

National Action Plan for U.S. Leadership in Advanced Compute & Microelectronics

The modern world is vertically integrated on the transistor. The incredible technology trajectory of the integrated circuit has made possible technologies like personal computers, GPS, the Internet, and smartphones. Today, however, the fundamental processes that have enabled decades of progress in compute and microelectronics are breaking down. The United States has long benefitted from its position as the global driver of innovation in these technologies, but continued leadership is not assured.

The United States should chart a post-Moore's Law future by catalyzing disruptive innovation via compute moonshots; building a flourishing atoms-to-architectures innovation pipeline that can develop, scale, and integrate novel materials and devices; and making key supporting moves to address enabling factors that make future U.S. and democratic leadership possible.

We recommend six key lines of efforts (LOEs) to advance U.S. leadership:

- 1. Launch: Scale emerging compute paradigms via national moonshot programs.** The era of Moore's Law is coming to an end. The United States needs bar-setting programs dedicated to seamless integration of compute paradigms, as well as quantum computing, energy efficient computing, and superconductor electronics.
- 2. Organize: Closing gaps in the microelectronics innovation ecosystem.** The United States must ensure it is organized to scale post-Moore's Law breakthroughs. Orienting the National Semiconductor Technology Center to pursue moonshots and fund innovation is a critical first step.
- 3. Research: Fund and attract microelectronics R&D.** The United States must commit to long-term sustained R&D funding for compute and microelectronics while channeling additional R&D dollars from industry. This includes sustained funding for CHIPS R&D programs and altering the tax code to attract private R&D dollars.
- 4. Scale: Enabling technologies for future compute & microelectronics.** Microelectronics design and fabrication requires a range of sophisticated tools, equipment, and processes. The United States must ensure it establishes positions in these enabling technologies.
- 5. Assure: International collaboration for secure microelectronics.** The next opportunity for allied coordination is addressing shared cybersecurity risks stemming from the proliferation of cheap, insecure legacy chips, IoT devices, and other hardware security vulnerabilities.
- 6. People: Cultivate, attract, and retain microelectronics talent.** To scale emerging compute paradigms and promote disruptive innovation, the nation must focus beyond staffing fab positions to training future research talent. This includes investing in high-skilled immigration, supporting engineering talent in emerging paradigms, and scaling the custom silicon movement.