# EU-US Standards Harmonization Task Group Report: Summary of Lessons Learned

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**EU-US ITS Task Force**
**Standards Harmonization Working Group**
**Harmonization Task Groups 1 & 3**

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**16. Abstract**

Harmonization Task Groups 1 and 3 (HTG1 and 3) were established by the EU-US International Standards Harmonization Working Group to attempt to harmonize standards (including ISO, CEN, ETSI, IEEE) on security (HTG1) and communications protocols (HTG3) to promote cooperative ITS interoperability. One of the first substantive standards harmonization activities under the EU-US ITS Cooperation agreement, it served as a workshop for discerning how the European and U.S.-based SDOs and government stakeholders can work together more effectively. This "Lessons Learned" report documents the key observations expected to be useful for future international collaborations. It complements the HTG1 and HTG3 reports by focusing on the process that was followed in development and distribution of the mainstream work products. The lessons are categorized as follows: formation and management of the task group, report content, stakeholder outreach, longer-term observations on standardization, and technical. Its use is intended for those interested in connected vehicle standardization, as well as the broader EU-US ITS Cooperation community who will participate in future collaborative efforts.

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**Background**

The Harmonization Task Groups HTG1 and 3 were convened to develop recommendations for harmonizing the standards for communications and security for cooperative Intelligent Transportation Systems (ITS), also known as connected vehicle technologies, which have been developed separately in the EU and US.  This was one of the first substantive standards harmonization activities under the EU-US ITS Cooperation agreement, and as such served as a laboratory for learning how the European and American SDOs and government stakeholders can work together more effectively on ITS issues.  From the start, it was recognized that this was a precedent-setting collaboration that could pave the way for even more substantive future efforts if it succeeded.  The participants were conscious of this dimension of the work and therefore sought to capture their observations about both positive and negative aspects of the collaboration so that others could learn from it.  At their first meeting HTG1 and 3 resolved to develop a "Lessons Learned" report to document the observations that they expected to be useful for future international collaborations.

This report complements the other reports of HTG1 and 3 by focusing on the process that was followed in performing and disseminating the other work products, rather than on the technical contents of those products.  It is intended to be useful not only to people who are interested in cooperative ITS standardization, but also to the broader EU-US ITS Cooperation participants and managers who will be conducting the future collaborative efforts.  By identifying the keys to success as well as the impediments to success, future EU-US collaborative efforts will be able to learn from this experience and improve their chances of success, enhancing the return on their investments.

The Lessons Learned are grouped in the following categories in the subsequent sections of this report:

1. Process of forming the task groups and managing their work

2. Contents of the reports

3. Outreach in communicating the results to the stakeholder community

4. Longer-term observations on standardization

5. Technical observations

It is worth starting with a general cross-cutting observation that was noted at the end of the HTG1 and 3 activities. Many participants noted that after the trans-Atlantic differences in terminology were sorted out, they realized that there were actually more similarities in the operational concepts and architectures for cooperative systems than they had originally perceived.  Since these participants were experts already deeply involved in the definition and development of the cooperative ITS technologies and systems, it is significant that this realization did not dawn until after they had spent a great deal of time together in intensive discussions.  Once this realization dawned, it provided a good starting point for making progress on harmonization.

**1. Process of Forming the Task Groups and Managing their Work**

The technical success of the harmonization work was critically dependent on the composition of the task groups and the way their work was managed. The lessons in this area are almost entirely positive, providing excellent guidance for future EU-US collaborative efforts:

**1.1 Team Composition**

The most important single contribution to the success of the work was in the selection of the participants. Without having selected the right combination of people to work together, the results would not have been favorable even if all the subsequent decisions were well-judged. The key elements in the successful team composition were:

High-level expertise – The technical issues were challenging, and there were only a limited number of people possessing the depth of expertise needed to understand them thoroughly. It was important to have this expertise balanced across the topic areas and across both sides of the Atlantic so that all issues could be addressed with appropriate balance. The participants also needed to be widely recognized for their expertise so that their outputs would be given due attention and respect in the broader stakeholder community.

"Team-player" mentality – It was not sufficient to have high expertise, but the experts also needed to be willing to work interactively with the other experts. This was not the place for "lone wolves" to work on their own, but required ongoing close collaboration with the others. It was particularly important to have a combination of experts who respected one another's knowledge and expertise and were therefore willing to listen to opposing opinions and work towards identifying common ground.

Precise English usage – Standardization is critically dependent on precise use of language, and since English is the agreed-upon language for international ITS standardization it was essential that the experts all be able to communicate precisely in English. HTG1 and 3 were fortunate that all of their experts, including the non-native English speakers, had the ability to speak and write precisely and accurately in English. This meant that there was a minimum of ambiguity or miscommunication based on language problems, so attention could be focused on the technical issues.

Small enough to be manageable – The groups had to be kept small enough to be manageable, considering the challenges of scheduling meetings and managing discussions of controversial topics in those meetings, as well as financial resource constraints.

Large enough to be inclusive – The groups needed to have representation of a wide range of technical expertise as well as affiliations with all the relevant standards development organizations so that the results could be fed back directly to the work of those SDOs. The inclusiveness goal became feasible while keeping the groups small enough to be manageable by selecting experts who are active in multiple SDOs and who have multiple areas of expertise.

### 1.2 Intensively Collaborative Meetings

The work of HTG1 and 3 was primarily conducted in a series of five one week-long meetings. Some document writing and editing was done between the meetings, but a large proportion of the work was actually accomplished in those meetings. It was vitally important to identify full weeks when all the experts could gather in one place at the same time for intensive collaboration. These face-to-face meetings were vital for team-building, so that the experts could get to know each other better and learn how to negotiate technical issues with each other and the efficiency of this face-to-face communication in quickly converging on solutions cannot be overstated. In addition having the experts stay as much as possible in the same hotels facilitated much discussion outside the formal meetings, enabling progress to be gained over the entire duration of the session, in both formal and informal environments.

The success of the meetings was strongly dependent on the quality of the supporting facilities. Where internet access was good and the meeting and hotel accommodations commodious, progress was smoother and more efficient. Poor internet connectivity in one meeting location and un-air-conditioned accommodations during a heat wave in another location were unnecessary irritants and impeded progress temporarily. Exchanges of information during and between meetings were facilitated by use of online tools such as an e-mail reflector and an online document repository account. These seemingly small amenities made a big difference by allowing the experts to focus on the technical content of their work with a minimum of practical impediments.

### 1.3 Scope Management

At the start of work, the scope of the effort was not entirely clear to the experts or the managers, so a substantial portion of the first meeting was devoted to refining the scope and defining the deliverables. This had to be re-visited at most of the subsequent meetings as the work progressed. There is a natural tendency for technical experts to probe deeper in areas that they find interesting, and it was a challenge to rein in this tendency during all the meetings to minimize scope creep. Nevertheless, the scope did expand as the work continued and the final deliverables were more numerous and voluminous than originally planned.

It would have been easier if the scope had been clearly delimited at the start of work, but at the same time it was necessary to do a substantial amount of work to recognize how the scope needed to be adjusted to produce the kinds of outputs that were really needed. The inherently governmental nature of scope definition for this government-sponsored effort made it important to have the appropriate governmental co-leadership on-site and directly involved in scope definition and work direction throughout the effort. It should also be noted that whilst technical harmonization in standardization was the goal, time had to be given to understanding the political and cultural variances in order to make the technical recommendations of the group acceptable when presented to the external stakeholders.

### 1.4 Progress Monitoring

It was challenging to monitor progress on the work because of the shifts in scope and a shortage of clearly defined milestones.  When possible, it would be preferable to define the milestones in advance and monitor progress relative to those milestones continuously so that shortfalls in progress can be identified as early as possible and remedial actions taken.  In the case of HTG1, some of the original experts did not have as much time available as needed, leading to schedule slippage, so it was necessary to recruit additional expertise in the middle of the project and to shift some of the attention of experts whose knowledge spanned both groups from HTG3 to HTG1.

### 1.5 Time Allocation

The schedule for the HTG1 and 3 work (six months) was extremely compressed considering the complexity of the assignment.  There is a difficult compromise involved in allocating time for this type of work.  There was external pressure to produce results quickly because of approaching milestones in the standardization processes of some of the SDOs, yet the experts were already heavily booked up when the project started so it was hard to schedule large amounts of their time for this work.  In the future, it would be desirable to allow a longer time for work of this complexity if the need is recognized early enough, so that the work is not so rushed and there is more time for stakeholder outreach and interaction (addressed more explicitly in a later section of this report).

### 1.6 Management Direction

The work of HTG1 and 3 was done with relatively little top-down direction.  Much of the decision making was bottom-up, based on the high level of experience and expertise of the participating experts.  This had the advantage of encouraging the creativity of the experts, but it had the disadvantage of making it harder to maintain schedule and scope.  Ultimately, the appropriate level of management intervention has to be decided on a project-by-project basis, based on the needs of the project and the working chemistry among the project participants.

### 1.7 Active Engagement by Government Sponsors

The active engagement in the project by the EU and US DOT sponsors was important for maintaining an appropriate balance between technical and political considerations.  Without this engagement, there would have been a tendency to tilt too heavily in the direction of technical perfection, without sufficient regard for the political realities of how the results will be received in the stakeholder community.  The sponsors also had an important role in keeping the experts focused on the end products of the work and steering them away from interesting, but ultimately less critical, side issues.

### 1.8    Flexibility

Flexibility was essential to the success of the work of HTG1 and 3.  The experts and sponsors had to make many adjustments in the course of the project as they learned more about both technical and non-technical issues, and they made these adjustments with a minimum of fuss.  An important aspect of the ability to be flexible was the building of contingencies into the project plan by the EU and US DOT project sponsors.  They recognized in advance that it would not be possible to anticipate all possible needs and accounted for that in the budgeting so that surprises could be taken in stride, without turning into crises.

### 1.9    EU-US Project Manager Cooperation

One of the keys to the success of the HTG1 and 3 work was the strong cooperation between the EU and US project managers, who were able to work together as genuine partners, with full trust between them.  They were able to reach consensus rapidly when decisions were needed and were able to implement decisions quickly, with a minimum of bureaucracy.  This provided the entire project with the flexibility to adapt to external changes and allowed the experts to focus on the technical work, without having to worry about administrative matters.   Development of this level of cooperation between EU and US project managers should be a high priority for future EU-US collaborative efforts that involve other project manager who have not yet worked together.

## 2. Contents of the Reports

The reports were the most direct and tangible products of the HTG1 and 3 collaboration. Several lessons were learned through the experience of producing these reports:

### 2.1 Technical Quality

A high priority was placed on ensuring the technical quality of the reports, so that they would be well regarded within the stakeholder community and would reflect favorably on the EU-US Cooperation. The experts were very careful about checking the accuracy of the contents and making sure that they were up to date with the latest developments. This was labor- and resource-intensive, within an environment with strong time and resource constraints. Considering those constraints, a heavier weight was placed on making sure that the validity of the reports could not be questioned seriously on the topics that they addressed than on providing higher levels of detail.

### 2.2 Clarity of Presentation

After the stakeholder review comments were received on the first review drafts of the reports, it became apparent that some of the stakeholders were misinterpreting the purpose and character of the reports. HTG1 and 3 did not initially assign a high enough priority to explaining the purpose of the reports, but focused more on the technical contents. As a result, some stakeholders drew the conclusion that HTG1 and 3 were trying to write new standards and thereby competing with the SDOs rather than developing recommendations for the SDOs to apply to their own work. Considerable effort was needed to correct this misinterpretation, indicating the importance of clearly presenting the material in context when it is first exposed to external review. The context for the project as a whole should have been explained up front, and the character and significance of the results or conclusions should have been explained unambiguously to minimize the chance of adverse reactions.

### 2.3 Early External Review

The first external reviews of the reports were solicited when they were nearly complete, and already quite voluminous. The project schedule compressed these reviews into a very short time based on external schedule constraints, but this posed challenges for the external reviewers. It limited the reviews to just a few individuals, who did not have enough time to review all the documents. In the future, it would be preferable to start the external review process earlier, with a subset of the project documentation, and provide the reviewers with enough time to do more thorough and less stressed reviews.

### 3. Outreach in Communicating the Results to the Stakeholder Community

The outputs of HTG1 and 3 were addressed to a broad community of stakeholders working on cooperative ITS and were intended to influence their decisions and actions.  Therefore, it was important to educate that community about the work and to gain their buy-in to the results.  This aspect of the project did not have as much success as the other aspects, so there were both positive and negative lessons to be learned in this area.  Some of the negatives were largely outside the control of the project participants, in that some of the stakeholders were unfavorably inclined toward the activity from the start and were unwilling to participate.

### 3.1  Engage as Many Stakeholders as Possible as Early as Possible

The project organizers sought to engage all the key stakeholders before the project started, but some of them declined to participate for their own reasons (ranging from insufficient priority given their resource constraints to active hostility to the goals of the project).  It would not have been feasible to incorporate all of the stakeholder interests directly in the HTG expert group because of practical constraints on manageable size of meetings and travel expenses, but it probably would have been good to maintain ongoing contact with those who did not participate directly to keep them informed about progress and to share interim results.  When the time came to engage them in reviewing the nearly-complete reports, it was summer vacation period and the review deadlines were too short.  This led to negative perceptions on the part of some stakeholders about whether their review comments were genuinely valued.

### 3.2  Choose Neutral Terminology

The terminology used to describe cooperative ITS differs more between the EU and US than the cooperative ITS operational concepts and architectures.  HTG1 and 3 decided at the start to use a mixture of terminology from both sides of the Atlantic, and at one time even discussed introducing each term with its trans-Atlantic counterpart in parentheses with a full explanation.  This was not implemented because of the severe time constraints on the report preparation.

Some of the stakeholders who reviewed the reports perceived a bias toward the opposite side of the Atlantic based on the mix of terminology that was used, in spite of the best efforts of HTG1 and 3 to find a balance.  In future EU-US cooperative projects, it may be necessary to include more explicit introductory comments about terminology and/or to include a full glossary of equivalent terms to minimize the chances that the terminology itself will become an impediment to effective communication of ideas about how to integrate efforts from the EU and US.

### 3.3  Incorporate Key Stakeholder (SDO) Representatives in the Expert Team

One of the main successes of HTG1 and 3 was the incorporation of the editors of many of the relevant standards into the HTG expert team.  These standards editors have the most direct knowledge of the contents of their standards as well as the undocumented knowledge about why these standards were written the way they were.  This means that they are also most likely to know which aspects of the standards can be most easily modified to promote harmonization and which are most difficult to change.

The project managers attempted to include representatives of the major vehicle industry consortia in the expert team, and although they succeeded in getting a representative of the Vehicle Infrastructure Integration Consortium (VIIC) from the U.S., they did not get a representative of the Car-to-Car Communication Consortium (C2C-CC) from the EU.  The VIIC representative was able to help the HTG experts understand the concerns of his members and was also able to facilitate the review of the HTG documents by the VIIC.  It would have been extremely useful to have comparable participation on the C2C-CC side to provide parallel liaison functions, and this also could have avoided a most unfortunate scheduling conflict for the public workshop where the HTG1 and 3 results were presented to a European audience.

When the HTG1 and 3 reports were completed, the standards editors who worked on them brought those reports to their respective standards-writing committees and began the process of adjusting their standards to facilitate harmonization according to the recommendations in the reports.  This helped make the process of harmonization as close to seamless as possible for the standards within their domains.

### 3.4  Manage Stakeholder Expectations

The stakeholder community did not have a clear image of what the HTG1 and 3 work was going to produce, and indeed it seemed to be shrouded in mystery because the meetings were closed and the work remained confidential until the first drafts were circulated for comment.  In retrospect, it may have been better to be more open about the activity and to circulate information that more clearly described what was being done.  When the reports were first released for comment, some reviewers were disappointed that the recommendations were not accompanied by thorough explanations of the reasoning behind those recommendations.  Even though it would have been very desirable to include such explanations, the project schedule and resource constraints precluded that.  The disappointment could have been minimized if the stakeholders had been informed in advance about the level of detail to expect in the HTG1 and 3 documentation.

### 3.5  Include the Full Range of Stakeholders

Throughout most of the work of HTG1 and 3, the primary audience of stakeholders was envisioned to be the standards-writing committees within the SDOs active in cooperative ITS standards.  At the final

outreach workshop, it was noted that much standardization is occurring in an ad hoc fashion through the activities in the major field operational tests (FOTs) and industry consortia, and these need to be addressed explicitly.  These groups are forced to make decisions quickly and cannot always wait for a formal SDO process to agree on a standard, yet their decisions may assume at least as much importance as the formal SDO ballot decisions.

### 4. Longer-Term Observations on Standardization

Some of the lessons learned were specific to the standardization process and the organizations involved in it, but may not be relevant to EU-US cooperation in other aspects of ITS.  These include:

### 4.1  Need Mechanisms for Communication Across SDOs

It was surprising how little communication exists across the SDOs that are active in cooperative ITS, except in cases where individual experts participate in the work of multiple SDOs and become the *de facto* liaisons.  Mechanisms are needed for SDOs to share basic information that does not compromise their intellectual property such as:

- meeting schedules (to avoid conflicts)

- current and planned work items (to minimize duplication of effort or direct conflicts)

The government agencies that provide financial support for their work should be able to exercise some leverage to encourage such information sharing through a common clearinghouse.

### 4.2  Need Incentives for SDO-SDO Cooperation Rather than Competition

There are no particular incentives for SDOs to cooperate with each other in an environment where they derive revenue from the sale of standards documents and from public sector funding to support the development of new standards.  Each tends to be motivated to expand its domain at the expense of the others.  The public agencies that sponsor the development of new standards are motivated to have their resources used most efficiently.  They should be able to allocate their sponsorship resources across the SDOs to promote the most efficient distribution of activities and avoid duplications.  Coordination between the EU and U.S. DOT in their respective sponsorship of standardization work could help avoid duplication at the international level, and they could focus their resources on standardization efforts that are designed to be cooperative across SDOs.

### 4.3  Need to Work Around SDO Procedural Constraints

Each SDO has its respective bureaucracy with its own way of doing things administratively.  These procedures are typically designed to protect the SDO's intellectual property and maximize its revenue stream from sale of standards documents, but that discourages sharing of information with other standardization efforts.   The volunteer standards editors currently need to find creative and unofficial work-arounds to circumvent these restrictions so that they can coordinate their work with the related work in other SDOs.   Incentives are likely to be needed from the sponsoring public agencies before the administrative impediments are going to be overcome officially.

### 4.4 Slowness of Standards Process

The consensus standards process in the volunteer-based SDOs tends to be slow because of the limited time volunteers can devote to the efforts and the inherent difficulty of reaching consensus when members have competing commercial interests. The pace of change in the information technology industry is so fast that in many cases industry cannot afford to wait for the SDO process. This means that companies are pressed to bring their products to market before standards have been defined, and large companies often have the economic strength to push their proprietary solutions as *de facto* standards. Industry consortia may base their FOTs on proprietary solutions, ad-hoc approaches or immature standards that have not yet been harmonized. These all undermine the traditional standards process, and indicate that it could become obsolete unless it is able to respond more quickly. That has potentially adverse implications for the future of standards harmonization, since it has to build on standards and then adds another layer of consensus building (and further delays).

### 5. Technical Observations

Some of the lessons that came out of the HTG1 and 3 work are specific to the technical issues in communications and security that were the subject of their attention.   These have important implications for the development of cooperative ITS, beyond the harmonization of standards.

### 5.1  Incorporating Mobile Devices as Well as Motor Vehicles

Much attention in recent years has shifted to the use of personal mobile devices as the communication nodes for cooperative ITS rather than devices permanently installed in motor vehicles.  This means that the international pool of potentially communicating devices would expand from about one billion to about five billion.  This makes the challenges of providing security significantly more difficult, and based on experiences in other industries solving the logistical challenges of managing the security credential process could require considerable time and effort when using asymmetric cryptography and public key infrastructures to manage trust amongst many unrelated stakeholders and actors.

### 5.2  Continuum of Security Approaches

Participants in the Darmstadt workshop noted that it is important to consider security as a continuum of varying levels of strength rather than as a binary concept (secure versus insecure).  The appropriate level of security needs to be chosen depending on the needs of the specific end-user application that is being supported and the cost of providing that level of security by managing the level of risk that the impacted stakeholders are exposed to.

### 5.3  Cryptographic Technologies

The cryptographic technologies needed for securing wireless communications are subject to export controls because of their categorization as dual use technologies (i.e. they have application in both civilian and military environments), which complicates their use across national borders.  In order to implement these technologies it is not sufficient to address only technical issues but it is also necessary to address protection of the technologies from exploitation by rogue nations, which requires close interaction with export control authorities to ensure a global supply market for ITS equipment containing cryptographic capability.

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