Lifetime Driver Learning Initiative

Forum Highlights, Program Framework and Action Plan

Subcommittee on Human-Centered Transportation Systems
Interagency Coordinating Council on Transportation R&D
National Science and Technology Council

September 1997

Lifetime Driver Learning Initiative-
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Acknowledgments-

These planning activities were conducted on behalf of:

The U.S. Department of Transportation
Research and Special Programs Administration

...and conducted by:

The Pennsylvania State University
Center for Intelligent Transportation

...in cooperation with:

GHL Federal Systems Inc.
Washington D.C.

...and under the guidance of:

The Volpe National Transportation Systems Center
Cambridge, MA.

Eddie Crow, Program Manager
Center for Intelligent Transportation
The Pennsylvania State University

Don Sussman, Division Chief
Volpe National Transportation Center
U.S. Department of Transportation

Foreword-

As charged by the Office of Science and Technology Policy, Dr. John H. Gibbons, issued the following guidance regarding FY 99 Interagency Research and Development Priorities:

> *"Through the National Science and Technology Council process, Federal agencies and departments have identified a set of priority research areas that are important national efforts requiring investment across agencies.... The research areas that are identified as priorities in the FY 99 budget preparation (include) Transportation Research and Development: Promote technology to improve the safety, security, and efficiency of air and surface transportation using advanced information technology and the global positioning system (GPS), Aviation Safety and Security: Support research and development aimed at reducing the aviation fatal accident rate ..., modernizing our aging air traffic control system using advanced information, communication, and navigation technologies....*
>
> *In addition to these priorities, agencies will be requested to provide estimates of funding contributions to five R&D budget crosscuts, i.e., education and training technologies ... and more efficient automobiles."* *(6 June 1997)*

The challenge of interagency coordination of research and development priorities was undertaken by a group of representatives from NASA, DoD, DoE, and persons from the modal administrations of DoT. A coordinating council was established and a subcommittee formed to identify of an Inter-Modal Transportation R&D Program to conduct long-term, inter/multi-modal research that will continue the steady advances in transportation technology necessary to meet the demands of the 21st Century. The scope of this total effort is budgeted to be $145M of Federal monies over the next six fiscal years as requested in the President's National Economic Crossroads Transportation Efficiency Act [NEXTEA].

Five long-term research areas were identified through the efforts of this subcommittee. These included information infrastructure, sustainable transportation, advance materials, computing and information technologies, energy and environment, tools for transportation modeling and human centered transportation.

Human-Centered Transportation, the focus of this effort at-hand, is one thrust in a concept stage consisting of enabling research with the promising large gains in safety. These gains are possible when considering that human centered systems target the single largest untapped area for safety improvements: *human operator behavior.* It is in human behavior and human performance that sizeable gains in transportation efficiency and safety may be realized through an integratedm, long-term research and development plan.

This document describes planning activities and program concept of a Lifetime Driver Learning Initiative as part of a transportation safety initiative for the 21st Century.

Lifetime Driver Learning

- Annually, 40,000+ motorists die and millions are injured in traffic crashes, many are caused by human error and bad judgment.

- Safety improvements can and are being made through changes to the roadway infrastructure and in automobile and truck designs.

- An untapped opportunity for safety improvement, yet difficult, is driver performance and driver behavior.

- Investments in "smart operators" or "smart drivers" can parallel investments in "smart highways" and "smart cars".

- Driver education in years past focused on the new or novice driver with mixed and uncertain results when tallying safety statistics.

- New forms of proficiency training and education for driving may be possible with the advances made in the interest of national defense such as pilot training, troop training and operator training.

- Simulation of the wartime environment using computers has enabled the military to put their men and women in an artificial situation allowing them to gain experience and develop proficiency in handling their vehicles that would otherwise might prove dangerous and risky in real life.

- Rapid increases in computer technology with decreases in cost has opened new opportunities for computer based training now that hardware and software are available in the schools, in the libraries and in many homes.

- Opportunities for interagency cooperation between the military and transportation community now exist to apply this training know how within the field of advanced driver education and training. The purpose of such activities is to conduct research into the science of the driving process and investigate the potential of these methods.

- Outcomes would include the piloting and deployment of affordable simulation-based training programs geared to the novice, aggressive and aging driver. The core of the training would be to expose these drivers to risky roadway situations and allow them to develop appropriate automatic responses under these conditions.

- As America's population changes, numbers of drivers, across all ages and experience levels utilize our nations roadways at ever increasing rates. Maintaining driver proficiency across the lifespan of these drivers, is essential to first maintain and then increase the safety levels as measured by fatalities and injuries caused in highway crashes.

Introduction-

A planning activity has been underway to identify and determine the elements of which would comprise a successful Lifetime Driver Learning Initiative as part of a future common strategy for future highway safety improvements through human centered transportation. Key issues were identified as essential elements of such an effort:

- what are the underlying keys to affecting judgment, decision making, habits and attitudes of vehicle operators???
- what are the core learning/training strategies and instructional designs and techniques resulting in safe and proficient driving skills???
- what are the "mediums for the message"...technologies and approaches for effective delivery of training and learning strategies???
- what are the business issues and economic thresholds for widely distributed, widely utilized and measurably effective driver training???

The planning approach consisted of inviting key constituents and knowledgable experts from both the public and private sector to attend and participate in a planning forum to discuss these issues. Approximately 50 persons attended the forum, held in State College, Pennsylvania in late July.

The findings and results of the forum have been summarized and published in a report. These ideas have been synthesized into a program framework and action plan, which is reported in this document.

Future plans are to continue the development of these program ideas and to seek federal funding for the initiation of the early phases of this multi-year research and development program.

Subsequent program activities will be undertaken by a multi-agency, public-private partnership.

Forum Highlights

Discussion Points

Opportunities

and

Actions

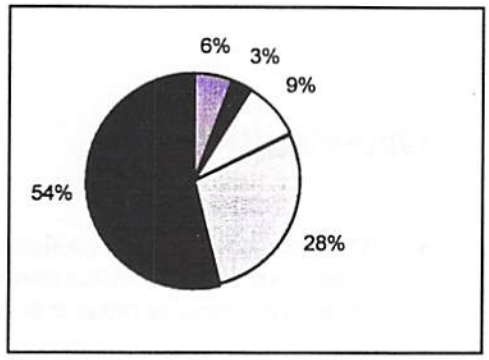
Transportation

Increasing highway safety is top priority…

There is a compelling need….

- Highway crashes result in death and injury greater that any disease or health epidemic
- Lives lost on nation's highways in 1995…equivalent to a death occurring every 13 minutes
- Costs are counted in lost productivity and in dollars; due to crashes in 1995 alone:
  4.8 million days of life and functioning lost
  $150 billion over the lifespan
  this is 2.2% of the Gross National Product
- Cost distribution

Federal	6%
State, Local	3%
Public Funds	9%
Personal	28%
Private Insurers	54%



There is an increasing sense of urgency…

Youth

- teens and young adults have 4-5 times the average crash rates
- 40 out of 100 youth, age 16, have a reportable crash
- there are _____million

Aggressive

- Road rage incidents increase on nation's metropolitan and urban freeways
- Angry drivers, frustrated by life's demands enrage and react violently on the roadway often triggered by congestion or behavior of other motorists

Older

- Aging baby boomers will swell the population with older, transportation needy citizens as we outlive our safe driving lifetimes

Frailty accounts for the high level of death rates and injuries in the ranks of the older driver population

Reinvention of driver education/training needed...

Discussion Points-

- Driver education and training historically appears to be ineffective in crash prevention, particularly as it was delivered traditionally in public schools.

- The Decalb Report, 1992, is particulary condemning of driver education

- Some data, indicate that driver education and training courses actually may contribute to increased crashes as drivers feel more empowered following graduation from such courses.

Opportunities-

- While the knowledge and proficiency requirements for safe driving may remain constant, the needs of the driver change over the lifespan from new/novice driver, the experienced driver and the older driver. The changing needs over the lifespan suggest that ....

Actions-

Driver behavior is very complex, at best…

- The science of driving is emerging and needs careful, rigorous study
- Opportunities do exist for early demonstrations
- Select high risk scenarios
- Model in simulation
- Conduct simulator studies with select drivers

	Near Term	Mid Term	Far Term
Knowledge			
Skills			
Abilities			
Attitudes			

- In-vehicle behavior needs to be baselined including inappropriate driving responses to risky situations
- Data collection in the vehicle should parallel in-simulation development

Training in the military, like for fighter pilots, has been tried, widely used and shown to be effective…

Discussion Points-

- Armed Services have data supporting utility of simulator training in combat effectiveness
- Training and simulation developed for both routine and emergency procedures
- Strategy is to train automatic human response to routine and adverse situations

Opportunities-

- Apply training designs and instructional methods based upon military experience base
- Determine level of fidelity needed to transfer training and knowledge to driving subject
- Simulation allows experience and situational awareness to be "felt" under safe context
- Automatic response training possible under these adverse conditions

Actions-

A clear and compelling motive is required to mobilize…

Discussion Points-

Opportunities-

Action-

regulatory
prerequisite for…
financial motive

Technological advances in personal computing with commensurate lowering in costs offer new opportunities....

Discussion Points-

- Technology is quickly advancing
- Buying power is increasing: capability for the money
- Uncertain how much fidelity in simulation is enough to effect transfer of training

Opportunities-

- Web television
- Increasing bandwidth w/satellite communications

Actions-

Framework for Action:

Purpose: Fully define the problem, define near term action agenda with long term research program

Phase One- (12-18 months)

Task I- Systems Level Analysis and Design

-prioritize driver cohort groups and critical behaviors
-prioritize high risk scenarios; high risk behaviors
-task analysis for scenarios
-design of training/instructional strategies

Outcomes:

1. Program Plan
2. Research Agenda

Task II- Design of Model Public-Private Partnership

-determine incentive structure
-identify stakeholder motives and benefits
-determine cross-agency roles
-deployment models:
    state level (e.g. graduated licensing)
    private sector (e.g. financial incentives)
-core stakeholders

Outcomes:

1. Cooperative Framework
2. Economic Thresholds/Targets
3. Establish Core Team Members

Task III- Models for Public Awareness, Information and Education

-thematic statement: accidents constitute a public health problem
-population demographics and impact on future driving patterns
-examine pre-existing models: seat belts, anti-smoking, STD's
-long-term approach for awareness and education (start young)

Outcomes:

1. Visibility
2. Immediate "Coverage"
3. Builds Demand

Task IV- Preliminary Data Collection

-target cohort groups: teen, older and aggressive
-high risk scenarios
-in-vehicle data collection
-in-simulator data collection
-initial indicators and comparisons

Outcomes:

1. Basis for further action
2. Visibility

Program Plan

Partnership:

- Unique organizational system and contract terms and conditions

- Multi -Agency
- Multi Performer
- Joint public private partnership

Core participants:

NHTSA	U.S. NAVY	Public Sector
FHWA	Penn State University	Stakeholders:
RSPA	University of Minnesota	AAA, USAA
NASA	Industry	

Funding requirements

	'98	'99	'00	'01	'02
Federal	$1.5M				
Private					

Future phases-

Agenda

[Annotated to Reflect Actual Presentations]
Human-Centered Transportation: Initiatives for the 21st Century
Toftrees Hotel Resort and Conference Center 814.234.8000
One Country Club Lane, State College, PA 16803-2099
Held 30 and 31 July 1997

Day One
AM Plenary Session

0800 - 0810 **Introductions and Welcome**
David N. Wormley — Dean, College of Engineering, Penn State University,

0810 - 0845 **Keynote Address: Human-Centered Challenges for Lifetime Driver Learning**
The Honorable John Peterson — United States House of Representatives

0845 - 1020 **Panel Session: Private Sector Experiences with Operator Learning Strategies**
Speakers:
Joyce Fredericks — AARP 55 Alive, North East Region
David Willis — AAA Foundation for Traffic Safety
Panelists:
Allen Robinson — American Driver & Traffic Safety Education Assoc.
Alice Gannon — USAA Insurance Group
Ed Starosielec — CalSpan SRL
Charles Butler — American Automobile Association

1020 - 1030 **Break**

1045 - 1200 **Government Experience with Enhancing Operator Learning**
Speakers:
Michael Smith — NHTSA, U.S. Department of Transportation
Maris Vikmanis / Henk Ruck — AirForce Research Laboratory
Panelists:
Dexter Fletcher — Institute for Defense Analysis
Gus Mast / Sam Tignor — FHWA/ Turner Fairbanks
Ronald Knipling — Research Division, OMC/FHWA

1200 - 1300 **Luncheon- Cost of Traffic Accidents in Human Life and by Other Measures**
Kelley S. Coyner — Acting Administrator, RSPA peaking on behalf of the Secretary, U.S. Department of Transportation

PM Plenary Session

1300 - 1430 **Discussion- Research Requirements for Enhanced Driver Learning**
Moderator: Don Sussman, Volpe
structured comments-Adolescent
Behavior: John Brock — InterScience America, Inc.
Older Drivers:
Richard Marotolli — TRB Committee: Safety & Mobility of Older Drivers
Aggressive Drivers:
John Larson — Institute for Stress Medicine
Dave Willis — AAA Foundation for Traffic Safety
Discussion

1430 - 1530 **Discussion- Current Research on Learning Technologies**
Moderator: Mary Stearns, Volpe
structured comments-
Randym Carlson — Georgia Southern University
George Kuehn — IITRI
Discussion

1530 - 1545 **Break**

1545 - 1700 **Discussion- Enabling Technologies**
Moderator: Dave Hall, Penn State
structured comments
Jim Voorhees — Illusion Technologies
Wade Allen — STI, Inc.
Dan Griffin — JPL
Discussion

1800 Dinner
Guest Speaker: Vivian Doty Hench — "Amos Nyhart: Pioneer in Driver Education"

Thursday AM

0800 - 1045 **Working Sessions - Defining Fundamental Assumptions and Underpinnings for a Program Framework and Action Agenda**
Facilitator: Damian Kulash, Eno Foundation
1. Current motive, influences and pressures to consider operator proficiency training
2. Underpinnings to Behavioral Modification; Learning Strategies and Instructional Designs
3. Simulation and Computer-Based Education and Training
4. Challenges to Uptake and Implementation of Technology — Private Sector Involvement
5. Outcomes, measures and metrics for success and evaluation; stretch goals/attainable goals

1045 - 1100 **Break**

1100 - 1200 **Dimensions Pertaining to Future NASA Cross-Modal and Trans-Modal Transportation Issues**
Speaker:
Bruce Holmes — NASA Langley
Lanny Jines — Air Force Research Laboratory

1200 Adjourn

Participant List

U.S.Congress

The Honorable John Peterson, PA

Government Federal/DoT

1. Fenton Carey, RSPA
2. Kelley Coyner, RSPA
3. Don Sussman, Volpe
4. Mary Stearns, Volpe
5. Mike Smith, NHTSA
6. Paul Rau, NHTSA
7. Gus Mast, FHWA/TF
8. Ron Knipling, FHWA/OMC
9. Garold Thomas, FRA
10. Don Hildabrand, OSTP
11. Caitlin Hughes, RSPA/OST
12. Eric Nelson, RSPA/OST

Federal/DoD,NASA

1. Bruce Holmes, NASA Langley
2. Maris Vikmanis, WPAFB
3. Dan Griffin, JPL
4. Henk Ruck, Air Force Research Lab
5. Lanny Janies, Air Force Research Laboratory

State

1. Becky Bickley, PennDoT (Invited)
2. Betty Serian, PennDoT (Invited)
3. Bob Benke MinnDoT
4. Laurel Broadhurst, North Carolina Department of Health

Private Sector: Associations, Representatives and Advocacy Groups

1. Gerri Hall, Operation Lifesaver
2. Joyce Fredericks, AARP 55 Alive
3. Mary Sweitzer, AARP 55 Alive
4. Dave Willis, AAA
5. Dave Snyder American Insurance Association (Invited)
6. Allen Robinson, Amer. Driver & Traffic Safety Education Administration
7. Sheila Prior, AAMVA (Invited)
8. Dexter Fletcher, Institute for Defense Analysis
9. Damian Kulash, Eno Foundation
10. Tom Goldberg, GHL, Inc.
11. Charles Butler, American Automobile Association

Industry

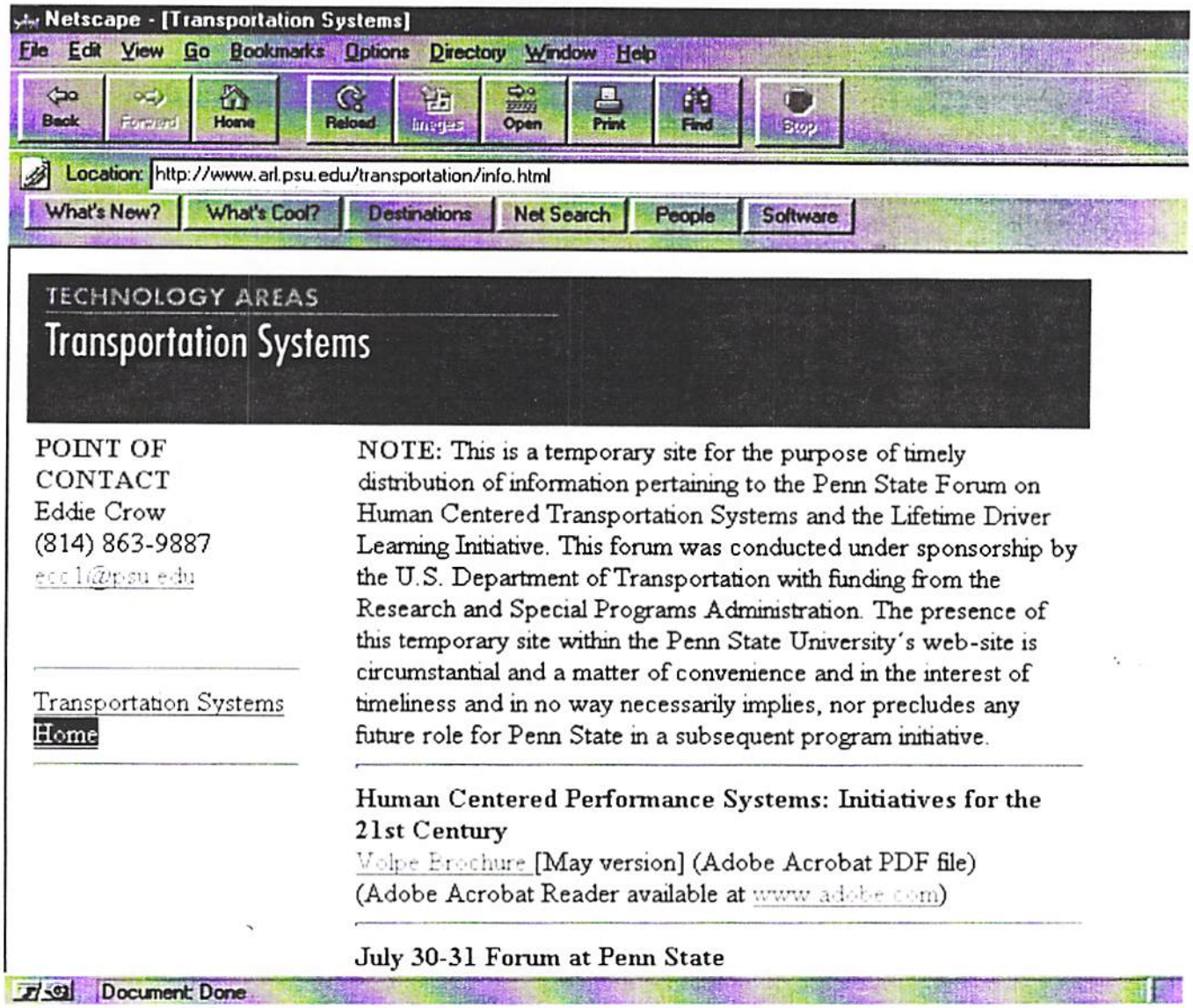
1. John McFann, North American VanLines (Invited)
2. John Brock, InterScience Associates
3. Dave Nordstrom, Battelle (Invited)
4. Jim Vorhees, Illusion Technologies
5. Alice Gannon, USAA Insurance Group
6. Jerry Wachtel, Veridan
7. Wade Allen, STI, Inc.
8. Ed Starosielec, Calspan SRL

Research Community

1. George Kuehn, IITRI)
2. Dennis Foderberg, U of MN
3. Dave Hall, Penn State
4. Martin Peitrucha, Penn State
5. Randy Carlson, Georgia Southern University
6. Rick Pain, TRB
7. Don Fisher, U of Mass
8. Rich Marotolli, TRB
9. John Larson, Institute for Stress Medicine (Invited)
10. David Wormley, Penn State University

Resources and Information-

Web Site: **www.arl.psu.edu/transportation/Human Centered Transportation**



Points of Contact:

Fenton Carey
U.S.DoT, RSPA
400 Seventh Street, S.W.
Washington D.C. 20590
202/366-1194; Fax 366-7952
Fenton_Carey@RSPA.dot.gov

Don Sussman
U.S.DoT, Volpe Center
55 Broadway, Kendall Square
Cambridge, MA 02142
617/494-2413; Fax: 494-2497
Sussman@volpe1.dot.gov

Ed Crow
Penn State University
P.O. Box,30, N. Atherton
State College, Pa. 16803
814/863-9887; Fax 865-1615
ecc1@psu.edu