

# Experiences using Root Cause Analysis for Product & Process Improvement

ESEPG conference 2002, April 9-12, Amsterdam

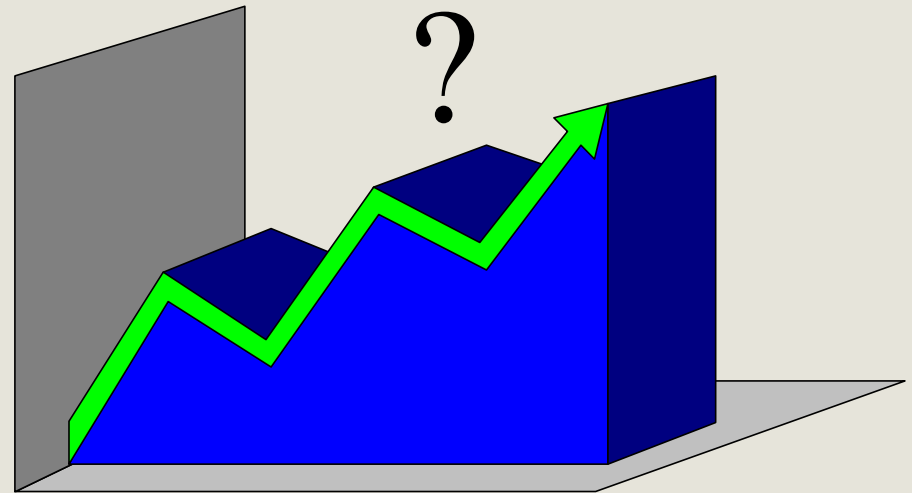
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# Overview

- Need for Root Cause Analysis
- Root Cause Analysis in Quality Systems
- Investigation of business results
- Conclusions, future direction



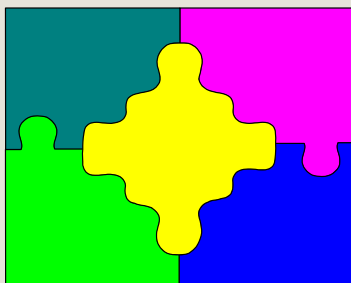
# Ericsson EuroLab Netherlands

- Worldwide Ericsson R&D company
- Wide product range:
  - Base stations, UMTS
  - Internet Applications
  - Intelligent Networks and Services, Announcements
  - Bluetooth, Business Cordless
- 950 employees, in the south (Rijen) and the east (Enschede, Emmen)

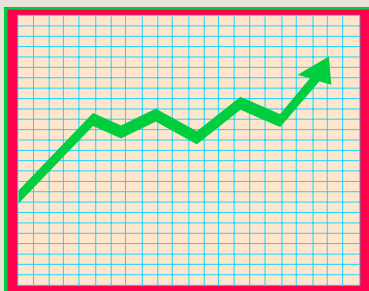
## **Root Cause Analysis is done at:**

- Local design centre: Development Projects
- Ericsson Corporate: Crash Commission for Outages

# Need for Root Cause Analysis



- Product Quality
  - In Service Performance
  - Customer Satisfaction



- Process Performance
  - Cost and lead-time reduction
  - Efficiency

**Combination of Product and Process focus**

## Customer Focus: Product Quality

### Issues like

- outages and downtime of telephone exchanges
- loss or duplication of Billing Data

are costly and highly undesired!



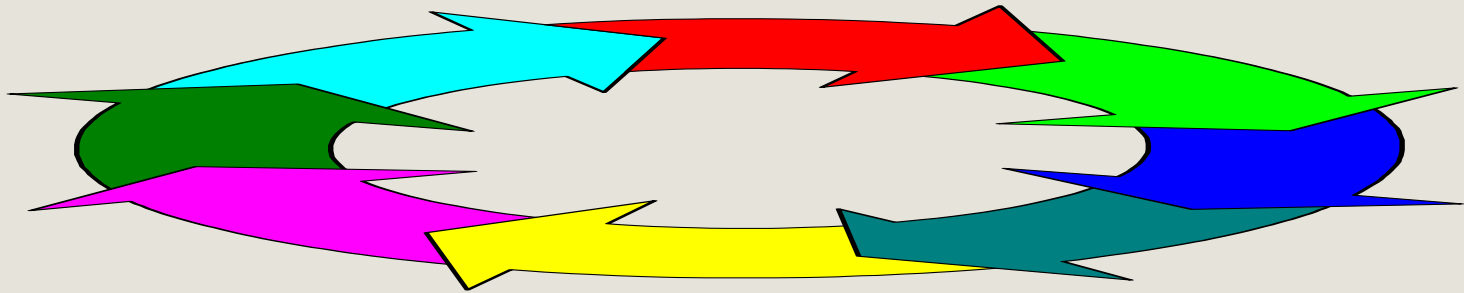
First criteria for improvement: A problem!



## Bottom Line Focus: Process Performance

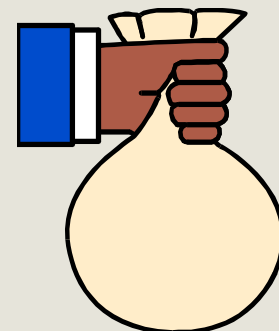
Budget overdrawn, insufficient quality, and missed deadlines, cannot be eliminated, but:

**An organisation should at least learn from its mistakes!  
(and don't make the same mistakes again...)**



## There is a Need for RCA

Product quality and process performance are both good reasons to prevent problems from happening again, at the customer and in projects.



**Best way to save money is to prevent problems!**

**Root Cause Analysis identifies basic/most effective actions**

# Root Cause Analysis in Quality Systems

Total Quality Management (TQM)



Capability Maturity Model - Integration (CMM-I)



International Telecommunication Union (ITU)



ISO 9001



## Can models help us?



# TQM



Overall philosophy to continually improve processes, activities, and operations to better meet customers expectations

Focus on achieving Customer Satisfaction

Key is management support, direction & commitment

RCA is performed:

- reactively on problems that have already occurred or
- proactively to anticipate on potential problems in the future (risk analysis).

# CMM-I



## Level 5 Process Area: Causal Analysis and Resolution (CAR)

- Select problems to investigate, based on quantitative criteria
- Analyse problem and determine the most basic causes
- Define corrective actions, and implement in the organisation
- Measure effect of improvements

RCA is done based on quantitative data (outliers), using available capability of an organisation to improve.

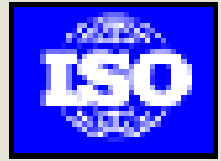


# ITU

## Recommendation E.436 Customer Affecting Incidents and Blocking Defects

- RCA is mandatory if failure occurs more than N times
- RCA is encouraged for failures that affect specific customers and are triggered by chronic customer complaints.
- RCA is also encouraged if process failures occur less than N times: could mask an underlying problem that could potentially have had a much larger impact.

Criteria when RCA is to be performed are to be specified in a company policy



# ISO 9001

Root Cause Analysis is part of corrective action process, done to improve the effectiveness and efficiency of the processes.

Multiple sources of information are used, including:

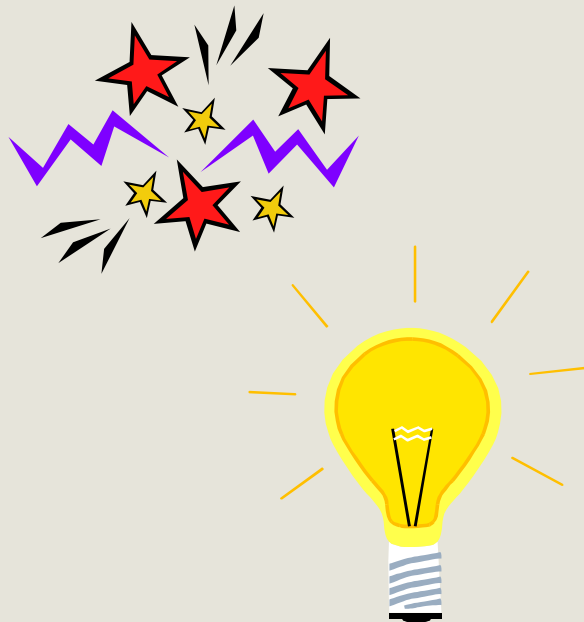
- Customer complaints
- Process measurements
- Audits and assessments

RCA is used to define improvement actions based on actual/potential problems

# Conclusions Quality Systems

Root Cause Analysis is a quality management approach, and as a set of techniques for finding basic causes of problems and defining actions to prevent them from happening again.

- Either pro-active or reactive
- Best if based on quantitative data



# Investigation of RCA Business Results

By student of Industrial Engineering and Management of the University of Twente, Enschede

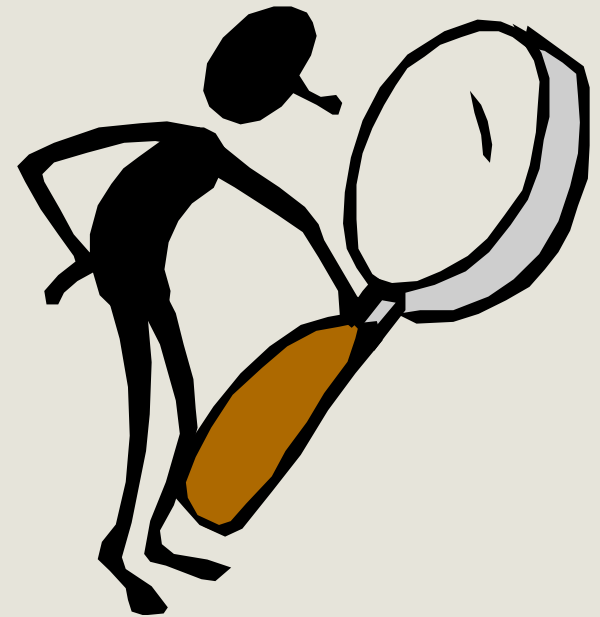
## Research approach:

RCA according to literature

Investigate how RCA has contributed to goals

Look for potential future application of RCA

Recommendations for further implementation of RCA

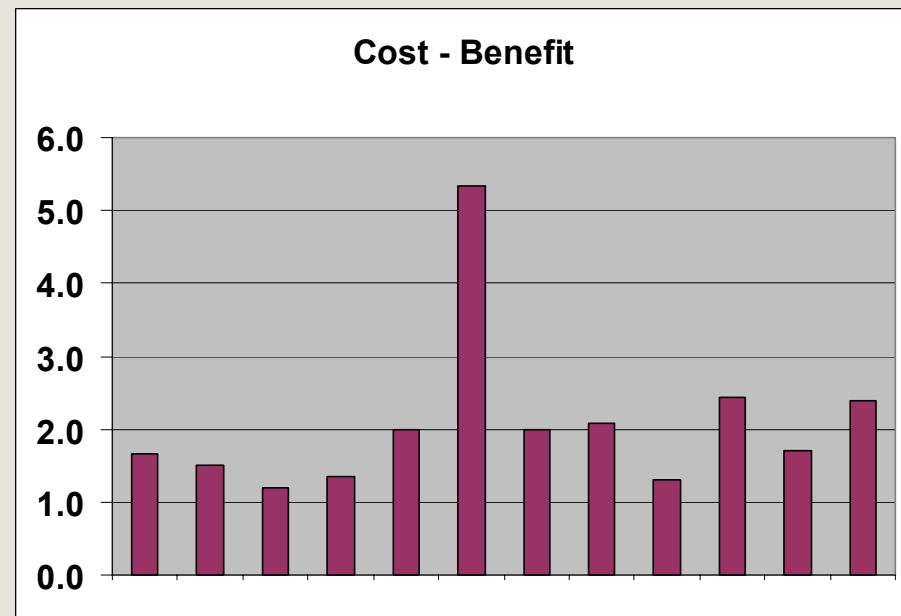
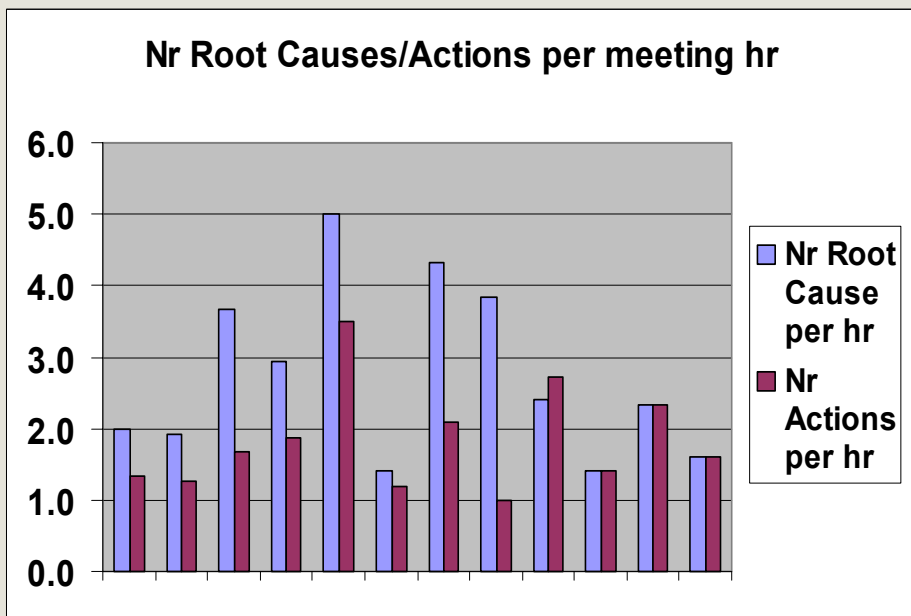


# Actions & Cost/Benefit

12 RCA sessions done in a year within one unit

Resulted: 190 Root Causes and 135 Preventive Actions

60% of actions done, average cost/benefit of 1:2

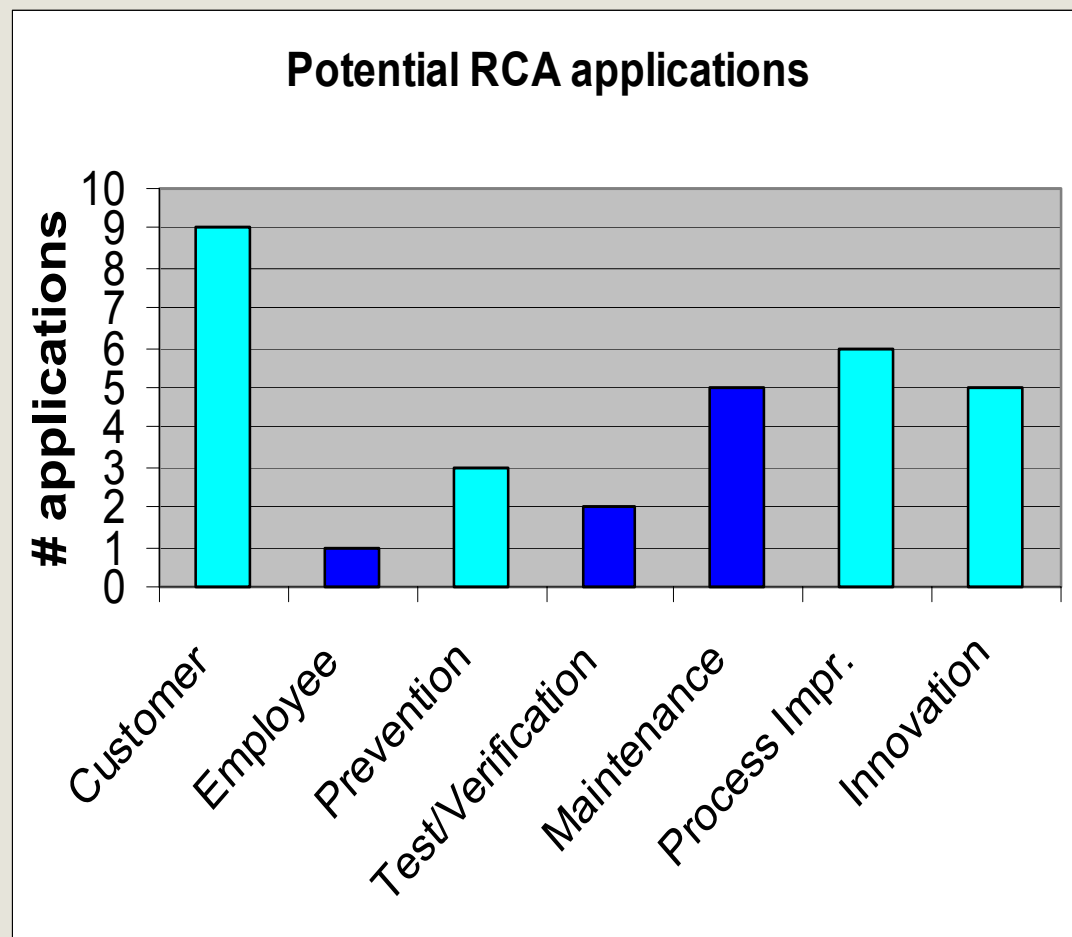


# Future Potential of RCA

Potential for improving customer satisfaction

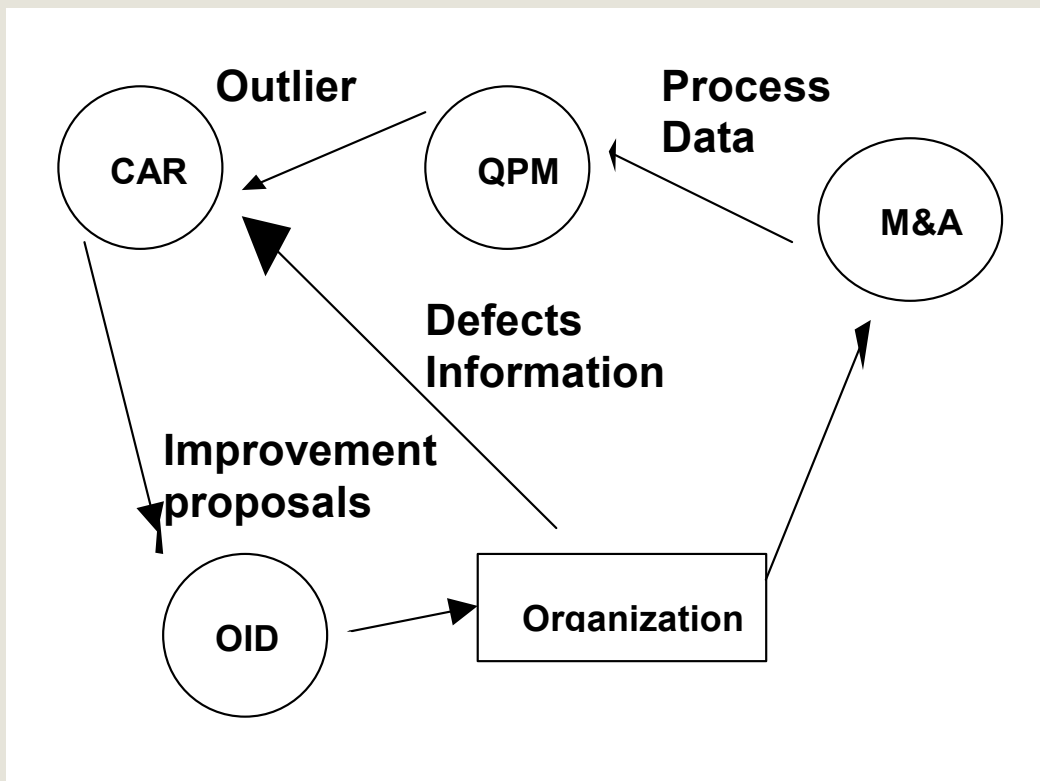
Preventing problems is solving them, but with process improvement

RCA as a means to come to product innovations





# CMMI applied: Causal Analysis & Resolution



## Lessons Learned:

- CAR is a support area: Guidance on application needed
- Description of CAR in CMMI has been usable
- Possible to implement CAR in a non level 5 organisation

## Recommendations Investigation

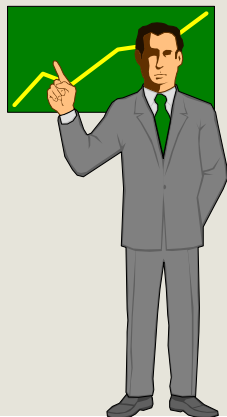
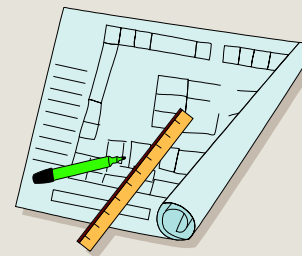
RCA processes are **sufficiently defined** at Ericsson

Insufficient institutionalisation of RCA, a **policy** is needed

RCA has significant positively contributed to business goals,  
there is a good **Business Case** to continue them

## Where to Go From Here

- Solid frameworks exist for RCA
  - CMMI Causal Analysis and Resolution
  - TQM, ISO & ITU
- RCA contributes towards business goals
  - Cost and lead-time reduction
  - Potential for customer satisfaction & innovation



**Policy is essential!**

Commitment and support

Budget for countermeasure actions

Assure that RCA is applied effectively