U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Future-Focused Research Activity: Regulatory Viability of Digital Twins

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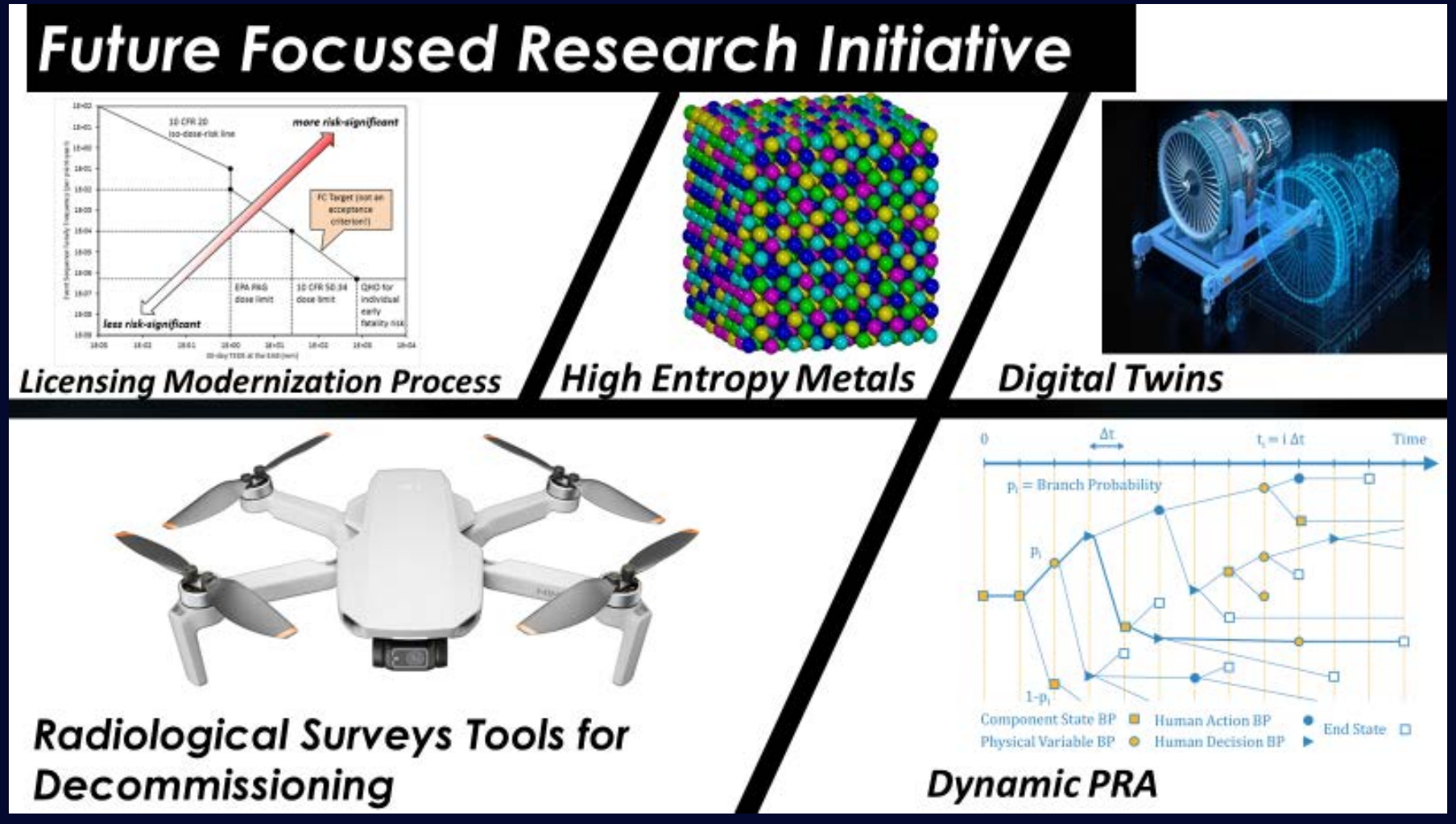
Future Focused Research

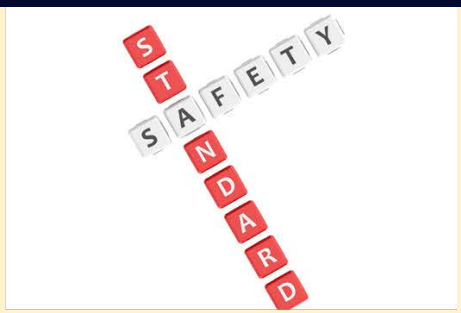
- Small annual program ($500k 2 FTE)
- Fosters Agency Innovation and Regulatory Readiness
- Staff led program - 48 proposals and 12 projects funded in FY20 and FY21



Future Focused Research
Digital Twins – Regulatory Viability

- ✓ Understand the current state of the technology and potential applications for the nuclear industry.
- ✓ Identify and evaluate technical issues that could benefit from regulatory guidance.
- ✓ Develop infrastructure to support regulatory decisions associated with digital twins.

Digital Twins – Regulatory Viability Project Plan



TECHNICAL PREPAREDNESS

State-of Technology of Application of Digital Twins

Assessment of Technical Issues

Advanced Sensors for Online Monitoring: Diagnostics and Prognostics

REGULATORY READINESS

Regulatory Readiness Level/Gaps

Methodologies to Address Challenges

Potential Regulatory Infrastructure

Cybersecurity and Digital Twins

ASSESSMENTS OF STANDARDS

State-of-Practice and Challenges: Representation of Physical Systems in Digital Platforms

COMMUNICATIONS & KNOWLEDGE MANAGEMENT

Public Workshops

Domestic/International Collaboration

Stakeholder Engagement

Building Capabilities & Skills

Training

Key Takeaways from the NRC Workshop on Digital Twins

- ✓ Digital Twin Applications for Advanced Nuclear Technologies, December 1-4, 2020.
  - ✓ Over 250 attendees per day

- ✓ Major Benefits of Digital Twins
  - ✓ Improve design
  - ✓ Reduce uncertainties
  - ✓ Reduce risk

COLLABORATION

- **Encourage information sharing between developers & innovators**
- **Increase stakeholder collaboration**

CROWDSOURCING CONTRIBUTIONS

- **Models**
- **Algorithm**
- **Datasets/Challenges**

COMMUNITY OF PRACTICE

- **Establish Community of Practice for Digital Twin Applications for Advanced Nuclear Technologies**


Thank You

BACK UP SLIDES

Reactor Digital Twins

- Digital representation of a physical asset
- Design optimization, effective maintenance and operations
- Safety of operations
- Data management, physics-based modeling, and artificial intelligence (AI) and machine learning (ML)