Co-design for Quantum Computing

The objective of this session is to start to understand what co-design means in the quantum computing design space. Co-design for classical digital computing takes input from a broad community consisting of end-users through to hardware designers to iteratively refine a computer system design which is optimized for simulation capability versus resources consumed. We expect that there will be similar and additional tradeoffs in the quantum co-design space.

In this session, there will be two talks, one on classical digital co-design and one on some of the first efforts in quantum co-design. This will be followed by a discussion which will attempt to address the following questions:

1. What communities must be brought together for effective co-design of a quantum testbed? How can a testbed help to bring these communities together?
2. What standards, interfaces, etc., for hardware, software, theoretical and mathematical models are needed to enable the co-design community to effectively communicate goals, requirements, tradeoffs, limitations, etc. with each other?
3. What are the elements of testbed operation that will enable rapid and effective iteration and improvement of hardware, software, and simulations?
4. Model and algorithm development; fundamental device engineering; and software (end-user facing, "middleware", and at the device level) are all key for successful co-design. What are some of the key advances required in these areas for the next 2- and 5-years?