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– DELIVERABLE REPORT –

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SECTION I – DELIVERABLE SUMMARY

Requirements and Specifications for data collection tool of non-conformity events

Deliverable ID , associated WP & Subproject	<i>D88 MODSYSTEM / WP23</i>
Type of Deliverable	<i>Report</i>
Input / Starting stage	<i>UGTMD D4 + inputs from others MODURBAN Subprojects and WPs</i>
Output / Final stage	<i>Report D 88</i>

Lead partner(s)	JRC
Achievement to date (%)	100%
Expected date of achievement	<i>30th June 2006</i>
Type of exploitation	<i>Internal to the project for the moment</i>
Exploitation potential	-
Expected budget	<i>See MODSYSTEM Budget</i>
Actual costs	<i>See MODSYSTEM Actual costs</i>
Expected costs to completion	-
Protection	<i>No specific IPR protection foreseen</i>
Protection date	-

IP's	Partners, (type, identification, date)
Pre-existing Know-How	UGTMS experience
Exploitation Rights	Not relevant

Associated Risk analysis	Type, solution envisaged, action, actors	Actual Reduction
Before start	Not relevant	
During task implementation	Not relevant	



Requirements and Specifications for data collection tool of non-conformity events

Deliverable Abstract

This Deliverable concentrates on the preliminary phase of development of a database system that harmonises different European approaches for collecting information about occurrences in the domain of urban guided transport systems.

The following activities are discussed:

- Identification of existing bodies of data on accidents/incidents within European operators of urban guided system.
- Definition of data necessary for sustaining the module for Human Factors Risk Assessment included in the generic model of the transportation system.
- Definition of requirements and specifications of data collection about non-conformity events and anomalies discovered during normal operations.

Associated Milestone (if relevant):

-
-

Contribution to MODURBAN Objectives as mentioned in the Description of Work

<i>Objective Definition</i>	<i>Comments</i>	<i>Quantification</i>
Objective 1 - Define new principles applicable to each of the different subprojects for safe integration of new technologies notably IT technologies taking into account human factors when applicable.	This process is achieved only if a consolidated body of data is available about near misses and minor events, in addition to the more serious occurrences, for which reporting is mandatory	The quantification of this process is essential and must be associated with a consistent approach for data analysis

SECTION 2 – DELIVERABLE DETAILED DESCRIPTION

1. Introduction

A systemic approach to safety is the overall goal of WP23. This implies the adoption and application of safety concepts, and methods to assess the safety of prescriptions for guided transport systems, so that health, safety, environmental and consumer protection can be assured.

Appropriate methodologies and tools are identified and integrated through the definition of a Safety Conceptual Approach (SCA) for functional and technical prescriptions (Del. 86 and 77).

In order to cope with the most relevant issues of modern technology, i.e. human factors, methodological approaches for system and human factors safety are studied and integrated with the general conceptual approach (top-down approach) in a harmonised systematic approach to safety that will become available for technology developers and operators (Del. 87).

The basic structure that enables the performance of consolidated safety assessment rest on the amount and validity of the data at all levels. The variety of data that can be utilised, enable the definition of reliability of components, frequency of failure, indicators of human response and human erroneous actions. Moreover, these data can be utilised for a variety of purposes that expand the simple perspective of risk assessment and enable to support the entire spectrum of safety management, i.e., training, audits, emergency management.

In particular, the existing experience of the field, in terms of available data on accidents and incidents, as well as the direct evaluation of drivers and train operators (bottom-up approach), are essential contributors for improvement of methodological approaches for implementing safety assessment.

The main objective of this Deliverable is to define the “Requirements and Specifications for data collection tool of non-conformity events” that can be developed:

- To sustain the identification of critical areas for proactive safety implementation through Safety Management System;
- To generate a database of human errors that may support the inclusion of human factors, and human reliability for functional and technical prescriptions of the MODURBAN safety conceptual approach.

As it will be seen, the need to collect data about accidents and incidents of different criticality has already been recognised in Europe and a number of actions have been initiated and are implemented with the objective of collecting data aimed at improving safety. However, there is still a need to concentrate on the potential contribution to safety that can be developed from the analysis of the most important contributor to accidents, i.e., the human factors.

The proposed way forward is to concentrate on a “proactive” type of approach that requires the early identification of possible existence of faults or human mishaps in different areas and/or levels of the “Organisation”, i.e., from the front line operators to the top management, and the preventive intervention with adequate corrections. Essential element of this approach is the identification of such critical areas in the cases of minor occurrences and incidents that can highlight where and when preservative action is needed. Thus the existence and active use of a reporting system and associated data collection instrument on minor events becomes the necessary foundation of such preventive safety activity.

This Deliverable concentrates on the preliminary phase of development of such database system and reports on the following activities:

- Identification of existing bodies of data on accidents/incidents within European operators of urban guided system.
- Definition of data necessary for sustaining the module for Human Factors Risk Assessment included in the generic model of the transportation system.

- Definition of requirements and specifications of data collection about non-conformity events and anomalies discovered during normal operations.

2. Existing bodies of data on accidents/incidents within European operators of urban guided system

In order to collect data and information about the metro non-conformity reporting system, research was first conducted, aiming at:

- Describing the current status of non-conformity event reporting within the MODURBAN Partners
- Evaluating the consistency in the use of terminology, by collecting and comparing the definitions about incident, accident, near misses, dangerous events, ...

The research was mainly carried out through

- Visits and interviews
- Questionnaires

The analysis focused on the information collected. Particular attention was given to 1) the forms currently used for data collection and the architecture of the databases; 2) the expectations the partners have about a future improved reporting system.

This chapter describes the preliminary research conducted on the “non-conformity event reporting systems” used by the MODURBAN Operators, and in particular it focuses on three major aspects of the reporting systems:

- Type of general information recorded
- Classification of the event
- Classification of the causes

Our research analysis has mainly focused on two reporting systems:

1. **ERIF**-Electronic Incident Reporting Form used by LUL for reporting Metro non-conformity events and the **INCA**-Incident Capture & Analysis data base.
2. **NEFERTARI**, which is the system used by RATP to report non-conformity events related to regional express trains. NEFERTARI has basically the same architecture of OSIRIS, which is the RATP Urban Metro Reporting System.

Some attention was paid to the systems used by the Barcelona metro operator and by the Warsaw metro operator, whose information was received later on during our research. Due to time, this part of the study is not detailed yet and will be better specified in the next WP 23 deliverable.

Information about the reporting systems used by the other MODURBAN partners will be integrated in this review when are available.

The information here below reported about the LUL system was taken from: 1) answers to the questionnaire, 2) “User guide for the INCA data Entry”, 3) LUL Standard N. 2-05105-502, December 2003, and 4) power point presentation given by LUL, in Ispra, October 2005.

The information about the RATP reporting system NEFERTARI was taken from: 1) answers to questionnaire that RATP filled in; 2) some documents that RATP made available to the Project, which describe the input loading screens and the data management and consultation, and 3) Power Point presentation given by RATP, during the meeting in Ispra, October 2005.

Since our primary objective was the identification of requirements about Human Factors and reporting systems, with particular emphasis on the classification of events and related causes, the information recorded about injuries was not deeply assessed. As a consequence, the information collected by the IRF and by NEFERTARI about Injuries is not discussed any further in this report.

2.1 London - LUL Reporting Systems and data-base

In LUL, different integrated systems are used for collecting the information about non-conformity events, for analysing the data and monitoring the implementation of the resulting recommendations and corrective actions.

First, different forms are used to record details of incidents and capture the findings of immediate investigations:

- IRF-Incident reporting Form
- RWIIF-Record of Workplace Injury or Illness Form
- SPAD-Signal Passed at Danger
- SARF-Staff Assault Report Form

All incidents, including those relating to contractors, shall be recorded on an IRF, at the very earliest opportunity, by the person responsible for the location or activity giving rise to the incident. Recently, the paper-based forms listed above have been replaced by the EIRF database. The paper versions are only used in the case of a failure of the EIRF System.

Second, INCA-Incident Capture and Analysis is used to capture, classify and analyse safety related incidents data, which have been obtained through the IRF suite of forms.

Third, the LUSATS-London Underground Safety Action Tracking System data-base is used to ensure that all major safety issues affecting the LUL group are addressed in a controlled and coordinated manner and to provide a clear traceable audit trail from initial decision making thorough to the assured close-out of an issue. It tracks the progress of any safety related workstreams.

Then, CIRAS-Confidential Incident Reporting and Analysis System is also used. "CIRAS is for front line railway staff to report safety concerns that they feel unable to report through normal company channels. It offers a completely independent and confidential way to report those concerns without fear of recrimination" [<http://www.ciras.org.uk/index.aspx>]. It is now compulsory, for all UK rail companies to be involved in a confidential reporting system. In 2000, CIRAS became a National System and has since received over 3000 reports. For more information see the CIRAS WEB page. CIRAS is independent of INCA and may happen any time after the incident occurs.

Finally, the whole LUL reporting system is aligned with **RIDDOR**, (Reporting of Injuries, Diseases and Dangerous Occurrences Regulation) which is a Health & Safety Executive (HSE) Regulation.

INCA - Incident Capture and Analysis

The INCA system, used by LUL, uses an electronic standardised form to enter and record the information about the non-conformity events.

First, some general information about local and temporal setting is recorded in the Incident Nucleus area. In particular, the date, time, location, "sector" and area where the incident occurred are entered. The sector and area are selected from a drop down list. Then, a free text field is used to give details of where the incident happened.

Second, the event is described through a free text narrative and classified according to its primary cause.

Third, in case of injury, the "employee injury" area is filled in with information about the personnel (name, surname, sex, age at incident, service start date, grade start date, grade) and the injury (status, severity, activity, method, Agent, Nature, Body Part, taken to hospital/first aid given/...). In case of "lost time injury", the "**lost time**" is recorded (absent start, absent end, day lost, shift lost). Another area is dedicated to collect the data about the "**other people involved**".

Then, for every incident involving **fire/smoke alerts**, the "fire report details" (fire category, fuel type, fuel description, ignition source, description) must be completed.

Finally, the INCA system records the data (local ref., completed, received) about the document type (for example, IRF or LPF-Loss of Process form...).

2.2 Paris - RATP Reporting Systems and Data Base

The information here reported is taken from the “Sustainable Development and Activity Report 2004”, http://www.ratp.fr/corpo/entreprise/rapport_activ2004/anglais/Activ_intro_ang.pdf

Created on January 1st, 1949, the RATP is a public establishment with industrial and commercial character, or EPIC. It employs 44.625 persons and exploits public transports in Ile-de-France with four networks: bus, subway, RER and streetcar.

RATP is a public service company. Managing one of the world's largest integrated multimodal networks, it aims to offer the community the best possible service for the lowest possible price. RATP is a public sector company whose sole shareholder is the French State. It implements public policy via an efficient and transparent management system. RATP is a fully fledged company that should be judged on the quality of the services it offers and its economic results.

RATP Data

43 582 employees, 2,778 billion journeys a year, €3,157 billion in revenues, €432 million in gross operating profits, €720 million in investments, €23 million in net profits, 14 Metro lines, 2 RER regional express network lines, 2 tramlines and more than 300 bus routes¹.

Since 2003, RATP has ascribed to the principles of the United Nations “Global Compact”, a pact based on ten principles derived from the Universal Declaration of the Rights of Man, the International Labour Organisation's core precepts and the conclusions of the Rio Summit on the Environment and Sustainable Development.

Traffic: Strong growth

In 2004, the level, regularity and quality of RATP's service provision led to a particularly satisfying rise in traffic, which hit new heights, totalling 2.778 billion journeys.

Traffic across all RATP networks rose by 6.3% over 2003, a year marked by a few temporary problems. Adjusted for industrial actions' impact on 2003 results, traffic growth reconfirmed its dynamism, rising by 4.5% on average, or twice as fast as the increase in household consumption.

The most satisfying results were recorded on the rail networks, with +7.4% for RER lines A and B and +5.1% for the Metro. On the surface network, traffic raised more in the suburbs than in Paris, with higher growth on routes covered by the PDU Urban Travel Plan.

NEFERTARI

NEFERTARI is the reporting system used by RATP for the Regional Express network service.

Like IRF and INCA by LUL, NEFERTARI as well uses an electronic standardised form to enter and record information about non-conformity events.

The 'data entry form' is divided into two main parts.

The first part records the **general information** about the occurrence, such as date, time, location (track, station, inter-stations, previous station). Then, the type of event is selected from a drop down list (operational incident, rolling stock failure, fixed installation failure, crime, passenger minor injury...). Finally, the data about the delay are recorded in this first part of the form as well. See Table 1 for more details.

The second part of the 'data entry form' makes use of **pre-established sentences on scroll menu**, which avoid subjectivity and foster standardisation. This criterion is used for developing the **text/description about the event**, its **causes**, **actions taken**, **consequences**, complementary information (“free text”) and comments.

Risk Management Tool

RATP has implemented an operational tool to steer transport risks management, the so-called "Tableau de bord d'Alerte des Dangers" (or hazard alert monitoring dashboard). This monitoring dashboard is prepared every month and periodically reviewed with operation and maintenance departments at a railway safety observatory meeting.

This tool is effectively operational for metro and RER operations. Tests are also being run for tramway operations. The hazard alert monitoring dashboard is also progressively expanded to include new

¹ Figures for RATP, a French Public Sector Industrial and Commercial Organisation

data. Relevant data are those that are the precursors of incidents. They are drawn from the whole range of protection measures put in place to ensure that the level of risk associated with our transport systems remains acceptable. The principle is to anticipate incidents--collision, derailment, people being run over by a train, electrical contact, fire, panic, etc., by analysing data relevant to safety and by putting in place specific measures for those systems whose data have moved out of the safety range.

Eventually, once validated, the necessary data will be directly provided from NEFERTARI and OSIRIS. Complementary data will also be provided by maintenance activities.

Additional Comments

Within both its reporting systems, i.e., NEFERTARI and OSIRIS, the RATP operational structure is involved at various levels in both inputting (lower tiers), but also in validating (management tiers) the information which has been inputted. It is obvious that following the importance of the event (i.e. incident or accident) the time for validation approvals depends on the proactive involvement of all tiers at stake. Specific interventions by police fire departments, justice may be required in the most serious cases. Standardisation of language is of the utmost importance for day to day incidents solutions and corrective action implementation. The level of specificity of serious happenings does definitely require additional reporting/validation provided from elsewhere under a complementary responsibility.

Given the operational features of each line, the systems at stake are to be only considered as tools. The importance and the quality level of operations shall always remain primarily dependent on the appropriation of the reporting requirement by operators. This should be guiding principle in devising such a tool, which is by essence both internal-structure dependent, and external-environment subjected.

2.3 Budapest - Reporting System

There are two public transportation companies in Hungary which operates significant local transport services: the Budapest Transport Limited and the Miskolc Transport Limited.

In this chapter, we summarize main characteristics of the accident event controlling systems of the two companies.

In the framework of the survey of accident event controlling systems (**Figure 1**), we examined the following phases, and we searched the answers to the following questions:

1. **Report.** In this phase, we examined if there is some kind of approved system for reporting and recording accidents. It is also very important to examine that who records what events.
2. **Examination of events.** Who leads the investigation? Are there different investigations for different kind of events? What is the subject of the investigation? Takes the investigation into consideration the human factor, or just the technical?
3. **Handling of data.** In this phase, we searched answers emerging from the recording and analyzing of the collected data.
4. **Feedback.** We examined the way and effectiveness of the feedback in this phase.

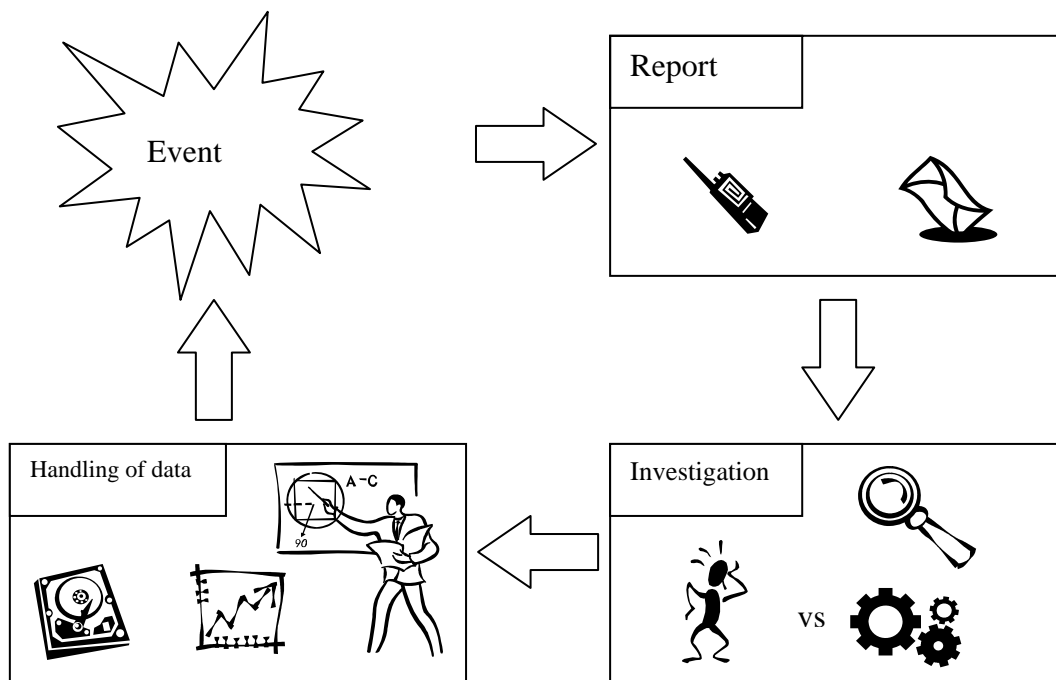


Figure 1 - Handling of accident events

2.3.1 Handling of accidents at the Budapest Transport Limited

About the Budapest Transport Limited

With its predecessors, the more than 100 years old, traditional Budapest Transport Limited (BKV) has always played significant role in public transportation of Budapest. The company operates 5 big departments (bus, tram, metro, suburban train, trolleybus) in an integrated transportation system. The BKV limited transports about 1400 million passengers annually, of which

- 41% transported by bus,
- 26 % tram,
- 22 % metro,
- 5 % suburban train and
- 6 % the trolleybus.

The total length of the BKV network (2005.10.30): 2.626,8 km, (including the 563,1 km night services). There are 224 (including 31 night) bus, 35 tram and 14 trolleybus routes. There are also 3 underground and 5 suburban train routes.

The number of employees in 2004 was 13 574.

The system of the BKV

For regulating the tasks and functions dealing with accidents, damages and traffic disturbances related with the operation of the company, the order no. 12/VU/2003 of the Managing Director is issued. The disturbance-free operation of the traffic and the safety is assured by the Department of Traffic Safety.

The department established a computer system in 1996, which originally served their own of duties. Today, this system is just a module of the company's SAP system, which deals with the coordination of the whole company.

Reporting

The order no. 12/VU/2003 issued by the Managing Director uses the following definitions:

- **Traffic accident** is such an event caused by something bound up with transportation, which results in injury and/or damage.

- **Traffic disturbance** occurs in the service frequency or the punctuality on a route when the headway between the services exceeds the normal headway by three times and the headway becomes higher than 15 minutes.
- The **traffic accident** is a **property damage accident**, when it caused only property damage without personal injury.
- The **traffic accident** is a **personal injury accident**, when it caused injury to one or more persons (light, heavy or mortal injury).
- **Light injury** occurs when the casualty's injury determined during the outside investigation requires less than 8 days of recovery by medical judgment.
- **Heavy injury** occurs when the casualty's injury determined during the outside investigation requires at least 8 days of recovery by medical judgment.
- **Mortal injury** occurs when the casualty died in the field, and the fact of the death was determined by doctor.
- **Own fault accident** is such a **traffic accident** which was caused by a mistake of an employee or an error of a property (vehicle) of the company
- **External fault accident** is such a **traffic accident** in which the responsibility of the company is not proved in any way.
- **Derailment** occurs when one or more wheel pairs of a rail vehicle leave the rails.
- **Diversion** occurs when one or more wheel pairs of a rail vehicle leaves the original route on a switch, but the vehicle does not derail (but the wheel pairs are on different tracks).
- **Jump out** occurs when a trolleybus's current collector leaves the overhead wires without the will of the driver.
- **External collision** occurs when a vehicle operated by the BKV collides with another vehicle which is not operated by the company.
- **Own collision** occurs when two or more vehicles operated by the BKV collide.
- **Disaster** is an accident in which at least 1 person died or had heavy injury and the number of injured persons reached 9.
- **"Famous" accident or traffic event:**
 - a disaster, where;
 - number of mortal injuries higher than 1;
 - number of heavy injuries higher than 5;
 - number of total injuries higher than 8;
 - on an important public transportation route with heavy traffic significant disturbance occurred (longer than 30 minutes);
 - where the people and property is in such danger that it pays public attention;
 - an extraordinary event, which causes significant damage to the properties of the company (e.g. fire);
 - an event, which attends the public's attention (media is present)

Engagement to report

Required actions for BKV related accidents are regulated by laws and company regulations. All employees of the company are liable to report personally or by the means of linkboy any the following events to the Main Dispatcher Service's (FDSZ) chief dispatcher:

- accident with injury (from the field, or from the place where the person detects the accident);
- property damage accident (without agreement: immediately, without leaving the field or with agreement: from the end station);
- traffic disturbance;
- sighting any defect with can be dangerous for the traffic (lack of signs, road defect etc.);
- anything endangers the traffic;
- any act which endangers the property of the company (damage, theft, etc.);
- fire;
- anything else related to accidents, traffic disturbances or pollution.

The report must contain:

- the accurate reason for the report;
- the accurate location (district, street, number, crossing, direction) and time of the accident, damage or traffic disturbance;
- the participants of the accident, damage or traffic disturbance (license plate number, route etc.);
- the name, the employment department and the status of the person who did the report;

- the place of the reporting.

The omission of the engagement to report treated as work discipline fault.

A vehicle driver must report all accidents and damages in which he is affected, in written form and hand the written document over to the site dispatcher. The dispatcher takes the document and its attachments from driver, registers the handover in a log book, and records the contents of the report according to the regulations of the operational head office.

The employer of the vehicle driver must post the report as soon as possible, but within 5 days to the Department of Traffic Safety.

Investigation

From the point of view of determining the responsibility for the accident, there are three basic cases:

- the police, the authority carries out the investigation. In this case, the BKV cooperates in the investigation on request. In case an expert is required, he is called by the police (suburban train or cogwheel railway: from the Hungarian State Railways);
- the question of responsibility is determined in the field with license leaf, and there is no technical or other condition (simple property damage accident / fault of the driver);
- the accident was not caused by fault (real or suspected) of the vehicle driver (e.g. technical failure, track error, traffic control etc.) and the police does not investigate the case.

The investigation is coordinated by the Traffic Safety and Traffic Monitoring department within the BKV. The investigation is carried out with assistance of the required specialists.

Certainly, the goal of the investigation is more than determining the responsibility, so in order improve accident prevention every case is examined and analyzed. The aim is to determine the reasons which resulted in the accident. The track, the vehicle, the human factor and traffic environment is analyzed together. The analyzed accidents show that about 95% of the accidents were caused by human error, so this has crucial importance. The involved person's employment conditions (working hours/Shift pattern?), age and the route's difficulty level is also taken into consideration.

Data recording-maintenance-analysis

The previously mentioned system was installed in January 1996 under the name „Accident and Insurance System” (BRB). This is an Oracle based database software, used for recording events and their conditions.

Based on the received reports, all accidents and damages must be recorded by the Traffic Safety Department, for

- rating and analysis,
- classification,
- information,
- accident prevention purposes.

Feedback

Based on the data gathered from the BRB system, various improvement arrangements are issued. For example:

- „Dangerous” drivers can easily be filtered. Statistics proved that the same persons are involved in significant portion of the accidents. The problematic persons are sent to obligatory training. According to reports, results of the training are positive.
- Dangerous route sections can be also determined. Based on this information, experienced staffs are assigned to these routes.

Sadly, the quantity of the available data and the lack of human resources do not allow utilisation of all system features.

Summary

The BKV operates a well-thought-out system. They use a proven system for reporting and recording the defined events. These systems are regulated by the orders of the Managing Director.

If there is no need to interact with authorities during the investigation of an accident or damage to determine the responsibility, the judgment of the Department of Traffic Safety is accepted as standard. Then, the process of impeachment can be started.

This department is also responsible for registering, analyzing and classification of reports in order to use them for preventive decisions. These decisions are executed by the responsible department, and the results of sent back to the Department of Traffic Safety to get picture of the effectiveness of the ongoing activities.

2.3.2 Handling of accidents at the Miskolc Transport Limited

About the Miskolc Transport Limited

With its predecessors, the Miskolc Transport Limited (MVK) is also more than 100 years old. The company operates 2 big departments (bus and tram) in an integrated transportation system. There are 42 bus and 2 tram routes.

The leadership considers of the primary aim of the MVK Limited to satisfy the passengers and to preserve and improve the environmental state of the city. In order to achieve these goals, the MVK Limited operates quality control and environmental control subsystems in the framework of the Integrated Controlling System.

The system of the MVK

For regulating the tasks and functions dealing with accidents, damages and traffic disturbances related with the operation of the company, traffic regulations are issued. The disturbance-free operation of the traffic and the safety is assured by the Team of Traffic Safety.

Reporting

The traffic regulation for the vehicle drivers uses the following definitions:

- **Traffic accident** is an injury happened to a person using the road network on the road or tram track, which resulted in injury or death of one or more persons.
- **Traffic event** is a collision or derailment, which resulted in vehicle or road/track damage without injury of any person.
- **Collision of own vehicles** happens, when vehicles operated by the MVK Limited collide.
- **External collision happens**, when a vehicle operated by an external company or person collides with a vehicle operated by the MVK Limited.
- **Personal injuries:**
 - i. **Light injury**, when, according to the opinion of the doctor, the time required for recovering requires less than 8 days.
 - ii. **Heavy injury**, when, according to the opinion of the doctor, the time required for recovering requires more than 8 days.
 - iii. **Mortal injury**, when the victim died on the spot, or dies due to the accident within 30 days, and it is proved by a doctor.
- **Other event:**
 - Collision of an MVK vehicle with a facility or something which can not be treated as vehicle.
 - External vehicle, which collides with a facility or something which can not be treated as vehicle and owned by the MVK Limited (e.g. traffic lights, overhead wires)
 - Vehicles do not collide, but capsize or damage in any way due to vehicle-road interaction.

Engagement to report:

The engagement to report is regulated by the Vehicle Driver Traffic Regulations. Every event must be reported if:

- personal injury occurred (passenger, employee or anybody else) and the accident is related to the services of MVK Limited;
- property of the MVK gets damaged, or the MVK causes damage;
- crime committed to an employee of the MVK Limited;
- any of the above suspected.

The report must contain:

- location of the event (street, street no, catenary mast no., name of the stop)
- time of the event, license plate number of the vehicles, route identifier and direction;
- the license plate number of the ambulance car, the name of the hospital where the involved persons were taken and type of injury;
- name and address and current location of witnesses;
- the data of the vehicle driver;
- name of the policeman.

A vehicle driver must report all accidents and damages in which he is affected, in written form and hand the written document over to the site dispatcher. The dispatcher takes the document and its

attachments from driver, registers the handover in a log book, and records the contents of the report according to the regulations of the operational head office.

The employer of the vehicle driver must post the report as soon as possible, but within 5 days to the Department of Traffic Safety.

All employee of the MVK Limited are required to report events to the chief dispatcher, who calls the company's accident examiner, the police, the police and fire department based on the received report. The deployment of the technical team is recorded in a software called BA. This software stores data in the order of recording, and assigns a diary number to the event. After locking, the data can not be modified or deleted.

Investigation

Property damage:

- In case the involved persons agree, no investigation;
- In case the involved persons can not agree, the investigator becomes the contact-man;
- In case the investigation carried out by the police has no result, the foul manager decides about usage of the photos, drawings, log books and hearing of the witnesses. Technical expert can be called;

Accident with injury:

- In case no moving vehicle involved, not traffic accident, recording of witnesses, assistance, reporting;
- In case moving vehicle involved, police investigates;
- When mortal injury occurs, court expert must be called. This is the police's task;
- Within 8 days injury foul order, more than 8 days the court judges. In case malfeasance behaviour can not be determined, polity examination. (e.g. omission of clambering is not stated in any regulation).

Site or end station damage

- Site areas not open to the public, rule of the road is not valid. The regulations for the site have to be applied;
- Property damage: in case the maker admits it, investigation not required;
- Property damage: in case the maker does not admit it: the opinion of the traffic safety manager is authoritative;
- In case the opinion is not accepted, judge expert must be called;
- In case it not accepted as well, the court must decide.

The goal of the investigation is to determine to causes of the accident, all relevant conditions are examined; usually the human factors are important.

Data recording-maintenance-analysis

There is database from 1st January 1996, the BA system. The operation of BA is regulated by the quality control regulation.

After the event, the chief dispatcher records the event, the team of traffic safety checks the data, and then locks them. After the locking, only the team of traffic safety has the right to modify the data. In the following day, the traffic director and involved department's director are informed about the events.

Feedback

Correcting actions are issued based on the data gathered from the BA and from feedback of the passengers:

- training in every two months, publication of lessons,
- the accident table is refreshed continuously,
- make dangerous situations end immediately,
- operating of an actuating system,
- controlling at the depots and on the routes.

Based on the new received data, the dispositions are examined by the board of directors, the traffic director, the operational traffic managers and dispatchers.

References

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- [2] Order of Managing Director No. 12/VU/2003 (Vezérigazgatói utasítás 12/VU/2003), BKV Budapest, 2003
- [3] Interviews (with Mr. Zs. Berhidi, and Mr. J. Lackovics, BKV)
- [4] www.mvkr.hu
- [5] Vehicle Driver Traffic Regulations (Járművezetői forgalmi utasítás), MVK
- [6] Interview (with Mr. Gy. Szaniszló, MVK)

2.4 Discussion on the Current Reporting Systems

This chapter aims at highlighting some issues which resulted from a first preliminary analysis of the reporting systems and of the answers of the questionnaire, and that should be further analysed in the next steps of research.

According to the information that we have analysed so far, most of the systems that we have taken into consideration have several commonalities. For example, the systems serve different functions: notification, loading, analysis, and inquiry. They all use, or are going to use very soon, a direct electronic input, to avoid paper related disadvantages.

A short discussion follows about: 1) classification of the type of event, 2) classification of the cause of events 3) and use of narratives, within the reporting system analysed.

TYPE OF EVENT

1. In the reporting systems that we have analysed, the events are classified according to different categories and items. The same type of event would be named differently if it would be classified with two different reporting systems (from two different European Nations). International comparison about data and communication about events would be difficult. Agreement on terminology and on the classification of the “type of event” should be reached among the MODURBAN partners. Terminology should be standardised and its meaning clear to all European countries. The European Railway Safety Directive also has definitions – we will take them into consideration during the next steps of this research.
2. A simple theoretical model should be selected and used for developing the category “Type of Event”.

CAUSES OF THE EVENT

1. According to the reporting forms and data-bases that we have analysed, the causes reported are only technical causes. In the questionnaire, both LUL and RATP stated that their systems take into consideration the HF cause. However, we noticed that the Human Factors issues are not mentioned in the forms and in the data bases. According to LUL, they “do take account of Operator / Staff error but not the root cause of the error”.
2. In NEFERTARI, the RATP system, the general categories under which the event causes are classified correspond to different technical systems/devices/components, e.g. electrical system, braking system, etc. The system which failed is considered as the cause of the event. The ambiguity between causes and failures should be clarified in the next steps on our research. There is the need of terminology agreement as well as theoretical agreement.
3. In INCA, the LUL reporting and data-base system, the list of possible causes is actually made up of causes (e.g., “alcohol related”) as well as consequences (e.g. “person injury” or “damage to personal property”). This ambiguity between the phenomenological appearance of an event and its causes should be clarified in the next steps of our research. Moreover, the list of causes in LUL contains some items which actually describe the ‘type of event’ instead (e.g. “Escalator Incident”). As stated by the INCA experts in LUL, “this list is something that has evolved over a number of years and as such represents both cause and consequence”.
4. The typology of causes to be taken into consideration (for example: active and/or latent cause) should be agreed. From our point of view, when a trend is identified, the analysis should surely focus on the latent causes as well.

NARRATIVES

1. There is a big difference from the type of narratives used by LUL and those used by RATP. In INCA, the narrative is used to describe WHAT happened, and it takes the form of a free text, which leaves the reporter free to describe what happened with his/her own words and expressions, focusing on the aspects that he/she thinks that have been the most relevant during the event. On the contrary, the narratives used within the NEFERTARI system are based on the selection of pre-established sentences and words. This method is characterised by a very positive aspect, i.e. the standardisation of the text allows easier analysis, avoiding subjectivity. On the other hand, it loses most of the advantages of the free text, i.e. to capture the real point of view of the people involved (or the reporter) into the event, and the “freedom” to describe elements which are not embedded into a fixed structured form. According to our point of view, the free narrative is a valuable source of information that cannot be simply replaced by fixed boxes to be marked; on the contrary, their use of pre-established answers in conjunction with free narratives should be promoted. A free description should be requested for defining WHAT happened as well as WHY it happened. Any drop-down list about the “Type of Event” and about the “Causes of the Event” should be followed by a free narrative. The role of free narratives and its qualitative analysis should be discussed and taken into consideration in the next steps of our research.
2. Free reporting is still possible on OSIRIS and NEFERTARI in parallel. But pre-programmed scrolls are mandatory.
3. Finally, the Human Factors aspects are more easily identified through open questions. Whether open questions should be part of a reporting form/data base or only be used for more detailed investigation purposes will be discussed in the next steps of our research.

According to the analysis carried out by now, a possible common *European format* for non-conformity event reporting should first be based on an agreement about:

- The general information to be recorded
- The classification of the type of events
- The classification of the type of causes

Then, agreement could be reached on the classification of the consequences.

Finally, the organisational requirements for the running and success of reporting system should be discussed and agreed.

Due to time constraints, our research has been focused more on LUL and RATP, than on the Barcelona or Warsaw system. This research will proceed by analysing and comparing in details ALL the reporting systems of the metro operators we are collaborating with. The results obtained by the analysis of the reporting systems will be integrated with the results of the questionnaire, to address the development of a standardised European reporting approach.

3. Questionnaire on current reporting systems: advantages and disadvantages and future expectations

3.1 Questionnaire Description

The questionnaire developed by KITE within the WP23.3 aimed at collecting information on how non-conformity events are reported and analysed in the different MODURBAN metro transport operators.

The questionnaire (see **ANNEX I**) is made up of a total of 34 open questions subdivided in three sections. Each section is characterised by a focused target:

- PART ONE of the questionnaire focuses on the specific system/tool the Operator uses for Event reporting and analysis.
- PART TWO focuses specifically on the Human Factors issues within Urban Guided Transport.
- PART THREE of the questionnaire addresses the company needs and requirements for an improved reporting tool.

The questionnaire has always been first introduced to the partners during a meeting, in order collect feedback and evaluate consensus, and then sent by e-mail for collecting the answers.

The questionnaire was first sent to all the metro Operators within WP 23.3: operators in London, Paris, Madrid, and Berlin. Later on, in order to draw a broader picture, it was sent to all other MODURBAN Operators: Lisbon, Roma, Barcelona, Prague and Warsaw.

The operators were asked to answer focusing on the current real practice and implementation issues of event reporting tools, avoiding theoretical answers which would only highlights the advantages that a tool should have, VERSUS the real advantages/disadvantages the tool has (THEORY VS PRACTICE).

Moreover, the operators were asked to provide the following information:

- definitions and classifications of accident, incident, near miss, non conformity event, dangerous event...
- the form they use for reporting/recording information
- the 'standard' they use for events analysis

3.2 Questionnaire Results – Preliminary discussion

The questionnaire was answered by 4 metro operators from different European cities: London and Paris first, and then Barcelona and Warsaw.

According to their answers, all 4 metro Operators have standardised systems for event reporting. All of them make use of direct data electronic input. In all 4 metro operators, the reporting process starts with the event notification and the data collection and finishes when the corrective actions and recommendations are finally implemented and their results are monitored.

Particular attention should be given to the answers given by the 4 metro operators about the main difficulties and disadvantages of their own reporting systems.

Then, regarding the Human Factors aspects, the answers focused on the factors which influence the driver performance and the controller, as well as on factors that a reporting system should focus on. Particular stress was given to the following issues:

- What influence driver performance
 - a. Pressure coming from operational job constrains (passengers interface, OCC instruction, operating rules).
 - b. Lack of practice in manual driving
 - c. Fading of attention due to routine
 - d. Human error

- e. Infrastructure design,
 - f. Motivation and fatigue
 - g. Good work plan
 - h. Driver's cabin ergonomics
 - i. Trainings
 - j. The big amount of different elements and systems inside the train
- What influence controllers performance
 - a. Monitoring activity may be problematic when exceptions becomes the rule
 - b. Quite work environment
 - c. Task distribution and role allocations: equally identified and distributed responsibility
 - d. Physical environment
 - e. Motivation
 - f. Fatigue
 - g. Workload
 - h. Automation of technical systems
 - i. Trainings
 - j. Knowledge and experience
 - HF aspect taken into consideration during reporting and analysis
 - a. Workload
 - b. Simplified human error mechanisms e.g. Mistakes, slips and lapses.

Then, the operators expressed the expectations that they would have about a new, improved, standardised reporting system. In particular, their expectations focused on the following issues:

- Key issues for WP 23.3 for an improved event reporting system
 - a. Definition of a standard event reporting language
 - b. Standardised event input
 - c. Remove dependency on subjectivity to support ad hoc reporting / analysis and standardised approaches
 - d. Facilitation of data extraction
 - e. less reliant on textual descriptions of events
 - f. a flexible tool, easy and simple to use, useful for all departments, that collect all data together, and that generate flexible and customizable analysis report, and excellent management ratios.
- Expectations from a new reporting system
 - a. Save time and money by simplifying and standardising the reporting procedures
 - b. Quantifiable return on investment
 - c. Operators acceptance through specific customisation
 - d. Reference tool between the Operator and their local Transport Authority
 - e. A user-friendly approach to analysis and extraction without the need of specialised training
- Information that need to be reported and analysed
 - a. Reasons for deviations from pre-established program
 - b. Responsibility allotment
 - c. Statistics for anticipation of "trends in deficiencies"
 - d. Events that impact or could have an impact on safety.
 - e. Need to know the what, who, where, when and why of the event.
 - f. What, where and when has happened, who has taken part, what actions have been done, damage occurred (description and economical evaluation), duration of the incident, and symptom-cause.

During the next phases of this research, the answers to the questionnaire will be analysed, in order to reach a conclusions on the metro operators' needs and expectations.

These results should guide the development of a standardised *European format* for reporting metro non-conformity events.

4. Towards a proposal for an organisational impact of reporting incidents/accidents

Different errors or recoveries related human factors can occur during all the life-cycle of an urban guided transport system. There are errors of design, of maintenance, of use, of learning, etc. Individual human factors concern external and internal detection, problem-solving and action related factors. Collective human factors lead with external and internal interaction based factors. Human operators on field are able to make erroneous actions, but also to detect and recover them. Facing technical failures, they are also able to control them if detected. Human factors are then both source of danger and of recovery of incident/accident. A reporting system of accident and incident management is useful for all the life-cycle of a given transport system refining the safety demands, analysis and assessment from the requirements to the operation levels, integrating several technological environment.

Therefore, a reporting system of accident/incident management has to model human operators as dynamic complex systems and integrate factors that may affect and improve safety. It cannot be limited to the human action but has to describe and explain the management of incident/accident made by human operators on field in order to complement safety analyses made at the system design process.

For instance, this reporting system may interact with the main management levels of an urban guided transport system, i.e. the conformity, the requirement, the design and the field levels, Figure 2:

- The conformity level (D10-UGTMS, 04). This level is the hierarchical level that orients the decision of the other levels. It includes European and national directives and local functional and safety demands.
- The requirement level (D6-UGTMS, 03). This level is the main safety life cycle process including formal reports or documents such as the Functional Requirement Specification (FRS), the Preliminary Analysis of Risks (PAR) and the Preliminary Analysis of Dangers (PAD) in order to determine the design framework for structural development.
- The development level. This level requires a minimum number of basic design steps based on models such as the well-known V life-cycle model containing the preliminary design, the detailed design, the realisation and the test steps.
- The field level. This level includes the operation, training, maintenance and decommissioning processes.

The conformity level develops a list of constraints to be followed for the requirement, the development and the field levels.

The Requirement step defines the relevant goal for the system. It is coupled with a Hazard Analysis. It aims at analysing functional specification requirements and particularly the safety functions by the integration of feedback from the conformity level or the reporting system. It provides system designers with a PAR or a PAD. Both PSA and PAR are tools for technical safety study. Sometimes, they identify human operator as source of danger or risk, and they may contribute to define recommendations such as procedures for human operators on field.

The development level has to propose a structural environment related to the functional and safety requirements. It defined barriers contributing to safety regarding the FRS, the constraints such as the staff qualification levels, procedures for training, maintenance, operation. It may update the safety analyses and the reporting may be use as a means to associate barriers to factors contributing or improving safety.

At the field level, situation awareness (SA) is usually considered as the main cognitive behaviour that helps human operators to prevent and recover from incidents or accidents. The factors that contribute to improve or maintain the human situation awareness have to be identified and reported when they contribute to recover known or new accident/incidents. On the other hand, loss of SA can lead to an undesirable event. The reporting system has also to determine the main factors affecting this behaviour. It can then represent a support for facilitating the process of retaining situation awareness, improving the training or simulation learning programmes or modifying the users' manuals or staff constraints deliberated by the system designers.

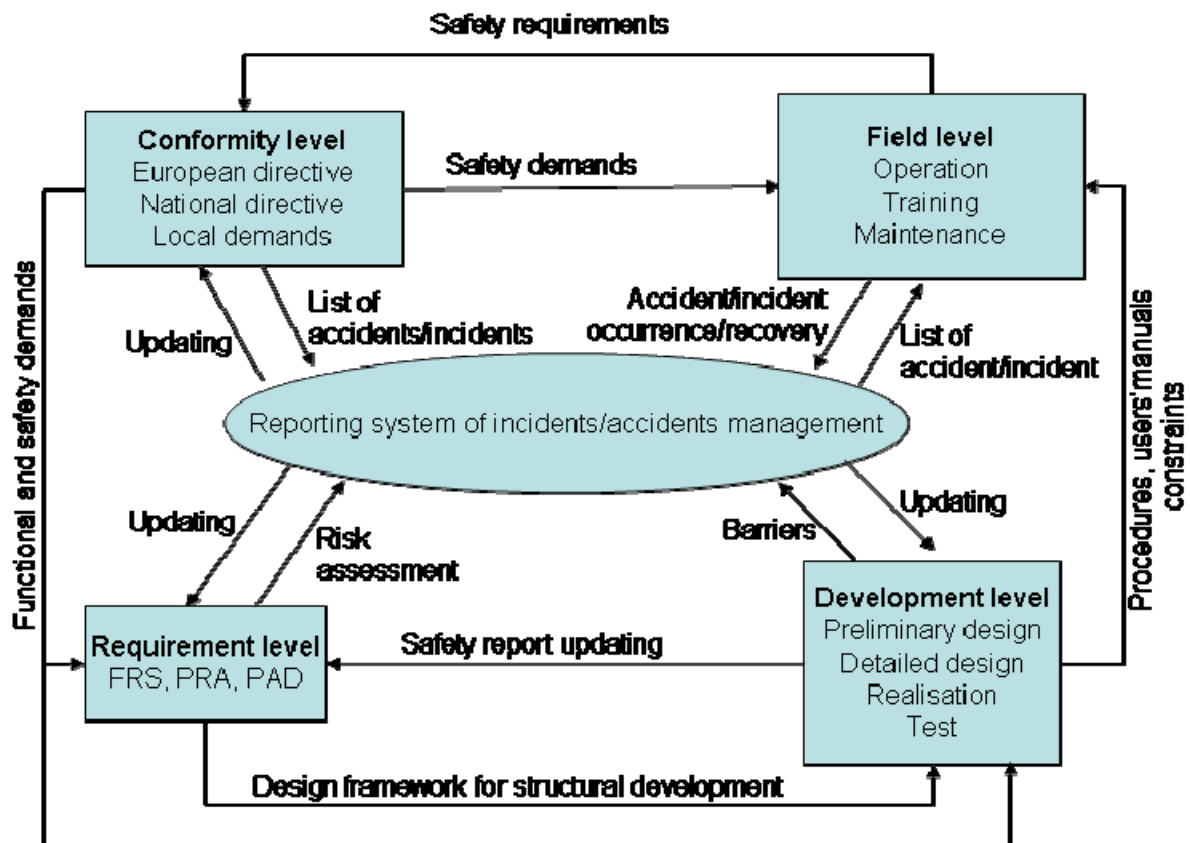


Figure 2 - An organisational safety reporting process

The reporting system may include a list of known scenarios of non-conformity events with the possibility to handle their characteristics or to add new ones (Figure 3). Two classes of scenarios should be considered:

1. The occurred scenarios, i.e. scenarios that picture/imagine/cause non-conformity events; and
2. The recovery scenarios, i.e. scenarios of near-misses of non-conformity events recovered by barriers or human actions.

The reporting process consists of handling the factors that affect or improve the occurrence of or the recovery from a given non-conformity event. It has to record mandatory and non-mandatory factors involving human actions, reactions or adaptations. A state of the art of the possible factors to be considered will be performed in order to identify the more pertinent ones for the urban guided transport system context.

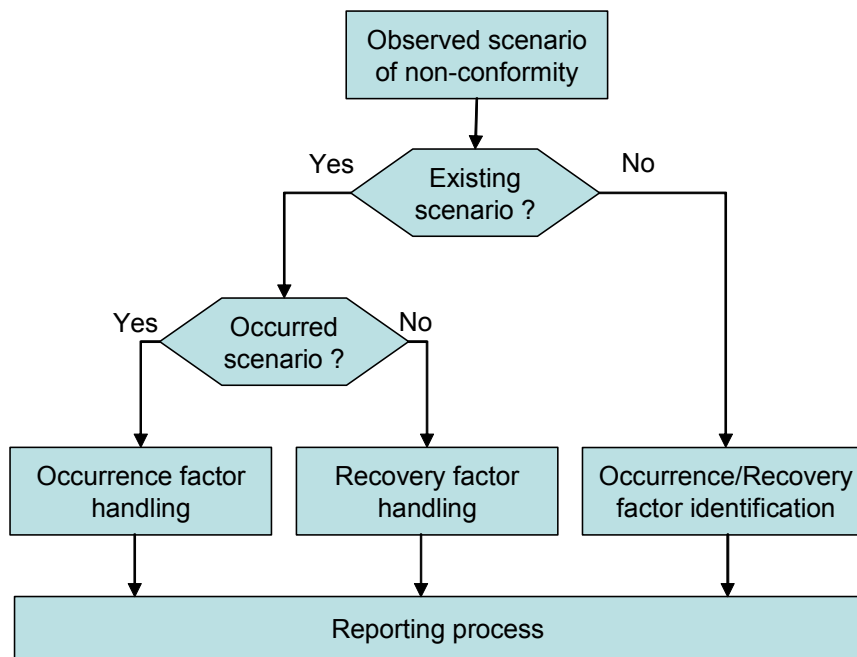


Figure 3 - Example of a scenario reporting

For instance, a reporting process table may contain human factors that may affect or improve the human detection, the human problem-solving or the human action generating slips, lapses, faults, violations or recoveries. It may distinguish internal factors such as motivation, trust, self-confidence or workload and external factors such as work interface, team structure or environmental constraints. A simplified framework should be defined in order to make to reporting process feasible and reliable.

The example of the Table 1 gives three types of behavioural effects of human factors that may degrade or improve human activities for each step of the occurrence or the recovery of a scenario: normal effect, no effect, wrong effect.

Table 1 - Example of a consequence-based framework for the reporting process

	Occurred / Recovered scenario of non-conformity			
	Sub-event 1	Sub-event 2	...	Sub-event n
Well detected				
Not detected				
Wrong detected				
Well solved				
Not solved				
Wrong solved				
Slip				
Lapsus				
Fault				
Recovery				

The scenarios of non-conformity are decomposed into several serial or parallel sub-events given by the fault trees from the preliminary analysis of dangers or risks or from a field analysis of the new ones.



References

D6-UGTMS, 03. Safety conceptual approach & guideline. Deliverable D6 of the UGTMS project. September 2003.

D10-UGTMS, 04. Confirmity assessment, human factors issues & guidelines for FRS. Deliverable D10 of the UGTMS project. January, 2004.



5. Definition of data necessary for sustaining the module for Human Factors Risk Assessment included in the generic model of the transportation system

5.1 The Safety Data Base of the International Unions of Railways

The Safety Data Base system of the International Unions of Railways (UIC-SDB) is a data collection system commonly agreed and applied by the members of UIC to collect data and information about the events that occur during normal rail operations and may be classified as Accidents, Serious Accidents, Significant Accidents, and Serious Injury Accident (Directive EC 2004/49/EC and EC Regulation No 1192/2003).

The following definitions apply from the above mentioned EC Directive and Regulation:

DIRECTIVE 2004/49/EC

- Accident means an unwanted or unintended sudden event or a specific chain of such events which have harmful consequences; accidents are divided into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
- Serious accident means any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety; "extensive damage" means damage that can immediately be assessed by the investigating body to cost at least EUR 2 million in total.

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- Significant accident means any accident involving at least one rail vehicle in motion resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic. Accidents in workshops, warehouses and depots are excluded.
- Serious injury accident" means any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person. Accidents in workshops, warehouses and depots are excluded.

The UIC Safety Database collates all significant accidents – i.e. any accident causing at least one fatality or serious injury or damage over €150K or tracks blocked for more than 6 hours. When in accordance with RID/ADR section 1.8.5, each accident involving dangerous goods has to be registered in the Safety Database. Accidents in workshops, warehouses and depots are excluded. Interruption of a line for more than 6 hours refers to the interruption of traffic on a section of line for more than 6 hours.

At the level of "accident analysis", each network should evaluate the real importance of this interruption, according to the volume or the concentration of traffic on each section of line concerned for example, interruptions of traffic which have occurred on less important lines where the infrastructure manager does not estimate it urgent to carry out a quick reestablishment of circulation.

In this context the relevance of Human Errors and Human Factors analysis is obvious. The majority of events and non-conformity occurrences are associated to a contribution derived from human intervention. These aspects need to be considered at all levels, i.e., when collecting information and when analysing the results of an occurrence, and specially, when performing statistical assessments of large organizations, such as metros and urban guided systems of cities.

In order to collect data and information, it is necessary that adequate "taxonomies" and models are utilized in order to structure such data in a format that can then be adequately analysed and lessons may be learned. Focusing on human related events, this implies the application of theories of Human

Factors. Such theories nowadays exist and have been proven valuable in other transportation domains such as Aviation. Consequently, it is possible to extend such theories to the domain of urban guided transport.

Finally, the level of seriousness at which data collection should be performed is also very relevant. The collection of data uniquely when a “serious occurrence”, when injuries and damage to the infrastructures and vehicles occur, is totally insufficient to create an adequate statistical base for analysis. The well known “iceberg” approach implies that for every “serious occurrence” many more minor events or near-misses occur. It is absolutely necessary that the latter types of occurrences are reported and data about them are analysed in order to enable a consolidated and proactive incident prevention process.

5.2 Human Reliability Assessment methods

In an approach for hazard quantification (Quantitative Risk Assessment, QRA), the combination of event trees and fault trees analyses, performed for a vast number of initiating events, provides a complete description of the possible accidental paths. These include also the events related to human erroneous behaviour.

The “human factor” techniques developed over the past years have well matched in accuracy and in formalism with the corresponding “system reliability” methods to which they have been coupled for the performance of hazard studies. The original work of Swain and Guttman (1983), called Techniques for Human Error Rate Prediction (THERP) is the most appropriate approach that can be initially applied when a quantification is required of the risk associated to human factors.

The reason for this conclusion is that THERP offers direct access to the data base contained in its Chapter 20 and an immediate integration of its output data into a FT type approach.

A detailed discussion on the reasons for considering THERP the most appropriate approach to start the assessment of HF contribution to Risk Analysis have been discussed in detail in Deliverable D 87.

References

Swain AD, Guttman HE: *Handbook on Human Reliability Analysis with Emphasis on Nuclear Power Plant Application*. Draft Report. NUREG/CR-1278. SAND 80-0200 RX, AN. Final Report, 1983.

6. Conclusions

A detailed discussion on Models and Taxonomies for Human Factors data Collection and Classification is the natural result of all the work developed so far.

This process can only be carried out when the assessment of user needs and evaluation of existing approaches are completed. This work will be the starting point of the next period of work and will lead to the definition of a potential set of specifications that will support the development of a preliminary version of a European data collection system.

This will also be associated with a set of techniques and tools of analysis focussed on Human Factors issues.



ANNEX I: Questionnaire

Questionnaire developed to collect information on the current metro reporting systems, their advantaged and disadvantages and the needs/expectations

QUESTIONNAIRE EVENT REPORTING AND ANALYSIS

This questionnaire aims at collecting information on how incidental or dangerous events are reported and analysed in your Company and it focuses on concrete current practice and implementation issues.

PART ONE of the questionnaire focuses on the specific system/tool your Company uses for Event reporting and analysis.

Part TWO focuses specifically on the Human Factors issues.

PART THREE of the questionnaire addresses your company needs and requirements for an improved reporting tool.

In answering these questions, please focus on the current practice and real implementation issues of event reporting tools. Avoid theoretical answers which would only highlights the advantages that a tool should have, VERSUS the real advantages/disadvantages the tool has (THEORY VS PRACTICE). We are not interested in formal answers and definitions, but in how things work/don't work in reality.

Your Company may currently use more than one reporting system. For example, you may have an incident reporting system as well as a voluntary/confidential/anonymous/non punitive reporting system to encourage people to report unsafe occurrences and dangerous situation. In this case, you are asked to answer the questionnaire twice.

If some questions are not clear enough, please do not hesitate to contact us for explanation.

Finally, please provide us with

- **definitions and classifications in your company of accident, incident, near miss, non conformity event, dangerous event, ...**
- **the form you use for reporting/recording information**
- **the standard you use for events analysis**

If your Company has not yet implemented a tool/system for event reporting, please feel free to skip PART ONE of the questionnaire, and answer only PART TWO and THREE, which deals with your requirements about improved Reporting Systems. Explain the reasons for not having implemented a reporting tool.



<u>PART 1</u> Currently, in your Company, which systems or tools are used for events reporting? For each reporting system/tool, please answer the following questions.	
1.	Name/title/acronym of the reporting system/tool.
2.	Who is the owner?
3.	How long have you been using it?
4.	Which is the objective of that reporting system/tool?
5.	Describe the Reporting System and list the type of information/data that you collect.
6.	Is there a standardised form to collect the information about the event? Who fills in the form? Directly electronic data entry or paper-based first? <u>Please, attach Electronic Form to this questionnaire.</u>
7.	Which type of events are reported and analysed through that specific system/tool? List the different types of events.
8.	In case there is no standardised form, for each event, which information do you record/collect? On which aspects of the event do you focus on? About what and who (people, operations, system)?
9.	Once the information is collected, is it analysed? How? By whom (person, department)?
10.	During the analysis, which type of causes do you investigate? Technical causes and Human Factors related causes? <u>List</u> the specific causes that you generally take into consideration during the analysis.
11.	Key findings which come out (or have come out) from the analysis.
12.	Is there a data-base for data collection and analysis? <ul style="list-style-type: none"> • Who enter the data into the data-base? Where? How? • Are data statistically analysed in order to identify trends? • Who analyse the data? • How often? • What is the objective of this statistical analysis? What do you analyse? • Which are the main results which come out from this statistical analysis?
13.	Then, how do you use those results?
14.	According to the key findings, do you develop recommendations and suggest corrective actions? How? To whom?
15.	Do you monitor if the actual implementation of the corrective actions occurs? How?
16.	Have recommendations and corrective actions an impact on the system? (broad VS focused perspective)
17.	Do you find that reporting system useful? Why?
18.	Which are the main difficulties and barriers that you encounter during its implementation?
19.	Which are the main advantages of this specific reporting system?
20.	Which are the main disadvantages?
21.	Which lessons have you learnt about your reporting system? What would you do differently and why?



22.	How could the reporting system ameliorate? Suggestions?
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PART 2

23.	According to your point of view, what are the critical aspects which most influence drivers' performance?
24.	What are the critical aspects which most influence the performance of the people working in the control room?
25.	Does your company take into consideration HF aspects during the reporting and analysis of an incident? Which aspects?
26.	Does your company have any statistical data about Human Factor involvement in incidents/accidents?
27.	Which are the Human Factors aspects that you would necessarily insert in an incident reporting form, because they need to be taken into consideration during the reporting and analysis?

PART 3

28.	Which are the key issues that MODSYSTEM WP23.3 should address, in terms of developing an improved event reporting tool/system?
29.	What would you expect from a "new" reporting tool/system? Why?
30.	What would you need to report/analyse? In particular, which type of information/data do you need to know? Why?
31.	Then, how would you use these information/data? Why?
32.	Who should be in charge/responsible for this reporting tool/system? What other parties involved (people and departments)?
33.	Describe how the relationship between reporting system and change interventions should be.
34.	How would you measure the reporting system success?