

US Department of Transportation Intelligent Vehicle Initiative Program Update

IVI Program Budget Holding Steady

IVI Program Manager **Ray Resendes**, at a presentation at the ITS America Annual Meeting in Boston, affirmed that USDOT expects funding for the IVI program to hold steady at \$20-30M annually. He also noted that their

It's no accident that the event is planned for the Ronald Reagan Building at the International Trade Center in Washington — a key audience is members of Congress and their staff people, for whom a deeper understanding of the IVI program and the potential of IV technologies is critical to their support in the budget process.

Overall Program

allocation of resources across platform types is approximately 5-10% for each of the Specialty Vehicles and Transit Vehicle areas, 25% for Commercial Trucks, with the remainder of funding devoted to the light vehicle platform and cross-cutting activities. This stance is consistent with government statements made in 1999.

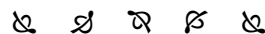
"IVI Week" Announced for July

USDOT has announced a National Intelligent Vehicle Initiative Meeting for July 19-20, 2000 in Washington, DC. The stated purpose of the meeting is to bring together experts from government, industry, and associations to do several things: showcase accomplishments in IV technologies; highlight achievements of IVI projects; serve as a forum to validate current and future R&D directions; and promote public and stakeholder awareness of the program.

On the first day of the meeting, driving demonstrations will be offered (by reservation only), with Transportation Secretary

Rodney Slater and others opening the meeting in the afternoon, followed by a panel of senior industry representatives discussing their role in IVI and how they see IV systems moving to market. Technical sessions are planned for the second day, covering each of the vehicle program focus areas: light vehicles, commercial vehicles, transit vehicles, and specialty vehicles/infrastructure. An exhibit and vehicle display will also be offered. Driving demos will be held at the **Federal Highway Administration's** Turner-Fairbanks Research Facility in McLean, Virginia.

The meeting is being organized by the Society of Automotive Engineers; full registration information is available at www.sae.org.



Nissan Joins Light Vehicle Research Consortium

As reported in Boston, **USDOT** and the automotive **IVI consortium** *still* have not completed negotiations on performing pre-competitive enabling research. The

Honda balked at the reporting/accounting requirements called for by **USDOT** in negotiations. Nissan emerges as a big winner, as they had been seeking entry to the consortium for some time. The total group is now **DaimlerChrysler, Ford, General Motors, Nissan, and Toyota.**

Light Vehicles

three areas of investigation are driver workload studies; further development of crash avoidance metrics, requirements, and test methodologies; and augmentation of control systems based on digital maps and GPS.

The automotive group saw a major change in the last several months — **Honda** has dropped out and been replaced by **Nissan**. Sources say that

Driver Distraction Forum

NHTSA has announced that they are sponsoring a series of meetings focused on identifying and understanding driver distraction issues. The first of three public meetings will be held during “IVI Week” in July, and an online forum to receive comment via the internet will be initiated this summer. More information is available in a [NHTSA press release on driver distraction](#); meeting details should be posted on the [NHTSA web site](#) by the end of June.

Operational Tests Evolving Nicely

Lane Departure Warning Added to Mack Test

USDOT has accepted a **Mack Trucks, Inc.** proposal to add Lane Departure Warning to their operational test, in addition to Infrastructure-Assisted Hazard Warning and Automatic Collision Notification. In addition, the government approved Mack’s research plan, which essentially gives the

program the “full speed ahead” signal.

The Mack Partnership is now proceeding in defining approximately 300 hazard sites in 10-12 states, primarily in the southeastern US. Typical sites are freeway ramps with unexpected curvatures that create a rollover hazard, tight merge/weaving sections of highways, and any other unusual roadway geom-

Heavy Trucks

etries or situations. The team has worked with **Virginia DOT** to define initial sites, and Florida, Maryland, and Pennsylvania are ready to participate. Other states will be contacted this summer.

The lane departure warning evaluation will be based on the **Assistware SafeTRAK** units, which use video processing of the roadway image to detect lane



boundaries and to give the driver warnings based on impending lane/road departure. The “drowsy driver” feature of SafeTRAK will not be evaluated in this test.

Mack Vision Cabs to be Used

The original plan called for Mack’s older truck cab version to be used in the test, in order to accommodate the existing fleet of project partner

MacKenzie Tank Lines.

However, after Mack and MacKenzie put their heads together to examine production schedules and the existing fleet, they proposed that the entire test take place on tractors with the Mack Vision cab, newly introduced last year.

The government enthusiastically accepted this change, because this brings the components under test into an active production line configuration; this would allow test systems to be brought rapidly into full production, if desired, based on the results of the test.

The Vision also offers a greatly enhanced driver interface, moving from the CH cab “Co-Pilot”

16-character display to the Vision’s large, free format VIP display screen, with its 6 inch (15 cm) diagonal viewing area. The tractors will also be equipped with **Eaton-VORAD** EVT-300 collision warning system as a standard feature (not intended for evaluation).

USDOT's Intelligent Vehicle Initiative Website:
www.its.dot.gov/ivi/ivi.htm

ACN Expected to be Popular with State Incident Managers

System design is nearly complete for the Automatic Collision Notification aspect of the project, which has gained intense interest from some state officials. **Mike Akridge**, Acting ITS Program Manager for **Florida DOT**, spoke up at a recent ITS America CVO committee meeting to praise this initiative, particularly because of its application to hazardous materials carriers such as MacKenzie Tank Lines — incident response times are expected to be reduced by one-half or more, as better information on the nature of the cargo will reach incident

managers within minutes of a crash.

Fleet Size Adjusted to 36 Trucks; Recosting Underway

Given these changes, the revised program calls for pilot testing of fully equipped trucks to begin in late 2000, with the operational test beginning in Spring 2001. Plans now call for 36 (rather than the original 40) trucks to be equipped. The program

is now led by **Jim Hall**, Senior Staff Engineer at Mack, who replaces **Mark Kachmarsky**, who now has a lead role at the company in highway truck engineering. The project cost, originally estimated at \$1.6M with federal ITS funds of \$1.1M, is being re-estimated as well; overall funding may rise.

Freightliner Adds Rollover Stability Controller and Lane Tracker

The **Freightliner** operational test, originally announced as testing only their Rollover Stability Advisor (RSA), is now additionally addressing Rollover Stability Controller (RSC), and Lane Tracker (LT), according to





the USDOT IVI web site (www.its.dot.gov/ivi/ivi.htm).

The RSA is an in-cab device that will present the truck driver with the rollover threshold of the combination being driven, and how close to that threshold the driver is at any particular time; the feedback is meant to allow the driver to adjust his or her driving to a safer level. The RSC has been added to provide some active response to hazardous conditions.

*(No further information is provided on the lane tracker — based on other sources, it is most likely either an in-house design developed some years ago, or the **Iteris Lane Tracker™**. According to Iteris, their unit is being introduced this year in Europe on Mercedes trucks by **DaimlerChrysler**, Freightliner's parent company.)*

Human-Centered Design Featured

The bulk of the op test focus seems to be on the

RSA, particularly the human factors evaluations, since this is a warning-only device and any safety benefit depends on how the driver responds. These evaluations take into account both driver interviews and quantitative data measured on-vehicle. According to the IVI website, fleet partner **Praxair**, in collaboration with the **University of Michigan Transportation Research Institute (UMTRI)** and other human factors professionals, plan to provide periodic feedback sessions with half of the drivers in the test, connecting their RSA experience with the objective facts on rollover. UMTRI plans to support these feedback sessions with individualized results showing both the driver's performance in the rollover margin-keeping, overall, plus any specific circumstances in which the RSA display prompted their attention.

The UMTRI human factors team also plans to debrief Praxair drivers,

administer questionnaires, and conduct focus group sessions in order to collect subjective data on the use of the RSA system and its acceptability. Correspondence will be examined between the subjective reactions of the individuals and objective measurements that show how each person actually drove, especially in their management of rollover margin. In addition, Praxair management will be queried to document the supervisory perspective on the RSA application as both an in-vehicle element and as an aid in giving supervisory feedback to the drivers for the prevention of rollover.

The total project is funded at \$6.5M, with \$3.9M of federal ITS funds.

Volvo Moving Forward with EBS, CWS, and ACC

The Volvo Operational Test is examining the operational effectiveness of the "bundled" ad-



Heavy Vehicle Tests at a Glance:

Team	# of vehicles	Featuring	Funding: priv / fed
Mack Partnership	36	LDWS, CWS, ACN	\$1.6M / 1.1M-plus
Freightliner Partnership	6	RSA, RSC, LT	\$6.5M / 3.9M
Volvo Partnership	100	EBS, CWS, ACC	\$5.4M / 3.5M

vanced safety system consisting of Electronically Controlled Brake System (EBS), Collision Warning System (CWS), and Adaptive Cruise Control (ACC), according to the IVI website. While advanced braking systems were part of test plans originally announced last November, a greater emphasis on EBS is now seen to be part of the program, presumably reflecting the increased commercial readiness of this feature.

Electronically controlled braking systems have the potential to reduce stopping distance and improve braking performance, and thus to mitigate crashes. The estimated percentage of combination-unit truck crashes involving brakes as a contributing factor is 30 to 36%. When the truck occupant is killed, brake-related crashes account for 20 to 22%.

When a fatality occurs in the other vehicle, brake-related crashes account for 17% (NHTSA, 1991).

100 Tractors, Three Equipment Configurations

The **Volvo** project involves 100 new Volvo tractors with varying equipment suites, evaluated side by side. The fleet partner is **US Xpress Leasing, Inc.** These tractors will be tested nationwide in three groups: 50 vehicles equipped with a full IVI suite (disc brakes, EBS, Eaton VORAD EVT-300 CWS, and ACC); 30 vehicles equipped with s-cam drum, anti-lock braking systems (ABS), Eaton VORAD EVT-300 CWS, and conventional cruise control (CCC); and 20 vehicles equipped as baseline vehicles (with no EBS, CWS, or ACC). Testing will occur over a period of 18 months.

According to the government's website, truck drivers will be polled via questionnaires periodically throughout the test duration regarding the perceived functionality, performance, acceptability, and value of the advanced safety systems. Parametric data associated with driver responses will be measured and collected to assess the extent to which the drivers adjust their driving after receiving warnings. Forward-looking video on some trucks will provide data on near-misses as a complement to the rest of the stored parametric data. All of these data will be analyzed for the effectiveness of the displays and for indications of the usability and acceptability of the CWS.

This project is funded at \$5.4M overall, with \$3.5M in government funding.

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New Players Added

Transit

Buses Running with Lane Change / Merge Collision Warning

Pittsburgh Transit Agency (PAT) and researchers at **Carnegie Mellon University** now have ten buses running with lane change / merge collision warning systems manufactured by **Collision Avoidance Systems, Inc.** Sensors line

both sides of the buses to help drivers avoid collisions with moving cars, as well as parked cars, light poles, and other stationary objects that can be hit by buses while maneuvering. Additionally, the project is developing a performance specification for collision countermeasures of this type, under FTA funding.





Ann Arbor a Winner on Rear-Impact Project

Gaining an *IVSource* Perserverence Prize, **Ann Arbor Transit Authority** (AATA) is now in negotiations with FTA to proceed with an operational test of rear impact countermeasures, following **Houston Metro's** decision to withdraw from this type of research (due to a new set of priorities defined by their

new general manager). AATA will work with **Veridian ERIM International** to implement a radar based system which looks rearward from a bus to detect following cars which are approaching at a dangerously rapid rate, triggering alarm sirens and warning lights. Rear impacts are a significant portion of the crashes involving transit buses.



Minnesota Plowing Ahead

Minnesota DOT is leading a team to integrate and test the operational effectiveness of a pot-pourri of intelligent vehicle systems that might be particularly useful to specialty vehicles.

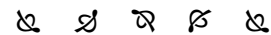
System (Micro-DAS). The primary focus is on snow plow vehicles, but ambulances and police vehicles will be included also.

For Minnesota, the need is clear —according to a case study conducted by MnDOT, between 1991 and 1997, Minnesota experienced an annual

introduction of these Driver Assistive Technologies is expected to reduce the number and severity of rear-end collisions involving private vehicles hitting the back of snow plows by 10%, and to reduce run-off-road accidents and crashes with roadside features by 25%.

Four snow plows will be instrumented to collect driver performance data: two plows will be test vehicles with IVI technologies and two plows will be control vehicles with no IVI technologies. One ambulance and one state patrol vehicle will have ITS instrumentation and Driver Assistive Technologies. Comparisons will be made between vehicles with and without IVI technologies, both before and after the operational tests.

The project is funded at \$6.5M total, with \$3.9M in federal funds.



Specialty Vehicles

The slate includes: magnetic roadway tape, DGPS, GIS Mapping, a 360 degree obstacle detection device, a forward Collision Avoidance System (CAS), Head-Up Display (HUD) systems, auditory warnings, haptic feedback, an external light warning system, an in-vehicle specialty proximity warning system, and a Micro-Data Acquisition

average of 37 rear-end crashes into snow plows (Mn/DOT Snow Plow Vehicle Case Study, September, 1998). In Minnesota for 1996, 14% of fatal crashes, 24% of personal injury crashes, and 34% of property-only crashes occurred when road surfaces and visibility due to snow were poor. In addition to improving productivity and efficiency, the

IVI Infrastructure

The **Infrastructure Consortium**, supported by FHWA and state members **California, Virginia, and Minnesota**, has awarded two research projects. The consortium, led by **Caltrans**, exists as a “pooled fund” study between these states and other states who choose to join. Its purpose is to develop and evaluate supporting infrastructure for IV systems for all vehicle types.

The **University of California at Davis** was funded at \$420K for continuing development of advanced snowplow

technology, and **Minnesota DOT** was funded at \$405K to develop advanced driver assistance systems.

The MnDOT project will include development of an advanced driver display, integration of radar and GPS information, and collision avoidance systems to implement their “virtual bumper” concept.

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