

Executive Summary for the 2016 Innovate Carolina Roadmap Progress Report

This report is a comprehensive review of the creation and implementation of the Strategic Roadmap to Accelerate Innovation (Innovate Carolina Roadmap) at the University of North Carolina at Chapel Hill, from 2010-2016. It starts with messages from Chancellor Carol Folt, Board of Trustee Chair Dwight Stone, past Board Chair and Chair of the Innovation Circle Lowry Caudill and Vice Chancellor for Innovation, Entrepreneurship and Economic Development Judith Cone. They explain why this work became, and continues to be, a critical part of the strategic direction for the University as it seeks to have even greater impact.

ACCOMPLISHMENTS TO DATE

Organize and Mobilize for Impact: In 2010 UNC-Chapel Hill declared that it wanted to systematically help solve some of the biggest issues facing North Carolina, the nation and the world. The University had to build a culture, infrastructure and a robust ecosystem of innovation to have any hope of taking on grand challenges. Programs, or even a center, would be insufficient—this effort would require a centralized/decentralized approach so that each unit and program would include innovation as core to its work whenever possible. Leaders would be needed throughout the University, as well as in central administration.

This report is the story of how the Board of Trustees, chancellor, administration, deans, chairs, faculty, staff, students, alumni, parents and other donors came together to ensure that this University is well positioned to make people's lives healthier, happier and more prosperous. In the process of creating the Innovate Carolina Roadmap, the University took a hard look at itself and designed a path to become a place that thoroughly supports people who want to work with others to understand needs, and design and successfully implement solutions. The Roadmap outlined key steps that would make innovation and entrepreneurship (I&E) widely shared working priorities at Carolina.

The vision and mission paint the picture of this work:

Vision—With a special focus on the world's most pressing problems, innovators and innovations launched at Carolina consistently put important ideas to use for the public good.

Mission—Be a place where innovators thrive.

Defining innovation was an important part of the earliest discussions and focused on three equally important parts:

An innovation is a **successfully implemented, unique and valuable** idea.

The full report shares the details of the strategies, goals, actions, lessons learned and next steps for the five key strategic areas described in the Roadmap:

- **Prepare** faculty, graduate and undergraduate students, staff and the broader Carolina community with the knowledge, skills and connections necessary to translate ideas into innovations.
- **Collaborate** with diverse groups internally and externally to explore issues, options and creative approaches that may lead to innovations.
- **Translate** important new ideas more expediently and at an increased volume into innovations that improve society.
- **Align** people, incentives, resources and processes to strengthen an intentional culture of innovation at Carolina.
- **Catalyze** innovation at Carolina by facilitating the work of faculty, staff and students as they put important ideas to use for the public good.

In 2010 then Chancellor Holden Thorp commissioned a special assistant for innovation and entrepreneurship to lead the creation of the Roadmap and implementation of the centralized/decentralized model described in that document. The Innovation Circle, made up of alumni, parents and donors, was instrumental in challenging the University with different viewpoints and offering support. Faculty and student working groups helped create the Roadmap. Thorp, along with University Entrepreneur-in-Residence Buck Goldstein, released *Engines of Innovation*, a book written to encourage the reshaping of higher education institutions to better support innovation. And finally, the UNC-Chapel Hill Board of Trustees made a commitment to support innovation by devoting one of its four committees to focus on innovation and entrepreneurship, which continues today.

In 2014, the UNC-Chapel Hill Board of Trustees and Chancellor Carol Folt made innovation, entrepreneurship and economic development a top priority of their administrations. In 2015, Chancellor Folt created the new Office of the Vice Chancellor for Innovation, Entrepreneurship and Economic Development to strengthen the overall ecosystem and to offer direct programs and services. This would include creating a campus-wide integrated approach, to be continued under the Innovate Carolina label that was introduced in 2010. The Chancellor set a specific goal for commercialization, commonly referred to as technology transfer: Be among the top performing offices relative to Carolina's peers. At the time, UNC's Tech Transfer Office was one of the most underfunded, understaffed and underperforming such offices.

Achieving such a goal depends on: 1) the amount and nature of the research, 2) alignment of reward systems, 3) encouragement from deans and chairs to translate research, 4) deans, chairs, faculty, students and staff developing an innovation mindset and skillset, 5) the expectations and desires of faculty to be translational when possible, 6) efficient processes for sponsored research and the management of conflicts of interest, 7) leadership talent and funding for de-risking ideas and for faculty startups, 8) availability and funding of essential spaces and programs, especially for life-science faculty startups, 9) relationships with industry and other external partners, and 10) funding for the ecosystem from donors and the University. It is essential that an adequate budget be allocated to protect intellectual property, operate the office and hire the appropriate number of people with the required type of commercialization expertise.

At the start, some deans were already engaged in innovation and direct service to individuals and communities. Areas such as medicine, public health, social work, dentistry and government, along with the Campus Y and Center for Public Service, have service missions to North Carolina that are integral to their very purpose.

Today, across the campus, a growing number of academic units have designated faculty serving as their Innovation and Entrepreneurship (I&E) liaisons, and many have external entrepreneurs-in-residence (EIRs) who help to watch for promising ideas and mentor potential faculty or student entrepreneurs. The Innovate Carolina Student Leadership Team, formed to channel student input and to promote and assist student-led activities, is actively working with students and informing the overall agenda.

Networks and linkages of innovation leaders are growing both within the University and with external partners. In 2010 there were a few people involved in I&E. Today the Innovate Carolina Network has more than 200 people on campus who meet regularly to learn from each other, work together and help move the I&E strategy and programs forward.

Communication of I&E news has accelerated; a master web portal for information (innovate.unc.edu) is in service and all efforts are branded under *Innovate Carolina*.

Embrace Multidisciplinary, Convergence and Diversity of Thought: The Roadmap described the need for interdisciplinary, diverse communities to understand and help solve the world's most complex problems. It specified the need for hybrid disciplines, such as applied physical sciences and biomedical engineering.

- The chancellor, provost and dean of the College of Arts and Sciences created the first new department in 40 years in the sciences—applied physical sciences.
- UNC-Chapel Hill and NC State University Chancellors Folt and Woodson and Provosts Dean and Arden committed to strengthening the joint department of biomedical engineering.
- The Roadmap also called for makerspaces, graduating students data literate, strengthening computer science, building app development services and promoting serious games as important tools of innovation.

Partner with Donors and Industry: Donors such as Dennis Gillings, Tom Marciso, Fred Eshelman and many others made significant investments in translational work and continue to be involved on a strategic level as well. The Roadmap called for an increased emphasis on industry partnerships.

- The GlaxoSmithKline project with UNC-Chapel Hill for the HIV/AIDS cure was a first-of-its-kind public-private partnership. This is just the beginning of such meaningful relationships. In order to better realize these complex deals, there is now a cross-university team dedicated to developing additional deep relationships with industry.
- The chemistry department partnered with Eastman Chemical Company for joint research.
- The School of Medicine began its work with IBM Watson Health and with SAS and Siemens.
- Plans for the future call for commercialization spaces to house such activities. Most peer institutions have dedicated innovation spaces including wet labs for faculty startups and proximity for/to industry.
- The Office of Industry Contracting was formed to consolidate and improve the support of industry-sponsored research at UNC. The Office of Sponsored Research is undergoing a complete redesign.

Embed Innovation in Research and Teaching: The teaching of innovation and entrepreneurship, both for credit and in extracurricular workshops and coaching, grew from a few courses in the business school and a new minor in entrepreneurship in Arts and Sciences, to numerous programs in schools and institutes. Today the following is underway:

- Applied Physical Sciences is hiring new faculty and will be part of the proposed new convergence science building.
- Carolina's BeAM (Be a Maker) movement now operates three state-of-the-art makerspaces where students and faculty can prototype and build physical objects. This is essential for developing ideas that could lead to advanced manufacturing and new products in the arts and other fields.
- The Center for Entrepreneurial Studies in the Kenan-Flagler Business School already offered courses in 2010 and was running Carolina Challenge, a business venture competition. Today those efforts have expanded. The center, in collaboration with the Vice Chancellor's Office for Innovation, Entrepreneurship and Economic Development, has taken on responsibility for Launch Chapel Hill and 1789 Venture Labs. The new Adams Apprenticeship is their latest program.
- In 2010 the undergraduate Entrepreneurship Minor had just started and served 100 students in two tracks: social and commercial. Today, the minor enrolls 125 students per year and offers Econ 125 Introduction to Entrepreneurship, enrolling up to 400. It has hubs in Silicon Valley, New York and Beijing (recently moved to Shanghai) and continues to reach more students through nine tracks.
- The School of Media and Journalism developed numerous classes that teach design, advertising and marketing—all part of an entrepreneurial skillset. The School's Reese News Lab generates student-led solutions to current issues in the media industry.

Support Startups and Innovators: Pre-Roadmap, the University had no physical facilities dedicated to nurturing startup ventures. Now there are several with related support services and programs, and more are

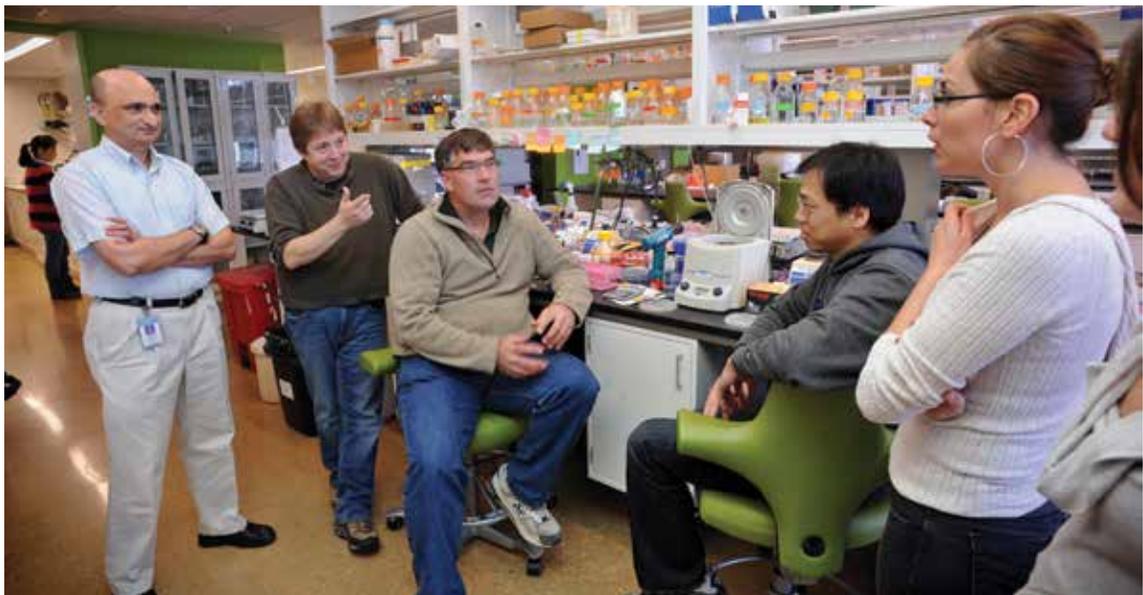
being planned through the Master Planning process. Launch Chapel Hill and 1789 Venture Lab were co-founded by University leaders and alumni, the Town of Chapel Hill, the Downtown Partnership, and Orange County Economic Development. The Becker Family generously donated funding to the University for Launch Chapel Hill, Jim Kitchen provided original funding for 1789, and various other donors contributed. The Vice Chancellor's Office provides a portion of the annual funding for Launch Chapel Hill and 1789, and the Center for Entrepreneurial Studies at the Kenan-Flagler Business School provides programming and staff. These spaces are important to nurturing startups, yet they are already too small to meet the demand. Additionally, donors are needed to maintain operations and expand the offerings. Faculty startups based on University-IP in the life sciences require access to wet labs, offices and meeting rooms. Since Chapel Hill has no wet lab space for startups, companies are forced to go elsewhere, which is inconvenient for the faculty and an economic loss for Chapel Hill/Orange County. The fundraising campaign for Innovate Carolina includes these items.

Once the Vice Chancellor position was established in 2015, several programs were absorbed into the new office. NC TracCS' KickStart Venture Services and the Kenan Institute's Patent and Landscape program as well as other initiatives became part of the comprehensive approach to commercialization, while leaving many programs operating at the unit level. Not only do startups need spaces, they need de-risking/proof-of-concept funding as well as startup funds. Grant programs for these purposes are provided through the Eshelman Institute for Innovation, the NC TracCS program, the School of Medicine, UNC Health Care and the Office of the Vice Chancellor for IEED. The Vice Chancellor's Office worked with the Board of Trustees and the Office of the Vice Chancellor for Finance and Administration to establish the Carolina Research Ventures Fund. Sallie Shuping Russell was instrumental in making this a reality and serves as the chair of the board. The Carolina Angel Network is the latest program designed to help close the early-stage funding gap.

- **Launch Chapel Hill Accelerator:** 63 companies since 2013 > raised \$15M > 250 jobs in Orange County > 1,000 jobs beyond Orange County > 3 companies acquired.

Launch Chapel Hill is an international award-winning startup accelerator located in downtown Chapel Hill. Initiated by UNC-Chapel Hill, this public-private partnership brings together the Town of Chapel Hill, Orange County, the University and a private donor. Twice a year, it accepts applications from entrepreneurs who are committed to building their early-stage businesses into self-sustaining enterprises. Its goal is to provide the tools and knowledge needed to decrease risks, reduce go-to-market time and accelerate the growth of startups.

The Genome Sciences Building brings faculty and researchers together, fostering collaboration among multiple units across campus. From left are, Hemant Kelkar, Center for Bioinformatics, Department of Genetics at the School of Medicine; Greg Copenhaver, Biology, Carolina Center for Genome Sciences, Lineberger Comprehensive Cancer Center; Joe Keiber, Biology; Yuchang Tsai, Biology; Daniela Munoz, Genetics and Molecular Biology at the School of Medicine discuss a project in one of the labs in the new building.



- **KickStart Venture Services:** Provided \$1.8M in awards to 56 IP-based faculty startups since 2009 > \$20M in SBIR/STTR grants > \$137M in total funding.

KickStart Venture Services, part of the Vice Chancellor's Office for IEED, supports the formation of IP-based companies at UNC-Chapel Hill. Services include business development through coaching and mentoring, early-stage funding, connection with key service providers, management, investors and space. KickStart Labs is the wet lab startup incubator located on campus in the heart of research and innovation. KickStart Labs has incubated 20 startup companies, offering proximity to the University founders, access to specialized equipment and a location for a faculty startup business.

- **Carolina Research Ventures Fund LLC:** Started in 2015 > \$10M fund > Hired Hatteras Venture Partners to manage > 3 investments to date in startups that have raised more than \$115M.

Many of the UNC-Chapel Hill faculty startups based on intellectual property are working on breakthrough ideas and solutions that could greatly benefit the public. However, private investment capital is not broadly available at this earliest stage, preventing many potentially-valuable innovations from evolving into commercial products. The Carolina Research Ventures Fund helps unlock these young companies' potential and get their products into the hands of businesses and consumers by providing early capital and leveraging the University's relationships with the national venture capital community. This is an affiliated entity, run by an experienced board that oversees a venture capital firm managing the fund.

- **Carolina Angel Network:** Started in November 2016 > has 90 members, exceeding expectations by three-fold > has a \$2M side-car fund designed to return revenue to the University.

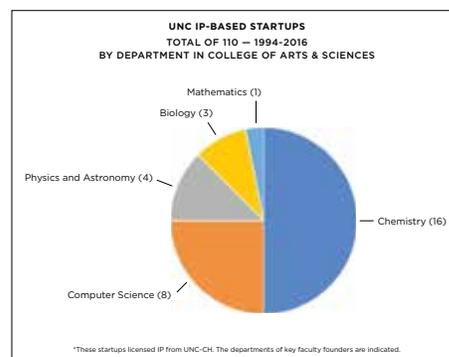
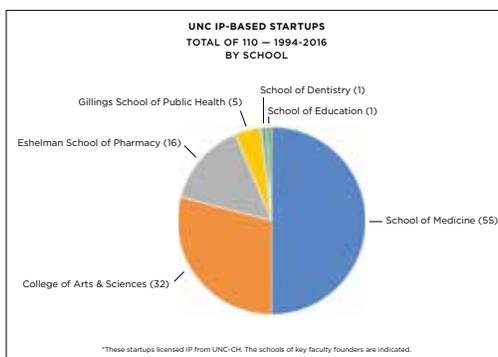
CAN is part of a four-university consortium made up of Duke, NC Central, NC State and UNC-Chapel Hill. These four universities first started working together when they formed the Blackstone Entrepreneurs Network. The Blackstone program provides growth-oriented entrepreneurs the opportunity to be mentored by a group of the area's top repeat entrepreneurs called entrepreneurs-in-residence (EIRs). Angel investors are often the first significant people to believe in a startup, thus they play an important role in the early stages of building a company. And since the Blackstone EIRs' goal is to get entrepreneurial teams investment ready and funded, these two programs are complementary.

- **Office of Commercialization and Economic Development (OCED):** Includes technology transfer, strategic partnerships, startup services, and outreach to faculty to drive the pipeline and build faculty innovation capacity.

The Roadmap outlined in detail the types of actions needed to improve the translational outcomes of the University. The University's goal is to maximize the societal value of its intellectual property and other ideas, plus return revenue to the University. As part of the newly formed Office of the Vice Chancellor for Innovation, Entrepreneurship and Economic Development, the OCED was formed to commercialize University intellectual property, as well as to help move forward important ideas of all kinds. Significant changes were made to the tech transfer office, and the aforementioned additional units were added. For more information, please visit oced.unc.edu. This office reports the official data on technology transfer to the Association of University Technology Managers (AUTM). These are but a few examples of the hundreds that are described in the full report. Collectively they reflect the comprehensive ecosystem and culture of innovation at Carolina.

Because it takes a long time to realize the investment in life science technologies, the following statistics from tech transfer activities are reported as annual averages over a five-year period.

	Annual Avg. FY07-11	Annual Avg. FY12-16	Cumulative 1994-2016	% Increase / % Decrease
Disclosures	127.8	157.2	2762	23%
Patent Applications	116	169.4	2551	46%
Issued US Patents	25.4	37.4	705	47%
Licenses	58.2	52.8	1183	-9%
Startups	4.2	9.8	110	133%
Revenue	\$2.4 M	\$4.16 M	\$57.10 M	73%



WHAT LIES AHEAD

As this report shows, many significant initiatives are now well under way with efforts in other areas at the planning or early stages. Some key areas going forward are:

- Innovation and entrepreneurship are central to UNC’s strategic priorities and the plans of many of the schools. In fact, within The Blueprint for Next, the University’s strategic framework, one of the two core strategies described is called “Innovation made fundamental.”
- A comprehensive space plan is in progress and will become part of the 10-year master plan to develop more and better spaces for Innovate Carolina Network programs.
- A number of University policies and procedures need updating to facilitate, rather than hinder, innovation. These include conflict of interest resolution, tenure and promotion guidelines to include I&E activities by faculty, and reducing barriers to collaboration across boundaries. These are being addressed with an ultimate goal of building a nimble, responsive organization.
- Better measurement and evaluation of I&E impact are needed, both to document Carolina’s contributions to society and to inform future work. This is challenging, as positive impact takes many forms beyond more easily measured economic gains.
- Further fundraising and appropriate budgeting for Innovate Carolina programs is critical.
- Pan-university dialogues on social innovation and economic development will guide the work in these areas.

In general: The work begun under the 2010 Innovate Carolina Roadmap is itself a massive exercise in innovation. It amounts to a sweeping re-invention of the University across many fronts to better serve a fast-changing society. New ideas have been piloted and proven, which now need to be scaled and/or widely emulated.



UNC-CHAPEL HILL'S SANCAR WINS NOBEL PRIZE IN CHEMISTRY

Aziz Sancar, MD, a researcher in the School of Medicine, was honored with the 2015 Nobel Prize in Chemistry for his research on the natural mechanisms of DNA repair. DNA in living cells can be damaged by many factors, and health may depend on the body's ability to restore the affected parts. Sancar's early work identified a mode of repair which, if defective, can allow UV damage to lead to skin cancer. His Sancar Lab at Carolina has now "mapped" the various DNA repair mechanisms for the entire human genome—information that could help in finding new ways to deal with cancers, aging and other conditions

Born in the historic town of Savur in Turkey, Sancar began his career as a medical doctor, then came to the U.S. for his doctoral studies and research. A member of the UNC-Chapel Hill faculty since 1982, he is the Sarah Graham Kenan Professor of Biochemistry and Biophysics. Sancar shared the Nobel in Chemistry with Paul Modrich of Duke and Tomas Lindahl of Cancer Research UK, whose research has shed light on other aspects of DNA repair.

top: Aziz Sancar, MD celebrates his Nobel Prize with Chancellor Carol Folt.

bottom left: UNC-Chapel Hill's two laureates the late Oliver Smithies, MD and Aziz Sancar, MD view their respective prize medals.

bottom right: Aziz Sancar, MD with UNC System President Margaret Spellings and Louis Bissette, Jr., Chair of the UNC Board of Governors.





top: Kelly Hogan, Director of Instructional Innovation for the College of Arts and Sciences and Senior STEM Lecturer in the biology department, delivers the commencement address during the 2015 Winter Commencement.

bottom: The State Historical marker for the University of North Carolina at Chapel Hill on McCorkle Place.