

Commonwealth Research and Technology (R&T) Strategic Roadmap

Executive Summary

Submitted by the Center for Innovative Technology
on behalf of the
Innovation and Entrepreneurship Investment Authority

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Executive Summary

Innovation is recognized as the premier path to economic expansion. Success in innovation requires an ecosystem to support these breakthroughs and entrepreneurship, research in strategically important industry sectors and technologies, and commercialization of research in those promising sectors. The Commonwealth Research and Technology (R&T) Strategic Roadmap identifies sectors in which Virginia has strength and that offer commercial promise, and in which the Commonwealth may invest to drive economic growth.

Virginia has many assets that drive innovation and economic development. The Commonwealth's public higher education system is repeatedly cited as among the best in the nation. Also prominent are research centers, the Commonwealth's workforce, and such innovation assets as MACH37™, the nation's first cyber security accelerator. Virginia was ranked #5 in Forbes' Best States for Business 2017¹, up from #6 in 2016 and #7 in 2015². Along with research assets and talent, regulatory environment, economic climate, and other criteria, economic leadership also requires smart investments in research and commercialization.

In 2011 the General Assembly directed the Center for Innovative Technology (CIT) to create the Commonwealth R&T Strategic Roadmap to help guide legislators in their funding decisions. The Roadmap provides a baseline: it identifies industry and research areas worthy of economic development and institutional focus and offers a framework for aligning key industry sectors within the state. It is a guide for investing funds allocated through the Commonwealth Research Commercialization Fund (CRCF), and, effective FY2017, through the Virginia Research Investment Fund (VRIF). The R&T Roadmap provides for regular review and, as such, reflects revisions to Virginia's strategic technology priorities, direction, and investments. The initial Roadmap was submitted in November 2011 and, per legislation, has since been submitted tri-annually. In interim years, CIT has conducted a higher level refresh to ensure that recommended industry sectors remain current. This year, CIT coordinated its development of the Roadmap with the Virginia Research Investment Committee (VRIC), which will assume responsibility effective January 1, 2018 for approving the assessment that is to be developed henceforth by the State Council of Higher Education for Virginia (SCHEV). In accordance with Code of Virginia 2.2-2221.2, CIT respectfully submits this tri-annual update.

Sources that provided input include colleges and universities, federal labs and other research organizations in Virginia, and the Virginia Economic Development Partnership (VEDP). Relevant reports prepared by or for the Commonwealth, the federal government, and industry also provided insights. Additionally, the Research and Technology Investment Advisory Committee (RTIAC) contributed to this examination of Virginia's strengths and priorities, as did two new and important resources uniquely available this year:

¹ Forbes.com. (2017). *Best States for Business*. <https://www.forbes.com/best-states-for-business/list/>.

² Forbes.com (2016). *The Best and Worst States for Business 2016*. <https://www.forbes.com/pictures/582b1f12a7ea431d60195e28/best-states-6-virginia/#46f41ad914cb>.

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- Growth and Opportunity (GO) Virginia regional Economic Growth and Diversification Plans
- VRIC's (ongoing) research-asset assessment study.

GO Virginia's nine Economic Growth and Diversification Plans provided the important regional data and perspective for this FY2018 Roadmap, while VRIC's study provided valuable empirical and other data to help understand and assess Virginia's technology and commercialization capabilities and opportunities.

The FY2018 Roadmap identifies the following sectors as research and technology strengths and opportunities that cut across regional and research assets and represent high-priority industries, subsectors, and research disciplines with promising out-year growth.

- **Advanced manufacturing**, with particular interest in advanced and engineered materials and power electronics
- **Communications**, with particular interest in next-generation broadband networks and wireless telecommunications
- **Cyber security and cyber-physical systems**, with particular interest in cloud-based and enterprise networks, critical infrastructure, authorization / authentication / identity management technologies, data and application encryption and key management, and mobile / device security
- **Energy**, with particular interest in clean energy, energy efficiency, and energy storage
- **Environment**, with particular interest in marine science and water technologies
- **Information technology**, with particular interest in data management and analytics, including related to the Internet of Things
- **Biosciences and medtech**, with particular interest in biopharma, diabetes technologies, cancer, neuroscience, including cognitive disorders and therapies, health IT, bioinformatics, personalized medicine, medical devices, and software
- **Transportation**, with particular interest in transportation logistics and intelligent systems
- **Unmanned systems and aerospace**, with unmanned systems including interest in air, space, ground, and water

Identifying and funding high-impact technologies will have widespread benefit to individual regions and to the Commonwealth as a whole. Investments targeted at the intersection of industry capabilities and direction, research strengths, and economic development can create a multiplier effect that increases the benefit of the CRCF, VRIF, and other industry / research growth initiatives.

Two of Virginia's strong and promising sectors, cyber security and data analytics, are considered priorities by regions and institutions across Virginia. Investments in these sectors will support growth in multiple industries important to the Commonwealth, including healthcare and biosciences, advanced manufacturing, education, energy, unmanned systems, and government.

Research requires specialized facilities and equipment; at Virginia's public universities, such infrastructure requests may be captured in the Commonwealth's budget for capital projects and capital outlay

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recommendations. Most capital projects requested by these institutions support objectives other than research. However, as in past years, the biennial [budget](#) and latest [Systemwide Capital Outlay Budget Recommendations for Higher Education in Virginia](#) include research facilities and / or equipment, or facilities that serve such purposes as research and teaching.