



National Strategic Computing Initiative (NSCI)



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National Strategic Computing Initiative (NSCI)

Maximize HPC benefits for economic competitiveness, scientific discovery

National

- “Whole-of-government”, “whole-of-Nation” approach
- Public/private partnership with industry, academia

Strategic

- Leverage beyond individual programs
- Long-time horizon (decade or more)

Computing

- HPC: most advanced, capable computing technology available
- Multiple styles of computing, and all necessary infrastructure
- theory and practice, software and hardware

Initiative

- Above baseline effort
- Link and lift efforts

Objectives in the NSCI Executive Order

1. Accelerate delivery of a capable exascale computing system that integrates hardware and software capability
2. ***Increase coherence between technology base used for modeling, simulation and that used for data analytic computing.***
3. ***Establish, over 15 years, a viable path forward for future HPC systems even after the limits of the current semiconductor technology are reached (the “post Moore’s Law era”).***
4. ***Increase the capacity and capability of an enduring national HPC ecosystem by employing a holistic approach ... networking technology, workflow, scaling, foundational algorithms, software, accessibility, and workforce development.***
5. Develop an enduring public-private collaboration to ensure that the benefits are shared among government, academia, industry.

NSCI Organization

NSF Called on to Provide Leadership

- Scientific Discovery Advances
- Broader HPC Ecosystem for Scientific Discovery
- Workforce Development

Executive Council

- Co-chairs: OSTP and OMB Directors
- Initial Implementation Plan Submitted (90 days)

NSF Plan Builds on the current foundation while setting an ambitious Future

- Investment in Software, Technology, People
- NSF lead: Irene Qualters, DD ACI
- OSTP leadership team includes S. Gonzales (MPS)
- NSF-wide WG: R. Eigenmann (CISE/ACI), E. Misawa (MPS) includes all directorates

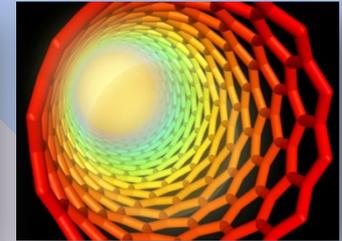
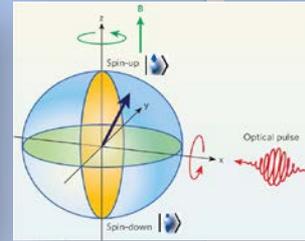
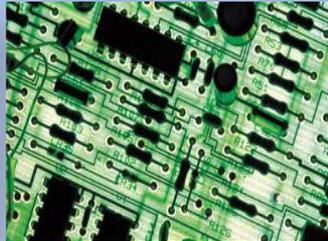
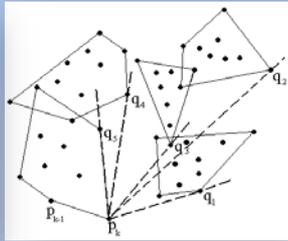
NSCI Organization: federal agencies

- DOD + DOE
 - Capable exascale program
 - Analytic computing to support missions: science and national security
- NSF
 - Scientific discovery
 - Broader HPC ecosystem
 - Workforce Development
- IARPA + NIST
 - Future computing technologies
- NASA, FBI, NIH, DHS, NOAA
 - Deployment within their mission contexts

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3. NSCI: Establish, over the next 15 years, a viable path forward for future HPC systems in the post Moore's Law era



Happening now

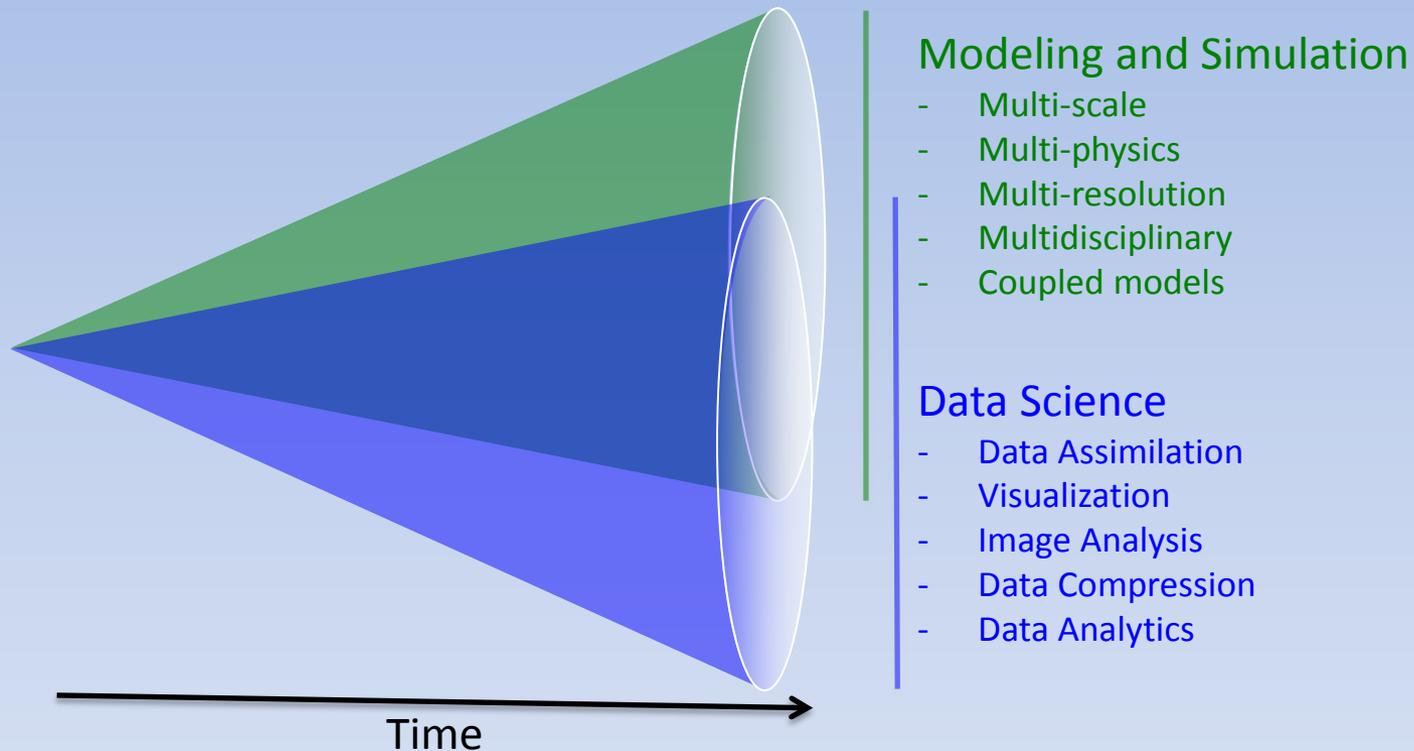
- Multi-core and many-core processors
- Domain-specific integrated circuits
- Energy-aware computing
- Hierarchical memories
- High-speed Interconnects

Longer term

- Usable parallelism, concurrency, and scalability
- Resiliency at scale
- Decreased power consumption
- Architectures that reduce data movement
- New materials (e.g., carbon nano-tubes, graphene-based devices)
- Non-charge transfer devices (e.g., electron spin)
- Bio, nano, and quantum devices

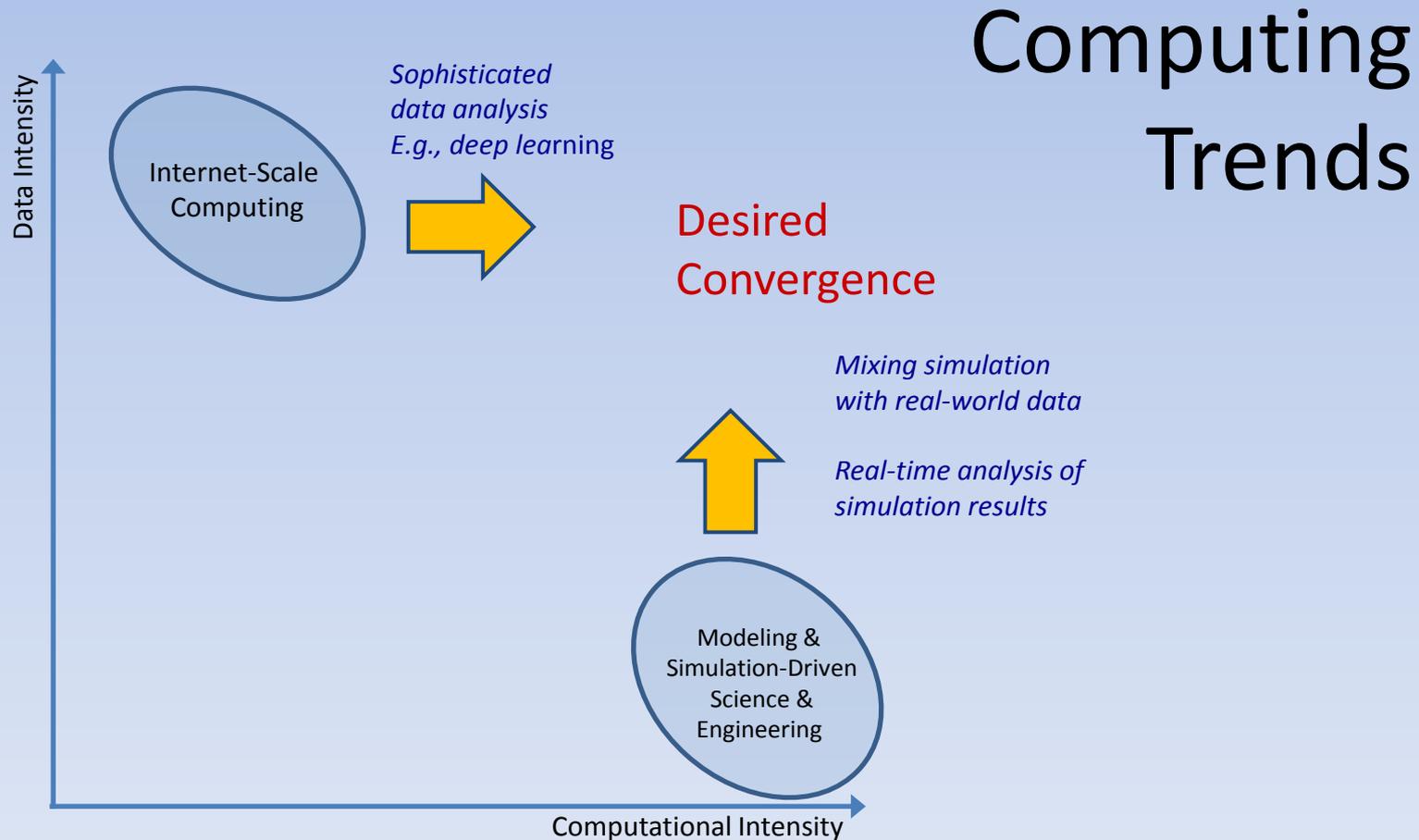
NSF Role: Support foundational research
(leadership by ENG, CISE, MPS, and BIO)
Build on Existing Interagency and Industry Partnerships

2. Increase coherence between technology base used for modeling and simulation and that used for data analytic computing

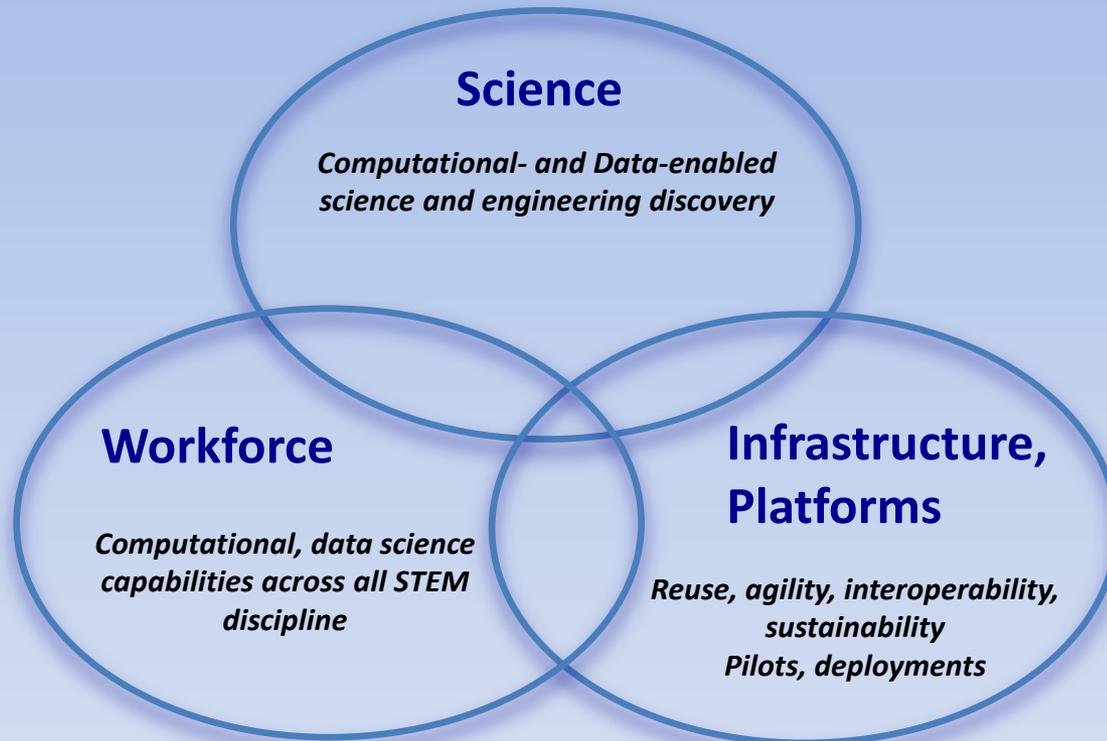


NSF Role: Support foundational research and research infrastructure within and across all disciplines (across all NSF directorates)

2. Increase coherence between technology base used for modeling and simulation and that used for data analytic computing



4. Increase the capacity and capability of an enduring national HPC ecosystem, employing a holistic approach ... networking, workflow, downward scaling, foundational algorithms and software, and workforce development.



NSF Role: Accelerate Scientific Discovery Advances

Participation by All Directorates

Expand International, Interagency, Public sector, and Industry Collaborations

National Strategic Computing Initiative (NSCI)

- Tremendous national need, tremendous opportunity!
- Long-term focus, horizon
 - leveraging, focusing accelerating
 - we are at the start
- Critical collaborations:
 - across NSF
 - among agencies
 - academia, and industry
- Acknowledgements:
 - I. Qualters (CISE/ACI), S. Gonzales (OSTP/MPS) “whole of government” leadership
 - Eigenmann (CISE/ACI), E. Misawa (MPS)