Department of Technology and society
Transport & roads

19/12 2012

Course plan

Evaluation of ITS applications

A PhD course in the Swedish postgraduate school for ITS

5 ETSC credits

Course start: second half of February 2013 (kick-off seminar)
End date: end of May / beginning of June 2013 (final seminar)

Aim

The aim of the course is to teach participants a scientific approach to how ITS applications and their effects can be evaluated with respect to functionality, user related criteria, traffic effects and transport policy goals.

Learning outcomes

Knowledge and understanding
For a passing grade the student shall comprehend the various evaluation criteria of ITS applications, as well as what scientific methods can be used for their assessment and evaluation.

Competences and ability
For a passing grade the student shall be able to independently compose evaluation schemes and apply scientific methods to analyse the need for, technology used for and the effects of ITS applications.

Content

Technology assessment
Technology tests and "validation", Simulation, "Software in the Loop", "Hardware in the Loop" tests.

User-related assessments and evaluation
Methods to identify the needs of the various types of actors and user groups with regard to ITS applications (HMI issues, Actor analysis, Goal trees, Interviews, Focus groups, Surveys) as well as methods applicable to evaluate ITS applications with regard to user reactions, behaviour and acceptance.

Impact assessment
Prospective and retrospective assessments
Evaluation steps, building of hypotheses on expected effects and possible negative effects as a result of undesired behavioural adaptations,
Study design and methodology,
Effect evaluation in simulator and in-field experiments,
Impact assessment by network simulation (safety, efficiency, environmental effects),
Short-term and long-term effects),
Socio-economic impact assessment.

Disposition

The course is mainly run as a distance course with four meetings.
1. At the first meeting the topics of the course will be presented and discussed.
   Then, each participant will be assigned an evaluation handbook/guidelines for ITS.
   The task: Analyse the handbook/guidelines critically: What aspects of evaluation they are aiming at? How do they fulfil the goals for evaluation? Do they cover all the aspects they should cover? What evaluation methods are proposed? Are these methods relevant, appropriate and validated?
2. At the second meeting, each participant will present and discuss the intentions of the handbook/guidelines.
   Then, each participant will be assigned a (completed) ITS development project/case to analyse it from the evaluation point of view.
   The task: Analyse the project you are assigned critically: was it evaluated in all aspects along the ITS development steps, was the evaluation properly planned and carried out? Were any formalised guidelines considered?
3. At the third meeting, each participant will present and discuss her/his case.
   Then, each participant will be assigned a new ITS application for which she/he will compose an evaluation plan and write an individual report.
   The task: Make a detailed evaluation plan for each development stage of he ITS application, you are assigned, including technology "validation", hypotheses, observational variables, measurement methods (Hermeneutic or Positivistic), study design, number of observations, etc. Consider the time perspective, as well as various possible effects, such as expected, side- or secondary effects.
4. At the final meeting, each participant will present the evaluation plan to the other course participants.

Peer-reviewing by fellow course participant will be practiced, which means that the report is read by a fellow student, the "reviewer", who at the final seminar gives his/her opinion and comments on the report.

The participant's work will be supported by lecturers in connection to the seminar meetings.

Topics for lectures:
Evaluation of ITS applications (András Várhelyi, LU, S)
Technology tests, software, hardware, HMI issues (Mark Fowkes, MIRA, UK)
Stake-holder analysis – goal trees, interviews, focus group, questionnaires (Mark Fowkes)
Socio-economic impact assessment (Gunnar Lind, Movea, S)

Evaluation Handbooks/Manuals/Guidelines:
- ADVISORS (Methodology to assess ADAS impact on safety, network efficiency),
- AIDE (Evaluation methodology with ADAS end users),
- CONVERGE (Guidebook for user needs, impact assessments, socio-economic assessment),
- eIMPACT (Socio-economic impact assessment),
- FESTA (Field Operational Tests),
- FITS (Finnish) Guidelines for the evaluation of ITS projects),
- Handledning för planering av utvärdering vid införande av väginformatik (Vägverket),
- RESPONSE (Code of practice for design and evaluation of ADAS),
- SEISS (methodology for assessing the potential impact of IVSS),
- TEMPO (Guidelines for the evaluation of ITS projects).

ITS projects:
- Congestion charge in Stockholm
- Variable speed limits large scale trial in Sweden
- ISA national large scale trial in Sweden
- MASTER
- PROSPER
- SASPENCE
- eIMPACT

ITS applications for evaluation study:
1. Internet based travel planning services with travel time prediction: A travel planner comprising all travel modes (walking, cycling, public transport and car) and combination of these is to be developed and its effects to be evaluated.
2. Dynamic route guidance: A dynamic route guidance system provides the driver with on-line information on the best route from the vehicle's present position to the final destination. The system is to be developed and its effects to be evaluated.
3. Real-time information on road friction: Slipperiness information based on ABS and ESC in probe vehicles, combined with weather information from weather status monitoring stations along the road is used to give hazard warning and information on appropriate speed to the drivers, as well as information to road maintenance unit, who can act in a timely way to improve road conditions. The system is to be developed and its effects to be evaluated.
4. Demand responsive public transport: Travellers contact the control centre and indicate their destination, preferred time of travel and any special needs. The centre locates and

dispatches the most conveniently located vehicle (with passengers on compatible routes). The system is to be developed and its effects to be evaluated.

5. Speed-over-distance enforcement: A system designated to recognise vehicles at two measuring points along the road, using cameras (triggered by in-pavement loops), automatic number plate recognition and optical character recognition. Image matching enables calculation of the vehicles' average speed over the fixed distance between the cameras. The system is to be developed and its effects to be evaluated.

6. Black-box in motor vehicles: Driving data (speed, acceleration, etc), mobile phone use is logged continuously in a recorder unit in motor vehicles and in case of a crash the last 10 seconds' data before the crash is saved. The system is to be developed and its effects to be evaluated.

7. Pay-as-you-drive: The car insurance fee is dependent upon how the vehicle is driven. Driving history is recorded in a small data recorder (speed limit compliance and jerkiness of driving) and the insurance fee is formed to reward safe driving. The system is to be developed and its effects to be evaluated.

8. Road pricing for heavy vehicles: A flexible tax system for heavy vehicles, based on driven distance. Heavy vehicles are equipped with a dedicated on board equipment for registering vehicle mileage. Road tax is paid depending on mileage on different road types, day and time of the day. The system is to be developed and its effects to be evaluated.

9. Platooning of commercial vehicles: To increase density of goods traffic, several lorries are linked together by "electronic tow-bars" that let them travel in close convoy, with only the leading lorry driven. The system is to be developed and its effects to be evaluated.

10. Cell phone blocker: a wireless car key device to stop motorists from talking on their cell phone or sending SMS while driving. The device is to be developed and its effects to be evaluated.

Assessment

The participants will be assessed due to their performance on their presentation, report writing and reviewer activity. The grading in each part is "passed"/"not passed". To get approved on the course all parts must be "passed".

Literature

Literature references will be provided in connection with the lectures.

Course manager

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