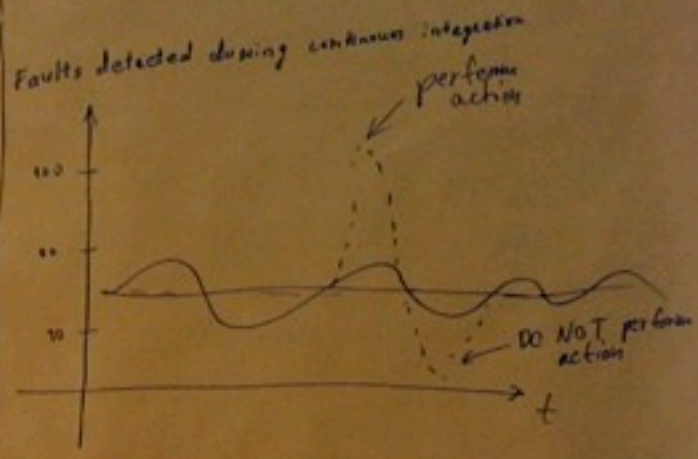
Cause-and-effect Diagram

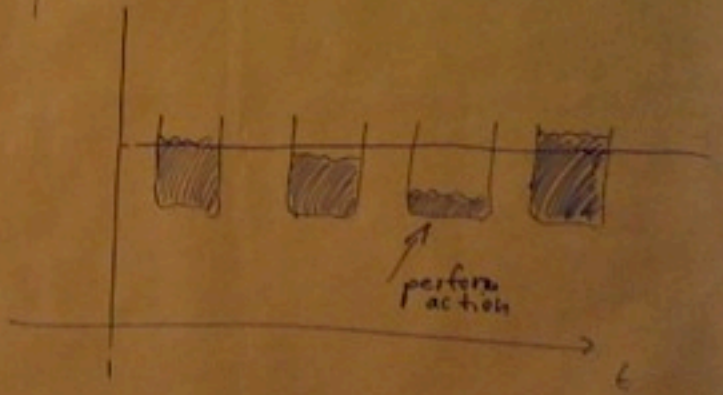


- show factors and effects



Example:





Target: Minimize special cause variation

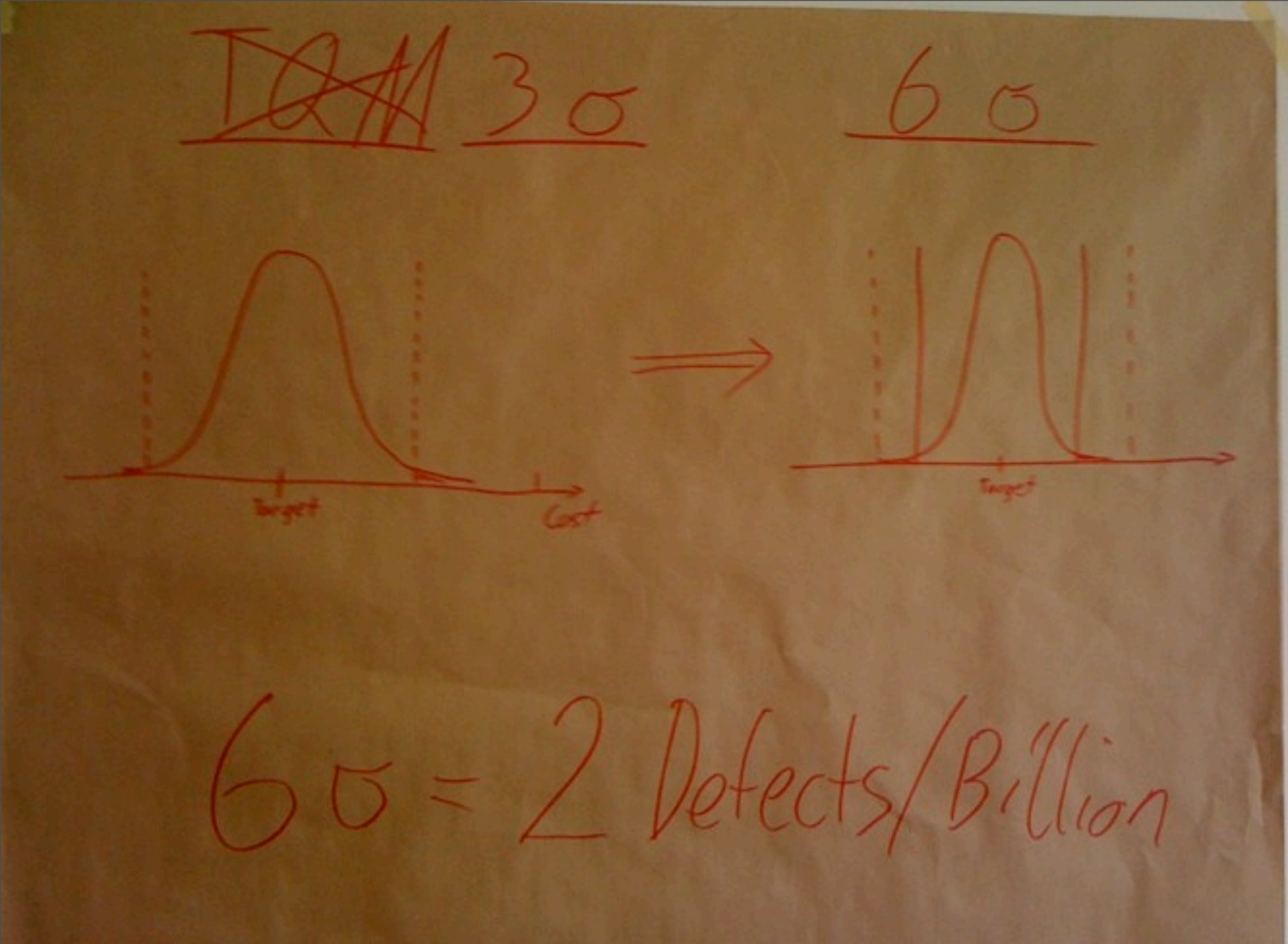
Plan:

① Understand process
- monitoring using control charts
- process capability analysis

② Understanding causes of variation
- Ishikawa diagrams
- designed experiments
- pareto charts

③ Eliminate sources of special causes
- Is the cause practically relevant?
- Eliminate if

Statistical Process Control (SPC)



Six Sigma

Balanced Score Card

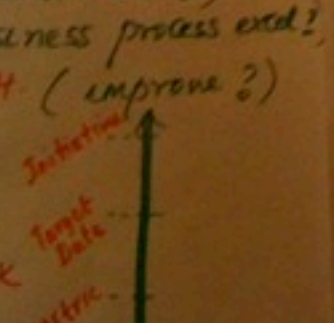
History :- 1990's
- Robert Kaplan & David Norton

Purpose :- Define metrics for mainly financial goals - Employees aware of firms key strategies

Definition :- Set of objectives, measures & targets to achieve a strategy

Contents [Prespectives of BSC] :-
* Finance (to stakeholders ?)
* Customer (to customers ?)
* Operational (business process excel ?)
* Learning & Growth (improve ?)

Tools :-
* Strategy maps
* Strategy matrix



Timeline : Initial results after 24 - 36 months

Critical factors :-
* Make strategy everyones job
* Make strategy a continual process
* Align organisation to strategy
* Link strategy to operational tasks

Common Pitfalls :-
* No accountability
* Failure to communicate
* Measures tied to compensation too soon
* Employees not empowered
* Measures do not focus on strategy

Quality Function Deployment

- Increase communication
  (Developer, customer, tester)
- Map Customer Requirements with Technical features
  - Nothing to do with each other? Discard!

Quality management methods