

Day 3 Lunch Program Technology as an Opportunity

Center for the Remediation of Complex Sites (RemPlex)
2023 Global Summit on Environmental Remediation
November 13 – 17, 2023



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
**ENVIRONMENTAL
MANAGEMENT**

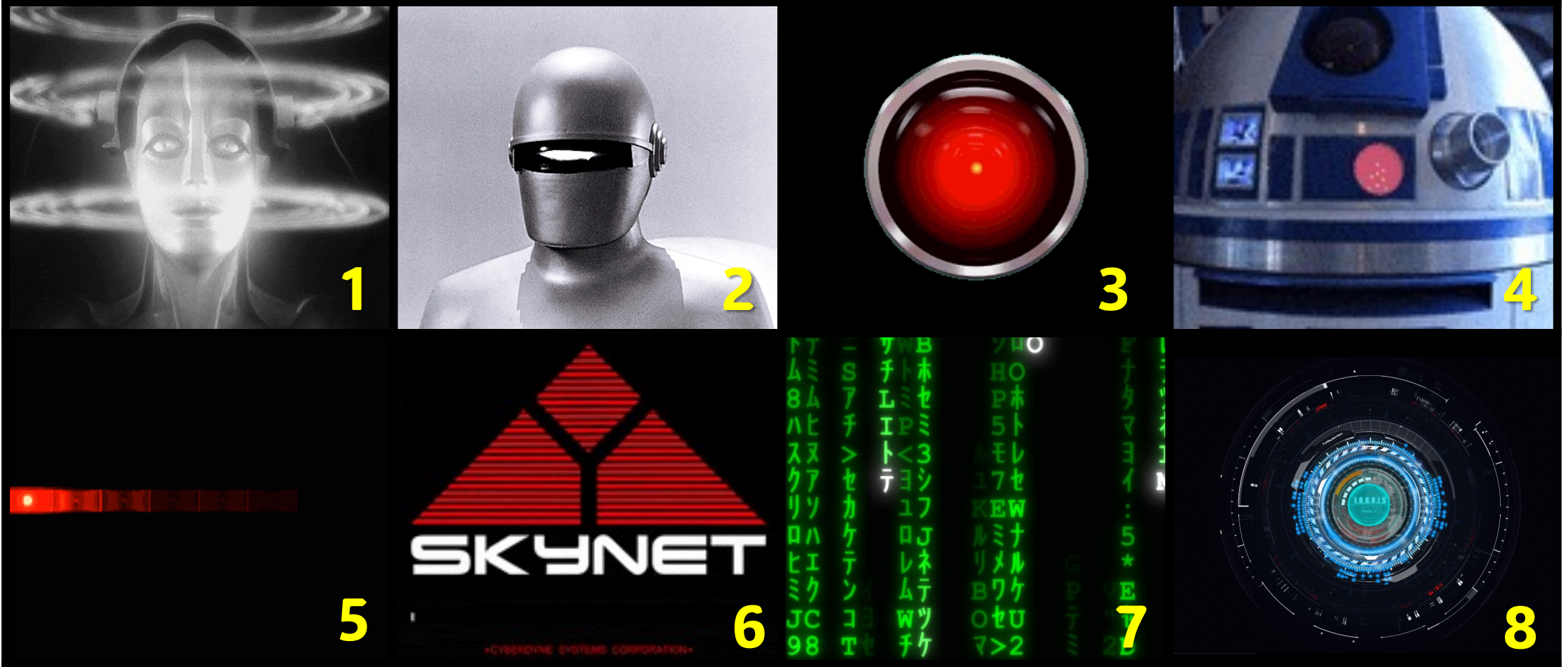
Agenda

- ❖ **Mission Status**
- ❖ **Technology Development: EM Portfolio**
- ❖ **Workforce Development: University Partnerships**
- ❖ **Implications to Cleanup Mission**

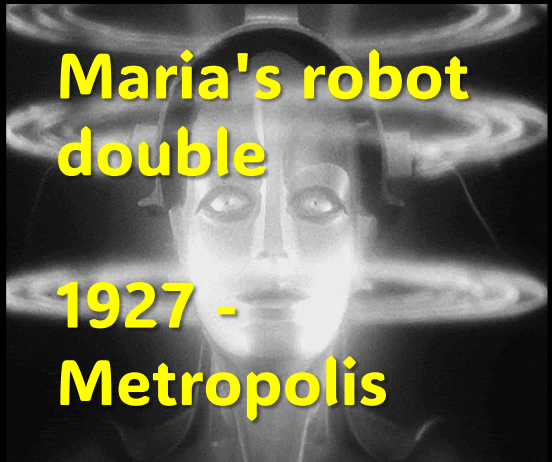









REMPLEX
CENTER FOR THE REMEDIATION
OF COMPLEX SITES
@PNNL

Which would be considered AI?



Which would be considered AI?

 <p>Maria's robot double 1927 - Metropolis</p>	 <p>Gort 1951 - The Day the Earth Stood Still</p>	 <p>HAL 9000 1968 - 2001: A Space Odyssey</p>	 <p>R2-D2 1977 - Star Wars</p>
 <p>KITT 1982 - Knight Rider</p>	 <p>Skynet 1984 - The Terminator</p>	 <p>Agent 1999 - The Matrix</p>	 <p>J.A.R.V.I.S. 2008 - Iron Man</p>

Mission Outlook



❖ Legacy Cleanup

- ◆ 92 sites completed
- ◆ 15 sites to go

❖ Completion Estimates

- ◆ Mission: 2078 – 2091
 - \$488,504M - \$723,332M
- ◆ SNF: 2040
- ◆ SNM: 2060
- ◆ Tank Waste: 2065
- ◆ D&D: 2086
- ◆ Soil & Water: 2091
- ◆ Solid Waste: 2091

Current Budgets



FY2023 Enacted Budget: \$8,263M

- ◆ SNF/SNM: \$580M
- ◆ Tank Waste: \$2,874M
- ◆ TRU, SW: \$1,033M
- ◆ D&D: \$1,755M
- ◆ Soil, GW: \$511M
- ◆ Site Services: \$1,510M

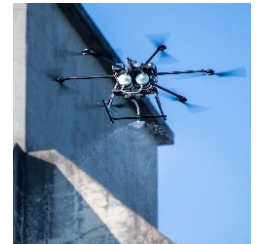
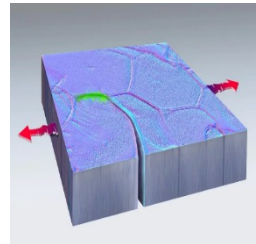
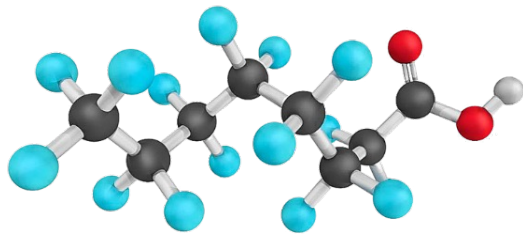


FY2023 TD Portfolio: \$68.55M

- ◆ SNF/SNM: \$7.40M
- ◆ Tank Waste: \$12.47M
- ◆ TRU, SW: \$0.83M
- ◆ D&D: \$5.78M
- ◆ Soil, GW: \$15.48M
- ◆ Enablers: \$21.02M

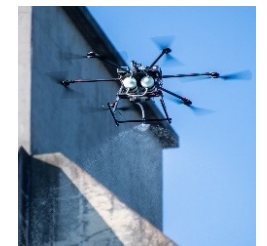
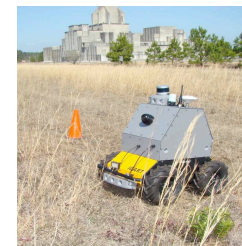
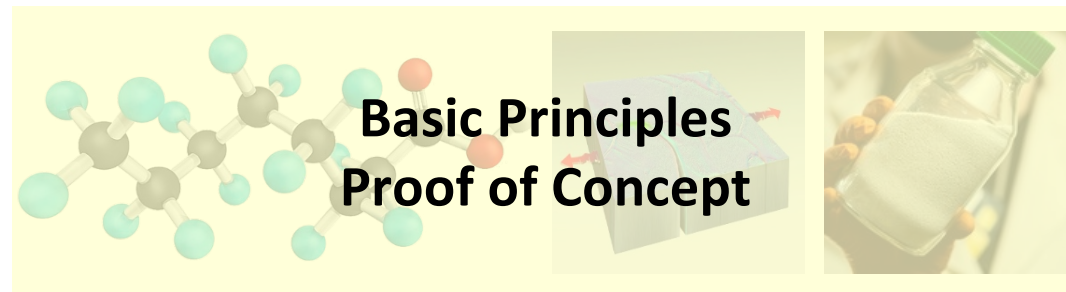
Technology Maturation

Technology Readiness Level Scale								
1	2	3	4	5	6	7	8	9
Discover		Design		Demonstrate			Deploy	
Observe and report basic principle .	Formulate technology concept and application.	Experiment, test, and analyze proof of concept or key function, behaviors, or reactions.	Validate in a laboratory environment .	Validate 50% design model in a relevant or representative environment .	Demonstrate 75% design model or prototype in a relevant or representative environment .	Demonstrate 90% design solution in an operational environment .	Technological solution completed , functionally proven, and operationally qualified .	Technological solution proven through successful mission operations .



Discovery and Technology Design

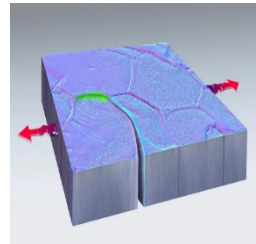
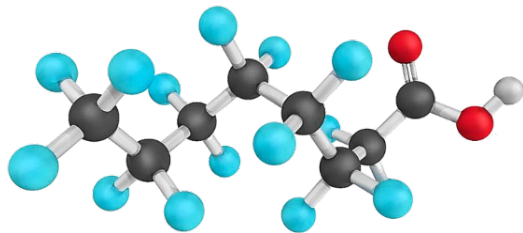
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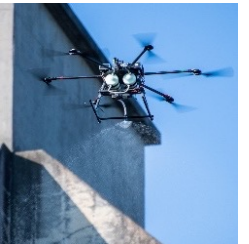


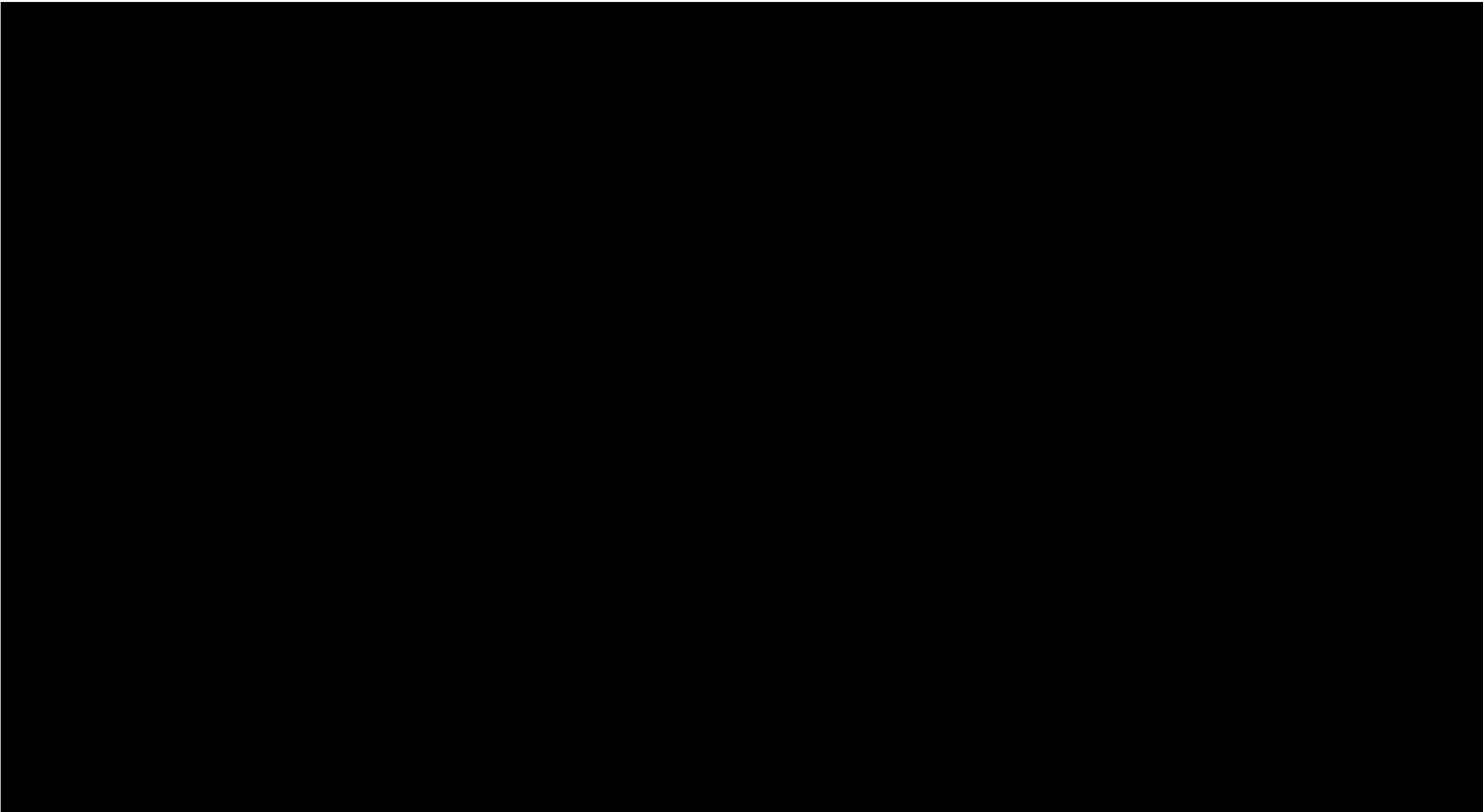
Technology Demonstration

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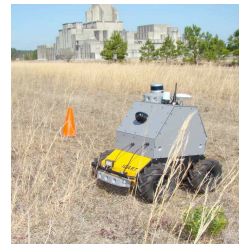
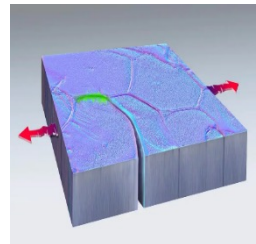
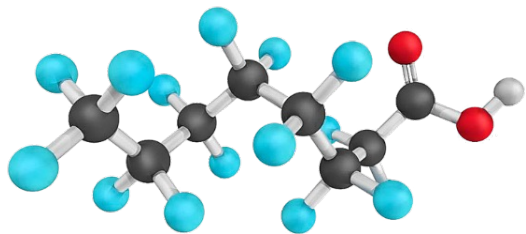
Testing & Evaluation
Verification & Validation
Safety, Security & Ops Basis



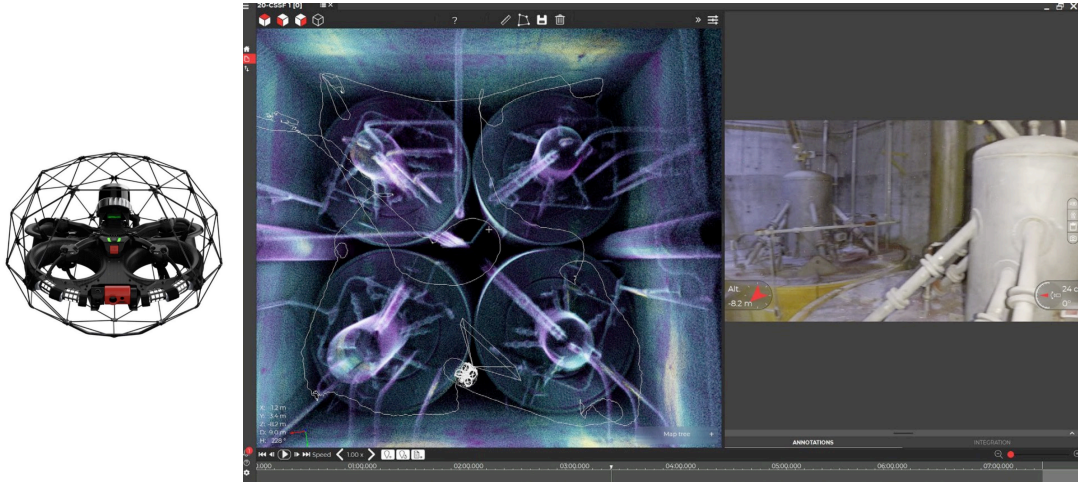


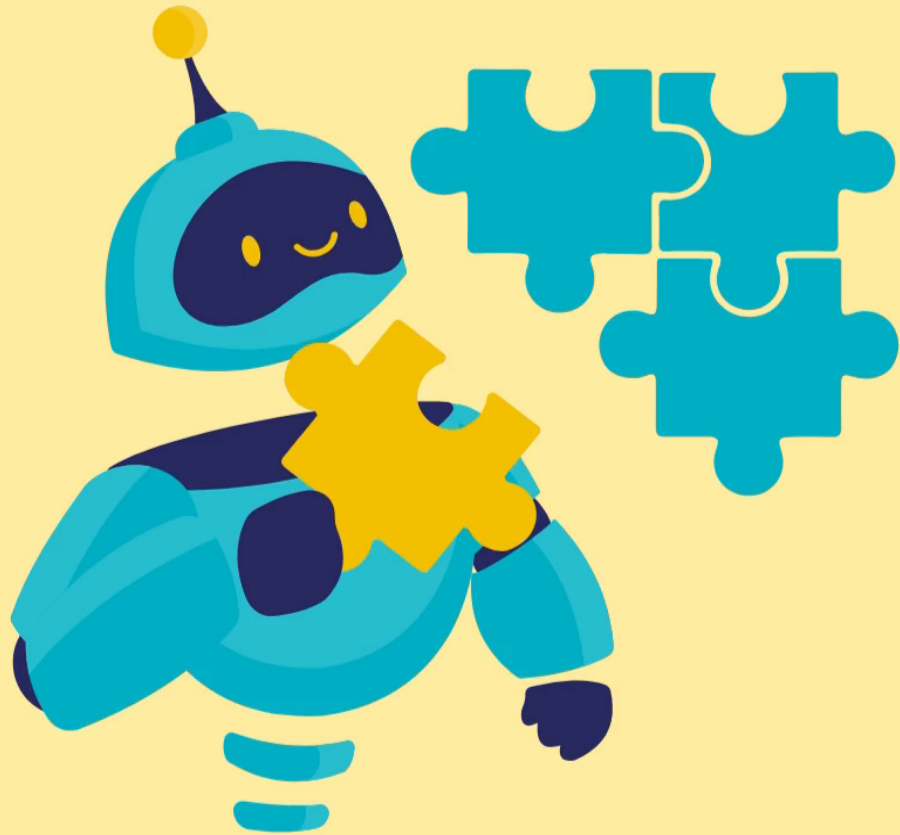
Technology Deployment

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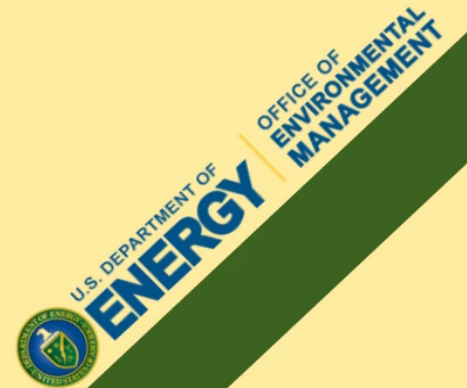


Recent Deployments





Robotics on EM's Cleanup Mission



Current Technology Portfolio

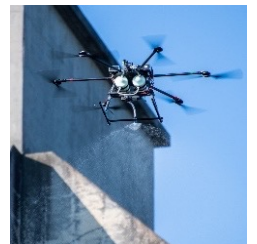
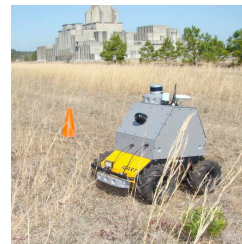
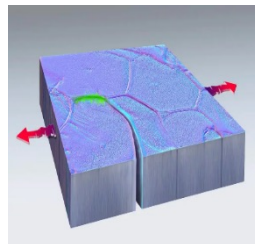
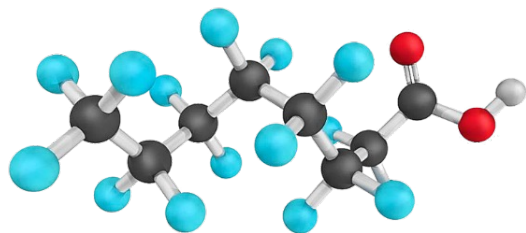
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Profile of Current Technology Projects

42 Projects (40%)	60 Projects (57%)	4 Projects (3%)
\$15,150K (22%)	\$50,090K (73%)	\$3,310K (5%)

Distribution of Lead Principal Investigators

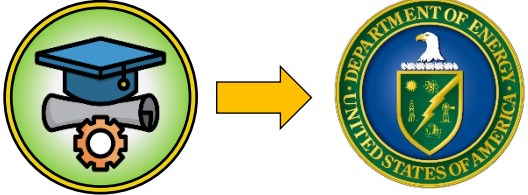
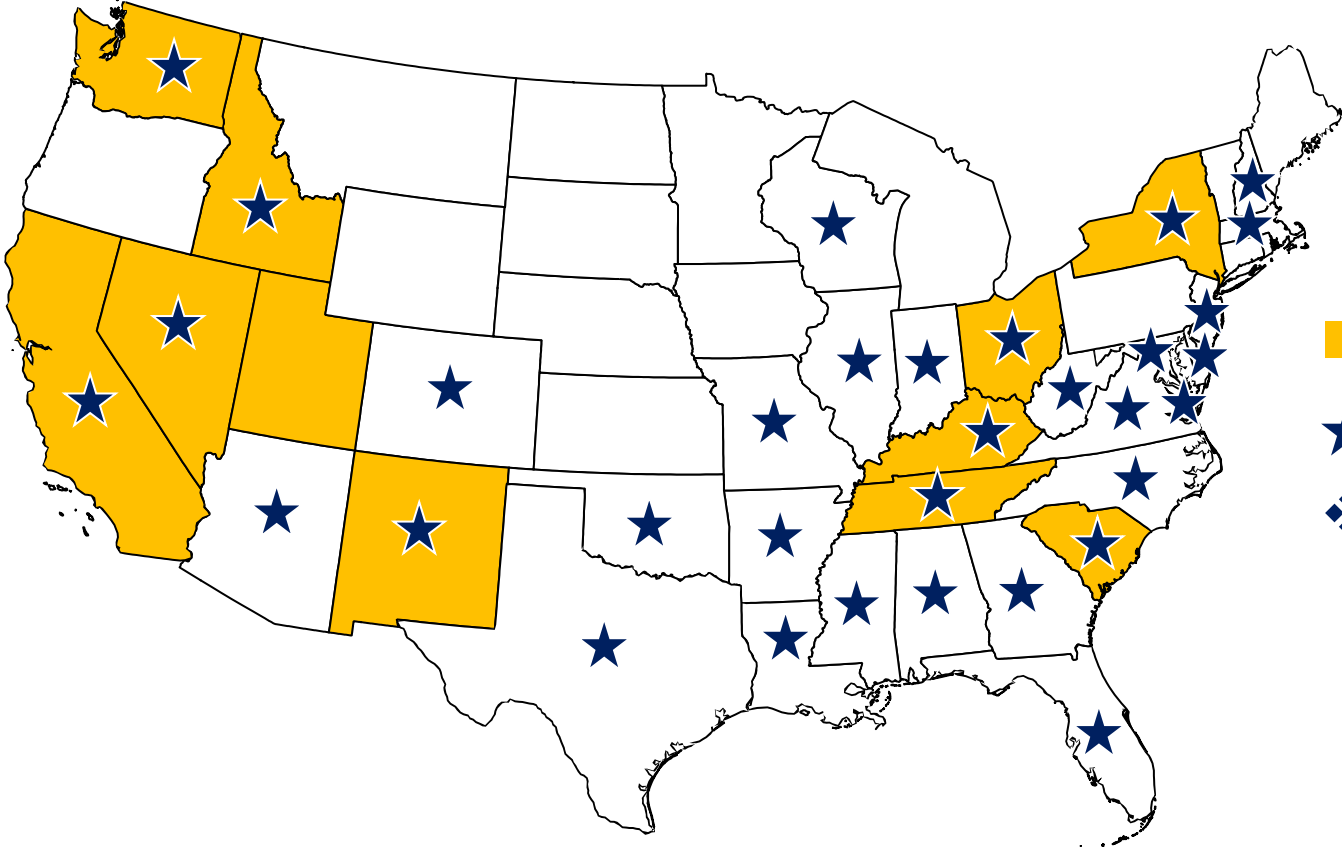
National Labs: 10 Projects (9%) Universities: 32 Projects (30%)	National Labs: 55 Projects (52%) Universities: 5 Projects (5%)	National Labs: 3 (3%) University: 1 (1%)
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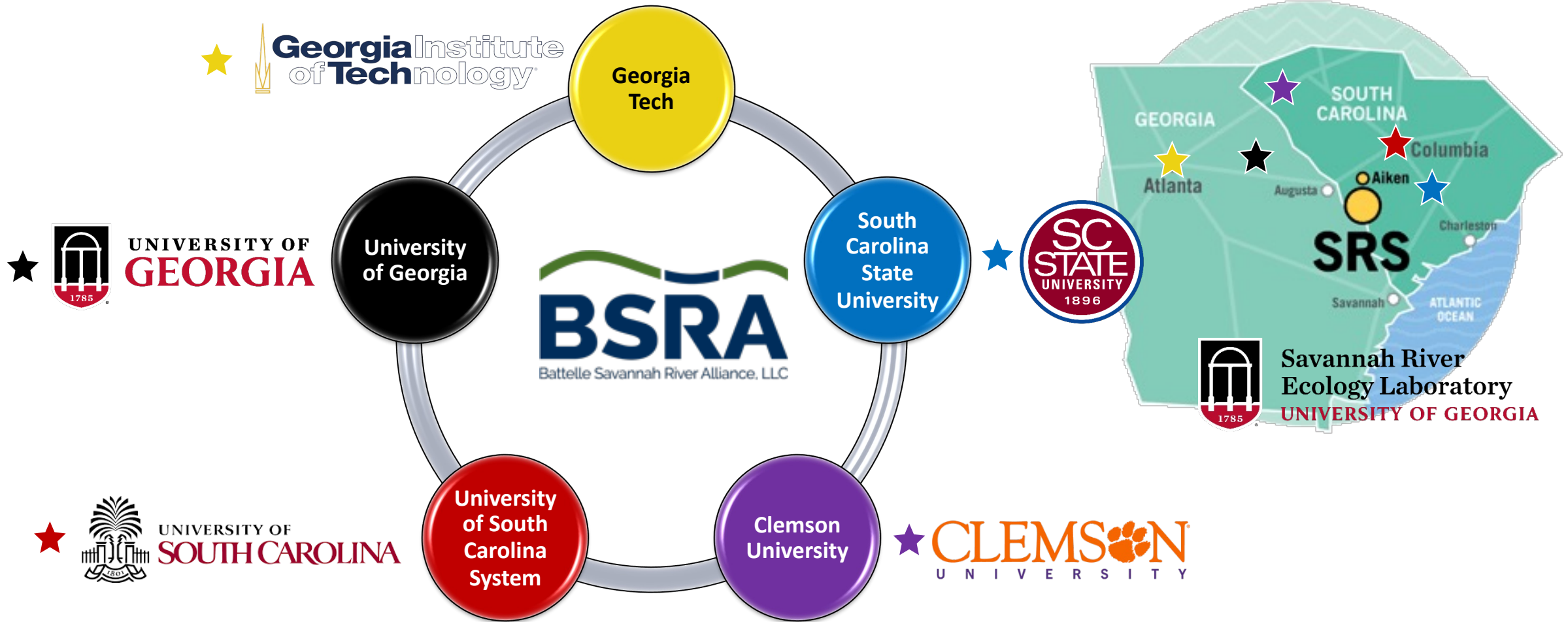
Collaboration



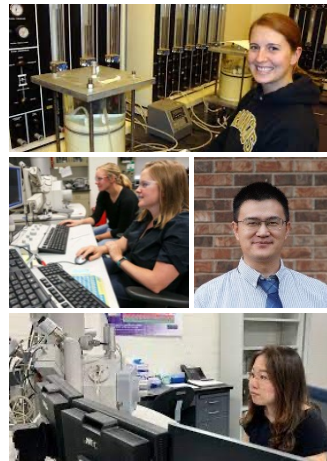
Engaging Institutes of Higher Education




- Cleanup at 11 States
- ★ IHEs in 35 States
- ❖ > 100 IHEs
 - ◆ > 75 MSIs
 - > 1,600 students
 - > 100 faculty, staff



Early Partnerships






DOE-FIU Workforce Development Program


Minority STEM Students


Science, Technology, Engineering, and Mathematics (STEM) students come from majors including: Mechanical Engineering, Electrical Engineering, Computer Engineering, Environmental Engineering, Civil Engineering, Chemistry, Computer Science, and Mathematics.



#1 in nation in awarding bachelor's and master's degrees to Hispanic students.


5th largest U.S. public university by enrollment





98% Hiring Rate* After Graduation

*This number is based on 125 Fellows out of 127 that have completed the program and joined workforce with in DOE, federal, state and local gov't agencies and STEM industry upon graduation, 18 DOE-EM and 1 DOE-LM Fellows are currently in the program, 15 graduated from FIU and pursued graduate studies at other universities and 46 left the program before graduating



Tomorrow's Workforce

The DOE-FIU Fellowship program allowed me to gain hands-on research experience, solving real-life problems with FIU-ARC engineers and DOE national laboratory scientists. Thanks to these collaborations, I had five peer-reviewed journal publications upon graduation. Always GANAS! A forever and ever DOE Fellow

DOE EM has benefited tremendously from our partnership with FIU. The caliber of the DOE Fellows are top-notch, especially in the STEM disciplines, in meeting our mission objectives.

20 Students hired by DOE, national labs, and DOE contractors

19 Students hired by federal, state, and local government agencies

86 Students hired by private STEM industry

Silvina Di Pietro (DOE Fellow - Class of 2015)
NNSA Graduate Fellow & Postdoctoral Researcher

Melody C. Bell (EM 70 acting DAS)
DOE Environmental Management

A "pipeline" of minority engineers specifically trained and mentored to enter the Department of Energy workforce in technical areas of need.

More info at <http://fellows.fiu.edu>

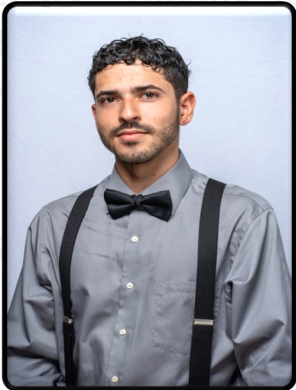
Revision Date: August 18, 2023

MSI Partnerships

- ❖ Competitive Research Awards
- ❖ Technology, Curriculum and Professional Development Grants
- ❖ Shared Interest Research Partnerships Grants
- ❖ Savannah River Environmental Sciences Field Station
- ❖ Internships
- ❖ Graduate Fellowship
- ❖ Postdoctoral Research



Recent Good News



Axwel Deliz Arroyo
IU PR → SRESFS



Olivia Bustillo
FIU → UCOR



Silvina Di Pietro
FIU → LLNL



Josue Estrada
FIU → WRPS



Phuong Pham
FIU → SRNL



Looking Forward

❖ Industrial Revolutions

- ◆ 1st (1765): Coal, steam, mechanization
- ◆ 2nd (1870): Electricity, steel, chemical synthesis, comms, mass production
- ◆ 3rd (1969): Fission, electronics, telecommunications, computers
- ◆ 4th (2000): Renewables, IoT, big data, human-machine interaction, AI/ML, automation/robotics
- ◆ 5th (2030): *Fusion, sustainability, human-centeredness, deep space*
- ◆ 6th (2060) and 7th (2090): ?

❖ Workforce Generations

- ◆ 1946 – 1964: Baby Boomers
- ◆ 1965 – 1980: Generation X
- ◆ 1981 – 1996: Millennials (Gen. Y)
- ◆ 1997 – 2012: Generation Z
- ◆ 2013 – 2028: *Generation A*
- ◆ 2029 – 2044: *Generation B*
- ◆ 2045 – 2060: *Generation Γ*
- ◆ 2061 – 2076: *Generation Δ*
- ◆ 2077 – 2092: *Generation E*

Final Thoughts

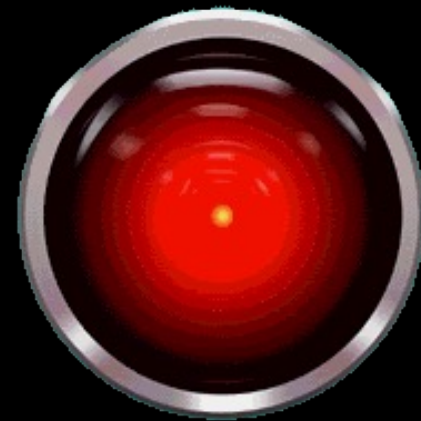
❖ Technology & Innovation

- ◆ Exploit scientific discoveries
- ◆ Keep pace with technological advancements and the future-of-the-art
- ◆ Facilitate and embrace new concepts, advanced tools, complimentary capabilities, and baseline alternatives

❖ Workforce & Workplace

- ◆ Technology as an elixir
- ◆ Generational succession and workforce planning
- ◆ Become the “greener grass”

I'm sorry RemPlex.
I'm afraid this talk
has just been
terminated.



2001: A Space Odyssey

HAL 9000 (Heuristically programmed Algorithmic computer)

thanks

**director, acting
em office of technology development**

rodrigo.rimando@em.doe.gov

