



UNC Chapel Hill Board of Trustees Innovation and Impact Committee

Response to Questions Posed in June 2014 Memo

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This paper responds to the questions posed to the Administration by Board of Trustees' Committee on Innovation and Impact Chair Phil Clay in his memorandum of June 10, 2014. Administrative liaisons to the Committee are Vice Chancellor of Research Barbara Entwisle, Joe DeSimone, Chancellor's Eminent Professor of Chemistry, and Judith Cone, Special Assistant to the Chancellor for Innovation and Entrepreneurship, who was asked to write the response in consultation with Vice Chancellor Entwisle.

The Innovation and Impact Committee is exploring ways to maximize the volume and quality of innovations from UNC Chapel Hill by strengthening the innovation ecosystem to benefit North Carolina and beyond. The University wants to fuel transformation at Carolina and make it a vibrant place of research, teaching, and innovation, addressing the most challenging issues of our time.

In the June 10 Memo the Committee presented the following questions to University Administration and asked for each to be answered in three parts 1) actions to date, 2) what have we learned, 3) what remains to be done. Questions and responses are arranged here under five main headings.

A. Leadership, Strategy, and Alignment

- What are the optimum administrative structures and functions for leading our efforts in innovation and entrepreneurship? What are the roles of other senior officers and deans? How is the faculty mobilized for various roles?

B. Carolina's Innovation Assets

- How does research connect throughout all of our programs and work in innovation and entrepreneurship?
- What does an innovation agenda mean for various segments of the UNC Chapel Hill community and their activities? (education programs, student activities, faculty, staff, alumni, town-gown relations)
- How can we best address design (and cultivate "design thinking") in innovation and entrepreneurship?
- What are the space requirements to support a robust innovation ecosystem? What is our strategy for Carolina North? Does the existing plan hold up? If not, how will we determine what to do?
- How can we leverage Carolina's global brand for maximum impact?

C. External Engagement

- How can we engage industry partners in building a strong innovation ecosystem?
- How can we form a strong regional infrastructure of support for our innovation agenda in the Triangle?
- How can we build and maintain an innovation ecosystem that supports both broad and deep engagement with the state?

D. Funding

- How will we adequately fund our research and its application, in light of declining federal and state dollars?
- How can we engage the venture community in support of new ventures?
- How does an innovation agenda relate to a university development campaign – and to other possible opportunities for funding?

E. Learning and Communicating

- How can we continually learn from others while also leading in innovation and entrepreneurship?
- What communication strategies are needed to bring the University community and the public on board with our innovation agenda – and to tell the story of impact?

A. LEADERSHIP, STRATEGY, AND ALIGNMENT

Q: What are the optimum administrative structures and functions for leading our efforts in innovation and entrepreneurship? What are the roles of other senior officers and deans? How is the faculty mobilized for various roles?

CONTEXT: ABOUT IMPACT

In responding to this question, it is helpful to make a distinction between commercialization of technology, and innovation as a process of putting important ideas to use for the public good. Bringing new technologies to market through startups or licensing is very important – but is only one way to be innovative and have impact. The University has taken a broad approach to innovation and has described three key translational methods used by faculty, students, and staff:

1. *Launch innovators into the world.* Graduates armed with technical knowledge, grounded in the liberal arts, and inspired to action by example are powerful ongoing contributors to impact. Carolina wants its students to graduate with the tools and confidence to apply entrepreneurial thinking and action throughout their lives. Many parties at the University have been working together to identify – and then cultivate – new skills and attributes that students will need in order to have positive impact in a fast-changing world. For example, a recent Faculty Working Group on Data Studies recommended that all students graduate data literate.
2. *Influence based on research.* Many faculty use the knowledge derived from their research to develop cases that influence government and corporate policy, inform the development of programs and interventions to influence attitudes and behaviors, or to advance the state of practice in fields including science, medicine, government, and education. Through artistic and social endeavors, other faculty, students, and staff create broader understanding of issues and provoke new insights into human affairs.
3. *Create social and commercial enterprises.* This encompasses the *formal* technology commercialization process (based on university-owned intellectual property) as well as *informal* enterprise creation (the starting of ventures that do not depend on university IP). Due to patent tracking, the formal type is officially recorded, while many of the informal type go uncounted. Students are particularly active in informal enterprise creation, although of course, faculty participate in this space also.

While the Board of Trustees Innovation and Impact Committee is broad in its vision, the focus so far has been largely, although not exclusively, on innovation in relation to commercialization and economic development.

All types of innovation require leaders to:

- Make innovation and impact a top priority and build a supportive climate.

- Communicate with multiple audiences inside and outside the University about why this is important and involve them.
- Provide sophisticated guidance and education through formal and informal programs.
- Engage strategic partners to facilitate innovative endeavors.
- Provide incentives and rewards; remove barriers.
- Fully resource the efforts.
- Ensure that the building blocks of innovation are in place (APS, BME, Data studies, Computer Science).
- Promote diversity in interdisciplinary work (team science, convergence, implementation science).
- Communicate Carolina's impact on North Carolina and on the world.

The above-listed fundamentals of an innovation ecosystem will appear in various sections throughout this document. In myriad ways, UNC Chapel Hill leaders demonstrate their commitment to innovation through their actions.

Regarding the senior administration team:

Some major steps have been taken since 2010 in terms of creating, and enhancing the work of, key offices. These offices, in turn, have done much to help build (or to revamp) systems and programs for innovation. Some critical next steps are being planned. While several offices could be highlighted, two existing and a proposed new one are discussed:

Chancellor's Office of Innovation & Entrepreneurship:

Actions To Date — I&E OFFICE

Established in 2010, this office leads campus-wide efforts to strengthen a culture of innovation and entrepreneurship and encourages all three translational approaches. Early on it engaged faculty, students, and external groups (including five Board of Trustee members) to create a strategy (the *Innovation Roadmap*) and then to implement it (documented in the *Two-Year Progress Report*). The *Roadmap* called for actions such as having the campus adopt a central major global issue such as water. It also highlighted the need for diversity in interdisciplinary approaches to help solve complex problems. It recommended creating and/or strengthening the building blocks of innovation: Applied Physical Sciences, Biomedical Engineering, Data Studies, and Computer Science.

Using the *Roadmap* as a guide and iterating along the way, the I&E Office has advocated for the issues stated above and has encouraged advancements in teaching entrepreneurship and building innovation spaces. One of the most important tasks has been to identify roadblocks and then collaborate with administrators and staff members to remove or at least lessen them. Whether people wish to pursue social, artistic, commercial, sports, health, or scientific innovations, the I&E Office monitors programs and services to ensure everyone is well served by the University community. The Office publishes progress reports on the University's innovation ecosystem every two years.

From the beginning, the Office has turned to student leaders to help set the agenda and implement the work. The Chancellor's Student Innovation Team, created in 2010, has been an integral part each step along the way, followed by a more recent graduate-student team.

Further, the I&E Office works with units across campus to start and/or improve their work, involves students as leaders in these initiatives, helps to raise funds, and provides seed grants for projects. The Office, along with the Center for Entrepreneurial Studies, co-founded Launch Chapel Hill, and it helped establish 1789 Venture Lab and the CUBE Social Innovation Incubator in collaboration with the Campus Y. It established a campus-wide community of faculty, staff, and students involved as leaders in innovation and entrepreneurship, the *Carolina I&E Network*, to grow the ecosystem. The Network has approximately 125 on the mailing list and an average attendance of 85 at monthly meetings. The I&E Office has organized these meetings to introduce the group to each other, further integrate the campus's work, provide connections to senior leaders (Chancellor Folt was the kickoff speaker), present informational sessions, bring up issues that need to be addressed, and pursue new opportunities.

The Office communicates the stories of innovation through its innovate.unc.edu website and social media. It represents the University in developing the Triangle entrepreneurship ecosystem, in the State, and on the national stage.

Finally, the I&E Office has helped raise millions of dollars for innovation and entrepreneurship. (The *Roadmap* goal was \$125 million, and that target is close to being reached with one year left in the plan.) In turn, the University has helped social ventures, student startups, and faculty spinoffs get started. Thousands of students have engaged in experiential education to learn what it means to think and act entrepreneurially.

What We Have Learned — I&E OFFICE

The strategic and catalytic role of this Office is important to drive innovation in myriad ways on campus and to ensure that resources and processes are aligned with the vision. Singularly, it works across all dimensions of the University: Administrative and academic leadership, research, teaching, service, undergraduates, graduate students, post docs, faculty, staff, donors, and the community. This type of panoramic view allows Carolina, as a large complex organization, to make the type of strategic decisions necessary to be a vibrant innovation hub that tackles the biggest challenges of our time.

Much progress has been made; much important work remains. Culture building requires consistency over time.

Remains to Be Done — I&E OFFICE

Recommendations

- Continue to be a catalyst. Articulate the vision and mission, engage a wide variety of internal and external stakeholders, and advocate for a culture of innovation and entrepreneurship campus-wide.
- Continue to evaluate the ecosystem, advocate for necessary changes and promote new advancements in how our campus accomplishes this work.

- Implement tools that can be shared within the *Carolina I&E Network* such as the adoption of Salesforce, which is under way.
- Celebrate successes and tell the stories of innovators and their impact.
- Help raise funds for campus initiatives.

Office of the Vice Chancellor for Research:

Actions To Date — OFFICE OF RESEARCH

The Office of the Vice Chancellor for Research represents the front end of the innovation pipeline. Despite the sequester and the federal shutdown, Carolina has continued to increase its research and it now ranks 9th nationally in federal funding, and 11th from all sources. Federal sponsors account for most of this funding. Accordingly, the Office of Research has had a strategic focus on diversification, making investments and organizational changes to support funding from industry, including our own spinouts. It has also made investments to help maximize the impact of Carolina’s research through support for the CTSA, and through the research centers and institutes, where applied research related to policy, programs, and practices is largely based. It is these accomplishments that highlight even more graphically the underperformance on the other end of the pipeline.

With respect to commercialization specifically, the Office of Research has made improvements in the Office of Technology Development (OTD) through personnel and budget changes and better systems. It created a patent review process and a Technology Development Grant program as well as waived indirect charges on Phase I SBIR/STTR grants. OTD is performing much more effectively than previously.

As background, prior to 2010, for many years the Office of Technology Development, reporting to the Vice Chancellor for Research, was the only organization on campus commercializing research. It seemed unable to fill that role adequately, as shown by weak indicators of performance compared with peer institutions. As a consequence, in 2004 the School of Medicine started the Carolina KickStart initiative with funds from a NC TraCS CTSA award. During that same time, the Carolina Express License was created by a faculty task force and went into use in 2010.

What We Have Learned — OFFICE OF RESEARCH

The Research Office has a large and growing portfolio that now includes nearly \$800 million in research. It has 11 offices that support research development, compliance, and impact, is responsible for 16 university centers and institutes, and works with all faculty to advance their research. Carolina’s research portfolio is more than twice the size of the next largest in the UNC system (NCSU) and, because the portfolio is dominated by the life sciences, is highly regulated.

Throughout the University’s history, research and teaching have received the majority of resources, while service was lauded but certainly not an equal partner in allocations. Now that impact has risen to a priority, innovation will need to be supported accordingly.

The size and complexity of the Research Office’s portfolio is important because Carolina is in a time of transformation. The services offered by OTD have improved, but those advances in

themselves will not be sufficient to deliver the types and quality of services needed across multiple audiences quickly enough to close the innovation performance gap. Take the sum of our good actions, and we improve. Take the vision of what we could become, and it means we have to be disruptive for the public good.

There are plans to create a separate office for commercialization and economic development (discussed in the next section).

Remains To Be Done — OFFICE OF RESEARCH

Recommendations

- Continue the mission of growing research and maximizing its impact. Work closely with the Offices of Development, Communication, Innovation & Entrepreneurship, and the proposed Office of Commercialization and Economic Development, as well as with departments, centers, and institutes, to help increase research funding and facilitate the translation of research into practical benefit.
- Provide streamlined services for sponsored research proposals and agreements with private industry through the Office of Industry Contracting.
- Enhance communication research benefits through the Office of Research Communications.

Proposed Office of Commercialization and Economic Development:

This proposed new office will report to the Chancellor and provide the needed focus on end-of-the-pipeline impact. It will be nimble and experimental, give visibility to the goals, and be able to hire the type of additional talent needed. Most important, it will enable the University to take next-level steps to become a leader in these fields.

Actions To Date/What We Have Learned — PROPOSED OFFICE OF COMMERCIALIZATION AND ECONOMIC DEVELOPMENT

Presentations to the Committee highlighted the underperformance of Carolina in commercialization. While the University is much improved due to the investments of the Office of Research and those of other units around campus, incremental improvements will not catapult Carolina into becoming a global leader in this area.

Since commercialization is a critical component of the innovation ecosystem, University leaders believe this proposed office is needed to integrate the various entities on campus (including the OTD) into a unified effort and add additional services. It would build on the solid base that has been developed since 2010 and make Carolina a highly effective university in commercialization. A great deal of analysis and planning has gone into how such an office could be designed.

Economic development has been covered during the Committee meetings in relationship to the impact Carolina has on the state. The economic strength of North Carolina is of utmost importance to the University. This is our State, and we are dedicated to serving its citizens.

Having a senior-level position dedicated to economic development will harness campus-wide efforts, draw on the strengths of our research, and leverage faculty, staff, and students in a

coordinated way to make lasting and significant improvements. The proposed office would work with experts in economic development across campus to create and implement a strategy for maximizing UNC Chapel Hill's efforts, in partnership with local, regional, and state leaders from business, government, and support organizations. Further, this Office would, in partnership with Development and Research, help lead a major focus on developing industry relations.

Multiple factors are now converging that make this the time to create the proposed office:

- The Board of Governors, Board of Trustees, Chancellor and Provost are aligned behind making innovation and impact a top priority and increasing benefits to the State from UNC Chapel Hill research.
- The campus has been building a culture of innovation and has made progress in commercialization. Deans who lead units that engage in commercialization, as well as academic entrepreneurs, want the University to take the needed actions to make Carolina an exemplar in these areas.
- State government officials are encouraging universities to increase their commercialization efforts.
- Federal funding agencies increasingly favor research geared to translation and commercialization of basic science.
- Millions of people in North Carolina already benefit from the economic impetus that Carolina, as a major research university, provides, but the need is great.
- UNC Chapel Hill has not had a university-level representative for economic development since 2010, when the two-person Office of Economic and Business Development closed upon Director Jesse White's retirement. Faculty and staff working on topics related to economic development continue to meet monthly during the academic year to discuss issues, but there is no comprehensive framework for advancing their efforts.
- The Office of Research is large and complex, dealing with a budget of nearly \$800 million that is concentrated in the highly complex fields of human life sciences. Having a separate office that works closely with Research, but is focused on commercialization, could help in managing all aspects of the work more effectively.

Remains To Be Done —PROPOSED OFFICE OF COMMERCIALIZATION AND ECONOMIC DEVELOPMENT

Recommendations

- Create the Office of Commercialization and Economic Development to fulfill the following two missions:

Mission for Commercialization – From Invention to Impact: Provide maximum benefit to the people of North Carolina and beyond by optimizing the University's systems for practical innovation, and by licensing university intellectual property promptly to those who will most effectively and appropriately propagate it into use for society.

Mission for Economic Development: Grow North Carolina's economy and competitiveness by engaging key faculty/staff experts and students to develop and implement a strategy to address economic development drivers in our State.

The roles of other senior officers and deans:

Actions To Date — SENIOR OFFICERS AND DEANS

Strengthening a culture of innovation that maximizes Carolina's impact on the citizens of North Carolina and beyond is the responsibility of every leader.

Senior leaders throughout the campus have contributed to the innovation agenda. The Provost and Vice Provosts, along with the Vice Chancellors for Research, Development, Student Affairs, Administration/Finance, Workforce Strategy, Legal Affairs, Communications, and Special Assistant for I&E have been instrumental in the advances to date. Some deans lead units that have more a direct relationship to commercialization, but all can and do drive innovation and impact.

Frustrated by inadequate commercialization services offered by central administration prior to 2010, and motivated by a vision of what was possible, a few deans, whose schools are most prolific in generating patentable intellectual property, took the lead. Wanting to close the commercialization gap, they created their own programs and shared them with others across the campus. Most notable in this regard are the deans of the School of Medicine, Kenan-Flagler Business School, the Eshelman School of Pharmacy and the College of Arts & Sciences, working with the Departments of Computer Science and Chemistry. Some have included innovation in plans for the upcoming campaign.

What We Have Learned — SENIOR OFFICERS AND DEANS

To have a robust, highly effective, and sustainable innovation and entrepreneurship ecosystem, the University's related goals and strategies need to be fully integrated by each senior administrative leader and dean, and resources and processes need to be aligned.

The University's commercialization efforts are now distributed between central services and localized programs. Carolina KickStart, UNC Kenan-Flagler's Frank Hawkins Kenan Institute of Private Enterprise and the Center for Entrepreneurial Studies provide important services to augment the work of OTD, especially around the creation of new businesses based on university IP. Finding the optimal mix between centralized leadership and decentralized services will fully leverage campuses resources.

Remains To Be Done — SENIOR OFFICERS AND DEANS

Recommendations

- Continue to include goals related to innovation and impact in their strategies and actions. Senior leaders need to align institutional resources and processes accordingly. Since the Chancellor and Provost are working closely with administrative leaders and deans on strategic planning and the Development Office is preparing for the new capital campaign, this is the time to incorporate innovation goals.
- Articulate to their constituents how and why the University is building an innovation ecosystem and how it is relevant to their areas of responsibility or research. Specifically encourage their faculty, staff, and students to consider the rewards of converting ideas into practical benefit.
- Balance central services and unit programs to keep them strategically aligned and fully integrated.

- Deans: Continue creating structures and environments that support innovation. Prioritize innovation initiatives in development goals as well as in communication strategies. Following the lead of some deans, it is helpful if each assigns an innovation and entrepreneurship liaison officer to join the university's I&E Network group, and to serve as an internal contact person and champion. The Schools of Medicine and Pharmacy and the Department of Computer Science have associate deans/chair with titles related to entrepreneurship.
- Deans: Ensure that their faculty feel supported in undertaking scholarly work in ways that benefit non-academic sectors and have impact. Align incentives and rewards.

Mobilizing faculty for various roles:

Actions To Date — MOBILIZING FACULTY FOR VARIOUS ROLES

Faculty are at the heart of the innovation effort, whether they contribute by creating intellectual property, starting enterprises, or maximizing impact in other ways. A variety of programs and initiatives are under way to spur faculty involvement in commercialization and entrepreneurship more broadly. For example:

- Carolina KickStart, the Center for Entrepreneurial Studies, the Office of Technology Development, the Kenan Institute of Private Enterprise, the CUBE, Launch Chapel Hill and unit programs all help faculty with commercialization. Carolina KickStart has created a faculty mentor program whereby faculty seasoned in commercialization coach those new to the process. Other formal training programs are available, such as Launching the Venture, as well as many mentoring programs such as the Concierge program at the Kenan Institute and the ongoing assistance provided by OTD staff. Entrepreneurs-in-Residence are in place throughout the University and work closely with administrators, faculty, staff, and students.
- Faculty have a role on the OTD Advisory board, have been on task forces for commercialization and industry relations, and speak at the OTD Innovations Seminar Series.
- Carolina KickStart has consistently advocated for incubation space. It spearheaded the use of part of the second floor of the Genome Sciences Building for office and wet-lab space for faculty ventures, and pre-negotiated conflict of interest and facilities use agreements.
- The Faculty Entrepreneurship Bootcamp, hosted by the Economics Department's Minor in Entrepreneurship and staffed with facilitators from on and off the campus, is a four-day program for faculty who want to learn the principles of moving their ideas forward to application. This past year, several faculty from other UNC universities attended, and there are conversations about expanding it further.
- Other programs focus on innovative engagement and outreach, such as the Felix Harvey Award. As formally stated, this award is meant to *recognize exemplary faculty scholarship that reflects the University's commitment to innovation.*

What We Have Learned — MOBILIZING FACULTY FOR VARIOUS ROLES

Not all faculty wish to be involved in the innovation work of the campus. Some perceive innovation in the narrow sense to mean commercialization of IP, and think that such activity is not relevant to them. Communicating that innovation is about impact engages more faculty. For faculty who do wish to commercialize their work, there is an awareness gap in terms of knowing where to turn for help and how to navigate the process. Some find the task too daunting to even begin. Among those faculty already engaged in commercialization, the majority are not seasoned in this type of work and would benefit from added guidance and services. The process of managing conflict of interest remains a major barrier to this work at Carolina.

Remains To Be Done — MOBILIZING FACULTY FOR VARIOUS ROLES

Recommendations

- More effectively help faculty understand that translation is an extension of their scholarly pursuits.
- Find ways the University can incentivize and facilitate translational work. For instance, faculty need time to invest in the translation process.
- Effectively guide faculty through the translation process.
 - Expand the Faculty Bootcamp or some such equivalent(s).
 - Use successful, respected faculty innovators as mentors and guides for others. Expand on the KickStart Faculty Fellows program – which is modeled after a University of Utah program.
- Streamline the Conflict of Interest Review process.
- Create a cross-campus entrepreneurship education curricular committee to continue refining how faculty teach entrepreneurship to various audiences.
- Better engage with Carolina faculty who are noted scholars in innovation and entrepreneurship to learn from them and extend their scholarly work.

B. CAROLINA'S INNOVATION ASSETS

Q: How does research connect throughout all of our programs and work in innovation and entrepreneurship?

CONTEXT

As a leading research university, Carolina is connected to local, national and global communities. Society often looks to the top talent at universities – scientists, innovators, program leaders – to produce new solutions to pressing local and global challenges. Such complex problems require diversity of thought and collaboration in finding solutions based on interdisciplinary research. Research, especially research that brings together diverse talent, is at the heart of our innovation agenda.

Actions To Date — RESEARCH FUNDING

The steady growth of research funding at the University over the past 15 years is a tribute to the talent, hard work, and success of the faculty (a product of earlier as well as current investments) and an interdisciplinary approach to advancing knowledge and understanding. UNC Chapel Hill faculty are part of an internationally-recognized research enterprise that draws from five health sciences schools (Dentistry, Medicine, Nursing, Pharmacy, and Public Health), plus UNC Health Care and its teaching hospitals, as well as the College of Arts and Sciences and the other professional schools. UNC Chapel Hill is particularly known for its collaborative and interdisciplinary culture, as evidenced by the centers and institutes that are vital to its research program. Team science is the norm.

The 2011 Academic Plan identified *interdisciplinarity* in teaching, research and public service as a central focus, and outlined action steps to build support for it across campus, thus leveraging a comparative advantage the University already enjoys. Fully half of the external funding received supports projects that include faculty from more than one department, often from more than one school within the University. Institutes and centers have a particular role in supporting interdisciplinary collaboration and helping to leverage impact. For example:

- The North Carolina Translational and Clinical Sciences (NC TraCS) Institute combines the research strengths, resources and opportunities of UNC, partner institution RTI International and planning partner North Carolina Agricultural and Technical State University (NC A&T). The mission of NC TraCS is to accelerate clinical and translational research in health science, from discovery to dissemination to patients and communities. It seeks to overcome barriers to translation by improving efficiency, training the research workforce and sharing successful research methods. It is the sponsor of Carolina KickStart, 4D, and other relevant programs.
- The Cecil G. Sheps Center for Health Services Research seeks to improve the health of individuals, families, and populations by understanding the problems, issues and alternatives in the design and delivery of health care services. This is accomplished through an interdisciplinary program of research, consultation, technical assistance and training that focuses on timely and policy-relevant questions concerning the accessibility,

adequacy, organization, cost and effectiveness of health care services and the dissemination of this information to policy makers and the general public.

- The Asia Center works with the College of Arts and Sciences, professional schools, and various departments, centers and student organizations at UNC Chapel Hill, and collaborates with other regional and international institutions to develop and implement educational programs about Asia.

UNC Chapel Hill is leading a national conversation on convergence. Chancellor Folt and Joe DeSimone, Chancellor's Eminent Professor of Chemistry, helped organize a National Academies conference on the topic, and the conference report stated:

“Convergence” of the life sciences with fields including physical, chemical, mathematical, computational, and engineering sciences is a key strategy to tackle complex challenges and achieve new and innovative solutions. For example, researchers draw on contributions across these disciplines to advance our understanding of health and disease at genetic, cellular and systems levels and to develop and deliver novel therapeutics designed to treat diseases earlier, more successfully, and with fewer side effects.

Numerous reports have explored advances that are enabled when multiple disciplines come together in integrated partnerships (e.g., *A New Biology for the 21st Century* (NRC 2009); *Research at the Intersection of the Physical and Life Sciences* (NRC 2010); *The Third Revolution: The Convergence of the Life Sciences, Physical Sciences, and Engineering* (MIT, 2011); and the *National Bioeconomy Blueprint* (White House, 2012). As a result, institutions have increasingly moved to implement programs that foster such convergence or are interested in how they can better facilitate convergent research.

Research-based interdisciplinary work, often carried out in collaboration with colleagues at other institutions around the world and/or in the private sector, has been fertile ground for innovative, applied solutions. For example, the exceptional work of the Water Institute under the leadership of Jamie Bartram, together with the Institute for the Environment under the leadership of Larry Band, has drawn experts from around the world to its annual water conference, and has launched multidisciplinary efforts to solve issues of access to safe, clean water sources.

Programs to help faculty translate their research into innovations include Carolina KickStart and the Concierge Program for Entrepreneurs (including patent landscape analysis) at the Kenan Institute of Private Enterprise. OTD Associates assist faculty on an individual basis.

What We Have Learned — RESEARCH FUNDING

An innovation and entrepreneurship agenda that prioritizes commercialization and other translational methods is, by definition, one that depends on excellent interdisciplinary research to initiate the process. Yet, faculty who want to explore ways to apply their research struggle to find the time. They also need the right mentorship. Waiting until a faculty member files an invention disclosure with OTD misses opportunities to work on research ideas in their earliest stages and help guide their development.

With the exception of graduate students in the Kenan-Flagler Business School, graduate students and postdocs have few educational or co-curricular opportunities to build their entrepreneurial capacity. A major challenge has to do with conflict of interest issues around the participation of students in startups based on faculty IP.

Remains To Be Done — RESEARCH FUNDING

Recommendations

- Given the focus at Carolina (and, indeed, nearly everywhere) on interdisciplinary work, continue to promote collaboration and research across disciplines as a fertile source of potential innovations.
- Develop more integrated, clearer systems and support for faculty interested in commercializing their research including allocating time for faculty to become involved.
- Create and implement a comprehensive plan to educate and involve graduate students and post docs in the translational work of the campus, while also pursuing studies within their disciplines. Include connections between MBAs and graduate students and post docs in the sciences.
- Within the general structure of federal and state regulations, resolve conflicts of interest in an expedient, fair, and respectful manner so that faculty and graduate students are able to appropriately engage in innovation activities.

Q: What does an innovation agenda mean for various segments of the UNC Chapel Hill community and their activities?

CONTEXT

UNC Chapel Hill has many stakeholders pursuing a myriad of activities. To carry out the innovation and entrepreneurship agenda with maximum effect, it is worthwhile to consider how that agenda is being expressed in and integrated with the following:

- Educational programs
- Student activities
- Alumni relations
- Town-gown relations
- Faculty
- Staff

Good work has been done on all fronts but many needs remain. Below is a review of each area:

Educational programs:

Actions To Date — EDUCATIONAL PROGRAMS

UNC Chapel Hill has developed outstanding programs for faculty and students in innovation and entrepreneurship, with varying degrees of saturation depending on the target audience. Curricular offerings include: undergraduate and graduate entrepreneurship concentrations

through courses at the Business School, the Entrepreneurship Minor led by the Economics Department in the College of Arts & Sciences, a joint MBA/MD program, the Reese News Lab in the School of Journalism, a new Education Innovation Masters program in the School of Education, and courses in schools and departments across campus such as Public Health and Social Work.

Curriculum in the building blocks of innovation (APS, BME, Data Studies, Computer Science) is being created and/or strengthened. A new CreatorSpace will be tied into the APS and BME courses and open next year in Murray Hall.

Programs outside the classroom for faculty and students include: Carolina KickStart and 4D, Concierge Service for Entrepreneurs, Blackstone Entrepreneurs Network, Launch Chapel Hill, 1789 Venture Lab, the Campus Y CUBE Social Innovation Incubator, and UNC Health Innovations. Depending on the level of interest and point in the innovation process (imagine-design-build-grow), UNC Chapel Hill has a program that will help develop innovation skills and provide connections to other resources.

What We Have Learned — EDUCATIONAL PROGRAMS

As a recent survey revealed, many faculty are unaware of the services and educational programs available. When faculty do use these, they report benefits from formal programs like the Faculty Bootcamp and Launching the Venture, and from co-curricular workshops through programs like the Carolina Challenge and CUBE.

Students are looking for ways to combine their innovative and entrepreneurial passions with their formal studies. At the same time, students in areas that are not necessarily thought of as entrepreneurial benefit from exposure to the fundamentals of an innovation toolkit. These include the abilities to work in multidisciplinary teams, see opportunities and design imaginative solutions, communicate and execute on goals, be literate in data, have exposure to design methodologies, and navigate a rapidly-changing global environment.

Remains To Be Done — EDUCATIONAL PROGRAMS

Recommendations

- Continue developing and enhancing the entrepreneurship curriculum in units across campus to include methodologies for the entire innovation process: imagine-design-build-grow. Incorporate creativity and design thinking more fully in the existing entrepreneurship programs.
- Strengthen entrepreneurship educational programs for graduate students and post docs. Identify funding that could facilitate participation in these programs.
- Continue creating/expanding courses in Applied Physical Science, Biomedical Engineering, Data Studies, and Computer Science.
- Create targeted programs to best meet the needs of faculty in learning how to translate their work. Focus on just-in-time learning with a mixture of online tutorials, mentoring, and small groups.
- Market the educational programs more effectively, and in general make it easier for all audiences to find the resources and people they need.

Student Activities:

Actions To Date — STUDENT ACTIVITIES

In addition to curricular and co-curricular programs, the University has seen an increase in student-led activities to engage and build participation in an innovation ecosystem. Examples include: TEDxUNC, hackathons organized by student groups in Computer Science, Global Entrepreneurship Week activities, Carolina Creates, Kairos (featuring top student startup leaders), Design for America, University Innovation Fellows, CreatorSpace Student Leaders, the Chancellor's Student Innovation Team (CSIT) and Chancellor's Graduate Student Innovation Team (CGSIT). The I&E Office works with these student groups to plan and execute activities throughout the year, including a recent Innovation Fair and Maker Fair during Week of Welcome.

Some graduate students work closely with their faculty advisors to develop potential innovations, consult via student teams, and serve in such paid internships as the Blackstone Fellows. On a limited basis, a few graduate students work as interns in OTD and receive two-year fellowships to work on a faculty spinout.

Each year the University actively recruits a few top students to come to Carolina on a four-year full scholarship as undergraduate Innovation Scholars. These students are automatically part of the Entrepreneurship Minor and are invited to join the related campus leadership organizations.

What We Have Learned — STUDENT ACTIVITIES

Students are drawn to activities that allow maximum room for creativity, exploration and growth. UNC Chapel Hill has successfully built an innovation culture among undergraduate students across disciplines. Students who have ideas for forming startups can find support through various programs. Most of their startup ideas tend to be disconnected from significant areas of expertise and research on our campus, however. Student engagement with some of those areas, and with the faculty leads, could potentially be a source for more entrepreneurial solutions to the challenges that Carolina is taking the lead in addressing.

Remains To Be Done — STUDENT ACTIVITIES

Recommendations

- Better align student innovation activities with the research agenda of the University, exposing students to problems and potential solutions in areas outside their personal knowledge, and attuning them to the University's efforts to address pressing global challenges. This will help to expand students' thinking, so that when they generate their own ideas for startups (as many now do), they can see possibilities beyond the limited scope that is often typical of student enterprises.
- Engage graduate students more fully in the innovation agenda.
- Find ways to harness the expertise of post docs and when appropriate, engage them with faculty spinouts.
- Better market campus resources to all students.
- Expand the Innovation Scholars program.

Alumni relations:

Actions To Date — ALUMNI RELATIONS

The University's innovation agenda has sparked new relationships with alumni and parents who are themselves entrepreneurs, investors, or generally supportive of the work. Beginning with the Innovation Circle (a group of external stakeholders assembled to help create strategy for the campus), potential supporters have been provided many ways to become involved in the University's work in innovation. Alumni and parents as well as foundations have funded needs outlined in the *Roadmap*, including the endowment for the Entrepreneurship Minor, funding for innovation in the arts and humanities, social entrepreneurship, programs in the Business School, Innovation Scholars, and for many other initiatives across campus. In addition to giving, UNC alumni are working diligently to support the innovation agenda through mentorship in programs such as Launching the Venture, Blackstone Entrepreneurs Network, and Carolina KickStart, as well as through efforts to build the student innovation ecosystem. (For example, a local entrepreneur who is an alumnus founded and provides the majority of funds for the 1789 Venture Lab on Franklin Street).

What We Have Learned — ALUMNI RELATIONS

Despite much progress in this area to date, UNC Chapel Hill has just scratched the surface of the potential that exists in engaging alumni as donors, mentors, investors and often as creative forces in the University's projects and people. The Office of Development is eager to work more systematically towards alumni relationships that can yield significant future support for innovation work.

Remains To Be Done — ALUMNI RELATIONS

Recommendations

- Develop a high-level strategy for engaging alumni support for the innovation agenda. Segment the alumni and call upon them for their expertise as entrepreneurs, investors, and subject-matter experts as well as donors.
- Create an Innovation Fund for the campus that would support all aspects of the innovation agenda.
- Tie in alumni through regional innovation hubs.

Town-gown relations:

Actions To Date — TOWN-GOWN RELATIONS

For some time, talks with the Town of Chapel Hill about economic development centered around Carolina North, which called for innovation space particularly for faculty. As plans for Carolina North slowed, the University continued looking for ways to work with the Town to further support local economic development in addition to the University being a major employer and consumer of services and products. Helping develop and be home to Carolina startups is now part of the Town's and County's agenda. The Launch Chapel Hill business accelerator is a joint project among the Town of Chapel Hill, Orange County Economic Development, successful

entrepreneurs, and the University to support and accelerate startups of both UNC alumni and local residents. This partnership has been tremendously successful.

What We Have Learned — TOWN-GOWN RELATIONS

The Town of Chapel Hill and Orange County are pleased with the Launch Chapel Hill project and are eager to continue working together to support entrepreneurs. There are a number of challenges in creating a thriving startup scene in Chapel Hill. Rents are high and space is sparse near campus. There is not a major Chapel Hill corporation that is championing the startup ecosystem, such as occurs in Durham with Capital Broadcasting.

Remains To Be Done — TOWN-GOWN RELATIONS

Recommendations

- Continue working with Chapel Hill and Orange County officials on how to attract, support, and retain entrepreneurs and harness innovation for the economic and social benefit of the community. Good relations have been established and talks are underway for next phases of this work.
- Encourage landlords who own office space to offer flex terms and lower rents for startups.
- Build a world-class Innovation Center in Downtown. (see Space section)
- Create a strategy to engage local influential individuals in this work.

Faculty:

Actions To Date — FACULTY

The innovation agenda has resonated with the majority of faculty, especially when discussed in more general terms as a means of extending their scholarly work to have practical benefits and impact beyond the academic realm. Some faculty come and stay at Carolina because of its ethos of research-based service. Even so, innovation themes are more readily embraced by faculty whose work is obviously translational (especially in computer science and the health sciences). UNC Chapel Hill has worked to recruit and retain noted innovative faculty members and to celebrate their work, striving to be a University where innovators thrive. Only a small percent of faculty have patentable discoveries, and not all of them want to commercialize those discoveries. In the latter case, OTD waits for invention disclosures from faculty while KickStart and unit liaisons start to work with faculty as early as possible to better move discoveries into the commercialization pipeline.

Two examples of faculty work show the diversity in types of impact. Both received much support from innovation team members on campus. As then chair of Music in Arts & Sciences, Mark Katz was asked to create the arts entrepreneurship track in the Entrepreneurship Minor, and he also received funds and support through an IAH Innovation award. Professor Katz created several new courses, including The Art and Culture of the DJ, Beat Making Lab, Rap Lab, and Rock Lab. With Professor Katz's assistance, his two adjunct faculty took Beat Making around the world and created an independent company to promote Beat Making and art activism. Professor Katz leveraged this work to win a U.S. Department of State grant for \$1 million to create *Next Level*, a program that sends American artists abroad to foster cultural exchange, conflict resolution, and entrepreneurship.

On a different front, faculty members Shelley Earp and Stephen Frye are commercializing their discoveries. Their firm Meryx is a new spinout company from Lineberger Comprehensive Cancer Center and the Eshelman School of Pharmacy. In partnership with the National Cancer Institute (NCI), they are developing a novel therapeutic treatment for acute lymphoblastic leukemia (ALL). They have a platform of small-molecule drugs for a wide range of clinical indications; cancer, anti-viral, and anti-thrombotic. The team is led by co-founders Stephen Frye, PhD; H. Shelton "Shelley" Earp, III, MD along with Seth Rudnick, MD, Chairman of the Meryx board and Mary Napier, PhD Operations Lead.

Specific support for faculty who wish to commercialize their technology is handled by the Office of Technology Development, the Carolina KickStart program, the Concierge Service for Entrepreneurs at the Kenan Institute of Private Enterprise, and through I&E liaisons within the schools themselves.

What We Have Learned — FACULTY

Those faculty already inclined toward translating their research into practical application tend to find the resources that they need to be successful. Many faculty remain confused about the best pathways to take and are not well informed about the opportunities that are available. Often they are unsure about how to handle such issues as conflict of interest. Some have not recognized or found the linkages between their research/careers and translation to non-academic audiences.

Remains To Be Done — FACULTY

Recommendations

- Reach more faculty with the opportunities of the innovation agenda.
- Develop an integrated network of innovation liaisons working with a core staff to be closely in tune with all faculty work and to educate faculty about Carolina's innovation agenda and resources.
- Create integrated, comprehensive systems that support faculty from early-stage innovation through all phases of translating knowledge into practical use. Build bridges of assistance across gaps in the process that are hard for faculty innovators to traverse on their own.
- Streamline all systems to remove resistance to the process, especially conflict of interest and facilities use.
- Find the resources needed for faculty to pursue innovations.

Staff:

Actions To Date — STAFF

UNC Chapel Hill students and faculty are supported in their innovation work by a small cadre of program staff, distributed across campus. These staff members work with each other and with faculty and students who are not directly engaged in the innovation agenda but have critical roles to play. Staff from the Office of Technology Development, KickStart, Kenan Institute of Private Enterprise, unit liaisons, those who operate the innovation spaces as well as offer the accompanying programs, and many others work tirelessly.

What We Have Learned — STAFF

Innovation often requires flexible thinking and approaches that challenge bureaucratic systems. University staff have worked to find ways through roadblocks and to expedite processes that are critical to advancing innovation, although there is still more to be done. Staff members in this area are too few and are under-resourced.

Remains To Be Done — STAFF

Recommendations

Garner resources to bring additional staff support to the innovation ecosystem. Develop clear linkages between the offices and programs that provide staff support and guides to help others navigate the landscape.

Q: How can we best address design (and cultivate “design thinking”) in innovation and entrepreneurship?

CONTEXT

Those involved with design thinking promote methodologies that include: seeing a problem or opportunity in the world, targeting the need, ideating possible solutions, and then ultimately designing a solution – all from a customer-driven or user-driver perspective. Increasingly, these methods are being used not only to design products but to design new businesses, whether they are startups or new arms of existing firms, and to design not-for-profit ventures that address social issues. The process centers around answering three key questions: Is this desirable? Feasible? Viable?

Design thinking may be combined with other concepts such as the lean startup model, which emphasizes building a new company iteratively, with feedback from customers, before scaling to each next step. The result is a highly-adaptable approach, which (when executed well) can produce startups that truly meet needs, while reducing the cost and risk involved. This is a departure from traditional business plan approaches in which entrepreneurs first map out a detailed master plan for their startups and try to find financing.

Actions To Date —

UNC Chapel Hill has shifted to teaching entrepreneurship on the basis of design thinking, lean startup, and business models with a focus on guided ideation as an integral part of design. The Human-Centered Design Toolkit, funded by the Gates Foundation, shows how to use the same methodologies in not-for-profits and social enterprises. Human-centered design is used by the Reese News Lab in the School of Journalism to generate solutions such as Capitol Hound, a social enterprise that provides a searchable audio archive and alert system for people following the North Carolina General Assembly floor sessions and committee meetings. In the Business School and the Entrepreneurship Minor, design thinking and lean startup methods are being integrated into the curriculum. Co-curricular support teams like Design for America (undergraduate-led), the Biomedical Engineering Club (graduate-student led), Carolina Creates (undergraduate-led) and

the new Carolina Makers club (graduate and undergraduate student-led) conduct events and workshops that provide opportunities for idea development and solution design. Formally, design methodologies are integrated into the BME curriculum and will be a component of the curriculum in the new department of Applied Physical Sciences (APS).

APS also has led in the development of a new maker space (with the working title Carolina CreatorSpace) scheduled to open in the fall of 2015. A faculty working group of more than 25 members met during the past year to make recommendations for a 3500 ft² central space that will provide tools, technology and instruction for students and faculty in making physical objects. The space will support both curricular and co-curricular programming. It will be a hub that connects existing spaces on campus where design and making already occur, such as the Environmental Science Engineering (ESE) Design Center in the Gillings School of Global Public Health, the Art Lab in the Art Department, the Playmakers Theater Shop in the Paul Green Theatre, the University Libraries' 3-D printing hub in the Kenan Science Library, and the new children's maker space in the Morehead Planetarium.

What We Have Learned —

Methodologies for seeing problems, targeting need, ideating possibilities, and designing customer-driven solutions are effective means of innovation. Design thinking, human-centered design, improvisation and other creative methodologies add value to the entrepreneurial process, generating more actionable and successful ideas.

The campus program leaders and faculty are in the process of incorporating these methods in their offerings. Design is at the forefront in the discussion of I&E spaces.

Remains To Be Done — DESIGN

Recommendations

- For faculty entrepreneurs, integrate ideation and design methods into the full-service technology development approach that begins in the lab, well prior to invention disclosure. Lean Startup methods for the life sciences are made available through an NIH program, but our campus needs to create its own version.
- For students, support full integration of design methods into areas where this is already being done or planned—notably APS, BME, the proposed Data Studies competencies, and the CreatorSpace – while exploring potential uses of the methods in other curricular and co-curricular offerings.
- Expand the University's educational programs in design thinking for faculty and University program leaders, and continue exploring ways to ingrain design on our campus, especially as we create new spaces for innovation.

Q: What are the space requirements to support a robust innovation ecosystem? What is our strategy for Carolina North? Does the existing plan hold up? If not, how will we determine what to do?

Space requirements:

Actions To Date — SPACE

In 2010 there were no formal spaces on campus dedicated to hosting and supporting startups. Since then, programs and spaces have opened and are essential infrastructure for the University's burgeoning innovation ecosystem. The Campus Y has created and has even increased its services for social entrepreneurs. The Entrepreneurship Minor is in the process of opening its new space in Gardner Hall. Faculty, staff, students, and donors have made numerous trips to visit innovation spaces. Teams have visited many spaces in Boston, Chicago, Stanford, California, Las Vegas, New York City, and others.

The spaces now available on and adjacent to campus include:

Launch Chapel Hill – Opened May 2013

Type: Student, faculty, alumni, community; edge of campus.

Capacity: Approx. 12-15 ventures (depending on size of teams).

Funding: Three-year co-investment from Chancellor's Office (\$300K), Town of Chapel Hill (\$150K), Orange County (\$150K) and the Becker Family (\$300K). In-kind donations from Triangle Office Equipment and 3 Birds Marketing.

Benefits: Bridges gap in support for recent UNC alums; keeps them in the Chapel Hill community. Great for town/gown relationship.

Limitations: Capacity is limited and space is challenging for events. Lease ends in December 2015.

KickStart Labs Faculty Entrepreneurs Office and Wet Lab Space – Opened December 2012

Type: Faculty commercialization of scientific research.

Capacity: 2000 ft² office/meeting space; 4000 ft² lab with pre-established terms for faculty use, as well as clear conflict of interest terms, capacity to incubate 10-12 startups

Benefits: Proximity for faculty to go between their work and a startup in its earliest stages.

UNC has the ability to house startups on campus using a Facility Use Agreement (FUA) usually in the faculty founder's lab. FUAs have been a good stop-gap solution but have drawbacks including: (a) poor oversight and management (b) poor optics, and (c) no interactions and synergies between companies. Dedicated incubation space addresses these challenges.

Funding: Carolina KickStart

Limitations: Control of the space in the Genome Science Building transfers from SOM to College of Arts and Sciences in February 2015. All indications are that the KickStart Labs will need to move. No appropriate future space has been identified.

Campus Y CUBE Social Innovation Incubator – Opened December 2012

Type: Student, faculty startups that are non-scientific commercial, social, or artistic.

Capacity: 6 ventures plus ability to host workshops and events.

Funding: Investment from Chancellor's I&E Office for staff position; private fundraising for remainder.

Benefits: Supports the campus-wide social innovation and public service community. Provides entrepreneurial skill development, as well as space, through mentoring, workshops, and other co-curricular programs open to the campus.

Limitations: Programs and space are at capacity. Growth upside is high but without resources to capitalize.

1789 Venture Labs – Opened May 2013

Type: Student non-scientific commercial, social, artistic; edge of campus

Capacity: 40+ ventures currently working out of the space, plus ability to host workshops and events for up to 100 people.

Funding: Currently funded by alum Jim Kitchen with some University support through the CES.

Benefits: Popular space for entrepreneurs on Franklin Street; bridge to the community.

Limitations: Budget

Entrepreneurs Lounge CS (Computer Science)

Capacity: Meeting space for up to 15; no permanent workspace.

Benefits: Provides space for groups to meet around a common theme.

Limitations: Not a hackerspace (with equipment). No dedicated workspace for teams to use.

Kenan Institute Reading Room

Capacity: Meeting space for up to 3 teams of 4-6 people; no permanent workspace.

Benefits: Provides much needed co-working space at the Kenan Center.

Limitations: Space can only be used on a temporary basis; no dedicated space.

What We Have Learned — SPACE

For a dynamic, fully-functioning innovation ecosystem, UNC Chapel Hill needs a portfolio of spaces that serve faculty and students and are woven together to form an integrated whole. Executing a well-considered space plan is key to institutionalizing innovation and entrepreneurship on campus and ensuring that Carolina's efforts are world class, achieving impact on par with or exceeding other leading universities. Physical spaces present a thoughtful way to centralize some activities with nodes spread throughout the ecosystem, taking advantage of the benefits of diffusion while realizing the opportunities of integration. Programs on campus have bootstrapped through proof-of-concept and have proven the need for, and effectiveness of these spaces.

Remains To Be Done — SPACE

Recommendations

- Allocate adequate space for Applied Physical Sciences, Biomedical Engineering, and maker space: The Chancellor, Provost, Dean of Medicine and Dean of Arts and Sciences are addressing these needs and have made significant investments.

- Find permanent wet lab and office space on campus for faculty entrepreneurs and their spinouts. The need is immediate and urgent, with the current space at the Genome Sciences Building due to be vacated by February 2015.
- Create an Innovation Headquarters on central campus. Having such a physical location would present a strategic opportunity. It would serve as a front door for the campus where people can come for assistance, and donors could be inspired by a tangible reminder of the impact Carolina is having. The proposed Commercialization and Economic Development Office could also use this space for some of its activities.
- Build a world-class Downtown Innovation Center. A proposed downtown Chapel Hill Innovation Center (CHIC) would bridge the campus and community while becoming home to the already-successful accelerator, Launch Chapel Hill, and the popular 1789 Venture Lab. (With its current lease expiring in December 2015, Launch Chapel Hill is considering its options.) In addition to event and ideation space and a design center, CHIC would provide new spaces for growing companies that want to stay in Chapel Hill, including potentially those requiring web lab space, as well as space for investors and professional service providers, and for strategically chosen industry partners such as the local Google office. The groups of people involved in creating Launch Chapel Hill and 1789 are actively engaged in conversations about CHIC.
- Investigate building a Life Science Innovation Center. There are several reasons to build an innovation center for the life sciences: 1) It will be a place where industry can interface with faculty and graduate students; 2) Commercialization staff can have offices near a large portion of the University's innovation portfolio; and 3) It will provide much-needed faculty access to wet-lab space, offices, and equipment as they remain full-time professors/researchers but also start a company. Once the Genome Sciences space is unavailable come February 2015, faculty startups will have no space on campus. New resources need to be available to all faculty, even if they are administered by an academic unit.

Regarding Carolina North:

The future of Carolina North is being discussed by others and will not be covered in this document.

Q: How can we leverage Carolina's global brand for maximum impact?

Actions To Date — GLOBAL BRAND

At the core of UNC Chapel Hill's innovation agenda is the desire to put the resources of the University to use in solving some of the most pressing challenges of our time – in North Carolina and globally.

The University leverages its global reach and distinguished reputation in a number of ways, such as to recruit and retain faculty, staff, and students and convene international leaders around complex issues. The brand helps position UNC faculty as leaders in setting strategic agendas with federal agencies and other policy and funding groups. The brand is important in securing strategic partnerships as well.

An outstanding example of global leverage is *Water in Our World*, UNC's first cross-campus theme. It has been co-led over the past three years by Jamie Bartram, director of the internationally-recognized Water Institute in the Gillings School of Global Public Health and Terry Rhodes, Senior Associate Dean for Fine Arts and Humanities in the College of Arts & Sciences, home to some of the nation's best programs in the arts and humanities. A key feature of the water theme was its breadth and ability to engage these disciplines as well as the sciences. It has advanced understanding of the issue, raised Carolina's already-strong global profile in water research, built relationships on campus as well as beyond, and led to developing new knowledge and solutions. The exceptional work of the Water Institute, together with the Institute for the Environment under the leadership of Larry Band, has drawn experts from around the world to its annual water conference, and has launched multidisciplinary efforts to solve issues of access to safe water, sanitation, and hygiene.

Another example of the University's global reach is related to advancing innovations in AIDS treatment and cure. One lab in this area is led by Dr. David Margolis and another by Dr. Myron Cohen. Through the Margolis Lab, UNC Chapel Hill is part of the international consortium CARE (Collaboratory of AIDS Researchers for Eradication of the disease), and discussions are under way to establish a UNC-led public-private partnership with key strategic partners to continue pushing towards a cure. Meanwhile, a world-renowned research team led by Dr. Cohen has shown that with the right type and time of delivery of antiretroviral treatments, sexual transmission of HIV-1 can be prevented. Dr. Cohen's work was recognized by *Science* magazine as the *Breakthrough of the Year* in 2011.

The Gillings School of Global Public Health put *global* in its name in 2008 although it had always had a global perspective. The School's new Gillings Global Gateway initiative is a way to make its world-renowned experts more accessible and engaged.

UNC Chapel Hill has also been building strategic international partnerships with schools such as National University of Singapore, King's College-London, Tsinghua University, Universidad San Francisco de Quito (which is instrumental to the Galapagos initiative) and others. When working on complex global issues, these institutions offer vital knowledge, resources, and access.

UNC Global has strengthened Carolina's strategic partnerships through internal and external efforts. On campus, UNC Global has established a Partnership Roundtable composed of delegates representing each of the University's existing and emerging partnerships, or areas of the world in which the University seeks to develop partnerships. Led by the University's chief international officer, the Roundtable has contributed to the support and extension of the partnership network. Externally, the Global Relations office within UNC Global has developed collaborations with the corresponding international offices at partner institutions.

The Kenan-Flagler Business School has had a multi-year global strategy. Innovation programs include GLOBE® (Global Opportunities in Business Education), which brings together three of the world's best business schools to provide undergraduate students a premier international business education. UNC Chapel Hill partners with the Chinese University of Hong Kong and the Copenhagen Business School to offer a unique, integrated global curriculum to prepare students

as future managers and business leaders. GLOBE Fellows are chosen upon application to the undergraduate Business program during the early fall of their sophomore year, and participate over 18 months during their junior and senior years. As a requisite part of the GLOBE program, students take coursework in entrepreneurship and private equity.

The Venture Capital Investment Competition (VCIC) turns the traditional business plan competition on its head by bringing in teams of students from around the world who want to try their hand at awarding investment dollars to worthy startups. Started by CES in 1997, this year's event drew teams from 66 schools representing 12 countries and three continents. The UNC Chapel Hill team made the finals in the competition for the 10th time, placing third overall behind first-place Columbia University and runner-up Colorado's Leeds School of Business.

For undergraduate students, UNC's global strategy executed through the Global Education Center has increased opportunities both to study abroad and to engage in community-based scholarship and service work around the world. The result is an increase in student-founded or recent alumni-founded global not-for-profits such as A Ban Against Neglect (which works to simultaneously address the issues of uneducated street girls and environmental waste in Ghana), Nourish International (working to eradicate hunger globally through a network of domestic campus organizations), and Carolina for Kibera (with the goal of alleviating poverty through community collaboration in this African ghetto).

What We Have Learned — GLOBAL BRAND

UNC Chapel Hill's global strategy has played a significant role in advancing a broad-reaching innovation agenda on campus. High-profile multidisciplinary efforts led by accomplished, well-regarded faculty are creating and moving innovative ideas forward. Initiatives like the cross-campus theme, as well as the work of institutes and centers that engage in multidisciplinary approaches to addressing complex challenges, need to be well-resourced and supported. Further, connecting students' global experiences to opportunities for creative problem solving in communities around the world contributes to their development of an innovative skillset and mindset that will serve them no matter what their future pursuits may be.

Remains to be done — GLOBAL BRAND

Recommendations

- The choice of *Water in our World* as the University's first cross-campus theme, three years ago, has proven successful on several fronts. Decide if there will be another cross-campus theme, or perhaps a series of smaller themes, that draws together the Carolina community to address major issues.
- Recruit top faculty and graduate students who are globally oriented and have a strong translational bias.
- Leverage the power of Carolina's alumni and families to grow a global innovation ecosystem.
- Explore the idea of regional hubs and how they might support the innovation agenda.

C. EXTERNAL ENGAGEMENT

Q: How can we engage industry partners in building a strong innovation ecosystem?

CONTEXT

This is a multifaceted issue, as industrial firms and universities can and do interact with each other in a variety of ways. Areas of mutual interest include: research and technology development, workforce development, and the strength of the regional ecosystem (for new startups as well as existing firms). Each area holds the potential for deeper collaboration and each will be addressed separately. The goal for UNC Chapel Hill is to actively and strategically engage with industry in an integrated as well as diffused manner to increase the volume, type, and degree of positive benefits for all concerned.

Regarding research, technology development, and industry relations generally:

Actions To Date — INDUSTRY RELATIONS

The Roadmap called for a more strategic, coordinated, and deliberate approach to engaging with industry partners in all of the areas mentioned above. While units across campus have good relations with industry related to their disciplines (RENCI, the Business School, School of Pharmacy, School of Medicine, etc.), there remains an acute need for a coordinated, high-level University approach to this area. Discussions of how to increase collaboration with industry have been ongoing, involving internal and external stakeholders, and culminated with the UNC Chapel Hill Industry Task Force study released in 2013 that focused on increasing knowledge transfer between the University and industry. It stated:

The goal of improving university-industry partnerships is not unique to UNC Chapel Hill. In fact, it is central to recommendations made in the just-released National Academy of Sciences report, *Research Universities and the Future of America*, which calls for “the relationship between business and higher education...[to] evolve into more of a peer-to-peer nature, stressing collaboration in areas of joint interest rather than the traditional customer-supplier relationship in which business procures graduates and intellectual property from universities (p. 92).”

Specifically, the Task Force cited the need for central strategic integration to enhance UNC Chapel Hill’s industry relationships by coordinating them across the areas of philanthropy, sponsored research, commercialization, and clinical trials. Further, the Task Force report called for streamlined processes and accounting procedures, and for finding ways to make it easier for industry to engage with the University through central contact points.

Plans for the proposed Office of Commercialization and Economic Development are in harmony with plans from the Offices of Research and of Development for strengthening university-industry collaborations. These three groups will work together to strategically advance all aspects of university-industry collaborations working closely with units and will finalize a definition of their interconnected roles and responsibilities.

Recently, the Office of Research took several steps to streamline procedures and make it easier for industry to work with the University. One example is the creation of the new Office of Industry Contracting (OIC), which will consolidate back-office support for such contracting. This office re-organizes contracting work that the Office of Sponsored Research (OSR) and the Office of Clinical Trials (OCT) have been doing for more than a decade. The OIC will have responsibility for reviewing and executing all sponsored research proposals and agreements with private industry. The Office of Technology Development will continue to be the contact point for industry licensing of intellectual property.

And, in a parallel development, the Development Office has made increased industry funding an objective of its new campaign strategy. Judging from the experience of other universities, most of this funding will be for research. Benchmarking of peer institutions demonstrates that there is an opportunity to increase industry funding as a source of the University's R&D funding, as well as to engage with industry donors to build new innovation spaces.

The proposed Office of Commercialization and Economic Development will include a director-level position focused on developing external strategic partnerships in several categories, one being industry relationships. This Office will have a particular focus on engaging industry and other partners in the full process of moving ideas to implementation.

What We Have Learned — INDUSTRY RELATIONS

The topic of *industry relations* is broad and touches nearly every part of the University. Just as UNC Chapel Hill is a large, complex organization with both central and distributed leadership, many industry partners are large multinationals in which different units and people are focused on various functions. Think of how GlaxoSmithKline has an ongoing need to build its product portfolio through R&D, which makes various parties at the company interested in university research and intellectual property development. Meanwhile, all Glaxo units (not just R&D) hire university graduates; conversely the University and its spinouts hire former Glaxo employees. The company's corporate foundation has a wide breadth of interests, and Glaxo has a local presence in RTP. Optimizing the complexities of such a relationship is a challenge, and one we are eager to address.

It is not feasible that all activities fall within a central office, as illustrated by the difference in mission and goals between Career Services and technology licensing. Indeed, some schools have invested in personnel to help develop partnerships with industry and to grow the industry-supported research portfolio, e.g., the School of Medicine and the Eshelman School of Pharmacy. The Office of Research, the Development Office, and the planned Commercialization and Economic Development Office will come to agreement about how each will help share a comprehensive plan and align with that plan to improve results.

Remains To Be Done — INDUSTRY RELATIONS

Recommendations

- In the next few months, the Offices of Research, Development, and the proposed Commercialization and Economic Development Office will work with the Chancellor and

Provost, Career Services, deans and others to develop a common shared plan for UNC Chapel Hill's collaborations with industry.

- Better coordinate within the University.
- Pursue (and, where necessary, expand) efforts to align University policies and procedures with industry practices and expectations.
- Communicate to industry that UNC Chapel Hill is actively seeking partnerships.
- Make it easy for industry to know how to enter the University's "front door," and smooth the way for industry partners to work with us.

Regarding the regional ecosystem:

Actions To Date — REGIONAL

The Innovation and Impact Committee heard from Bob Geolas, President and CEO of the Research Triangle Foundation, about the current vision for reinventing the Research Triangle Park. This includes engaging with industry in new ways especially by connecting to the entrepreneurial community. UNC Chapel Hill leaders serve on the RTP board and on the board of the Triangle Universities Center for Advanced Studies Inc. (TUCASI). In those roles they are deeply involved with planning for the future of the region and aligning UNC Chapel Hill's goals.

Various members of the University community are engaged with local industry. The National Consortium of Data Sciences, created by RENCi Director, Stan Ahalt, brings together leaders in academia, industry, and government to address the data challenges of the 21st century. The Triangle Region is ripe with opportunities, and there are many examples of fruitful partnerships. Most are forged on a case-by-case basis and thus difficult to discuss from a comprehensive view. For instance, Career Services actively engages corporate partners in the work of the University beyond job placement activities. The School of Medicine and SAS entered into a multi-year collaboration to develop analytics-driven population health management capabilities to help providers personalize care for patients with type 2 diabetes. Other partnerships abound.

What We Have Learned — REGIONAL

The University is fortunate to have such high-level industry located in the RTP and the surrounding region. While the University units and faculty with the help of the Development Office's Corporate and Foundation Relations Division engage in important regional partnerships, there is much more opportunity than we have capitalized on thus far.

Remains To Be Done — REGIONAL

Recommendations

Create a comprehensive strategy for maximizing local industry-university partnerships. The Offices of Development, Research, proposed Commercialization and Economic Development, Career Services, and unit representatives will need to work together on the plans and their execution.

Regarding workforce development:

Actions To Date — WORKFORCE

Thousands of UNC students are graduating with entrepreneurial skills and mindsets developed through experiential learning that includes ideation, design, and the entrepreneurial process. Additionally, the professional schools and Graduate School continue to look at ways to foster innovative thinking and practices through their curriculum and training. Examples include the joint MBA/MD program between the Business School and the School of Medicine, and early immersion and flipped classroom techniques for first-year students in the School of Pharmacy and increasingly in the College of Arts & Sciences.

Another fundamental skill for innovative students is proficiency in data and computational skills. The Faculty Working Group on Data Studies called for all UNC Chapel Hill students to graduate data literate. Its report released in April 2014 stated:

Data literacy has become essential to research and scholarship, to learning at all levels, to translational endeavors, and to future student career success. In fields from healthcare to the humanities; the acquisition, management, analysis, and use of data has become a required skillset for college graduates. Further, because Carolina is committed to having its faculty and students see the world broadly and think critically and multi-dimensionally, data literacy should be embedded in an understanding of the influence of data on individuals and society. This contextualization of data includes examining such areas as the effects of data proliferation on social constructs, communication, privacy, security, and ethical considerations.

What We Have Learned — WORKFORCE

Innovation occurs at the intersections of diverse disciplines, experiences and knowledge. A prepared workforce today requires an innovative skillset and mindset that needs to be both formally taught in the classroom and informally learned through opportunities to imagine, design, build and grow ideas outside of the classroom. UNC schools, departments and programs are inventing and re-inventing ways to foster these opportunities but could benefit from more direct engagement with industry partners to better understand their needs and develop deeper collaborations.

Recent studies at the national level show that most PhDs and postdocs will need to pursue alternate career paths to academia. There is an opportunity for UNC to lead in developing new programs to prepare PhD students and postdocs for alternative career tracks.

Remains To Be Done — WORKFORCE

Recommendations

- UNC Chapel Hill has an opportunity to partner with industry and to gain synergies by better understanding workforce needs across industry sectors. University-industry relations should include mechanisms for engaging external stakeholders in the development of ways to ensure that our graduates have critical skillsets, which will vary by discipline but also include core strengths in areas such as data and innovation processes.

- Develop alternative career tracks for PhDs, including working in faculty spinouts and/or starting their own ventures. Strengthening this area will give the University a platform to better understand statewide needs and develop new strategies for addressing them.
- As UNC Chapel Hill forms its economic development strategy, there will be opportunities to leverage engagements with the nine regional economic development partnerships in the state and NC Business Development in the Department of Commerce.

Q: How can we form a strong regional infrastructure of support for our innovation agenda in the Triangle?

CONTEXT

Over the past several years a growing Triangle-wide innovation and entrepreneurship ecosystem has emerged. This is partly the result of increased focus on I&E at the region's research universities as they develop and execute their own agendas, as Carolina is doing. It is also a response to a statewide emphasis on growing an innovation economy, and to the needs of a local startup community that has increased in size and scope.

Actions To Date — REGIONAL

UNC Chapel Hill is helping lead and shape a regional agenda to spur innovative new companies, fuel the state's economy, take advantage of strengths at each of the region's research institutions through new collaborations, and provide a pipeline of potential ideas and technologies to the existing corporate community. University leaders are regular speakers, serve on boards and steering committees for Triangle funders and organizations that support innovation and entrepreneurship, and participate in task forces and think tanks about the regional ecosystem.

The University has led several programs to bring more resources to the regional ecosystem while fast-tracking UNC-born companies. The Blackstone Entrepreneurs Network was created by UNC Chapel Hill and involves the area's most experienced entrepreneurs in identifying and mentoring high-growth-potential companies from our own campus, Duke, NC Central and NC State, as well as in the broader community. The Network is run from UNC Chapel Hill and the University has received additional support from the funder for a national replication program. The first replication site in Denver opened this past spring.

The Kenan Institute of Private Enterprise led a joint proposal with Duke, NC State, and NC Central to become an NSF I-Corps (Innovation-Corps) node. I-Corps is a National Science Foundation initiative to increase the economic impact of NSF-funded basic research. In collaboration with the National Collegiate Inventors and Innovators Alliance (NCIIA), NSF offers select participants from U.S. academic laboratories training in a special, accelerated version of Stanford University's Lean LaunchPad course. Although the award went to another region, that stimulus has led to the coalition working on other ideas together. (The first for this group was Blackstone).

University leaders served on the Innovate Raleigh design team, which resulted in the launch of HQ Raleigh, an Entrepreneurs House, and continue to be involved in other regional venues for supporting entrepreneurs. Durham's American Underground is also working with UNC Chapel Hill leaders to bring an American Underground startup co-working space to Chapel Hill. UNC Chapel Hill is providing market landscape and patent analysis to Duke in exchange for services from the startup ventures clinic in Duke's law school.

The University regularly collaborates with support programs and startup incubators and accelerators, and co-sponsors events ranging from startup weekends to hackathons to major conferences across the state.

What We Have Learned — REGIONAL

Generally there is widespread belief that this region has the potential to be one of the country's top five entrepreneurial hotspots. Some building blocks are in place to reach that goal. Each university and city has its own entrepreneurship initiatives.

Yet, the region underperforms in several ways, one of them being the amount of venture capital invested. What is missing? Is it lack of capital, or a lack of investable deals (i.e. promising startups) that would draw capital here? Is it both? If outside capital is invested, will startups have to leave the region? All of these present challenges, but investable deals are at the core of the issue. This has significant ramifications for UNC Chapel Hill. The University wants to create such investable deals by developing commercializable IP, but very early grant money is needed for development to de-risk ideas enough to make them attractive to equity investors.

By working together locally, with partners throughout the state, by being connected via a few strong regional hubs, and by recruiting talent and investment dollars outside of the region, The Triangle can become a dynamic entrepreneurial hotspot.

Remains To Be Done — REGIONAL

Recommendations

- Continue to build on established relationships with NC State, Duke and NC Central and identify specific opportunities for multi-institution collaboration on projects related to innovation and entrepreneurship.
- Develop Blackstone 2.0, taking the Blackstone Entrepreneurs Network to the next level.
- As noted elsewhere in this memo, the University needs to invest in end-to-end support for commercializing IP from faculty research. Not only would this stimulate startups and venture investment within the region, it is crucial for increasing impact generally.
- Accelerate involvement of potential investors early in the idea development stage.
- Communicate and engage more effectively with alumni who can help with these goals.

Q: How can we build and maintain an innovation ecosystem that supports both broad and deep engagement with the state?

CONTEXT

UNC Chapel Hill has contributed to the economic and social well-being of North Carolina citizens through a long commitment of service, putting its vast resources and expertise to use for the State. The Board heard a report on the direct economic value that comes from the research enterprise alone. (Its \$800M per year in federal research funding creates the equivalent of 4,000+ full-time jobs, with average salaries of \$75,000 and a North Carolina-based payroll of \$300M annually. It does business with 1,100 North Carolina vendors and has created over 80 spinout companies.) Schools and units across campus work in different ways to fulfill their service missions, while also exploring ways to collaborate and engage with the State to bring innovations to bear. The University's centers and institutes often have very applied agendas and contribute to advancing innovations for the public good. The response to this question will focus on being more collectively strategic in serving North Carolina in broad and deep ways.

Actions To Date — ENGAGEMENT WITH THE STATE

Through student-service learning opportunities, UNC Chapel Hill students connect with North Carolina communities and learn methodologies for identifying a problem, working on community-informed solutions, and implementing new ideas. Through community-engaged research, Carolina faculty address the concerns of citizens across the state. For example:

- The UNC Chapel Hill Center for Public Service has long served as an engagement arm for the campus, supporting faculty who do applied work in communities across North Carolina. CPS has added ways to help faculty take innovative approaches in their community-engaged scholarship, and has been an active partner in advancing a University-wide innovation agenda.
- The School of Government has deep and widespread relationships in all 100 North Carolina counties, and has worked for many years to help develop the capacities of local and county governments, as well as the state's elected officials.
- UNC Health Care brings tremendous benefit to North Carolinians by extending its reach into communities statewide, and providing services at no cost through free clinics in the neediest parts of the state. UNC Health Care and the UNC School of Medicine recently partnered to launch Innovate Health Care@Carolina, a center to support adoption of disruptive innovations in the delivery and financing of health care. The focus is on ideas that are "patient centered and increase value with improved health outcomes and lower costs." Further, since 2006, UNC Chapel Hill has played a leadership role in the North Carolina Healthcare Quality Alliance (NCHQA), a statewide collaboration for using evidence-based strategies to improve the quality of care in practices across the state. Through the UNC North Carolina Area Health Education Centers (AHEC) program, the Alliance is able to fully integrate quality improvement into its support services, and help practices implement technology for that purpose. North Carolina is the only state in which health care quality improvement goals and health information technology support are seamlessly integrated.
- The Institute for the Environment works with policy makers and experts across the state, and with leaders of UNC's world-renowned environmental sciences community, in developing

solutions to the critical challenges North Carolina faces. In doing so, it educates future environmental leaders and engages with the people of North Carolina and the nation to address environmental challenges.

- The Kenan-Flagler Business School's STAR program and NC Center for Strategic Economic Growth engage students with impressively strong results. The reputation of these programs is touted at legislative, regional, and local business levels.

These are just a few examples. As noted earlier, UNC Chapel Hill is also active in creating and leading a development agenda for the Triangle region to spur new companies, fuel the state's economy, take advantage of strengths at each of the area's research institutions through new collaborations, and provide a pipeline of new ideas and technologies to the existing corporate community.

What We Have Learned — ENGAGEMENT WITH THE STATE

Across many fronts, UNC Chapel Hill is deeply engaged with public- and private-sector leaders and experts in finding better solutions to the most pressing challenges faced by North Carolina. Since this work is led largely within schools and units of the University, it has been challenging to articulate to State leadership a comprehensive view of how UNC Chapel Hill is applying its innovation agenda to benefit North Carolina. Indeed, few people in any capacity know about the full extent of the University's statewide collaborations or the impacts that these efforts are having.

Remains To Be Done — ENGAGEMENT WITH THE STATE

Recommendations

- Enhance the benefits that the University provides to the state, and raise the perception of them through more effective communication.
- Create an economic development strategy in the proposed Office of Commercialization and Economic Development. This office will coordinate with senior leaders at UNC Chapel Hill to help build the innovation ecosystem. It will also play a key role in developing and articulating new strategies to work with (and for) people across the state. In every sense, it will raise the profile of UNC Chapel Hill as an engaged collaborator in building the State's future.
- Develop a data-driven strategy and approach to understand the true impact of UNC Chapel Hill and the UNC system on North Carolina.
- Create a dashboard to communicate Carolina's impact.

D. FUNDING

Q: How will we adequately fund our research and its application, in light of declining federal and state dollars?

CONTEXT

Even though federal and state funding for research has been declining in recent years, Carolina continues to compete well. Total funding for FY14 was \$793 million, up from \$778 million in FY13, despite the sequester and federal shutdown. Without much prospect for improvement in federal and state funding of research in the near term, continued growth will require a more diversified approach, including funding from industry.

Actions To Date — FUNDING RESEARCH

The University continually seeks alternative funding sources from industry, philanthropies, and individual donors. The Office of Research has invested in improved support for industry-funded clinical trials, supported an innovative collaboration with Eastman Chemical based in the Chemistry Department, waived F&A on Phase I SBIR/STTR grants involving our own spinouts, and is now in the process of creating a new Office of Industry Contracting, that will consolidate back office support for these activities. The Vice Chancellor for Development is setting ambitious goals for support from industry, philanthropies, and individual donors as part of the new campaign. Development and Research are finalizing new policy and procedures that will enable them to partner even more effectively on private fund raising for research.

What We Have Learned — FUNDING RESEARCH

Federal funding dollars are consolidating to a few top universities and Carolina is positioned in this group. The only way to stay in the top category is by hiring and retaining top faculty and recruiting outstanding students at all levels. To be maximally successful, faculty and students need state-of-the-art buildings and equipment. With State support declining, alternative funds are needed to recruit and retain world-class faculty and refresh the innovation infrastructure that supports their work.

Remains To Be Done — FUNDING RESEARCH

Recommendations

- Continue to support researchers as they seek research funding.
- Continue developing a comprehensive, diversified campaign with innovation and impact as top priorities.
- Become more engaged with venture philanthropy.

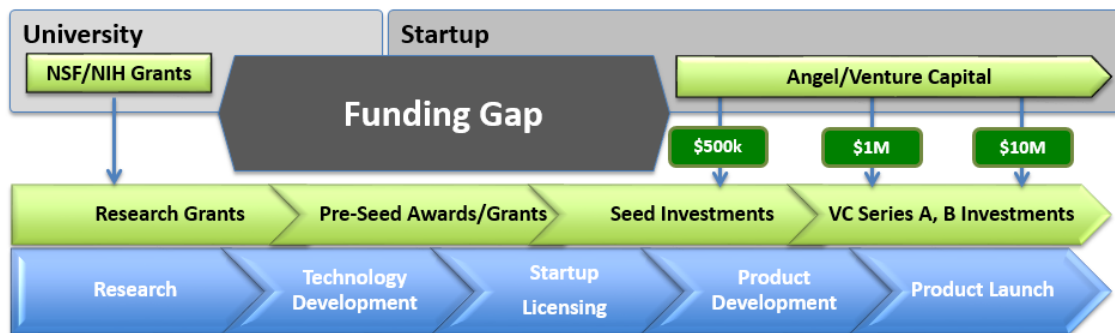
Q: How can we engage the venture community in support of new ventures?

CONTEXT

Funding new ventures is one part of the equation, but Carolina has to also figure out how to fund the development process that leads to strong IP for a license. This answer addresses the full funding cycle.

The University's approach to developing licensable IP is informed by the classic venture capital approach, which supplies not only milestone-driven financial resources but also expertise in the venture/commercialization process, specific domain expertise, and access to a wide network of specialized talent and advisors.

The commercialization process requires different types of funding at different stages to help de-risk the technology and develop it into a viable product. Funding comes in many forms, from technology development grants to industry funding, angel capital, and/or venture capital. Funding is needed first to demonstrate proof of concept or validate the discovery, increasing its attractiveness for either launching a startup or licensing to an established firm. In the case of a startup company, funding needs to continue as the technology is developed into a marketable product. The University recognizes funding gaps that exist in bringing technologies to market: 1) technology development funding within the University, 2) bridge funding between Phase I and II of SBIR grants, and 3) early-stage seed funding which is increasingly needed as angel- and venture-capital investors take a more risk-averse approach. All combine to create a major gap early in the process:



Actions To Date — VENTURE FUNDING

The University funds commercialization activity in various ways. One of the first efforts was the KickStart Commercialization Awards (up to \$50k each), which target emerging and new companies licensing (or planning to license) UNC life science technologies. A more recent program is OTD's Technology Enhancement Grants. This program was started by the Office of Research but is now housed within the Office of Technology Development and complements the KickStart program, expanding eligibility to all kinds of faculty IP but focusing specifically on unlicensed technologies (up to \$30K each). The TraCS 4D pilot program is the newest entrant into this field. For early-stage companies needing funds for feasibility studies, the University supports their SBIR grant applications and works closely with the local SBTDC. Carolina KickStart engages

several SBIR consultants who work with companies to write and review grant proposals as well as conduct mock review panels. Recently, to help speed the development of early stage technologies, the Vice Chancellor for Research announced that indirect costs on Phase I SBIR/STTR awards would be waived.

To help maximize University assets, the Board of Trustees asked Administration to create a small evergreen investment fund. The Carolina Research Venture Fund, a \$2 million fund available for investments in UNC Chapel Hill spinout companies.

In March 2014, Sallie Shuping-Russell discussed the Carolina Research Venture Fund with the Innovation and Impact Committee. Her memo states:

The purpose of CRVF is two-fold: (1) a strategic purpose to maximize the research assets by getting them into the marketplace and (2) an investment purpose to get sufficient return on the investments which can be reinvested into the CRVF, making it an evergreen fund. Because of this two-fold mission – and because the initial funds will not come from the Investment Fund – the CRVF does not have to receive a “venture capital” level of return. Its return goal will be to generate return of capital and provide sufficient excess return to enable CRVF to become an evergreen fund.

In order to facilitate informed decisions about investable IP at Carolina, the CRVF will establish its own advisory board of venture capitalists. Further quoting from the memo:

In addition, CRVF will establish its own Venture Capital Advisory Committee (VCAC). This will comprise leading venture capitalists from across the country and within North Carolina. Examples from outside the region include partners or ex-partners from Kleiner Perkins Caulfield & Byers, Greylock, NEA, Polaris, Domain, Andreessen Horowitz, Sequoia, Trident and others. VCAC will provide strategic advice to the Board as needed. It will also discuss with the manager(s) the viability of potential companies and offer advice to address concerns which start-up companies face as they grow. VCAC will also offer a long-term vision for new markets that could underwrite larger impact investments. It is also hoped that these venture firms would provide additional follow-on capital as the UNC-based companies develop.

The Venture Capital Advisory Committee will be an important tangible connection to the venture capital community that can be further leveraged. External investors have been attracted during the past several years largely through entrepreneurship support programs sponsored by Carolina KickStart, UNC Kenan-Flagler’s Center for Entrepreneurial Studies, Kenan Institute of Private Enterprise, and the Blackstone Entrepreneurs Network. Additionally, some investments come from individual relationships formed by a handful of seasoned faculty entrepreneurs. Carolina KickStart has engaged with a number of venture capital firms to enhance commercialization. Interactions have ranged from informal meetings with faculty, to help assess the commercial potential of a technology, to formal presentations to the firms for investment. KickStart also has worked with the Office of Technology Development on recruiting professionals from outside the University to help inform decisions about patenting investments. The Blackstone Entrepreneurs Network engages with experienced entrepreneurs (many of whom are themselves investors), who use their networks of VCs and funders to make connections for the companies that they

mentor. Local investors also regularly attend University-sponsored pitch events for new firms, such as the Carolina Challenge (funded by a private investor, managed by UNC Kenan-Flagler's Center for Entrepreneurial Studies), and the Emerging Companies Showcase, which draws approximately 300 attendees and includes technology and life-science tracks.

Hatteras Discovery Fund is an early-stage arm of Hatteras Venture Partners. Due to the strong relationship between the University and the Partners and its geographic target area, HDF has looked at several startups and invested in G1 Therapeutics, and is doing due diligence on others. Through research led by faculty PI Ned Sharpless, G1 has developed a novel small-molecule-based method for preventing the hematological side effects of exposure to ionizing radiation and cancer chemotherapy. Not only did HDF invest dollars, the Partners built a board of seasoned professionals for G1, hired a top CEO, and continue to carefully guide the company. It is these types of relationships we seek.

Meanwhile, the University's Office of Technology Development plays a role in finding venture dollars using a more one-on-one relationship model. The role that OTD might play in a University strategy to enhance relationships with the venture community is under active discussion.

Engagement with the venture community for teaching and mentoring young entrepreneurs draws top investors from around the world to Carolina. Some are embedded in different parts of campus as Entrepreneurs-in-Residence. The Center for Entrepreneurial Studies' Global Venture Capital Investment Competition (VCIC) offers investors the opportunity to get involved with the nation's top business school students and network with fellow VCs while getting an early glimpse of some pre-screened investment opportunities, 25% of which raise venture capital after pitching at VCIC.

What We Have Learned — VENTURE FUNDING

Most often, university ideas in the life science space are too early-stage for venture capital to be the first money. This requires the University to have a strategy for moving ideas to commercialization with technical assistance and the appropriate funding for each segment of the journey.

The majority of UNC Chapel Hill faculty engaging in commercialization activities have little experience with this type of endeavor. There are notable exceptions, but most faculty lack the expertise, time, financial resources, and career incentives to be highly successful. To support these faculty, it is helpful to pair expertise with funding, but it is not necessary that they come from the same source. Depending on a number of factors, some faculty lead in commercializing their discoveries and some take a more passive role. For the latter, the University may be better served by the faculty member continuing the research that generated the ideas in the first place. Just as venture capitalists surround their investment with experts from a wide range of fields, the University needs to do likewise. This is happening ad hoc in various areas on campus, but with too few people and resources to fully maximize the opportunities that members of the Carolina community are creating.

The traditional pace of faculty receiving grant funds for technology development is too slow. Not only are funds scarce along the development pathway, but technology development funds such as from SBIR/STTR come in periodic cycles. The proposal and review process can provide helpful if stringent external feedback on ideas and plans to move forward. There can be gaps in productivity as faculty seek funding, submit proposals, and wait for awards. In the meantime, the commercialization activity is stalled. Faculty also need continuing guidance in applying funds for prototyping, to keep moving forward in technology development. Support is needed in identifying and selecting vendors, and with contracting and NDAs.

Universities are challenging environments for investors to navigate without dedicated guides. UNC Chapel Hill would benefit from a structure designed to cultivate relationships with investors and help them make connections to emerging technologies or ideas that may be of interest. The University's startup companies would benefit from more involvement of investors as they are exploring avenues for moving a technology forward. With an acute need for funding during the proof-of-concept phase, there is a role for the investment community to play in advancing University-born technologies, particularly those that fall outside the funding available through federal agencies such as NIH or NSF.

It will take several years to judge the CRVF performance, but we are hopeful this vehicle will provide needed dollars to a few high-performing companies and also create new connections to venture capitalists.

Remains To Be Done — VENTURE FUNDING

Recommendations

Create a comprehensive strategy to engage the venture community and fund the full development cycle. As currently envisioned, key components of the strategy would be:

- Expand and coordinate (or consolidate) the University's Technology Development Grant programs to fund proof-of-concept studies across all schools and disciplines and then into investment. Many university technologies never reach the marketplace because no commercial relevance has been demonstrated which would attract both people and funding. These technologies need proof-of-concept or validation studies showing whether they do, in fact, have potential for becoming products or solutions that users would buy. Funding for such studies is extremely difficult to acquire, as these activities are beyond the scope of typical federal research grants, but too risky for investors or industry partners to fund. The proposed grants will range from \$25K to \$75K and will be awarded to projects on a competitive basis. Project applications will be evaluated by a panel of industry-relevant experts. Beyond allocating funds, this panel will provide feedback to the OTD and the faculty member(s) as part of the review process.
- Create an SBIR Gap Fund. One of the greatest opportunities for unlocking university technologies is through Small Business Innovation Research (SBIR) grants if the timing issue can be addressed. Startups built around university innovations can seek SBIR funds to demonstrate feasibility (Phase I) and to develop the product (Phase II). However, many companies struggle because of the time gap of SBIR funding. A successful Phase I SBIR grant (usually of about \$250K) is followed by the submission and review of an application for a Phase II grant (about \$750K to \$1M). The time from completion of Phase I to the funding of Phase II can be 9

to 12 months. Many startups do not have the resources to continue to pay scientific staff or rent space during this period and waste valuable time waiting for the evaluation of the application. The proposed SBIR Gap Fund will bridge this gap for university startups. The funding will be on the order of \$100K to \$150K to help the company remain viable while it seeks additional funds. Stringent review will be critical to the wise investment of these funds.

- Connect to local VCs. The Blackstone Entrepreneurs Network was formed to activate connections among startups, successful entrepreneurs, and investors (or “dealmakers”). From University research on dealmakers, we know that North Carolina, and the Triangle region in particular, has investor activity that is not as maximized as it is in other locations due to a lack of connectivity. UNC Chapel Hill will need to intentionally build more ways of connecting local funders to University opportunities, including through local alumni.
- Connect to key hubs to create relationships with VCs and other constituents. Investment from outside North Carolina will be critical to UNC Chapel Hill’s ability to commercialize research and realize impact. Our undergraduate entrepreneurship programs and VCIC program for MBAs have established activities in Silicon Valley and New York City, exposing students to the investment communities in those hubs. However, the University needs to build more direct connections and opportunities for engaging investors from other regions with our most promising emerging companies. Additionally, alumni who are investors can be made aware of University IP and invited to provide advice. There have been discussions by some alumni about creating an alumni seed fund.
- Provide needed technical and administrative assistance. This strategy would include integrating startup services for faculty across the campus, including Carolina KickStart and the Concierge Service for Entrepreneurs, with leadership from the proposed Office of Commercialization and Economic Development (which would include OTD).
- Fully implement the Carolina Research Venture Fund.

Q: How does our innovation agenda relate to a University development campaign – and to other possible opportunities for funding?

Actions To Date — CAMPAIGN

The Development Office has been an integral partner in promoting the I&E agenda. It has worked in a unit-based approach to identify and secure funds for initiatives across campus. As the culture has strengthened, deans and senior leaders have supported fundraising specific to their individual areas. Senior Development leadership at the University has indicated support for innovation priorities in the next capital campaign. The Office of Corporate and Foundation Relations within Development has been particularly helpful in connecting faculty innovators and program staff to potential individual donors. Rather than creating a central innovation fund, development efforts targeted individual units and their programs.

What We Have Learned — CAMPAIGN

There are a potentially significant number of UNC Chapel Hill alumni yet to be engaged with this work. They include entrepreneurs, investors (some with particular interests in research and commercialization), and industry partners who are generally supportive of the University’s

innovation agenda. A coordinated effort from senior administration leaders is critical to maximizing the potential of these philanthropic prospects.

Lack of centralized funds to support the overall campus ecosystem building, fund experiments, and catalyze efforts is a significant limitation.

Remains To Be Done — CAMPAIGN

Recommendations

- As noted earlier in this report, assure that fundraising for innovation is a significant component of the next campaign.
- Work with Development and senior leaders (such as deans and directors) across campus to support their individual I&E fundraising goals.
- Explore various foundation models for supporting I&E work on university campuses.
- Continue conversations with alumni who have expressed interest in a venture philanthropy fund for the University.
- Create a central Innovation Fund.

E. LEARNING AND COMMUNICATING

Q: How can we continually learn from others while also leading in innovation and entrepreneurship?

CONTEXT

UNC Chapel Hill was one of only a handful of universities that intentionally chose to strengthen a culture of innovation and entrepreneurship in a systematic and holistic way. Arizona State University is another that took the same approach – and interestingly, both Arizona State and UNC Chapel Hill were Kauffman Campuses. Both became part of the Kauffman Foundation’s learning community of 35 universities, led by the person who is now UNC Chapel Hill’s Special Assistant to the Chancellor for Innovation & Entrepreneurship. Other universities are aware of UNC Chapel Hill’s work and have used its approach as a model. Campus leaders are part of a community of universities that meet regularly and exchange ideas.

Actions To Date — LEARNING AND LEADING

During the 2010 planning process, teams made up of faculty and staff, students, and external constituents traveled to various places to learn and bring back best practices. They visited MIT, Stanford, the University of Florida, the University of Utah, New York City (for arts innovation) and other innovation hubs. Since that time, innovation leaders at UNC Chapel Hill have continually benchmarked I&E work on other campuses and in entrepreneurship ecosystems nationally and globally – again with the purpose of learning and adopting best practices. During the past several years, the Eshelman School of Pharmacy has brought in university commercialization leaders to speak with the campus community about best practices, as has OTD for its Innovation Seminars.

Members of the University are connected globally to entrepreneurship-education networks and commercialization organizations, and are international leaders themselves. One campus leader is an early member of a university-industry group and is documenting best practices for that organization. The experienced OTD staff stays abreast of the field of tech transfer and incorporates new methods when appropriate. UNC Chapel Hill leaders speak regularly at international conferences and attend to learn from others as well as host and talk with leaders from other campuses and countries.

A University of Pennsylvania program is the model for the New Enterprise Organization (NEO) program at Carolina. In some cases, the University only needs to provide advice and make the right connections to help campus innovators launch startups. Others need more support. The NEO program is designed to assist faculty members with very early-stage technology who do not wish to spend the massive amounts of time that starting a new venture may require. NEO provides a number of extra services to help form, launch, and grow the company: incorporation and documentation support, consultants for SBIR grant writing, an evaluation of the technology, and recruitment of the CEO.

UNC Chapel Hill led in establishing a standard easy IP license called the Carolina Express License. Its purpose is to greatly reduce the time and cost of processing technology licenses and thereby incentivize faculty and investors. OTD has executed 33 Carolina Express Licenses since 2010. The

University averaged 3 new companies per year in the several years before 2010 and now is averaging 5 to 7 per year, but this is not just the result of the Carolina Express License. It also reflects the support of Carolina KickStart in the School of Medicine and the Kenan Institute of Private Enterprise, and an improving economy. UNC has executed an additional 7 licenses for startups that were not Express Licenses during this same time period.

What We Have Learned — LEARNING AND LEADING

Faculty, staff, and students at UNC Chapel Hill are highly involved in entrepreneurship and innovation. Several people on our campus are global academic leaders in these fields.

Every major university works hard at commercialization and revisits the models that it uses. At some universities, separate entities like the Wisconsin Alumni Research Foundation have been formed to more effectively bridge the academic world and the marketplace. WARF's website states:

The Wisconsin Alumni Research Foundation (WARF) is the private, nonprofit patent and licensing organization for the University of Wisconsin–Madison, one of the world's great research universities. WARF was founded in 1925 and is a pioneer and innovator among university-based technology transfer offices. WARF's mission is to support, aid and encourage UW–Madison research by protecting its discoveries and licensing them to commercial partners for beneficial use in the real world.

Many models for catalyzing, funding and supporting innovation programs are available to provide continuous learning opportunities for UNC Chapel Hill as it advances an innovation agenda.

Remains To Be Done — LEARNING AND LEADING

Recommendations

- After studying many commercialization operations, UNC Chapel Hill leaders stepped back to ask an intriguing question: How would the University commercialize IP if it were the first ever to attempt this type of function? The conversation was between experts on campus and those outside. Once the leaders settled on an approach, they again sought feedback from a wide audience to test assumptions and make modifications. The result is the proposed Office of Commercialization and Economic Development, which will give the University the opportunity to implement the new approach in an iterative process – taking steps, testing those steps and the assumptions behind them, making corrections, and then moving forward. Leaders will continue to call upon their wide network of external expert practitioners as well as the University's own experts to develop improved practices that can inform the field.
- To fully realize the potential of the University's innovation ecosystem, individual I&E spaces, programs, and curricular activities need the resources to adopt best practices and apply lessons learned.
- UNC Chapel Hill needs to carefully consider the pros and cons of a closely held separate structure for certain innovation activities.

Q: What communication strategies are needed to bring the University community and the public on board with our innovation agenda – and to tell the story of impact?

CONTEXT

Effective communications about innovation and entrepreneurship serve a number of ends. They demonstrate the University's commitment to advancing the public good, reinforce its reputation for fostering creativity and discovery, encourage people to become involved, and illustrate the University's impact on the community, state, and beyond.

Actions To Date — COMMUNICATION

The Communication Office, Chancellor's Office of I&E, Office of Research, and the distributed communicators' network serving campus units all contribute to communicating the work and the impact of the innovation ecosystem. The Vice Chancellor of Communication is developing a campus-wide communication strategy, and since two key themes of the University are innovation and impact, his team will work with campus communicators on better delivering key messages. They already are working on getting more stories about innovative people at our campus.

The Office of Innovation & Entrepreneurship is a central catalyst that serves as a hub of communications about a wide range of related on- and off-campus activities. The University's innovation and entrepreneurship vision has been communicated to key audience segments by multiple means. Channels of communicating have included standard platforms (web, e-newsletters, social media) plus staff have made numerous presentations on- and off- campus, locally and nationally, including serving on the Governor's Innovation-to-Jobs Task Force. The I&E website serves as a central portal and can be found at innovate.unc.edu.

The Office of Research Communication focuses on faculty research, their stories, and the impact of their work. A new Director was just recruited who brings a decade of experience in science and research communications at NASA to assist in the development and execution of a communication strategy for UNC's research enterprise. The *Endeavors* online magazine is a popular resource available at endeavors.unc.edu.

What We Have Learned — COMMUNICATION

Several conversations with the Board Committee on Innovation and Impact have centered around the frustration of not effectively communicating the impressive work being done at UNC Chapel Hill and its impacts on the citizens of North Carolina and beyond. A broad communications strategy for innovation needs to be an essential component of the University's overall strategy, and also integrated with targeted strategies for specific key stakeholders.

Our story is one and many. The overarching story is about the innovation vision and mission, and how the ecosystem makes it possible to achieve real-world goals. This is an important message to communicate as it encourages people to join the University community and to support the work. It also positions UNC Chapel Hill as a leader in taking a holistic approach to innovation and entrepreneurship.

The many stories of how people at UNC Chapel Hill are impacting the world are told through the University website, news releases, and social media. Unit communication teams have their own websites, news operations, and media to target various audiences. Many produce high quality print pieces, conduct conferences, and have faculty, students, and staff representing them at international symposia. All of these communication efforts need to be not only continued, but organized in ways that are targeted to key audiences.

It is challenging to mount a broad and consistent overall effort in communicating the University's innovation work. Resources have been limited, and there are many other messages that the University needs to deliver. Having clarity at the leadership level about vision and goals is helping to reinforce the communication efforts, and will make it easier to help schools and units deliver innovation messages from their perspectives. Having a vice chancellor of communications and the resources for him to create a strong team clearly addresses this challenge.

Remains To Be Done — COMMUNICATION

Recommendations

Under the direction of the Vice Chancellor for Communications, a new communications team and structure (Carolina Compass) brings the opportunity for added resources, direction and collaboration around innovation communications. Some areas for action include:

- Formalize a system for effectively gathering and pooling information (content) on innovation and entrepreneurship activities at UNC Chapel Hill. This will require having a network of campus communicators team up with the central communications office.
- Create portals and pathways for faculty, students, and external audiences to learn about innovation and entrepreneurship programs specific to their needs, so they can find help quickly and easily. This work would be executed through the I&E Office.
- Create a national strategy for raising UNC Chapel Hill's profile as a thought leader in this area through key story placements, rankings, etc.
- Provide resources, tools, and guidance to stakeholders, e.g., faculty, staff, student innovation groups and working group members – so that they, in turn, can communicate consistently with audiences.
- Create an easy-to-understand dashboard of the University's economic impact on the State of North Carolina. This should include the direct impact of research, commercialization statistics, and other direct economic benefits.
- Develop and execute investor- and industry-specific communication strategies.
- Develop and execute alumni-specific communication strategies.
- Develop and execute a communication strategy for other key stakeholders.