96th TRB Annual Meeting
Surrogate Measures of Safety (SMoS) Subcommittee ANB20(3)
Monday, January 9th, 2017, 8:00AM - 9:45PM
Marriott Marquis Ballroom Salon 14 (M2)
Chair: Nicolas Saunier
Andrew Tarko presiding

1. **Opening remarks** - Andrew Tarko

2. **Introduction of participants** - All

3. **Discussion and approval of the 2016 meeting minutes** - Approval of the 95th TRB subcommittee meeting minutes is postponed to the next session.

4. **TRB Annual Meeting update -** Bernardo Kleiner (not present)

5. **Updates from liaisons with other TRB groups and International Associations (none present)**
   - **5.1.** Salvatore Cafiso - Transportation Safety Management (ANB10)
   - **5.2.** Geometric Design (AFB10)
   - **5.3.** Hillel Bar-Gera - ANB20(5) Joint Subcommittee on Speed and Safety
   - **5.4.** Amir Sobhani - Task Force on System Simulation (AHB80T)
   - **5.5.** John Ivan - Highway Safety Performance (ANB25) and Future Directions in Safety Analysis ANB20(1)
   - **5.6.** Nicolas Saunier - International Co-operation on Theories and Concepts in Traffic Safety (ICTCT) Workshop

6. **Surrogate measures at the 96th TRB Annual Meeting -** synthesis of papers - Matin Nabavi Niaki, Cristhian Lizarazo, and Thomas Hall.
   - Twenty-eight papers were identified involving SMoS.
   - The most relevant topics covered in these papers include:
     - intersection safety (11 papers),
     - pedestrians and non-motorized traffic (8 papers),
     - highway safety (7 papers), and
     - connected vehicles (3 papers).
   - Traffic conflicts are the most frequently used SMoS (18 papers). Time-to-collision (TTC) and post-encroachment time (PET) are the most commonly used indicators. Speed-related measures (including acceleration and deceleration) are used as SMoS in 7 papers.

- Data sources and techniques include: field observations (17 papers), simulation methods and tools (8 papers), and naturalistic driving data (4 papers).

7. Research updates and presentations

7.1. Naturalistic Driving Studies (NDS) projects sponsored by FHWA – Carol Tan.

- The SHRP2 Implementation Assistance Program (IAP) is expanding. The program helps DOTs, MPOs and other organizations deploy SHRP2 solutions focused on SMoS.
- SHRP2 – Roadway Information Database (RID) was improved to include where crashes happened, weather data, traffic information; 7 years of crash history. It helps to identify specific road infrastructure, such as intersections and segments, for assessing safety analysis based on surrogate measures.
- Crashes and near-crashes were identified based on kinematic signatures defined by the Virginia Tech Transportation Institute. These may be obtained for further investigation.
- The goal of the Safety Training and Analysis Center (STAC), which is currently certified as secure data enclave (SDE), is to expand understanding of and access to SHRP 2 safety data.

7.2. SSAM and ETFOMM updates (http://sourceforge.net/projects/etfomm/) – Li Zhang

- Parallel computing platforms were incorporated into the new version of SSAM for speeding up the result processing. The new parallel computing capabilities decrease the computation time by up to 90 %.
- New safety performance measures were included in the software such as trajectory prediction by sampling distribution of acceleration and direction, Multiple PET (mPET), multiple TTC (mTTC), and probability of unsuccessful evasive action P(UEA).
- The conflict map from the original SSAM was converted from 2D Java graphics into a 3D display programmed using OpenSceneGraph library based on OpenGL.
- Additional features in SSAM include bar charts, heat maps, and contour maps to illustrate conflicts. API functions for data input, SMoS exporting, and interfacing with traffic simulation software.
- The project is ending so we should tell them if we want any other measures added to the software.
- Four universities are currently using the software.
- Information about the software is provided on http://www.etfomm.org.

7.3. Update on the European project In-depth Understanding of Accident Causation for Vulnerable Road Users (InDeV) (http://www.indev-project.eu) – Andrew Tarko

- In WP2 (Review of existing methods for accident causation studies), an extensive scoping literature review on surrogate safety measures has been performed and is available online (Appendix 6 of deliverable D2.1 http://www.indev-project.eu/InDeV/EN/Documents/pdf/2-1-4.pdf?__blob=publicationFile&v=2).
- The WP3 (Observational Studies) of InDeV aims to calibrate and validate SMoS and behavioral indicators against accident statistics and in-depth accident investigations based on new data collected through long-term (1 year) filming in Poland, Belgium and Spain and short-term filming in Denmark, Belgium and Poland.
- In WP4, methodologies to observe conflicts using video data and computer vision have been implemented in the project.
    - Semi-automated watchdog video analysis RUBA (https://bitbucket.org/aauvap/ruba/)
    - Mobile application for naturalistic walking/cycling data collection (crash and conflict self-reporting)
- The project aims to build a vulnerable road user safety diagnosis handbook (WP6).
- Additional information may be found at the following website: http://www.indev-project.eu/InDeV/EN/Home/home_node.html

7.4. Research on SMoS at Purdue University - Andrew Tarko

- Purdue research is doing research on the feasibility of using LiDAR technology for tracking road users. The system is referred to as "TScan-Stationary LiDAR for traffic and Safety Applications".
- The research was conducted using a Velodyne HDL-64E LiDAR mounted on the mast arm of the Purdue Mobile Traffic Laboratory: with 64 laser sensors, video cameras for day and night function and communication tools for real time data processing which saves only the results.
- Preliminary phases of the project support the feasibility of the TScan system for tracking vehicles, pedestrians, and cyclists at intersections under disperse and low-volume conditions. Detection of moving objects reaches 98 %.
- The trajectory files obtained from TScan were incorporated into SSAM for identifying real traffic conflicts at intersections.

7.5. An analytical method for safe system assessment of intersection design - Amir Sobhani (not present)

8. **Current activities**

8.1. Subcommittee website migration to Google Sites - John Hourdos (not present)

8.2. Survey on surrogate measures in use ("best practices") - Karim Ismail (not present)

8.3. New initiatives and Future Activities – Paul Jovanis

- There is a continued need of finding relationship between SMoS and crashes. The validation of SMoS must be assessed based on statistical evidence. Further discussion of this initiative should be included in a future research statement.
- Decision makers understand crash reduction therefore it is important to establish a clear connection between conflicts, near crashes and other SMoS, and crashes.

8.4. Research needs statements: revise and update

- Carlos Lima Azevedo - A first draft of the research needs statement was developed. A list of potential peers was constituted for additional revision.
- Majed Al-Ghandour - Surrogate Measures of Safety (SMoS) Synthesis Project (NCHRP problem statement). The subcommittee applied in 2016, but was not selected. In order to apply next year, it needs to be updated to be more practical.

8.5. Ideas of special sessions for TRB 2018 meeting - Nicolas Saunier (not present)

9. **Coming conferences, meetings, research opportunities, and other matters** - All
    - 2017 Road Safety and Simulation (RSS) International Conference, hosted by Delft University of Technology (TU Delft) and organized in cooperation with the Dutch Institute for Road Safety Research (SWOV).

10. **Adjourn**

Minutes prepared by:

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