

EPRI Digital Transformation Update

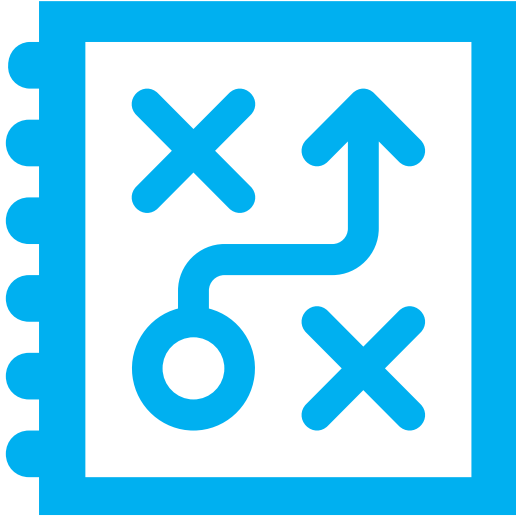
Metrics, KPIs and Risks of Inaction on Foundations



Colton Smith
Sr. Technical Leader

July 14, 2025

Topics



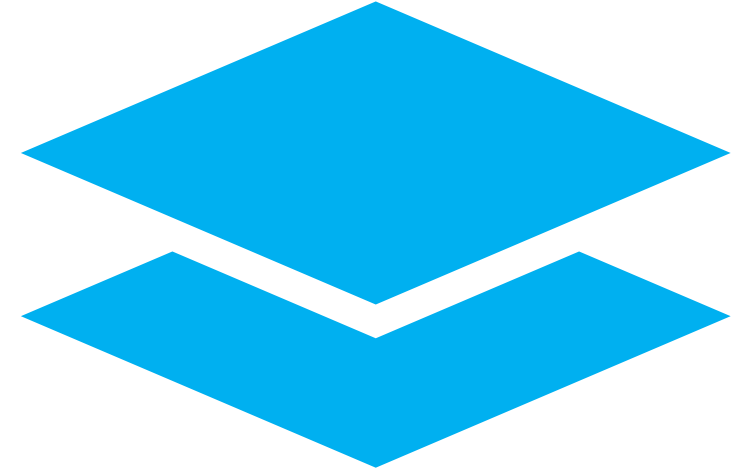
DXRI Overview

- 2024 Recap
- 2025 Preview
- Broader DX Efforts



Determining the Benefits of DX Projects

- Financial Metrics
- Non-Financial Metrics and Measures of Success



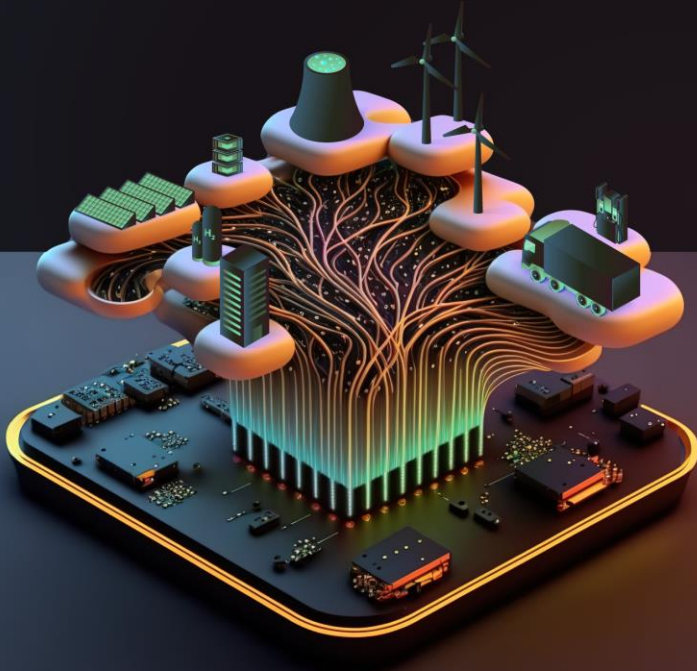
Risk of Inaction on Digital/AI Foundations/Fundamentals

- DX Fundamental areas
- DX Success Factors
- Data Foundation

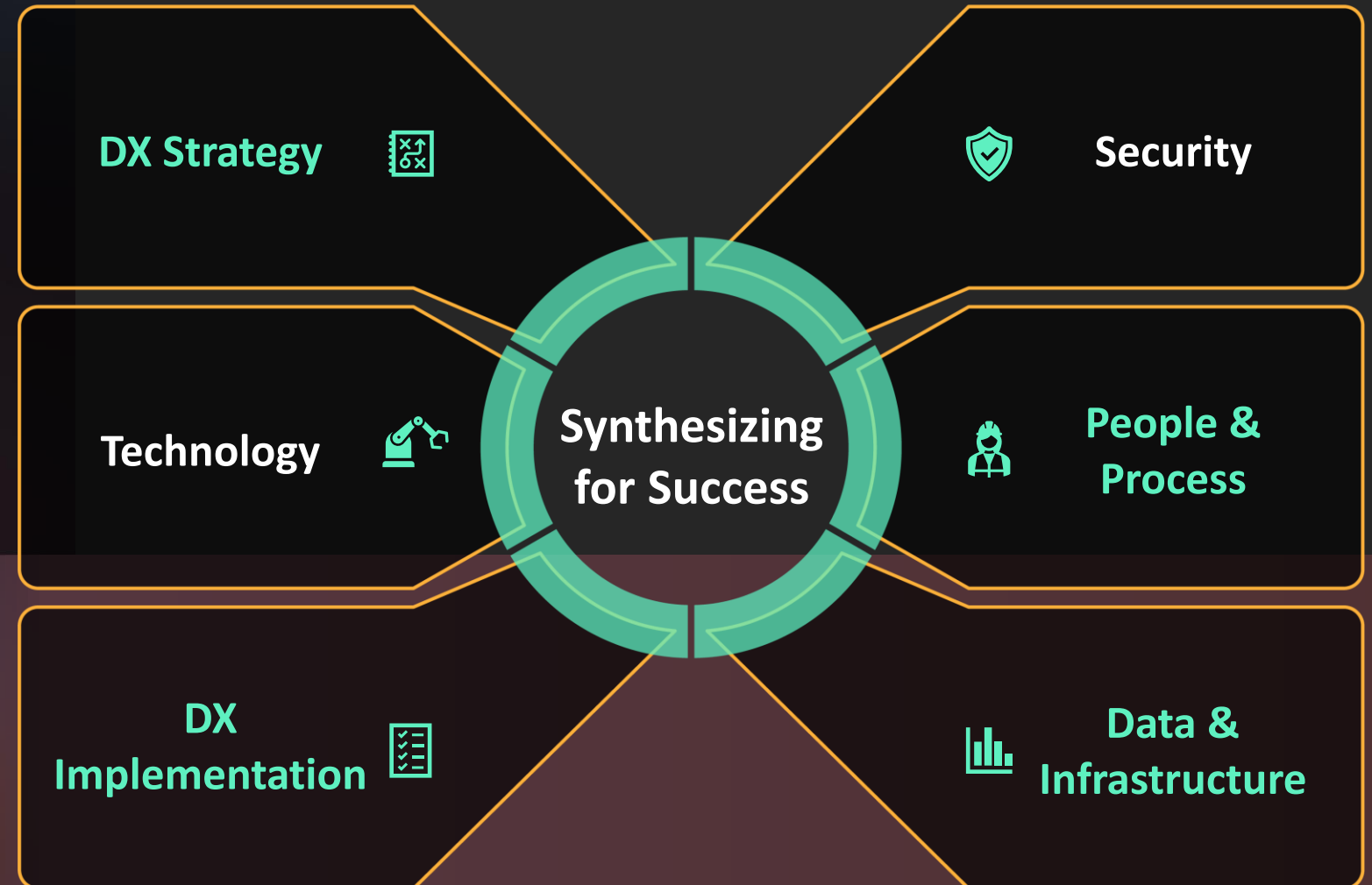
EPRI

DXRI

Digital Transformation
Research Initiative



DX Strategic Focus Areas



Digital Transformation Research Initiative (DXRI)

Objectives & Scope

- Drive successful implementation of DX across the power industry
- Focus on enabling and foundational technologies to integrate enterprise DX strategy, people, processes, data & infrastructure, and DX implementation
- Provide a forum for peer-to-peer exchange

Research Strategic Focus Areas

- DX Strategy & Implementation
- People & Process
- Data & Infrastructure

Value

- Enhanced strategic planning
- Comprehensive view of digital strategies
- Understanding the impacts of digital solutions
- Best practices for implementation



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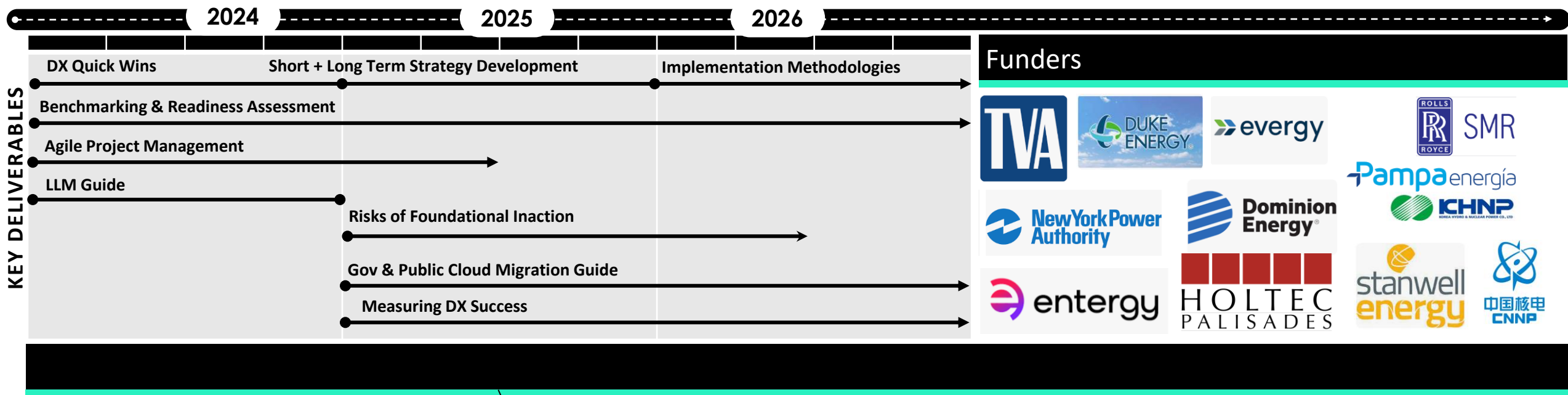
Enabling the Energy Transformation – Collaborative Supplemental GEN + NUC



Research VISION

Digital Transformation Research Initiative

The Digital Transformation Research Initiative (DXRI) supports the industry in the development of strategy and implementation for intentional digital transformation. The DXRI is unique because of its overarching perspective and our focus on the “how” of implementing DX. There is no one size fits all for DX strategy but through the work in this supplemental program we are striving to develop actionable guidance for the short term and long-term benefits.



Access Monthly Webcast Materials
[DXRI Microsite](#)

Visit [DXRI](#) to learn more

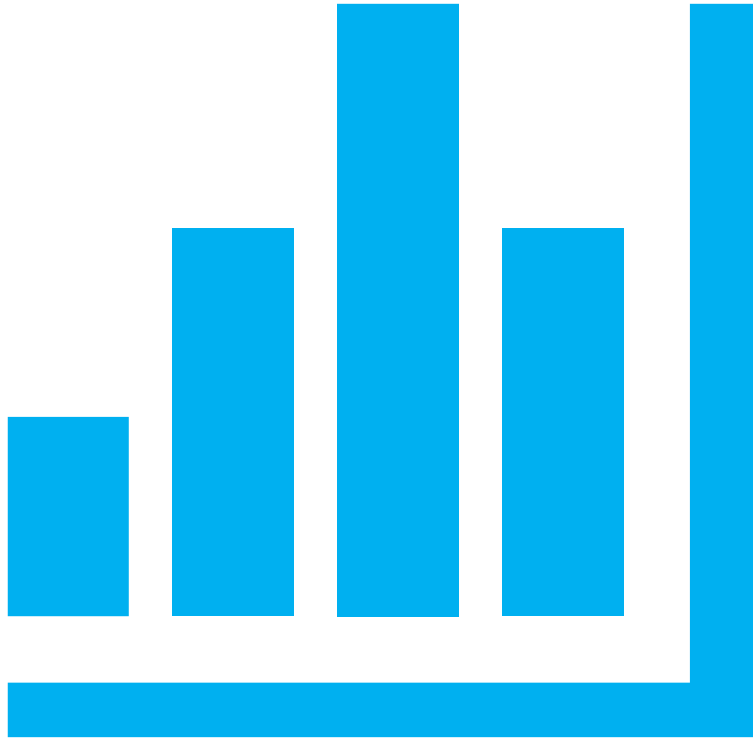
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Determining the Benefits of DX Projects

Determining the Benefits of DX Projects



Financial Metrics

- Business Case Analysis Model



Non-Financial Metrics and Measures of Success

- DX Metrics Framework

Business Case Analysis Model (BCAM)

BCAM V2.0

Detailed Evaluation of DX Projects

Comprehensive Data Entry

Detailed Financial Outputs

Online BCAM

High Level Evaluation of
Modernization Projects

Streamlined Data Entry

Immediate Financial Outputs

Available at <https://nuclearplantmod.epri.com>

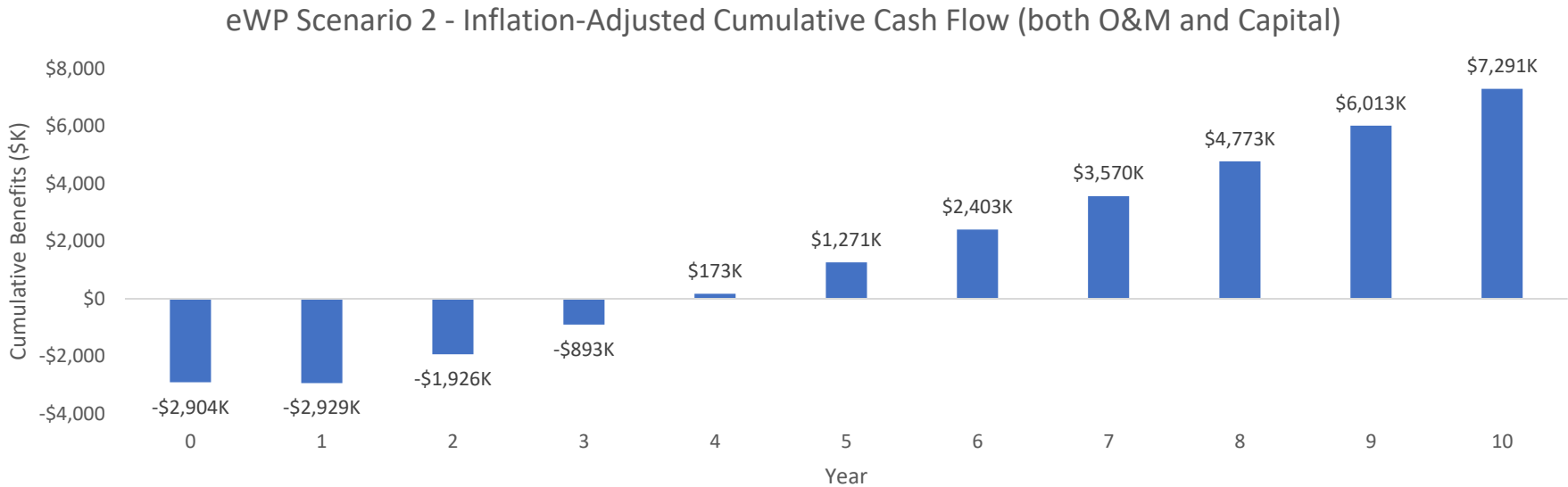
Plant Modernization Business Case: Electronic Work Packages

Overview of Scenario

- These outputs depict the genericized version of Utility 1's business case, and the results are positive

Inputs Breakdown

- In this scenario, it is assumed the utility was able to use the eWP labor benefits to reduce the following positions:
 - 3 clerical
 - 2 maintenance supervisors
 - 1 records management
- Reduced 2,024 hours of internal craft overtime time resulting in \$128,000 annual savings
- Redeployed 4,048 hours of internal craft hours to reduce contractor craft hours



Scenario 2 Specifics	
eWP Utilization Percentage (#)	90%
Internal Overtime and Contractor Spend Reduced (\$)	~\$450,000
FTEs Reduced	6
Implementation Costs	~\$3,900,000
Ongoing Costs	~\$500,000
Materials Savings	\$36,000
Breakeven (Years)	3.84
NPV	~\$2,900,000

Example BCAM Output from 3002019843

Plant Modernization Toolbox

- **Modernization Strategy** (3002020908)
 - Informs decision making on modernization projects
- **Business Case Analysis Model**
 - On-line or Excel software that provides financial metrics for decision making (cash flows, net present value, break-even, and Internal Rate of Return, and operational metrics)
- **Business Case Examples**
 - Notional examples
 - Features of a successful project
 - References for implementation included
- **70 Modernization Technology Assessments**

Technology & Improvement Areas

- Digital I&C Upgrades
- Digital/New Replacement Technologies
- Equipment Monitoring
- Drones and Robotics
- Business Process Improvements
- Outage, Inspection, and Repair Improvements
- Risk-Informed Methodologies
- Automated Work Planning

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Measuring DX Success

- **Objective & Scope**
 - Develop Metrics Framework: Create a structured framework to measure the success of DX projects at multiple levels, incorporating strategic and tactical dimensions, and balancing leading and lagging indicators.
 - Consider Non-Traditional Measures: Explore and define non-traditional metrics, such as workforce engagement, innovation pipelines, and time to worker proficiency.
 - Perform a Deep Dive in One Focus Area: Conduct a focused analysis (e.g., AI, automation) to illustrate the value of foundational modernization technologies.
- **Goal & Value**
 - Provide guidance on HOW to measure DX project success (Strategic, Tactical and Operational level)
 - Guidance on developing Descriptive, Diagnostic, Predictive and Prescriptive metrics
 - Provide a detailed example focusing on AI or automation
- **Deliverables**
 - Technical Brief, 9/15/2025

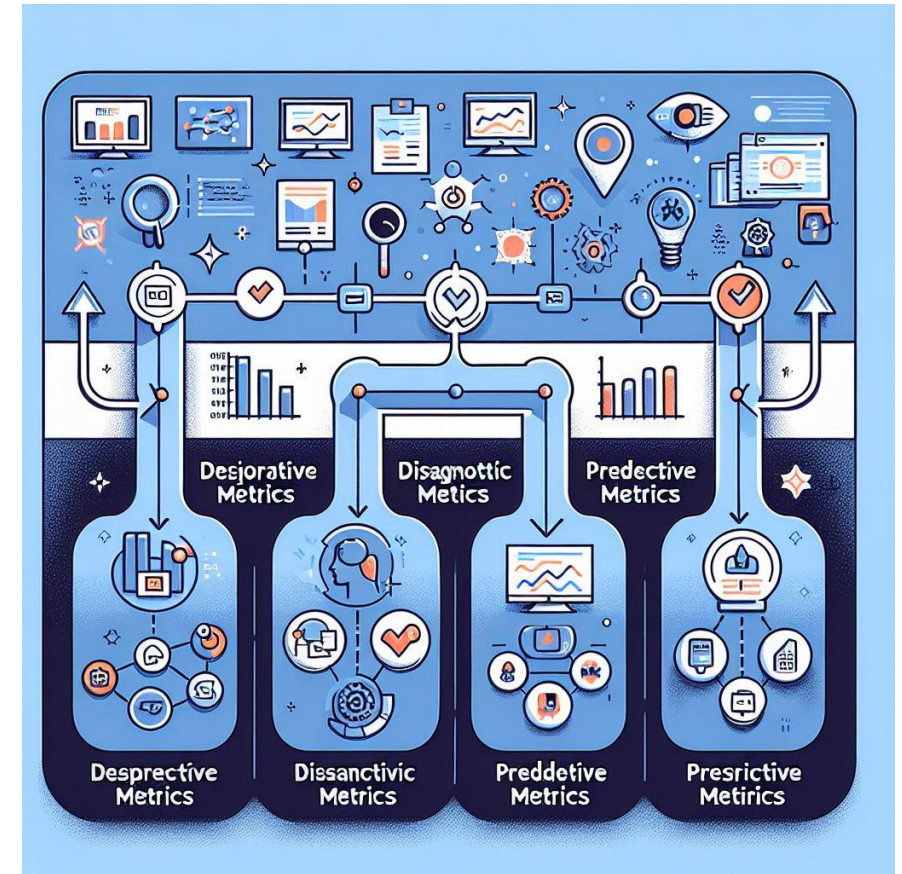


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Key Lessons Learned



Data interoperability is a huge barrier, especially when scaling

- Foundational gaps in data standardization and system integration stall progress even when strategic alignment exists
- Data quality and integration serve as prerequisites for measurement effectiveness



Workforce engagement is essential

- Digital champions in both field and leadership roles play key roles in building trust and momentum
- Successful initiatives engage end users early in design, ensuring alignment with real workflows



Cultural resistance can slow adoption

- Frontline staff may be hesitant about technology changes when practical benefits aren't immediately clear
- Departmental silos can create friction due to security concerns or system ownership



Value can occur at all levels of maturity

- Early digitization efforts deliver efficiency gains by reducing low-value administrative work
- Reallocating time to higher-impact tasks is one of the clearest indicators of success



Initiatives often outpace measurements

- Many utilities launch tools without clear frameworks for evaluating outcomes
- Well-documented failures can prevent larger-scale missteps and reduce wasted investment (e.g., learning the reasons behind pilot project failure to prevent future issues)

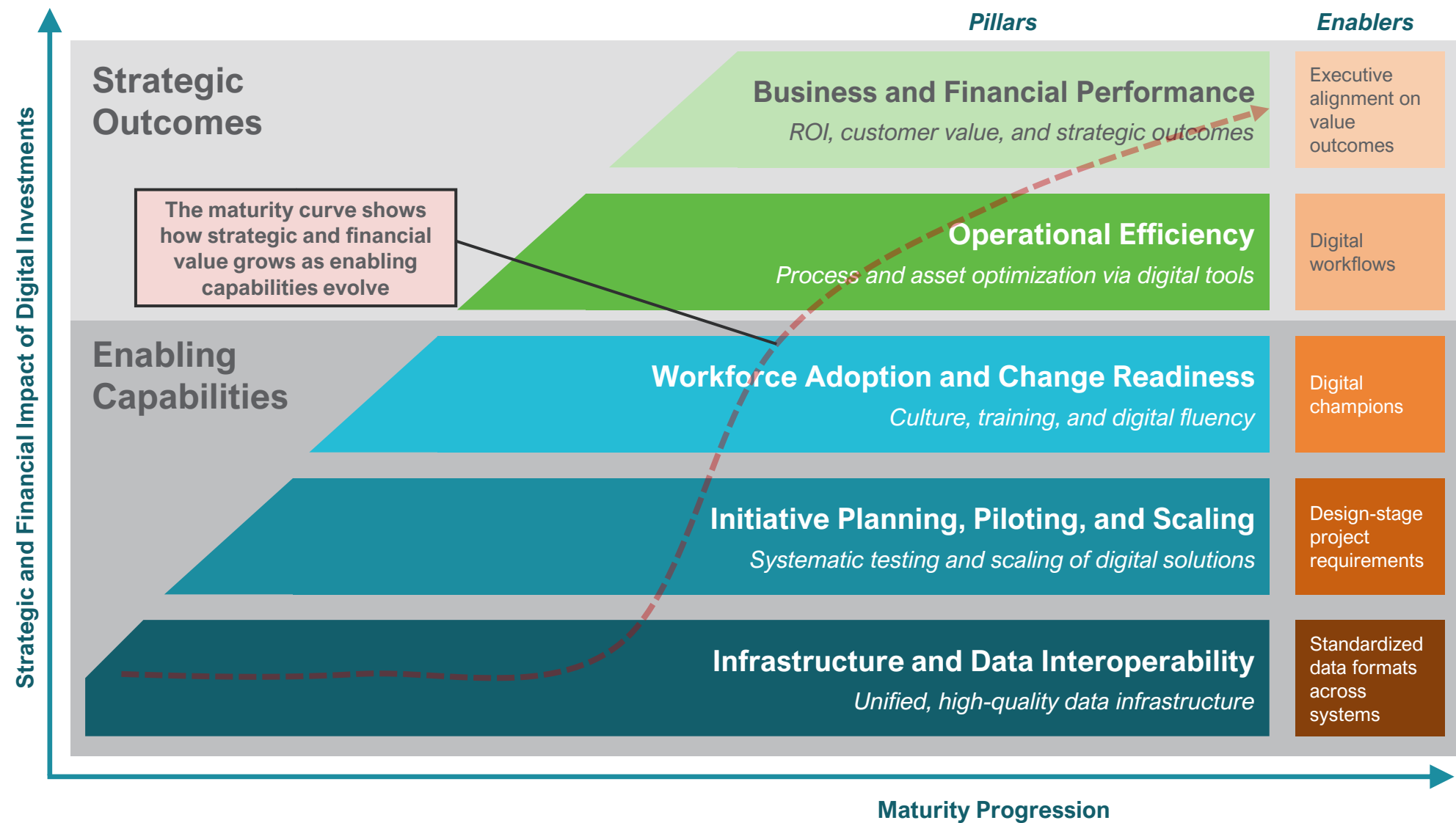


Current measurement approaches often overlook qualitative aspects

- Metrics frequently miss outcomes like workforce morale and cross-department collaboration
- Digital innovation itself becomes a strategic return through increased capacity for experimentation

Key Themes Across DX Efforts Highlighting Enablers and Obstacles in Realizing Full Value

DX Metrics Framework





Risk of Inaction on DX/AI Foundations and Fundamentals

Risks of Inaction on DX Foundations/Fundamentals

■ Objective & Scope

- Summarize DX foundations/fundamentals
- Determine the risks of implementing DX technologies (i.e. AI, automation, analytics, etc.) without proper foundations/fundamentals
- Identify high-value areas where members need strategic and implementation guidance

■ Goal & Value

- Develop a case for foundational & enabling investments
- Highlight the necessity of foundational elements
- Enable successful DX

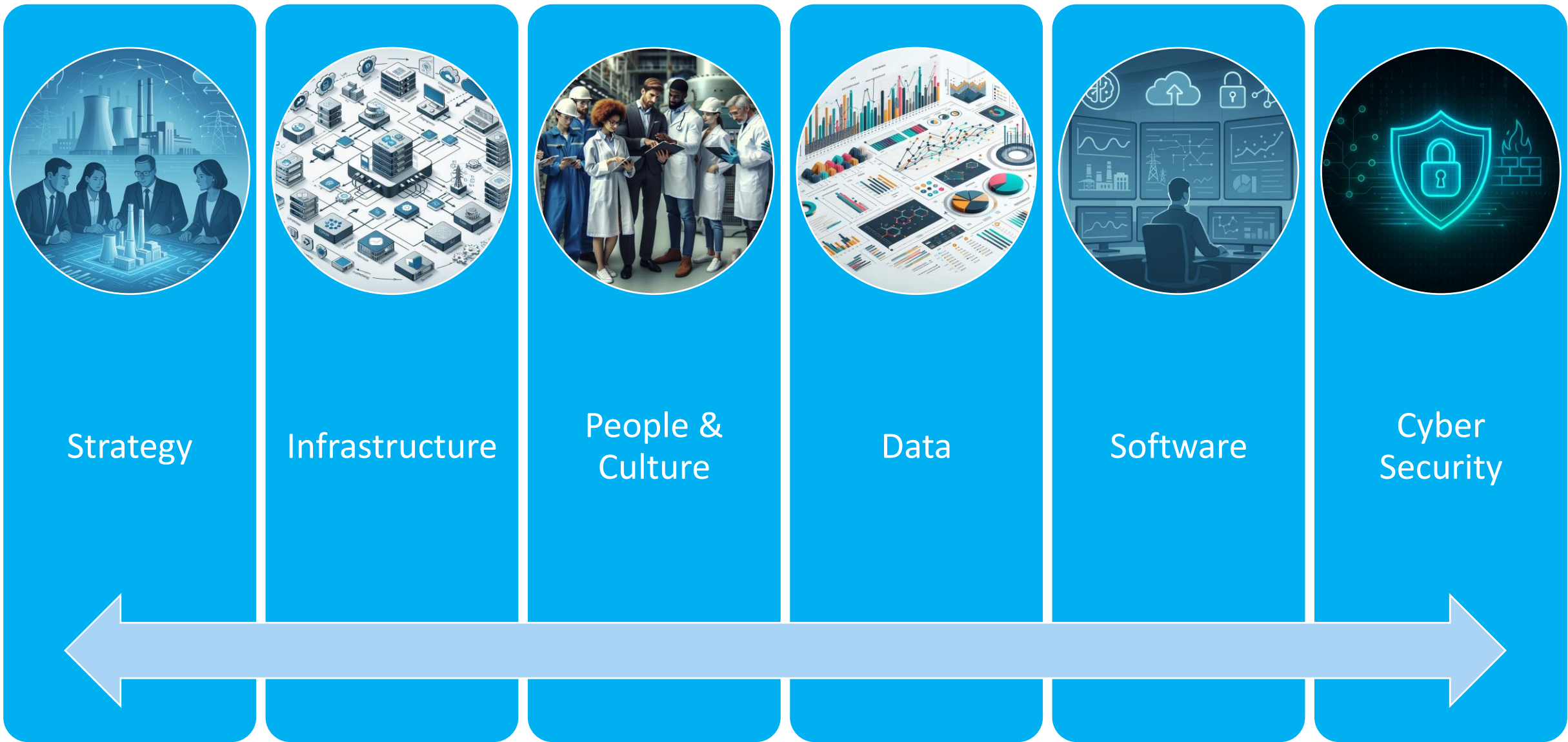
■ Deliverables

- Public Whitepaper, 8/31/2025
- Technical Brief, 12/31/2025



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Digital Transformation Foundations/Fundamentals



Digital Transformation Success Factors

Engagement
with
Stakeholders

Proper Metrics

Wireless
Connectivity

Digitization

Centralized
Data Systems

Knowledge
Transfer

Thorough
Documentation

Technical
Project
Execution

Data
Standardization

Data-Driven
Insights

Modernizing
Legacy Systems

Effective
Version Control

Data
Confidentiality

Secure Devices

Data Foundation Whitepaper

- Key Aspects of a data foundation
 - Data Governance
 - Data Handling and Lineage
- Risks of underdevelopment
 - AI/LLMs, Digital Twins, Supply Chain, Legal, etc.
 - Hidden costs
- Common Challenges
- Examples of Pitfalls
- Implementation Guidance
- Needed R&D



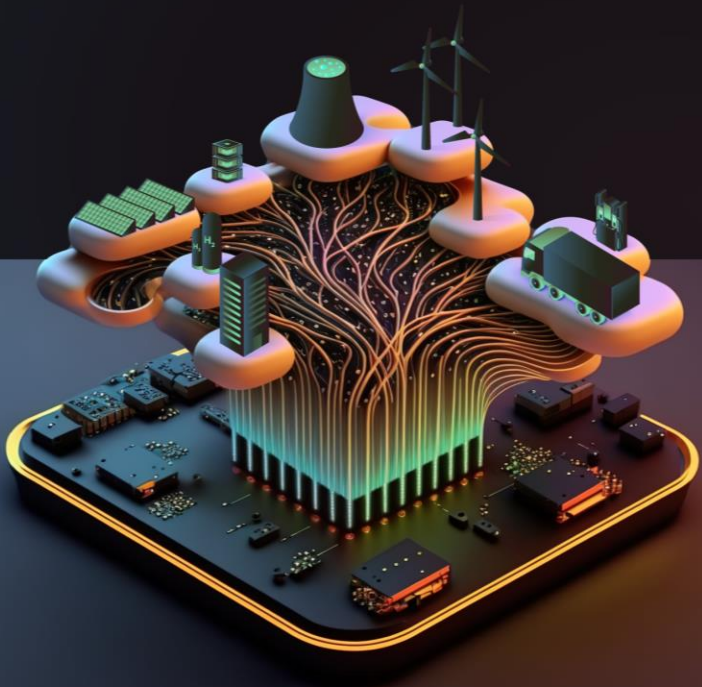
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Whitepaper to be Published in Q4

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Where do I find information on DXRI?

- Visit the [DXRI](#) site
- DXRI [Supplemental Project Notice](#)
- Register for monthly webcasts
- Recommended Resources:
 - [EPRI-Wide Digital Transformation Research Roadmap](#)
 - [EPRI-Wide Digital Transformation Wiki](#)
 - [Digital Transformation Framework: Utility Strategy and Implementation Guide](#)
 - [Program on Technology Innovation: Digital Transformation Maturity Model](#)
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