



Field Operational Test of Intelligent Speed Adaptation, Following Distance Warning and Seatbelt Reminder Systems: Methods and Findings from the Australian TAC SafeCar Project

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MONASH University
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TAC SafeCar Project

- First Australian FOT of Advanced Driver Assistance Systems (ADAS)
- Started June 1999; finished August 2005
- 3 project partners:
 - Transport Accident Commission of Victoria (TAC)
 - Monash University Accident Research Centre
 - Ford Motor Company of Australia



Aims

- evaluate technical operation of three ADAS technologies – ISA, FDW and SBR
- evaluate driver attitudes to and acceptance of these technologies
- determine impact of technologies on driving performance - separately and together
- estimate safety and other benefits
- ultimately, stimulate societal demand for ADAS



Phases

Phase 1. Identification of candidate ADAS technologies likely to have large safety benefits.

Phase 2. Fitment and pilot testing of ADAS technologies identified in Phase 1 to two pilot vehicles.

Phase 3. Equip 15 Ford passenger cars with Intelligent Speed Adaptation, Following Distance Warning, and Seatbelt Reminder systems.

Phase 4. Run FOT and associated simulator study (on ISA effectiveness)



Final Reports

- Regan, M., Triggs, T., Young, K., Tomasevic, N., Mitsopoulos, E., Stephan, K., and Tingvall, C. (2005). On-Road Evaluation of Intelligent Speed Adaptation, Following Distance Warning and Seatbelt Reminder Systems: Final Results of the Australian TAC SafeCar Project. Volume 1: Report. MUARC Client Report prepared for the Victorian Transport Accident Commission (270 pages)
- Regan, M., Triggs, T., Young, K., Tomasevic, N., Mitsopoulos, E., Stephan, K., and Tingvall, C. (2005). On-Road Evaluation of Intelligent Speed Adaptation, Following Distance Warning and Seatbelt Reminder Systems: Final Results of the Australian TAC SafeCar Project. Volume 2: Appendices.. MUARC Client Report prepared for the Victorian Transport Accident Commission. (3 volumes)

Available: www.monash.edu.au/muarc/reports/rpts06.html



Journal Articles – So Far...

- Regan, M., Young, K., Triggs, T., Tomasevic, N., Mitsopoulos, E., Tierney, P., Healey, D., Tingvall, C, & Stephan, K. (2006). Impact on driving performance of Intelligent Speed Adaptation, Following Distance Warning and Seatbelt Reminder Systems: Key findings from the TAC SafeCar project. ***IEE Proceedings Intelligent Transport Systems*, 53, (1), pp 51-62**
- Young, K.L., Regan, M.A., Triggs, T.J., Tomasevic, N., Stephan, K., & Mitsopoulos, E. (2007). Impact on Car Driving Performance of a Following Distance Warning System: Findings from the Australian Transport Accident Commission SafeCar Project. ***Journal of Intelligent Transportation Systems, Technology, Planning, and Operations*, Volume 11, Issue 3, 121-131.**
- Young, K.L., Regan, M.A., Triggs, T.J., Stephan, K, Mitsopoulos, E, & Tomasevic, N. (2008). Field Operational Test of a Seatbelt Reminder System: Effects on Driver Behaviour and Acceptance, ***Transportation Research, Part F (In Press)***
- Young, K. L., Regan, M.A., Triggs, T.J., and Jontof-Hutter, K. (2008). Intelligent Speed Adaptation: Effects on experienced and inexperienced drivers' behaviour and acceptability. (Submitted to ***Accident Analysis and Prevention***)



Phase 4 FOT: Overview

- 15 ADAS-equipped Ford vehicles – SafeCars
- 9 corporate car fleets from in and around Melbourne
- Participants: 23 car fleet drivers aged 25 to 64 years
- Each participant drove a SafeCar for 16,500 kms
- Equated to approx 5 months driving per driver



SafeCar Display and Support Systems

Following
Distance
Warning



+
audio
warning



ISA



+
upward
accelerator
pressure



+ audio
warning

Seat Belt Reminder

Reverse
Collision
Warning
audio
warning



Intelligent Speed Adaptation

Following
Distance
Warning



+
audio
warning



ISA



+
upward
accelerator
pressure



+ audio
warning

Seat Belt Reminder

Reverse
Collision
Warning
audio
warning

Following Distance Warning

Following
Distance
Warning



+
audio
warning



ISA



+
upward
accelerator
pressure



+ audio
warning

Seat Belt Reminder

Reverse
Collision
Warning
audio
warning



Seat Belt Reminder

Following
Distance
Warning



+
audio
warning



ISA



+
upward
accelerator
pressure



+ audio
warning

Seat Belt Reminder

Reverse
Collision
Warning
audio
warning



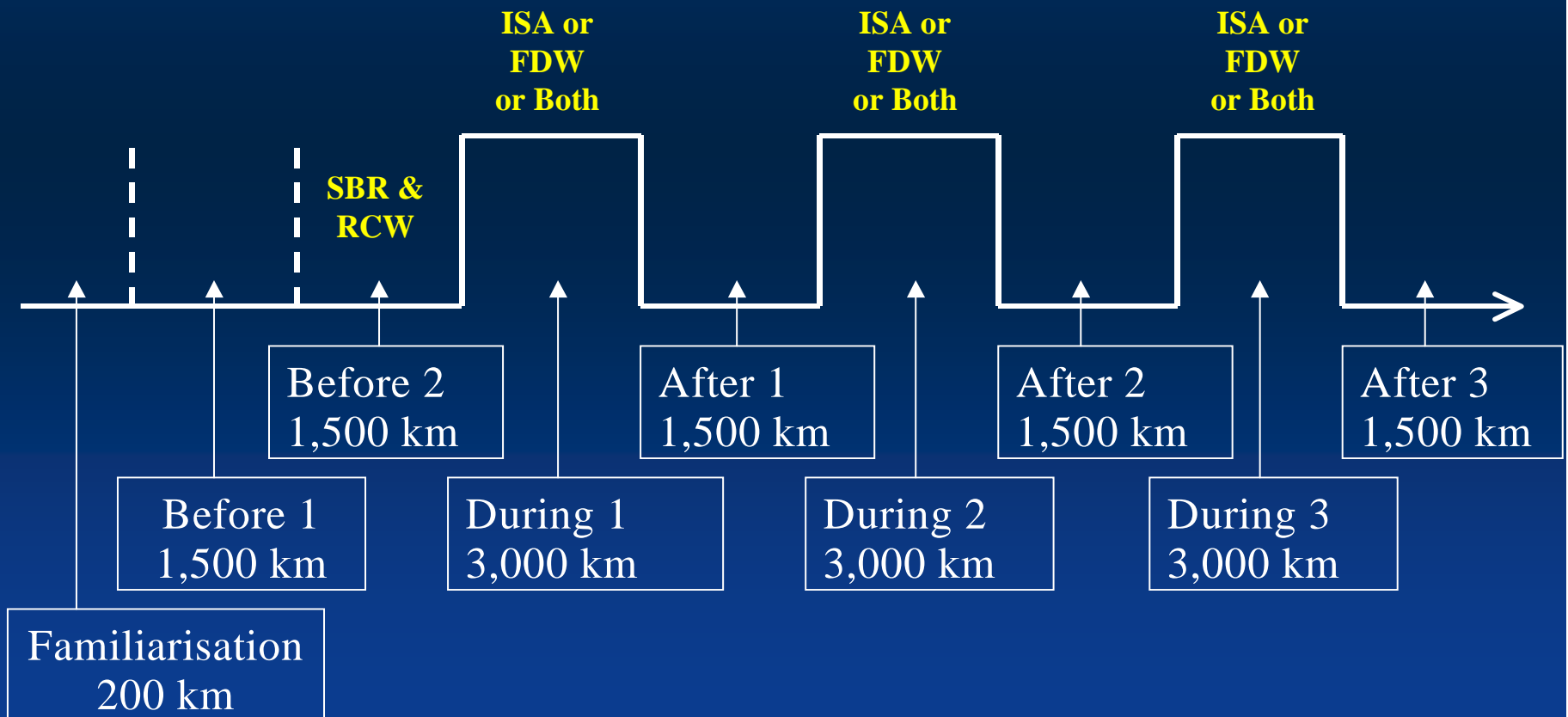
Participants

- **Treatment Group:**
 - 14 males & 1 female
 - Mean age: 43.7 yrs (SD= 8.5)
- **Control Group:**
 - 7 males & 1 female
 - Mean age: 44.5 yrs (SD= 9.23)



Phase 4 FOT: Design

- 15 Treatment participants
- exposed to all 3 ADAS – ISA, FDW and SBR





Phase 4 FOT: Design

- 8 Control participants
- exposed to SBR only





Conclusions

- ISA, FDW and SBR all had a positive effect on driving behaviour.
- But ..these effects did not persist when the systems were turned off.
- The speed reduction effects of ISA were more pronounced when ISA operated in conjunction with FDW – but not vice versa.



Lessons Learned

Activity 1: Convene teams/people

- don't let sponsor co-manage FOT – complicated, timely and costly
- Choose contractors with backup
- Keep steering committee in the loop
- Over-resource rather than under-resource

Activity 2: Aims, objectives, research questions etc

- Talk a lot with people who have run FOTs

Activity 3: Develop project management plan

- Budget more money and time than you think necessary
- Bring on side those who can't see the point of FOTs



Lessons Learned

Activity 4: Stakeholder communication

- We underestimated media interest
- Didn't anticipate requests for early data

Activity 5: study design

- Didn't anticipate cut in project size
- Too many questionnaires
- Keep questionnaires simple, and relatable to logged data

Activity 7: select/obtain vehicles

- Much easier to use production systems in production vehicles



Lessons Learned

Activity 8: obtain systems and functions

- Selecting, sourcing and procuring systems very time consuming

Activity 9: Data collection and transfer

- Too much driver involvement eg flash cards
- Not enough computer grunt for boot up and system operation
- Not enough spare parts in stock

Activity 11: Equip vehicles with technologies

- Not all systems operate identically across vehicles



Lessons Learned

Activity 12: Driver feedback systems

- Fuel docket – terrible problem

Activity 13: Data storage and management

- Didn't decide early what to do with post-project data

Activity 14: Acceptance testing

- Lots of flat batteries
- Corrupted flash memory cards over time

Activity 15: recruitment strategy

- Company drivers a nightmare to recruit and keep
- Women MUCH harder to recruit than men
- Hard to adhere to ethics requirements for company drivers



Lessons Learned

Activity 16: develop driver training and briefing materials

- Very time consuming!!

Activity 17: Pilot testing

- Not long enough to reveal some problems

Activity 18: Run FOT

- Don't assume that systems are working and recording data
- Drivers need regular reminding and follow up if you want them to do things for you



Lessons Learned

Activity 18: Run FOT

- Automate subjective data collection if possible eg use internet

Activity 19: Data Analysis

- Run reality checks on data regularly to ensure they are “clean”
- Sponsors may want supplementary analyses done

Activity 20: Write minutes and reports

- Don't allow sponsor review of final deliverables to drag out



Lessons Learned

Activity 21: Disseminate Findings

- Sponsor delayed dissemination
- No funding left for major EC-style workshop

Activity 22: Decommission FOT

- Lost momentum at end – took a while to implement recommendations. Not enough lobbying.



Conclusion

- FOT was ahead of its time in Australia
- But plenty of ISA activity now in Australia
- Most new Australian cars equipped with SBRs
- ISA high on political agenda, and society now ready for it



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