European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

2017 International Accomplishments Summary

www.its.dot.gov/index.htm

Final Report
FHWA-JPO-18-702

U.S. Department of Transportation

Produced by (Name of Contract)
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
(List all U.S. DOT agencies sponsoring this report; only list one agency on the report cover)

Notice

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

The U.S. Government is not endorsing any manufacturers, products, or services cited herein and any trade name that may appear in the work has been included only because it is essential to the contents of the work.

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

2

Technical Report Documentation Page

1. Report No. FHWA-JPO-18-702	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment: 2017 International Accomplishments Summary		**5. Report Date** April 2018
		6. Performing Organization Code 69-01-0004
7. Author(s) Stephanie Fischer, Elizabeth Machek, Hannah Rakoff, Suzanne Sloan		**8. Performing Organization Report No.**
9. Performing Organization Name and Address John A. Volpe National Transportation Systems Center U.S. Department of Transportation 55 Broadway Cambridge, MA 02142		**10. Work Unit No. (TRAIS)**
		11. Contract or Grant No. DTFH6114V000017
12. Sponsoring Agency Name and Address Intelligent Transportation Systems Joint Program Office U.S. Department of Transportation 1200 New Jersey Ave., SE Washington, DC 20590		**13. Type of Report and Period Covered** Final Report – January – December 2017
		14. Sponsoring Agency Code (Delete and insert information here or leave blank)
15. Supplementary Notes		

16. Abstract

The European Commission (EC), the United States Department of Transportation (U.S. DOT) and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan have a long history of collaboration on Intelligent Transportation Systems (ITS) research and development initiatives. This report provides an overview of the formal collaboration structure and highlights key accomplishments, milestones, meetings, and upcoming meetings of each working group: the Deployment Working Group, the Architecture and Standards Harmonization Working Group, the Human Factors Working Group, and the Automation in Road Transport Working Group.

17. Keywords	18. Distribution Statement
Intelligent Transportation Systems, International, Deployment, Automation, Human Factors, Standards	

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
(Delete and insert information here or leave blank)	(Delete and insert information here or leave blank)	(Delete and insert information here or leave blank)	(Delete and insert information here or leave blank)

Form DOT F 1700.7 (8-72)   **Reproduction of completed page authorized**

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

iv

Table of Contents

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

6

Chapter 1. Introduction

The European Commission (EC), the United States Department of Transportation (U.S. DOT) and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan have a long history of sharing research results on Intelligent Transportation Systems (ITS) activities. This exchange was formalized in 2009 and 2010 with a series of three bilateral agreements among the three parties, officially authorizing technical cooperation on ITS research and development initiatives.

Through the organizational structure of Steering, Coordinating, and Working Groups (WGs), depicted below in Figure 1, the three parties address high-priority areas of shared interest. Topics are addressed on a trilateral or bilateral basis, according to the interests of the parties.
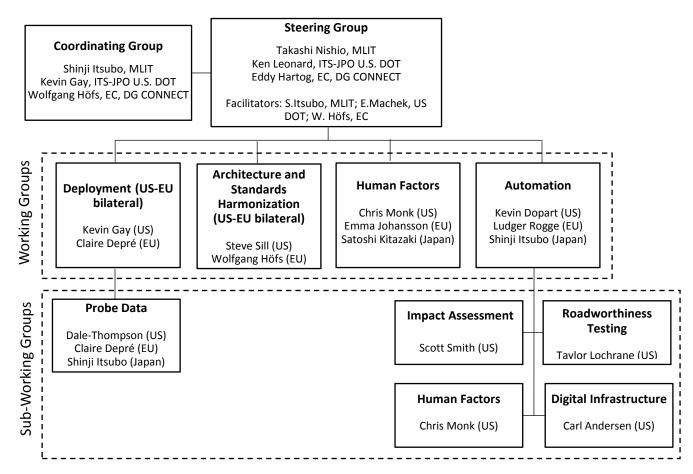
Coordinating Group

Shinji Itsubo, MLIT
Kevin Gay, ITS-JPO U.S. DOT
Wolfgang Höfs, EC, DG CONNECT

Steering Group

Takashi Nishio, MLIT
Ken Leonard, ITS-JPO U.S. DOT
Eddy Hartog, EC, DG CONNECT

Facilitators: S.Itsubo, MLIT; E.Machek, US DOT; W. Höfs, EC

Working Groups

Deployment (US-EU bilateral)

Kevin Gay (US)
Claire Depré (EU)

Architecture and Standards Harmonization (US-EU bilateral)

Steve Sill (US)
Wolfgang Höfs (EU)

Human Factors

Chris Monk (US)
Emma Johansson (EU)
Satoshi Kitazaki (Japan)

Automation

Kevin Dopart (US)
Ludger Rogge (EU)
Shinji Itsubo (Japan)

Sub-Working Groups

Probe Data

Dale-Thompson (US)
Claire Depré (EU)
Shinji Itsubo (Japan)

Impact Assessment

Scott Smith (US)

Roadworthiness Testing

Tavlor Lochrane (US)

Human Factors

Chris Monk (US)

Digital Infrastructure

Carl Andersen (US)

Figure 1: EU-US-Japan Collaboration Structure and Leadership

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

7

This report summarizes the accomplishments of each of the working groups. For each working group, the applicable chapter provides a short overview of the background of that group; explains its objectives; lists the group membership; highlights the group's accomplishments in 2017 as well as its main accomplishments since inception; and lists upcoming planned activities, milestones and meetings.

Sub-working groups are addressed within the chapter covering their parent working group.

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

8

Chapter 2. Deployment Working Group

Background

In 2014, representatives from the European Commission and the U.S. DOT Intelligent Transportation Systems Joint Program Office (ITS JPO) met periodically to learn about each other's ITS deployment guidance, policy initiatives, and challenges. Based on these meetings, the two parties agreed that there would be great value in formalizing the exchange with a Working Group under the EU-US-Japan Steering Group. The Steering Group formally approved the Deployment Working Group (DWG) Terms of Reference in September 2014 at the ITS World Congress in Detroit.

Objectives

The objective of the bilateral EU-US Deployment Working Group is to advance infrastructure and network operations deployment of cooperative intelligent transportation systems (C-ITS)/connected vehicles (CV) through shared learning and common implementation approaches.

Membership

United States	European Union
Robert Sheehan, ITS JPO, Deployment Working Group co-chair (through September 2017)	Claire Depré, EC/DG MOVE, Deployment Working Group co-chair and Probe Data sub-Working Group co-lead
Kevin Gay, ITS JPO, Deployment Working Group co-chair (beginning October 2017)	Maria Alfayate, EC/DG MOVE, facilitator (through May 2017)
Hannah Rakoff, U.S. DOT Volpe Center, facilitator	Geert van der Linden, EC/DG MOVE, interim facilitator (June-August 2017)
Dale Thompson, Federal Highway Administration (FHWA), Probe Data sub-Working Group co-lead	Pedro Barradas, EC/DG MOVE, facilitator (beginning September 2017)

2017 Accomplishments

2017 Deployment Working Group Accomplishments

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

9

- Met in Washington, DC in conjunction with the Transportation Research Board (TRB) Annual Meeting. This meeting included an update on recent EU deployment activities, such as the adoption of the C-ITS Strategy in November 2016, a milestone for the deployment of C-ITS technologies across Europe. The EC delegation also provided as an introduction to Phase II of the European-Commission-chaired C-ITS Platform, which includes representatives from EU Member States as well as industry, local authorities, and other stakeholder groups. The working group discussed potential collaboration in areas such as technical and policy approaches to security and privacy, outreach and communications, and case studies on early deployments.

- Held a web-conference to determine key topics for technical exchange related to the security credential management system (SCMS) in the United States and parallel systems in Europe. The goal of these systems is to ensure the integrity, authenticity and privacy of messages sent or received by connected and connected-automated vehicles.

- Met ancillary to the June 2017 plenary meeting of the C-ITS Platform in Brussels. Topics included cooperative mobility, assessing impacts of C-ITS services, and mandatory safety-related data exchange on certain events between infrastructure owner-operators (IOOs) and Original Equipment Manufacturers (OEMs) in the EU. These meetings also provided a clearer picture, enriched with the similarities and differences between the US and EU security models, to contribute to a better understanding of how to improve the cost-benefit ratio of connectivity deployment.

- Observed the meetings of the C-ITS Platform's working groups on enhanced traffic management, data protection and privacy, and compliance assessment

- While at DG MOVE premises, U.S. DOT ran a full-day workshop with EC colleagues on the SCMS. The group agreed to pursue the following topics of mutual interest:
  - the certificate lifecycle of pseudonym certificates
  - governance structures for security oversight
  - data exchange between OEMs and IOOs

- Held monthly calls to pursue the three agreed technical topics. Calls covered updates on certificate policy and practice, governance and compliance assessment, and lessons from and benefits of the IOO/OEM Forum in the United States.

- Scheduled additional calls as needed, and invited other relevant partners to help to leverage the relationships established between the regions. To date, staff from the National Highway Traffic Safety Administration (NHTSA), FHWA, Federal Transit Administration (FTA), ITS JPO contractors, and IOO and OEM partners within the IOO/OEM Forum have benefited from these opportunities for exchange.

- Conducted an informal bilateral meeting in Montreal, Canada in October 2017 with participation from FTA representatives to discuss mobility-as-a-service.

- Learned specific, actionable information about how short-range communications technology and interoperability are being approached in Europe.

2017 Probe Data sub-Working Group Accomplishments

- Launched (via a kick-off webinar in August 2017) the Operational and Probe Data sub-Working Group with trilateral participation (EU-US-Japan) to conduct joint research on a specific research topic beginning in 2018. The three regions each prepared a short statement of preferences for

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

10

this joint research, and at a second webinar in November 2017 the group came to a tentative agreement on future research topics.

Main Accomplishments since Group Inception

- Drafted a white paper comparing the EU and US approaches to engaging stakeholders from Member States (in the EU) and State DOTs (in the US) to create a shared baseline understanding of driving forces in policy, regulation and strategy in each region and identify topics for further exchange (2016-2017) .
- Held in-depth technical discussions on CV security certificate policy and practice, security governance and compliance assessment, and lessons from and benefits of the IOO/OEM Forum in the United States (2017).
- Launched the Operational and Probe Data sub-WG and came to tentative agreements on topics for joint research.

Planned Activities and Milestones

- Develop joint research program for 2018-19 on topics related to the integrity, authenticity and privacy of messages between vehicles, the infrastructure and other devices. This joint research will build upon and leverage complementary existing research initiatives sponsored by the EC and U.S. DOT.
- The Operational and Probe Data sub-WG expects to come to final agreement on joint research topics and launch the agreed-upon work.

Upcoming Meetings

- Continue monthly calls on specific technical topics, scheduling additional calls as needed and inviting other partners as relevant.
- January 11, 2018 – ancillary to TRB, Washington, D.C.
- Summer 2018 (tentative) - Joint site visit and working meetings in partnership with U.S. field tests
- Operational and Probe Data sub-WG:
  - January 11, 2018 – TR, Washington, D.C.
  - Quarterly webinars
- September 2018 (tentative) - ITS World Congress, Copenhagen, Denmark

Chapter 3. Architecture and Standards Harmonization Working Group

Background

The Architecture and Standards Harmonization Working Group was established between the EC and the US to support the development and adoption of harmonized standards for C-ITS/CV and future generations of transportation technology, such as connected-automated vehicles. The scope of work has expanded to include work related to the ITS systems architecture, as well as the security mechanisms required to support standards harmonization and cooperation.

The work is primarily targeted at resource sharing to reduce research and development costs to each participant country/region. The working group seeks to avoid redundant standards, while efficiently using the collective expertise available in the EU and US. Further, the parties agree that harmonized ITS architectures and standards can result in faster, more cost-effective realization of the safety, system efficiency, mobility, and sustainability benefits of new technologies.

In addition to accelerating realization of societal benefits of connectivity in transportation systems, architecture and standards harmonization can increase innovation and competition among ITS equipment manufacturers and service providers, reduce development and deployment costs for ITS stakeholders and consumers, and promote a vibrant international market for ITS products and services. To the extent requirements are sufficiently common, deployers can achieve substantial cost savings via the use of common hardware and software offerings which meet requirements across multiple regions.

The Architecture and Standards Harmonization Working Group coordinates with Standards Development Organizations and other key stakeholders to ensure timely realization of these benefits. In addition, since the initiation of the working group, the EU and United States have welcomed cooperation with other interested countries. To date, the working group has cooperated extensively with Australian, Canadian, and Japanese governmental entities and their partners on architecture, standards, security policy and related activities. The shared resources and expertise have significantly enhanced the product while reducing resource requirements for each partner. The working group will continue to be open to additional resource-sharing cooperation with interested parties.

Objectives

The objectives of the Architecture and Standards Harmonization Working Group are to:

- Expedite ITS architecture and standards development.
  - Cooperate to leverage common interests and access the best global expertise while reducing costs for each participating government.
- Globally harmonize ITS architectures and standards in order to:

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

12

- o Reduce costs, achieve economies of scale, and speed adoption of technologies to enhance safety, system efficiency, mobility and environmental sustainability;
- o Avoid redundancy; and
- o Improve interoperability across borders to facilitate safe, secure and efficient movement of people and goods.
- Engage with technical experts and Standards Development Organizations to facilitate collaborative development of advanced transportation technology standards or adaptations of existing standards when they deliver benefits to the public sector .

Membership

The Architecture and Standards Harmonization Working Group organizes its efforts into specific programs of work, called Harmonization Task Groups (HTGs). When necessary, the EC and U.S. DOT hire their own experts for specific tasks. These include representatives from the vehicle manufacturing and ITS infrastructure industries, the standardization community, and academia. The table shows membership in the two current HTGs, included internal and hired experts, as well as Australian and Japanese participants.

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

13

United States	European Union	Australia	Japan
Harmonization Task Group 6: C-ITS Security:			
Steve Sill, USDOT/ITS JPO, co-chair	Wolfgang Höfs, EC/DG CONNECT, co-chair	Chris Koniditsiotis, Transport Certification Australia, co-chair	Takaaki Sugiura, Mitsubishi Research Institute, Vehicle Telematics Expert
Suzanne Sloan, USDOT/Volpe Center, co-chair	Knut Evensen, Q-Free, co-chair	Peter Girgis, Transport Certification Australia, co-chair	
Tom Lusco, Iteris, System Architecture Expert	Gianmarco Baldini, EC/Joint Research Centre, Security Systems Expert		
Robert Rausch, Transcore, Infrastructure Expert	Vincent Mahieu, EC/Joint Research Centre, Security Systems Expert		
William Ball, Merriweather Associates, Vehicle Telematics Expert	Norbert Bissmeyer, Fraunhofer Institute, Security Expert		
Dominie Garcia, Booz Allen Hamilton, Institutional Security Expert	Dr. Frank Kargl, University of Ulm, Security Expert		
Claire Barrett, USDOT/Office of the Secretary, Privacy Officer and Expert			
William Whyte, Onboard Security, Security Expert			
Harmonization Task Group 7: C-ITS Standards Gap Analysis:			
Steve Sill, USDOT/ITS JPO, co-chair	Wolfgang Höfs, EC/DG CONNECT, co-chair	Chris Koniditsiotis, Transport Certification Australia, co-chair	Shinji Itsubo, NILIM/MLIT Japan, co-chair
Suzanne Sloan, USDOT/Volpe Center, co-chair	Knut Evensen, Q-Free, co-chair	Philip Lloyd, Transport Certification Australia, co-chair	Junichi Hirose, Highway Industry Development Organization- HIDO, Standards Expert
Tom Lusco, Iteris, System Architecture Expert	Gianmarco Baldini, EC/Joint Research Centre, Security Systems Expert	David Rowe, Architecture and Standards Expert	Takeshi Wada, Highway Industry Development Organization- HIDO, Standards Expert
Jim Marousek, Booz Allen Hamilton, Standards Expert	Hans Joachim Fischer, ESF GmbH, Standards Expert		

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

14

Ken Vaughn, Standards Expert	Robert Williams, CSI (UK) Ltd, Standards Expert

The working group periodically holds public meetings to update stakeholders on progress and to solicit input. Periodically, the HWG or individual HTGs have held public meetings to present findings and gather stakeholder input; HTG working meetings are generally open only to those regions/countries who commit resources. HTG drafts for comment and final products are typically posted publicly online.

2017 Accomplishments

- Identified current gaps in standards applicable to a complete cooperative and interoperable transportation environment:
  - o Developed a Harmonized Architecture Reference for Technical Standards (HARTS) that combines the U.S. DOT's ITS reference architecture, the European project "FRAME," the Australian National ITS Architecture Framework (NIAF), and Japanese applications.
  - o Compiled abstracts of relevant standards from around the world, and compared these with HARTS to identify remaining standards gaps and develop strategies to address any inconsistencies.
  - o Completed communications profiles associated with the majority of C-ITS standards. The profiles support a range of communications technologies that can apply to applications and services in American, European, Australian, and Japanese deployments.
  - o Analyzed 33 common applications and services that are included in the first set of C-ITS deployments in these regions. These applications are known as "Day One" applications. They are being deployed by CV Pilot sites in the US, C-Roads Platform cross-border harmonization projects in Europe, and Cooperative and Automated Vehicle Initiative (CAVI) deployments in Australia.
  - o Engaged with standards experts to validate results, and began drafting report.
- Facilitated progress on a C-ITS Registry, partnering with representatives of Standards Development Organizations who comprise the Cooperative-ITS Registry Roundtable. Advanced development of a longer-term, sustainable plan for an identifier registry associated with C-ITS applications and services.
  - o Developed options for C-ITS Registry solutions that include a candidate path for identifier assignment criteria as well as proposed roles and responsibilities.
  - o Began analyzing the options and drafting a standard.

Main Accomplishments since Group Inception

- Completed the EU-US Cooperative Systems Standards Harmonization Action Plan (available online) to guide HWG work (2011).
- Harmonized core safety messages and completed candidate harmonized security and communications protocols for C-ITS (HTGs 1 and 3; reports available online) (2012).

- Harmonized C-ITS Security Policies (HTG 6); final drafts available online) (2015).
- Harmonized C-ITS architectures as a tool for (1) developing standards selection recommendations, (2) identifying standards gaps for cooperative development, and (3) addressing global identifier requirements (HARTS tool set available online; reports expected in 2018) (2017).
- Ongoing work harmonizing V2I Signal Phase and Timing (SPaT) messages via the International Organization for Standardization (ISO) in cooperation with SAE International.

Planned Activities and Milestones

- Finalize HTG7 reports on standards gap analysis and recommendations in summer of 2018.
- Finalize a concept of operations for the C-ITS Registry and formalize into a consensus standard, working with partners in industry and standards organizations. Draft standard expected to be available through ISO TC 204 working group in late 2018.
- Continue information exchange to maintain cooperative relationships with key international partners.
- Investigate viability of future cooperation for:
  - Automation User Services - to expand the U.S. ITS reference architecture to more fully accommodate Automated Driving Systems (ADS).
  - Electronic operation information (current EU working term is "Management for Electronic Traffic Regulations" (METR)) – a means to ensure secure, interoperable and timely delivery of operational information (e.g., variable speed limits; road conditions; routing information) from the controlling authority to participating vehicles, especially ADS.

Upcoming Meetings

- Participate (directly or via contractor grantee participation) in meeting of Standards Development Organization working groups, as appropriate. Standards Development Organizations include ISO, the International Organization for Standardization; IEEE; SAE International; ETSI; and the European Committee for Standardization (CEN); with additional coordination with oneM2M possible.

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

16

Chapter 4. Human Factors Working Group

Background

The Driver Distraction and Human-Machine Interaction (HMI) Working Group formed in 2010 as a result of the importance of driver distraction in the high-level political discussion of road safety in the US and EU. The bilateral group welcomed Japan in 2015 and adopted the name "Human Factors Working Group" to reflect its scope covering the broader domain of human factors in driving. In addition, in 2015, the working group established a new focus group on human factors in automation, which operates as a sub-working group under the broader scope of the Automation in Road Transportation Working Group.

Objectives

The Human Factors Working Group identifies opportunities for alignment and collaboration in human factors research. It identifies, recognizes and builds on international differences for a broad set of human factors issues, including management of driver distraction, HMI, and human factors for automation. Specifically, the working group seeks to generate products that that leverage international cooperation to establish definitions, research priorities, taxonomies, and other research products that meet international research needs.

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

17

Membership

United States	European Union	Japan
Chris Monk, NHTSA, co-chair	Emma Johansson, Volvo, co-chair	Satoshi Kitazaki, AIST, co-chair
Paul Rau, NHTSA	Ingrid Skogsmo, EC/DG RTD, facilitator	Kiyozumi Unoura, Honda
Dan McGehee, University of Iowa	Alan Stevens, TRL	Hiroki Mori, Toyota
Johan Engstrom, VTTI	Andreas Keinath, BMW	Takashi Sunda, Nissan
Chuck Green, General Motors	Anna Schieben, German Aerospace Center	Makoto Itoh, University of Tsukuba
Brian Philips, FHWA	Natasha Merat, University of Leeds	Tatsuru Daimon, Keio University
	Klaus Bengler, TU Munich	

2017 Accomplishments

- Met in January 2017 during the TRB Annual Meeting.
- Completed and revised draft iterations of the "Out of the Loop" technical report from the 2016 technical expert meeting. This report discusses the physical and cognitive aspects of driving tasks, with "out of the loop" referring to situations in which a driver is not actively engaged in the process of driving (i.e., when a vehicle is steering or braking without human input).
- Generated candidate topics and selected one (mental models of automated driving systems) for the SIP-adus 2017 technical expert meeting in Tokyo, Japan.
- Initiated work on mental models with a meeting during SIP-adus 2017 and identified possible sub-topics (e.g., standardization, best practices, test scenario/use cases, safety criteria, marketing, and driver training and testing).

Main Accomplishments since Group Inception

- Developed and published a Definition of Driver Distraction document in 2011.
- Developed and published an Inattention Taxonomy report in 2013, jointly addressing a critical issue in transportation.

Planned Activities and Milestones

- Submit a paper on 'Out of the Loop' in April 2018 to the journal *Cognition, Technology & Work.*

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

18

- Identify leadership, task force and format for the next research topic on mental models.

Upcoming Meetings

- Working Group and Expert Group meetings during the April 2018 Transport Research Arena (TRA) conference in Vienna, Austria.

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

19

Chapter 5. Automation in Road Transportation Working Group

Background

The trilateral Automation in Road Transportation Working Group was established by approval of the Steering Group in October 2012 at that year's ITS World Congress meeting. The working group held its first meeting in January 2013 during the TRB Annual Meeting in Washington, DC.

Objectives

The overall goals of the Automation in Road Transportation Working Group are to support shared learning, develop solutions to shared challenges, and harmonize approaches where appropriate. The working group seeks to achieve these goals by:

- allowing each region/country to learn from one another's programs,
- identifying areas of cooperation where each region will benefit from coordinated research activities, and
- engaging in cooperative research and harmonization activities.

Membership

United States	European Union	Japan
Kevin Dopart, ITS JPO, co-chair	Wolfgang Höfs, EC/DG CONNECT, co-chair	Shinji Itsubo, MLIT NILIM, co-chair
Eli Machek, U.S. DOT Volpe Center, facilitator	Ludger Rogge, EC/DG RTD, facilitator	Yozo Hiraiwa, NILIM, MLIT and ITS Research Fellow
Carl Andersen, FHWA, co-chair, subgroup on Digital Infrastructure	Patrick Mercier-Handisyde, EC/DG RTD, facilitator	Hajime Amano, ITS Japan, SIP-adus
Scott Smith, U.S. DOT Volpe Center, co-chair, subgroup on Impact Assessment	Claire Depré, EC/DG MOVE, facilitator	Takahiko Uchimura, ITS Japan, SIP-adus
Chris Monk, NHTSA, co-chair, subgroup on Human Factors	Geert van der Linden, EC/DG MOVE, facilitator	Satoru Nakajo, The University of Tokyo/SIP-adus,
Taylor Lochrane, FHWA, co-chair, subgroup on Roadworthiness Testing	Maxime Flament, ERTICO – ITS Europe	Nobuyuki Uchida, JARI/SIP-adus
	Alvaro Arrue, IDIADA	Satoshi Kitazaki, AIST/SIP-adus
	Nadege Faul, VEDECOM	Takashi Imai, Toyota Info Technology/SIP-adus
	Emma Johansson, VOLVO	Norifumi Ogawa, Mazda Motor Co. /SIP-adus
	Satu Innamaa, VTT	Masayuki Kawamoto, University of Tsukuba/SIP-adus

OBSERVERS: By agreement among all three regions, observers from Korea Ministry of Land, Infrastructure, and Transportation; the Australian National Transport Commission; and Transport Canada are invited to observe meetings.

2017 Accomplishments

2017 Automation in Road Transportation Working Group Accomplishments

- Under the EC-US bilateral exchange, launched "twinned" automated vehicle research opportunities, funded separately but coordinated between U.S. DOT and the EC. Two European and four U.S. DOT-funded projects were part of new twinning agreements in 2017. The twinned projects cooperate in the areas of interaction of automated vehicles with other road users (European project "interACT" with the NHTSA-sponsored "Automated Vehicle Communication and Intent with Shared Road Users"), and infrastructure design for automated vehicles (European project "CoEXist" along with three smaller U.S. projects)

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

21

- U.S. DOT established a coordination effort with Volvo Cars and SAFER (the Vehicle and Traffic Safety Centre at Chalmers University in Gothenburg, Sweden) to share safety impact assessment methodologies and results with respect to the DriveMe field operational test in Sweden. The kickoff meeting was held in March 2017.
- Planned national automated vehicle research meetings with broad membership participation at Japan SIP-adus, US Automated Vehicles Symposium, the European Connected and Automated Driving Conference, and the ITS World Congress.
- Participated in the ITS European Congress in Strasbourg with a session on "International Activities and Pilots on Connected and Automated Driving" and at the ITS World Congress in Montreal with the Special Session "Connected and Automated Driving (CAD) Research around the World" at which Canada, Korea, and Australia also presented their CAD research. Additionally, the Automation in Road Transport subgroups used these opportunities to present their progress on topics including security, accessible transport, and connectivity.
- Detailed and documented each subgroup's objectives and listed its coordinators in a "structure and overview" matrix.
- Discussed whether a sub-working group on connectivity should be established under the Automation in Road Transport Working Group or whether this topic should be addressed by a dedicated connectivity working group. The Steering Group is expected to discuss this issue to make a final determination.
- Requested the proposers for a New Mobility Solutions sub-Working Group (formerly the Accessible Transport sub-Working Group) to prepare a position paper on the group's planned activities.

2017 Impact Assessment sub-Working Group Accomplishments

The Impact Assessment sub-Working Group includes regular participation from all three regions. The subgroup's objective is the harmonization of the high-level evaluation framework for assessing the impact of automation in road transportation. The framework consists of a series of impact assessment areas (e.g., safety, efficiency, land use) that may be evaluated using different approaches and methodologies. Studies are planned to provide a clearer picture of the impact of connected and automated driving on economy and society.

Accomplishments in 2017 include:
- Published first version of *Trilateral Impact Assessment Framework for Automation in Road Transportation* in January 2017 (available online). This version covers classification of automated vehicle systems and their impacts as well as recommendations for experimental procedure and data management for research into impacts.
- Based on a breakout session at the 2016 Automated Vehicles Symposium, wrote and published a chapter on impact assessment in *Meyer, Gereon, Beiker, Sven (Eds.), Road Vehicle Automation 4, Springer International Publishing, ISBN 978-3-319-60933-1*
- Participated in the first EU Connected Automated Driving Conference (Brussels), the Automated Vehicles Symposium (San Francisco) and SIP-adus (Tokyo).

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

22

- Developed and distributed a survey on key performance indicators for automation, to gather the input of a range of practitioners around the world on which metrics are most important for various impact areas

2017 Roadworthiness Testing sub-Working Group Accomplishments

- Agreed to re-scope the Roadworthiness Testing sub-Working Group to a single use case (truck platooning) to showcase how testing could be conducted (under the assumption that this use case could be taken as a model for additional use cases in the future).
- As an initial step, jointly produced a draft report comparing regional approaches to platooning tests.

2017 Human Factors sub-Working Group Accomplishments

- Continued developing a shared understanding of the definition of the Out of the Loop (OotL) concept, which refers to the times when a human operator is not actively engaged in the act of driving.
- Gained additional support from the U.S. DOT Volpe Center for the development of a technical report which is expected to be published in 2018.

In addition, cooperation continued between Japan's National Institute of Advanced Industrial Science and Technology and ITS Leeds on similar research on vehicle automation and human factors, which will feed into this sub-working group's activities.

2017 Digital Infrastructure sub-Working Group Accomplishments

- The Digital Infrastructure sub-Working Group ceased its active work due to the lack of feedback from stakeholders. Members proposed that the group be converted into an information exchange forum within the overall Automation in Road Transportation Working Group. Findings are summarized in Appendix A.

Main Accomplishments since Group Inception

- Published a first edition of the trilateral impact assessment framework (January 2017).
- Identified six key areas in which to investigate shared research and harmonization opportunities: connectivity (V2V/V2I/I2V); digital infrastructure; human factors; roadworthiness testing; evaluation of benefits; and reliability and cybersecurity (2013).
- Participated in planning and presenting at one another's national research workshops to advance international understanding impact of automated vehicles and the challenges they present for road agencies worldwide.
- Developed an "internal record" report to track and record working group discussions, agreements, and deliverables.

Planned Activities and Milestones

- The Impact Assessment sub-working group plans to publish results of the international survey on key performance indicators. It will then revise the impact assessment framework and publish a second version to include detailed recommendations for metrics in each impact area. The group then plans to identify projects in the EU, US and Japan for application of the impact assessment framework and intends to publish a candidate project list in September 2018.
- Continue twinning EU-US research projects.
- Continue Volvo/U.S. DOT DriveMe collaboration.
- Participate in planning and presentations at national AV research symposia, such as SIP-adus (Japan), Transportation Research Arena (EU), and Automated Vehicle Symposium (USA).

Upcoming Meetings

The Automation in Road Transport Working Group and its sub-working groups foresees organizing working meetings as ancillary events to major conferences, congresses and workshops which address road transport automation issues and draw an international expert audience. The following are the anticipated meetings for 2018.

- January 11, 2018 – ancillary to TRB, Washington, D.C.
- April 20-21, 2018, - ancillary to Transport Research Arena, Vienna, Austria
- July 13, 2018, - ancillary to Automated Vehicle Symposium, San Francisco, CA
- November 16, 2018 – ancillary to SIP-adus, Tokyo, Japan

Due to the costs of international travel, not all working group members attend each meeting in person. Remote access options (audio- and web-conferences) are used when practical to allow more members to join. Several of the sub-working groups also hold regular audio- and web-conferences to accelerate work progress.

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

24

Appendix A. Digital Infrastructure Sub-Working Group

After approximately one year of attempting to complete a detailed survey, complete with telephone interviews, of selected people/organizations in Europe, Japan, and the U.S., only three of a planned 27 interviews have been completed. The DI SWG does not have any information on why there is an apparent lack of interest in the survey. The survey was designed to inform the DI SWG on common interests regarding digital infrastructure and dynamic maps.

Without information from the survey, the DI SWG is not able to clearly define an objective and products to accomplish under the trilateral Automation in Road Transport Working Group. This is due to different approaches to DI that are currently underway by the trilateral signatories, and differences in levels of maturity in those approaches:

- Japan is preparing to conduct a field operational test (FOT) on providing dynamic maps to vehicles based on a model of digital infrastructure, which includes static, static-dynamic, and dynamic data. The dynamic maps will be prepared and updated through a public-private consortium. This demonstrates a clear public agency involvement in digital infrastructure. Japan is also very involved in standards development related to defining, acquiring and processing the data elements required for dynamic maps.

- The EU is also involved in several standards efforts related to data elements, high definition (HD) maps, and how dynamic maps enable vehicle systems.

- In the U.S., efforts are not as well-defined. There is agreement that digital infrastructure and dynamic maps are critical to safe, efficient operations of Automated Driving Systems (ADS). However, there is not a defined position on federal involvement in this issue. There is a growing involvement in general data definition, acquisition, governance and maintenance, which may provide opportunities for future collaboration. Several States are also collaborating with private industry to better understand how data may be shared to mutual advantage.

Although the DI SWG is not able to define specific products that require collaborative work, the group strongly believes that there is a continuing value to use the trilateral Automation in Road Transport Working Group as a forum to share information on activities involving digital infrastructure and dynamic maps. Accordingly, the DI SWG recommends that the trilateral Automation in Road Transport Working Group limits DI SWG's task to a forum for information exchange, with one reporter from each of the trilateral signatories. If new opportunities for cooperation arise the subgroup's tasks might be revised

European Union – United States – Japan Cooperation on Intelligent Transportation Systems Research and Deployment

U.S. Department of Transportation

ITS Joint Program Office – HOIT
1200 New Jersey Avenue, SE
Washington, DC 20590

Toll-Free "Help Line" 866-367-7487

www.its.dot.gov

[FHWA Document Number]

U.S. Department of Transportation