Implementation of AMP
Implementation of Asset Management Processes

Mobile solution for effective Asset Management
Implementation, Savings and Possibilities
The national transport agencies jointly formulate proposals for the National Transport Plan (NTP).
Organizational structure

- Director General
  - Planning and Development
  - Market and Communication
  - Management Control
  - Organisation and HR
  - Safety and Quality
  - Technology
  - Administration

- Norw. Railway Museum
- Norw. Railway School

- Infrastructure Management
  - Operating and Maintaining rail infrastructure

- Traffic Management
  - Operational Traffic management and Allocating track capacity

- Infrastructure Construction
  - Planning, Designing and Constructing rail infrastructure
4000 employes
Numbers 2013

The network
- 4169 km track
- 241 km dobbel track (5.78%)
- 2764 km electrified
- 696 tunnels
- 2506 bridges
- 4500 level crossings
- 12000 signals
- 73000 catenary masts
- 358 stations

Transport volume
- 59 mill passangeres
- 22 mill tonn freight
Mobile solution for effective AM

Products and phases

2001
- Revision of technical regulations
- Establishing maintenance strategy, maintenance handbook & procedures
- Developing of decision support tools
- Generic RCM-analysis

2004
- Implementing BaneData (AMS)
  - Connecting Generic Work-orders to objects
  - Updating objects
  - Training and supervision
  - User adjustments

2008
- Mobile solution 80% implemented (Syclo)
Generating work orders in Maximo

Based on generic RCM

400,000 PM's was generated in one operation

Generating work orders based on generic routines and information from the PM-module

Mobile solution for effective AM
Mobile solution for effective AM

The day to day Maintenance process

BaneData Maximo

MaxPlan

Mobile Unit PDA

REPORT PERFORMED PM
REPORT CM
REPORT Acute Corrective Maintenance (ACM)

DOWNLOAD PM-ORDER
DOWNLOAD CM-ORDER

PREVENTIVE MAINTENANCE
CORRECTIVE MAINTENANCE
PM-projects

PLANING NEXT YEAR
preventive maint.
corrective maint.
PM-projects

The day to day Maintenance process
## Work Order Status in the day to day Maintenance Process

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPLAN</td>
<td>PM waiting to be planned</td>
</tr>
<tr>
<td>KVPLAN</td>
<td>CM waiting to be planned</td>
</tr>
<tr>
<td>REG</td>
<td>CM registered</td>
</tr>
<tr>
<td>OVERFØRT</td>
<td>Work Order transfered to BaneData</td>
</tr>
<tr>
<td>PLANL</td>
<td>Work Order available on Mobile Unit</td>
</tr>
<tr>
<td>MOTATT</td>
<td>Received Work Order on Mobile Unit</td>
</tr>
<tr>
<td>STARTET</td>
<td>Work Order started on Mobile Unit</td>
</tr>
<tr>
<td>VENT</td>
<td>Waiting to be finalized</td>
</tr>
<tr>
<td>SLUTTF</td>
<td>Finalized</td>
</tr>
<tr>
<td>LUKKET</td>
<td>Approved finished</td>
</tr>
</tbody>
</table>
Mobile solution for effective AM

The day to day Maintenance process

- PLANING NEXT YEAR
  Preventive Maint. Corrective Maint.
  PM-projects

- OWNER

BaneData Maximo

- PM
- CM

MaxPlan

- ORDER
- PLAN

- SUPPLIER

DOWNLOAD PM-ORDER
DOWNLOAD CM-ORDER

- REPORT PERFORMED PM
- REPORT CM
- REPORT Acute Corrective Maintenance (ACM)

Mobile Unit PDA

RMS work

1 year
1. Trackchief prioritize, besides operator and update BaneData

2. Manager in contractor organisation beside PDA-user

3. Manager in contractor organisation perform detail planning

4. Manager in contractor organisation change status to PLANNED

5. PDA-user download dedicated PM-tasks
Mobile solution for effective AM

The day to day Maintenance process

BaneData
Maxim

MaxPlan

PM
CM

UPLOAD

PM projects

DOWNLOAD PM-ORDER
DOWNLOAD CM-ORDER

REPORT PERFORMED PM
REPORT CM
REPORT Acute Corrective Maintenance (ACM)

Mobile Unit PDA
Mobile solution for effective AM

Network, servers and tablets

Mobile solution
- Password
- Encrypted info
- Communication via Agentry

Cellular network

Agentry server

Outside the firewall.

Network, servers and tablets

PDA

Smart phone

iPhone

Tablets
Mobile solution for effective AM

Log-in interphase on PDA

PM-reporting on PDA

From a similar interphase we also update infrastructure information.
Mobile solution for effective AM

PM-reporting on PDA – Example Turnout

Status: STARTED
WO started on Mobile Unit

12 month Control of turnout

Location Gvarv station

The specific turnout (unique nr.)

Failure: None

X: External Contractor

Date and name

Generic Work Order
**Mobile solution for effective AM**

PM-reporting on PDA

<table>
<thead>
<tr>
<th>Measure gauge on tongue</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PM-task descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>WO #36813971</td>
</tr>
<tr>
<td>Utført</td>
</tr>
<tr>
<td>5000</td>
</tr>
<tr>
<td>5010</td>
</tr>
<tr>
<td>5020</td>
</tr>
<tr>
<td>5030</td>
</tr>
<tr>
<td>5040</td>
</tr>
<tr>
<td>5050</td>
</tr>
<tr>
<td>5060</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punkt: A10 - A10</td>
</tr>
<tr>
<td>Forrige måling: 1443</td>
</tr>
<tr>
<td>Forrige dato: 10.11.08 11:25:15</td>
</tr>
<tr>
<td>Grenser:</td>
</tr>
<tr>
<td>Upper limit</td>
</tr>
<tr>
<td>Lower limit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Warning</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the measure is out of limit the system will automatically produce a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrective MaintenanceWO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>This measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the measure is out of limit the system will automatically produce a Corrective MaintenanceWO</td>
</tr>
</tbody>
</table>
Mobile solution for effective AM

CM-reporting on Ipad

Priority 1: ASAP

AKV

Problem description

Failure class

Problem code

AKV - Akutt korrektivt vedlikehold

FVK - Ekstra visitasjon

UKV - Planlagt korrektivt vedlikehold
Mobile solution for effective AM

Welding form and Animal colissions

Animal colissions

Welding form

Contractor

Responsible for the welding

Temp rail
Mobile solution for effective AM

Animal collision form

Elk collision
Mobile solution for effective AM

Benefits using Syclo Mobile solution
- Documentation without paper
- All necessary information available from the track
- Always updated maintenance information in BaneData (PM and CM)
- Better data quality/information
- Several other users may benefit from the data collected and stored

Without Mobile solution
- Several steps
- Late registrations
- Uncertain data quality
- Inconsistent data

Without Mobile solution

Create Work Order (WO)

Distribute WO

Prioritise WO

Perform Work

Allocate WO

Write out WO

Return to office

Update lists

Arrange lists

Go through lists

Data available in database
**Total antall brukere eller teknikkere** | 5
---|---
De har brukt 8 mann i fjor, men sier at det er 5 årsverk

**Årlig antall Arbeidsdager** | 220
---|---
**Antall Arbeidsdager**

**Gj. snitts kost for brukere** | kr 380 t
---|---
**Intern kost/men drift skal brukes**

**Total kost for resusene** | kr 380 t
---|---
**Det de betaler til drift**

**Arbeidsordre pr. dag for teknikkere** | 16,4
---|---
220 dager og ca 27.000 AO'er

**Arbeidsordre FVK** | 17 254
---|---
Data fra BD

**Arbeidsordre AKV** | 126
---|---
Data fra BD

**Arbeidsordre UKV** | 633
---|---
Data fra BD

**Arbeidsordre FVP** | Data fra BD

**Ca Antall AO'er pr. år** | 18 013
---|---
Antall AO'er er nr. 6-

**Estimert tid for Arbeid**

<table>
<thead>
<tr>
<th>Estimat tid for Arbeid</th>
<th>148 Min</th>
<th>24 Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papir</td>
<td>16,4 Min</td>
<td>16,4 Min</td>
</tr>
<tr>
<td>Innsats med Mobil PDA</td>
<td>0,0 Min</td>
<td>1,5 Min</td>
</tr>
<tr>
<td>Manuel registrering på papir AO'er gjennom skiftet</td>
<td>16,4 Min</td>
<td>16,4 Min</td>
</tr>
<tr>
<td>Reisetid</td>
<td>15,0 Min</td>
<td>0,0 Min</td>
</tr>
<tr>
<td>Dagens gjennomgang av AO'ene (Legge inn i BaneData)</td>
<td>81,9 Min</td>
<td>1,5 Min</td>
</tr>
<tr>
<td>Total Tid pr. dag</td>
<td>148 Min</td>
<td>24 Min</td>
</tr>
</tbody>
</table>

**Kost pr. time**

<table>
<thead>
<tr>
<th>Kost pr. time</th>
<th>kr/t 938,93</th>
<th>kr/t 154,38</th>
</tr>
</thead>
</table>

**Kost pr. time for hele Arbeidsstyrken**

<table>
<thead>
<tr>
<th>Kost pr. time for hele Arbeidsstyrken</th>
<th>kr/t 4 694,67</th>
<th>kr/t 771,89</th>
</tr>
</thead>
</table>

**Kost pr. år for hele Arbeidsstyrken**

<table>
<thead>
<tr>
<th>Kost pr. år for hele Arbeidsstyrken</th>
<th>kr/år 1 032 827,33</th>
<th>kr/år 169 815,67</th>
</tr>
</thead>
</table>

**Årlige kostnader ved bruk av Mobilt BaneData**

<table>
<thead>
<tr>
<th>Årlige kostnader ved bruk av Mobilt BaneData</th>
<th>kr 169 815,67</th>
</tr>
</thead>
</table>

**Årlige kostnader ved manuell registrering i etterkant**

<table>
<thead>
<tr>
<th>Årlige kostnader ved manuell registrering i etterkant</th>
<th>kr 1 032 827,33</th>
</tr>
</thead>
</table>

**Total årlige besparelser**

<table>
<thead>
<tr>
<th>Total årlige besparelser</th>
<th>kr 863 011,67</th>
</tr>
</thead>
</table>

Vurderingen er basert på 4 årsverk, pluss 1 årsverk i tillegg for å inkludere SPV = 5årsverk og totalt ca 27.000 AO'ere. Totalt var de 16 mann, hvorav en admin resten var strekningsansvarlige som inkluderte planlegging, Byggeledelse, Nabokontakt, pluss enkelt visitesjoner. Dvs ca 8 mann utførende kontroll ca 25 AO'ere pr. dag.
### Number of users - Mobile BaneData

#### External users

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of users</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>4</td>
</tr>
<tr>
<td>2009</td>
<td>24</td>
</tr>
<tr>
<td>2010</td>
<td>37</td>
</tr>
<tr>
<td>2011</td>
<td>37</td>
</tr>
<tr>
<td>2012</td>
<td>37</td>
</tr>
</tbody>
</table>

#### Internal users

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of users</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1</td>
</tr>
<tr>
<td>2005</td>
<td>4</td>
</tr>
<tr>
<td>2006</td>
<td>76</td>
</tr>
<tr>
<td>2007</td>
<td>333</td>
</tr>
<tr>
<td>2008</td>
<td>479</td>
</tr>
<tr>
<td>2009</td>
<td>506</td>
</tr>
<tr>
<td>2010</td>
<td>546</td>
</tr>
<tr>
<td>2011</td>
<td>768</td>
</tr>
<tr>
<td>2012</td>
<td>850</td>
</tr>
</tbody>
</table>

---

**Total users of BaneData 2013: 1022**

The chart shows the growth in the number of users of the Mobile BaneData solution from 2004 to 2012. The solution is designed for effective AM (asset management). The total number of users in 2013 is 1022, with a significant increase over the years.**
Mobile solution for effective AM

Reported PM and CM - Mobile BaneData

Preventive maintenance

Corrective maintenance

Mobile solution for effective AM
Increase mobility and improve operative planning/logistics
- Possible to download condition/failure data on Mobil Units to perform analysis
- Be able to link photos and video from Mobile Unit to workorder/equipment
- Manage Mobile units from support unit

Improve the quality in BaneData

Implement traceability for rotating components
Overhaul components put back in infrastructure

Revision of predefined failure codes fit to failure mode used in the RCM-analysis
Mobile solution for effective AM

Leadership

Tools, Systems and procedures

Competent people

Culture
Thank you for your attention!