Risikoprofil/hazardlog og sammenhæng med sikkerhedsledelsessystemet – Hvordan kan det gøres i praksis?
Presentation by Nicola De Negri, Metro Service / Copenhagen Metro – 31 October 2013 (nde@metroservice.dk)
Content

1. Copenhagen Metro and Metro Service
2. Preliminary Hazard Identification and Analysis
3. Central Hazard Log and Operational Hazard Log
4. Configuration Management and Operational Hazard Log
5. Incident Management System and Operational Hazard Log
6. Conclusions
1 - The Copenhagen Metro

- Opened October 19th 2002
- 21 km with two lines
- 22 stations
  - 9 underground
  - 13 aboveground
- 34 trains
- 54 millions passengers in 2012
- 24 hour service
1 - Metro Service

- The Copenhagen Metro is operated by a joint venture of ATM and Ansaldo STS

- 280 employees work in maintenance, operations, customer service, communication/marketing and administration

- Providing services to other metro around the World (Brescia, Milano, Rome, Riyadh, Honolulu)
1 - Ownership

- **International Metro Service** (IMS)
  - 100% owned by **Metro Service**
  - 51% owned by **ATM** (Azienda Trasporti Milanesi S.p.A.)
  - 49% owned by **Ansaldo STS**

- **Milan**
  - **ATM**
  - **IMS**

- **Genoa**
  - **Ansaldo STS**

- **Copenhagen**
  - **Metro Service**
1 - Contract set-up

Metroselskabet

Contract: Operation & Maintenance - Lines M1 & M2

AnsaldoSTS

Subcontract: Operation & Maintenance - Lines M1 & M2 (back to back)

Metro Service
Content

1. Copenhagen Metro and Metro Service
2. Preliminary Hazard and Identification Analysis
3. Central Hazard Log and Operational Hazard Log
4. Configuration Management and Operational Hazard Log
5. Incident Management System and Operational Hazard Log
6. Conclusions
2 – Preliminary Hazard Identification and Analysis

An early comprehensive and systematic identification of hazard was performed at the beginning of the project (conceptual design phase).

The hazards identified during this phase applied to the normal, fall back and emergency operation and were defined with respect to passengers, employees and third parties.
2 – Preliminary Hazard Identification and Analysis

RAMS Life cycle of EN-50126

- Concept
- System Definition and Application Conditions
  - Risk Analysis
  - System Requirements
    - Apportionment of System Requirements
    - Design and Implementation
    - Manufacture
- Installation
- System Validation, including Safety Acceptance and Commissioning
  - Operation and Maintenance
  - Performance Monitoring
  - De-commissioning and Disposal
- Modification and Retrofit
The process identified 4 different categories of hazard analysis:

- system hazard analysis
- interface hazards analysis
- subsystem hazards analysis
- operating and support hazards analysis

In this early process only the analysis of “system hazards” and “interface hazards” was carried out.

- “subsystem hazards analyses” were then carried out by each supplier during preliminary design.
- “operating and support hazards analysis” was carried out when rules for train circulation will be established.
2 – Preliminary Hazard Identification and Analysis

What steps were followed to carry out hazard identification and hazard analysis?

(1) Hazard Identification:
- comprehensive identification of the hazards associated with the system
- identification of the safeguards and protection features
- identification of the consequences of the hazards

(2) Hazard Analysis:
- analysis of the consequence severity
- analysis of the occurrence frequency
- analysis of the level of risk from the severity and frequency
Hazard identification

A systematic and comprehensive hazard identification was carried out, with the purpose of identifying all potential hazards that could occur as a result of:

- internal events
- external events
- operation procedures
- human interface hazards
Internal events
They include all component and system failures that affect:
- safety related systems (Automatic Train Control, Emergency Systems, Vehicle and Platform doors, brakes, etc.)
- the structural integrity of the guideway (track, switches, etc.)
- the structural integrity of the vehicle (axle, bogies, car body, etc.)

External events
They include event of external nature like:
- extreme weather conditions
- sabotage
- floods
- negligent behaviour of metro users and neighbours
2 – Preliminary Hazard Identification and Analysis

Operating procedures
Operating procedures may also be source of hazards, when not properly implemented or when not suitable to deal with contingencies such as stranded trains.

Human interfaces
They include events which may be created by
- Passengers
- Staff

as a consequence of misuse of the system, both deliberate or inadvertent.
2 – Preliminary Hazard Identification and Analysis

General hazards

As starting point for the identification of hazards, general and typical consequences of the most foreseeable accidental events and component failure were defined based on:

- hazards analyses performed for similar transportation systems
- record of occurred accidents in other railway systems

The following general consequences were identified:

- Derailment
- Collision (between two vehicles)
- Death/Injury
- Fire/Smoke
- Electrocution
2 – Preliminary Hazard Identification and Analysis

Checklists

Extensive use of checklist to support the identification of hazards was made, as an example:

<table>
<thead>
<tr>
<th>Functional</th>
<th>Electrical</th>
<th>Mechanical</th>
<th>Structural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Arcing</td>
<td>Corrosion</td>
<td>Collision</td>
</tr>
<tr>
<td>Coupling</td>
<td>Chemical</td>
<td>Derailment</td>
<td>Derailment</td>
</tr>
<tr>
<td>Evacuation</td>
<td>Deterioration</td>
<td>Deterioration</td>
<td>Deterioration</td>
</tr>
<tr>
<td>Hardware Failure</td>
<td>Electrocution</td>
<td>Dropped Load</td>
<td>Dropped Load</td>
</tr>
<tr>
<td>Human factors</td>
<td>EMC</td>
<td>Vibration/Shock</td>
<td>Structural Collapse</td>
</tr>
<tr>
<td>Interfaces</td>
<td>EMI</td>
<td>Explosion</td>
<td>Explosion</td>
</tr>
<tr>
<td>Inadvertent activation</td>
<td>Explosion</td>
<td>Extreme weather</td>
<td>Extreme weather</td>
</tr>
<tr>
<td>Interlocks</td>
<td>Extreme weather</td>
<td>Stress concentration</td>
<td>Fire</td>
</tr>
<tr>
<td>Loss of services</td>
<td>Flood</td>
<td>Fire</td>
<td>Flood</td>
</tr>
</tbody>
</table>
Outcome of the PHIA process

A total of 50 hazards were identified during the process, examples for each category is reported below

<table>
<thead>
<tr>
<th>HAZARD ID. No.</th>
<th>HAZARD DESCRIPTION</th>
<th>COLLISION</th>
<th>DERAILMENT</th>
<th>DEATH/INJURY</th>
<th>FIRE/SMOKE</th>
<th>ELECTROCUTION</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS/EXT/1</td>
<td>Objects on the guideway</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/EXT/7b</td>
<td>People trespassing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/EXT/8</td>
<td>Weather conditions (ice, extreme cold, heavy rainfall, excessive foliage)</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYS/INT/3</td>
<td>Train movement with doors open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/INT/5</td>
<td>Failure or distortion of guideway, sleepers or ballast slip</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYS/INT/9c</td>
<td>Reduced brake performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/HUM/2</td>
<td>Train doors trap person or object and train moves off whilst person still trapped</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/HUM/3</td>
<td>Person attempts to open a door and jump out while the train is moving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/HUM/6a</td>
<td>Overcrowding of platforms in underground stations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/O&amp;M/1a</td>
<td>Evacuation from train to safe area on a viaduct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/O&amp;M/3</td>
<td>Operation of maintenance staff in the CMC where vehicles are still in automatic guide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SYS/O&amp;M/5</td>
<td>Train is automatically moved to an area (eg station or tunnel) where there is a fire or other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
Hazard Analysis

Following the identification of the hazards, a classic assignment of severity and frequency were carried out.

Severity derived by the assessment of possible consequences based upon a pessimistic judgment of the most severe consequences which may credibly result from the realization of the hazard.

Frequency considered the occurrence of the hazards and the realization of the respective consequence(s).

Three risk categories were utilized, “Intolerable”, “Tolerable” (ALARP) and Negligible.
Example of hazard log sheet from PHIA (EXT)
2 – Preliminary Hazard Identification and Analysis

Example of hazard log sheet from PHIA (O&M)
Content

1. Copenhagen Metro and Metro Service
2. Preliminary Hazard Identification and Analysis
3. **Central Hazard Log and Operational Hazard Log**
4. Configuration Management and Operational Hazard Log
5. Incident Management System and Operational Hazard Log
6. Conclusions
3 – Central Hazard Log and Operational Hazard Log

The outcome of the PHIA and subsequently the subsystem hazard anlaysis and operation and support hazard analysis was collected and tracked within the Central Hazard Log.

For each hazard log sheet the following fields were filled in:

- a description of the hazard
- a description of the expected possible consequences of the hazard
- document originating the hazards
- severity, frequency and risk rankings
- hazard mitigation action(s)
- results of actions taken and signing off
3 – Central Hazard Log and Operational Hazard Log

Central Hazard Log at a glance:

- 2,500 hazards
- up to 12 remedial actions each
- ATC, 223 hazards
- Platform Screen Doors, 44 hazards
- Permanent Way, 17 hazards
- Rolling Stock, 94 hazards
- Traction Power & Power Supply, 39 hazards
- Third Rail, 45 hazards
### 3 – Central Hazard Log and Operational Hazard Log

Example of Central Hazard Log sheet

<table>
<thead>
<tr>
<th>CENTRAL HAZARD LOG</th>
<th>Hazard Code</th>
<th>O&amp;M 9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hazard Description</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General hazard related to maintenance in the proximity of a track area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Consequences

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Freq</th>
<th>Sev</th>
<th>Mitigated Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Maintainer hit by train</td>
<td>E</td>
<td>III</td>
<td>T</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Hazard Identification/Analysis Document

- **Document:** LET/ATR-29.07.02-O&M00733
- **Doc. Date:** 29/07/2002
- **Reference In Doc.:** O&M 9

#### Remedial Actions

<table>
<thead>
<tr>
<th>Action No.</th>
<th>Done</th>
<th>Closure Ref.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>KBBV000GE000EH34173</td>
</tr>
</tbody>
</table>

**Rev. 2**

- **Dated:** 28/05/2002
- **Identified by:** O&M
- **Party to act:** O&M

**Workzones must be established to prevent automatic trains in the work area**

<table>
<thead>
<tr>
<th>Action No.</th>
<th>Done</th>
<th>Closure Ref.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Yes</td>
<td>KBBV000GE000EH34173</td>
</tr>
</tbody>
</table>

**Rev. 2**

- **Dated:** 28/05/2002
- **Identified by:** O&M
- **Party to act:** O&M

**Working on platforms in close proximity of track area requires establishment of a workzone and cancellation of train service**
3 – Central Hazard Log and Operational Hazard Log

Why Operational Hazard Log?

- Day-to-day tool accessible by all employees
- Focus on operation and maintenance
- Improve correlation between hazards and procedures
- Uncouple hazard knowledge from individual expertise (to the extent possible)
- Improve search functionality (per subsystem, location, description, causes, etc.)
- Management of user rights
- Improve traceability of all editing activities

- Operational Hazard Log contains currently 195 hazards
### Example of Operational Hazard Log sheet

**Description**: Evacuation from train to safe area on a viaduct

**Cause**: 

**Subsystem**: ROS

**Location**: Guideway

**Closed**: True

**Originating Documents**

- **Document Title**: OHL checkpoint 220
- **Document Code**: N/A
- **Document Code**: N/A
- **Document Date**: 18-06-2010
- **Reference in Doc.**: SAP 53

**Consequences**

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Frequency</th>
<th>Severity</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injuries on evacuation and delays in train evacuation</td>
<td>E</td>
<td>V</td>
<td>Negligible</td>
</tr>
<tr>
<td>Electrocution</td>
<td>E</td>
<td>III</td>
<td>Tolerable</td>
</tr>
</tbody>
</table>

**Safety Measures**

- **SM #**: 1.0  
- **Reg.Date**: 17-11-2011  
- **Reg.Dept**:  
- **Safety Dept**: 

**Act.Dept**: Betriebseiter  
**Subsystem**: ROS  
**Done**: 

**Description**: Procedures for train evacuation in a station or between stations (including viaduct sections) are presented in System Operating Scenarios. The hazard needs further investigation (refer to Chapter 5). O&M Company to follow on-going discussion and eventually pick up actions from Metro SMO / Procedure for evacuation of a train on a viaduct and to shut off power to third rail is included in the operating procedure “Evacuation of a train”. / Procedure for Detainment deals with ways of detaining and walking routes of routes to be used.

**Closure References**

<table>
<thead>
<tr>
<th>Closure doc code</th>
<th>Closure doc title</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEBB.V00.GE00.0EH.34177</td>
<td>Evacuation of a train: Termination of log</td>
<td></td>
</tr>
<tr>
<td>SIK-PR-S-089</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hazard closure**

- **Closed by**: NDE  
- **Date**: 17-11-2011 18:31:45
3 – Central Hazard Log and Operational Hazard Log

Example of Operational Hazard Log sheet (general hazard)
Example of Operational Hazard Log sheet (location dependent)
3 – Central Hazard Log and Operational Hazard Log

Example of Operational Hazard Log sheet (location dependent)

<table>
<thead>
<tr>
<th>Hazard</th>
<th>OHL 169</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Kastrup: when a train is parked in the Pocket Track, distance between gabion and vehicle will not accommodate the necessary respect distance to the pick-up shoe.</td>
</tr>
<tr>
<td>Cause</td>
<td>Narrow tracks</td>
</tr>
<tr>
<td>Subsystem</td>
<td>TR</td>
</tr>
<tr>
<td>Location</td>
<td>Guideway</td>
</tr>
<tr>
<td>Closed</td>
<td>True</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Originating Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Title</td>
</tr>
<tr>
<td>Document Code</td>
</tr>
<tr>
<td>Document Generic</td>
</tr>
<tr>
<td>Document Date</td>
</tr>
<tr>
<td>Reference in Doc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consequences</th>
<th>Frequency</th>
<th>Severity</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk to staff (electrocution)</td>
<td>E</td>
<td>III</td>
<td>Tolerable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM #</td>
</tr>
<tr>
<td>Reg.Date</td>
</tr>
<tr>
<td>Reg.Dept</td>
</tr>
<tr>
<td>Act.Dept</td>
</tr>
<tr>
<td>Subsystem</td>
</tr>
<tr>
<td>Description</td>
</tr>
<tr>
<td>Done</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Closure References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closure doc code</td>
</tr>
<tr>
<td>KBB.V00.GE00.0EH.34117; SIK.PR-S-022</td>
</tr>
</tbody>
</table>

Hazard closure
| Closed by | NDE |
| Date | 17-11-2011 18:31:45 |
1. Copenhagen Metro and Metro Service
2. Preliminary Hazard Identification and Analysis
3. Central Hazard Log and Operational Hazard Log
4. Configuration Management and Operational Hazard Log
5. Incident Management System and Operational Hazard Log
6. Conclusions
Metro Service has established a configuration management system as per the Cenelec railway standard EN 50126.

Main objectives of Configuration Management are:

- Ensure that a change is performed in a controlled way
- Ensure full visibility of the valid configuration of the system at all time
- Ensure that the impact of the change against the valid configuration of the system is adequately assessed

System is intended as a combination of technological systems, organisation and documentation.
All changes to the system, organisation and procedures are processed via an **Operation and Maintenance Change Request** (OMCR).

A **Configuration Control Board** is established to evaluate whether the originator of the change shall proceed or if adjustment to the proposed change shall be made.

**Safety Department** is always involved in the OMCR process.

Final authorization of an OMCR is given by the **Betriebsleiter**.

- In 2013 a total of 78 OMCRs were authorized and implemented
- From 2008 a total of 536 OMCRs were authorized and implemented
As part of the OMCR lifecycle, the following compulsory items shall always be addressed by the originator via a "short description" template:

- Title of the Change Request
- Description of the Change
- Need for Change
- Impact on safety against the System in operation
- Operating Restrictions to be imposed, modified or cancelled
- Procedure for carrying out the change
- Result of Tests performed
- Recovery Plan, in case of failure of the change
- Expected Time Plan (working hours)
- Training
- Documentation to be modified
4 – Configuration Management and OHL

Example: Daily check of a metro train

A metro train shall undergo an inspection every 24 hours; inspection includes among others:

1. Internal light check
2. External light check
3. Interior checks (fittings, sharp edges)
4. Communication equipment

These checks are all described by means of an operational procedure (“Train entering and exiting the service”).

We wished to change the frequency of this inspection from 24 to 48 hours. How could we do this?
4 – Configuration Management and OHL

Example: Daily check of a metro train

All procedures contributing to the closure of a hazard contain a reference to what hazard(s) they address.

Procedure “Train entering and exiting the service”

5. Referencer
   - Idriftsættelse/rullende materiel
   - Driftsregulering og styring
   - SAP fejl
   - Brug af kontrolrumssloggen
   - Opbevaring af tog i hovedstrækningen eller vigespor

Hazard reference: OHL 027, 113, 114, 124, 127, 143, 156

6. Handlinger

6.1 Idriftsætning af tog

Tog vil normalt blive sat i drift automatisk på et forud planlagte tidspunkt fra opmarchområderne 1SA, 2SA og 3SA i CMC. Trafiklederen skal sikre, at det korrekte antal af tog bliver opbevaret på opmarchområdet i henhold til togkøreplanen. Hvis det korrekte antal af tog ikke opbevares på opmarchområderne vil en alarm blive genereret via ATC-arbejdsstationen.
Example: Daily check of a metro train

1. Internal light check ➔ OHL 114

<table>
<thead>
<tr>
<th>Hazard</th>
<th>OHL 114</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Loss of internal lighting during hours of darkness or in tunnels.</td>
</tr>
<tr>
<td><strong>Cause</strong></td>
<td>Component failure</td>
</tr>
<tr>
<td><strong>Subsystem</strong></td>
<td>ROS</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Vehicle</td>
</tr>
<tr>
<td><strong>Closed</strong></td>
<td>True</td>
</tr>
</tbody>
</table>
Example: Daily check of a metro train

2. External light check $\rightarrow$ OHL 113

<table>
<thead>
<tr>
<th>Hazard</th>
<th>OHL 113</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Headlight failure undetected during train operation in manual mode of operation</td>
</tr>
<tr>
<td>Cause</td>
<td>Component failure</td>
</tr>
<tr>
<td>Subsystem</td>
<td>ROS</td>
</tr>
<tr>
<td>Location</td>
<td>Vehicle</td>
</tr>
<tr>
<td>Closed</td>
<td>True</td>
</tr>
</tbody>
</table>
4 – Configuration Management and OHL

Example: Daily check of a metro train

3. Interior checks → OHL 124

<table>
<thead>
<tr>
<th>Hazard</th>
<th>OHL 124</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Light fittings or overhead panels coming loose or swinging open.</td>
</tr>
<tr>
<td>Cause</td>
<td></td>
</tr>
<tr>
<td>Subsystem</td>
<td>ROS</td>
</tr>
<tr>
<td>Location</td>
<td>Vehicle</td>
</tr>
<tr>
<td>Closed</td>
<td>True</td>
</tr>
</tbody>
</table>
4 – Configuration Management and OHL

Example: Daily check of a metro train

4. Communication equipment \(\rightarrow\) OHL 027

<table>
<thead>
<tr>
<th>Hazard</th>
<th>OHL 027</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Passengers on failed train exit the train via Emergency door handle release and enter trackway and may be struck by rescue train moving automatically during coupling operation</td>
</tr>
<tr>
<td>Cause</td>
<td>ATC</td>
</tr>
<tr>
<td>Subsystem</td>
<td>Guideway</td>
</tr>
<tr>
<td>Location</td>
<td>Guideway</td>
</tr>
<tr>
<td>Closed</td>
<td>True</td>
</tr>
</tbody>
</table>
Example: Daily check of a metro train

By evaluating the risk of each hazard it could be demonstrated that extending the daily check from 24 to 48 hours the risks remain either negligible or tolerable.

All the procedures contributing to the closure of an hazard:

- contain a reference to the hazard
- are “S” marked
- are part of the company Safety Management System (60 out of a total 131 covering the entire SMS)
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6. Conclusions
5 – Incident Management System and OHL

The Incident Management System to report "abnormal situation" in the day-to-day work.

It covers different management systems of the company, including railway safety.

All employees have access to the system and all are capable to write incident reports via INSYS.
The Incident Management System (INSYS) is used to follow-up on reported incidents and monitor trends on pre-defined (but new can be added if needed) incident categories and sub-categories.

Examples of category for railway safety:
- Passenger incident
- Collision with object
- Persons on track
- Procedures
- Communication
- Etc...
5 – Incident Management System and OHL

Screenshot from INSYS

What do we do with indication of potential trends?
Identification of a trend can in general result in the following actions:
Example: from the Incident Management system we detected an increase of events in relation to

- Person on tracks
- Movement of a metro vehicle in bypass

Two safety indicators were set up early this year to monitor the development of these events.
INSYS is a powerful tool to detect events related to procedural/staff aspects and partially to detect events related to technical aspects.

To support detection of the technical aspects, other tools are available in Metro Service:

- Metrolog
- Log from various subsystems
- An internally developed tool which processes logs on a daily basis
6 – Conclusions

OHL has proven to be a beneficial tool for:

- Better visibility of operation procedures vs hazards
- Better understanding of the reasons behind operational safety principle
- Better interaction with other elements of the Safety Management system
- Source of knowledge detached from individual expertise

Challenges:

- Organisation commitment, as a minimum at SM and MM level
- Continual review and update (discipline)
- Quantification of selected risks (especially frequency)
6 – Conclusions

Way forward:

- Final clean-up of the OHL from “old traces” of the CHL
- Wider dissemination of the OHL within the organisation
- Closer and more automatic interaction with the Incident Management System
- Clearer definition of what type of hazard shall be contained in the OHL
Thank you

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