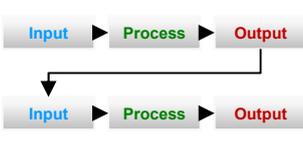


Define

Relevance of Topic: 36%

Suitable for: Six Sigma

Own contribution: 80%



Voice of Customer & Business

Requirements and Deviations

Severity of Problems of Outputs

Project-Charter	
Business Relevance	Problem
Scope/ Objectives	Experts Belt-Team Management

Input

Requirements and deviations

negative Influences on Problems

Process-Steps > Activities

Input, Output, Methods & Resources

negative Influences on Problems

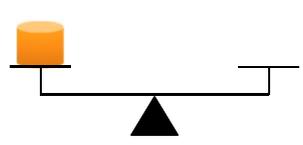
		Problems (Y)			
		Y1	Y2	Y3	Yn
Input (Xi)	Xi1		3		
	Xi2				1
	Xin			4	
Process-Steps (Xp)	Xp1	2			
	Xp2			5	
	Xpn		7		

		Operationalisation				Graphical Display			
		Y1	Y2	Y3	Yn	Y1	Y2	Y3	Yn
Problems (Y)	Y1								
	Y2								
	Yn								
Input (Xi)	Xi1								
	Xi2								
	Xin								
Process-Steps (Xp)	Xp1								
	Xp2								
	Xpn								

Risk: 14%

There is a/ no Difference in: the degree of: (Y) ... between: Levels of: (x)

Test: ANOVA



12

9 3

6

011011102200801
110114051978101
101501195801001
010100101010101
001110100110011

Application & Support:

- Red circle: Management (Sponsor, Accountable)
- Yellow circle: Belt (Black-Belt/ Green-Belt)
- Green circle: Experts

Analyse

Identify Project

- collect project topics
- evaluate topics
- prioritize topics
- select project

Define Project

- process and output
- problem
- effect
- solution ideas (if present)

SIPOC (Supplier-Input-Process-Output-Customer)

- structure process into the main process steps
- assign inputs and (intermediate) outputs
- assign supplier and customer

VoC/ VoB > CCR/ CBR > CtQ

- interview customer/ manager
- derive requirements for outputs and evaluate their deviations
- derive problems Y of the output and their severity

Project-Charter

- focus on critical problems Y
- specify their business relevance
- define scope and objectives
- build a team

Input-Analysis

- identify necessary inputs
- specify the requirements
- specify negative influences xi of inputs on the output/ problems Y

Process-Mapping & -Analysis

- map process steps into activities
- assign inputs and outputs
- specify methods & resources
- specify neg. influences xm/ xr

Cause & Effect-Matrix (C&E)

- evaluate impact strength of the negative influences of inputs xi, methods xr and resources xr on the outputs/ problems Y

Data-Collection-Plan

- operationalize influences xi, xm, xr and problems Y as measurands
- determine scale level
- determine conditions and procedure of measurement

Hypotheses

- automatically generated with:
 - type of hypothesis (Difference/ Relationship)
 - relevance of hypothesis (Risk)
 - appropriate statistical tests

Measurement-System-Analysis

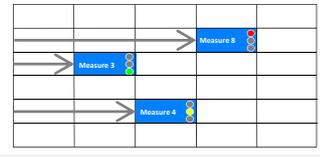
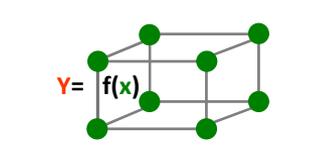
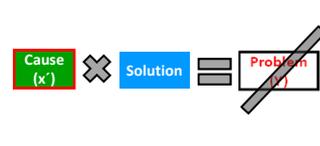
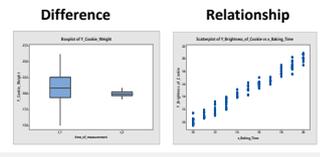
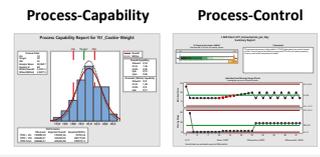
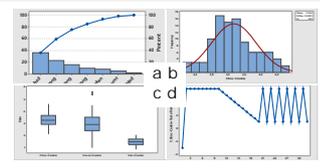
- check repeatability, reproducibility, stability and linearity of the measurement system
- Gage R&R

Collect Data

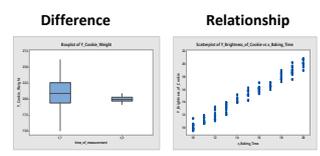
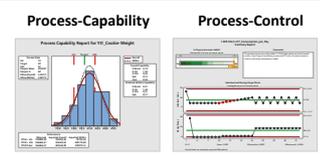
- collect existing data
- measure actual data
- according to Data-Collection-Plan

Focus:

- Y Problem
- X Influence/ Cause
- Z Effect
- S Solution
- P Project Management



Measure	Who?	What?	When?
Measure 3			
Measure 4			
Measure 5			



Start Continuous Improvement (CIP)	Continue checking Target Achievement	Continue checking Process Capability
Plan Process Monitoring and Out of Control Measures	Document Project and present Results	Define Standards for the new Process

Tools:

- sigmaGuide®
- Minitab®

Graphical Data Evaluation

- a) Pareto-Chart
- b) Histogram
- c) Boxplot
- d) Time Series Plot

Process-Capability/ -Control

- Yield%/ DPU/ DPMO
- Z.Bench (Sigma Level)/ cp/ cpk ...
- I-MR/ xbar-R/ xbar-S/ P-/ U-Chart as baseline of the process

Test Hypothesis

- Difference-Hypothesis: $Y_a \neq Y_b$
- Relationship-Hypothesis: $Y \neq f(x)$

Root-Cause-Analysis

- identify root-causes x' of the negative influences x on the problems Y

Solution-Ideas

- develop solutions to eliminate, circumvent or adjust parameter of the root-causes x'
- prioritize solutions

Design of Experiments (DoE)

- adjust significant/ relevant parameters x to optimize Y

Action-List

- specify solutions as measures (Who?/ What?/ until When?)

FMEA (Failure Mode and Effects Analysis)

- minimize risks of measures

Implementation

- decide on measures
- inform and motivate
- qualify (if necessary)
- implement measures

Process-Capability/ -Control

- Yield%/ DPU/ DPMO
- Z.Bench (Sigma Level)/ cp/ cpk ...
- I-MR/ xbar-R/ xbar-S/ P-/ U-Chart for the improved process

Test Hypothesis

- Difference-Hypothesis: $Y_a \neq Y_b$
- Relationship-Hypothesis: $Y \neq f(x)$

Sustainability, Documentation

- Process-Management-Plan
- Project-Story-Book

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Measure

Define: 36%, 80%
 Analyse: Y, Z, S
 Improve: Y, Z, P
 Control: Y, X, Z, S
 Measure: Y, X, Z, S
 Define: 14%
 Analyse: Y, X, Z, S
 Improve: Y, X, Z, S
 Control: Y, X, Z, S
 Measure: Y, X, Z, S

