IOWA HUMAN FACTORS IN TRANSPORTATION FOCUS GROUP
Proceedings from June 1, 2005, Meeting
University of Iowa Memorial Union

INTRODUCTION

A focus group on research needs regarding human factors in transportation was held June 1, 2005, at the University of Iowa's Memorial Union. The focus group was sponsored by the Iowa Department of Transportation (Iowa DOT) under the provisions of the Collaboration Agreement between the Iowa DOT and the Center for Transportation Research and Education (CTRE) at Iowa State University, the University of Iowa, and the University of Northern Iowa. Attendees included representatives from the Iowa DOT, the Federal Highway Administration (FHWA), the three Iowa universities, local government, associations, driver educators, and neighboring states. The agenda is attached as Appendix 1. The list of attendees, including breakout topics to which they contributed, is attached as Appendix 2.

Two guest speakers presented national perspectives. Matt Sundeen from the National Conference of State Legislators discussed cell phones and driver distractions. The same themes were followed up in the breakout groups. Gregg Davis from the FHWA's Human Centered Systems Team described the Cooperative Intersection Collision Avoidance Systems (CICAS) initiative for warning red-light violators and discussed research on driver responses to intersection collision warning systems. Preliminary findings with simulator research indicate that a majority of drivers will respond to a compelling warning. The presentations are included as Appendices 3, 4, and 5.

SUMMARY OF FINDINGS

Six breakout topics were identified in advance of the focus group:

- Judgment and Decision Making
- Older Drivers
- Multi-tasking and Distractions
- Intelligent Vehicle Interactions
- Technology and Policy Issues
- Young Drivers/Graduated Drivers License

Participants discussed the topics in separate breakout groups and then presented findings in a plenary session. All participants voted (ten votes each, maximum of four on one topic) on suggested research problem statements brought forward from the breakout groups. The top 20 problem statements and the votes for each are listed in Table 1. Full problem statements for the highest-ranked topics are included as Appendix 6.

Table 1. Top 20 Human Factors Research Problem Statements

Problem Statement	Votes	Group
1. Driver education and parental involvement	44	Young Drivers
2. Engineering responses to bad decision making by drivers	41	Judgment & Decision Making
3. Young driver Iowa exposure data	31	Young Drivers
4. Conduct a task analysis on human factors with new in-vehicle technology.	27	Intelligent Vehicle Interactions
5. A comprehensive study focusing on data collection for technology usage related to motor vehicle safety and accidents	25	Technology & Policy
6. Determine how various distractions impact driver behavior, positive or negative, by evaluating the level and duration of each distraction.	24	Multi-tasking & Distractions
7. Understanding, maintaining, and improving driving skills in older adults	24	Older Drivers
8. Understanding older driver limitations in order to improve the driving environment/infrastructure	22	Older Drivers
9. Understanding and shaping habits, behaviors, and needs as these change with age	21	Older Drivers
10. Identify human factor issues related to the deployment of proactive roadside ITS systems used to improve safety at high accident locations	21	Technology & Policy
11. Driver cognitive processes: What do we see/notice first and how do we react?	20	Judgment & Decision Making
12. Teen and young adult driver crash analysis	19	Young Drivers
13. Rear-end collisions at traffic signals on high speed roads (Understand driver interaction at high speed intersections with signals)	19	Judgment & Decision Making
14. Evaluate the magnitude at which multi-tasking impacts driver distraction and crash risk	16	Multitasking & Distractions
15. Design an interactive system to monitor and improve driver alertness; improve driver attentiveness to reduce crashes	16	Intelligent Vehicle Interactions
16. How to teach proper driver decision making to new and experienced drivers	14	Judgment & Decision Making
17. State comparison of GDL features	11	Young Drivers
18. Evaluate the usability of current technology and failure scenarios	8	Intelligent Vehicle Interactions
19. Understanding, maintaining, and improving driving skills in older adults	2	Older Drivers
20. Research into technology uses which respects privacy	2	Technology & Policy

The remainder of this report is organized around the six human factors breakout groups.

JUDGMENT AND DECISION MAKING BREAKOUT GROUP

Facilitator: Carol Culver, Iowa DOT
Note taker: Kelly Strong, Iowa State University
Attendees: John Adam, Iowa DOT
Jim Bane, Iowa DOT
Tim Boyle, University of Iowa
Steve Gannon, Linn County
Becky Hiatt, FHWA
Paul Imhoff, Missouri DOT
Gregg Parker, Johnson County
Doug Rick, Iowa DOT
Jim Schnoebelen, IowaDOT
Tim Simodynes, Iowa DOT
Tim Strauss, University of Northern Iowa
Will Zitterich, Iowa DOT

The judgment and decision making breakout group discussed drivers' cognitive processes, information cues, perception of risk, impact of incentives on behavior, and the environmental stimuli that cause distractions. The group also discussed the cognitive and perception issues underlying rear-end crashes at high-speed approaches to traffic signals.

Six topics were covered during the break out session.

1. Driver training and education
   - Teach situational decision making
     - Work zones
     - Weather
     - Vehicle condition
   - What causes drivers to reject or forget their training?
   - Relationship of personality to decision making

2. What do drivers we see or notice first?
   - Goal: Determine the cognition queue? Is it always the same?
   - Signs
   - Signals
   - Pavement markings
   - People

3. How do drivers react? What is the perception of risk?
   - Goal: Create awareness of risk choices (how and why)
   - There is tradeoff of speed versus risk
   - We need to understand how to use the perception of risk in our design
   - Involves traffic engineers, simulators, behaviorists

4. Incentives or sanctions to change behavior

- Goal: To find out what incentives and sanctions are effective in changing behavior
    - Financial
    - License validation
    - Enforcement
- Can be affected by age, culture, gender
- Right to drive versus privilege
- Severity
- Effective enforcement: Random check versus public relations campaign
- Examples: Driving without license, repeat OWI and speed violators
- Involves enforcement, policy setters, insurance, media, Driver Services

5. Driver information overload

- Goal: Determine appropriate level of information and its location & grouping
    - Too much sensory input = overload
    - Could be in or outside vehicle
    - The mind can only handle so much!
    - DOT uses DMS, HAR, signs, markings, etc., and contribute to problem
- Involves simulator, Virtual Reality lab, 3d visualization

6. Engineering response: How to refocus drivers' attention

- Rumble strips as runoff prevention
- Design for vehicles or people?
- Perceptual blindness
- Roundabouts

OLDER DRIVER BREAKOUT GROUP

Facilitator:	Bob Rye, Iowa DOT
Note taker:	Tom McDonald, Iowa State University
Attendees	Phil Barnes, FHWA
	Allan Demorest, AARP
	Jim Doeden, Iowa DOT
	Paul Hanley, University of Iowa
	John Hill, University of Iowa
	Larry Jackson, Iowa DOT
	Joe Jurasic, Iowa DOT
	Mark Kerper, Iowa DOT
	Corey Peek-Asa, University of Iowa
	Stan Peterson, Iowa DOT
	Charlie Purcell, Iowa DOT
	Frank Redeker, Iowa DOT
	Ann Smiley-Oyen, Iowa State University
	Kim Snook, Iowa DOT

Mary Stahlhut, Iowa DOT
Jill Wallace, University of Northern Iowa

Sixty percent of older driver crashes are left turns and failures to yield. Existing research indicates that older drivers avoid certain situation such as interstate driving, work zones, and rush-hour driving. State and local agencies are improving the driving environment for older drivers, but improvements in crash rates for older drivers will not be apparent for some time, if at all. It is important to continue research, developing strategies to further improve conditions for older drivers. Origin-destination studies are needed to determine elder driver patterns and times of day; better public information is needed on work zone location.

The difficulties experienced by older drivers and possible reasons were listed, grouped by sensory input and motor skills, cognitive abilities, attitudes, and lifestyles. There is potential to conduct research on these issues and develop strategies to help older drivers overcome weaknesses.

- Sensory input and motor skills
    - Poor eyesight
    - Hearing
    - Physically frail—reduced strength and resilience
    - Reduced range of motion

- Cognitive abilities
    - Slower reaction time
    - Confused by signs
    - Slower decision time
    - Slower driving
    - Distractible (is this worse for older adults or kids?)
    - Slower perception time
    - Good days/bad days
    - Medication changes

- Attitudes
    - All others are the bad drivers
    - Wealth of experience
    - Ability to adapt to change

- Life style
    - Retired
    - Political clout
    - New communities
    - Independence
    - Rural isolation

The group identified 30 issues that could be investigated:

1. Distractibility of older drivers
2. Cardiovascular fitness effects on driving
3. Application and evaluation of improvements for older drivers
4. Synthesis of applied older driver improvements
5. Local driving restricted licenses effects and results
6. At-grade intersection treatments for older drivers
7. Attention stress affects on avoiding crashes
8. Coordination of agencies, programs, and efforts in addressing issues
9. Confusing signs for older drivers
10. Evaluating older driver improvement programs (AAA, AARP, etc.)
11. Awareness training or evaluation for decreasing abilities
12. Evaluation of older driver crash rates for differing roadways
13. Public acceptance of continuation education for older drivers
14. Increased perception of oncoming traffic at at-grade intersections
15. Nighttime visual enhancements for intersections
16. Working with older driver interaction with motorcycles
17. Cognitive learning techniques for older drivers
18. Data collection improvement-officer input
19. Improved nighttime visibility for guidance
20. Is older driver assistance matching needs?
21. Interval of relicensing evaluations
22. Development of quick testing methods for abilities
23. Does crash experience affect driver self assessment of abilities
24. More definitive restrictions for operation of vehicles
25. Driving exposure
26. Vehicle enhancement to accommodate older bodies
27. Rate of seat belt use by older drivers
28. Work zone accommodation for older drivers—evaluation
29. New headlight design affects on visibility for oncoming older drivers
30. Standardization of vehicles and roads

Drawing from all of these possible topics, the group identified three researchable projects and the goals of each:

1. Understand, maintain, and improve driving skills
    a. Reduce crashes and improve quality of life
    b. Provide information to improve environment
    c. Maintain independence and ability
2. Understand and shape driving habits (behavior) as these change with age
    a. Keep license (goal of all elder drivers)
    b. Educate on risks so better decisions can be made by older drivers
    c. Disseminate information
    d. Reduce risk through safer, more informed driving
3. Understanding older driver needs in order to improve the driving environment
    a. Understand capabilities, physical skills

b. Understand the driving-environment interface
c. Use a and b to design roads that accommodate the limitations and special needs of older drivers
d. Continue to upgrade/fine-tune older driver enhancements at problem sites
e. Reduce crashes and injuries

MULTI-TASKING AND DISTRACTIONS BREAKOUT GROUP

Facilitator: Cathy Cutler, Iowa DOT
Note taker: Duane Smith, Iowa State University
Attendees: Linda Boyle, University of Iowa
Patti Lemongelli, Missouri DOT
James Phillips, Iowa DOT
Barb West, Iowa DOT
Andy Wilson, Iowa DOT

The group discussed the activities that many drivers engage in from time to time while driving. The activities were categorized into human characteristics, technology related, information processing, external environment, and internal auto environment. Some activities may belong to more than one group, but this classification provides a baseline for dealing with the great variety of driver distractions.

- Human characteristics
  - Eating and drinking
  - Personal grooming
  - Daydreaming/inattention
  - Personal health or physical condition – pills, sleepiness, fatigue
  - Emotional state
- Technology-related
  - Talking on cell phones
  - Music/radio – listening, changing, DVD's
  - Electronic navigation aids
  - On-board computer displays
  - Technology helpers – office in car
- Information processing
  - Paying attention to /helping passengers
  - Road signs
  - Traffic, pedestrians
  - Billboards, animals, scenery
  - Paper maps
  - Reading
  - Writing
- Internal auto environment
  - Bug in the car
  - Comfort system in car

    - Car condition/personal comfort
    - Familiarity with car controls
- **External environment**
    - Road conditions
    - Other cars, headlights,
    - Construction
    - Weather

A fundamental research issue is the relationship between driver distractions, motor vehicle crashes, and death or injury. Clearly, all distractions are not equal; type, duration, and timing are important. Some distractions are voluntary and others are involuntary. If voluntary and involuntary distractions occur at once, the result can be serious. For example, a one-second distraction to tune the radio can be fatal if a child runs out from between parked cars. Conversely, reading the paper may be relatively harmless in stalled traffic. For voluntary distractions like cell phone conversations or grooming, the exercise of situational driving judgment is as important as the activity itself. Don't play with cell phone when driving on a residential street with parked cars and children around.

Vehicle design can reduce the involuntary distractions resulting from in-vehicle controls and equipment – switches, radio tuner, navigational devices, cell phones, etc. Auto makers have investigated ergonomic issues for years, but have not developed standards. There are similarities between makes, but there is still potential for confusion when changing from one car to another. With respect to cell phones, some states require hands-free devices to reduce distractions associated with dialing.

Two priority research topics were identified: a synthesis of research on cell phone usage and crashes, and investigation into driver confusion associated with the location and ease of use of interior controls and equipment. These distractions are not mutually exclusive. A general study format was developed:

Determine how distractions contribute to crashes/vehicle deaths

a. Determine levels of distractions
b. Evaluate how many tasks drivers conduct at any one time
c. Evaluate exposure time (the time each distraction takes away from driving); example: cell phone usage by driver age
d. Methods: accident reports, in-vehicle cameras, eye monitoring devices, anonymous reports from drivers

INTELLIGENT VEHICLE INTERACTION BREAKOUT GROUP

Facilitator:	Ed Engle, Iowa DOT
Note taker:	Tom Maze, Iowa DOT
Attendees:	Greg Davis, FHWA
	Steve Ratke, FHWA
	Ingrid Ruddy Teboe, Iowa DOT

Lee Smithson, AASHTO
Jill Trainer, University of Northern Iowa

The intelligent vehicle interaction group covered a wide range of potential research issues. The transportation community needs to ask itself what is the need for change in the vehicle intelligence area. What are the current driving problems and will benefits actually accrue? If benefits are likely, how should the technologies best be integrated into the driving experience and how does the public change behavior?

The group discussed the degree to which decisions should be made by on-board technologies; the risk of a "cocoon sensation" that may change a driver's sense of responsibility; and the continued use of technologies after the "wow" phase passes. Privacy issues and the risks of hacking were raised. Since advanced systems are susceptible to sabotage, reliance on advanced technologies could be a homeland security risk.

The breakout group participants identified eight potential research topics:

1. Evaluate the usability of technology and failure scenarios.
   - Making the system work for older, handicapped, vision/hearing impaired and younger drivers
   - What happens when something goes wrong with technology?
     - Responses of drivers
     - Be obvious there is a problem
     - Education opportunities/requirements
   - What level of decision making is the driver's and what level is the technology?

2. Conduct a task analysis on human factors issues associated with in-vehicle technologies. Determine the number of crashes associated with in-vehicle technologies, and develop an age, activity, technology matrix. Potential partners/funders include NCHRP, the auto industry, insurance companies, AAA, and AARP.
   - Navigation systems
   - Adaptive cruise control
   - Entertainment features
   - Testing for licensing
   - Should car dealer be required to do simulation and training

3. Design an interactive system to monitor driver alertness (fitness for driving) and act to improve it. Benefits would accrue to drivers and car makers. Potential collaborators include the auto industry, insurance companies, and the Federal Motor Carrier Safety Administration. (Note: Extensive work on fitness-for-duty testing has been done by the Air Force, the nuclear power industry, the maritime industry, and, to some extent, the trucking industry.)

4. Impacts of advanced in-vehicle technology on homeland security and disaster management. Potential collaboration with the Federal, Highway Administration, AASHTO, and auto makers.

- The downside of technology is the potential to disrupt highways through sabotage or hacking of computer-based systems.
- The upside is that technology can be used to improve security (e.g. mass evacuations).
- Advanced in-vehicle technology could improve emergency response.

5. Legal ramification of in-vehicle technologies.

- Legal responsibilities for crashes
- Was a technology in use when the crash occurred?
- Reliability, e.g., false alarms or no alarm
- What is the potential for hacking?
- What are the privacy implications

Benefits would accrue to industry through fewer lawsuits. There is a potential for collaboration with US DOT and car makers.

6. Analyze effect of adaptive cruise control and other driving aids on driver behavior and traffic flow.

- What is impact on traffic, e.g. following behavior and density?
- Variability in headway settings?
- What are the liability issues?
- What percent of vehicles need to be equipped to achieve traffic flow benefits?

Collaboration opportunities: auto industry, government, insurance

7. Determine the cognitive load on drivers (e.g. books on tape).

- Check varying abilities of drivers to deal with distractions
- New satellite radios with logs of interactions
- Voice activated features
- Check driving routines and attention
- Check usability, especially by older drivers

8. Vehicle reactions to incidents.

- Control goes back to driver?
- What are the demographic and social characteristics of people are getting these systems? What are their expectations?
- Collision system – legal ramifications for crashes
- What sells cars?
    - Navigational aids
    - Safety technology add-ons
    - Development will come from marketplace

TECHNOLOGY AND POLICY ISSUES BREAKOUT GROUP

Facilitator: Mike Jackson, Iowa Department of Transportation
Note Taker: Derrick Parkhurst, Iowa State University
Attendees: Leonard BomBom, University of Northern Iowa
Jim Brachtel, FHWA
Dennis Johnson, South Dakota DOT
Dick King, Black Hawk County
Ian MacGillivray, Iowa DOT (retired)
Matt Sundeen, National Conference of State Legislatures

1. Personal technology usage

There is a clear lack of data on personal technology usage in vehicles. Most of the currently available information is purely anecdotal. The available self-report surveys are potentially biased given that some usage, for example cell phone usage is against the law. Observational surveys should be conducted to avoid an under-reporting bias. These data will be important for good policy decisions. Differences in technology usage between rural and urban areas as well as between older and younger drivers may exist. This may be critical because the ability to multitask and the familiarity with new technology may provide younger drivers a superior ability to cope with personal technology usage. It is also possible that this technology familiarity might lead to overconfidence in their ability to drive while distracted by technologies and thus lead to more accidents. Although personal technology can be distracting, there are significant transportation-related benefits to this technology, for example, the ability to immediately contact emergency, safety and maintenance services using a cell phone. A balance must be struck between personal freedom and safety. We will need more data to judge an appropriate balance.

2. Infrastructure-based technology

There exists a significant potential for newly available technologies to enhance safety. However, there are a number of accuracy and privacy concerns that are frequently raised with the usage of this new technology. The infrastructure technology that has received the most public attention is the ‘red-light running’ camera system. These systems determine if a driver has run the light and then determine the driver’s identity in order to appropriately ticket the violation. Because of differences of implementation between contractors (across jurisdictions) and initial difficulties with the systems that in some cases lead to a high false-alarm rate, there has been a significant public controversy over the usage of this technology. In spite of these difficulties, red-light running cameras are becoming increasingly used and have been shown to reduce red-light running. To minimize public reactivity, Illinois takes a picture of driver running the red light and sends the owner of the vehicle a ticket in the mail along with a copy of the picture showing the violation. There are salient privacy concerns with the approach if, for example, the recipient of the photograph is not the driver – especially if the photograph also identifies passengers. The support for a similar camera technology, automatic speed-

limit enforcement, is much greater when installed exclusively in school zones and work zones. Additional enforcement is needed in work and school zones to increase safety. Automatic enforcement using a technological approach may be much less expensive than using traditional enforcement by way of stationed police officers.

On the horizon are a number of advanced technology developments that could potentially lead to an even greater public controversy. For example. in Oregon road taxes will be based on GPS tracking of all vehicles in order that taxation can be directly related to road usage. There is already a significant privacy concern given that a persistent location trace of every vehicle at all times would exist. The potential for this information to be inappropriately used is high. Although new technology has a number of important benefits, the privacy implications associated with its usage needs to be evaluated prior to deployment. With this caveat and the fact that infrastructure-based technology has demonstrable safety benefits, new technology development that respects privacy needs to be supported and the integration of this technology into the transportation infrastructure needs funding.

3. Technology-related public policy

The pace of technology development is extremely rapid which makes regulation difficult. New technologies are frequently available well before their effect on transportation is understood or even examined. Developing legally appropriate definitions of technology given its rapid evolution is particularly difficult. This difficulty leads to problems in implementing effective legislation, for example, in differentiating between hands-free and hand-held cell phones. There are legitimate privacy concerns with new technology, yet an aggressive legislative approach to secure privacy may significantly inhibit technology development that could improve roadway safety. Black-box technology is included in all new cars, with a number of benefits to the vehicle owners. These benefits include automatic notification of emergency personnel in case of an accident, as well as enhanced mileage and maintenance information based on computer system diagnostics. Rental-car companies use this technology to track their fleet vehicles to prevent theft and abuse and enable stolen vehicle recovery; in some cases this tracking information has even been used to issue speeding fines. This usage has led to a negative reaction by some legislators. The information that these devices record represents a privacy concern given the legal precedence for using this information against the vehicle owner. Public policy that protects privacy needs to be appropriately balanced against the potential benefits that may stem from new technologies.

4. Education

Across a variety of areas, it is clear that there is a lack of transportation-related educational efforts. With respect to personal technology usage, an effort is needed to educate younger drivers of the dangers of cell phone usage while driving. This content could be simply be added to the driver education curriculum in high schools. However, given the reduction in availability of this type of educational program, targeting educational campaigns at youth through traditional media outlets such as TV might be

more successful. Simple campaigns, for example, encouraging drivers to just "pass the cell phone" to a passenger instead of driving and talking could lead to significant safety benefits. Media campaigns could also be utilized to bring human factors issues to the attention of the public. This type of educational effort could be very important when, for example, transportation issues are brought to vote on a public ballot. A greater focus on human factors will also be important in the education of current and future engineers. Engineers need to be trained to design roadways with human factors in mind. Drivers' perceptions of the road (as safe or not) will govern the way they drive. Therefore, consideration of human factors can potentially increase roadway safety significantly. Finally, legislatures need more information concerning the importance and nature of transportation-related issues. It is too often the case that there is a poor relationship between state transportation officials and state legislators. Mechanisms such as educational seminars that promote communication between legislators and transportation officials need to be put in place to enhance this relationship. Across the board, more education is required to raise the salience of transportation issues.

5. The human factors of new technology

The consequences of new technologies on transportation safety need more investigation. Human factors associated with new technologies are often ignored in the design process and dealt with only after deployment. An example of this was the introduction of countdown traffic signals at intersections. Countdown signals were used in unexpected ways which ultimately lead to removal in some cases. This argues for more evaluation of technologies prior to deployment to avoid a waste of resources. However, even extensive evaluation will not reveal all issues in advance. Therefore, there needs to be a cultural shift so that problems with new technology installations are seen as learning experiences rather than failures. Other examples include deer warning systems or dynamic message signs. These technologies are aimed at increasing safety, however they may represent a double-edge sword being distracting as well as helpful. South Dakota has had good success with the use of dynamic message signs for providing information to the public. Informing a driver of the approximate delay to expect from an accident scene could keep driver frustration and the sense of powerlessness (and consequentially road rage) at a minimum. Providing information to drivers costs relatively little but could significantly increase satisfaction and reduce complaints. However, it is unclear what information should be provided to the users to promote satisfaction and safety and enhance roadway capacity. It will be important to evaluate the potential behavioral modifications that this additional information might induce and the associated consequences.

Identified focus areas:

1. A comprehensive study focusing on data collection for technology usage related to motor vehicle safety and accidents

2. Research into technology uses which respects privacy

3. Identify human factors issues related to the deployment of proactive roadside intelligent transportation systems used to improve safety and reduce accidents at high accident locations

YOUNG DRIVERS BREAKOUT GROUP

Facilitator: Stephen Andrle, Iowa State University
Note taker: Reg Souleyrette, Iowa State University
Attendees: Mark Bortle, Iowa DOT
Linda Boyle, University of Iowa
Terry Garrett, Driver Educators
Steve Gent, Iowa DOT
Max Grogg, FHWA
Dan McGehee, University of Iowa
Bob Thomson, GTSB
Stacia Totman, FHWA
Steve Tudor, Iowa DOT

The group drew upon their own experiences as young drivers and the experiences of their children and friends' children to personalize this issue. The group discussed judgment extensively. Judgment is difficult to teach, and some research shows that the part of the brain that governs judgment is the last to develop.

To some degree, driving judgment is learned by driving with parents, but many parents don't know what to do or how to teach young drivers. Guidelines providing parents with methods for coaching young drivers and the degree of driving freedom teenagers should receive would be very beneficial.

The value of driver education was discussed. Some professional groups question its value, and the value is not easy to demonstrate from performance. There is no standardized curriculum for driver education in Iowa or any other state. No college in Iowa teaches a curriculum for future driver education teachers.

The characteristics of teen crashes, the lack of exposure data on teen drivers, and the effect of graduated drivers' license (GDL) programs were discussed. All GDLs are not the same. A comparison of teen driving performance after the implementation of GDLs with various rules in different states would provide very useful policy guidance.

The topics discussed in the young drivers breakout group in include:

- Different types of risk-taking behavior by gender
- State comparison of GDL features (Iowa data / table of states)
- Education of young drivers
    - Dept. of Education, permits, behind the wheel training, GDL
    - Safe use of cruise control –when do you turn it off?
    - Standardized curricula for the Department of Education

    - What not to teach – reduced shock value of “blood & guts” photos
    - Look at quantifying performance by state
    - No colleges teaching driver education teachers
- Exposure data by age/gender, etc., by type of road and time of day
    - Random sample – black box (Possible “SHRP-2 Safety” instrumented car project)
    - Surveys
- Parental involvement
    - NIH Guide for parents
    - Research done, State of Washington model
- Behavior recidivism – stages in life
- Trip log analysis
- Multi-tasking and distractions
- Animal crashes
- Iowa teen crash data analysis

These ideas were developed into four potential research projects.

1. State Comparison of Graduated Drivers Licensing (GDL) Features and Safety
2. Driver Education and Parental Involvement
3. Teen and Young Adult Driver Crash Analysis
4. Young Driver Iowa Exposure Data

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APPENDIX 1

Human Factors Focus Group
June 1, 2005
University of Iowa Memorial Union
Third Floor Ballroom

Agenda

7:30-8:30	Registration and Continental Breakfast
8:30-8:45	Welcome – Dan McGehee, University of Iowa
8:45-9:30	Speaker –Matt Sundeen, National Conference of State Legislatures "Cell Phones and Driver Distractions"
9:30-9:45	Structure of the Day – Steve Gent, Iowa DOT
9:45-10:00	Break
10:00-12:00	Breakout Session #1 – Brainstorming research needs
12:00-12:45	Lunch in the Ballroom
12:45-1:30	Speaker – Greg Davis, FHWA Human Centered Systems Team "Cooperative Intersection Crash Avoidance System"
1:30-2:45	Breakout Session #2 – Problem statements for top needs
2:45-3:00	Break
3:00-4:15	Report Back and Voting in the Ballroom
4:15-4:30	Next Steps – Sandra Larson, Iowa DOT

Breakout Topics & Rooms

1. Judgment & Decision-making	Purdue Room (341)
2. Older Drivers	Michigan Room (351)
3. Multi-tasking & Distractions	Penn State Room (337)
4. Intelligent Vehicle Interactions	Northwestern Room (345)
5. Technology & Policy Issues	Iowa Room (335)
6. Young Drivers/Graduate Driver Licensing	Ohio State Room (343)

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APPENDIX 2

Human Factors Focus Group
June 1, 2005
University of Iowa Memorial Union

Attendance

First Name	Last Name	Organization	E-mail	Breakout
John	Adam	Iowa DOT	john.adam@dot.iowa.gov	judgment & decision making
Steve	Andrle	ISU - CTRE	andrle@iastate.edu	young drivers/gdl
Jim	Bane	Iowa DOT	james.bane@dot.iowa.gov	judgment & decision making
Phil	Barnes	FHWA	phillip.barnes@iastate.edu	older drivers
Leonard	Bombom	University of Northern Iowa	gompilsitji@yahoo.com	technology & policy issues
Mark	Bortle	Iowa DOT	mark.bortle@dot.iowa.gov	young drivers/gdl
Tim	Boyle	University of Iowa		judgment & decision making
Linda	Boyle	University of Iowa	lnboyle@engineering.uiowa	young drivers/gdl
Jim	Brachtel	FHWA	jim.brachtel@fhwa.dot.gov	technology & policy issues
Carol	Culver	Iowa DOT	carol.culver@dot.iowa.gov	judgment & decision making
Cathy	Cutler	Iowa DOT	catherine.cutler@dot.iowa.	multi tasking & distractions
Greg	Davis	FHWA	greg.davis@fhwa.dot.gov	IVI
Allan	Demorest	AARP	ademorest@aol.com	older drivers
Jim	Doeden	Iowa DOT	james.doeden@dot.iowa.gov	older drivers
Ed	Engle	Iowa DOT	edward.engle@dot.iowa.go	IVI
Rob	Ettema	University of Iowa	robert-ettema@uiowa.edu	--------
David	Forkenbrock	University of Iowa	david-forkenbrock@uiowa.edu	--------
Steve	Gannon	Linn County	steve.gannon@linncounty.org	judgment & decision making
Terry	Garrett	Driver Educators	garrettt@se-polk.k12.ia.us	young drivers/gdl
Steve	Gent	Iowa DOT	steve.gent@dot.iowa.gov	young drivers/gdl
Max	Grogg	FHWA	max.grogg@fhwa.dot.gov	young drivers/gdl
Paul	Hanley	University of Iowa	paul-hanley@uiowa.edu	older drivers
Becky	Hiatt	FHWA	rebecca.hiatt@fhwa.dot.go	judgment & decision making
John	Hill	University of Iowa	john-hill@uiowa.edu	older drivers
Paul	Imhoff	Missouri DOT	paul.imhoff@modot.mo.gov	judgment & decision making
Mike	Jackson	Iowa DOT	michael.jackson@dot.iowa.	technology & policy issues
Larry	Jackson	Iowa DOT	larry.jackson@dot.iowa.gov	older drivers
Dennis	Johnson	South Dakota DOT	dennis.johnson@state.sd.u	technology & policy issues

First Name	Last Name	Organization	E-mail	Breakout
Joe	Jurasic	FHWA	joe.jurasic@fhwa.dot.gov	older drivers
Mark	Kerper	Iowa DOT	mark.kerper@dot.iowa.gov	older drivers
Dick	King	Black Hawk County	rking@co.black-hawk.ia.us	technology & policy issues
Sandra	Larson	Iowa DOT	sandra.larson@dot.iowa.gov	--------
Patti	Lemongelli	Missouri DOT	patricia.lemongelli@modot.	multi-tasking & distractions
John	Lundell	University of iowa	john-lundell@uiowa.edu	?
Ian	MacGillivray	Iowa DOT retired	cimac38@mchsi.com	technology & policy issues
Tom	Maze	ISU – CTRE	tmaze@iastate.edu	IVI
Tom	McDonald	ISU - CTRE	tmcdonal@iastate.edu	older drivers
Dan	McGehee	University of Iowa	daniel-mcgehee@uiowa.edu	------
Greg	Parker	Johnson County	gparker@co.johnson.ia.us	judgment & decision making
Derrick	Parkhurst	Iowa State University	derrick.parkhurst@hci.iasta	technology & policy issues
Corey	Peek-Asa	University of Iowa	corinne-peek-asa@uiowa.edu	older drivers
Stan	Peterson	Iowa DOT	stan.peterson@dot.iowa.gov	older drivers
James	Phillips	Iowa DOT	james.phillips@dot.iowa.go	multi-tasking & distractions
Charlie	Purcell	Iowa DOT	charlie.purcell@dot.iowa.gov	older drivers
Steve	Ratke	FHWA	steven.ratke@fhwa.dot.gov	IVI
Frank	Redeker	Iowa DOT	frank.redeker@dot.iowa.go	older drivers
Doug	Rick	Iowa DOT	douglas.rick@dot.iowa.gov	judgment & decision making
Ingrid	Ruddy Teboe	Iowa DOT	ingrid.ruddy@dot.iowa.gov	IVI
Bob	Rye	Iowa DOT	robert.rye@dot.iowa.gov	older drivers
Jim	Schnoebelen	Iowa DOT	james.schnoebelen@dot.io	judgment & decision making
Tim	Simodynes	Iowa DOT	tim.simodynes@dot.iowa.gov	judgment & decision making
Ann	Smiley-Oyen	Iowa State University	asmiley@iastate.edu	older drivers
Duane	Smith	ISU - CTRE	desmith@iastate.edu	multi tasking & distractions
Lee	Smithson	AASHTO	leland.smithson@dot.iowa.	IVI
Kim	Snook	Iowa DOT	kim.snook@dot.iowa.gov	older drivers
Reg	Souleyrette	ISU - CTRE	reg@iastate.edu	young drivers/gdl
Mary	Stahlhut	Iowa DOT	mary.stahlhut@dot.iowa.go	older drivers
Tim	Strauss	University of Northern Iowa	tim.strauss@uni.edu	judgment & decision making
Kelly	Strong	Iowa State University	kstrong@iastate.edu	judgment & decision making
Matt	Sundeen	National Conf of State	matt.sundeen@ncsl.gov	technology & policy issues
Bob	Thompson	GTSB	robert.thompson@dps.stat	young drivers/gdl
Stacia	Totman	FHWA	stacia.totman@fhwa.dot.go	young drivers/gdl
Jill	Trainer	University of Northern Iowa	jill.trainer@uni.edu	IVI
Steve	Tudor	Iowa DOT	steven.tudor@dot.iowa.gov	young drivers/gdl

First Name	Last Name	Organization	E-mail	Breakout
Jill	Wallace	University of Northern Iowa	wallace@uni.edu	older drivers
Barb	West	Iowa DOT	barbara.west@dot.iowa.gov	multi-tasking & distractions
Andy	Wilson	FHWA	andrew.wilson@fhwa.dot.gov	multi-tasking & distractions
Will	Zitterich	Iowa DOT	william.zitterich@dot.iowa.gov	judgment & decision making

APPENDIX 6

Human Factors Focus Group
June 1, 2005
University of Iowa Memorial Union

PROBLEM STATEMENTS

JUDGMENT AND DECISION MAKING BREAKOUT GROUP

Title: Engineering Responses to Bad Decision Making By Drivers

Group rank: 2

Research Topic:

What types of design conditions (color, texture, sounds, etc.) are most effective in "de-distracting" drivers? How can engineers bring human judgment factors into transportation designs (rumble strips, shoulder rumbles, roundabouts, vehicle/human interface)?

Research Goal:

Design infrastructure and work zone safety could be improved with a thorough understanding of human reactions to information in the transportation environment. The results of this research could be used to improve or correct high-incident locations where the design has been implemented using current engineering standards but function is below expectations.

Background:

Many engineering decisions are based on economic or engineering efficiency that may not be aligned with user-preferences or actual driver decisions. A better understanding of how drivers perceive conditions can lead to better engineering solutions.

Suggested approach:

Use experimental design with control set and various interventions (alternative designs), and measure driver reactions, survey driver perceptions, etc. Possibly appropriate for simulator study.

Time Frame:

2-5 years, ongoing process of research, development, validation and redevelopment

Resources required:

Graduate students, data analysts, field reviews, perhaps driver simulation stations, programmers. This is potentially a multi-million dollar effort. Done in phases, $100,000 would be a good start on the highest priority issues.

Collaboration:

Universities
Center for Transportation Research and Education
Iowa Department of Transportation

Implementation:

Designers, researchers, infrastructure owners, standard developers and regulators. Some legislative or policy changes might be required based on the findings of the research in areas such as worker safety, traffic law, etc.

JUDGMENT AND DECISION MAKING BREAKOUT GROUP

TITLE: DRIVER'S COGNITIVE PROCESSES. WHAT DO WE NOTICE FIRST AND HOW DO WE REACT?

Group rank: 11

Research Topic:

What are the cognitive processes of drivers? What types of information do they use to make decisions, and what are the priorities or decision weights of the information cues? What are the perceptions of risk (overconfidence, speed vs. loss, etc.) by drivers? What are the interactions between the environment/ conditions and the decisions of drivers? What are the appropriate engineering responses and design considerations for these interactions? What types of information (signage, signals, striping, etc.) are most likely to be utilized and which are most likely to be ignored? What is the relationship between information and enforcement?

Research Goal:

The knowledge generated by this research would promote the use of the most effective methods of informing drivers regarding decisions such as speed, interchanges, etc. Determine the information that drivers use most often or most frequently so that transportation systems can be designed for improved safety, traffic flow, and traffic calming.
What are the most effective "attention grabbers?"

Background:

We have multiple methods of informing drivers regarding decisions and driving behavior. Drivers have cognitive limits in their ability to process information, so it is important to make certain that the most critical information is communicated clearly. Too much information or signage/signaling can produce confusion and indecision. Also, some unprocessed information can be eliminated, thus saving costs.

Suggested Approach:

This is fundamental psychological and perception research. There is undoubtedly a huge body of literature on human cognitive processes germane to this topic. Rather than investigate all of the literature, it would be better to start with police officers, accident investigators, and anyone else that might have a hypothesis about why people did not see a sign or other feature. Distraction issues and state of mind are also pertinent. This project should have an initial phase to identify researchable hypotheses and then and experimental design should be developed. This project is probably appropriate for simulator study.

Time Frame:

Phase I: 6 months
Other Phases: one year

Resources Required:

Phase I: $50,000
Other phases: Not clear. Probably in the $500,000 + range

Collaboration:

Simulation centers, behavioral/sociological/cognition researchers, biometricians, traffic engineers, drivers (focus groups), police agencies, accident investigators, universities

Implementation:

If findings imply a change in the way roads are marked or signed, proposals should be made to the Iowa DOT Standards committee, SUDAS, MUTCD committee, AASHTO design guide, or other appropriate standards-setting organizations.

JUDGMENT AND DECISION MAKING BREAKOUT GROUP

TITLE: REAR-END COLLISIONS AT TRAFFIC SIGNALS ON HIGH SPEED ROADS

Group Ranking: 13

Research Topic:

High speed approaches at traffic signals have led to increased fatality rates from rear-end collisions at these intersections. The causes of these rear-end collisions, along with the best methods for preventing them, are not completely understood.

Research Goal:

Traffic engineers need a better understanding of driver interaction with signals at high-speed roadway intersections to improve safety and reduce fatalities. A research program that examines the human judgment factors involved with high-speed interchange approaches would allow for better designs and planning for these interchanges.

Background:

Growth, urban sprawl and corridor preservation have resulted in more signaled intersections of high-speed roadways. There may be different causes and solutions for rear end collisions at high-speed exchanges than for those used in right angle intersection crashes.

Suggested Approach:

Review statistics for this type of crash, review the crash reports, and try to determine causation from the crash reports. Some states use strobes, “signal ahead” signs and other attention getters for isolated signals on high speed roads. Focus groups with investigating officers may generate researchable hypotheses about why this happens.

Time Frame:

One year

Resources Required

$100,000. It is costly to review crash reports.

Collaboration:

Enforcement officials, traffic engineers, urban planners

Implementation

Implementation would be conducted through the DOT design standards committee, SUDAS, and MUTCD committee

JUDGMENT AND DECISION MAKING BREAKOUT GROUP

TITLE: TEACHING SITUATIONAL DECISION MAKING TO NEW AND EXPERIENCED DRIVERS

Group Ranking: 16

Research Topic:

Review driver training and education practices.

- Teach situational decision making
    - Work zones
    - Weather
    - Vehicle condition
- What causes drivers to reject or forget their training?
- Relationship of personality to decision making – road rage?

Research Goals

Reduce crashes through better driver training and retraining.

Background

The driver training curriculum for young drivers is not standardized, no colleges in Iowa teach drivers ed teachers, most student driving occurs in good weather, and licensing agencies do not require evidence of driving competence in bad weather, work zones, or even congested conditions. As drivers, we all figure this out for ourselves. If we are lucky, a parent, experienced driver, or friend provides tips, guidance, and an extra set of eyes. Given this environment, how do we train new drives in this broader set of skills and how do we refresh older drivers, especially those driving for the first time in winter conditions.

Suggested Approach:

Convene one or more meetings of driving instructors, law enforcement personnel, motor vehicle enforcement personnel, drivers' licensing officials and drivers of various ages. Review the Iowa drivers test and manual and a sample of drivers' education curricula. Review the in-vehicle testing conducted by instructors and DOT examiners. Discuss how people learned to drive in stressful conditions, how they handle anger, etc. Have the group develop hypotheses about how to improve the training and build refreshers into normal driving life.

Time Frame

9 months

Resources Required

$75,000

Collaboration:

Same as focus group attendees

Implementation:

Department of Motor vehicles, driving educators

JUDGMENT AND DECISION MAKING BREAKOUT GROUP

TITLE: DRIVER'S RISK PERCEPTIONS

Group ranking: unranked

Research Topic:

What are the risk perceptions of drivers, and how do they affect driver behavior? How does risk communication (presence of law enforcement/ticketing, road congestion signage, weather condition updates, etc.) change risk perception? Does a change in risk perception change driver behavior? Are incentives and licensure procedures effective in changing risky driver behavior?

Research Goal:

The results of this research could be used to help create awareness of risk perceptions among transportation agency personnel, designers, and policy makers to improve transportation laws, enforcement, and design. The results could be used to incorporate driver risk perceptions into transportation designs and policies.

Background:

There is tradeoff decision between risk and consequence for most drivers. Certain driver behaviors (speed, calming, distractions, etc.) may result from this tradeoff decision. An understanding of the risk analysis process of drivers could improve transportation designs and policies aimed at improving safety, reducing cost, and improving flow.

Suggested Approach

This research could be conducted using driver surveys and focus groups to identify risk preferences. However, such an approach may be subject to responder bias. A more accurate data collection method would be through the use of driver simulators or remote sensing to capture actual behaviors rather than self-reported expected behaviors.

Time Frame

1-2 years; could be done in phases

Resources Required

If done using focus groups and surveys, $100,000
If done using simulators and/or remote data collection, $750,000

Collaboration

Media
DOT Traffic and Safety Office
Educators/ Universities
Law Enforcement
Driver Services

Implementation

If certain activities, programs, or designs are effective in promoting more accurate risk perceptions among drivers, the Department of Motor Vehicles and Department of Transportation may want to consider changes in enforcement protocols, design standards, or system designs. Also, driver educators may need to incorporate better risk perception information into their curricula.

JUDGMENT AND DECISION MAKING BREAKOUT GROUP

TITLE: EFFECTIVENESS OF DRIVER INCENTIVE/DISINCENTIVE PROGRAMS IN CHANGING BEHAVIOR

Group rank: unranked

Research Topic:

How do incentive/disincentive programs impact driving behavior?

Research Goal:

This research will determine what incentives and disincentives are most effective in changing driver behavior, including incentive/disincentive differences among groups (age, culture, gender, etc.)

Background:

There are cultural and personality differences that may impact driver behavior. Some of these differences may result in varying responsiveness to existing traffic policies and behavior modification programs (e.g., not everyone slows down because of the threat of a speeding ticket). A better understanding of how different groups of drivers respond to different types of incentive/disincentive programs will allow policy makers to target incentives and disincentives to particular groups.

Suggested Approach

This research could be conducted using driver surveys and focus groups to identify effects of incentives and disincentives. However, such an approach may be subject to responder bias. A more accurate data collection method would be through the use of driver simulators or remote sensing to capture actual behaviors rather than self-reported expected behaviors.

Time Frame

1-2 years; could be done in phases

Resources Required

If done using focus groups and surveys, $100,000
If done using simulators and/or remote data collection, $750,000

Collaboration

Policy centers
Media
Insurance companies
Office of Driver Services
Enforcement agencies

Implementation

If certain activities, programs, or designs are effective in promoting better decisions and safer driver behavior, the Department of Motor Vehicles and Department of Transportation may want to consider changes in enforcement protocols, design standards, or system designs. Also, insurance companies and policy makers may change their programs and policies to include more effective incentives and disincentives to promote safer driving.

JUDGMENT AND DECISION MAKING BREAKOUT GROUP

TITLE: DRIVER DISTRACTIONS THAT IMPACT DRIVER FUNCTION

Group rank: unranked

Research Topic:

What types of information or environmental stimuli impact driving distractions? How much information can a driver utilize? At what point does information create cognitive overload? What are the appropriate limits to information processing, and how do these limits affect driver function.

Research Goal:

This research could help determine how much information and environmental stimuli can be processed by drivers before accident risk increases greatly. Determine appropriate level of information, its grouping and location, to determine if we are adding to distractibility.

Background:

Cognitive research has shown that most individuals have a relatively low limit of cognitive inputs they can process in making decisions or reacting to situations. Such "cognitive overload" can result in distractions by drivers.
This research could be conducted using driver surveys and focus groups to identify effects of incentives and disincentives. However, such an approach may be subject to responder bias. A more accurate data collection method would be through the use of driver simulators or remote sensing to capture actual behaviors rather than self-reported expected behaviors.

Time Frame

1-2 years; could be done in phases

Resources Required

If done using focus groups and surveys, $100,000
If done using simulators and/or remote data collection, $750,000

Collaboration

Regents Universities
Center for Transportation Research and Education
Office of Driver Services
Enforcement agencies

Implementation

If environmental stimuli or information sources can be identified which effectively communicate risk at a time sufficient for drivers to take corrective action, the Department of Motor Vehicles and Department of Transportation may want to change existing programs to locate and communicate information in a more efficient and timely manner.

OLDER DRIVER BREAKOUT GROUP

TITLE: HELP OLDER DRIVERS UNDERSTAND, MAINTAIN, AND IMPROVE THEIR DRIVING SKILLS (The focus is on what the driver can do for him or her self)

Group Rank: 7/19

Research Topic:

The intent is to identify materials that agencies can provide to older drivers and actions that older drivers can take for themselves to improve driving skills and help reduce crashes.

Research Goal

The goal of this research is to reduce crashes and improve the quality of life for older Americans and maintain their independence by helping them to maintain driving skills.

Background:

Diminished driving skills with age are associated with the decline in many physical and mental capabilities, such as:

Sensory input and motor skills
Poor eyesight & Hearing
Physically frail—reduced strength and resilience
Reduced range of motion

Cognitive abilities
Slower reaction time
Confused by signs
Slower decision time
Slower driving
Distractible (is this worse for older adults or kids?)
Slower perception time
Good days/bad days
Medication changes

Attitudes
All others are the bad drivers
Wealth of experience
Lessened ability to adapt to change

Life style
Retired
Political clout
New communities
Independence
Rural isolation

Training, attitude changes, exercises, and other activities can help offset declining abilities. Some older drivers resist acknowledging declining skills and other cope in an ad hoc way. This project focuses on helping older drivers cope in a systematic way. Understanding the unique learning abilities of the older population would be needed.

Suggested Approach:

This project involves reviewing the literature to list physical and cognitive skills that decline with age, partnering with the medical and gerontology community to gain understanding of these processes, and develop self-help guidance materials that can help older drivers cope better and longer. The self-help may range across situational decision making, driving tactics (avoid interstates, avoid school closing time), information on help that is available for the asking, openness to receiving help from agencies like area agencies on aging, physical and cognitive exercises, and self-tests to confirm declining vision, dexterity, reaction time, etc. The goal of this project is to bring together diverse knowledge and package it into a useful kit for older drivers.

Time Frame

Two years

Resources Required

$200,000 or more depending on the scale of self-help products developed.

Collaboration: State licensing agencies, gerontologists/medical community, ophthalmologists, auto manufacturers, Governors' Traffic Safety Bureau, Department of Public Safety/highway patrol, AAA, AARP, Area Agencies on Aging, Senior Centers, Insurance companies

Implementation

Implementation and dissemination would be carried out through licensing agencies and agencies that serve seniors in varying capacities.

OLDER DRIVER BREAKOUT GROUP

TITLE: UDERSTAND OLDER DRIVER LIMITATIONS IN ORDER TO IMPROVE THE DRIVING ENVIRONMENT (Focus on engineering responses)

Group Rank: 8

Research Topic

Improve understanding in the engineering community of older driver limitations, the driver-road environment interface, and use this understanding to accommodate older drivers.

Research Goal

Reduce crashes and injuries related to the road environment

Background

Senior citizens complain more about sign size, advance warning, and pavement markings than any other road features. They like continuous guide lines on the pavement and plenty of advance warning so they can position themselves for turns. The Manual on Uniform Traffic Control Devices (MUTCD) is a consensus standard maintained by FHWA governing pavement markings and sign placement, size, and reflectivity. The MUTCD establishes minimum levels, but state or local agencies can choose to go above the minimums. The MUTCD is periodically revised, and recommendations are included that can provide an improved environment for older drivers. However, it is up to the implementing agencies to adopt policies that better accommodate older drivers. This has budgetary implications, of course. Transportation agencies continue to submit ideas for improvements to the MUTCD and they are debated in that forum. This research project will provide additional items that could be submitted and will provide data that can be used by implementing agencies for budget justification to invest in higher quality markings and signs.

Suggested Approach

- Review the literature on this topic, the results of past focus groups (especially in Iowa), and MUTCD options that benefit older drivers
- Scan Iowa crash data for crashes involving older drivers that are likely attributable to road conditions that could be improved by engineering
- Synthesize knowledge of physical limitations of older drivers and the driving environment to identify situations that cause problems and postulate engineering solutions
- Convene additional focus groups to address specific topics identified above
- Develop guidance for implementing agencies that identify situational problems faced by older drivers, put some scale to the problem, recommend engineering

steps that would address the problem (e.g., paved shoulders, rumble strips), recommend MUTCD options that should (could) be selected to address the problem, provide parametric cost estimates (e.g., cost per intersection, cost per mile of 4-lane arterial, etc.), and prepare submittals to the MUTCD committee for additional changes to accommodate older drivers.

- Establish recommended procedures for agencies to adopt in assessing physical roadway features (e.g., sign placement, message reinforcement at ramps/turns, lane markings), particularly at night and at intersections.
- Prepare a document for distribution to policy makers that builds the economic and quality-of-life case for supporting increased expenditure to accommodate older drivers.

Time Frame

Eighteen months

Resources Required

$150,000

Collaboration

State DOT, City and county engineers, gerontologists/medical community, ophthalmologists, Governors' Traffic Safety Bureau, Department of Public Safety/highway patrol, AAA, AARP, Area Agencies on Aging, Senior Centers, Insurance companies

Implementation

Implementation by state and local transportation agencies.

OLDER DRIVER BREAKOUT GROUP

TITLE: UNDERSTAND AND SHAPE DRIVING HABITS (BEHAVIOR) AS THESE CHANGE WITH AGE (The focus is on licensing agencies)

Group Rank: 9

Research Topic:

This project focuses on how licensing agencies can help older drivers keep their licenses by providing education about risks, helping older drivers make better decisions about driving, and disseminating information.

Research Goal

The goal is to help older drivers keep their license as long as it is safe for them to drive.

Background

Licensing agencies already provide assistance to older drivers. This project would produce ideas, insights, and materials that will assist licensing agencies in providing support for older drivers.

Suggested Approach

The project should incorporate tasks such as:

- Summary of support for older drivers provided by licensing agencies in Iowa and adjacent states
- Survey and focus group with licensing agency officials about problems they have regarding older drivers and programs or materials that might help
- Survey and focus group with older drivers regarding support they need and how best to supply it.
- Survey and focus group with agencies serving senior citizens such as AARP, Area Agency on Aging, Senior centers, AAA, etc. What support would help them do their job better?
- Develop a framework for supporting older drivers and disseminating information
- Develop selected products that address need identified during the surveys and focus groups.
- Develop a dissemination plan for materials provided.
- Improve data collection on performance of restricted license drivers
- Develop streamlined testing for VVVVV abilities
- This project could identify medical screening issues like eye exams, physical capability screening, heart attach risk, etc. These conditions impose risks to the older driver and others. Fundamental constitutional rights regarding privacy and the police powers of the state are involved. A second phase might be needed address issues of this magnitude.

Time Frame

One year

Resources Required

$75-$100 depending on the extent of the surveys and number of products prepared

Collaboration

State licensing agencies, gerontologists/medical community, ophthalmologists, Governors' Traffic Safety Bureau, Department of Public Safety/highway patrol, AAA, AARP, Area Agencies on Aging, Senior Centers, Insurance companies, attorney general's office

Implementation

Implement the dissemination plan

MULTI-TASKING AND DISTRACTIONS BREAKOUT GROUP

TITLE: EVALUATE HOW MULTI-TASKING/DISTRACTIONS IMPACT DRIVER PERFORMANCE AND CRITICAL THE THRESHOLDS

Group rank: 6/14 (Two similar problem statements were merged)

Research Topic

Determine how various non-driving tasks and distractions impact driver behavior, positive or negative, by evaluating the type, level, and average duration (or time range) of each activity/distraction. Evaluate critical thresholds at which multitasking impacts driver performance distraction. Evaluate driver judgment associated with when a driver chooses to engage in a voluntary, distracting activity.

Research Goal

The goal is to form the basis for design of interior automotive equipment, driver training materials, public service campaigns, and perhaps legislation (e.g., hands-free cell phones) to reduce the risks associated with driver distractions.

Background:

It is likely that driver distractions contribute to auto crashes, but the degree to which this happens is not well understood. New technologies such as cell phones, on-board navigational aids, on-board computers, and in-car offices are adding to the distractions that have always been around. The transportation industry needs to put some scale to the problem.

Suggested approach

1. Determine critical distractions/non-driving tasks
2. Determine how each distraction impairs driving
3. Evaluate exposure by relevant cross classification variables, eg. , age, gender, occupation
4. Determine how to obtain data, e.g., driver simulator, crash records and reports, in-vehicle cameras, eye monitoring devices, surveys, and “black boxes.”
5. Analyze the data for each distraction and combination of distractions and link to crashes or risky behavior.

Time Frame

A statistical study on crash data or a simulator study would take about a year. An instrumented vehicle study would take two years or more.

Resources required

Driver simulator and survey; possibly instrumented vehicles and a cadre of willing drivers. A study like this could range from $75,000 for a paper study to over $500,000 for an instrumented vehicle or simulator study.

Collaboration

Iowa DOT, FHWA, State Universities, Iowa State Patrol, auto manufacturers

Implementation

The most immediate implementation medium would be driver education modules for use by driving instructors. Manufactures may benefit if results showed design dos and don’ts.

MULTI-TASKING AND DISTRACTIONS BREAKOUT GROUP

TITLE: SYNTHESIS OF KNOWLEDGE ON THE IMPACT OF CELL PHONE USEON DRIVING

Group Ranking: Unranked

Research Topic

Conduct a synthesis of available research and research in progress on the impact of cell phone use on driver performance.

Research Goal

There is so much attention to this issue recently, that an effort to document currently available data on the impact of cell phones on driver performance is warranted. The goal is to identify this as a problem that needs attention or conclude that it is probably no worse that all the other things we do in cars. (Did distraction-related crashes drop when the incidence of smoking dropped?)

Background

Cell phone use has exploded since the late 1990s, creating a public concern about safety. Some states (Virginia) require hands-free devices. If legislation is a possibility, it behooves us to have some sense of the risk.

Suggested approach

Conduct a literature search and a survey of states and relevant organizations like AAA to determine if anyone has a handle on this.

Time Frame

Nine months.

Resources required

Only labor and office equipment are needed for this effort, about $30,000.

Collaboration

Iowa DOT, FHWA, other states, motorist associations, state universities, Iowa State Patrol

Implementation

If this study returns evidence that cell phone use is a contributing factor to auto crashes, driver training and public service campaign materials should be prepared. Drat legislation is a possibility.

INTELLIGENT VEHICLE INTERACTIONS BREAKOUT GROUP

TITLE: TASK ANALYSIS ON THE HUMAN FACTORS ASSOCIATED WITH NEW IN-VEHICLE TECHNOLOGY

Group Rank: 4

Research Topic

Conduct a task analysis on human factors issues associated with in-vehicle technologies.

Research Goal

Determine if in-vehicle technologies constitute a safety problem. If so develop mitigation strategies.

Background

Vehicles are now available with on-board computers, navigation systems, adaptive cruise control, anti-collision devices, rear view cameras, DVD audio and video players. Many drivers also use cell phones. Does use of these devices constitute a safety problem? The answer is unclear.

Suggested Approach

Determine the number of crashes associated with in-vehicle technologies, and develop and age, activity, technology matrix.

- Navigation systems
- Adaptive cruise control
- Entertainment features
- Testing for licensing

If a problem is confirmed develop recommended solutions. Should car dealer be required to do simulation and training? Can the displays and controls be less distracting?

Time Frame

One year

Resources Required

$150,000. The cost is largely a function of the number of state crash data bases used.

Collaboration

Potential partners/funders include: States, AASHTO/NCHRP, the auto industry, insurance companies, AAA, and AARP.

Implementation

Public information documents on the findings are all that can be done directly. Stronger actions would have to come from the auto industry or legislation.

INTELLIGENT VEHICLE INTERACTIONS BREAKOUT GROUP

TITLE: DESIGN AN INTERACTIVE SYSTEM TO MONITOR AND IMPROVE DRIVER ALERTNESS AND ATTENTIVENESS TO REDUCE CRASHES

Group Rank: 15

Research Topic

The purpose of this project is to design a system to monitor driver alertness (fitness for driving).

Research Goal

Improve safety and reduce crashes.

Background

The larger issue is fitness for duty testing. Devices have been developed for testing employees with high risk jobs for fatigue or drug impairment -- fighter pilots, nuclear plant operators, ship crews. The technology isn't foolproof. False positives are a problem- someone tests as unfit when they are not. In situation where time is not a problem, fitness-for-duty screening devices can be backed up with other tests. The trucking industry has experimented with devices to test for drowsiness and devices exist that can prevent impaired drivers from starting their car. In short, devices already exist that can monitor alertness, but they are not sufficiently reliable for commercial application, and legal issues abound.

In the mid 1990s TRB's Transit Cooperative Research Program conducted a test of fitness-for-duty devices for possible use in the transit industry. The project began with a workshop to which anyone with a working fitness-for-duty-testing device was invited. The most promising devices were selected for human subjects study using alcohol as an impairing agent. The results were disappointing. No device was suitable for rapid and reasonably accurate screening for impairment due to alcohol, nor, by extension, fatigue.

Research has continued, of course, over the following 10 years. The topic is worth pursuing

Suggested Approach

Phase I

- Conduct a literature search on devices that test for fatigue or impairment while a person is on the job or driving. Eye-based devices seem to be the most promising.
- Determine the technical shortcomings of existing devices.
- Consider an invitational workshop to view the devices that are available.
- Investigate legal issues

Phase II

- Identify the shortcomings of the most promising devices and target research at correcting the short comings. Some devices will be patented, so further research may have to involve patent holders.

. Phase III

- If a device has promise or is developed, test it in a simulator environment. (Fatigue studies are difficult and expensive, because subjects must be kept awake for a period of time, then the tests are run, and then subjects must be allowed to sleep or be driven home with the assurance that they do not have to drive or work for a few hours. To avoid liability, it is better to keep them at the test site for rest).

Time Frame

Phase I: one year
Phase II: at least 2 years
Phase II: One year

Resources Required

Psychometric researchers/instrument developers and a simulator

Phase I: $75,000 (With a workshop)
Phase II: Unclear. It depends on the state of the practice -- could be zero or over one million dollars.
Phase III: $300-$500,000 depending on simulator costs and test protocol.

Collaboration

Auto industry, psychometric researchers, instrument manufacturers, Federal Motor carrier Safety Administration

Implementation

Auto manufacturers could offer the device as an option. Fleet operators could require it.

INTELLIGENT VEHICLE INTERACTIONS BREAKOUT GROUP

TITLE: EVALUATE THE USEABILITY OF CURRNET TECHNOLOGY AND FAILURE SCENARIOS

Group Ranking: 18

Research Topic

Evaluate the usability of technology and failure scenarios

- Making the systems work for older, handicapped, vision/hearing impaired and younger drivers
- What happens when something goes wrong with technology?
    - Responses of drivers
    - Design should make it obvious there is a problem
    - Education opportunities/requirements
- What level of decision making is the driver's and what level is the technology?

Research Goal

Ensure that on-bard technologies can be used by a wide range of drivers (old, young, disabled) and ensure that equipment use or equipment failures do not cause crashes.

Background

As intelligent vehicle technologies develop, the issue of human control arises. What is the right degree of human control and what can be safely automated. What happens when something breaks I service. Guided car and guided platoons of cars have been successfully demonstrated. Navigation is rapidly migrating from paper maps to electronic devices. Collision avoidance systems are available. Adaptive cruise control paces your vehicle with the one in front of it and holds a safe interval. If you are going 70 mph in a guided platoon of following another care on adaptive cruise control and the system fails, a major crash could result.

Suggested Approach

Select technologies that are likely to have significant market penetration in the next five years. Place them on a simulator and test the ergonomics and failure mode. Have subjects use the equipment while being subjected to traffic situations and distractions. Test subjects should include people of varying ages, education, and physical abilities.

Time Frame

Two years

Resources Required

A simulator and sample equipment. This is probably a million dollar study, because the equipment must be realistically connected to the simulator and driving and distraction scenarios must be programmed.

Collaboration

An agency with a simulator, human subjects for testing, FHWA, FMCSA, NTSB, NHTSA, Consumer Reports, auto manufacturers, specialty equipment manufacturers.

Implementation

Auto and equipment manufacturers.

TECHNOLOGY AND POLICY ISSUES BREAKOUT GRUOP

TITLE: A COMPREHENSIVE STUDY FOCUSING ON DATA COLLECTION FOR TECHNOLGY USAGE RELATED TO MOTOR VEHICLE SAFETY AND CRASHES

Group Ranking: 5

Research Topic

Research Goal

Provide the research base for sound public policy on new technologies.

Background

The information on safety risks of new technologies is thin. The technologies range guidance assistance, to ITS roadside information to in vehicle technologies information such as navigation aids. Many of these technologies re intended to improve safety, but do they?

Suggested Approach

Identify technologies the will have significant market penetration in the next five years and assemble crash data from as many state as possible that may involve one of these technologies. Develop crash rates or a model to predict crash rates.

Time Frame

Two years for a multi-state study

Resources Required

$150,000

Collaboration

State DOTS, universities

Implementation

Policy makers

TECHNOLOGY AND POLICY ISSUES BREAKOUT GRUOP

TITLE: IDENTIFY HUMAN FACTORS ISSUES RELATED TO DEPLOYMENT FO PROACTIVE ROADSIDE ITS SYSTEMS TO IMPROVE HIGHWAY SAFETY AT HIGH ACCIDENT LOCATIONS

Group Ranking: 10

Research Topic

Research Goal

Improve the design, placement, and message sets used roadside ITS installations to avoid inadvertent, counterproductive consequences.

Background:

ITS technologies are aimed at increasing safety, however they may represent a double-edge sword being distracting as well as helpful. South Dakota has had good success with the use of dynamic message signs for providing information to the public. Informing a driver of the approximate delay to expect from an accident scene could keep driver frustration and the sense of powerlessness (and consequentially road rage) at a minimum. However, on congested freeways nearing breakdown, the introduction of a message on a dynamic massage sign creates an instant backup as motorists slow down just a little to read and process the information. It is not always what information should be provided to the users to promote satisfaction, safety and enhance roadway capacity. ITS information can be counter productive. The potential behavioral modifications that this additional information might induce and the associated consequences should be evaluated.

Suggested Approach

Scan the ITS academic and periodical literature
Interview by telephone the managers of major ITS installations—e.g., Minneapolis, Kansas City, St. Louis, Los Angeles (Develop and interview guide) Probe for changes that they have made in response to past “mistakes.”
Synthesize the information
Develop a best practices guide for roadside ITS installations

Time Frame

One year

Resources Required

$100,000

Collaboration

DOTs, traffic engineers from major cities, roadway authorities, highway patrol, and ITS managers

Implementation

State DOTs, Cities

TECHNOLOGY AND POLICY ISSUES BREAKOUT GRUOP

TITLE: RESEARCH INTO TECHNOLOGY USES WHICH RESPECT PRIVACY

Group Ranking: 20

Research Topic

Legal research into privacy and technology

Research Goal

Provide principles for use by legislators and regulators.

Background

Although new technology has a number of important benefits, the privacy implications associated with its usage needs to be evaluated prior to deployment. With this caveat and the fact that infrastructure-based technology has demonstrable safety benefits, new technology development that respects privacy needs to be supported and the integration of this technology into the transportation infrastructure needs funding.

New technologies are frequently available well before their effect on transportation is understood or even examined. Developing legally appropriate definitions of technology given its rapid evolution is particularly difficult. This difficulty leads to problems in implementing effective legislation, for example, in differentiating between hands-free and hand-held cell phones. Because of the privacy concerns with new technology, there is a danger that if an aggressive legislative approach is taken to secure privacy, this may significantly inhibit technology development (which could otherwise improve roadway safety). Black-box technology is included in all new cars and there are a number of benefits of this technology to the owner of the vehicle. These benefits include automatic notification of emergency personal in case of an accident as well as enhanced mileage and maintenance information based on computer system diagnostics. Rental-car companies use this technology to track their fleet vehicles to prevent theft and abuse, enable stolen vehicle recovery and in some cases this tracking information has even been used to issue speeding fines. This usage has lead to a negative reaction by some legislators. The information that these devices record represents a privacy concern given that there is legal precedence for using this information against the vehicle owner. Public policy that protects privacy needs to be appropriately balanced against the potential benefits that may stem from new technologies.

Suggested Approach

Conduct a legal synthesis on privacy and technology. Hire a law student to review federal and state laws and court cases relevant to this issue. Synthesize the principles used by judges and legislators.

Time Frame

One year

Resources Required

$75,000

Collaboration

Legal community, NHTSA, university researchers

Implementation

Articles and web information

YOUNG DRIVERS BREAKOUT GROUP

TOPIC: DRIVER EDUCATION AND PARENTAL INVOLVEMENT

Group Ranking: **1**

Research Goal

Identify the most effective educational methods and messages for student drivers and parents

Background

- Problem w/young drivers is judgment – comes from values, previous experience, knowledge from class and family
- Last part of the brain to develop is judgment – book "The Primal Teen" last part doesn't develop until the early twenties
- IIHS has not been a proponent of drivers education – see DeKalb county study that showed no effect of drivers education on driver performance
- Order in which drivers acquire a license varies by state: (classroom), permits, and behind the wheel
- What kind of education should be provided and not provided? E.g., young drivers that feel overconfident.
- **S**tandardized Curriculum: There is no state curriculum on drivers' education (only topics covered and time spent). GTSB could assemble a curriculum including cell phones, passengers, and other distractions. However, school districts do not want a curriculum dictated to them. Who would determine a "standard" curriculum? In 1988 the DOT put out a guide to helping teachers write their curriculum. There are 5 books circulating nationally that on which a curriculum be based– including overheads, etc. What metrics should go into a study of curricula? Then use the metrics to study the impact of different curricula. The legislature is not likely to enforce standards, but research could be useful to those who want to do better.

Research Product

- Model driver education curriculum
  - Continue driving mechanics and laws
  - Add emphasis on thinking skills
  - Decision making
  - Judgment
- Guidelines for parental involvement in the drivers education process
  - What you should do with your young driver while in the car
  - Step-by-step guide; perhaps a laminated booklet to carry in the car
  - Situational guidance, e.g., right of way, on ramps, left turns, etc.

- Continuing education for driver education teachers
  - University extension
  - Community colleges
  - Area Education Agencies

Time Frame and Resources

- 18 months to 2 years
- $150,000

Implementation

- Multidisciplinary study oversight committee
- Approval process for the curriculum
- Conduct a pilot delivery

YOUNG DRIVERS BREAKOUT GROUP

TOPIC: YOUNG DRIVER IOWA EXPOSURE DATA

Group Ranking: **3**

Research Goal

- To obtain data on exposure (VMT) for drivers by
  - Age
  - Gender
  - Geography (county, rural/urban)
  - time of day, day of week, seasonal
  - weather conditions
- Also crash data by how long drivers have been driving

Background

- Profound lack of relevant exposure data
- Data required for any meaningful statistical analysis of younger driver issues
- "Bathtub" chart based on old/possibly irrelevant (national) data
- Major national interest

Suggested Approach

- Literature review
- Conduct surveys (driving patterns)
  - High schools (sophomores, juniors, seniors)
  - Phone surveys 14-24 year olds
  - College campus surveys
- Use video technology to estimate driver age. Couple with license plate capture or post card survey to capture exposure data.
- Electronic data capture (GPS)
- Travel diaries

Time Frame

- At least one year of data
  - A little data (one week?) for a lot of drivers
  - A lot of data (one year?) for a few drivers
  - Both?

Resources Required

- GPS units (100) @$250 = $25,000
- Possible specialized video equipment to create a sample of young drivers

- Undergrad student(s) for data collection
- Grad student for data analysis
- DOT (Trans Data, TAS)/local (MPO?) staff time
- $200,000 to start with

Collaboration

- GTSB, DOT, FHWA
- Insurance Companies (IIHS, AAA …)
- Pooled fund (extend model to other states)
- ISU – ITSDS, GIS, engineering
- U of I – human factors, public policy
- UNI – survey, geography

Implementation

- **Resources developed to be used by**
  - Legislature (GDL?)
  - Drivers Education Curriculum
  - National Model/Crash Statistical Analysis
  - Safety programs at DOT and GTSB
  - Ultimately implemented by MVD, parents
- **Major national implications! (extend model to other states)**

YOUNG DRIVERS BREAKOUT GROUP

TOPIC: TEEN & YOUNG ADULT DRIVER CRASH ANALYSES

Group Ranking: **12**

Research Goal

Examine the teen and young adult (ages 14-25) crash data in detail

- Gender
- Time-of-day
- Impairment
- Number of passengers on-board
- Crash scenario
- Road type
- By individual age
- Etc.

Background

- Teen and young adult crash scenarios are varied--risk issues figure prominently
- Lack of comprehensive scenario-based crash analysis

Suggested approach

- Query Iowa crash database for a wide range of crash variables
- Understand the top 10 crash types for drivers in each year from age 14-25

Time frame and resources

The project would take about six months and up to $50,000.

Collaboration

- Iowa and other mid-west peer States

Implementation

- Iowa DOT
- No legislation necessary

YOUNG DRIVERS BREAKOUT GROUP

TOPIC: STATE COMPARISON OF GRADUATED DRIVERS LICENSING (GDL) FEATURES AND SAFETY

Group Ranking: 17

Research Goal

Examine successes, challenges and lessons-learned from Iowa and other State's GDL experience

Background

GDL regulations vary greatly from state to state. Michigan only allows one passenger per vehicle. Other states require accompanying drivers over 18, only for school or work trips, etc. In Iowa, self tracking since GDL was initiated shows citations down 30-35% and crashes down 25%. The Insurance Institute for Highway Safety also shows benefits.

Suggested approach

Compiling the GDL regulations from states with GDL laws is a necessary first step to a comparison of impact. Once it is determined which states have comparable laws, crash data should be investigated to look for relationships, adjusting for the number of years such laws have been in place.

- Comparative State-by-State analysis of GDL laws
- Review current Iowa GDL and examine before and after Iowa crash data for the affected age groups
- For states with GDL laws examine before and after crash rates for affected age groups, controlling as much as possible for differences in state data formats. The analysis should investigate the effects of different GDL provisions.

Time frame and resources

This project would require about $25,000 for the Iowa part; $150,000 for a national study. Time frame is six months to 18 months.

Collaboration

Collaborators would include motor vehicle licensing offices, university researchers, and State DOTs.

Implementation

- State of Iowa public service campaign

- Driver’s education
- Legislation