

National Charging Experience Consortium Virtual Kick-Off Meeting

June 1, 2023

New Effort to Improve Public Charging Reliability and Usability



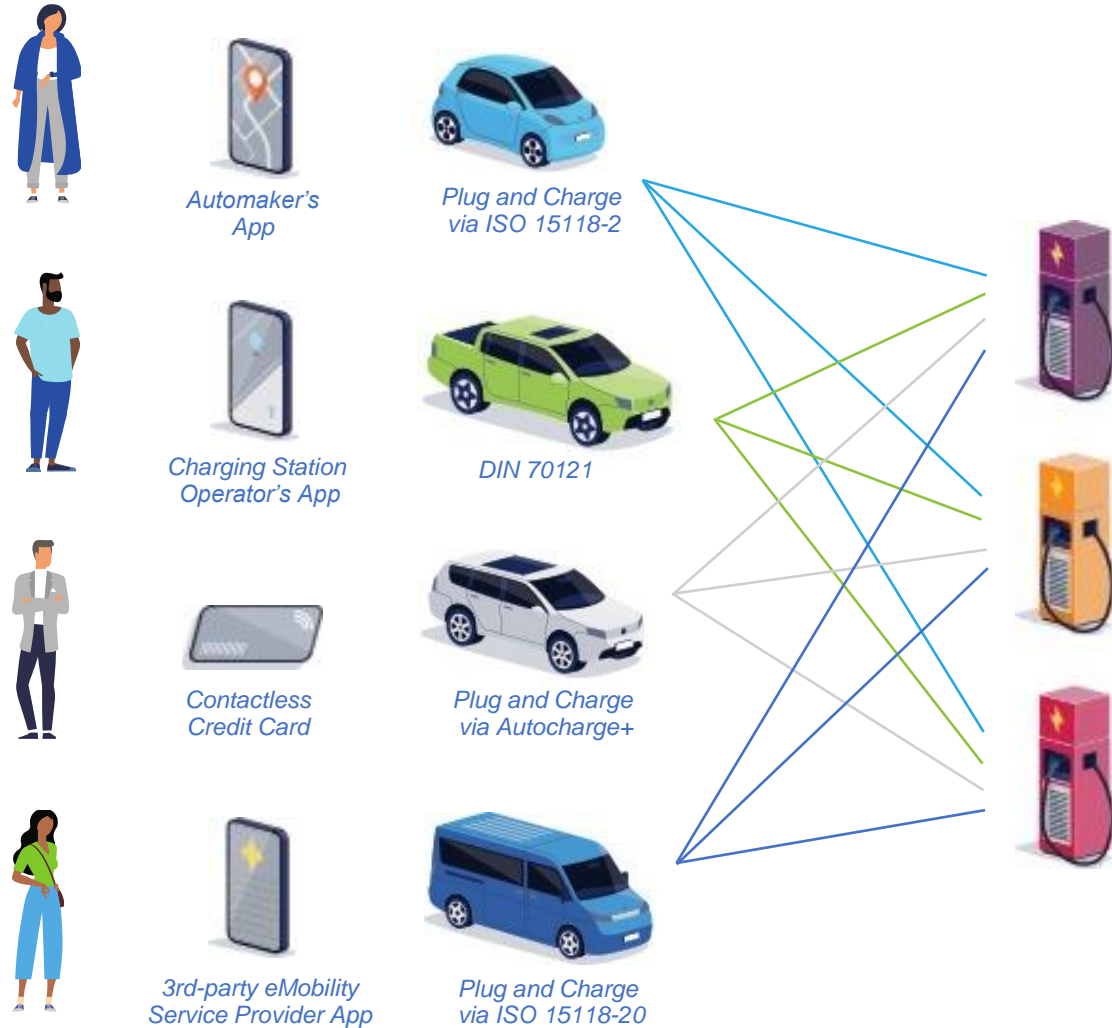
Vision:

A reliable, frictionless charging experience for all

Mission:

Bring together EV charging industry members, national laboratories, consumer advocates, and other stakeholders to measure and significantly improve public charging reliability and usability within 24 months (by June 2025).

Any Driver, Any EV, Any Charger



FIRST TIME,
every time

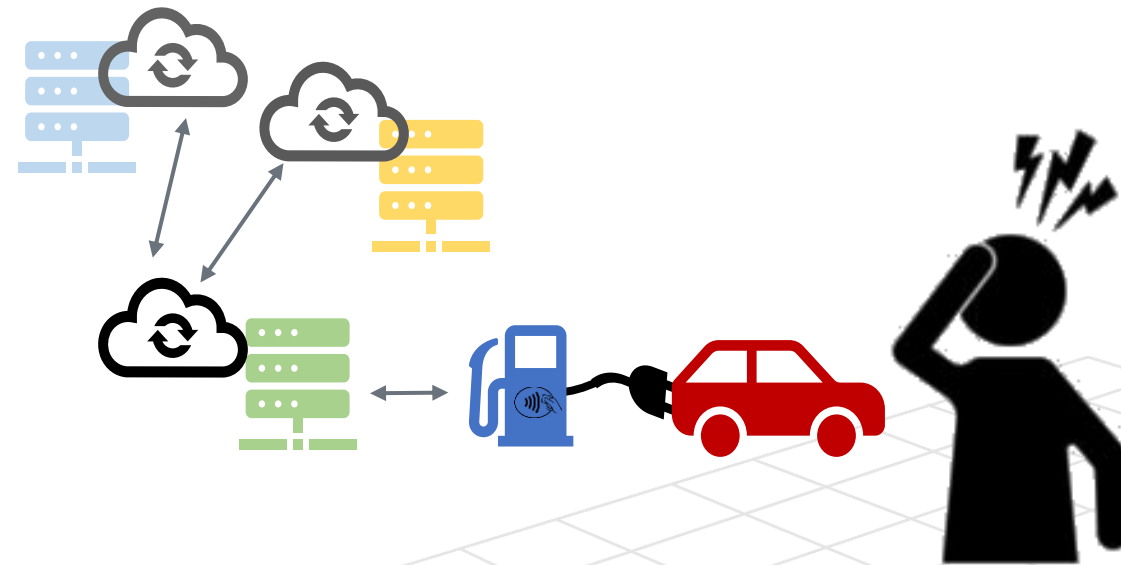
Purpose of the Consortium

Help the EV Industry achieve >97% uptime

Help EV Industry achieve **first-time plug-in success every time they charge**

Focus on complex issues that require multi-stakeholder collaboration to solve and simplify:

- Measuring the charging experience
- payment and user-interface issues
- communication failures
- diagnostics limitations



Committed Participants (as of 5/30)

Charger manufacturers	ABB, BTC Power, Tritium, Siemens, EVBox, NovaCHARGE
Charging Station Operators and Network Providers	EVgo, FLO, Electrify America, Blink, Francis Energy, ChargePoint, EV Connect, Switch, InCharge, ampUp, NYPA
Auto manufacturers	General Motors, Ford, Stellantis, Tesla, Rivian, Lucid, BMW
3rd-Party Station Locator App and Roaming Providers	Coming soon
Field Service Providers and Analytics Firms	ChargerHelp!, Uptime Charger, EVSession, Energetics
Consumer Advocates	JD Power, Cool the Earth, Plug In America
Payment Industry Stakeholders	Coming soon
Standards Organizations	SAE, CharIN
Electric Utility Representative	EPRI
Universities	University of California, Davis; University of Washington
State Agencies	California Energy Commission, California Air Resources Board

Organization

Lab Leadership Team

- Consortium director and two senior advisers from three national labs
- Sets direction, monitors progress, approves participation requests

Executive Advisory Board

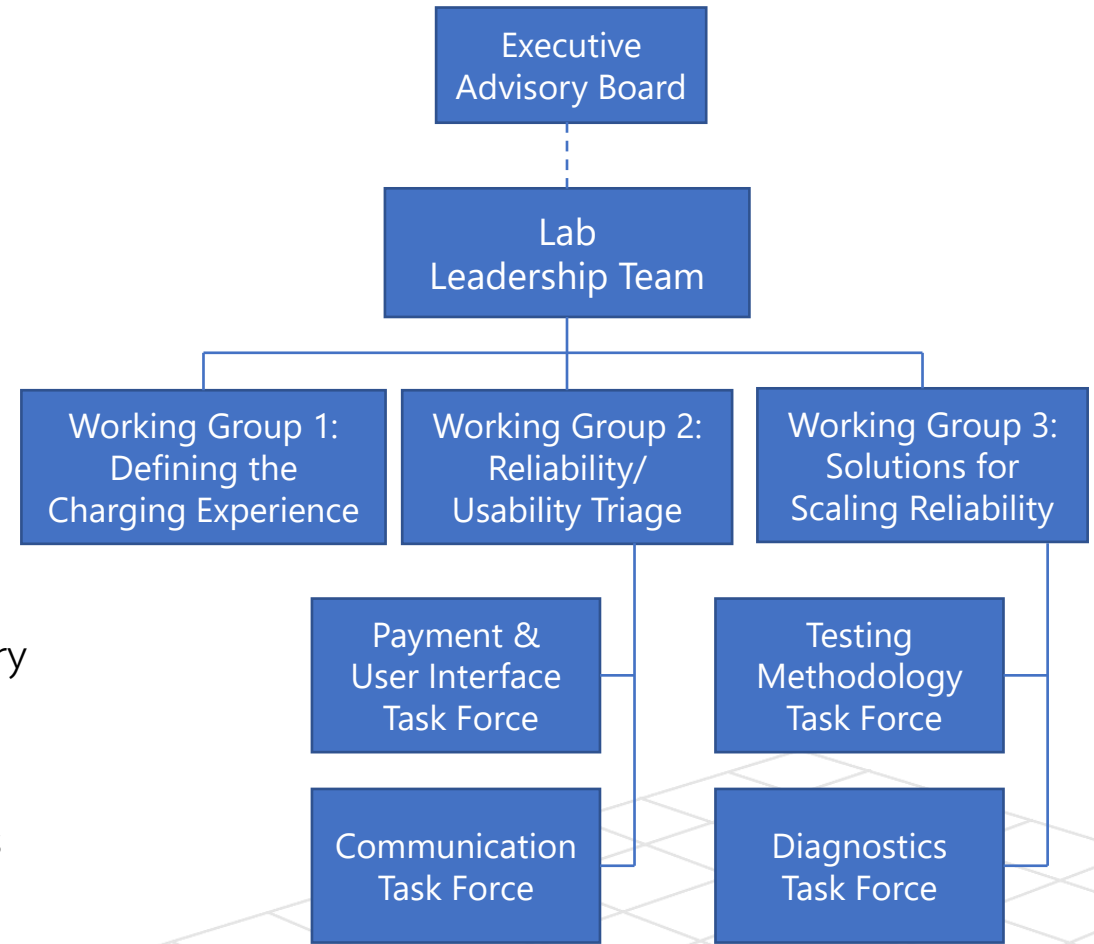
- Senior representatives from industry participants
- Advises Lab Leadership Team on consortium strategy and impact

Working Groups

- Subject matter experts
- Each Working Group led by a national lab co-chair and industry co-chair

Task Forces

- Led by task force leader selected by Working Group co-chairs
- Specialized experts focus on key issues and tools



Leadership from National Laboratories

Consortium Lab Leadership Team



Consortium Director
John Smart
Idaho National
Laboratory



Senior Adviser
Chris Gearhart
National Renewable
Energy Laboratory



Senior Adviser
Thomas Wallner
Argonne National
Laboratory

Working Group National Lab Co-Chairs



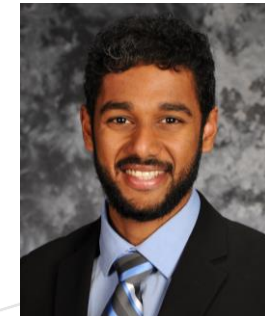
National Lab Co-Chair
Working Group 1
David Smith
Idaho National Lab



National Lab Co-Chair
Working Group 2
Kristi Moriarty
National Renewable
Energy Lab



National Lab Co-Chair
Working Group 3
Dan Dobrzynski
Argonne National Lab



Interim National Lab
Co-Chair
Working Group 3
Benny Varghese
Idaho National Lab

Working Group 1: Defining the Charging Experience

Work Plan Summary

Mission

Working Group Objectives

- Identify and prioritize the customer pain points for EV charging
- Define and publish key performance indicators (KPIs) that gauge the customer charging experience
- Set meaningful targets for each KPI and measure the performance of charging networks in the U.S.

Working Group Outcomes

- Succinct definition of the customer charging experience
- Tools and methodologies for quantifying the customer charging experience
- Insight and recommendations to inform Working Groups 2 and 3

Team Structure

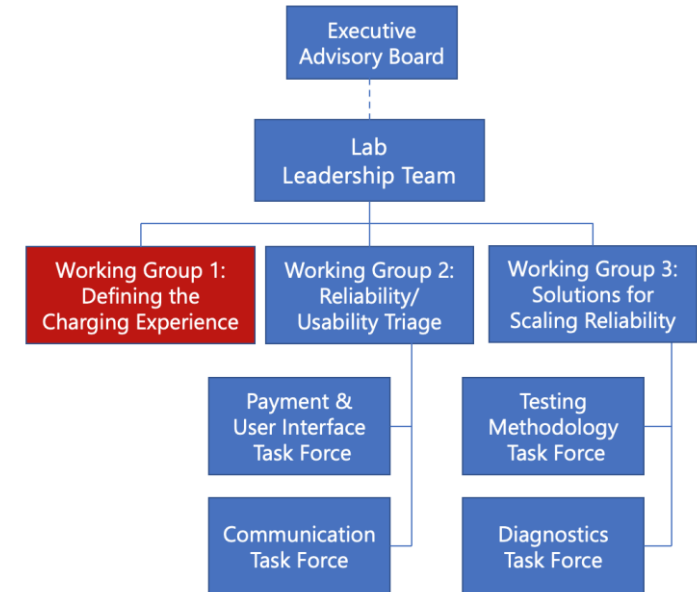
Laboratory Co-chair: *David Smith, INL*
Industry Co-chair: ***This Could Be YOU!***

Participants:

INL: *Kaleb Houck, Casey Quinn, John Smart, Benny Varghese*
NREL: *Kristi Moriarty, Andrew Meintz, Keith Davidson*
ANL: *Dan Dobrzynski, Sam Thurston*

GM:
Ford:
Stellantis:
Tesla: *Francesca Wahl*
BMW:
Lucid:
Electrify America: *Jeff Samalot*
EVgo: *Jeffrey Dunn, Alex Beaton*
ChargePoint: *Mal Skowron*
Blink Charging:
InCharge:
FLO:
EV Connect:
ampUp: *Virginia Bodyfelt*
KIGT: *Paul Francis*

NYP&A: *Philip Saglimbene*
Switch: *Marc Multin*
Francis Energy: *Matt Ellis*
ABB:
Siemens:
BTC Power:
Tritium:
EVBox: *Becky Knox*
NovaCHARGE: *Mark Gross*
ChargerHelp!:
EVSession: *Bill Ferro*
SAE: *Frank Menchaca, Mike Paras*
Cool the Earth: *Carleen Cullen*
J.D.Power: *Elizabeth Krear*
Energetics: *Bryan Roy*



Plug In America: *Ingrid Malmgren*
UC Davis: *Gil Tal, Tisura Gamage, Vaishnavi Karanam*
University of Washington: *Don MacKenzie, Daniel Malarkey*

Objectives and Timing

Task	Accomplishment	Deadline
1.1 Understand customer pain points	Identify, analyze and prioritize customer pain point data from different sources	9/30/2023
1.2 Define customer key performance indicators (KPIs)	Hold stakeholder engagement sessions to understand key customer performance attributes	12/31/2023
1.3 Set and validate targets for each KPI	Perform surveys, customer observations, and focus groups to set and validate targets for each KPI	6/30/2024
1.4 Track industry performance	Collect and analyze data from EV drivers' experiences with public chargers and publish findings	6/30/2025
1.5 Assess reliability market impact	Determine effect of poor reliability and usability on EV adoption	9/30/2023

What We Need to Be Successful

Participant Subject Matter Expertise:

- Understanding the perspectives, preferences, and behavior of customers of public charging infrastructure
- Charging station hosting, operation, and maintenance
- Charging network operation
- Charging equipment design, manufacturing, operation, maintenance, and repair
- EV design, manufacturing, maintenance, and repair
- Standards development relevant to charging infrastructure

Participant Contributions:

- Each participant commits to engaging the necessary individuals within its organization as active participants, as appropriate, to the best of its ability, and aligned with its areas of expertise and interest.
- Participants are expected to contribute the following information to Working Group 1 :
 - Consumer sentiment, consumer behavior
 - Charging performance data to support KPI development, target setting, and validation.

Meeting Cadence

Working Group 1 Meetings:

- Meeting Length: 1-hour (initially)
- Meeting Cadence: Bi-weekly (initially)
- First Meeting: TBD – Targeting mid-June

June

2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
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Please email chargex@inl.gov to request to *participate* in this group by **June 8, 2023** (1 week from today)!

Working Group 2: Reliability/Usability Triage

Work Plan Summary

Working Group Objectives

- Understand the root causes of problems that prevent customers from successfully charging on public chargers, with emphasis on:
 - Payment and user interface
 - Communication between EVs, chargers, and cloud services
 - Hardware component testing
- Identify interim solutions for fast implementation and permanent corrective actions

Working Group Outcomes

- Recommended-practice documents describing root causes and recommending interim and permanent corrective actions
- Verification of corrective actions through testing and demonstration
- Hardware testing results

Team Structure

Laboratory Co-chair: *Kristi Moriarty, NREL*

Industry Co-chair: ***This Could Be YOU!***

Participants:

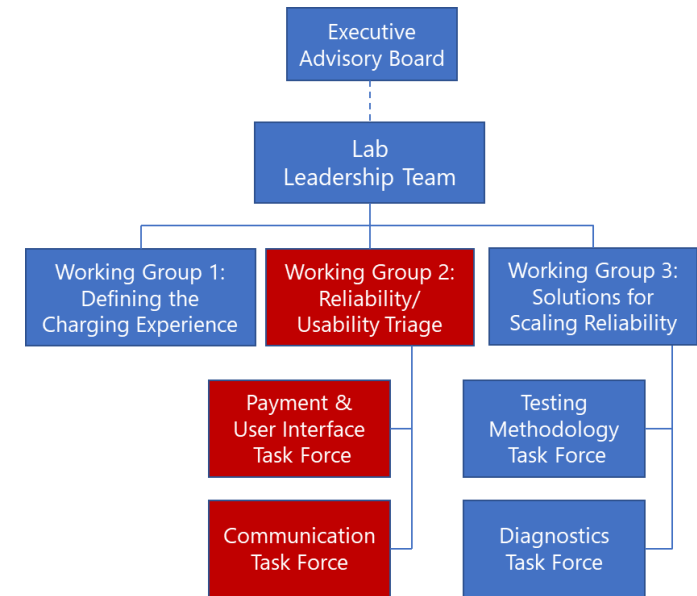
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Rivian:
BMW:
Lucid:
Electrify America: *Max Zettl,
Ken Tennyson*
EVgo: *Jeremy Whaling,
Alex Beaton*
ChargePoint: *Justin Wilson*
Blink Charging:
InCharge: *Cliff Fietzek*
FLO: *Matthieu Loos*

EV Connect: *Riccardo Bilen*
ampUp: *Josie-Dee Seagren*
KIGT: *Brandon Aparicio*
NYPA: *John Markowitz*
Switch: *Marc Multin*
ABB:
Siemens:
BTC Power:
Tritium:
ChargerHelp!: *Walter Thorn*
Uptime Charger: *Bill Policastro,
David Soens, Patrick LLOYD*
EPRI: *Marcus Alexander, John
Halliwell*
Energetics: *Ewan Pritchard*



Objectives and Timing

Task	Accomplishment	Deadline
Root Cause Analysis	Identify and prioritize top 3-5 most prevalent engineering issues that underlie customer pain points. Prepare summary report.	9/30/2023
Recommended Best Practices	Draft recommendations to improve credit card reader payment system reliability.	9/30/2023
	Update credit card draft to include NFC, RFID, app payments, plug and charge	12/30/2023
	Develop recommended practice for user interface.	3/31/2024
	Report describing major root causes of most common vehicle-charger communication issues and recommended corrective actions	9/30/2024
Hardware Component Testing	Documented hardware evaluation approach that identifies hardware to be tested.	3/31/2024
	Interim results on hardware evaluation effort.	9/30/2024

What We Need to Be Successful

Participant Subject Matter Expertise:

- User experience (UX) design, assessment, and improvement
- Charging station operation, and maintenance
- Charging network operation
- Charging equipment design, manufacturing, operation, maintenance, and repair
- EV design, manufacturing, maintenance, and repair
- Standards development relevant to charging infrastructure
- Payment device design, manufacturing, operation, maintenance, and repair
- Payment network operation
- Charging system testing

Participant Contributions:

- Charging system performance data describing the operation of EVSE, EV charging subsystems, charging network communications, and payment networks to identify issues and investigate root causes
- Data and input from engineering activities necessary to support collaborative testing to identify issues, investigate root causes, and verify corrective actions, and/or
- Data and input from engineering activities needed to identify and implement interim and permanent corrective actions

Meeting Cadence

Working Group 2 Meetings:

- Meeting Length: 1-hour (initially)
- Meeting Cadence: Bi-weekly (initially)
- First Meeting: TBD – Targeting mid-June

June

2023

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Working Group 3: Solutions for Scaling Reliability

Work Plan Summary

Mission

Working Group Objectives

- Rapidly improve charger reliability and usability by overcoming diagnostic limitations
 - Enable industry-wide sharing of error code and diagnostic definitions.
- Reduce communication failures between EVs, EVSEs and charging networks by improving scalable interop testing
 - Ensure every EV can successfully charge with every charger as the market grows.

Working Group Outcomes

- Common error code and diagnostic definitions
- Design and prototype cloud-based diagnostic exchange
- Improve interoperability testing methodologies
- Prototype remote testing tool

Team Structure

Laboratory Co-chair: Dan Dobrzynski, ANL
 Interim Laboratory Co-chair: Benny Varghese, INL
 Industry Co-chair: **This could be YOU!**

Participants:

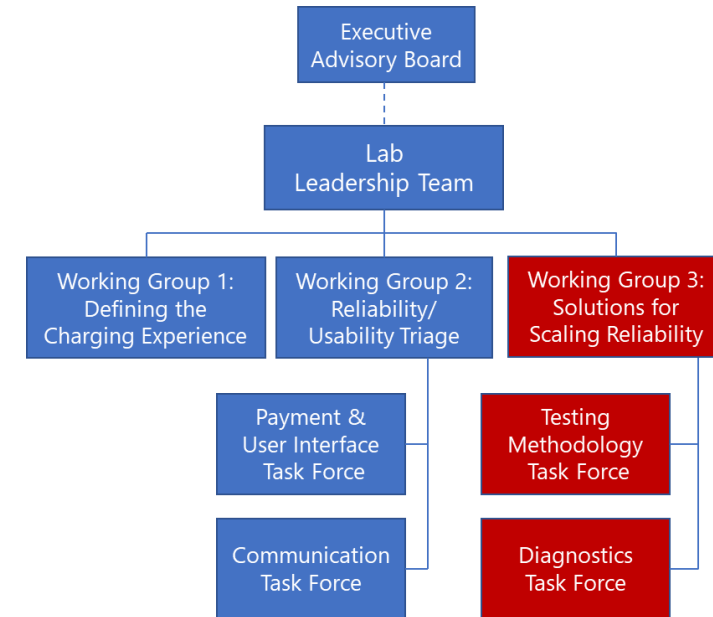
ANL: *Sam Thurston, Bryan Nystrom, Jason Harper, Akram Ali*

INL: *Kaleb Houck, Mayur Savargaonkar, Anudeep Medam*

NREL: *Andrew Meintz, Keith Davidson*

GM:
 Ford:
 Stellantis:
 Tesla:
 BMW:
 Lucid:
 Electrify America: *Max Zettl, Ken Tennyson*
 EVgo: *Jeremy Bibeau, Alex Beaton*
 ChargePoint: *Brian Hendrickson*
 Blink Charging:
 InCharge:
 FLO: *Matthieu Loos*
 EV Connect: *Riccardo Bilen*

ampUp: *Virginia Bodyfelt*
 KIGT: *Adrian Hightower*
 NYPA: *Neal Addison*
 Switch: *Marc Multin*
 ABB:
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 BTC Power:
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 ChargerHelp!: *Walter Thorn*
 Uptime Charger: *Bill Policastro, David Soens, Patrick LLOYD*
 SAE: *Frank Menchaca, Mike Paras*
 EPRI: *John Halliwell*
 CharIN: *Erika Myers*
 Energetics: *Cameron Rainey*



Objectives and Timing

Task	Accomplishment	Deadline
Common error code and diagnostic definitions	Preliminary recommended practice on error code definitions based on industry workshop.	6/30/2023
	Perform a generalized charge system DFMEA and identify/prioritize common and critical failures	8/31/2023
	Develop recommended practice with error and diagnostic code definitions	9/30/2023
	Implementation and demonstration at CharIN Festival	9/30/2023
Cloud-based diagnostic data exchange	Industry review of cloud-based exchange functional requirements and architecture	12/31/2023
	Review of performance results and prototype demonstrations	4/30/2024

Objectives and Timing

Task	Accomplishment	Deadline
Interoperability testing methodologies	Outline current testing practices and deficiencies based on industry workshop.	9/30/2023
	Build out a set of use-cases and testing scenarios that confront the current testing deficiencies.	12/31/2023
	Provide summary report on new testing methodologies and demonstrate at interoperability test event	4/30/2024
Prototype remote testing tool	Industry review of test tool device functional requirements and architecture	9/30/2023
	Review of performance results and demonstrations	9/30/2024

What We Need to Be Successful

Participant Subject Matter Expertise:

- Charging equipment architecture, operation, maintenance, and repair
- Charging network operation
- DFMEA experience
- Charge process errors
- Interoperability assurance and testing
- EV and EVSE charging communication (EVCC/SECC)
- OCPP/OCPI and device model architecture

Participant Contributions:

- Support implementation of error code and diagnostic definitions
- Information on failure modes and critical charge system components
- Support solutions and share implementation insights for scalable interoperability testing
- Review and feedback of remote test tool functions and feature-sets

Meeting Cadence

Working Group 3 Meetings:

- Meeting Length: 1-hour
- Meeting Cadence: Monthly
- First Meeting: TBD – Targeting mid-June

Common Diagnostics Task Force Meetings:

- Meeting Length: 1-hour
- Meeting Cadence: Bi-Weekly
- First Meeting: TBD – 1 week after WG3 meeting

Testing Methodologies Task Force Meetings:

- Meeting Length: 1-hour
- Meeting Cadence: Bi-Weekly
- First Meeting: TBD – 2 weeks after WG3 meeting

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Common Error Code Meeting @ EVS36

WG3 Diagnostics Task Force
in-person meeting to discuss
common error code definitions

When?

Tue June 13, 2023 – 3 to 5 pm PT

Where?

SAFE Credit Union Convention
Center, Sacramento, CA
(Co-located with EVS36)

Must register for EVS36 to attend

1-day passes are available on EVS36 Registration Page on
evs36.com

To register or to modify your registration click on the corresponding button below:



EVS36 Conference Secretariat - JPdL International

1555 Peel, Suite 500 | Montréal (Québec) H3A 3L8 | Canada
Phone: +1 514-287-9898 ext. 336 | Fax: +1 514-287-1248

Special Registration Code

(If you have been given a special identifier please enter it here)

Attendee Category 1-day Conference pass USD 625.00

Continue

EVS36 Conference Secretariat - JPdL International

1555 Peel, Suite 500 | Montréal (Québec) H3A 3L8 | Canada
Phone: +1 514-287-9898 ext. 336 | Fax: +1 514-287-1248

Email: EVS36secretariat@jpd.com

Q&A

Let's Get to Work!

By Thu, June 8, email chargex@inl.gov to:

- Submit names of Working Group and EAB participants
- Nominate Working Group industry co-chairs
- RSVP to attend Common Error Code meeting at EVS36 on June 13

Working Group national lab co-chairs will be in touch to schedule first Working Group meetings