

Roadmap of Standards and Codes for Electric Vehicles at Scale (Evs@Scale)

ANSI EVSP Virtual Kickoff Event
15 June 2022



Welcome!

- § This event is being recorded and a publicly accessible link to the recording on the [EVSP page](#) will be made available for those unable to attend today's meeting. If you do not wish to be recorded, keep your audio on mute and your camera off throughout the event.
- § All attendees (audience members) are muted on entry
- § We will hold Q&A until after the presentations
- § For the Q&A period, attendees may either
 - 1) Type your question into the chat (please send it to All Panelists)
 - 2) Use the "raise hand" feature in the Participants panel to speak
 - Staff will individually unmute those who wish to speak
 - If raising hand, please put it down again after your question is asked
- § Slides also will be made publicly available

Today's Speakers

- § Jim McCabe, ANSI
- § Fred Wagner, Wagner Energy Consulting (on behalf of DOE's Vehicle Technologies Office)
- § Ted Bohn, Argonne National Laboratory

American National Standards Institute

- § Founded in 1918, ANSI is a private non-profit membership organization whose mission is to enhance U.S. global competitiveness and the American quality of life by promoting, facilitating, and safeguarding the integrity of the U.S. voluntary standardization system
- § ANSI represents and serves the diverse interests of more than 270,000 companies and organizations and 30 million professionals worldwide
 - businesses, professional societies and trade associations, standards developing organizations (SDOs), government agencies, consumer and labor organizations
- § Official U.S. representative to the International Organization for Standardization (ISO) and, via the U.S. National Committee, the International Electrotechnical Commission (IEC)



Purposes of ANSI Include . . .

(selected excerpts from ANSI By-Laws)

- § To serve as the national coordinating institution for voluntary standards, conformity assessment and related activities in the United States of America . . .
- § To provide the means for determining the need for new standards and conformity assessment programs; to promote activity by existing organizations competent to resolve the need; and to work toward establishment of suitable groups for these purposes where such do not already exist
- § To cooperate with departments and agencies of federal, state and local governments in achieving (i) optimum compatibility between government laws and regulations and the voluntary standards of industry and commerce . . .

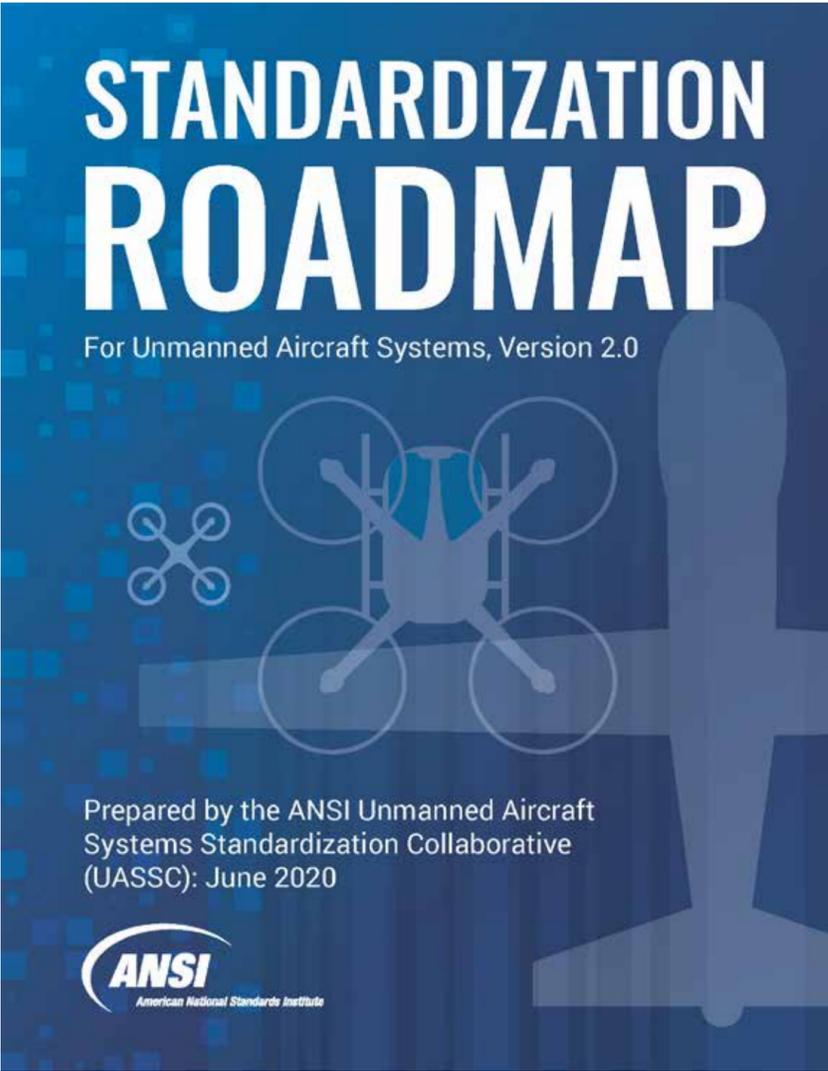
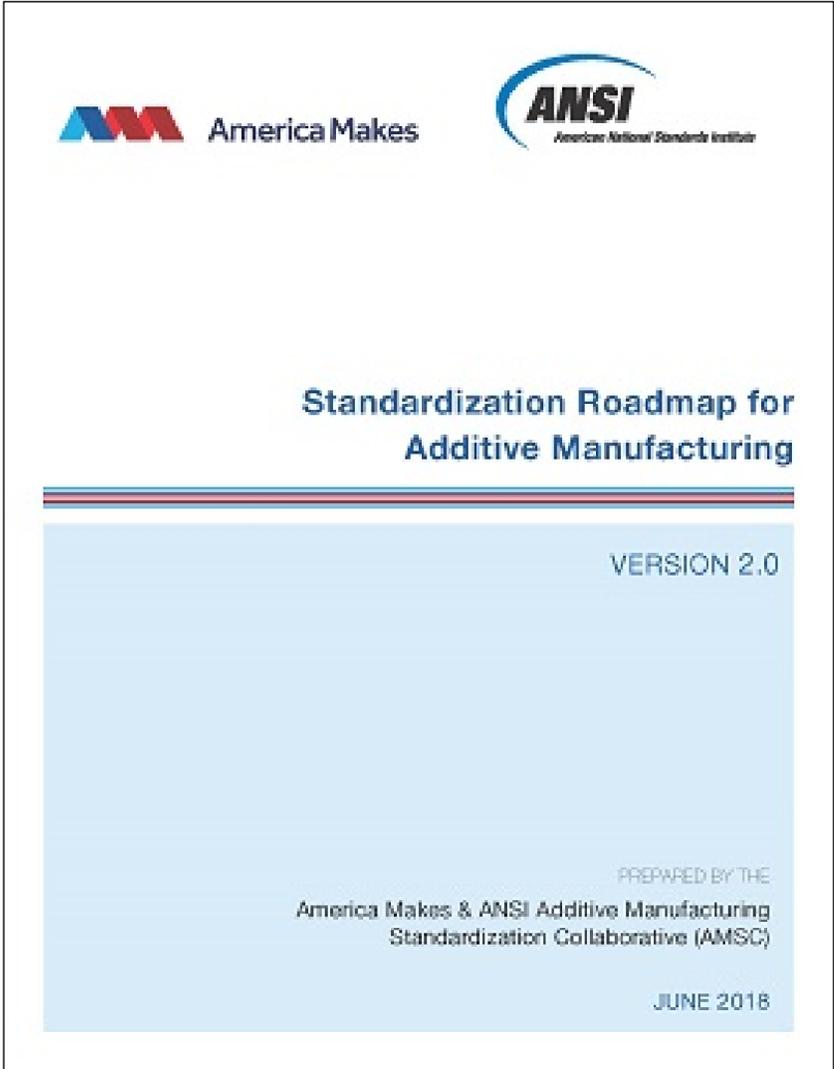
ANSI Standards Coordination Activities

One way ANSI coordinates and supports the standardization system is through **standards collaboratives and workshops**, which:

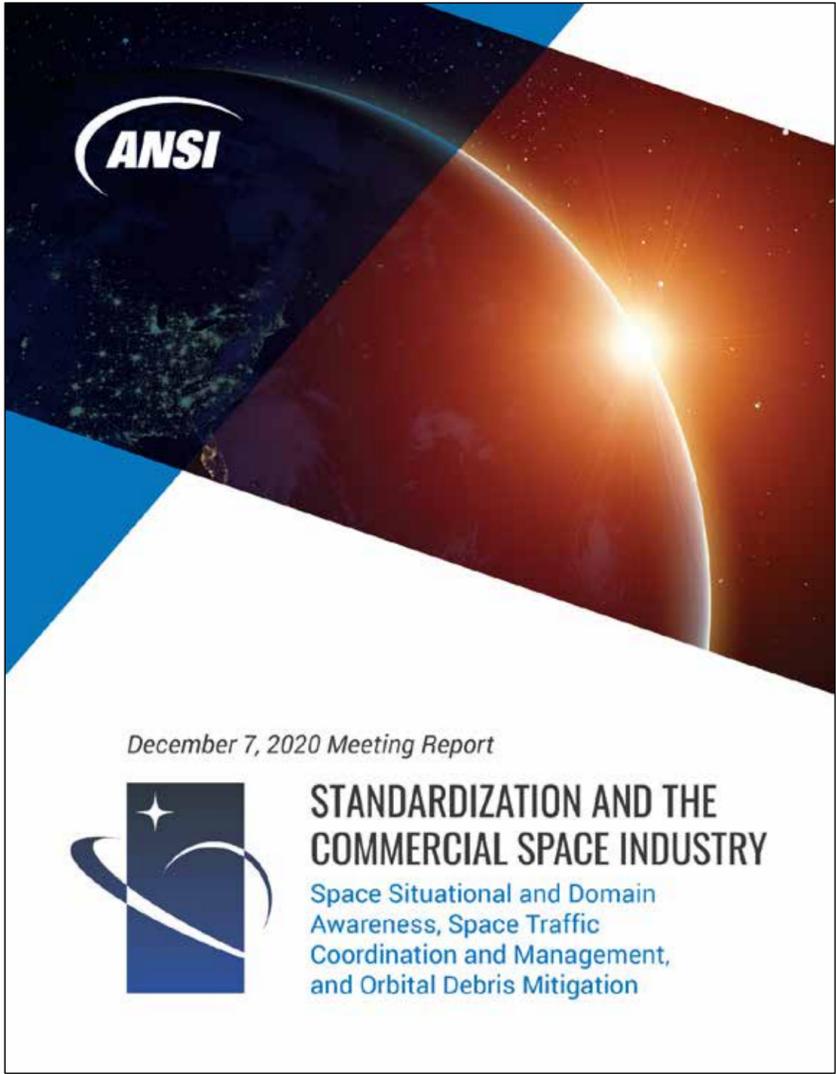
- § Bring together the public and private sector in a **neutral forum**
- § Identify current and in-development standards, where gaps exist, and recommend solutions
- § Identify organizations that can perform the needed work and priorities



ANSI Standards Coordination Deliverables



Meeting Reports

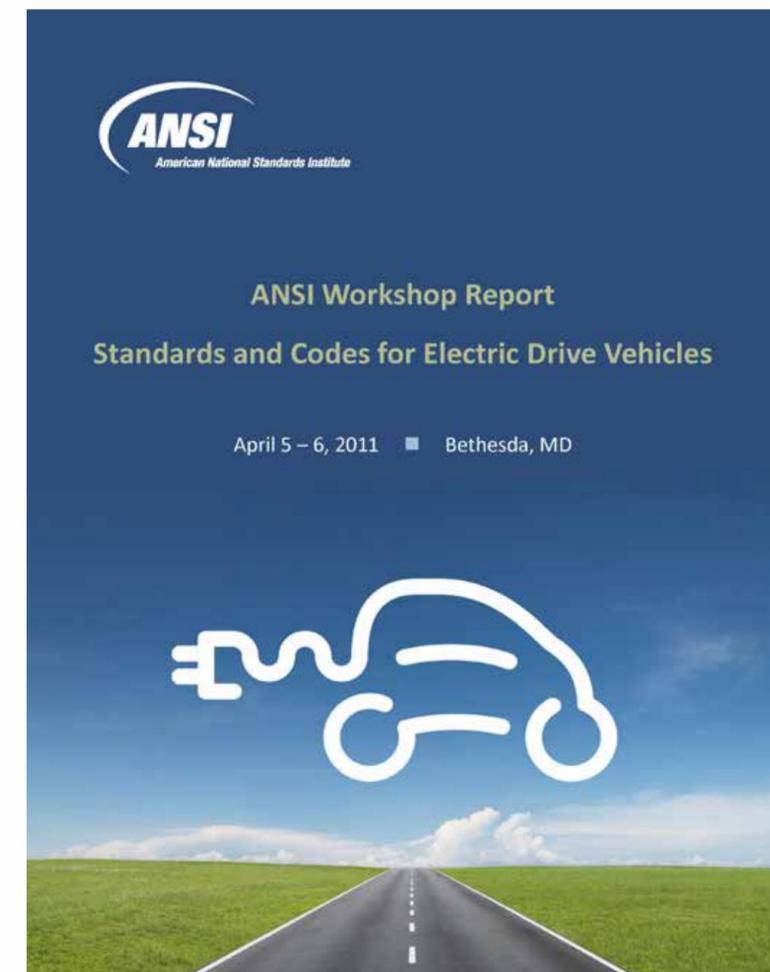


Standardization Roadmaps

ANSI EVSP



- In March 2011 ANSI formed the Electric Vehicles Standards Panel (ANSI EVSP)
- Purpose: To develop a roadmap of the standards and conformance programs needed to facilitate the safe, mass deployment of electric vehicles and charging infrastructure in the United States, with international coordination, adaptability and engagement
- Strictly a coordinating body; it was not formed to develop standards
- 100+ private and public sector organizations involved: automakers, utilities, electrotechnical industry, standards developing organizations (SDOs), government agencies



Why a Standards Roadmap for Electric Vehicles?

- § Maximize coordination among standards developing organizations
- § Capture work in progress and provide guidance on standards participation to other stakeholders
- § Enable the U.S. to speak more coherently with international trading partners in policy and technical discussions regarding EVs
- § Foster technology dissemination for EVs and charging infrastructure
- § Respond to consumer concerns regarding safety, interoperability, performance, cost, and environmental impact
- § Public policy drivers: reduce petroleum consumption and greenhouse gas emissions, achieve energy independence and security, and economic growth

Prior ANSI EVSP Deliverables

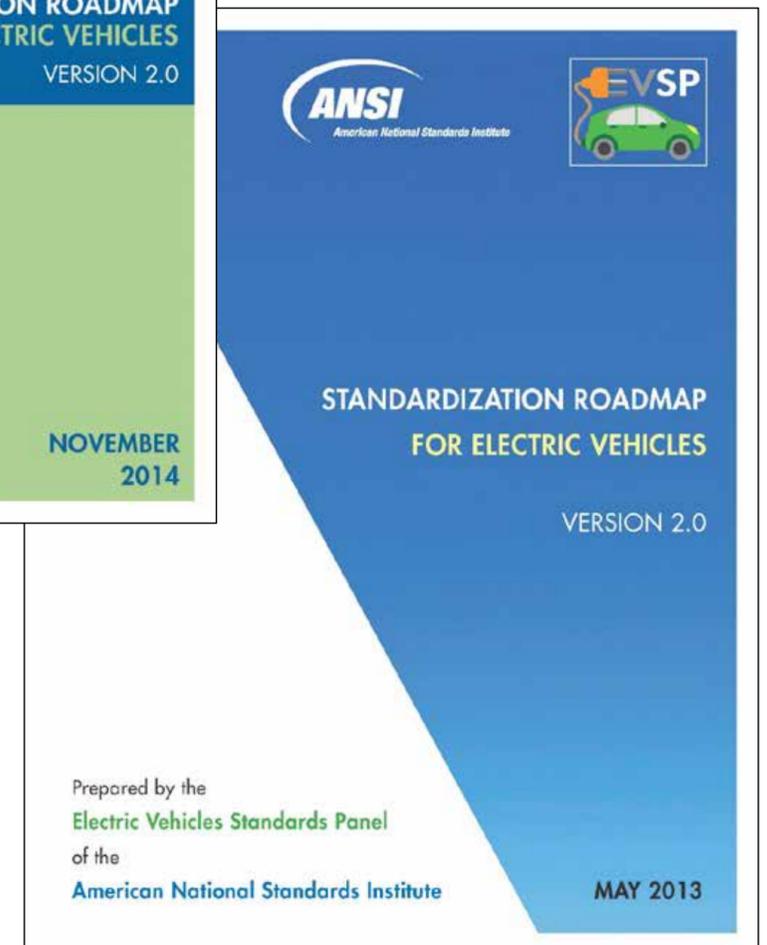
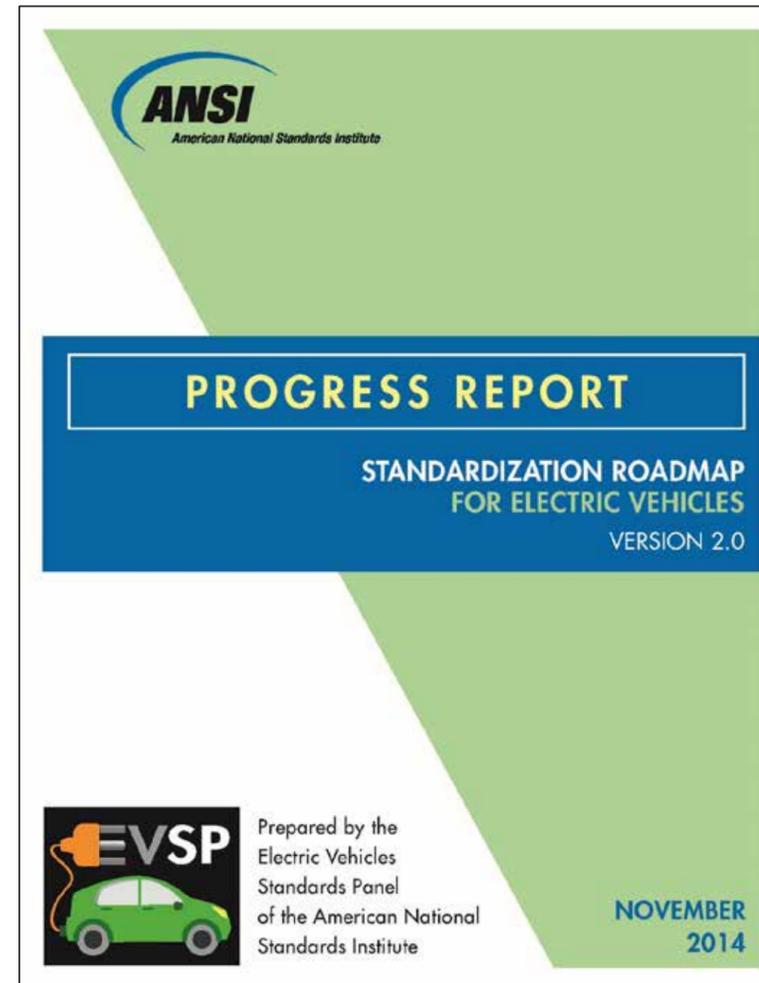
§ *Standardization Roadmap for Electric Vehicles*

- *Version 1.0 (April 2012)*
- [Version 2.0 \(May 2013\)](#)
- [Progress Report \(Nov 2014\)](#)

§ *ANSI EVSP Standards Compendium*

- a [searchable spreadsheet of standards](#) related to issues identified in the roadmap (Nov 2014)

§ Available as free downloads at links above



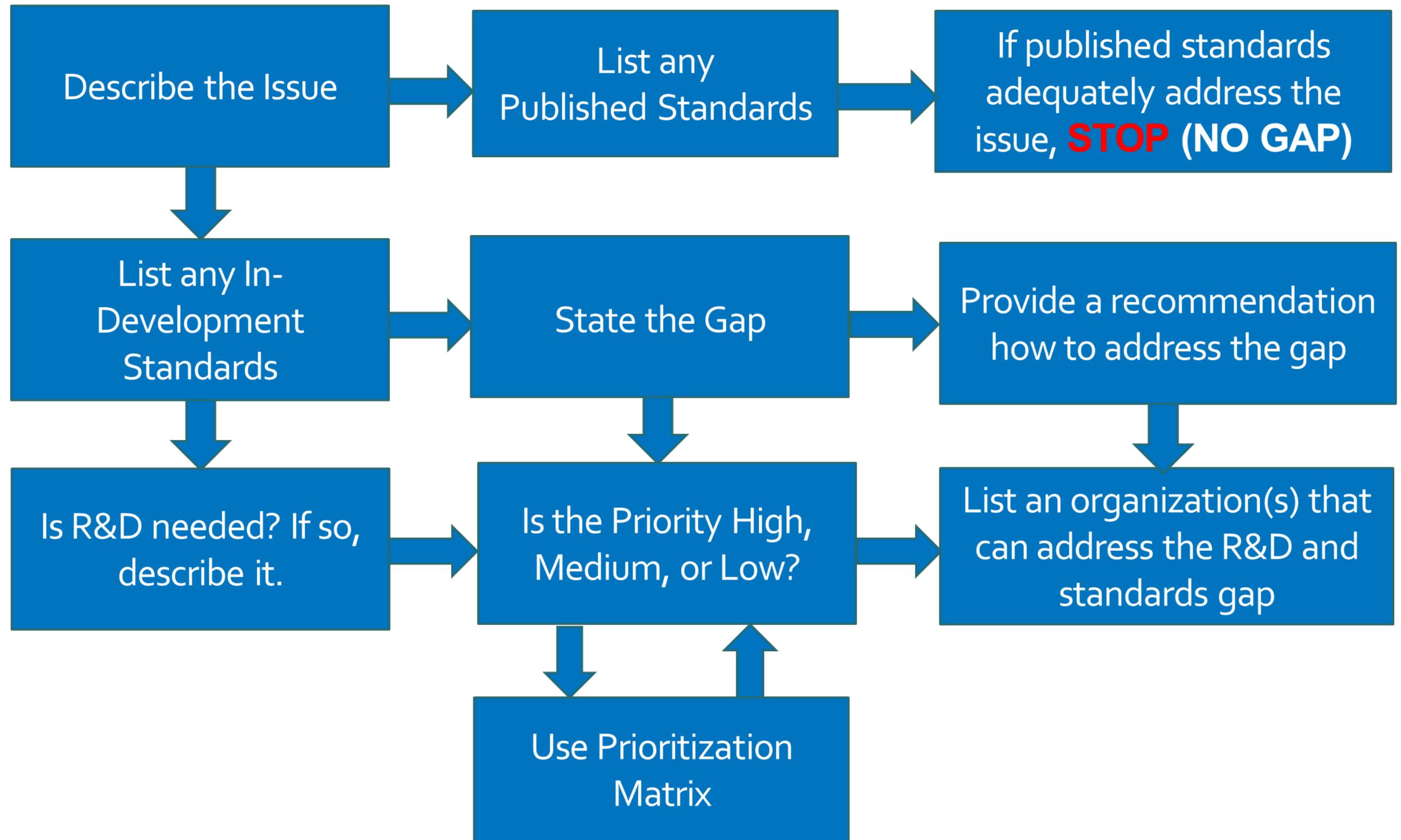
Recent Background

- § [U.S. Department of Energy \(DOE\) Office of Energy Efficiency & Renewable Energy \(EERE\) Vehicle Technologies Office \(VTO\)](#) issued a June 2021 lab call funding opportunity announcement.
- § Lab call included a pillar on codes and standards to "*identify and address challenges and barriers to the integration of EVs@Scale charging with the grid created by uncoordinated development of codes and standards and the rapid advances in vehicle and charging technologies.*"
- § EVs@Scale lab consortium formed in response committed to develop a 2022 roadmap like the [earlier ANSI EV standards roadmap](#). [Argonne National Laboratory \(ANL\)](#) is the lead lab for the codes and standards pillar, supported by consortium members [National Renewable Energy Laboratory \(NREL\)](#), [Oak Ridge National Laboratory \(ORNL\)](#), [Pacific Northwest National Laboratory \(PNNL\)](#), [Idaho National Laboratory \(INL\)](#), and [Sandia National Laboratories \(SNL\)](#).
- § The EV@Scale initiative supports federal and state funding associated with deploying EV charging infrastructure nationwide.

Roadmap Overview

- § Identifies issues as well as standards, codes, and regulations that exist or that are in development to address those issues
- § Identifies “gaps” & recommends development of new or revised standards, conformance and training programs, where needed
 - A “gap” means no published standard, code, regulation, or conformance program exists
- § Suggests prioritized timeframes for standards development and organizations that may be able to perform the work
- § Focus is U.S. market with international harmonization issues emphasized in key areas
- § Presentation of information follows ANSI drafting template as per next slides

Process Flow for Describing Issues & Gaps



Sample Gap Statement- Battery Secondary Uses

- n **Gap:** Battery secondary uses. There is a need for standards to address battery second life applications for grid storage and other uses.
- n **R&D Needed:** Yes/No. If yes, helpful to state what pre-standardization R&D is needed
- n **Recommendation:** Explore the development of standards for battery secondary uses, addressing such issues as safety and performance testing for intended applications, grid connection/communication interfaces, identification of parts/components that can be removed from the pack without destroying it, etc.
- n **Priority:** High/Medium/Low based on scoring matrix on next slides
- n **Organization:** SAE, UL

Prioritization Matrix: Making the CASE for the Gap Priority Level

Criteria

- § **Criticality (Safety/Quality Implications)** How important is the project? How urgently is a standard or guidance needed? What would be the consequences if the project were not completed or undertaken? A high score means the project is more critical.
- § **Achievability (Time to Complete)** - Does it make sense to do this project now, especially when considered in relation to other projects? Is the project already underway or is it a new project? A high score means there's a good probability of completing the project soon.

Scoring Values

- § 3 - critical
- § 2 - somewhat critical
- § 1 - not critical

- § 3 - project near completion
- § 2 - project underway
- § 1 - new project

Prioritization Matrix (contd.)

Criteria

- § **Scope (Investment of Resources)** - Will the project require a significant investment of time/work/money? Can it be completed with the information/tools/resources currently available? Is pre-standardization research required? A high score means the project can be completed without a significant additional investment of resources.
- § **Effect (Return on Investment)** - What impact will the completed project have on the industry? A high score means there are significant gains for the industry by completing the project.

Scoring Values

- § 3 - low resource requirement
- § 2 - medium resource requirement
- § 1 - resource intensive

- § 3 - high return
- § 2 - medium return
- § 1 - low return

Score Rankings / Desired timeframe to have a published standard

- § High Priority (a score of 10-12) / 0-2 years
- § Medium Priority (a score of 7-9) / 2-5 years
- § Low Priority (a score of 4-6) / 5+ years

Call for Participants

- § Open to all EV stakeholders with operations in the U.S.
- § We depend on volunteers to provide the content so please [sign up for a working group](#)
- § Working Groups will meet virtually twice a month to develop the text of the roadmap – schedule TBD
- § Individual authors / small teams draft sections which are then vetted with WG
- § Decisions are based on consensus
- § EVs@Scale lab consortium will function as steering committee for overall coordination and to ensure work stays on schedule

Sponsorship Opportunities

- § ANSI's facilitation of EVSP is supported in part by DOE VTO/Argonne National Laboratory
- § Additional, exclusive [sponsorship opportunities](#) with appropriate recognition benefits are invited from industry and other directly affected stakeholders
- § All revenue goes to help directly offset ANSI's costs of operating the EVSP

Priorities and Timeline

§ Priorities

- NEVI Program (high priority)
 - Light-duty EV infrastructure for corridors
 - Light-duty EV infrastructure for communities
- Medium / heavy-duty EV infrastructure (medium priority)
- Appendices: Non-traditional EV Applications (low priority)

§ Timeline

- Peer-reviewed draft roadmap (Feb 2023)
- Final roadmap by Annual Merit Review (May 2023)

WG1 – Vehicle Systems

On-Vehicle Charging. On-Road EVs
[Light-duty (high priority), medium and heavy-duty EVs (medium priority)]. Flag where on-road standards apply in other applications (summarized in appendix)

EV-EVSE Interoperability

V1G Smart charge management
(communications / control)

V2X

Vehicle aggregation

Cybersecurity

On-Vehicle Energy Storage Systems

Battery Management

Bi-directional power flow

Battery safety

Battery secondary use

Battery recycling

WG2 – Charging Infrastructure

Station / Site Architecture [Light (high priority), medium and heavy-duty EVs (medium priority)]

Highway / corridor charging stations, workplace, and residential (high priority); truck plazas, depots, and warehouses (medium priority)

DCFC and AC L2 (high priority), MCS (medium priority)

Site Architecture / Power Capacity

Onsite DERs / Energy storage

V2X

Vehicle aggregation

Retrofitting existing warehouses, shipping centers

Cross Cutting [smart charge management (communications/controls), facility controls/facility energy management systems, cybersecurity, resiliency, and safety]

Reliability [EVSE maintenance, cable management, environmental and use conditions, and ventilation for multiple charging vehicles]. Focus on charging stations, not residential.

Charging Systems

DCFC and AC L2 for light-duty EVs (high priority) and MCS for medium and heavy-duty EVs (medium priority)

Wireless power transfer (including electromagnetic compatibility) (medium priority)

Dynamic Wireless power transfer (including electromagnetic compatibility) (medium priority)

EV - EVSE interoperability

V1G Smart charge management (communications / control)

V2X

Safety

Cybersecurity

WG3 – Grid Integration

Communication / Control Pathways

Charging service provider

Energy services interface

DER aggregator

Building management

Telematics

Cross Cutting (V1G / V2X communications/control requirements, resiliency, cybersecurity)

Power Distribution and DER Integration

Medium voltage distribution

DC-as-a-Service (DCaaS)

Interconnection

Microgrids/DERMs

Implications of charging as a service

DER Integration (solar, wind, battery energy storage)

Cross Cutting

(communications/controls,

cybersecurity, resiliency, and safety)

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