International
Intelligent Transportation System
Research Activity
Overview

July 2015

Office of the Assistant Secretary for Research and Technology

Intelligent Transportation Systems Joint Program Office

U.S. Department of Transportation

Presentation Overview

- Introduction to ITS International Research
- Trilateral Research Exchange (EU-US-JP)
  - USDOT-EC Implementing Arrangement for cooperative activities in the field of research on Information and Communication Technologies applications to road transport
  - USDOT OST-R-Japan Ministry of Land, Infrastructure, Tourism, and Transport (MLIT) Memorandum of Cooperation in the Field of Intelligent Transportation Systems
  - Japan MLIT – EC Memorandum of Cooperation (MOC) on Cooperative Systems in the Field of Intelligent Transport Systems
- North American Research Exchange
- USDOT-Korea Ministry of Land Infrastructure, and Transport (MOLIT) ITS Cooperation
- ITS Architecture and Standards Harmonization

Introduction

- Purpose: Collect Information on ITS research, deployment and evaluation activity by international entities pursuing ITS
  - Share US Information with international partners on US DOT ITS activities
  - Expedite global ITS development and deployment
  - Open international markets for US firms
  - Increase interoperability in the supply chain

- Benefits
  - The ITS JPO's international collaboration in research, evaluation, and architecture and standards harmonization saves money, increases collective knowledge, and advances innovation for all participants
  - Where appropriate, harmonized international ITS technology standards and architectures support operating efficiencies, technological innovation, and competition
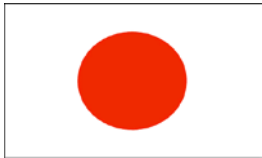
International Partners

European Commission
European Commission (EC) DGs Connect, DG MOVE and DG RTD

Mexico
Secretariat of Communications and Transport (SCT)

Japan
Ministry of Land, Infrastructure, Tourism, and Transport (MLIT)

Canada
Transport Canada (TC)

Korea
Ministry of Land Infrastructure, and Transport (MOLIT)

Australia
National Transport Commission (NTC)

Extended Staff Exchanges

Home Agency	Secondment	Staff Member	Year
Korea MOLIT	ITS JPO	Hanjoon Kwon	2015-2017
Japan MLIT	FHWA / ITS JPO	15 Fellows	1996-present
ITS JPO	Japan MLIT	Dale Thompson	2014
European Commission	ITS JPO	Wolfgang Hoefs	2013
ITS JPO	European Commission	Marcia Pincus	2013
ITS JPO	European Commission	Brian Cronin	2012

International Agreements

- **European Commission**
  - EC - US DOT Implementing Arrangement on ITS (2009)
  - EU - US Joint Declaration of Intent on Research Cooperation in Cooperative Systems (2009)

- **Japan Ministry of Land, Infrastructure, Transport, and Tourism**
  - Memorandum of Cooperation in the Field of Intelligent Transport Systems (2010)

- **Korea Ministry of Land, Infrastructure, and Transport**
  - Memorandum of Cooperation in the Field of Intelligent Transport Systems (2012)

- **Transport Canada**
  - Memorandum of Cooperation on ITS Architecture (2010)
  - Memorandum of Cooperation on General ITS (2010)

History of Cooperation

DATE	MILESTONE
July 2015	Mexico HLED ITS Architecture Training
May 2015	Transport Canada – US DOT Regulatory Cooperation Council Connected Vehicles Workplan Launched
February 2015	US Canada RCC Meeting and ecoTechnology Vehicle Forum
January 2015	Letter Exchange Renewing EU-US Arrangement
October 2014	RCC Stakeholder Workshop
August 2014	Mexico US HLED ITS Workshop
September 2013	Mexico-US High Level Economic Dialogue (HLED) Discussions
October 2012	Vienna ITS World Congress Demonstration (Harmonized BSM&CAM Safety Messages)
August 2012	Korea MOLIT-US DOT OST-R MOC in the Field of ITS
June 2011	Transition from bilateral to trilateral Steering Group effective Japan MLIT – EC MOC on Cooperative Systems in the Field of Intelligent Transport Systems
October 2010	Japan MLIT - US DOT OST-R MOC in the Field of ITS
March 2010	Transport Canada - US DOT MOCs on ITS and ITS Architecture
November 2009	EU - US Joint Declaration of Intent on Research Cooperation in Cooperative Systems
January 2009	EC DG Connect - OST-R Implementing Arrangement on ITS First US - Japan Task Force Meeting

Steering Group

Co-Chairs: Takumi Yamamoto, MLIT
Ken Leonard, ITS-JPO U.S. DOT
Colette Maloney, EC DG CONNECT
Facilitators: H. Kanoshima, MLIT; J. Lappin, US DOT; W. Höfs, EC

Coordinating Group

Co-Chairs: Hideyuki Kanoshima, MLIT
Brian Cronin, ITS-JPO U.S. DOT
Wolfgang Höfs, EC DG CONNECT

Working Groups

Sustainability

Co-Chairs:
M. Pincus (US)
M. De Kievit (EU)

Driver Distraction & HMI

Co-Chairs:
C. Monk (US)
J. Engström (EU)

Deployment

Co-Chairs:
R. Sheehan (US)
C. Depre (EU)

Automation

Co-Chairs:
H. Kanoshima (JP)
K. Dopart/J. Lappin (US)
J. Svensson/B. Krosse (EU)

V2V Safety Applications

Co-Chairs:
K. Dopart (US)
W. Höfs(EU)

Standards Harmonization

Co-Chairs:
S. Sill (US)
W. Höfs (EU)

Evaluation Tools and Methods

Co-Chairs:
D. Thompson (US)
H. Kanoshima (JP)

Probe Data

Co-Chairs:
H. Kanoshima (JP)
D. Thompson (US)
W. Höfs/C. Depre (EU)

☐ EU-US WG   ☐ US-Japan WG   ☐ Trilateral WG

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Working Group Accomplishments

- Sustainability
  - White Paper series (to be published Fall 2015)
  - Six foundational papers establishing commonalities, identifying lessons, and suggesting next steps.
- V2V Safety Applications
  - Demonstration of a substantially harmonized core safety message set at the Vienna ITS World Congress. (EU Cooperative Awareness Message (CAM) and US Basic Safety Message (BSM).
- Driver Distraction and Human-Machine Interaction
  - Inattention Taxonomy report. (available online)
  - Addressed a critical issue in transportation jointly
- Standards Harmonization
  - EU-US Cooperative Systems Standards Harmonization Action Plan (available online)
  - Harmonized European and US Basic Safety Message (BSM)
  - Harmonized Signal Phase and Timing (SPaT) messages

Working Group Accomplishments

- Deployment
  - Shared C-ITS deployment practices and leveraged each other's guidance to support national efforts
- Evaluation
  - Conducted comparative analysis of evaluation methods used to assess the performance and cost-benefit of ITS and cooperative systems in the US and Japan
  - Drafted Evaluation Tools and Methods Collaborative Research Final Report (to be published late 2015)
- Trilateral Probe Data
  - Trilateral probe data Report (available online)
  - Learning from Japanese precedents in using vehicle data for traffic management
  - Revised version (Fall 2015) will incorporate inputs from European Union
- Trilateral Automation in Road Transport
  - Joined evaluation teams for specific national programs enabling USDOT to contribute to the evaluation approach and direct access to evaluation data

Proposed Parallel Field Research on Collaborative Research Topics: "Twinning"

- Complementary EU-US Research Programming on selected issues of shared interest.
- Proposed by European Commission in January 2015
- Timing: Target: late 2016/early 2017. Projects will run two or three years.
- Potential Topics
    - Automated vehicle pilots and field operational tests
    - Transition to mixed traffic operations (some vehicles automated, some not) addressing operations, safety, and user acceptance
    - Infrastructure for operation
    - Demonstrations of small automated vehicles in city centers
    - Cross-cutting coordination in the areas of liability, regulation, insurance
    - Crash Avoidance
    - Crashworthiness

ITS Research Exchange with Mexico

- The U.S. and Mexico share a border and work together for regional goals of freight, movement, safety, etc., to facilitate cross-border movements that are safe and secure.
  - Technology can play a major role. Harmonized architectures are key to success.
  - Building on the information border architecture work, the US and Mexico continue to harmonize on the National ITS Architecture and are now beginning discussions on the Connected Vehicle Reference Information Architecture (CVRIA).

- ITS Architecture and Standards Workshop for Mexico
  - Product of discussion between USDOT and Sectretaria de Comunicaciones y Transportes (SCT) of Mexico as part the High Level Economic Dialog (HLED)
  - SCT requested that USDOT provide an introductory work shop on Intelligent Transportation Systems (ITS) system architecture and standards. (Summer 2014 and Summer 2015)

Canada-US Regulatory Cooperation Council (RCC)

- Executive, non-binding agreement between Canada and the United States with a mandate of working together "to promote economic growth, job creation, and benefits to our consumers and businesses through increased regulatory transparency and coordination" between the two countries.

- The RCC Initial Action Plan (December 2012 – March 2014) included an ITS Workplan and resulted in:
  - The first set of bilateral deployments under the Border Wait Time measurement initiative (six crossings in total).
  - USA-Canada shared funding agreement for the National Connected Vehicle Field Infrastructure Footprint Analysis.

- The RCC Joint Forward Plan (June 2014—December 2019) includes a CV Workplan
  - *A key objective under the RCC is to help ensure the interoperability of connected vehicles between Canada and the U.S. moving forward.*

2014 Joint Forward Plan Areas of Cooperation

- Health
- Transportation
- Food and Agriculture
- Aquaculture
- Environment
- Energy Efficiency
- Explosives Classification

RCC Connected Vehicle Work Plan Initiatives

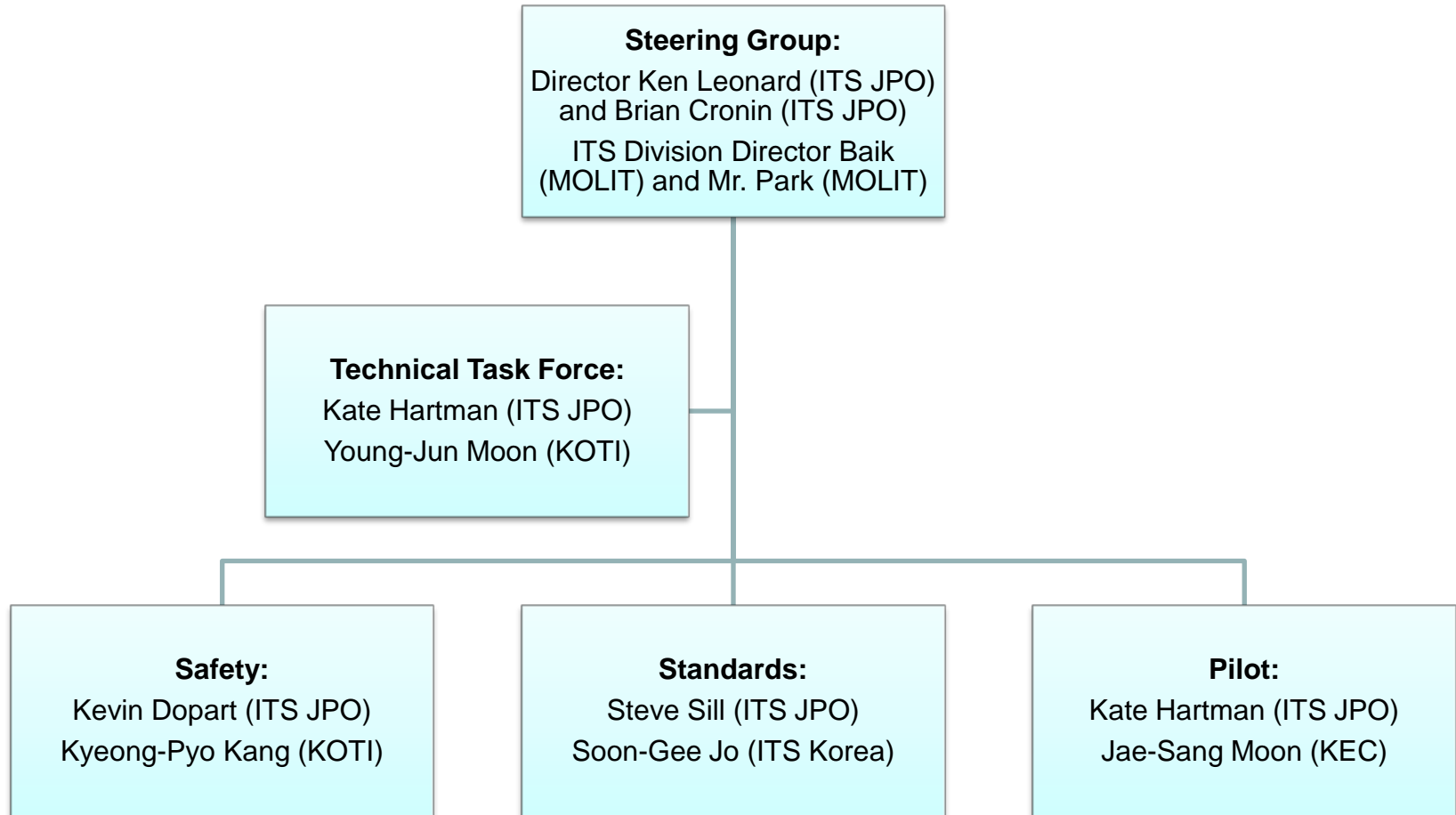| RCC Initiative	Planned Activities
Imitative 1: Connected Vehicle cybersecurity, equipment certification, and security certificate management systems	• Collaborate on policy and technical requirements to develop a cross-border connected vehicle security certificate management system (SCMS). • Collaborate to establish certification requirements for CV system components
Initiative 2: Spectrum Policy Analysis	• Identify opportunities for collaboration and exchange on Intelligent Transportation Systems (ITS) communications platforms, spectrum allocation and spectrum policy for connected vehicle applications.
Initiative 3: Standards and Architecture	• Identify new or revised standards required to support large scale connected vehicle technology deployment and integrate detailed Connected Vehicle Reference Implementation Architecture (CVRIA) into overall Canada/US National ITS architecture updates.
Initiative 4: Information Dissemination & Sharing (in support of regulatory activities)	• Jointly engage stakeholders on bi-national and related international CV issues, including hosting open public meetings that would include Canadian and U.S. stakeholders.

USDOT- Korea MOLIT ITS Research Cooperation

- Memorandum of Cooperation with Korea's Ministry of Land, Infrastructure, and Transport's Road Bureau signed August, 2012
- Three working groups (safety, standards, and pilots)
- Status
  - Current focus is on sharing information and lessons learned from the USDOT Safety Pilot to inform development of a future Korea Pilot. MOLIT plans to conduct a pilot demonstration similar to the USDOT Safety Pilot, but will include mobility applications in addition to safety.
  - USDOT is planning future pilots in V2I safety and mobility, environmental applications and views the Korean Pilot as a useful learning opportunity.
  - The 2018 Korea Olympics C-ITS installation will be another venue for data and information sharing. In particular, USDOT is interested in development of architecture standards for the Olympics and will be coordinating with Korea in this area.
  - Inaugural Korean ITS Research Fellow seconded to the ITS JPO (2015-2017).

US-Korea Cooperation Governance

Steering Group:

Director Ken Leonard (ITS JPO) and Brian Cronin (ITS JPO)

ITS Division Director Baik (MOLIT) and Mr. Park (MOLIT)

Technical Task Force:

Kate Hartman (ITS JPO)

Young-Jun Moon (KOTI)

Safety:

Kevin Dopart (ITS JPO)

Kyeong-Pyo Kang (KOTI)

Standards:

Steve Sill (ITS JPO)

Soon-Gee Jo (ITS Korea)

Pilot:

Kate Hartman (ITS JPO)

Jae-Sang Moon (KEC)

ITS Architecture and Standards Harmonization

Purpose: Established to encourage and enable the development and adoption of multi-regionally harmonized standards for ITS cooperative systems when in the public interest.

- Share costs, expertise, ideas, and work
- Avoid redundancy/conflicting standards
- Unify global supply chain, speed deployment
- Common hardware and software across regions can reduce development and manufacturing costs
  - Economies of scale, encouraging private sector investment
  - Greater accessibility to international markets for suppliers lowers costs and expands service for consumers
- Improved interoperability across borders facilitates safety and commerce

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ITS Architecture and Standards Activity

"Harmonized" need not be identical to be beneficial.

- *As similar as possible considering technical, institutional, legal differences*

ACCOMPLISHMENTS:

- Harmonized European and US Basic Safety Message (BSM)
  - Support vehicle-to vehicle safety/rulemaking, connected vehicles (CV)
- Harmonized security and management protocols for connected vehicles
  - Multiple work products supporting standardization
- Harmonized Signal Phase and Timing (SPaT) messages
  - Support CV safety, mobility, sustainability applications

ITS Architecture and Standards Activity

UNDERWAY:

- Collaborative development of security policies/guidelines to support large-scale CV deployment (US, Europe and Australia cooperating)
  - Results available Summer 2015 for stakeholder review/feedback
- Architecture cooperation with Mexico
  - Working towards interoperable architecture to support CV and efficient border
  - Well established cooperation with Canada continues

CANDIDATE FUTURE COOPERATION:

- Standards recommendations /gaps for CV deployment (w. Australia & EU)
  - Across entire large-scale deployment architecture
  - Facilitate globally unique "app" and other identifiers
- Possible work items on CV certification and probe being evaluated.

Thank You

ITS Architecture and Standards Cooperation

U.S. Based

International

Non-U.S. Based

Active support including strategic input, funding, and working group participation

Observation and strategic cooperation

Participation helps ensure the successful implementation of U.S. goals, policies, and regulations

Harmonization Challenges

Architecture/standards harmonization is a complex endeavor:

- Divergent technical, policy, commercial, legal interests/environments
- Divergent interests - public/commercial, SDOs, regions/governments
  - Sometimes divergent and/or inflexible institutional policies/practices

Success requires:

- Cooperation of SDOs, industry stakeholders, and governments
- Predictable, stable resource and policy commitments
- Cooperative governmental co-leadership/facilitation/participation/decision-making, funding support
  - Consensus-based program management requires greater Federal leadership resources than "traditional" contracted work
  - Flexibility to meet contracting, scheduling, travel and other needs
- Program management excellence