

EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY



COST ACTION TU1103:

OPERATION AND SAFETY OF TRAMWAYS IN INTERACTION WITH PUBLIC SPACE

Final conference – Frankfurt, Germany – 29 September 2015



Post-analysis and hotspots **Contents**

- Post-analysis
- Hotspots





Post-analysis and hotspots **Post-analysis**

"All processes taken after an event in order to improve safety"

- what happened and how to avoid it
- starts some time after accident resolution
- data from accident reports and other sources





Post-analysis and hotspots **Objectives**

- Evaluate, register and minimize risk;
- Check if rules were adapted to the situation;
- Make a human behaviour analysis;
- Bring complements to driver training;
- Make an economic evaluation;
- Draw a conclusion and propose measures.





Bouchet, 22 cantons, secteur Rive

La prison de Champ-Dollon nous signale avoir reçu de nombreuses réclamations

de la part de livreura, convoyeura et autres

entreprises externes qui rencontrent des problèmes à la sortie de l'enceinte de la

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éhicules venent d'en face. Veillez à

etc...).

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aux endroits concernés une sécurité maximale tout en évitant une usure prématurée du matériel roulant et des infrastructures.

risque de perturbation liée entre autres à un dysfonctionnement électrique ou à un

ontimale nermet d'assure accotements et des terrains des riverains





Post-analysis and hotspots Search for improvements

- Organizational improvements, e.g. procedures, staff, processes, accountability;
- Operational improvements, e.g. running times;
- Infrastructure improvements, e.g. signage;
- Rolling stock improvements, e.g. specifications, visibility;
- Environmental improvements, e.g. visibility by vegetation.





Post-analysis and hotspots **Different methods**

A. Treatment implemented at one location:





Post-analysis and hotspots **Different methods**

A. Treatment implemented at one location:



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Post-analysis and hotspots **Different methods**

A. Treatment implemented at one location:







Post-analysis and hotspots **Different methods**

A. Treatment implemented at one location:



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Post-analysis and hotspots **Different methods**

- B. Treatment implemented at several locations in one tramway system:
- type of events (e.g. left-turns)
- locations
- lines
- days of week and time of day





Post-analysis and hotspots **Different methods**

- B. Treatment implemented at several locations in one tramway system:
- type of events (e.g. left-turns)
- locations
- lines
- days of week and time of day
- emergency braking





Post-analysis and hotspots **Different methods**

C. Treatment implemented at several tramway systems:





Post-analysis and hotspots Different methods

C. Treatment implemented at several tramway systems:





Post-analysis and hotspots What is a hotspot?

Operator definitions:

- greatest number of events (accidents) in past year (Warsaw)
- accident locations in past 3 years (Lisbon)
- accident locations in past 10 years (Dublin, Barcelona, Manchester)



- three similar injury accidents in last 3 years or 5 damage only accidents in past 5 years (Vienna)
- emergency brake application frequency (Dublin)



Post-analysis and hotspots What is a hotspot?

Other definitions:

- numbers of near miss accidents (Dublin)
- passenger accidents due to emergency braking (Le Mans)
- minor collisions with vehicles (various)
- minor collisions with pedestrians (various)







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Post-analysis and hotspots

Identify number of accidents above maximum tolerable





Post-analysis and hotspots

Identify increase or decrease in accidents at locations and determine highest increase





Post-analysis and hotspots

Identify causes of accidents at locations and focus on highest ones





Post-analysis and hotspots Important sources of hotspot locations

- tram drivers
- line managers
- instructors



Get feedback every time an issue is reported.....

Operators in the field identify potential accidents before they happen!



Post-analysis and hotspots

Hotspot identification is the first step for in-depth post-analysis

...leads to proposals for improvements to reduce risks, e.g.

- new traffic signals
- modifications to existing traffic signals
- carriageway markings
- improved sightlines
- prohibit turning movements
- tram driver training
- safety campaigns



Post-analysis and hotspots Examples of before and after - Barcelona

Changes on traffic light programming

Close the entrance to roundabouts in the green phase for the tramway







Post-analysis and hotspots Examples of before and after - Porto

Problem: The tramway on reserved track in central reservation. Left turning vehicles at risk of collision with trams.

Solution: Left turning traffic movements prohibited and controlled by traffic signals and road signs. When the tram signal shows proceed all road traffic movements are stopped.





Post-analysis and hotspots Examples of before and after - Manchester

Poor sightlines at junction of cars with tramway – better signs erected





Post-analysis and hotspots Safety campaigns





Post-analysis and hotspots Safety campaigns







Post-analysis and hotspots Safety campaigns







Post-analysis and hotspots Safety campaigns







Post-analysis and hotspots Safety campaigns







Post-analysis and hotspots Safety campaigns







Warsaw





Westenin Sie während der Fahrt nicht den Platz.



Parkieren Sie den Kinderstägen gegen die Fahrbichtung and ziefen Sie die Breese an.



Zurich



Post-analysis and hotspots

Questions?







Thank you for your attention !

Katarzyna Goch (IBDIM, Poland) Tony Young (TY Consultancy, UK)

www.tram-urban-safety.eu