Advanced Remote Monitoring

“Preserving Nuclear Competitiveness in Today’s Economic Reality”

Clinton Carter
USA Director – Fleet Modernization

Big Data for Nuclear Power Plants Workshop

December 10, 2019
Our Situation:

➢ Nuclear Power is crucial for maintaining our nation’s:
  o energy security,
  o grid stability and
  o achieving our environmental goals.

➢ Economic Competitiveness is diminishing due to:
  o disruptive technologies,
  o increasing production costs and
  o lowering market prices.

➢ Nuclear Sustainability mandates that we:
  o transform core business processes,
  o reduce operating expenses and
  o technologically innovate.

Our legacy game plan cannot compete on today’s playing field

Industry Imperative: Accelerate Transformation
Industry Demonstration – Advanced Remote Monitoring

Vision:
Preserve the economic competitiveness of our nation’s nuclear power industry by transforming core business processes through the application of advanced technologies.

Deliverables:
➢ Deployment of field-sensing technologies, telecommunications infrastructure and machine learning algorithms to automate data collection, analytical capabilities and provide for remote facility monitoring and anomalies detection.

➢ Development of a shared-services platform to enable modernization of work practices and efficiencies, approaches to regulatory compliance and codification of operating experience.

➢ Development of a strategy, roadmap and supporting business case for the nuclear industry based upon the learnings realized through this project.
**NuSuite**

*Technological Transformation*

**Shared Services Platform**

**Benefits:**
- Owned by Participating Utilities
- Independence from 3rd Party software solutions
- Transparency into all transactions

**Features:**
- Scales organically with business requirements
- Integrated Social Media
- Knowledge Sharing Repository

**Architecture:**
- Open Source Ecosystem
- Blockchain Architecture
- Modular Component Design

**Interfaces:**
- Legacy Data Historians & Applications
- Telecommunications Infrastructure
- Expanded Monitoring Systems
Nuclear Operations Remote Sensory Advisor
Emulating Human Sensing and Cognition

- Integrated Field Sensing
- Intelligent Pattern Recognition
- Continuous Learning
- Automates Inspections
- Remote Personnel and Plant Monitoring
- Continuous Performance Analysis

NuSuite
Technological Transformation
Advanced Remote Monitoring - Sharing Project Learnings

INPUTS
- NEI Efficiency Bulletins
- INPO DNP Project Priorities
- Industry Best Practices
- INL OLM Capabilities
- Utility Performance Targets
- Advanced M&D Capabilities

OUTPUTS
- U.S. Fleet Roadmap
- Targeted R&D Opportunities
- Legacy & SMR Applicability

Technical Program Assessments
Advanced Technological Gap Analyses
Advanced Technology – Contribution

INL Nuclear Fleet Business Case Study

Utility Fleet Standardized M&D Platform

Fleet Level Platform
Accelerate Fleet Performance Improvements
Improve Safety & Reduce Generation Losses

Conceptual Design

U.S. Nuclear Fleet Optimization Platform

Scalable Value Proposition
Advanced Remote Monitoring – Stakeholder Benefits

**Participating Utilities**
- Strengthened safety, performance and reliability through the application of advanced technologies
- Objective 3\(^{rd}\) party valuation of actual benefits derived from demonstration project
- Standardized technological platform

**Nuclear Industry**
- Strategic roadmap for technological transformation
- Supporting business case for business process redesign
- Technological gap analysis

**United States of America**
- Sustain the large scale benefits of nuclear power supporting energy security and grid reliability
- Preserve the nation’s largest source of zero carbon generating capacity
- Reduce the need for new or ongoing subsidies to sustain nuclear