



Next Generation Integrated Mobility:

Driving Smart Cities

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Nicolas Saunier

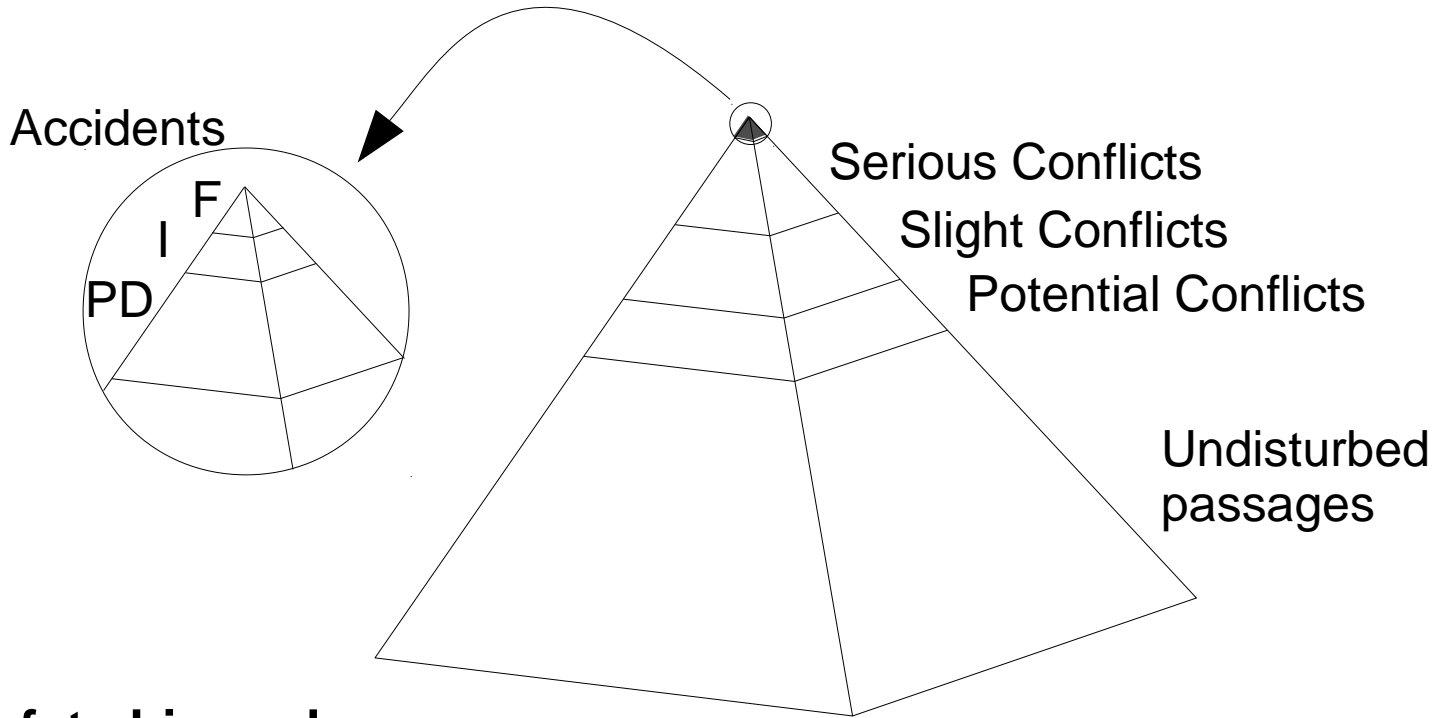
Polytechnique Montréal

State-of-Practice of Surrogate Measures of Safety

Methods for Road Safety Analysis

- 2 main categories of methods, whether they are based on **direct observation** or **not**
 - Accidents are reconstituted → **reactive approach**
 - traditional road safety analysis relying on historical collision data
 - vehicular accident reconstruction
 - Road user behavior and accidents are directly observed
 - surrogate measures of safety → **proactive approach**





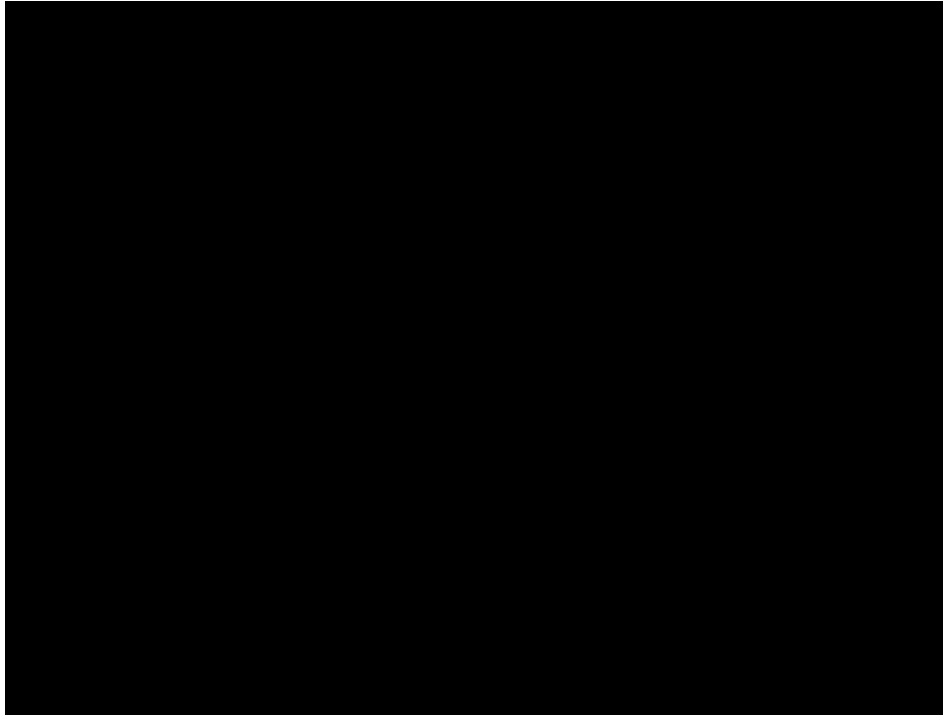
The safety hierarchy

adapted from (Chryster Hydén 1987) and (Svensson 1998)



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Serious Conflict

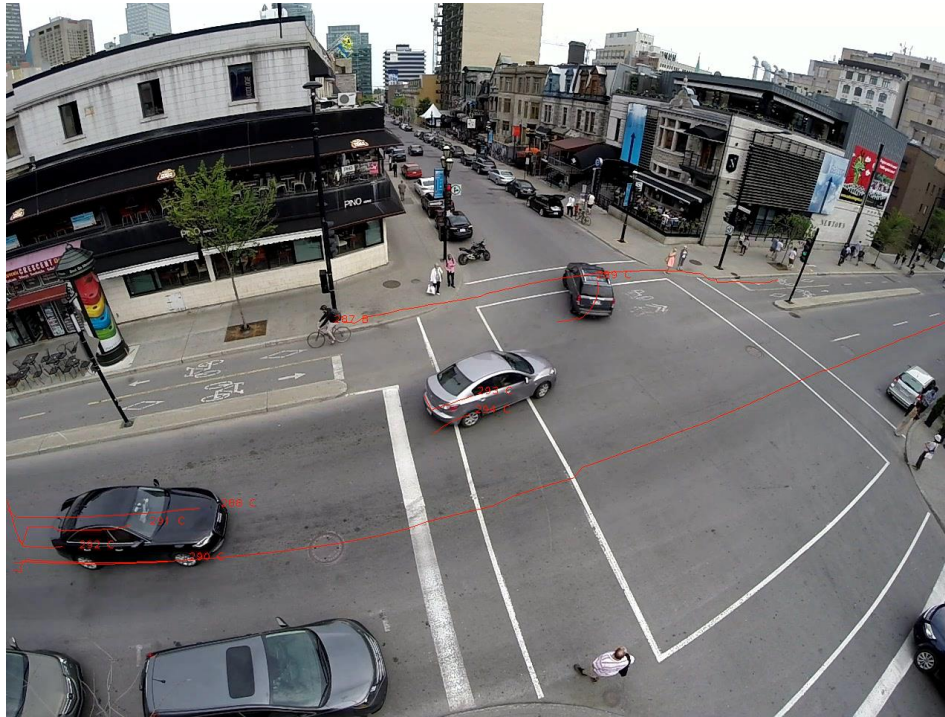


provided by A. Laureshyn, Oslo, Norway



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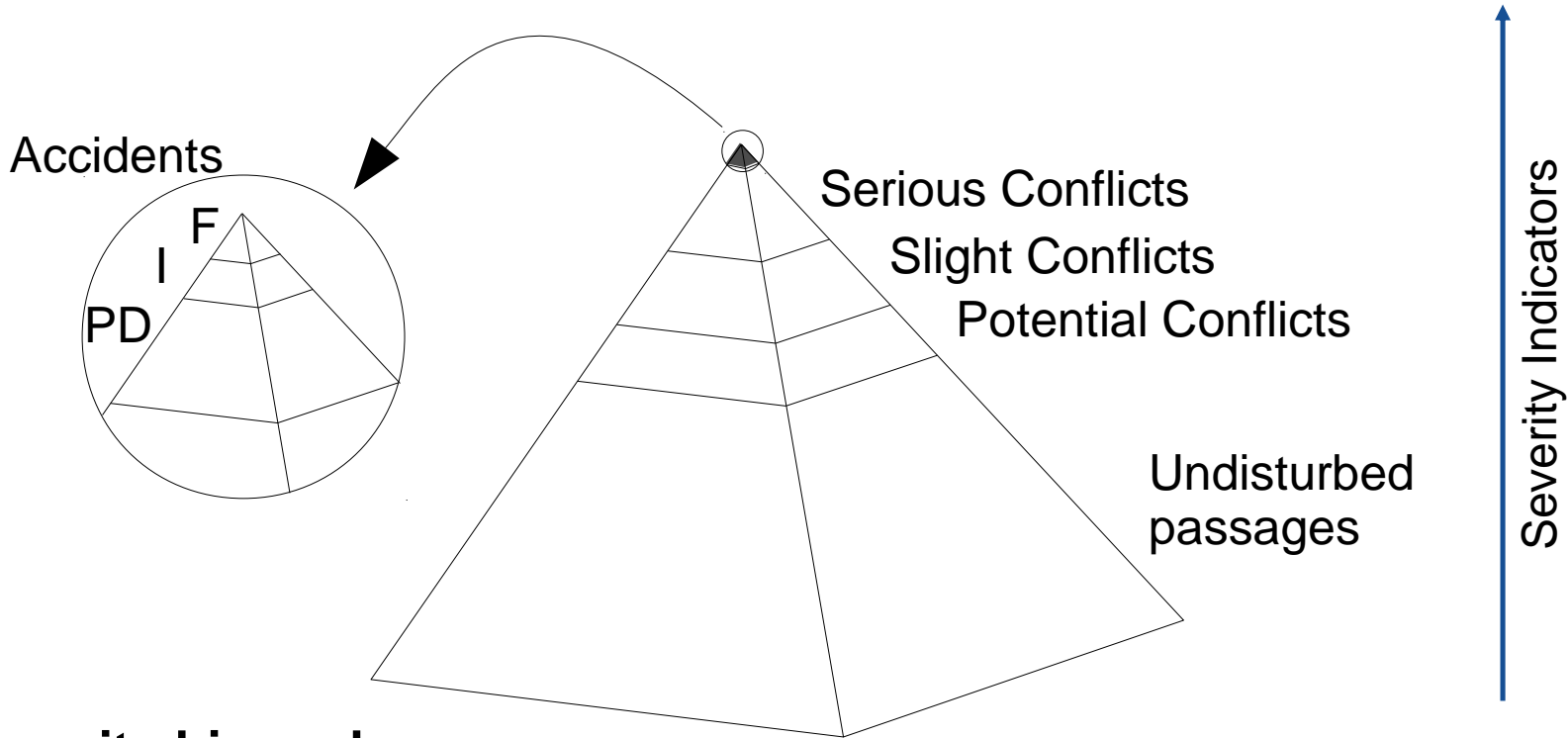
Serious Conflict



collected by S. Zangenehpour, Montréal, Canada



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The severity hierarchy

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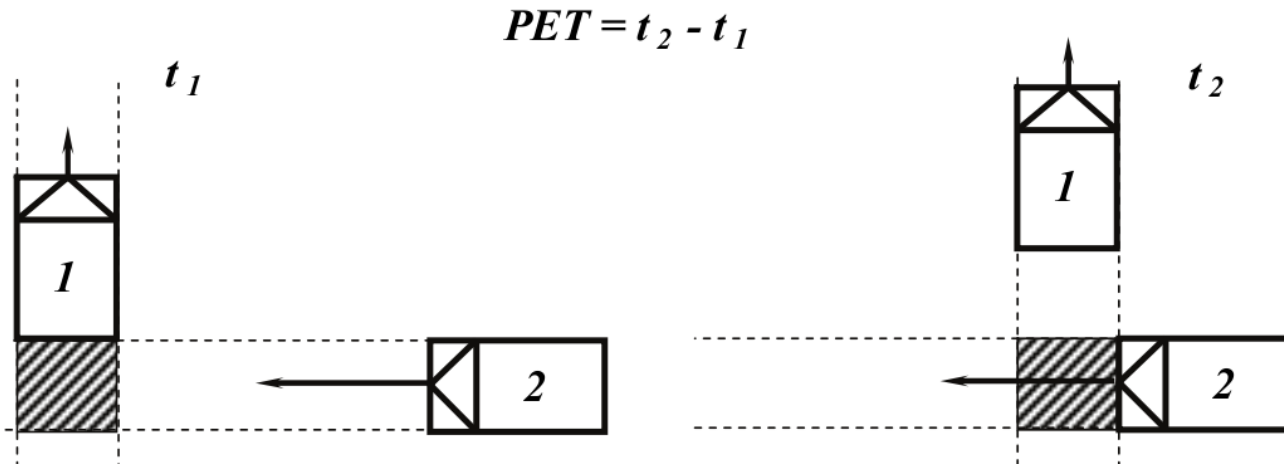
Conflict Techniques

- **Swedish** – *Hydén (1987)*
- **Dutch (DOCTOR)** – *Kraay et al. (1986)*
- **US** – *Parker & Zegeer (1989)*
- **British** – *Baguley (1984)*
- **Canadian** – *Cooper (1984)*
- **Finnish** – *Kulmala (1984)*
- **French** – *Muhlrad & Dupre (1984)*
- **Belgian** - *Mortelmans et al. (1986)*
- **German** – *Erke (1984)*
- **Austrian** - *Risser & Schutzenhofer (1984)*



Severity Indicators

- Speed, deceleration, jerk
- Distance
- Time difference: Post-Encroachment Time (PET)



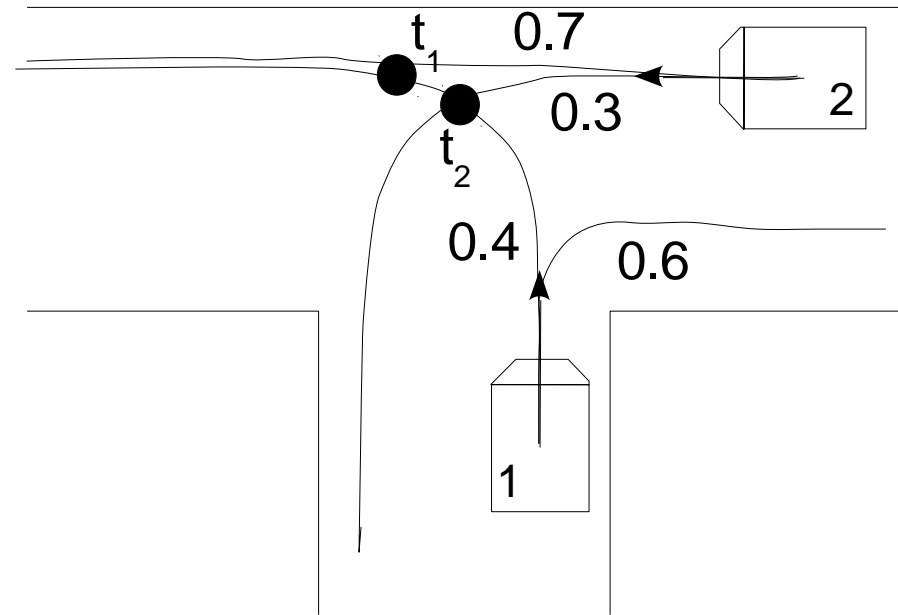
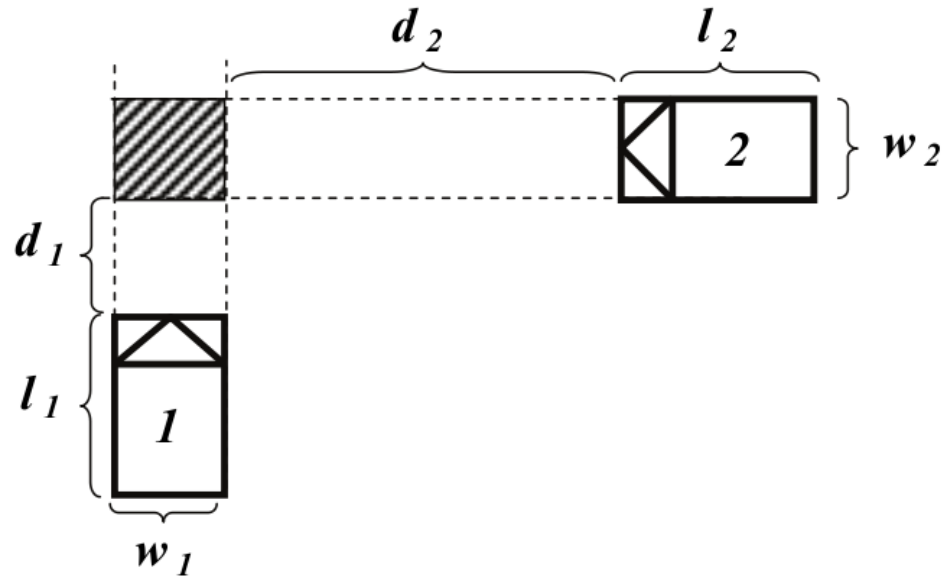
Severity Indicators

- A traffic conflict is “an observational situation in which two or more road users approach each other in space and time to such an extent that a collision is imminent **if their movements remain unchanged**” (Amundsen et al. 1977)
- Evaluating the safety of non-collision events requires to evaluate **what would have happened** if the road users were **not aware** of each other
 - a method to **predict** each road user’s future motion is needed
 - several indicators depend on **motion prediction: Time-to-Collision (TTC)**, predicted PET, deceleration to safety time (DST)



Severity Indicators

- TTC



Surrogate Measures of Safety Today

- Conflict techniques, esp. in Sweden
- Automated video analysis
- User-based data collection
- Traffic simulation



LUND
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Department of Technology and Society
Transport & Roads

24/04/2015

Certificate

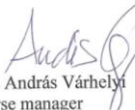
This certificate confirms that


Nicolas Saunier

has fulfilled the requirements as a trained conflict observer. This qualifies the above person to carry out conflict observations according to the Swedish Traffic Conflict Technique.

The aim of the training is to capture specially defined events in real traffic that are related to accidents. The training lasts for 30 hours and covers the basic theory of the technique as well as practical training, including speed and distance assessment.

The Swedish Traffic Conflict Technique has been proved to predict accident risk in a quick and efficient way. It is recommended that the technique is regularly practised to maintain the skills required and that re-training takes place in five years time.


Prof. András Várhelyi
Course manager


Dr Sverker Almquist
Main tutor

InDeV Project (Horizon 2020)

- In-Depth Understanding of Accident **Causation** for **Vulnerable Road Users** (VRU), 2015-2018
- Goals
 - develop an **integrated methodology** to study VRU accidents
 - improve assessment of VRU-accident costs
- Integrated methodology
 - accident databases (police & emergency)
 - in-depths accident investigations
 - **traffic conflicts/observational studies**
 - **naturalistic cycling/walking (mobile app)**
 - self-reported accidents



InDeV

IN-DEPTH UNDERSTANDING OF ACCIDENT CAUSATION FOR VULNERABLE ROAD USERS

InDeV Output

- Methodology
 - 24 sites->3 weeks (7 countries)
 - 3 sites->1 year
- Technical support tools (open source)
- VRU safety handbook & software manuals



Watch Dog RUBA

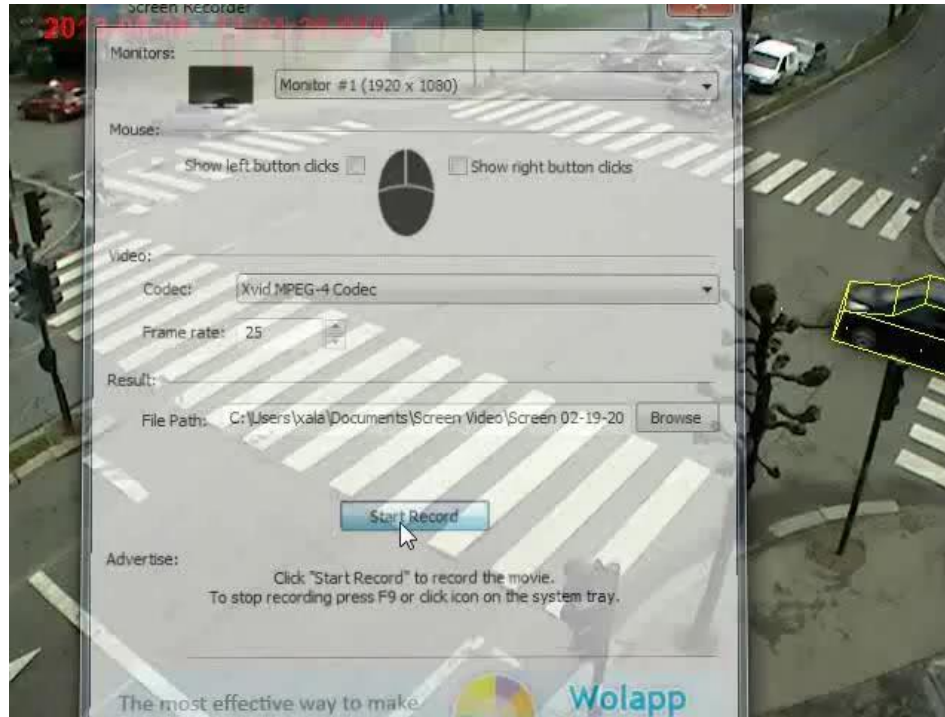


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<https://bitbucket.org/aauvap/ruba/wiki/Home>

T-Analyst



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<http://www.tft.lth.se/en/research/video-analysis/co-operation/software/t-analyst/>

Conclusion

- Getting started
 - *Review of current study methods for VRU safety: Appendix 6 - Scoping review: surrogate measures of safety in site-based road traffic observations*, www.indev-project.eu
 - TRB and SAE committees and **white papers**
- Tools
 - in particular **open source** software: Traffic Intelligence, RUBA watch dog, T-Analyst
- Many open questions
 - methods to **compare** and **validate** surrogate measures of safety





IN-DEPTH UNDERSTANDING OF ACCIDENT CAUSATION FOR VULNERABLE ROAD USERS

Visit us on www.indev-project.eu

Thank you very much for your attention!



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Mobile app – fall detection

