



U.S. DEPARTMENT OF
ENERGY

Nuclear Energy

Nuclear Energy Enabling Technologies (NEET) Advanced Sensors and Instrumentation (ASI)

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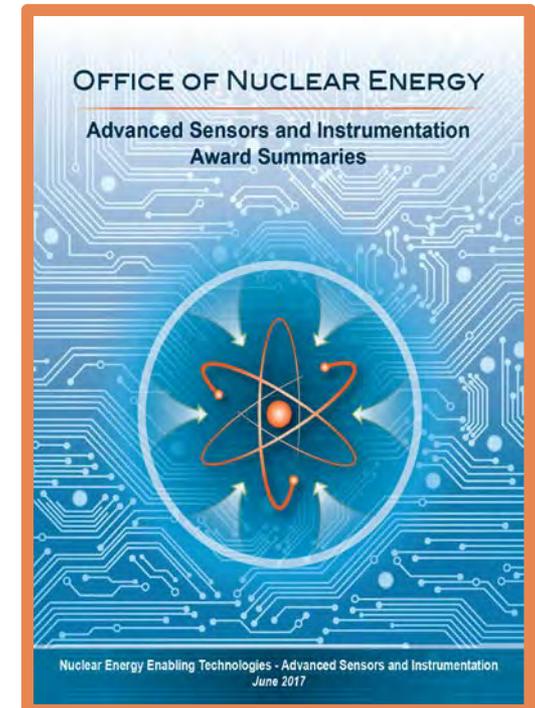
Nuclear Energy Enabling Technologies: Advanced Sensors and Instrumentation

■ Vision

Develop advanced sensors and instrumentation technologies that address critical technology gaps for monitoring and controlling advanced reactors and fuel cycle facilities

■ Goals

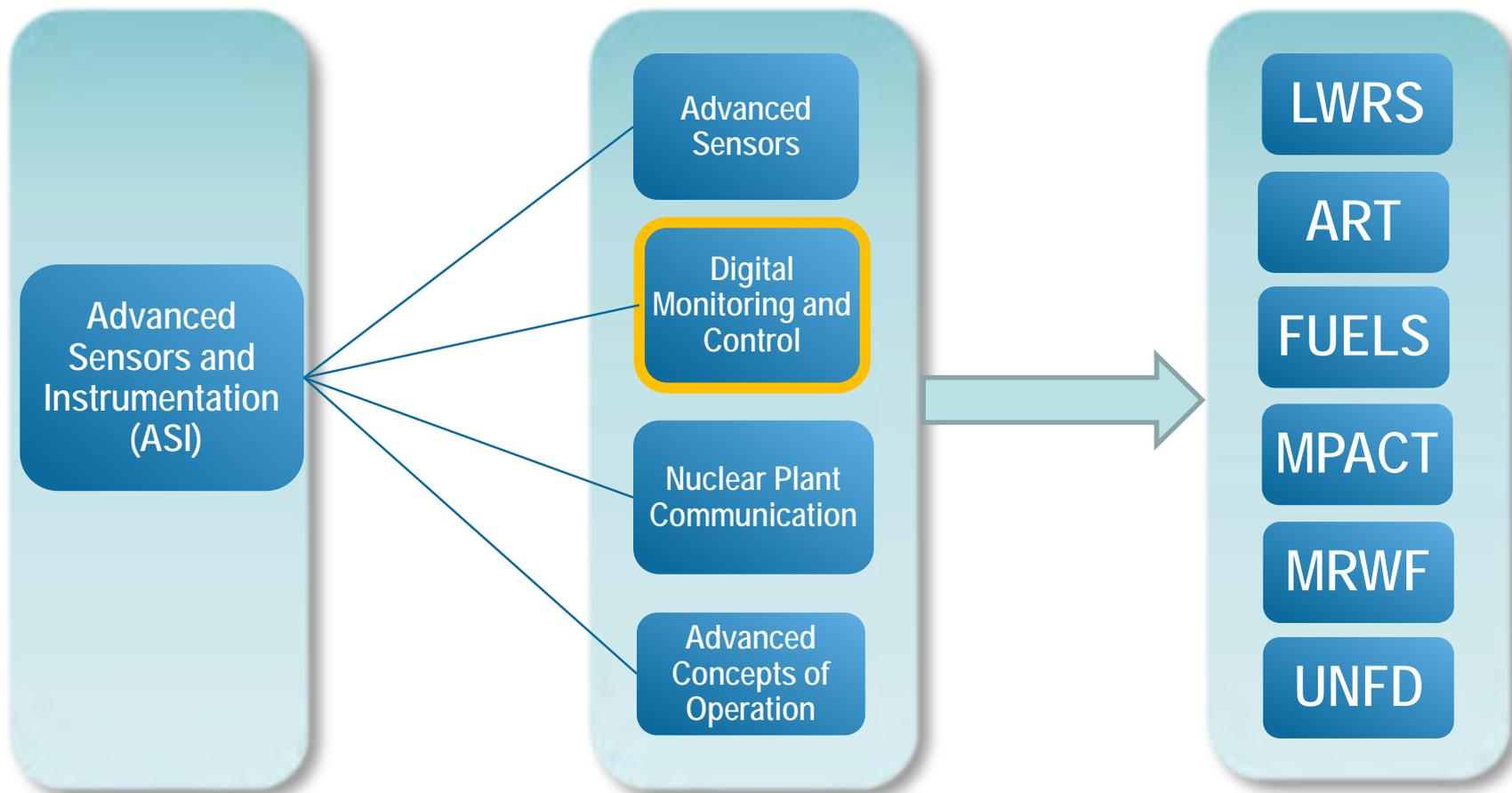
- **Support DOE-NE R&D programmatic needs**
 - Fuel & material studies, integral tests
- **Provide new capabilities for measurement and control**
 - Sensors for harsh environments, advanced control capabilities, fault tolerant operations
- **Address R&D needs for successful deployment**
 - Digital technology qualification, advanced operational concepts





ASI Program Areas

NEET Program ...divided into... R&D Topics ...target gaps in support of... NE R&D Programs Needs



[LWRS-Light Water Reactor Sustainability; ART-Advanced Reactor Technologies; Fuels -Advanced Fuels; MPACT-Materials Protection, Accounting and Control Technology; MRWF- Material Recovery and Waste Form Development; UNFD-Used Nuclear Fuel Disposition]



NEET- 2.1 TOPIC: State of the Art Control Technologies

Challenge: Design and develop state of the art advanced control rooms, control systems, and plant control technologies, including automated work management systems.

Objectives:

- Advance the state of the art in control room technology
- Demonstrate improved system performance and reliability by streamlining control approaches in monitoring and controlling a component or system in nuclear environment



NEET- 2.2 TOPIC: Big Data Analytics and Applications

Challenge: Develop and demonstrate “Big Data” analytics for monitoring nuclear plant operation and control

Objectives:

- **Demonstrate ability to analyze data from plant systems and demonstrate your application to**
 - **Improving Plant performance**
 - **Optimizing Plant Maintenance**
- **Develop applications to achieve improved**
 - **Economics, Safety, and Security**
 - **Workflow optimization**

NEET- 2.3 TOPIC: Sensors and Instrumentation for Data Generation

Challenge: Develop and demonstrate new sensors and instrumentation to generate data needed to support improved plant control and data analytics applications for improved plant operations

Objectives:

- Design sensor and corresponding instrumentation to be qualified and deployed at a nuclear facility in support of data analytics
- Demonstrate the ability to use these sensors and instruments at location of interest without disturbing the nuclear facilities conditions and support data communication

NSUF 1.1 TOPIC: Testing of Advanced Materials or Advanced Sensors for Nuclear Applications

Challenge: Conduct irradiation testing and post-irradiation examinations of 1) advanced materials for sensors, or 2) advanced sensors for nuclear applications

Successful Applications will include:

- A description of the materials/sensors
- Irradiation and post irradiation examination needs
- The role of the materials in new sensors, controls, communications or associated applications
- The purpose and application of the developed sensor in nuclear energy systems

Note: This funding does not support research and development activities to develop materials or sensors, but rather the cost associated with the irradiation of sensors and materials



Summary of ASI Proposals Expectations

- Research will improve and advance **ASI technologies** to
 - enable advances in nuclear reactor and fuel cycle system development
 - enhance economic competitiveness for nuclear power plants
 - promote a high level of nuclear safety
- Organizations performing this research will be expected to produce concepts, techniques, capabilities, and equipment that are or can be **demonstrated in simulated or laboratory test bed environments** representative of nuclear plant applications
- Successful applications will describe **truly innovative and crosscutting** sensors and instrumentation that offer the potential for **revolutionary gains** in reactor and fuel cycle performance and that can be applied to **multiple reactor designs and fuel cycle concepts**

I&C technologies are a vital key to enabling the expansion of clean, safe and economical nuclear power.

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