June 24, 2003

Mr. Jeffrey Paniati
Acting Director, ITS Joint Program Office
Federal Highway Administration
400 7th Street, S.W.
Room 3401
Washington, D.C. 20590

Dear Mr. Paniati:

We are pleased to transmit this fourth letter report of the Transportation Research Board's (TRB)
Committee for Review of the U. S. Department of Transportation's (DOT) Intelligent
Transportation Systems (ITS) Standards Program. This report, based on the committee's
discussions at its most recent meeting, presents the committee's views on issues related to the
ITS Data Registry (ITS DR).

BACKGROUND

This report was produced under TRB's continuing study to advise DOT on matters arising from
ongoing and planned activities of the ITS Standards Program, with emphasis on DOT's role in
achieving widespread adoption of ITS infrastructure standards in practice. The study is being
conducted by a committee appointed by the National Research Council (NRC) and at the request
of DOT's Joint Program Office (JPO), which is responsible for developing a national architecture
and selected standards to encourage the development and deployment of ITS technology in the
United States. A list of the committee's present membership is shown in Enclosure 1.

In accordance with the study plan, the committee meets three times each year to review
issues arising from JPO's ITS Standards Program and presents the outcome of its deliberations in
one or more reports. Issues considered by the committee to date include processes for standards
development, obsolescence and long-term maintenance of standards when technology is rapidly
evolving, the appropriate federal posture toward participation in international standards-setting
forums, and strategies for overcoming obstacles to effective standards deployment.

Each of the committee's meetings has been approximately 2 days in length, held at the
NRC's facilities in Washington, D.C. Each has included JPO staff presentations of relevant
aspects of the current status, activities, and plans of the ITS Standards Program, as well as
participation by knowledgeable guests. The most recent meeting, the second of 2002, was held
September 12 and 13, 2002. The meeting's agenda is shown in Enclosure 2.

ITS DATA REGISTRY

At this meeting, the committee discussed JPO's activities supporting the development of ITS DR. Joining the committee for that discussion were Mike Schagrin of the JPO and Gary Carver, Andy Schoka, and Al Stern, consultants to DOT. Also joining the discussion were three other individuals who have been involved in developing the ITS DR—Bruce Schopp, Joe Stapleton, and Bo Strickland. Mr. Schopp represents the National Electrical Manufacturers Association (NEMA). Mr. Stapleton recently retired from the Georgia Department of Transportation and is currently a consultant to URS Corporation. Mr. Strickland is a consultant to the American Association of State Highway and Transportation Officials (AASHTO).

Mr. Schagrin provided a white paper to the committee prior to the meeting, in which the status and prospects for the ITS DR are discussed (see Enclosure 3). As defined in this white paper, the ITS DR is an on-line database containing the data concepts defined and used in ITS standards that have been developed with DOT support. Several types of data concepts are currently included in the ITS DR: data elements defined in data dictionaries, messages defined in message sets, and other data describing the values or ranges of values that data elements and messages may assume. The ITS DR is made available through a website and associated software that allow users to add, modify, review, and query data concepts in the database. The registry is governed and operated by a complex organization that includes representation from all of the standards development organizations (SDOs) participating in DOT's ITS Standards Program.

The stated objectives of the ITS DR are to promote (1) *uniformity* of ITS data concepts from one standard to another, (2) *reuse* of previously developed data concepts when new standards are developed, (3) *harmonization* or resolution of differences among standards in the way they define data concepts, and (4) *convenient access* to all of the data concepts defined in the many ITS standards. The ITS DR was conceived to serve two distinct audiences: ITS standards developers, who would draw on existing data concepts as they undertake the crafting of new standards; and ITS standards users, such as application developers, system integrators, and buyers of ITS technology, who would find in the DR a convenient single source of information on which standards address data concepts relevant to an ITS application under consideration. According to the white paper, the ITS DR is a fundamental tool for promoting and attaining DOT's goal of interoperability among ITS systems.

Since the ITS DR was initiated in 1998, progress has been very slow. According to the white paper, more than 2,600 data concepts have been listed in the repository that is the first stage of entry into the ITS DR. Of these, 127 have been identified as requiring harmonization, for example, because their definitions differ in multiple standards. Only 49 of this smaller group are reported to have been substantially harmonized, and none have yet received all review and approvals necessary to achieve "preferred" status, indicating that the data concept has been harmonized, is included in an SDO-approved standard, and is recommended for use in ITS applications. The white paper notes that some critics claim the ITS DR management team has adopted rigid rules, conventions, and processes that unnecessarily impede the DR's progress. Regardless of the validity of such claims, harmonization is necessarily laborious and time consuming because it requires compromise among groups that have already invested substantial effort in building consensus around conflicting concepts.

The white paper asserts that the ITS DR website and associated software are operational, but reports that users have found it both cumbersome and slow for entry of information about data concepts, and lacking in key features that would encourage its use by the target audience. Neither the white paper nor committee discussions considered the specific programming software and data structures used by the website's developers. The white paper's authors nevertheless suggest that, in view of experience to date, the primary benefit of the ITS DR to DOT lies in its use as a technical standards development tool, despite the broader audience initially conceived.

In reviewing key points of the white paper, Mr. Schagrin emphasized concerns that continued development and maintenance of the ITS DR in its current form would represent a substantial cost for the ITS Standards Program, and that the benefits to be gained may not be proportionate to this cost. He concluded by summarizing three options presented in the white paper for streamlining the future management of the ITS DR's development and maintenance: (1) to carry on with the program essentially unchanged; (2) to reduce DOT's involvement by supporting only those elements of the ITS DR that are needed for ITS standards development, and (3) to discontinue all federal support for the ITS DR, with a likely consequence that it would cease to function. He noted that the white paper's authors had suggested several variations on the second option, operating for the most part within the context of the current ITS DR management structure.

Messrs. Schopp, Stapleton, and Strickland gave brief statements of their own views on these matters as well, and participated with the committee in a discussion of the issues that had been raised. As representatives of SDOs, Messrs. Schopp and Strickland expressed concern that the scope of the ITS DR development effort had grown since it was initiated and agreed that the effort would be unlikely to continue in the absence of federal support. Both suggested some effort is warranted to estimate the potential value of having a fully developed ITS DR. Mr. Stapleton, speaking as a standards developer and user, proposed that state departments of transportation could realize very substantial cost savings in using ITS standards if data frameworks encoded in the standards could simply be downloaded from an ITS DR when ITS applications were being developed. He suggested further that the ITS DR might serve as a basis for harmonizing all government transportation information technology (IT), for example, including data concepts from facility design and management and system planning as well as ITS. A single transportation IT DR would be highly useful in many areas of public-sector transportation management.

Following a period of open discussion of these various issues, the committee's guests departed, and the committee continued its discussion of the white paper and guests' comments in a closed meeting. The following paragraphs present the conclusions and recommendations resulting from these deliberations.

Considering the various objectives and potential benefits of an ITS DR, **the committee concludes that the principal benefit of the ITS DR lies in the concept of harmonizing data elements by resolving inconsistencies and conflicts among alternative views on how data should be structured in ITS applications**. Eliminating this benefit would substantially

diminish whatever value the ITS DR may have and the rationale for continued federal investment in its development.

The committee recognizes that the process now being used to achieve harmonization entails comparisons among standards that have reached advanced stages of development. At these advanced stages, SDOs and the individuals who have participated in developing the standards have made substantial commitments of time and energy to defining data concepts contained in their standards and to circulating those concepts for review and approval. They are understandably reluctant to consider changes that would extend the time and complicate the processes for achieving consensus within their own organizations. **The committee concludes that the difficulties and delays of harmonization could be reduced if efforts to achieve harmonization began earlier in the standards development process**. For example, data concepts could be disseminated to all SDOs for comments from the earliest stages of their development, and reviewed by a central group (as is the case with the ITS DR as currently configured) to identify and seek resolution of conflicts among overlapping concepts. A functional ITS DR could be used in this manner. **The committee concludes that facilitating ITS data harmonization warrants JPO support.**

The committee agreed that the ITS DR, given effective data harmonization, is a potentially valuable tool that can support ITS deployment as well as ITS standards development. Many committee members see great merit in the concept of a data registry initially encompassing all ITS standards without regard to whether their development has been supported by DOT funds, and ultimately data concepts used in other areas of transportation system planning and management as well. **While recognizing the DOT's responsibility, narrowly interpreted, extends only to standards developed with the agency's support, the committee urges that this broader view of the potential benefits of the ITS DR be considered in making decisions about future support for its development.**

The committee also agreed, however, that inadequate software and user interfaces could be a serious impediment to realizing the potential value of the ITS DR. Although they did not discuss the specific programming software and data structure used in the DR, the committee observes that if the ITS DR is to achieve its full potential value, improvements must be made to facilitate its use. **The committee concludes that revision of the website and application software to simplify data input and access could encourage the DR's use and may be warranted if the ITS DR is to continue as an element of DOT's ITS Standards Program.**

The difficulties of using the current website and application software may explain to some extent why the number of users registered at the ITS DR website remains low. The committee notes, however, that investment in the ITS DR can yield high returns with only a few users if it enables those users to develop new standards with reduced effort or to realize economies by purchasing ITS technology that incorporates proven data concepts.

The committee appreciates the difficult decisions DOT officials must make in allocating funds among the various elements of the ITS Standards Program. Committee members agree that the white paper makes no compelling case for exclusive reliance on federal support for the continuing development of the ITS DR in it current form. **The committee nevertheless is**

persuaded that the potential benefits of having a harmonized body of data concepts accessible through an effective and broadly usable data registry, as outlined in this report, may justify continuing federal involvement in the ITS DR's development.

The committee appreciates this opportunity to comment on the ITS DR as an element of DOT's ITS Standards Program.

Yours truly,

Jonathan L. Gifford, Ph.D.
Chair, Committee for Review of the U. S. Department of Transportation's
Intelligent Transportation Systems (ITS) Standards Program (II)

Enclosure 1: Committee Membership
Enclosure 2: Meeting Agenda and Attendees
Enclosure 3: ITS Data Registry Analysis (June 21, 2002)

Enclosure 1

**Committee for
Review of US DOT's Intelligent Transportation Systems (ITS) Standards Program (II)**

Members

Jonathan L. Gifford, Ph.D. (Chairman)
School of Public Policy
George Mason University
Arlington, VA

Jules A. Bellisio, Ph.D.
Telemediators, LLC
Farmingdale, New Jersey

Ray Chamberlain, Ph.D.
Parsons Brinckerhoff
Denver, CO

Irwin Dorros, Dr. of Eng. Science
Dorros Associates
Morris Township, NJ

William F. Johnson, Sc.D.
Transport Canada (Ret.)
Ottawa, Ontario

Samuel Krislov, Ph.D.
Professor, Political Science and Law
University of Minnesota
Minneapolis, MN

Alexander Lopez
Metropolitan Transit Authority
 of Harris County
Houston, TX

James R. Robinson
Virginia Department of Transportation
Richmond, VA

Steven E. Shladover, Sc.D.
Institute of Transportation Studies
University of California
Richmond, CA

William M. Spreitzer
General Motors Corp. (Ret.)
Beverly Hills, MI

Scott E. Stewart
IBI Group
Toronto, Ontario

Philip J. Tarnoff, Ph.D.
University of Maryland
College Park, MD

James L. Wright
Minnesota Department of Transportation
Roseville, MN

Staff

Stephen R. Godwin
Transportation Research Board
Washington, DC

Andrew C. Lemer, Ph.D.
The Matrix Group, LLC
Baltimore, MD

Enclosure 2

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Committee for
Review of the U.S. Department of Transportation's Intelligent Transportation Systems
(ITS) Standards Program (II)

Meeting Agenda and Attendees

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Meeting of September 12–13, 2002

<u>Attendees</u>

<u>Committee Members</u>	<u>Sponsors and Guests</u>[*]	<u>TRB Staff</u>
Jonathan Gifford, chair	Michael Schagrin (DOT/JPO)	Stephen Godwin
Jules Bellisio	Gary Carver (JPL)	Andrew Lemer
Ray Chamberlain	Andy Schoka (Mitretek)	Amelia Mathis
Irwin Dorros	Alan Stern (JPL)	Jocelyn Sands
William Johnson		
Samuel Krislow	Bruce Schopp (NEMA)	
Alexander Lopez	Joe Stapleton (URS Corp.)	
James Robinson	Bo Strickland (AASHTO)	
Steven Shladover		
Scott Stewart		
William Spreitzer		
James Wright		

<u>Agenda</u>

Thursday,   <u>10:00 am–11:00 am: Closed session</u>
September 12

10:00–11:00   Opening statements (Gifford, Lemer)
-          Welcome
-          Review of meeting objectives
-          Introduction of discussion of final report

11:00   Break, sponsors and guests join group

<u>11:00–3:30 pm: Open session</u>

11:00–11:30   Introductory remarks and introduction of guests

12:30–5:30   Discussion of "DOT's role in achieving widespread adoption of common standards for ITS infrastructure" with particular regard for "data registry"—statements or presentations by DOT staff and guests, followed by discussion

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[*] Attended open session only.

12:30–1:30	Lunch will be available in the meeting room

3:30 pm–5:30 pm: Closed session

3:30–5:30	Review of discussion on data registry, conclusions and recommendations; other matters that may arise

Friday,
September 13

8:30–2:30 am Closed session

8:30–9:00	Review of committee activities, reports, conclusions and recommendations to date
9:00–10:30	Discussions of scope, emphasis, and key issues for committee's final report
10:30–1:00	Discussions of committee's conclusions and recommendations
12:00–1:00 pm:	Lunch will be available in the meeting room
1:00–2:30	Summary of open issues, assignments, production schedule
2:30	Adjournment

White Paper
Presented to the
Committee for
Review of US DOT's Intelligent Transportation Systems (ITS) Standards Program (II)

ITS Data Registry Analysis

June 21, 2002

Prepared for:
US Department of Transportation
ITS Joint Program Office