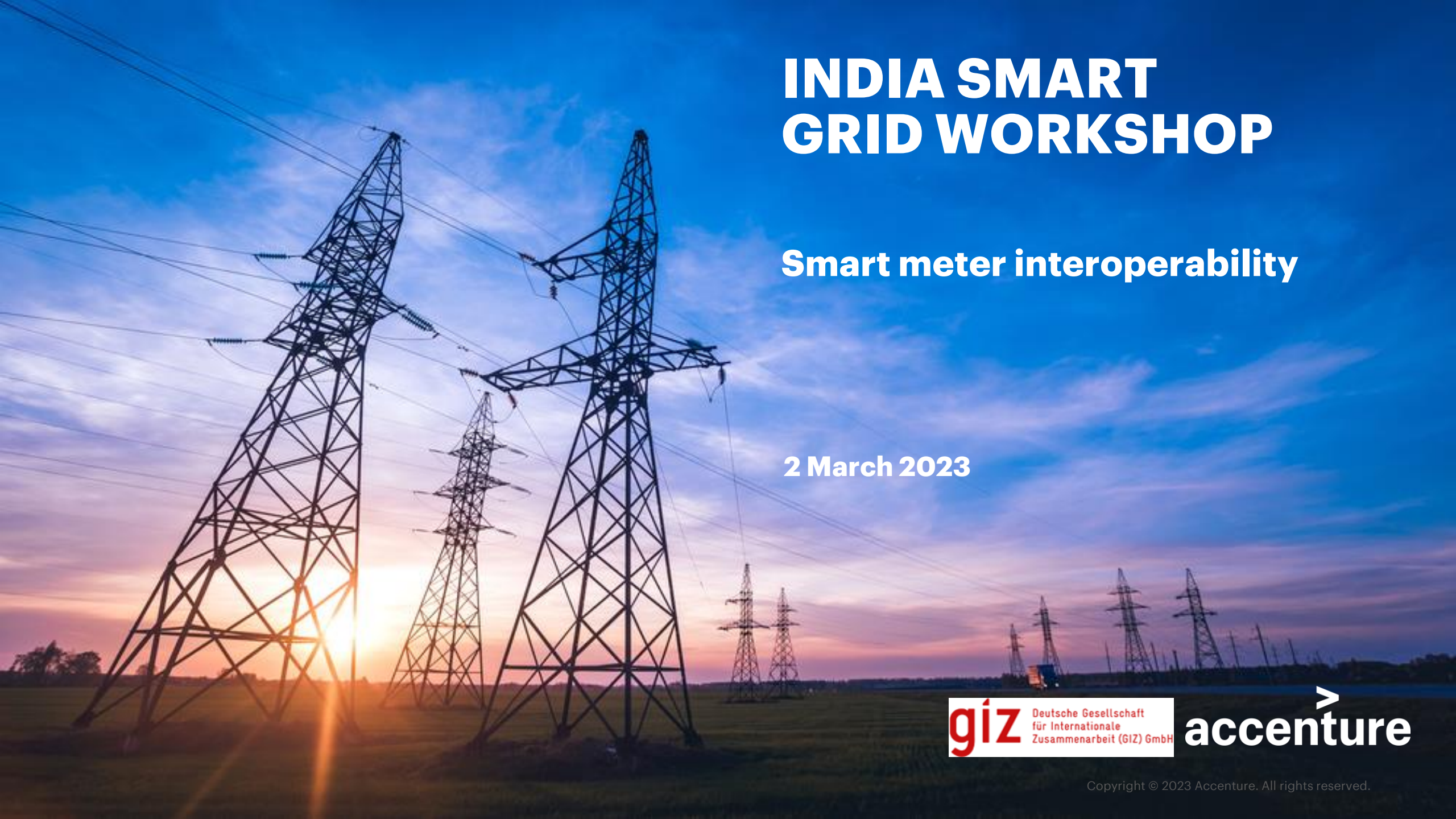


INDIA SMART GRID WORKSHOP

Smart meter interoperability

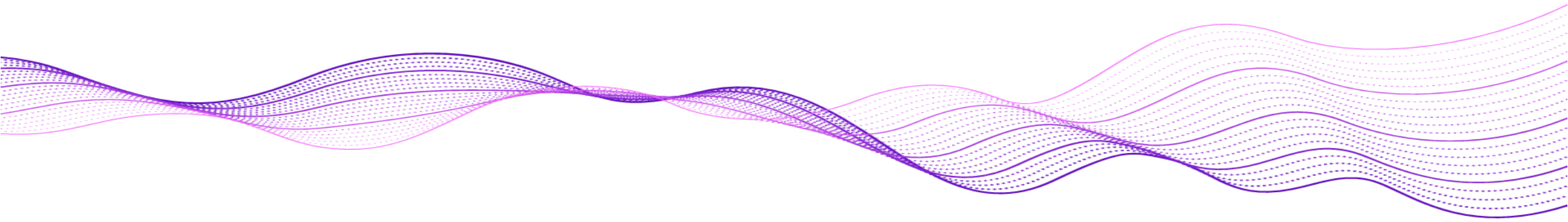
2 March 2023

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

accenture

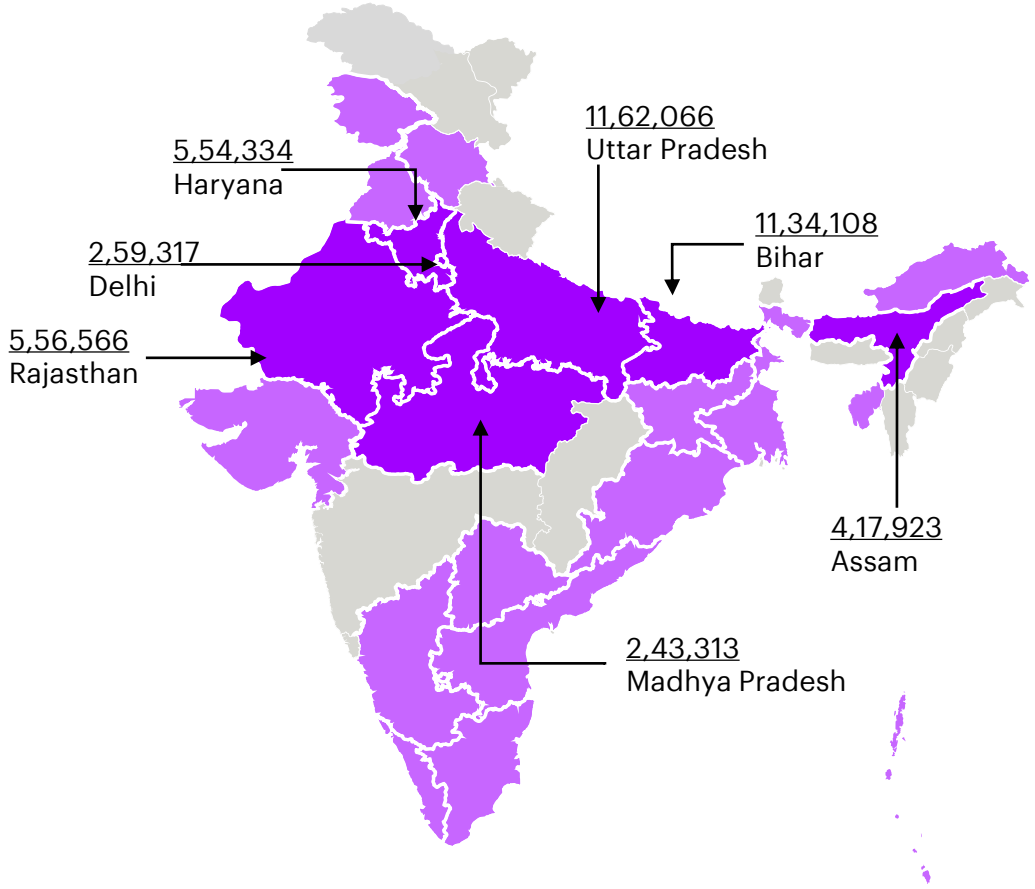
Today’s objective

1	**OVERVIEW**
2	**OBSERVATIONS AND RECOMMENDATIONS TO FACILITATE SMART METER INTEROPERABILITY**



Smart meter interoperability is a significant enabler for India to meet its target of 250-300 Million smart meter roll-out in next 3-4 years...

~5 million smart meters have been installed



(As on 28th October 2022)

Requirements to enable installation of 250 million smart meters

- Large pool of multiple vendors across components must come together for successful implementation
- Common standards between components is imperative for seamless communication, integration and data exchange across assets while avoiding vendor lock-in
- Components must be designed to be compatible with future technologies in order to avoid re-investment into future assets

Need for interoperability across all layers of AMI

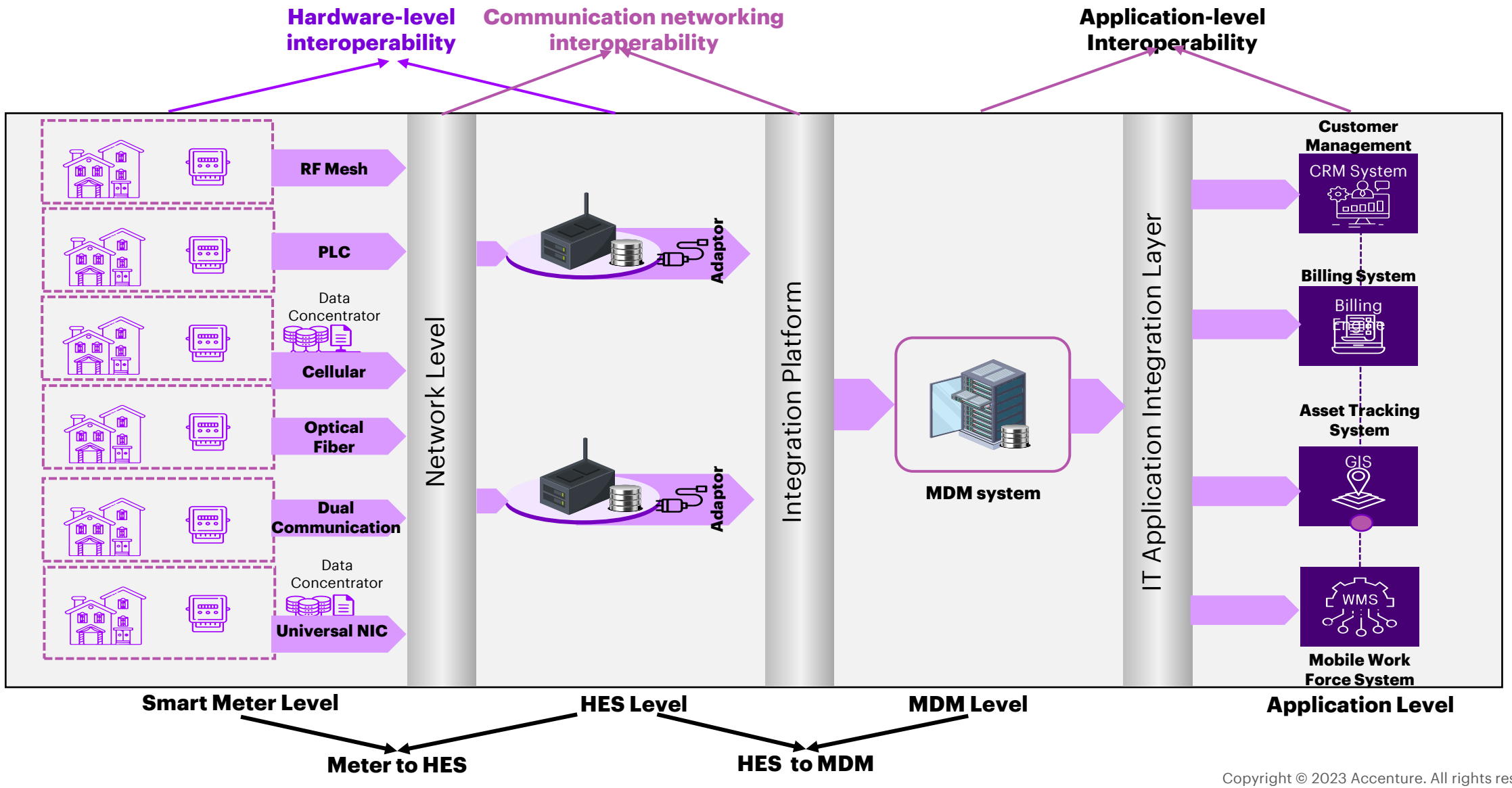
Therefore, we worked with GIZ to answer some key questions for achieving end-to-end AMI interoperability ...

01	**What is the current status of interoperability across different layers in India?**	• How is AMI interoperability defined and what are its different layers? • Is interoperability achievable across different layers in India? • What are the current challenges to achieve interoperability across layers including network layer?
02	**What are the best practices from smart meter implementation across the world?**	• How are smart meter rollout programs being implemented globally? • What are the current practices by international DSOs to make AMI interoperable?
03	**How can smart meter interoperability be facilitated in India?**	• What are the areas of development for Indian standards and specifications versus global best practices? • What are the requirements to upscale the testing facilities in India? • What is the approach to ensure a robust cybersecurity system? • What is the roadmap to facilitate AMI interoperability for Indian DISCOMs?

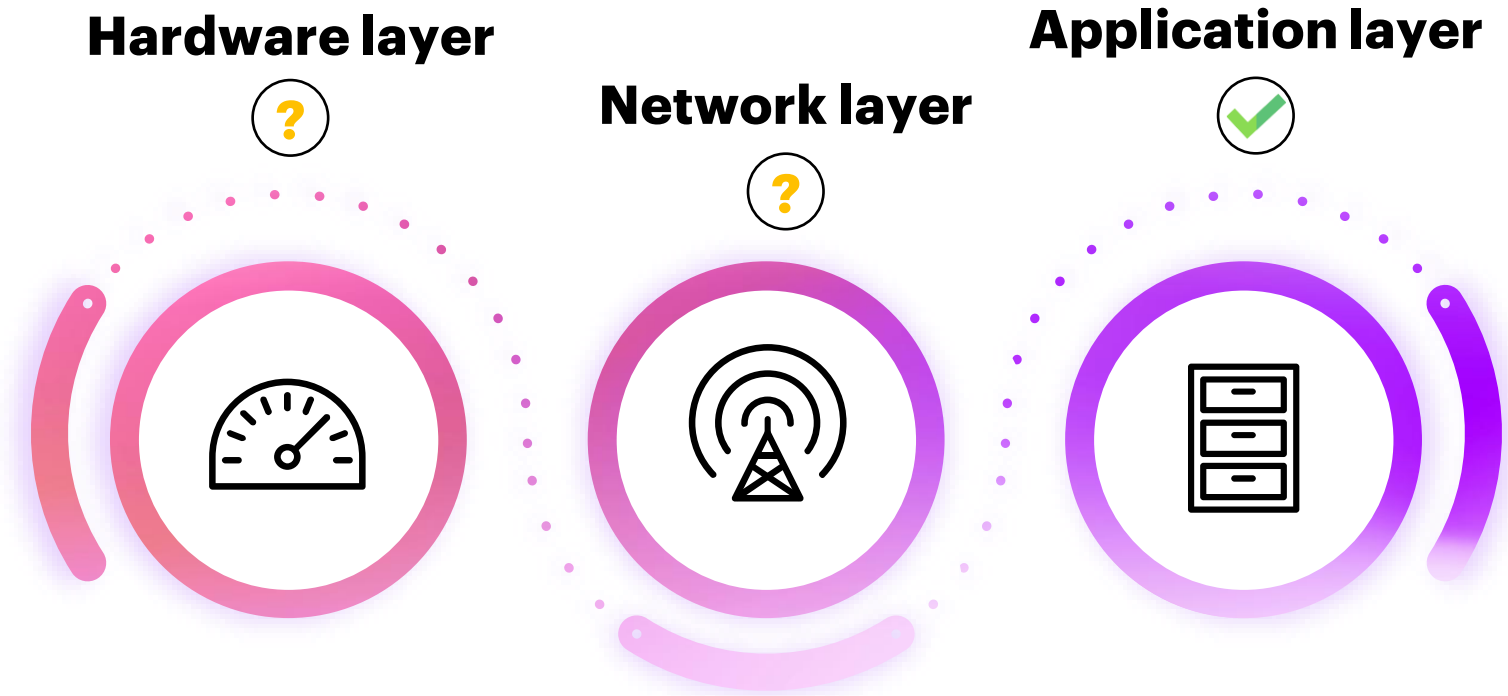
1.

What is the current status of interoperability across different layers in India?

For Advanced Metering Infrastructure (AMI), interoperability can be defined at multiple layers



Presently in India, interoperability is at different stages of maturity across the three layers



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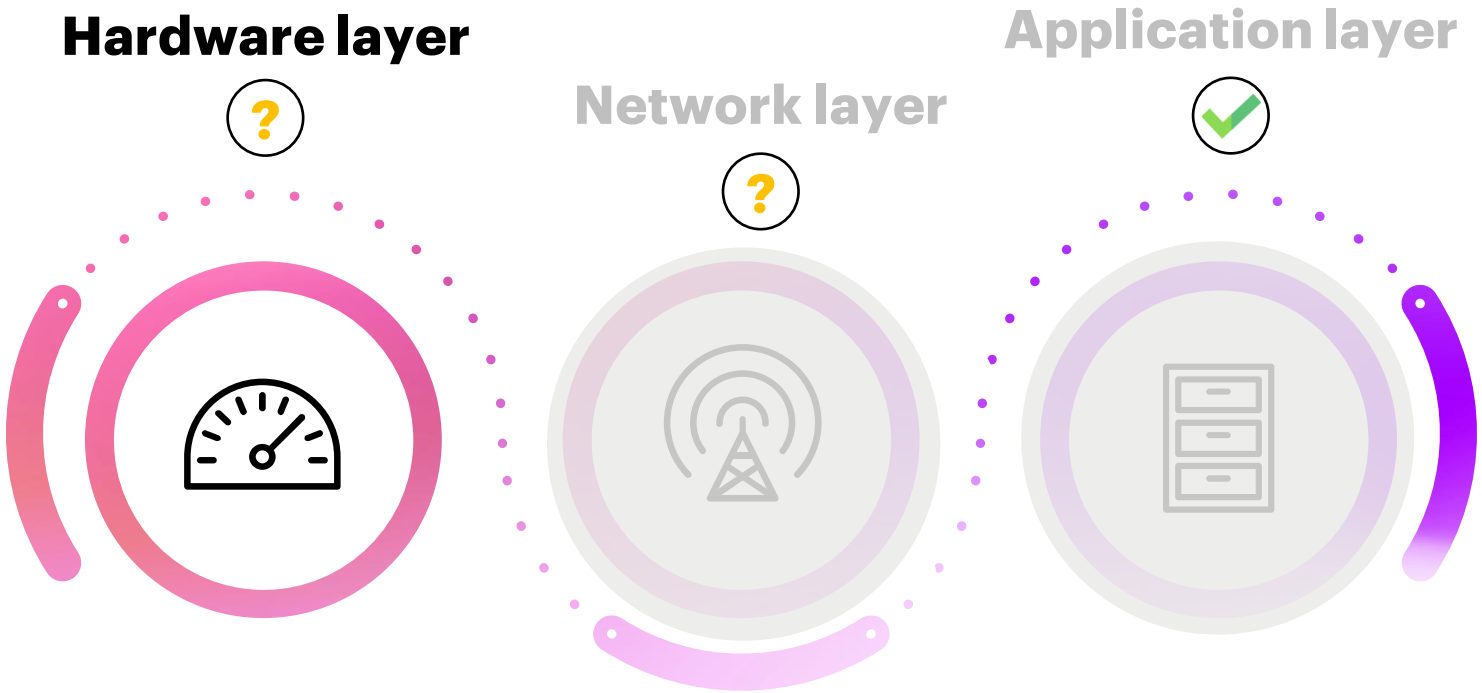


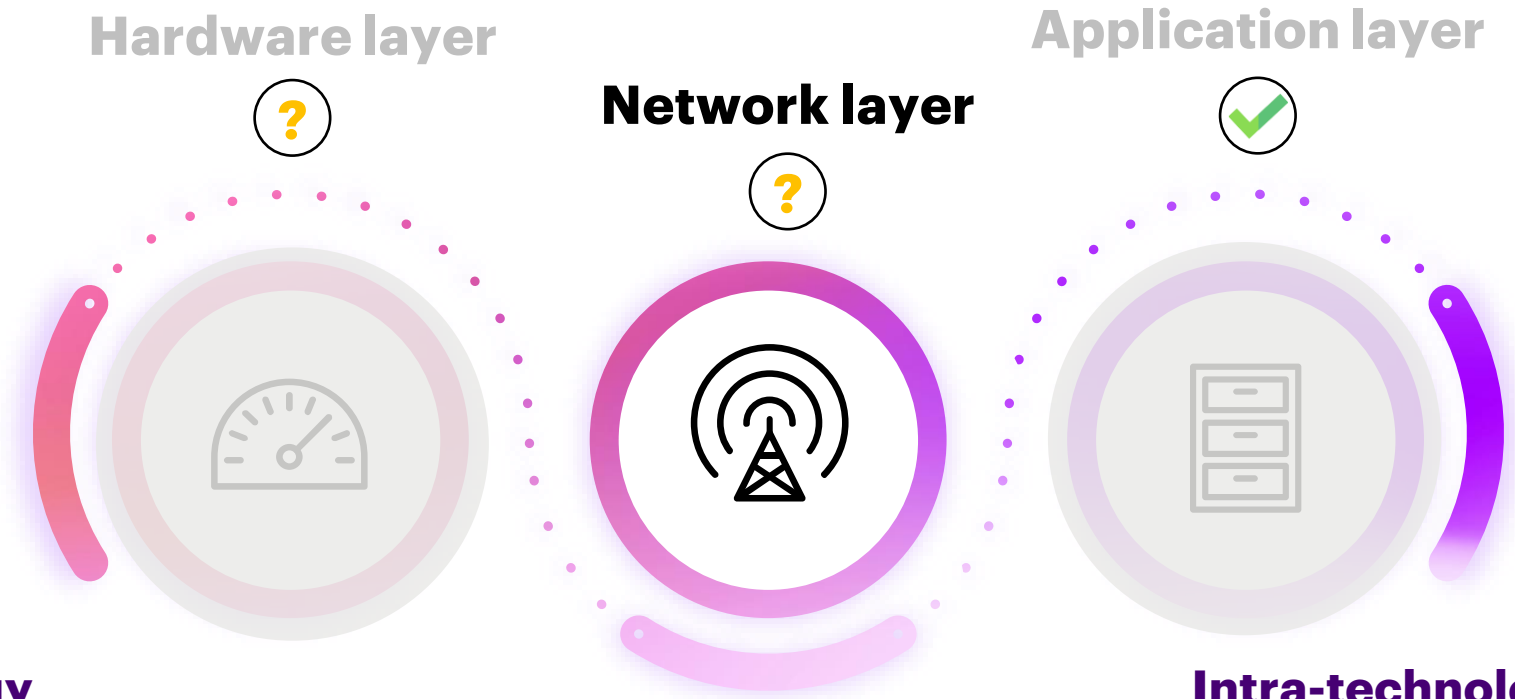
Meter to HES

- HES can communicate only with its own set of meters leading to vendor lock-in
- RF Mesh technology is proprietary

HES to MDM

- MDM can communicate only with its own HES, leading to vendor lock-in
- Enabling interoperability for existing systems requires infrastructure upgradation, which is cost intensive and operationally challenging

Presently in India, interoperability is at different stages of maturity across the three layers



Inter-technology

Meter to HES

- HES can communicate only with its own set of meters for the same communication technology

HES to MDM

- Not all HES and MDM can communicate with each other
- MDM needs to be upgraded to communicate with new HES leading to a cost intensive solution

Intra-technology

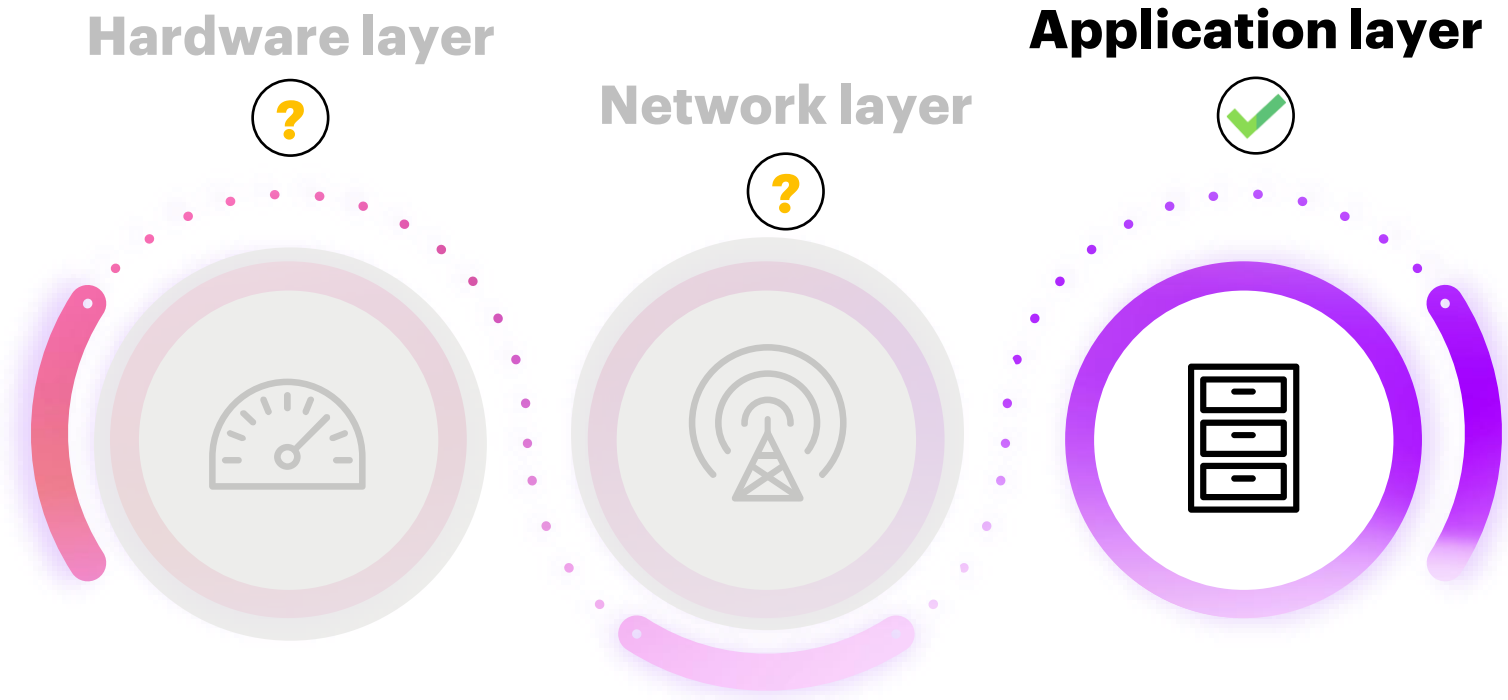
Cellular

- Network connectivity issues in urban & rural areas
- Inability to switch between network service providers
- Inability to switch between 2G/3G/4G

RF mesh

- Communication is specific to frequency levels
- Lack of mandate for the meter manufacturer to use a specific frequency level
- Use of vendor specific algorithm that are proprietary and not shared with other vendors

Presently in India, interoperability is at different stages of maturity across the three layers



1. The Discoms, in the tenders, have been mandating that the MDMS must be able to interface with both the HES and the utility systems by complying with standards like **CIM-XML-IEC 61968 / IEC 61968-100 / Web Services / Multi Speak**

2. CEA guidelines are available for **architecture of integration** (SOA-Service Oriented architecture)

2.

What are the best practices from smart meter implementation across the world?

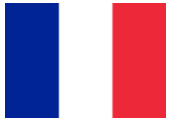
In-depth assessment of four global notable smart meter rollout programmes was instrumental in deriving some key learnings

UK Smart Metering Implementation Program (SMIP)

Replacement of 53 million (30 million electric and 23 million gas) legacy meters with smart meters by 2025

Key learnings

- Build on existing standards and specifications rather than creating from scratch to prevent implementation delays
- Ensure presence of right supporting infrastructure to ensure backward and forward compatibility of devices/ technologies
- Ensure end customer buy-in to improve adoption



EDF-Enedis Linky Smart Meter Program

Installment of 35 million Linky smart meters between 2015-2021

Key learnings

- Ensure strong ecosystem of partners for seamless on-ground implementation
- Set up structured, reliable and quality testing procedures
- Build consumer awareness and gain trust to improve adoption

AMI Implementation for a large North American utility

Installment of over one million residential smart meters in Colorado between 2019-2024

Key learnings

- Benefits from interoperability may be overruled by certain solutions which may be proprietary

Kansas City Power & Light (KCP&L) Smart Grid Demonstration Project

Installment of 14,000 smart meters with integrated AMI and MDM

Key learnings

- Mandate rigorous testing to ensure consistency across vendors and avoid differential interpretation of standards
- Ensure push to vendors by utilities to expedite adoption of new communications technologies

3.

How can smart meter interoperability be facilitated in India?

We have identified four solutions to enable AMI interoperability

1 Universal SIM Card

- ✓ Facilitates intra-network interoperability
- ✓ Enables switching between network providers
- ✓ For operationalization, coordination between telecom providers and central-level policy guidelines will be important

2 Common RF Band

- ✓ Facilitates interoperability between meter and HES
- ✓ Implies a frequency band that is dedicated to the utility sector in India
- ✓ Ensures no vendor lock-in for the RF mesh technology

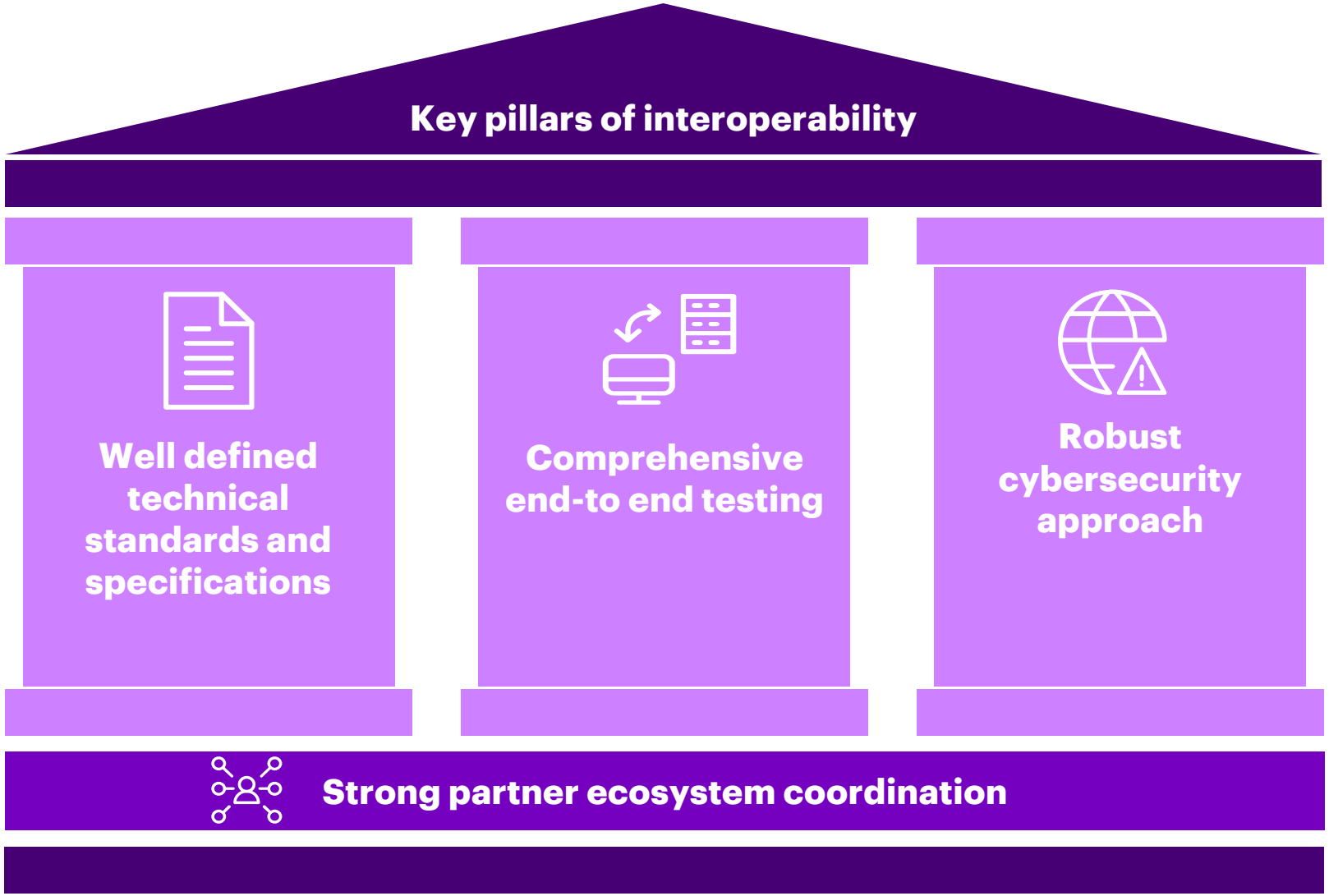
3 Universal HES

- ✓ Facilitates network-level interoperability
- ✓ Supports any networking systems, be it cellular, RF mesh or PLC
- ✓ Ensures network is not lost when primary network is unavailable

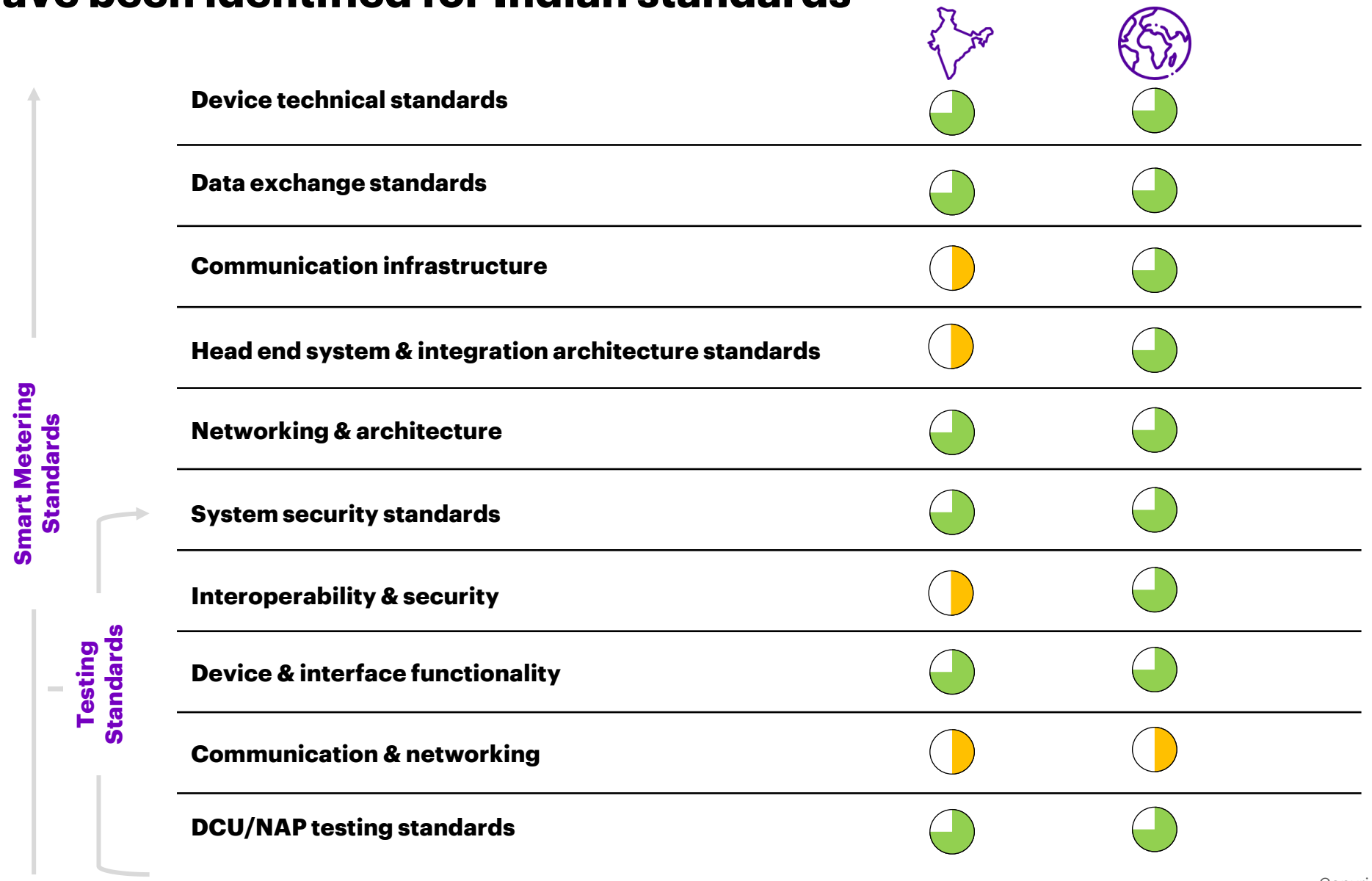
4 Data Enterprise Bus

- ✓ Facilitates interoperability between HES and MDM
- ✓ Vendor-agnostic solution
- ✓ Allows the MDM to communicate with different HES, irrespective of the communication technology

The following four key pillars will be critical to facilitate interoperability



Basis global technical standards and specifications, certain areas of development have been identified for Indian standards



A comprehensive end-to end testing ecosystem is key to facilitate a seamless implementation of the smart meter rollout

1 

Management

Appoint a nodal agency for managing the testing landscape in India and support with funding and infrastructure

- **Short-term:** support existing energy meter testing laboratories with equipment required for **communication and load switch testing capabilities**
- **Long-term:** take initiatives for funding new laboratories (region-wise/state-wise) for allowing testing of larger number of smart meters

2 

Training

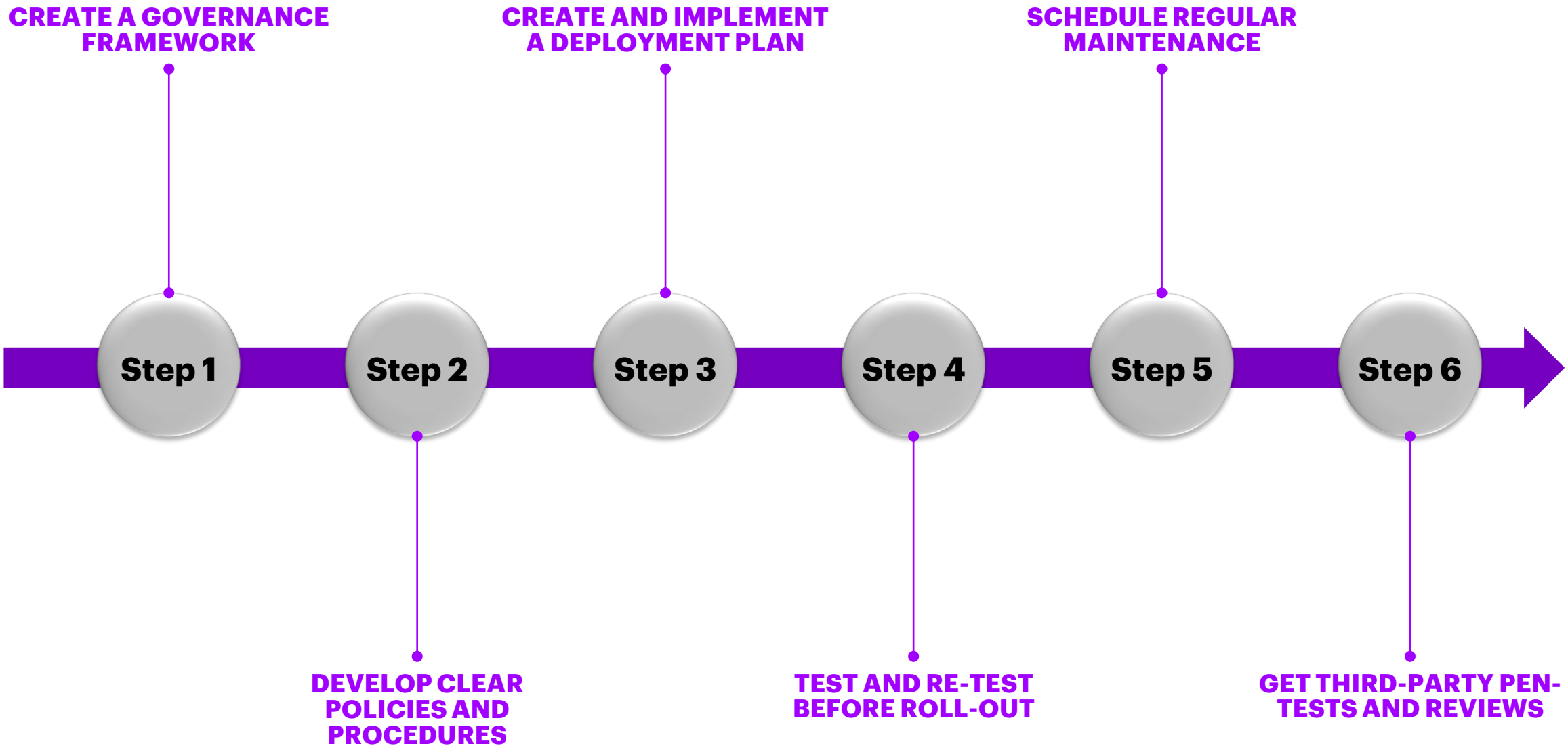
Train new people/ upskill existing people to operate equipment in laboratories

3 

Collaboration

Collaborate with existing laboratories for conducting training & awareness programmes

A robust cybersecurity approach is vital to secure the Discom's network and protect customer's data



A strong ecosystem collaboration is an imperative to achieve interoperability at all levels

The correct balance and coordination between stakeholders is required so that the devices and systems are compatible with each other, in terms of communication capabilities, data reception and management.

1. Coordination amongst telecom operators which **enables meters to switch from one operator's network to another**, in case the network is lost

2. Coordination amongst meter manufacturers which will **enable standardization of meter technical design** to allow compatibility with multiple communication technologies

3. Coordination amongst different stakeholders to practically **implement the concept of universal HES**, which will help enable network interoperability

4. Need to define **techno-functional features of the devices** and convey to the device manufacturers and vendors for standardization

*A universal HES is one which can support and be compatible with different communication technologies, for example: cellular (2G, 3G, 4G, 5G), RF mesh, power line communication (PLC), etc.

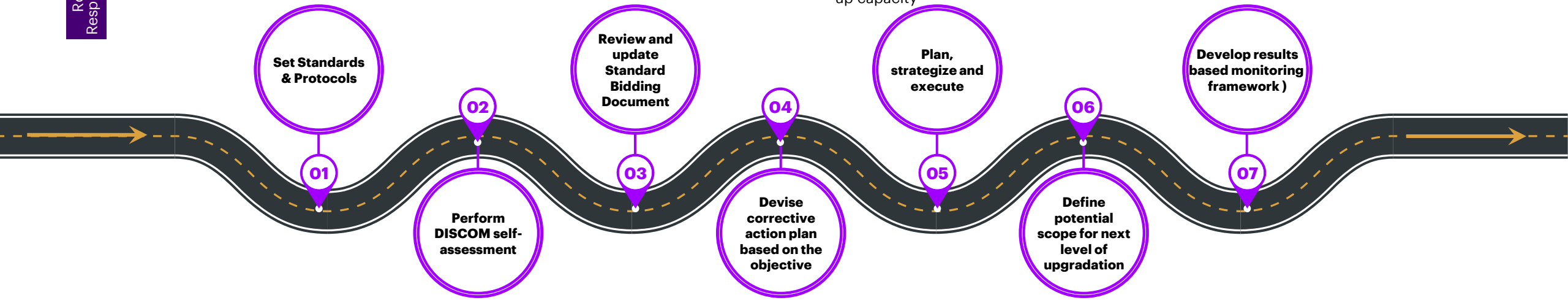
Proposed phased implementation plan to facilitate interoperability at all levels

Outcomes

- Establishing standards and protocols for Discoms to follow
- Updated SBD with common guidelines for DISCOMs
- End to end planning, risk identification and execution strategy followed by implementation activity.
- Evaluation of AMI interoperability at the Discom level, with reporting.

Roles & Responsibility

- **Bureau of Indian Standards** to define standards and protocols for facilitating interoperability
- **REC** to review and update the SBD
- **Discoms** to plan and execute smart meter deployment
- **Testing agencies** of India to ramp up capacity
- **Discom** to prepare and submit the evaluation report
- **State department/Central Ministry(MoP)** sign off the program & approve the same.



Outcomes

- As-is state of the AMI infrastructure with respect to interoperability measures taken by the Discoms along with the challenges faced
- Objective and granular actionable steps for Discoms (based on their individual goals)
- Defining next phase of interoperability based on results and learnings from the previous activities

Roles & Responsibility

- **DISCOM** to perform self-assessment of its current AMI infrastructure and status of interoperability
- **State power department** to define the objective
- **Discoms** to communicate & get the implementation plan approved from the authorized body
- **Meter manufacturers, Network provider, HES & MDM owners**, etc. to adhere to the guidelines.
- **State government and Discoms** to summaraise the program outcomes, learning & future scope

Thank you