CASC | Coalition for Academic Scientific Computation

CASC Response to Key Technology Focus Areas for the Directorate for Technology, Innovation and Partnerships

Submission Deadline: July 21, 2025

Overview: The Coalition for Academic Scientific Computation (CASC) appreciates the opportunity to provide input to the National Science Foundation regarding the Key Technology Focus Areas that guide the Directorate for Technology, Innovation and Partnerships (TIP). The current list reflects critical domains that underpin U.S. innovation, economic strength, and national security. CASC supports the framework while recommending refinements and additions based on member insights and institutional expertise.

1.a) Revisions or Refinements to Current Focus Areas:

- Artificial Intelligence (1): Emphasize that AI advances depend heavily on data quality, metadata, and provenance. Effective AI development requires a parallel focus on the data lifecycle.
- High-Performance Computing (2): Make explicit reference to scalable and parallel algorithms for numerical computation and statistical inference as foundational enablers of innovation.
- Cybersecurity (currently in 8): Separate cybersecurity from data storage and management. Its complexity and national importance warrant designation as a standalone focus area.
- Advanced Instrumentation (10): Add "advanced instrumentation" to this category to reflect its critical role in experimental science and engineering.

1.b) Removal or Consolidation Recommendations:

CASC does not recommend removing any current focus areas but encourages clearer delineation between immersive technologies and core infrastructure technologies.

1.c) Additions to the List:

- Precision Medicine and Precision Agriculture: Both represent high-impact domains of translational science with economic, health, and food security implications.
- Cybersecurity (as a standalone area): Elevated due to its strategic role in protecting infrastructure, institutions, and intellectual capital.

2.a) Geopolitical Technology Competition:

- Artificial Intelligence (1): AI is redefining global influence across defense, finance, and societal infrastructure.
- Quantum Information Science (3): Quantum capabilities are poised to revolutionize secure communications and computing.
- Energy Technologies (9): Energy security and sustainability underpin national resilience and competitiveness.

2.b) Potential to Power Significant Economic Growth:

- Advanced Manufacturing (4): Innovation in manufacturing drives job creation, supply chain resilience, and exports.
- Biotechnology (7): The U.S. leads in biotechnology, which is vital for healthcare, food production, and economic growth.
- Energy (9): Scalable, stable energy solutions are essential to industrial productivity and infrastructure expansion.

2.c) Ability to Advance National Security Capabilities:

- High-Performance Computing (2): Enables simulation, modeling, and secure information systems.
- Cybersecurity (new): Foundational to protecting digital infrastructure and government/military operations.
- Biotechnology (7): Critical to biothreat mitigation, force readiness, and food security.

2.d) Talent Gaps and Workforce Risks:

- Artificial Intelligence (1): Demand for AI literacy and specialization far exceeds supply.
- Quantum Information Science (3): Requires highly specialized, long-lead training pipelines.
- Advanced Computing (2): Talent is needed across the ecosystem—from developers to maintainers and educators.

2.e) Need for Use-Inspired and Translational Research:

- Artificial Intelligence (1): Advancements must be rapidly integrated into real-world applications.
- Advanced Materials Science (10): Requires use-inspired research to enable manufacturing, sustainability, and device innovation.
- Biotechnology (7): Accelerating translational pipelines is critical for healthcare and biosecurity advances.

Additional Considerations:

CASC underscores that the success of TIP focus areas depends on a robust basic research ecosystem. Budgetary reductions to NSF's foundational science programs would undermine the very innovations TIP aims to mature. Invention without support for scale-up and commercialization often benefits global competitors rather than the U.S. economy.

Conclusion:

CASC urges NSF to maintain support for all ten technology focus areas with the above clarifications and additions. Continued investments in research infrastructure, workforce development, and translational science will sustain U.S. leadership across key technology domains.