

# Quarterly Progress Update

Sep – Dec 2023



**CHARGE X**  
consortium



1/19/2024

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LED BY



INL/RPT-24-76367



## Vision

Any driver of any EV can charge on any charger the first time, every time

## Mission

Bring together EV charging industry members, national laboratories, consumer advocates, and other stakeholders to measure and significantly improve public charging reliability and usability in North America **by June 2025**

## Scope

Focus on complex issues that require multi-stakeholder collaboration and national lab support to solve and simplify

# Scope of Work

## Working Group 1

### Defining the Charging Experience

- Define KPIs
- Set and validate targets
- Track industry performance

## Working Group 2

### Reliability/Usability Triage

- Create fixes for:
- Payment and user interface
  - Communication
  - Hardware

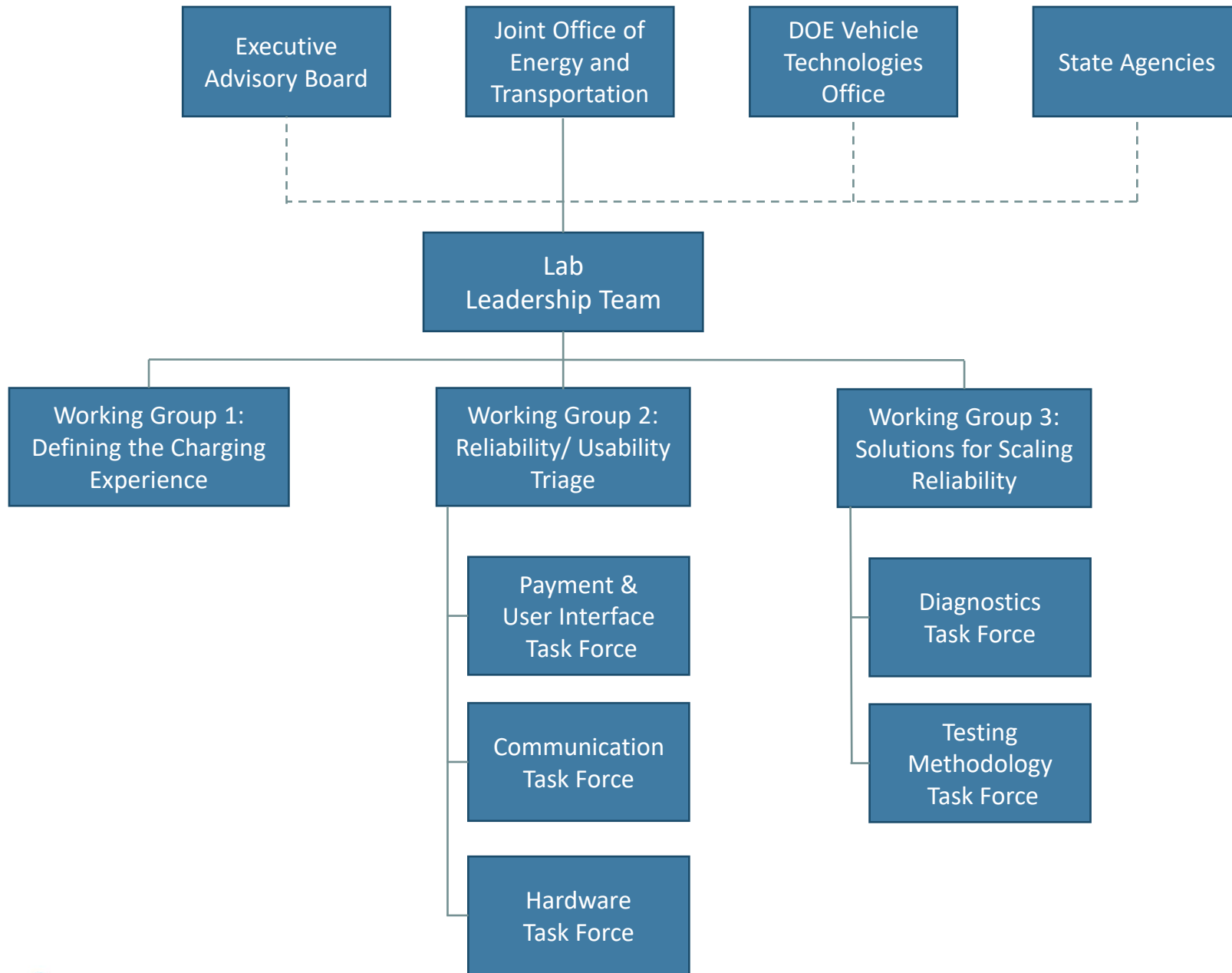
## Working Group 3

### Solutions for Scaling Reliability

- Improve:
- Diagnostics
  - Interoperability testing methods

## Outcomes

- Labs produce recommended practices, prototype tools, voluntary recognition program design
- Industry adopts practices and tools, improves standards



# Operating Model

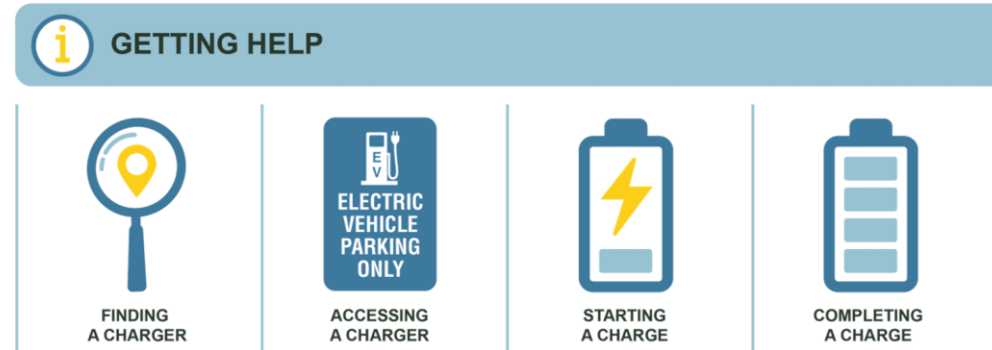
1. Working Group or Task Force defines focused project, identifies champion, and forms small project team
2. Project team performs work, develops draft product
3. Project team seeks input from Task Force, collects additional data, refines and publishes product
4. Task force implements, demonstrates product, and socializes across consortium
5. Consortium pushes for broad industry implementation

# Project Progress Updates

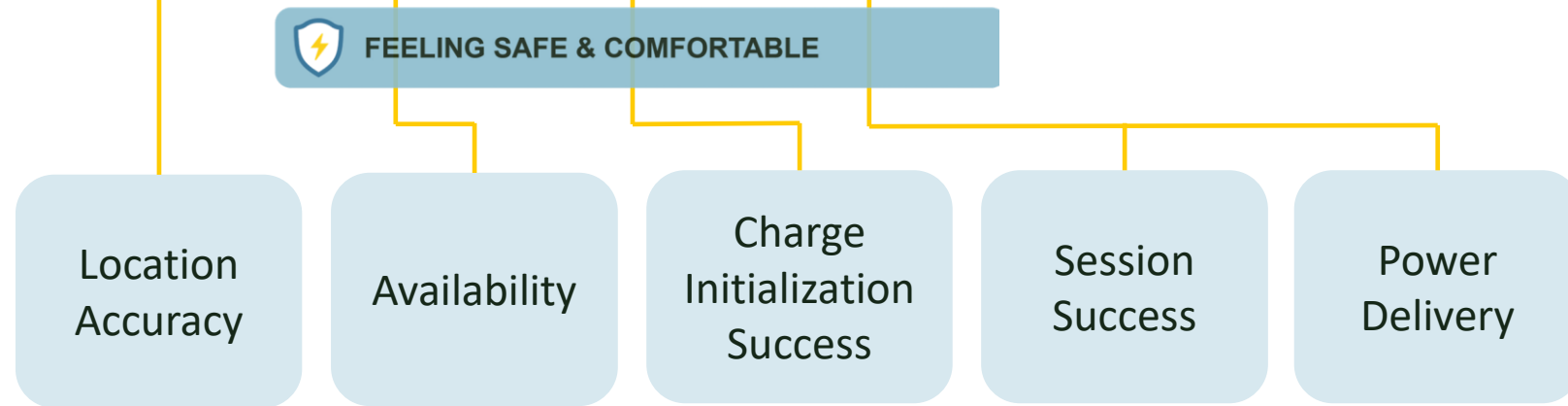
# Defining the Charging Experience

Working Group 1  
Lead lab: INL

Defined key aspects of the charging experience:



Defined KPIs to measure and improve performance:



# Payment System Reliability

Working Group 2,  
Payment & User Interface  
Task Force  
Lead Lab: NREL

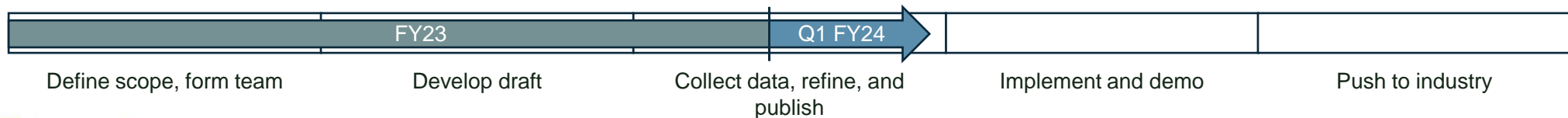
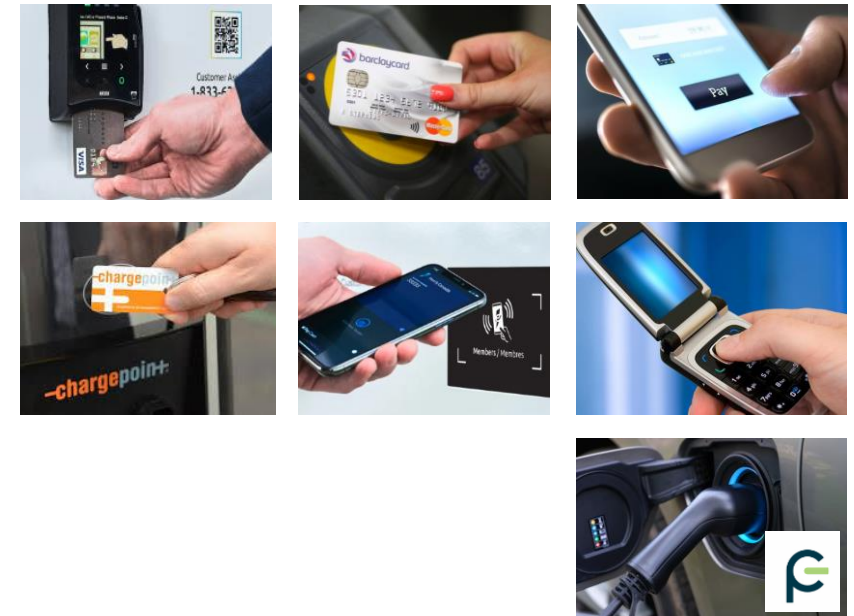
**Goal:** document problems and recommend solutions for wide range of payment system issues seen in the field

## Progress:

- Finished best-practice document
- Addresses payment by credit/debit card, app, RFID card, phone/SMS, PnC

## Next Steps:

- JO review; publish to ChargeX website
- Identify industry champions and secure commitment to implement and demonstrate select solutions





# Adapter Reliability and Safety

Working Group 2,  
Hardware Task Force  
Lead Lab: NREL

**Goal:** ensure industry testing standards and practices catch all major failure modes

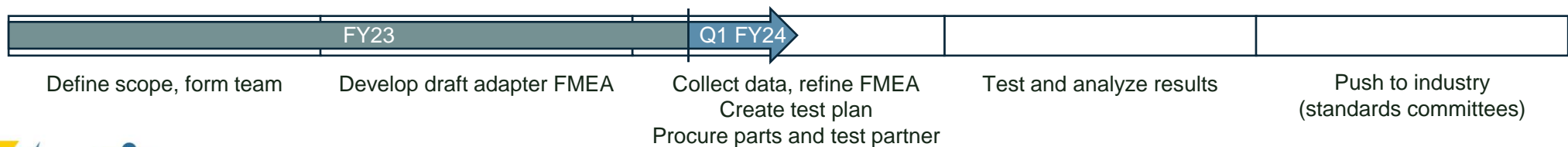
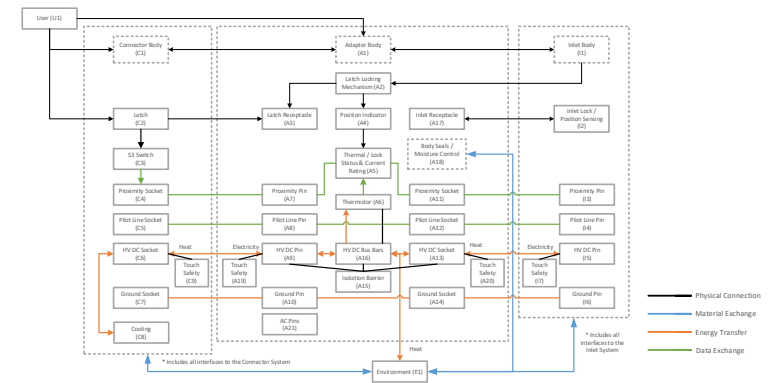
## Progress:

- NREL completed draft FMEA with industry input
  - Holding in-person FMEA final review Feb 27 at NREL
- Hardware procurement well underway
- Design of standard reference inlet has begun



## Scope expansion:

- Pin cap testing per industry request
- Broader EV and charger safety-related failure modes



# Seamless Retry

**Goal:** institute process to automatically retry session initialization after failure to prevent customer unplug/replug

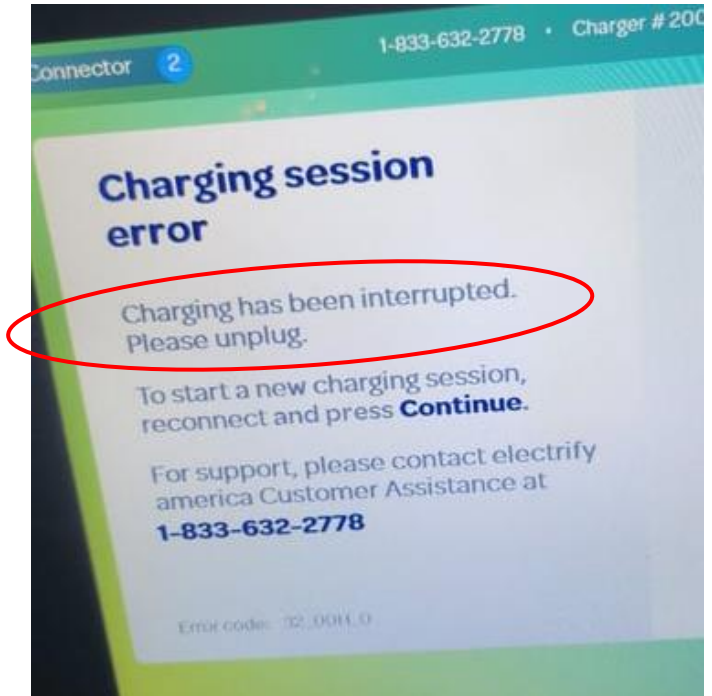
## Progress:

- Labs wrote first draft of recommended practice based on industry input and existing standards
- Draft shared with Project Team for review

## Next Steps:

- Write next draft and push to entire Comms TF for review
- Secure commitment to implement and demonstrate
- Define scope and form team for next topic: Timeouts

Working Group 2,  
Communications Task  
Force  
Lead Lab: NREL



# Minimum Required Error Codes

Working Group 3,  
Diagnostics Task Force  
Lead Lab: INL

**Goal:** institute common set of error codes across industry to accelerate problem resolution

## Progress:

- Charger MRECs published, added to EV-ChART guidance
- Preliminary demo conducted at CharIN Festival on 11/28/23
- Revising MRECs based on findings of demo

## Next Steps:

- Secure commitment for full implementation, demonstration
- Work with Accenture to implement MRECs in EVerest
- Expand scope to address EV- and roaming-specific MRECs



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# Diagnostic Data Sharing

Working Group 3,  
Diagnostics Task Force  
Lead Lab: INL

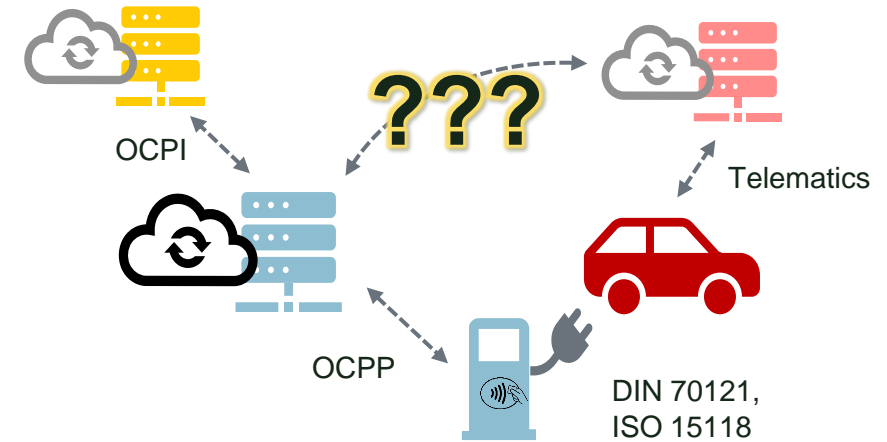
**Goal:** Develop solution to allow industry to efficiently share diagnostic data between charging and vehicle sides of ecosystem

## Progress:

- Agreement that lack of data sharing hampers customer experience
- 3 areas of interest: co-identification, MRECs, additional data to determine where root cause resides

## Next Steps:

- Develop data specification and method for sharing (cloud via API vs. EVSE to EV via pilot wire)
- Design short-term pilot
- Promote implementation and participation in pilot



# Interoperability Test Cases

Working Group 3, Testing  
Task Force  
Lead lab: ANL

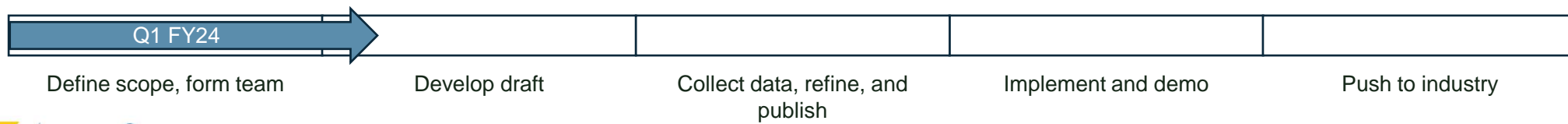
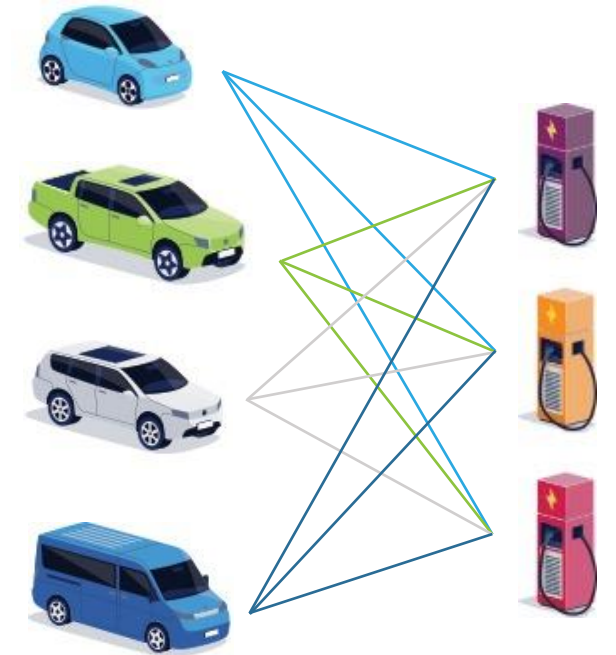
**Goal:** Develop comprehensive set of interoperability test cases to accelerate EV and charger product development

## Progress:

- Completed interviews to understand current practice, writing report

## Next Steps:

- Define scope of EV-EVSE interoperability test cases
  - Applicable standards/protocols (DIN, ISO, PnC, V2G, etc.)
  - Venues (peer-to-peer, industry test event)
  - Testing levels (happy path, edge case)
- Develop, demonstrate at JO-sponsored industry test event



# Remote Test Harness

Working Group 3, Testing  
Task Force  
Lead lab: ANL

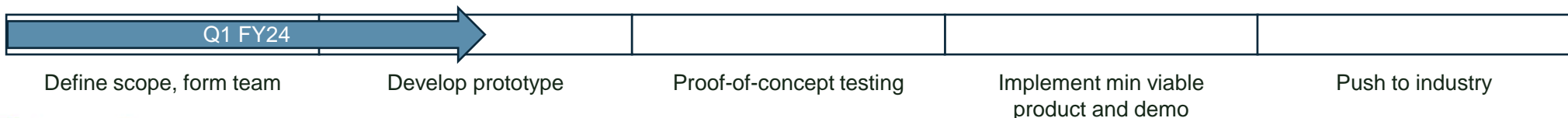
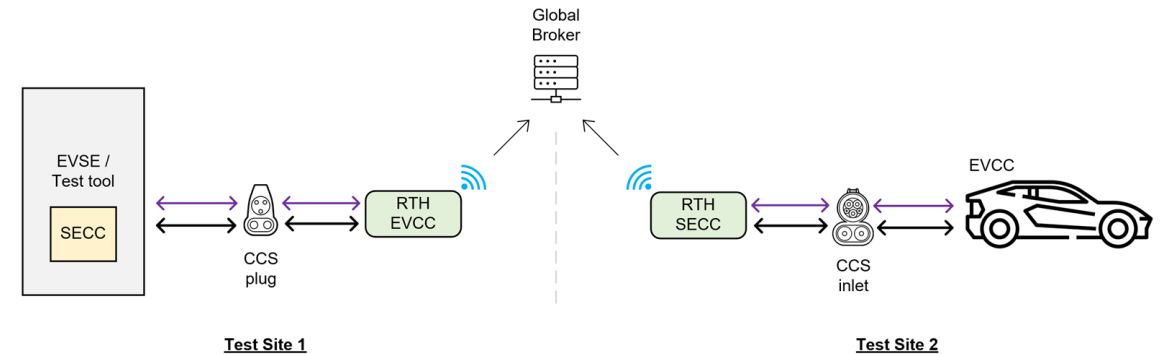
**Goal:** Develop first-of-a-kind testing system to conduct remote interoperability testing with EVs and EVSE at separate locations

## Progress:

- Completed system design specification
- Feasibility testing 90% complete, presented progress to Testing TF

## Next Steps:

- Create test plan
- Design hardware, implement software for DIN 70121, complete testing as proof-of-concept demonstration
- Recruit industry champions for minimum viable product testing



# Other Projects

## User Interface (Working Group 2, Payment & UI Task Force)

- Standardize steps to start a charging session so customer has consistent experience across charging networks

## Impact (Working Group 1)

- Assess the impact of poor charging reliability on EV adoption