Accelerating solutions for highway safety, renewal, reliability, and capacity

SHRP 2 Safety

Making a Significant Improvement in Highway Safety

Fourth Safety Research Symposium
July 23-24, 2009

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

SHRP 2 Safety Research Program

GOAL

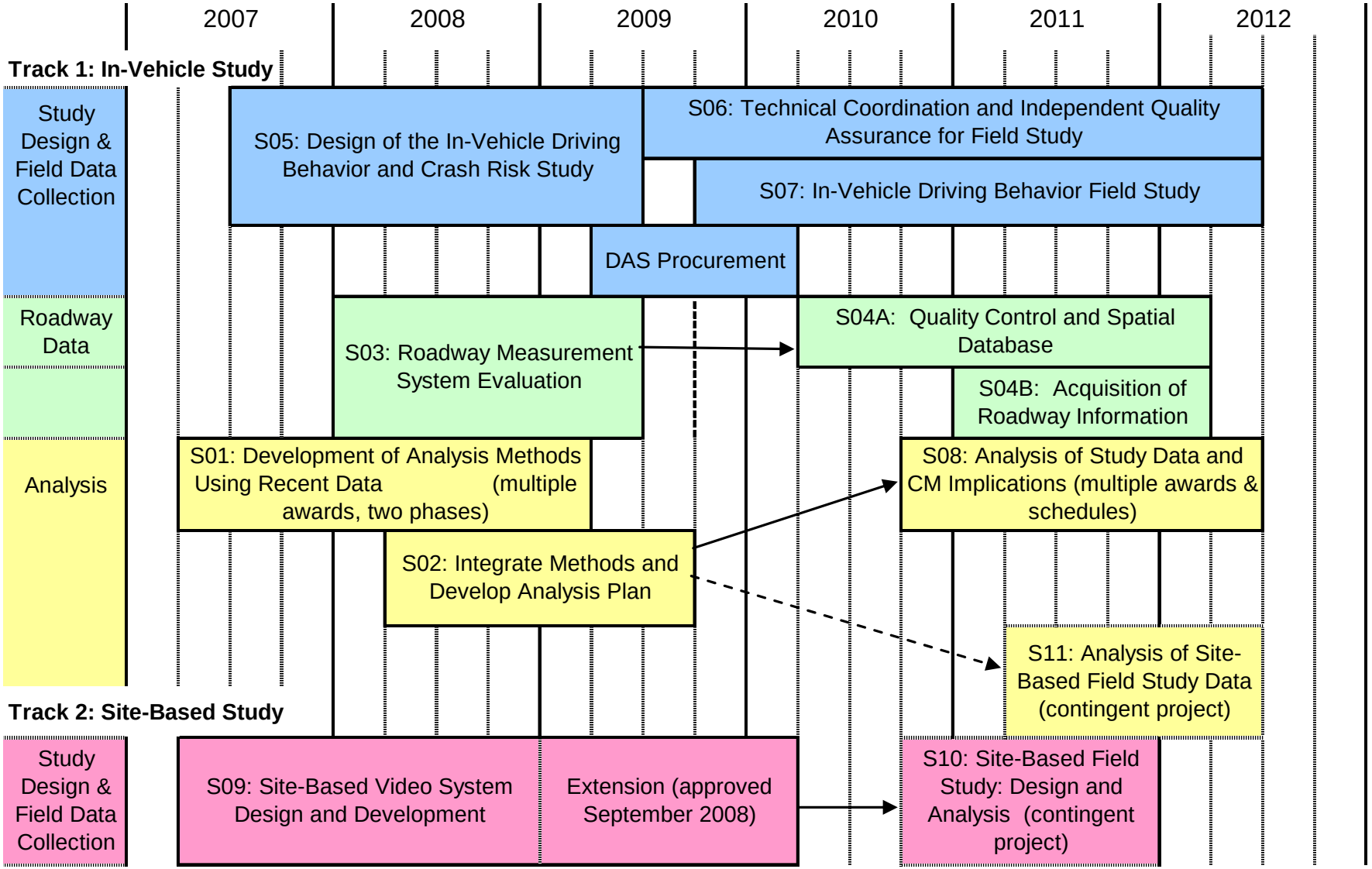
Greatly increased knowledge of *driver behavior*

- How the driver interacts with and adapts to the vehicle, roadway characteristics, traffic environment, traffic controls, weather, etc.
- Differences in *crash risk* associated with these interactions
- Proposed countermeasures based on the findings

Safety Projects

	Project	Cost	Status
S01	Analysis Methods	$1.5M	Current
S05	In-Vehicle Study Design	$3.0M	Current
S09	Site-Based Development	$1.0M	Current
S02	Analysis Integration	$0.5M	Current
S03	Roadway Evaluation	$0.5M	Current
S06	Technical Coordination	$6.0M	New
S04A	Spatial Database	$1.0M	New
S04B	Roadway Data	$3.5M	New
S07	In-Vehicle Field Study	$16.2M	New
S12A	DAS Procurement	$10.0M	New
S08	In-Vehicle Analysis	$4.0M	2010 RFP
	Total	$47.2M	

SHRP 2 Safety Projects Timeline



Revised June 2009

SHRP2
STRATEGIC HIGHWAY RESEARCH PROGRAM

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Project Status: S09
Site-Based Video System Design and Development

Contractor:

University of Michigan Transportation Research Institute (UMTRI) with
Virginia Tech Transportation Institute (VTTI),
Soar Technology and
University of California, Berkeley (PATH)

Budget: $1,000,000

- Revised System Design Interim report submitted August 2008
- TCC approved the revised report on the recommendation of a review panel and a no-cost time extension at their September 21-22, 2008 meeting
- System will be field tested July 2009
- Pilot study to begin in September 2009

SHRP 2
Naturalistic Driving Study Design

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Project S07: Naturalistic Driving Behavior Field Study Site Selection

Expert Task Group

Leo Tasca, Chair, Ontario Ministry of Transportation
Jim Hedlund, consultant
Richard Compton, NHTSA
Paul Tremont, TFHRC
Brad Overturf, CN DOT
James Tsai, Georgia Tech
Seymour Stern, NHTSA
Michael Pawlovich, IA DOT
Scott Osberg, AAAF
Mike Goodman, retired

S07 Candidate Data Collection Sites

September 2008 RFQ for southern sites: 6 responses 3 accepted
July 2008 RFQ: 13 responses 8 Accepted
March 2009 RFP stage: 11 qualified 9 responses 6 selected

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Recommended S07 Sites

Proposer	Site	Rural/Urban	DAS units
Indiana U	Bloomington, IN	mixed	150
Penn State U	Central PA	rural	150
CUBRC	Tampa Bay, FL	urban	450
CUBRC	Erie County, NY	mixed	450
Westat	Raleigh-Durham, NC	mixed	300
Battelle	Seattle, WA	mixed	450
Total			1,950

Design of the SHRP 2 Naturalistic Driving Study
Technical Expert Task Groups (TETG)

Machine Vision ETG
Dev Kochar, Ford, Chair
Mohan Trivedi, UC San Diego
James Tsai, Georgia Tech
Qiang Ji, RPI
Trent Victor, Volvo
Tom Huang, Univ. of Illinois
Pujitha Gunaratne,Toyota

Driver Testing Expert Group
Karlene Ball, University of Alabama
John Bullough, RPI
David Carr, Washington University
Nina Silverstein, Univ. of Mass.
Loren Staplin, TransAnalytics

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Study Design - Summary

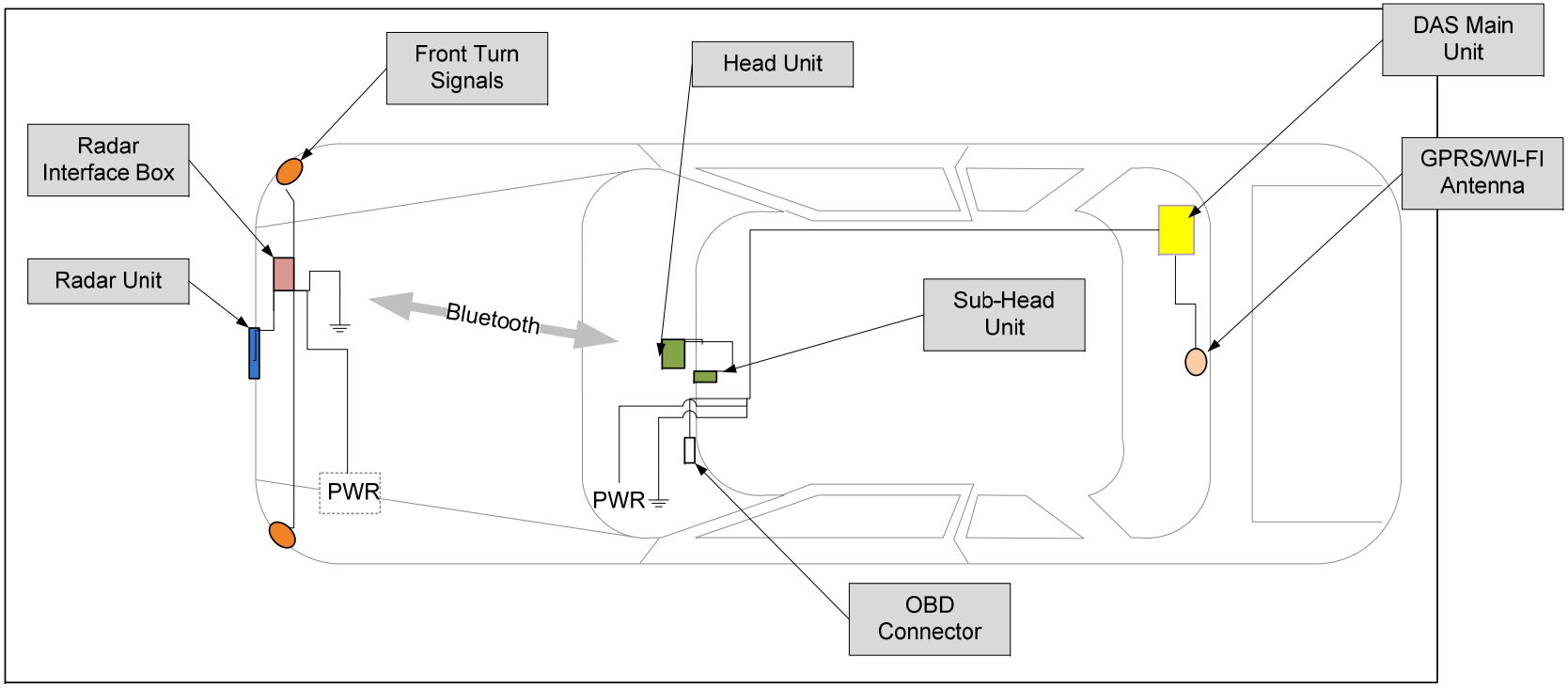
- **Participant Recruiting: Random Listed Sample (centralized)**
  - Supplemented Targeted Recruitment (at study sites)
- **6 Data Collection Sites**
  - Total DAS* Units 1,950
  - Amount of Data 3,900 data-year
  - 150 – 450 DAS units per site
- **Total Participants 3,102**
  - Participant Period: 12 or 24 months
- **Passenger Car, Van, SUV, Pickup Truck**
  - Target Minimum Sample per Vehicle Type (230)

* **Data Acquisition System**

Sample Design (age by gender)

Gender: Age Range	Age Range Description	One Year	Two Year	DAS units	Primary Participants	Data Years
M: 16-20	Teen	96	36	132	228	264
M: 21-35	Young Adult	96	36	132	228	264
M: 36-50	Middle Adult	96	36	132	228	264
M: 51-65	*Younger* Older Driver	96	36	132	228	264
M: 66-75	*Middle* Older Driver	96	36	132	228	264
M: 76+	*Older* Older Driver	96	36	132	228	264
TOTAL MALE						
F: 16-20	Teen	96	36	132	228	264
F: 21-35	Young Adult	96	36	132	228	264
F: 36-50	Middle Adult	96	36	132	228	264
F: 51-65	*Younger* Older Driver	96	36	132	228	264
F: 66-75	*Middle* Older Driver	96	36	132	228	264
F: 76+	*Older* Older Driver	96	36	132	228	264
TOTAL FEMALE						
Any	*Adv.Vehicle Technology*		366	366	366	732
Totals:		**1,152**	**798**	**1,950**	**3,102**	**3,900**

Components and Locations



Head Unit

Camera Views

Data Acquisition System (DAS)

- Multiple Videos
  - Machine Vision Eyes Forward Monitor
  - Machine Vision Lane Tracker
  - Machine Vision Driver ID
- Accelerometer Data (3 axis)
- Rate Sensors (3 axis)
- GPS
  - Latitude, Longitude, Elevation, Time, Velocity
- Forward Radar
  - X and Y positions
  - Xdot and Ydot Velocities
- Cell Phone
  - ACN, location notification
  - Health checks, remote upgrades

- Illuminance sensor
- Passive alcohol sensor
- Incident push button
- Video
- Audio (only on incident push button)
- Turn signals
- Vehicle network data
  - Accelerator
  - Brake pedal activation
  - ABS
  - Gear position
  - Steering wheel angle
  - Speed
  - Horn
  - Seat Belt Information
  - Airbag deployment
  - Many more variables…

Data Summary

- All raw data (video and sensor/parametric) will be recorded continuously and will be preserved.
- Data will be encrypted when acquired on the DAS, and the data will not be decrypted until the data reaches the S06 contractor servers.
  - DAS can be placed in diagnostic mode for installation and troubleshooting
  - DAS has cellular capability to send automatic collision notification
  - DAS will use cellular communication to send regular “health checks”
- Data will be downloaded from each DAS at ~4 month intervals.
  - DAS Health Check includes remaining hard drive capacity
- Each site contractor will have a data sever for downloading, transferring data and refurbishing hard drive

Symposium Overview

Started with Research Questions

S01 projects: develop candidate analysis methods

S02 project: develop an analysis plan

International Panel

Roadway Data projects

Data privacy and access

Meetings/International Activities

- TRB Annual Meeting, Session 508 on SHRP 2 Safety
- Keynote presentation at APROSYS, Ann Brach, Amsterdam February 17-18, 2009
- ESRC meeting on Canadian NDS, Ken Campbell, Vancouver March 9-10, 2009
- Visit to Swedish transportation groups, Ken Campbell, Gothenburg April 14-17, 2009
- Transportation Border Working Group, Derek Sweet and Ann Brach, April 29, Chicago
- NDS Workshop, Ann Brach, Chemnitz University, Munich May 14-15, 2009