UTILITIES SERVICE ALLIANCE
"SIMPLE, COST-EFFECTIVE EXCELLENCE"

NRC Data Science and AI Workshop 4 - AI Characteristics

Advanced Remote Monitoring and Diagnostics

"Strengthening Resilience and Safety of Nuclear Power through Advanced Technologies"

Clinton E. Carter
Utilities Service Alliance

U.S. Nuclear Regulatory Commission
Rockville, MD
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UTILITIES SERVICE ALLIANCE
"SIMPLE, COST-EFFECTIVE EXCELLENCE"

Advanced Remote Monitoring and Diagnostics

Preserve the resilience of our nuclear energy supply by Transforming core business processes through the application of Advanced Technologies

Idaho National Laboratory

Objectives:

Creation of a Shared-Services Technology Platform - *NuSuite*

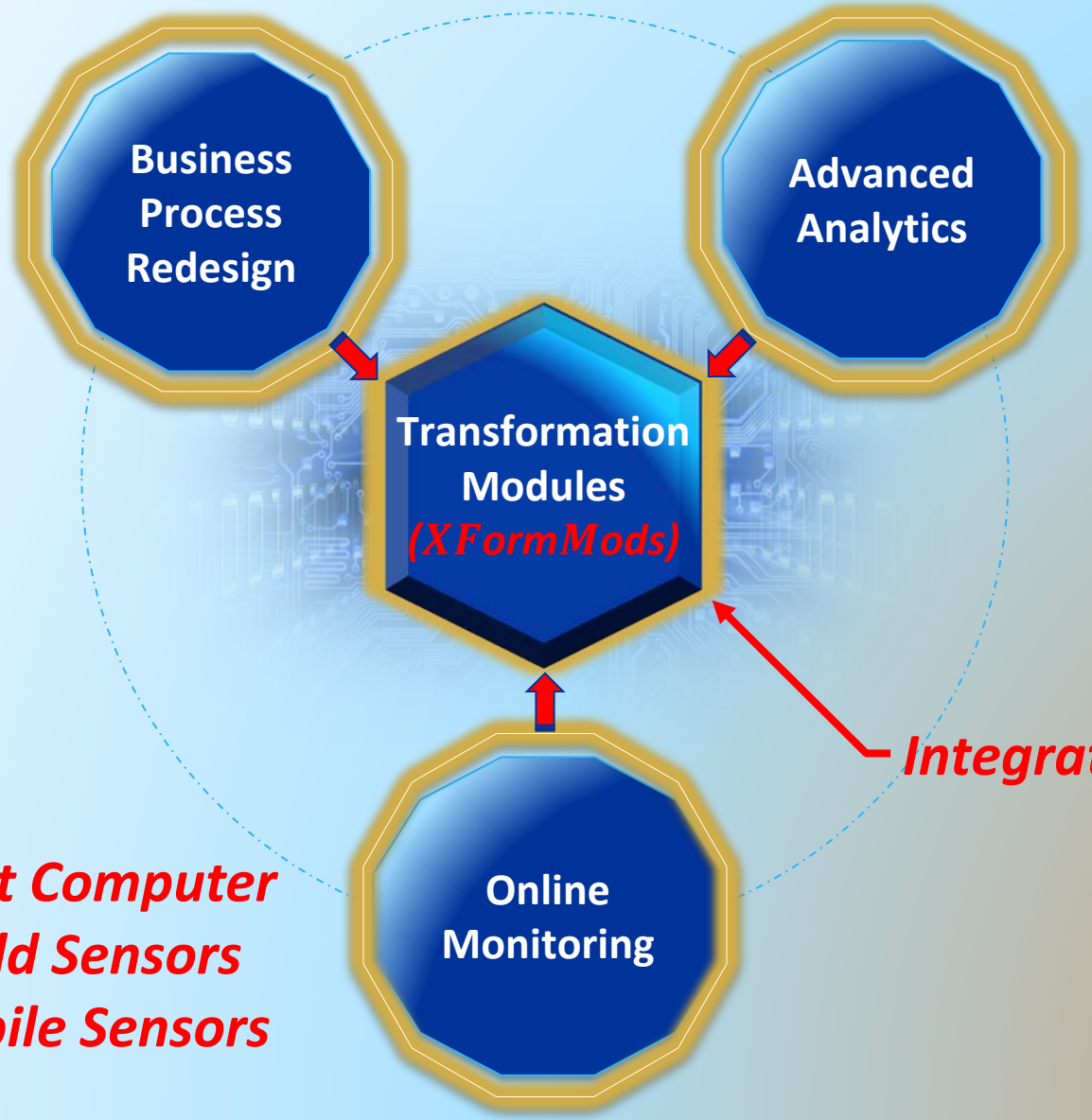
Transformation of Nuclear Business Processes - *Transformation Modules*

Establishment of 24x7 Monitoring & Diagnostic Services - *Power Optimization Center*

NuSuite

Technological Transformation of Nuclear Business Processes

Simplification
Standardization
Automation



First Principles
Multivariant
Artificial Intelligence

Integrated Business Solution

Plant Computer
Field Sensors
Mobile Sensors

Business Transformation

Advanced Remote Monitoring

Phase-1 (φ1)

- *Modules Development & Configuration – In Progress*
- *Embedded AI Algorithms – Collaboration with INL*
- *6-Month Plant Demonstrations – November 2023*

Phase-2 (φ2)

- *Objective: Scale-Up and Expand Capabilities*
- *Detailed Project Proposal – Complete*
- *Status - Seeking Funding to Commence R&D*

Embedded AI

- *Classification*
- *Regression*
- *Transfer Learning*

24x7 Remote Monitoring & Diagnostics

Power Optimization Center

Strengthening Nuclear Resilience, Safety and Reliability

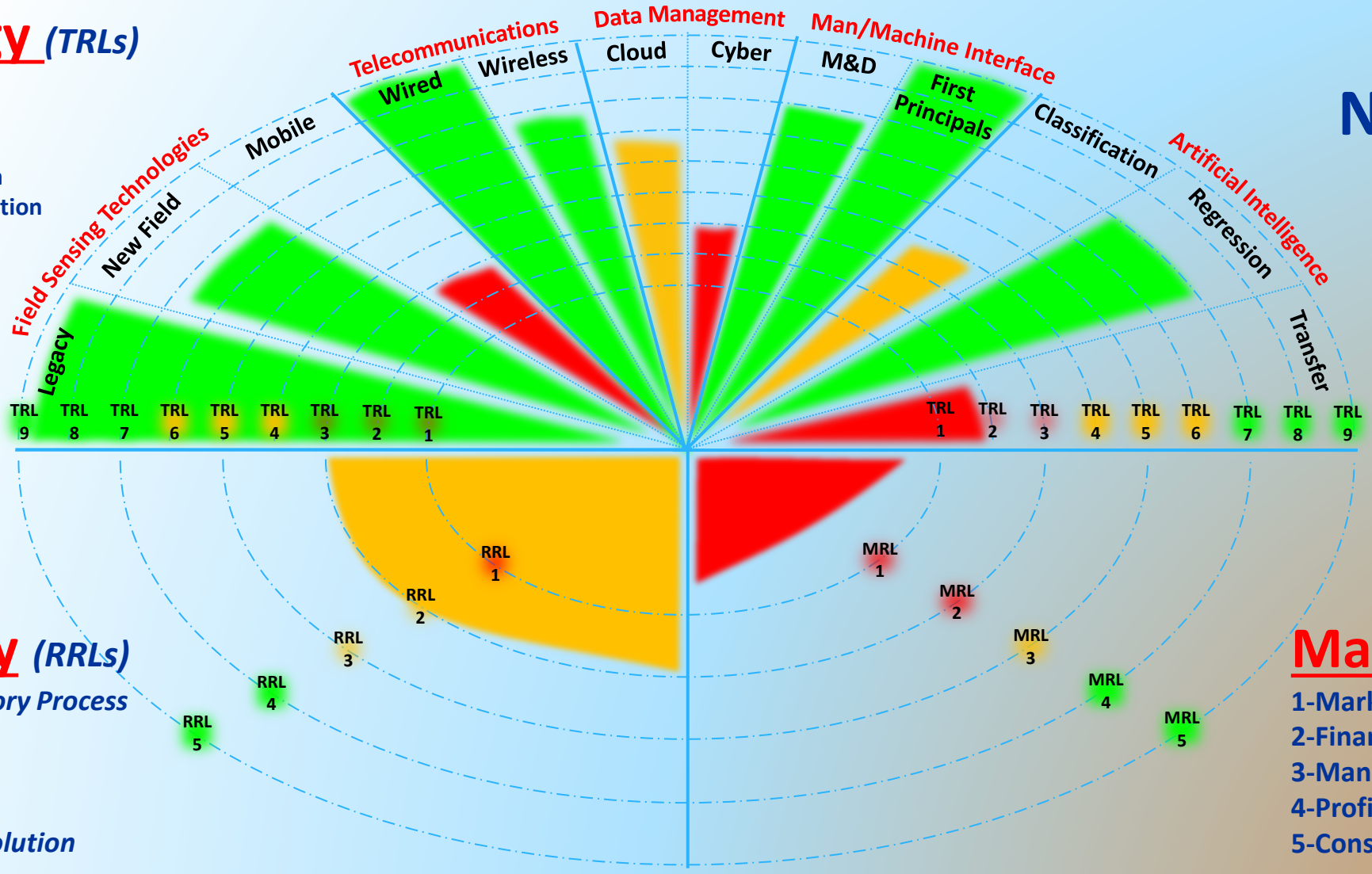
POC Represents the man/machine interface essential for supervised learning

Technology Transformation Framework

Technology *(TRLs)*

1-Principles Observed
2-Concept Formulated
3-Experimental Proof
4-Laboratory Validation
5-Environmental Validation
6-Environmental Demo
7-Prototype
8-System Completed
9-Proven

NuSuite



Regulatory *(RRLs)*

1-Access to Regulatory Process
2-Political Security
3-Effective Policies
4-Safe
5-Acceptability of Solution

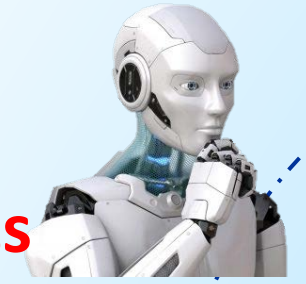
Market *(MRLs)*

1-Market Access
2-Financial Capital
3-Manufacturing Capability
4-Profitable
5-Consumer Utilization

Readiness Levels must Mature across all Three Sectors

Nuclear Industry Transformation

Motor
Drones | Robotics



Cognitive
Human | Cyber

Field Sensing Capabilities

Tele-Autonomous Ecosystem

Enabling a Future of Possibilities...

Nuclear Operations Engineering and Technical Support

Advanced Remote Monitoring
Nuclear Industry Impact

- ✓ *Strengthen Nuclear Safety*
- ✓ *Sustain Plant Reliability*
- ✓ *Reduce Occupational Dose*
- ✓ *Eliminate Human Error*
- ✓ *Preserve Commercial Viability*

Nuclear Resilience:
Foundational to a clean, reliable and secure energy future…