



Grid Research, Innovation, and Transformation (GRIT)

Prashant Kansal

ERCOT Director, Grid Transformation

Venkat Tirupati

ERCOT Vice President & Chief Technology Officer

August 26, 2026

Overview

- **Purpose**

Provide an update on ERCOT's Grid Research, Innovation, and Transformation (GRIT) initiatives

- **Requests**

Review and provide feedback on the GRIT process and initiatives

Key Takeaways

- The goal of GRIT is to address emerging grid challenges through cutting-edge research and innovation.
- GRIT initiatives are aligned with ERCOT's strategic objectives.



Grid Transformation: Unprecedented Confluence of Many Change Drivers

Grid Evolution

Grid Enhancing Technologies

Technologies improving grid efficiency and capacity



Solar/Wind/Battery Power

Power generation using renewable energy sources



Distributed Generation

Expansion of local energy generation sources



Load Increase/Data Centers

Growing demand and change in load characteristics



Weather Conditions

Impact of climate on grid stability



Operation Technologies Evolution

Simulation Tools

Planning and operations are enhanced by simulations



Artificial Intelligence

AI solves complex problems in grids



Massive Data Growth

Operations and visibility benefit from data



Computational Capabilities

Cloud and GPUs accelerate data processing



The grid and its supporting operational technologies are evolving rapidly, necessitating deliberate focus and specialized expertise to ensure future readiness.

Grid Research, Innovation, and Transformation (GRIT)



Purpose

Advance research and prototyping of emerging concepts and solutions to deeply understand the implications of rapid grid and technology evolution, positioning ERCOT to lead in the future energy landscape



Vision

To be a world-class innovation team that enables ERCOT to lead the power grid transformation and deliver strategic impact in a rapidly changing energy environment



Mission

Drive cross-functional coordination, foster internal and external partnerships, develop proofs-of-concept, build expertise, and deliver a unified perspective on emerging innovations to proactively lead industry transformation

GRIT Function Serves ERCOT's Strategic Objectives



Be an industry leader for grid reliability and resilience



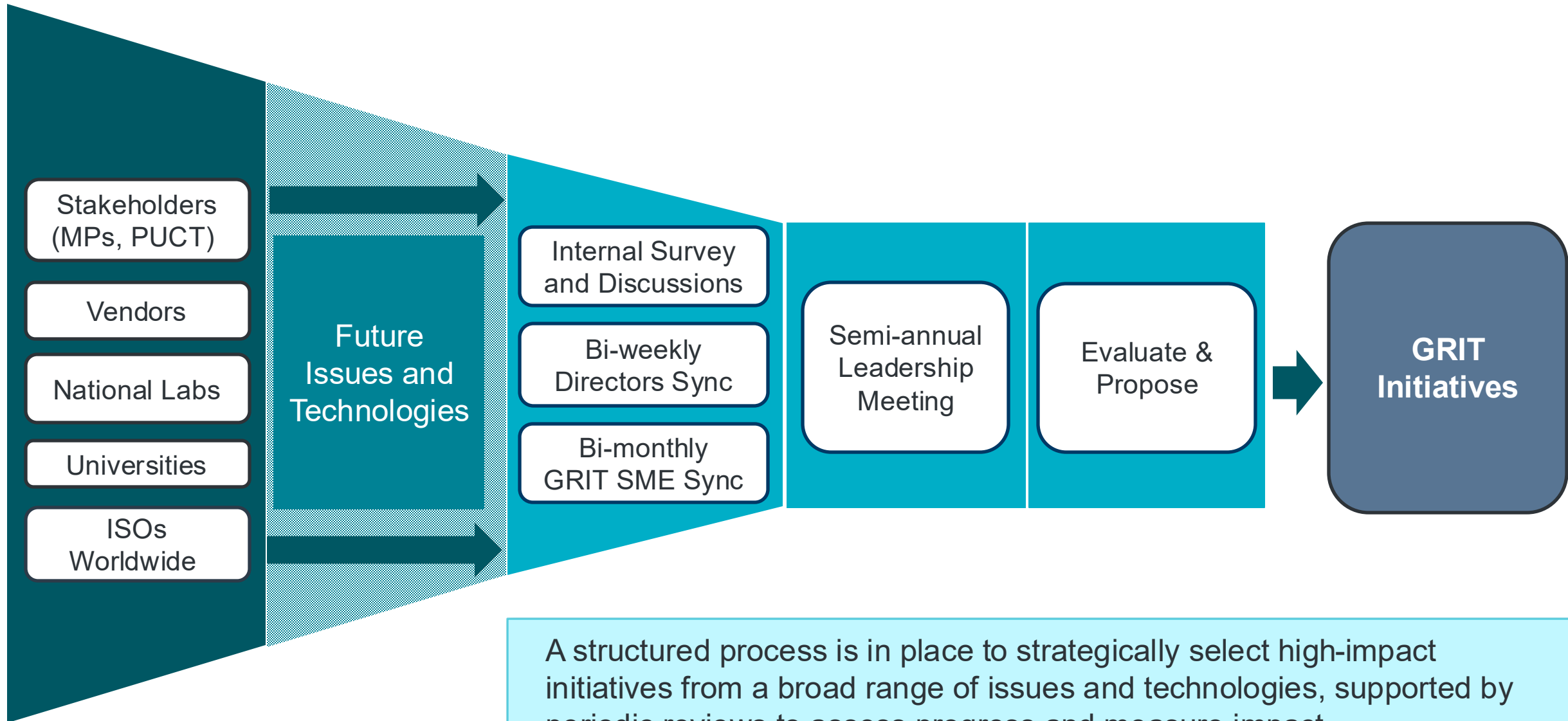
Enhance the ERCOT Region's economic competitiveness with respect to trends in wholesale power prices and retail electricity rates to consumers



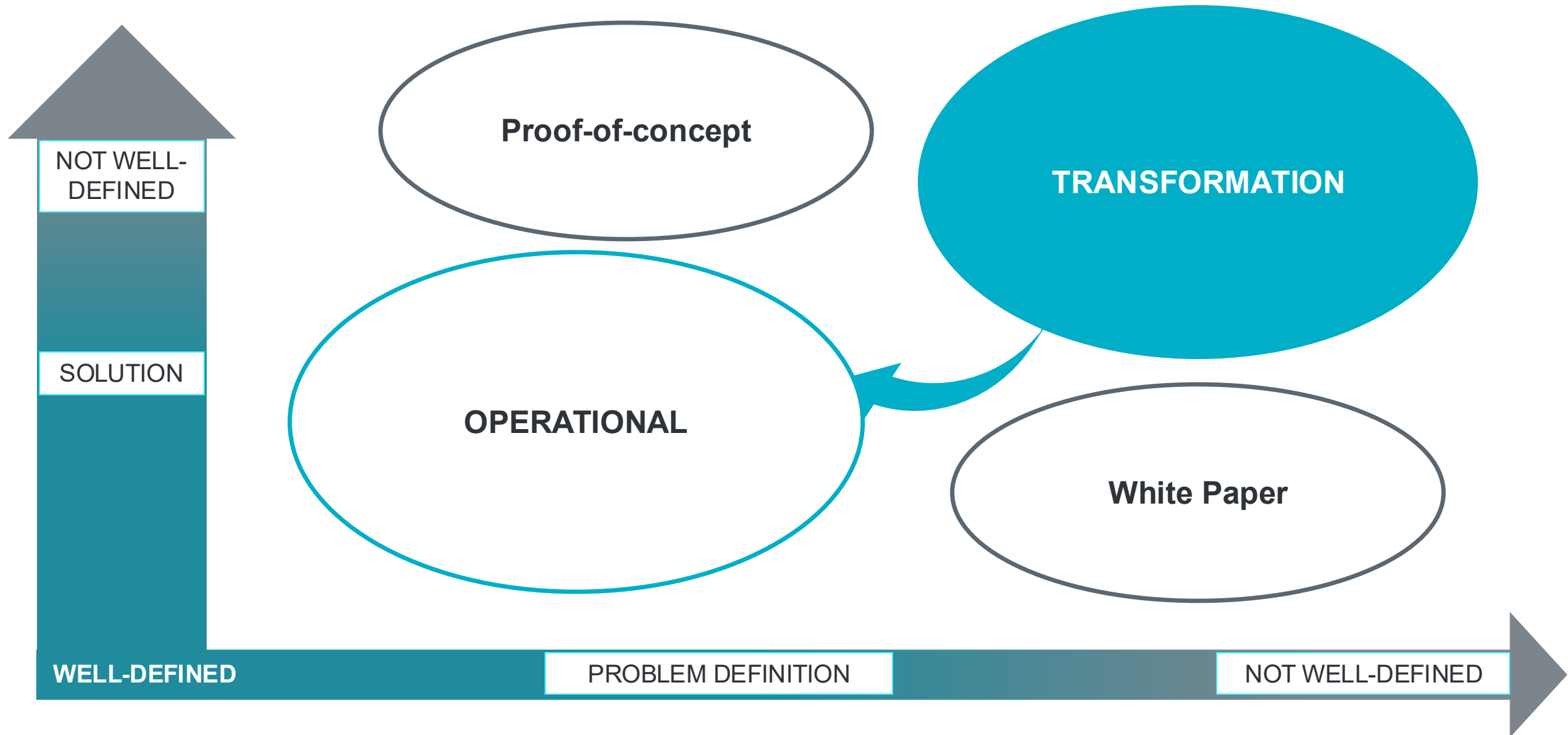
Advance ERCOT Inc. as an independent leading industry expert and an employer of choice by fostering innovation, investing in our people, and emphasizing the importance of our mission

GRIT's purpose, vision, and mission are fully aligned with ERCOT's strategic objectives — driving innovation that enhances grid reliability, improving market efficiency, and ensuring readiness for a rapidly evolving energy landscape.

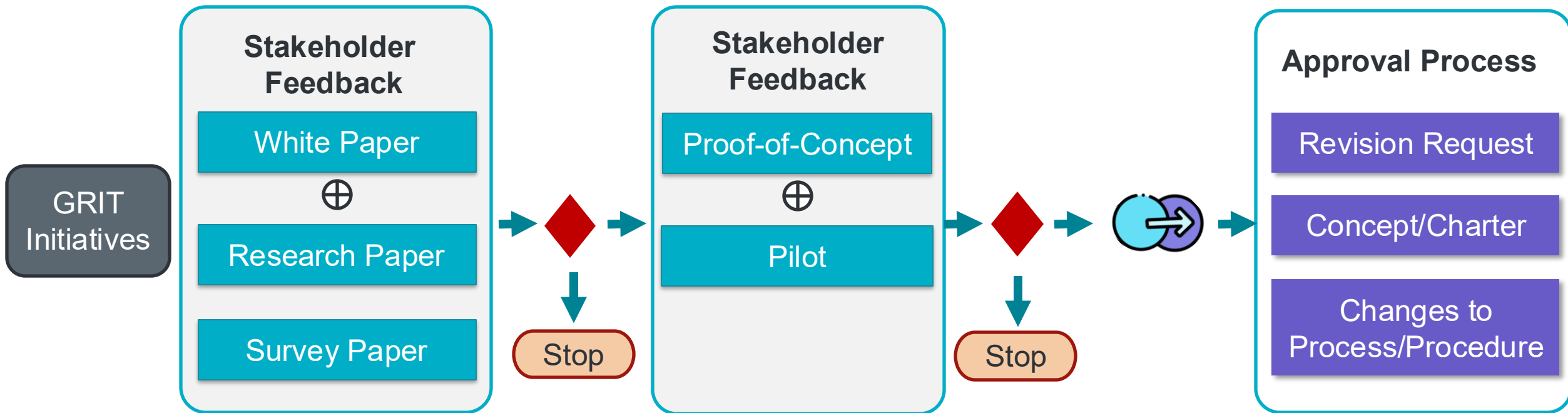
GRIT Initiatives – Stage Gate Process for Identification



GRIT Initiatives – Operational vs. Transformational



GRIT Initiatives – Process Flow



Stakeholder Feedback: Feedback on white papers and POCs solicited using GRIT webpage and TAC meetings

Approval Process: ERCOT stakeholder or internal ERCOT process

Case Study: Electromagnetic Transient (EMT) Simulations

Problem:

- The grid is getting very power electronics dominated leading to situation where EMT models are sometimes required to understand complex system behaviors
- EMT models are complicated, mostly black-box, and requires long time to build cases, run simulations, and conduct analysis
- There are underlying challenges, multiple options, and unclear problems/solutions as we think about use of EMT models and studies long term



Solution:

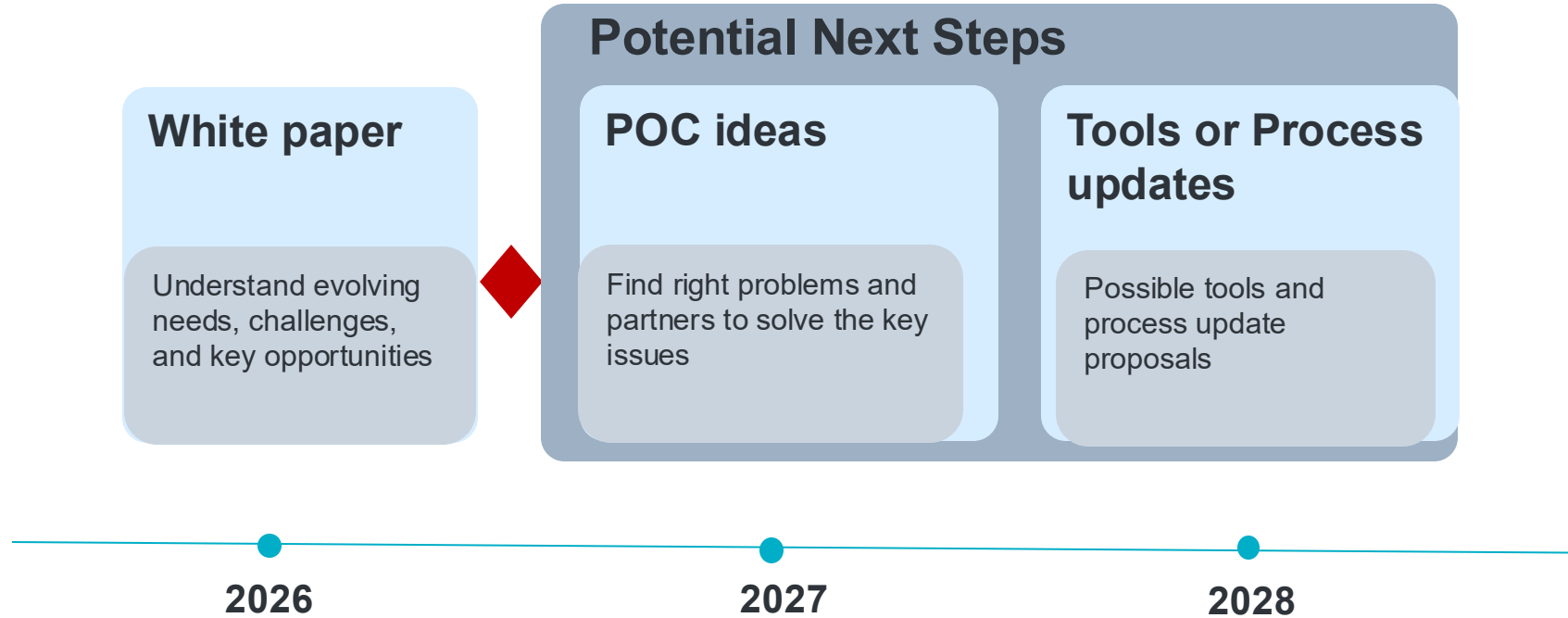
- We are developing a white paper to capture EMT model use cases, key challenges, evolving needs, and possible future pathways

Benefit:

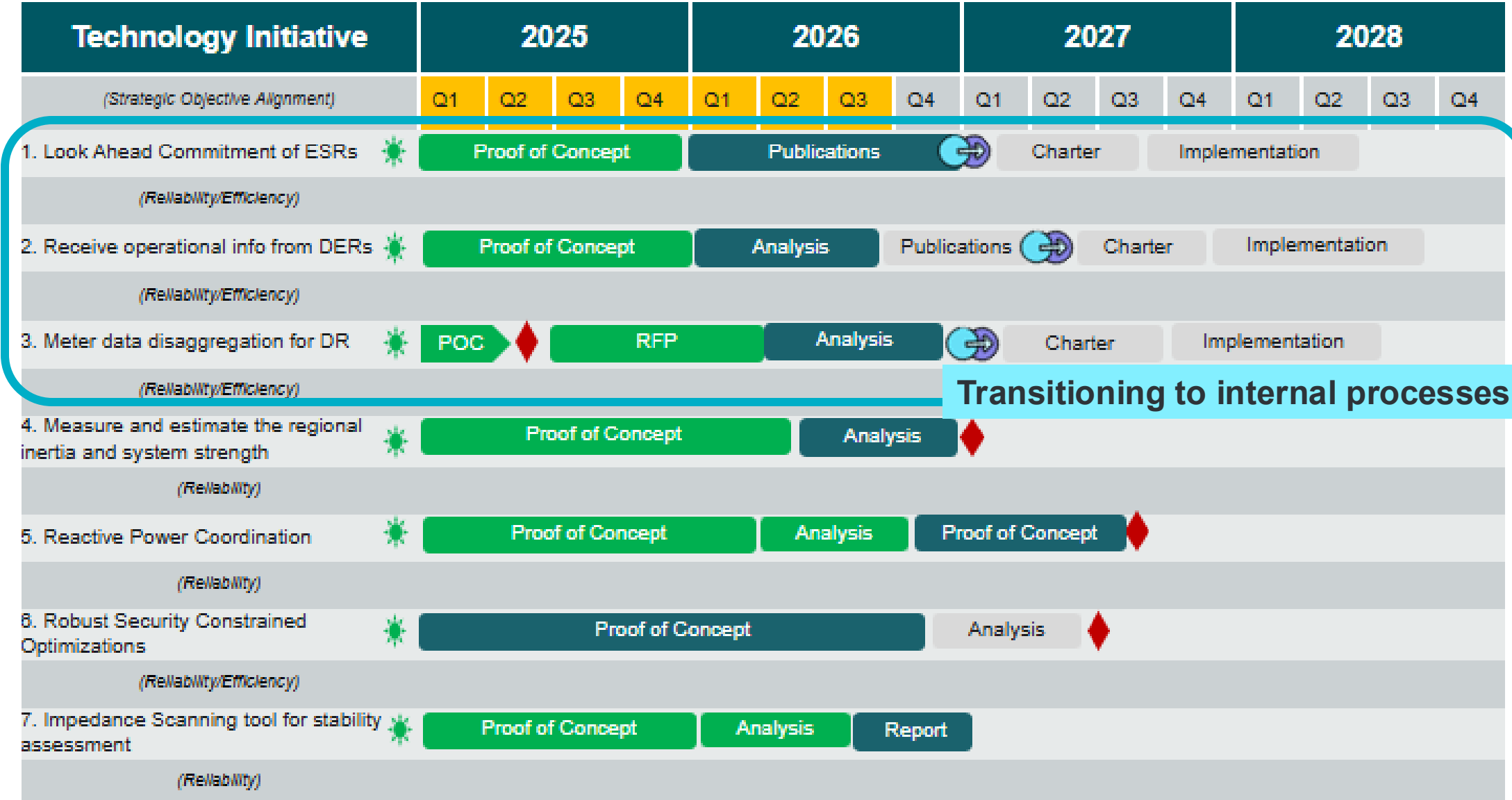
- Sharing ERCOT perspective on EMT modelling and simulations opportunities & challenge to get industry feedback and build towards right solutions



Case Study 1: Electromagnetic Transient (EMT) Simulations



GRIT Roadmap



Transitioning to internal processes



GRIT Roadmap

Technology Initiative	2025				2026				2027				2028			
(Strategic Objective Alignment)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
8. Improvements to large load modeling 	Proof of Concept Models															
(Reliability)																
9. Machine learning models for optimal power flows 	Proof of Concept															
(Reliability)																
10. Assessment of short circuit protection 	Survey				Feedback		White Paper									
(Reliability)																
11. Assessment of power quality 	White Paper				Research Report				Feedback and Phase-II							
(Reliability)																
12. Smart grid edge control of loads 	Research & Feedback															
(Reliability)																
13. Grid forming controls and overload current capability in inverters 	White Paper				Research Report				Feedback and Phase-II							
(Reliability)																
14. Combined economic/reliability analysis tools 	White Paper								RFP & Proof of Concept				 Charter Imp			
(Reliability/Efficiency)																

GRIT Roadmap

Technology Initiative	2026				2027				2028				2029			
(Strategic Objective Alignment)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
15. Dynamic Ancillary Services 	White Paper				 Implementation											
(Reliability/Efficiency)																
16. Large scale EMT need and strategy 	White Paper				 POC				 Charter				Implementation			
(Reliability)																
17. Open-source data and models 	Synthetic network				Data sets											
(Reliability)																
18. Topology Optimization 	Proof of Concept				 Implementation											
(Reliability/Efficiency)																

Research & Innovation Partnership Engagement (RIPE)

The **RIPE program** was launched on September 4, 2025. **50+ requests** have been received so far.

Validation: Many requests are primarily seeking ERCOT's endorsement to validate their technology rather than genuine collaboration.

Emerging technologies: Some proposals involve novel technologies requiring significant evaluation effort or are not aligned with immediate roadmap.

Multi-party coordination: Several proof-of-concept proposals involve TSP dependencies.

ERCOT is developing screening criteria to identify the highest value opportunities and continue to monitor the activity.

Research and Innovation

Research and Innovation Partnership Engagement

ERCOT's Research and Innovation Partnership Engagement (RIPE) program is designed to work with partners to solve for emerging challenges and opportunities to meet ERCOT's goal of providing a reliable grid, efficient electricity markets, open access, and retail choice. The RIPE program is focused on market-ready technologies that have potential for grid-wide deployment. The program is not about testing minor improvements in existing technology, data requests for research or early-stage development, or technologies with no clear merits for grid reliability, operations, or markets.

Ready to partner with ERCOT?

Simply click the 'RIPE Program Form' button below to access our Public Portal and get started!

[RIPE Program Form](#)

Note: First-time users will need to register. You will receive a response within 30 calendar days with initial feedback.

RIPE Program FAQs

+ What is considered a RIPE project?

+ Roles and Responsibilities of ERCOT