CRA
Computing Research Association

June 26, 2018

The Honorable Lamar Smith
Chairman
House Committee on Science, Space and Technology
2320 Rayburn HOB
Washington, DC 20515

The Honorable Eddie Bernice Johnson
Ranking Member
House Committee on Science, Space and Technology
394 Ford HOB
Washington, DC 20515

Chairman Smith, Ranking Member Johnson:

As an organization representing the computing research community – including more than 200 PhD-granting departments of computing, 11 industrial research labs, and 6 affiliated computing societies – the Computing Research Association is pleased to offer our support of your efforts to enact the National Quantum Initiative. The bill establishes a needed focus on Quantum Information Science and a framework of government resources, advisory committees and coordinating offices to ensure that progress in this area proceeds with adequate support, and that the United States continues in a leadership role in developing this potentially revolutionary technology.

As you know, the computing ecosystem has had deep impacts on society and technology, profoundly changing our lives in myriad ways. Nonetheless, despite impressive performance scaling and other growth in the computing ecosystem, there are still important potential applications of computing that remain out of reach. Quantum computing is viewed by many as a possible future option for tackling these high-complexity or seemingly-intractable problems by complementing classical computing with a fundamentally different alternative computing paradigm. These potential applications include chemistry and molecular dynamics simulations in support of designing better ways to understand and design chemical reactions, physical simulations that allow us to create new materials with pre-specified properties, finding better solar cells and more efficient batteries, power lines that can transmit energy losslessly, and encryption applications that can both make vulnerable current data encryption and secure future communications. If realized at scale, quantum computing would revolutionize computing and be the most important development in the field since the invention of the transistor and the design of the original ARPANET.

But there exists a huge gap between the potential of quantum computing and what we can currently build, program, and run. The goal of the quantum computing research community is to close the gaps such that useful algorithms can be run in practical amounts of time on real-world hardware. Although the pace of development is high, the projected time to close this gap is ten years or more into the future. Efforts like the National Quantum Initiative and the investment in fundamental research in QIS are crucial, both to maintain U.S. competitiveness and to push the frontier of this exciting technology.

While we support the intent of the National Quantum Initiative Act, we do have a concern that the bill defines "quantum Information science" without sufficient focus on the computational aspects of the discipline. Without an inclusion of the concepts of "representation" and "algorithmic manipulation," the definition fails to capture some of the key computational elements, while emphasizing the physical challenges of QIS. We believe the computational challenges -- including software and algorithmic development -- are just as pressing and require sufficient focus.

1828 L Street, NW, Suite 800
Washington, DC 20036
P: 202 234 2111
F: 202 667 1066
www.cra.org
info@cra.org

CRA
Computing Research Association

But we are otherwise pleased to support the framework outlined in this bill for ensuring the U.S. quantum ecosystem remains as globally competitive as the computing research ecosystem has since the High Performance Computing Act established a similar framework for it in 1991. Thank you and your colleagues on the House Science, Space, and Technology Committee for your long-standing support of computing research and America's science enterprise. We look forward to working with you on this important legislation as it moves towards passage.

Sincerely,

Susan B Davidson

Susan Davidson
Chair
Computing Research Association

1828 L Street, NW, Suite 800
Washington, DC 20036

P: 202 234 2111
F: 202 667 1066

www.cra.org
info@cra.org