So you are thinking about a career in science…

Approved for public release

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Pass the Torch Speaker Series
Carroll High School
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EXASCALE COMPUTING PROJECT
National Nuclear Security Administration
U.S. DEPARTMENT OF ENERGY | Office of Science

A little bit about me…

Julia C. White is the ECP **Technical Operations Manager**. The ECP will enable a new era of high-performance computing by employing a holistic approach that merges focus areas in application development, software technology, hardware technology, and exascale systems.

White facilitates operations within and across each focus area and is also the project's Risk Manager. She previously held management roles at Oak Ridge and Pacific Northwest National Laboratories and at *Physical Review B*, an international journal specializing in condensed-matter phenomena and materials physics. Most recently, she was program manager for INCITE, which allocates computer time on DOE's Leadership Computing Facilities supercomputers.

White holds a PhD in chemistry from Indiana University–Bloomington and an MBA from the University of Tennessee–Knoxville.

You may explore one—or many—careers related to science

My life has encompassed several careers

Evolution of my career in science: College

Setting the Stage

I like to read, am analytical, like processes, and have an inquiring mind.

It was assumed that I would go to college. My parents were college graduates, but I had no role models in science-related careers.

I went to Earlham College in Richmond, IN, and graduated with a BA in chemistry.

What I did right	What I did wrong
Did pick the right sized school for me	Didn't visit enough schools
Did a summer research internship	Didn't network with professors during my college career
Did change majors	Didn't think post-college

Evolution of my career in science: Graduate School

Setting the Stage

Since I'd given no thought to my post-college experience, I applied and was admitted to graduate school where I focused on simulation research: using computers, not a laboratory, for to explore fundamental aspects of materials.

I went to Indiana University in Bloomington, IN, and graduated with a PhD in chemistry.

What I did right	What I did wrong
Did receive scholarship funds and a research stipend	Didn't visit multiple schools
Did give graduate seminars, published papers	Didn't network with professors during my grad school career
Did graduate in 5 years	Didn't think post-graduate school

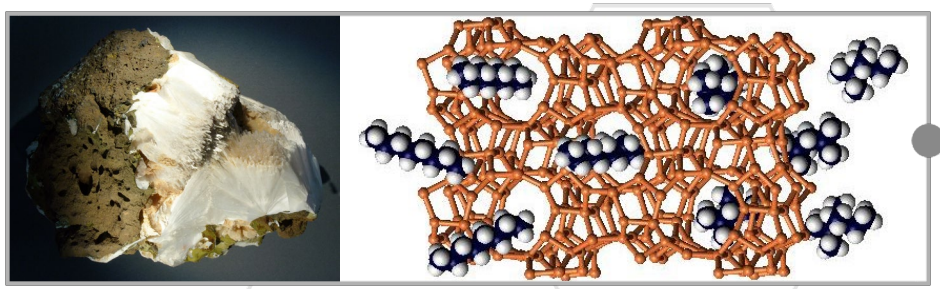
Evolution of my career in science: Post graduate school

Setting the Stage

Following a 3-year postdoc at Pacific Northwest National Laboratory (PNNL), I chose between another postdoc, a career in academia or research, or something else. I chose something else and left research for a position with a physics journal and rose through the ranks to senior editor. Later, I accepted leadership positions at PNNL and at Oak Ridge National Laboratory, where I remain today.

What I did right	What I did wrong
Did follow my heart and choose a different path	Didn't leave soon enough
Did develop a huge network of research contacts	Didn't factor in geographical location in career moves
Did foster a network of professional contacts	Didn't stay in research long enough to establish street 'cred'

My life has encompassed several careers



Researcher

Publishing

Project Manager

U.S. DEPARTMENT OF ENERGY
INCITE
LEADERSHIP COMPUTING

ECP EXASCALE COMPUTING PROJECT

A diverse work experience in science enables me to

Facilitate communications and operations of an R&D project among teams spread across the US

- ✓ Promote cross-project collaboration
- ✓ Share research achievements
- ✓ Manage project risks

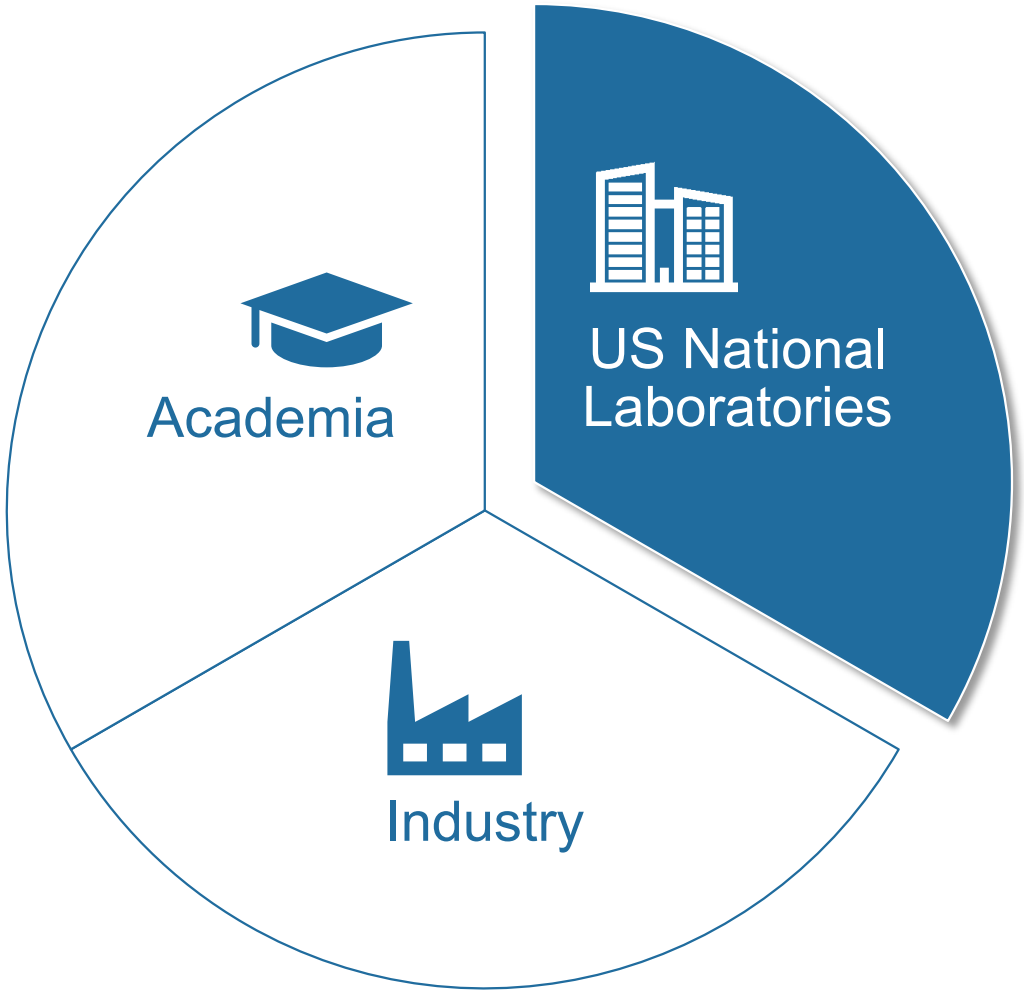
Exascale Computing Project

A seven-year, **$1.8B** high-performance computing research and development project launched in 2016

6 core US Department of Energy **national laboratories**

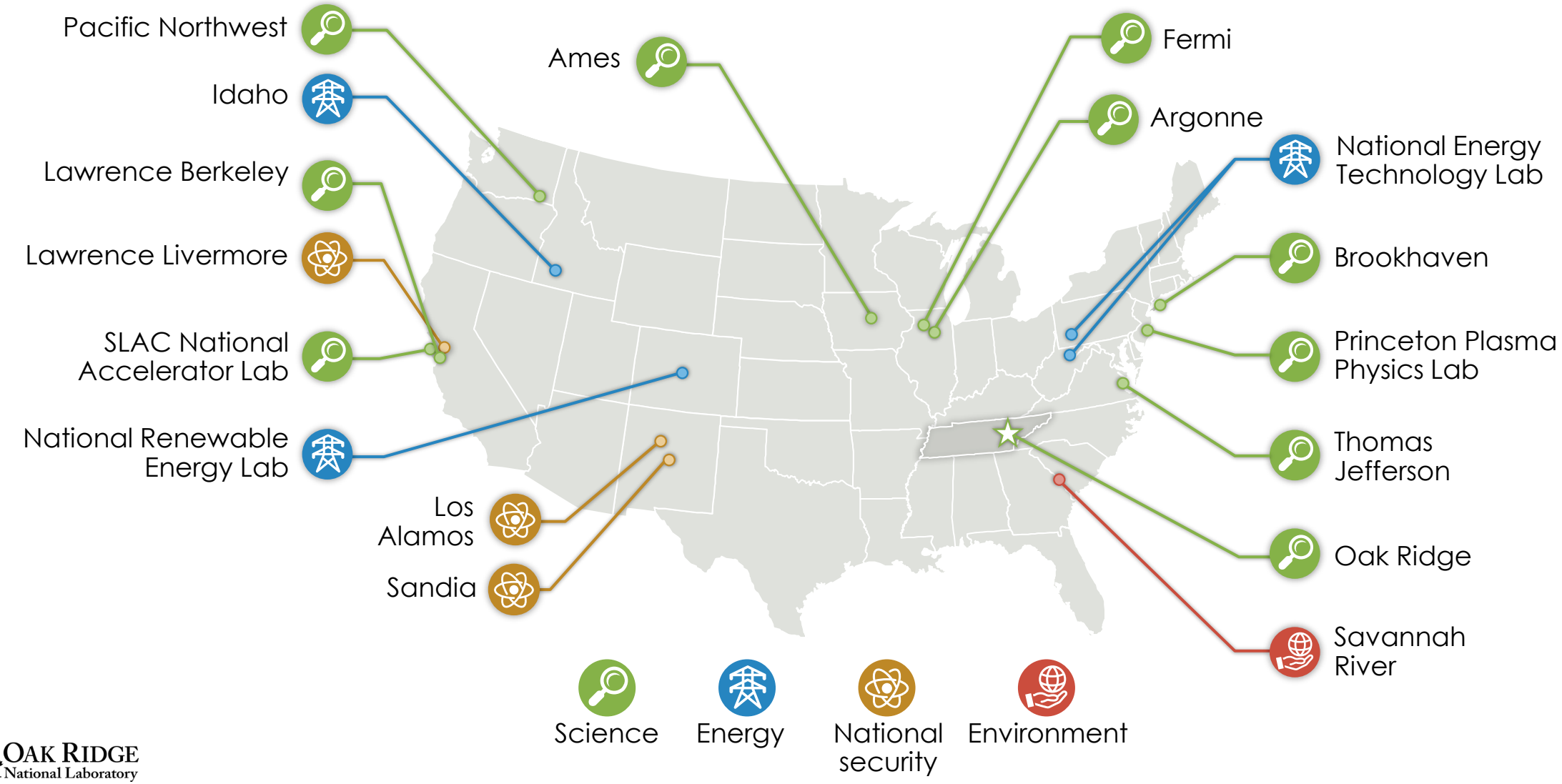
80+ R&D teams and 1000+ researchers
Three technical focus areas: Hardware and Integration, Software Technology, Application Development

Work environment for science-related careers



The US Department of Energy (DOE) National Laboratories and Technology Centers are a system of facilities and laboratories overseen by the DOE for scientific and technological research. Sixteen of the seventeen DOE national laboratories are federally funded research and development centers administered, managed, operated and staffed by private-sector organizations under management and operating contract with DOE.

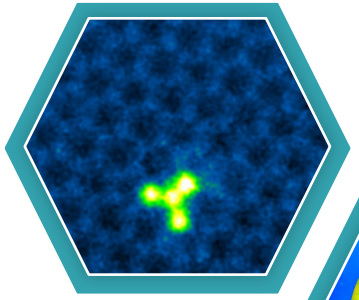
As a US Department of Energy (DOE) national lab, ORNL is part of a network for discovery and innovation



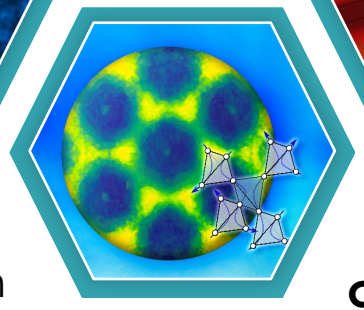
OAK RIDGE National Laboratory

ORNL's major science and technology initiatives

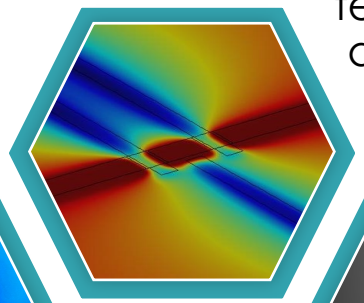
Discover and design next-generation **materials and chemical processes** for energy



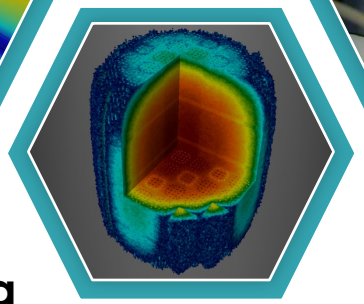
Advance the impact and application of **neutron science**



Scale **computing and data analytics** to exascale and beyond for energy

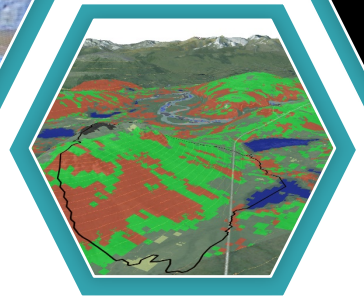


Achieve breakthroughs in **nuclear** science, technologies, and systems



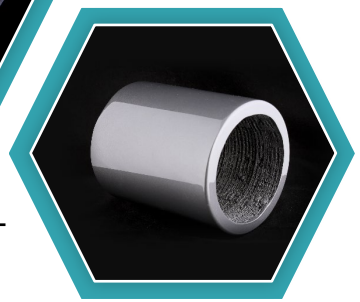
Provide strategic capabilities in **isotope R&D and production**

Understand complexity in **biological and environmental systems**



Deliver S&T to address pressing **national security** challenges

Deliver transformational R&D on integrated **energy systems**



So you are thinking about a career in science…

Classes you will need

- A firm foundation in mathematics is key. After that, take courses in areas of interest to you: chemistry, biology, physics, etc.
- Take computer science classes regardless of the science area you are pursuing. You'll never regret it and will always have a career "Plan B."

People who succeed in science

- Analytical
- Focused
- Dedicated
- Communicate well

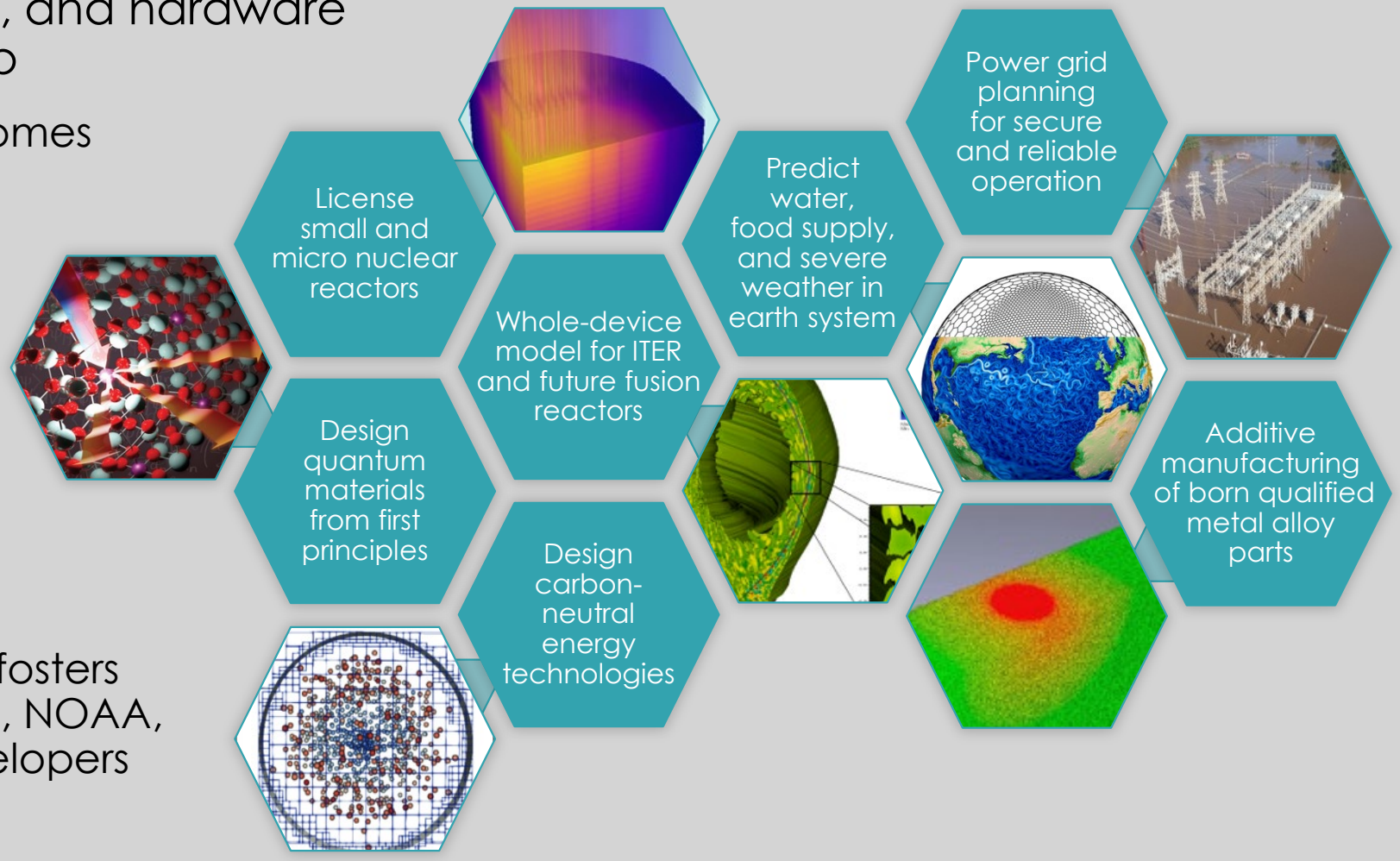
Lessons learned

- An advanced degree takes time and effort. There is no work-life balance. However, it opens many doors and in some cases is a prerequisite for a career in science.
- Network, network, network. Your teachers, professors, colleagues, and employers want you to succeed. Talk with them. That conversation may lead to your next project, grant, or job opportunity.

ECP delivers

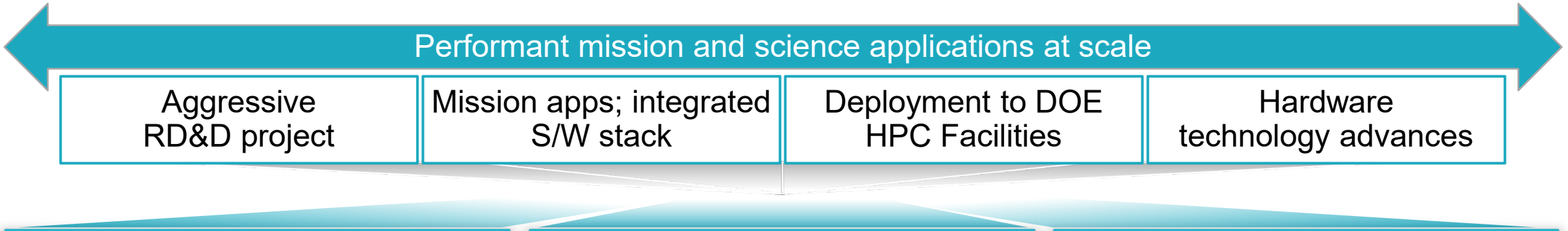
24 mission-critical apps, software, and hardware systems under 20 MW per exaflop

- Applications on track for key outcomes on problems of National interest
  - Built upon a new and sustainable Extreme Scale Scientific Software Stack (E4S)
- Successful February 2021 IPR results in 3 proactive plans
  - Contingency buy-down
  - End of project post ECP transition
  - Strategic software sustainability
- ECP Industry and Agency Council fosters collaboration with NSF, DoD, NASA, NOAA, NIH and US industry users and developers of HPC technologies



ECP's Technical Focus Areas

Providing the necessary components to meet national goals



Application Development (AD)

Develop and enhance the predictive capability of applications critical to DOE

24 applications
National security, energy, Earth systems, economic security, materials, data

6 Co-Design Centers
Machine learning, graph analytics, mesh refinement, PDE discretization, particles, online data analytics

Software Technology (ST)

Deliver expanded and vertically integrated software stack to achieve full potential of exascale computing

71 unique software products
spanning programming models and run times,
math libraries,
data and visualization

Hardware and Integration (HI)

Integrated delivery of ECP products on targeted systems at leading DOE HPC facilities

6 US HPC vendors
focused on exascale node and system design; application integration and software deployment to Facilities