

Reducing maintenance-related waste



Marcus Bengtsson & Antti Salonen
Carina Söderlund
Koteshwar Chirumalla
Farzaneh Ahmadzadeh
Ali Rastegari





How much does maintenance cost?

- Maintenance budgets in Europe: 1500 billion €
- Maintenance costs in Sweden: 20 billion €

Are all this money well spent?

About 1/3 is waste!





Reducing maintenance related waste

- A definition of Lean Maintenance:

“...proactive maintenance operation employing planned and scheduled maintenance activities through total productive maintenance (TPM) practices using maintenance centered through application of reliability centered maintenance decision logic and practiced by employee teams using the 5S process, autonomous maintenance, and technician work. They are committed to the committed use of their work center managed maintenance system (EAM) system. They are stocked, lean maintenance/MRO storeroom that processes and materials on a just-in-time (JIT) basis and backed by maintenance and reliability engineering group that performs root cause failure analysis (RCFA), failed part analysis, maintenance procedure effectiveness analysis, predictive maintenance (PdM) analysis, and trending and analysis of condition monitoring results.”

Is this really lean?



The core...

“It is the task of the maintenance function to support the production process with adequate levels of availability, reliability and operability at an acceptable cost” (Coetzee, 2004, p.24)

Efficiency:

The utilization of the maintenance resources

Effectiveness:

The effect of the delivered services



Maintenance related waste

We performed workshops with maintenance managers and engineers to identify sources of maintenance related waste.

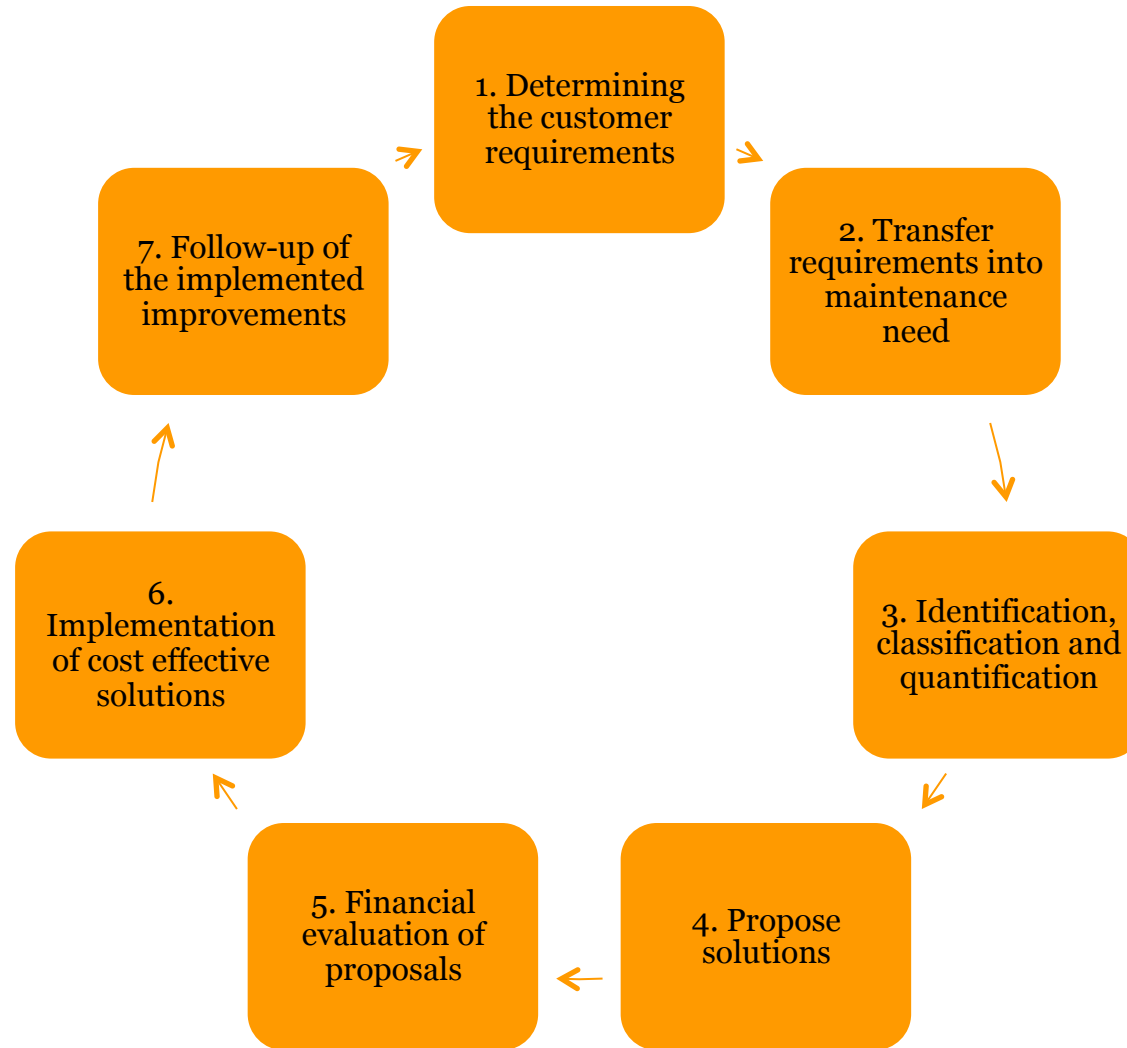
The following were the largest identified sources:

- Lack of knowledge and competence
- Poor spareparts handling
- Poor preventive maintenance
- Poor planning and preparation
- Poor use of facts/data/systems support
- Poor organizational structure
- Poor acquisition processes





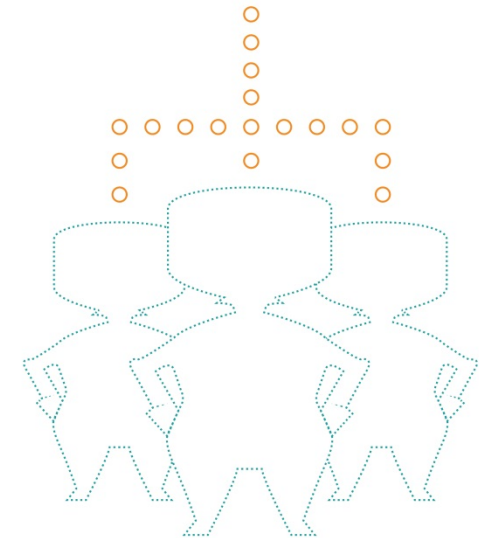
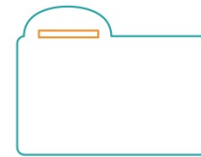
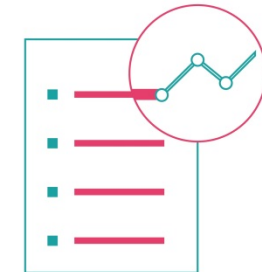
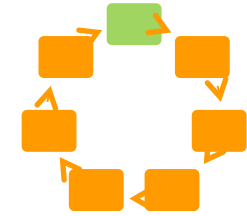
Handbook – work process





1. Determining the customer requirements

”Why is it that organisations over-simplify maintenance requirements to fit in with organizational goals rather than base it on the needs of the assets?” (Leverly, 1998)





An example:

An automotive production facility.
Machining, 350 machines

Production demand:
Max stop time for an un-planned stop: 4 h

Estimated cost for compliance (spareparts):
385 million SEK!



Requirements based on need

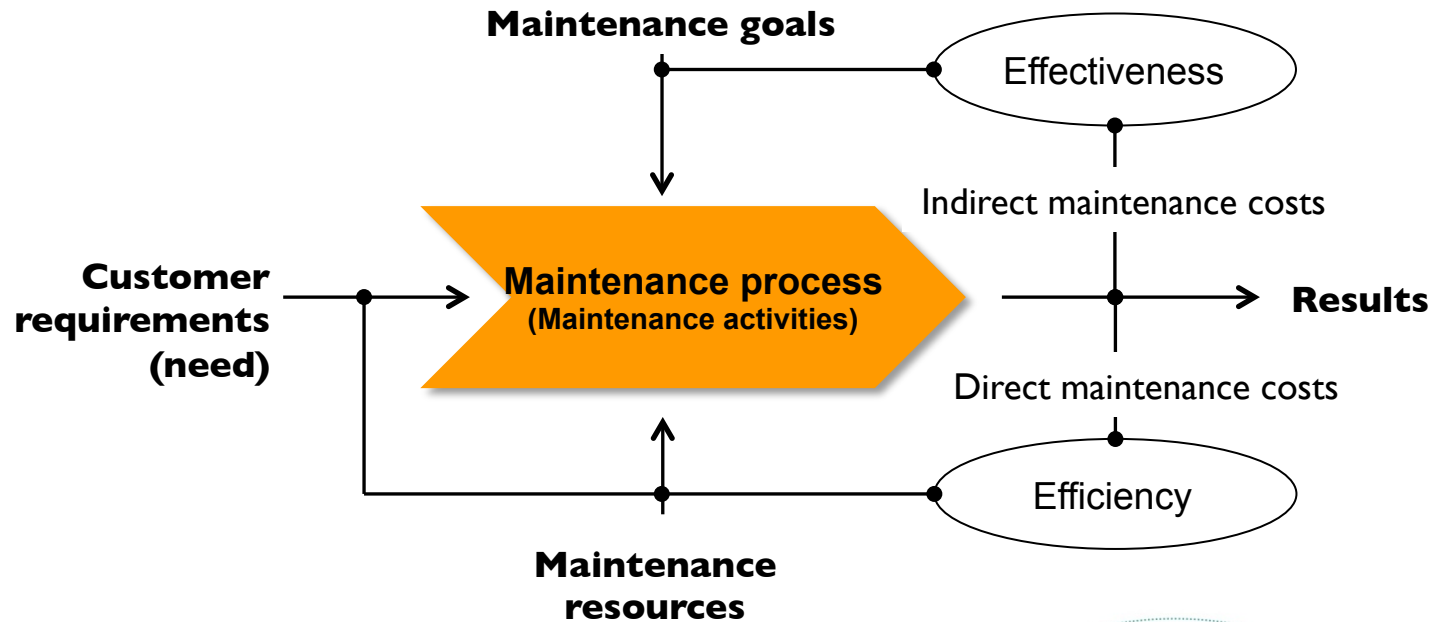
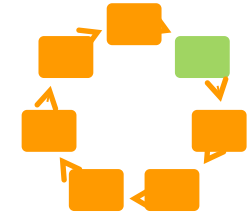
- Go from:
 - "Nice to have" (general formulations)
 - to
 - "Need to have" (differentiated requirements)

What do we really need?





2. Transfer requirements into maintenance need



- Make sure not to over maintain or under maintain



Illustration: Adrian Wirén



Maintenance activities based on need

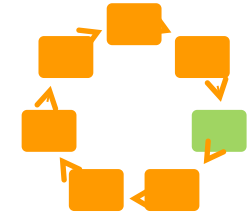
- Go from:
 - "Possible to do"
 - to
 - "Need to do"

What do we really need?





3. Identification, classification and quantification



- Value adding activities
- Necessary, non value adding
- Waste



- Quantify in various dimensions:
 - Frequency (How often does it occur?)
 - Severeness (How serious is it?)
 - Cost (the financial impact?)

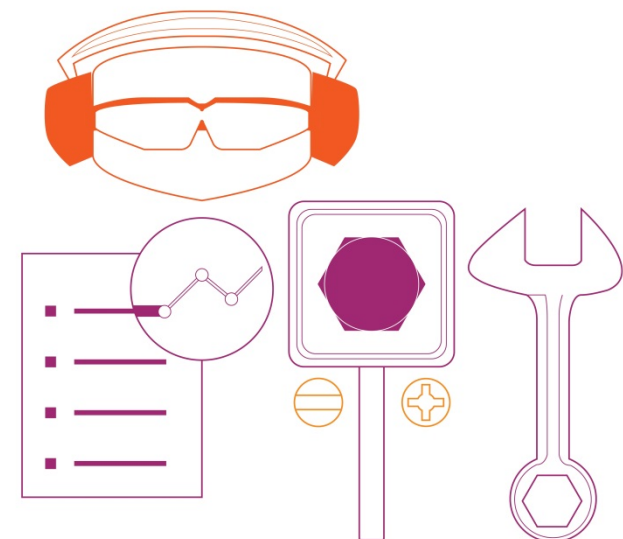
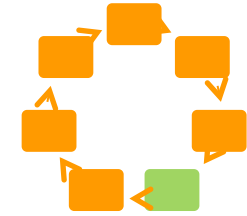


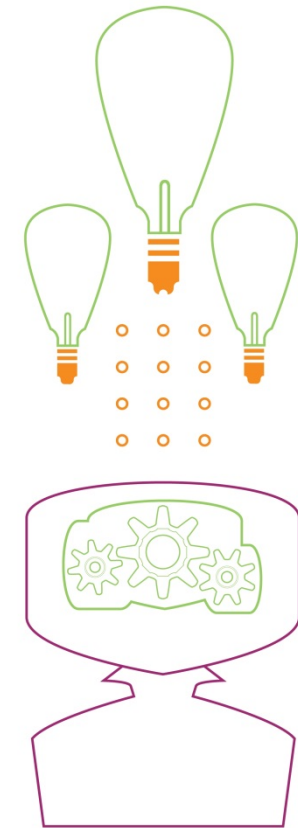
Illustration: Adrian Wirén



4. Propose solutions



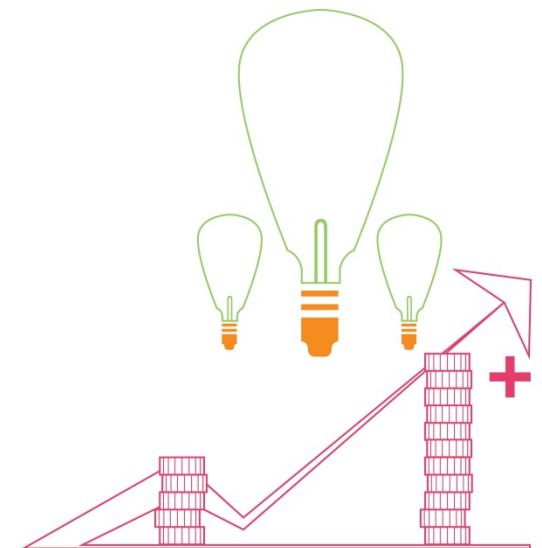
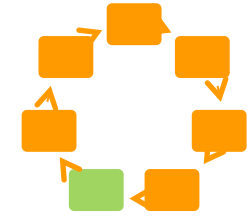
- *”Sometimes there are continuous corrections, rather than continuous improvements” (Freely translated from Per-Erik Johansson, DynaMate IS)*
- Root Cause Analysis!
- What creates the maintenance related waste?
- Cross functional with focus on the value chain





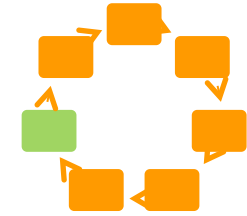
5. Financial evaluation of proposals

- Business case, pay-back time
- Trade-offs





6. Implementation of cost effective solutions



- Planning and scheduling
- Disturb the value chain as little as possible
- Planning of activities – What shall be done, how shall it be done and how long time will it take
- Scheduling the activities – allocating resources (manpower and supplies) and when to perform the activity

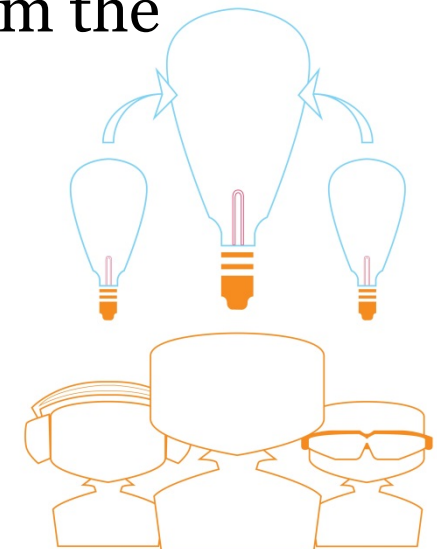
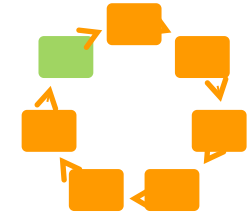


Illustration: Adrian Wirén



7. Follow-up of the implemented improvements



- Follow-up of Performance measures
 - Activity based KPIs
 - Result related KPIs
- Document – spreading the results
- Standardize

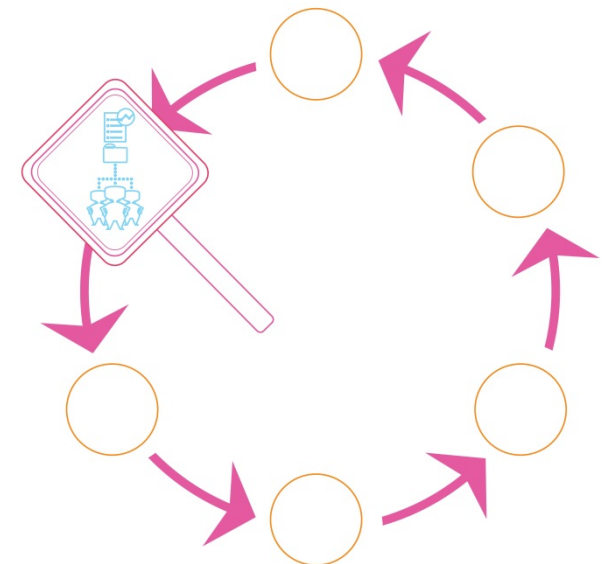


Illustration: Adrian Wirén