

Innovate Collaborate Accelerate:

The UNC Vision for Innovation and Technology Development

A report of the findings and recommendations of UNC leaders, private and public sector partners examining University innovation and technology commercialization practices and identifying the essential progress needed to expand the economic development impact of the University.





Each and every day, I am awed and energized by the potential of our UNC campuses to change people's lives for the better through research and discovery. From creating new medical devices, nanotechnologies, and drug compounds that save lives, to developing new crop varieties that help feed our state and the world, to offering new insights into life itself—our faculty, staff, and students are imagining possibilities and creating solutions that will help shape the future. Through our UNC Tomorrow initiative, we heard loudly and clearly that the citizens of North Carolina expect their public universities to do even more.

Several months ago, I asked our staff at UNC General Administration to figure out how we could create and transfer even more university discoveries to the marketplace and larger society, and how we could do it faster and better than any other university in the world. *Innovate – Collaborate – Accelerate: The UNC Vision for Innovation and Technology Development* is the result of this in-depth effort to understand how UNC can refocus its innovation efforts for greater impact.

The recommendations in this report were developed by a collaborative working group with representatives from UNC campuses, the private sector, and the public sector. I am especially grateful for IBM's participation in this effort. IBM, which has an unparalleled record of innovation globally and deep roots here in North Carolina, contributed people, resources, and perspectives that allowed us to consider new possibilities.

The recommendations found in this report offer new and expanded roles for a broad range of people throughout our University, as well as beyond. The ultimate success of this ambitious initiative will require more innovators, stronger leaders, visionary thinkers, more informed supporters, and stauncher advocates. We all must do our part if UNC is to realize its innovation and technology development vision. Let's get started.

A handwritten signature in black ink that reads "Erskine Bowles". The signature is written in a cursive, flowing style.

Erskine Bowles
UNC President



The steps outlined in this report will position UNC as one of the few large public Universities stepping forward to collaborate with the private sector across an entire multi-institutional system. This collaboration is designed to nurture a culture of innovation, accelerate the commercialization of technologies to the marketplace, and drive local and global economic development.

Bold moves and innovative changes will determine our success, as UNC implements recommendations to drive cross-institutional synergy. The changes will be cultural, in support of staff, faculty and students. And there will be process, role and metrics-related improvements, to expand the objectives of technology development.

IBM continues to enthusiastically support UNC and the many people working to implement the jointly developed recommendations. I look forward to seeing the results and opportunities sure to follow.

A handwritten signature in black ink that reads "John E. Kelly III". The signature is written in a cursive, flowing style.

John E. Kelly III
IBM Senior Vice President and Director of Research

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Executive Summary

From its innovative faculty and students to unique facilities and equipment, UNC is and will continue to be well-positioned to make discoveries that can change lives today and in the future. Yet we also know that our potential remains largely untapped, and strategic focus will unleash it. Three teams, co-led by UNC and IBM representatives and comprised of university, private, and public sector partners, have closely examined innovation and technology transfer in UNC. *Innovation* is commonly referred to as both a process – the act of creating something new – and a product – the invention itself. Oftentimes, however, an invention is not considered to be an *innovation* unless it has proven economic or social value. *Technology transfer* has come to represent the efforts of universities to commercialize those inventions that have economic and social value. The cultivation of university ideas for commercial and social use must move beyond the limitations of current technology transfer practices towards more holistic and value-added *technology development* approaches.

Teams looked at the UNC campus “culture” of discovery and innovation; the ways we work in partnership with business to move innovations forward towards commercialization, and how our innovative activity translates into economic development outcomes through the commercialization of university technologies. Through discussions with key stakeholders, analyses of exemplary examples of successful innovation within and outside of the University, and review of current policies and practices in technology transfer offices, the individual teams came to two key and common realizations. First, technology transfer must be conceptualized differently than it is at present in order to fully understand, support, and realize the multiple benefits from this work. Second, innovation and technology development require collaboration and partnership—within campuses, between campuses, and with outside partners—so the commercialization of technology is a simpler process. We in UNC must squarely and strategically focus our energies to improve and maximize our relationships in innovation and technology development. The vision for innovation and technology development that emerged from our work, as well as the recommendations we make for change in three foundational categories, allude back to these two overarching ideas and will help UNC establish patterns of good practice that ultimately stimulate economic and social progress. Over the next year we will be taking a series of steps to implement this vision (see pg. 17).

The UNC Innovation and Technology Development Vision

The University of North Carolina and its constituent institutions will engage in high-value research and commercialization partnerships, with both public and private sector partners, to work together to pioneer new ways to innovate and commercialize technologies – ways that accelerate global and local economic development and position UNC as the “go-to” place for collaborators who also seek to find solutions to the world’s toughest problems.

We will accomplish this vision by excelling in strategic research areas within institutions and across UNC, by supporting innovative individuals, and by modeling inspired, efficient technology development processes.

Initiative Recommendations

Excel in Strategic Research Areas

Recommendation 1. Conduct competitive analyses to identify unique strengths in research and intellectual property at each UNC institution.

Recommendation 2. Identify, articulate, and seek to combine each UNC institution's strengths and mission-appropriate role in technology development within an overall University strategy.

Support Innovative Individuals

Recommendation 3. Evaluate and enhance support of entrepreneurial faculty, staff, and students and form comprehensive mentoring strategies within and among campuses.

Recommendation 4. Launch and execute a comprehensive effort to recognize entrepreneurship and technology development in department- and campus-level reappointment, promotion, and tenure (RPT) policies and through other reward and incentive programs for faculty, staff and students.

Model Inspired, Efficient Technology Development Processes

Recommendation 5. Pilot new marketing-focused and relationship-based staffing models for technology development.

Recommendation 6. Create and disseminate UNC technology commercialization legal guidance documents and other aids to form a toolbox of resources to aid faculty, staff and partners in making negotiations simpler and faster.

The six recommendations and suggested strategies for achieving the recommendations represent a work agenda for UNC and its constituent institutions over the next year and our pathway to change – change that will result in UNC developing innovation with worldwide application, fruitful partnerships, and meaningful economic change. The success of this innovation initiative and realization of these recommendations demands the presence of ongoing leadership support and assumes dedicated and sufficient resources for this important work. Success and progress require that systemic change take place both inside and outside the academy in areas of policy and practice that currently restrict our ability to bring University innovations to bear on societal problems.

To do our part in advancing innovation and technology development, campus-based leadership teams will be formed in August 2009, and will begin the work outlined in this report in September 2009. Resource options that reflect innovation and collaboration will be explored throughout the implementation year. Progress on legal guidance and tools, incentive models, and analyses of competitive research strengths will be completed in the first six months, with work on other recommendations, such as RPT change and the development of pilot models, extending through the end of the implementation year. Baseline metrics will be captured for each recommendation. These metrics have been weighted and combined into a 100-point Innovation Index that, over the next year and into the future, will help the University and constituent institutions track success and progress towards achieving the innovation and technology development vision.

“In a global economy where researchers around the world are gaining on American universities and companies, we believe more must be done to rapidly and efficiently commercialize innovations developed by university researchers.”

-Ewing Marion Kauffman Foundation

Introduction

American colleges and universities have throughout history adopted ideals, models, and practices that position them, both individually and collectively, for an important and ongoing national role in innovation. *Innovation* is commonly referred to as both a process – the act of creating something new – and a product – the invention itself. Oftentimes, then, an invention is not considered to be an *innovation* unless it has proven economic or social value. The introduction of the research university model, the federal legislation that established land-grant institutions, and the emphasis on faculty research publication and dissemination each began well over a century ago, and have helped position universities to make ground-breaking discoveries. More recently, the 1980 Bayh-Dole legislation provided universities with greater control over their discoveries, and greater responsibility for translating those discoveries into innovations. *Technology transfer* has come to represent the efforts of universities to commercialize those inventions that have economic and social value.

Despite the cultural and political shifts that favor academic innovation, university technology transfer has gained a reputation in the last 30 years among private sector partners as being difficult, inflexible, slow, and unprofitable. While UNC can boast notable innovation and commercialization successes, the University has not been exempt from these same criticisms.

Our recent “UNC Tomorrow” discussions with people across North Carolina confirm that our citizens not only view UNC institutions as fertile grounds for the discoveries and innovations that ensure the economic well-being of our state and nation, but also that they expect our institutions to overcome the stereotypes of academic technology transfer, forge a new mold, and, put plainly—do more. The cultivation of university ideas for commercial and social use must move beyond the limitations of current technology transfer practices towards more holistic and value-added *technology development* approaches.

The report of the UNC Tomorrow Commission charges UNC to take active steps to expand the state’s economy through more, faster and improved translation and commercialization of university discoveries (see Figure 1). A closer look at UNC innovation inputs and outputs gives some sense of the opportunities at hand.

Assets and Opportunities

Research sponsored by the public and private sector provides the fuel for many university inno-

Figure 1: UNC Tomorrow Report Recommendations

This report addresses several recommendations of the UNC Tomorrow Commission, including:

4.1.2 – UNC programs, especially research programs, should be globally competitive to ensure that they are relevant and significant.

4.4.1 – UNC should increase its capacity and commitment to respond to and lead economic transformation and community development.

4.4.3 – UNC should seek to align appropriate campus programs with the strategic economic plans (including sector and cluster plans) of their regions and the state, recognizing the unique differences and challenges of our state’s economic and geographic regions.

4.7.1 – UNC should apply, translate, and communicate research and scholarship to broader audiences.

4.7.3 – UNC should create a mechanism for applying research and scholarship to addressing significant regional and statewide issues.

5.1 – UNC should examine the missions of its 17 constituent institutions in light of state and regional needs from a “system” perspective so that the programs and resources of all institutions serve the state and its regions in a manner that complement each other, maximize resources, and avoid unnecessary duplication.

5.3 – UNC should lead the campuses in a refinement and adjustment of the tenure, promotion, and incentive system to place greater value on faculty involvement and engagement in applied research and outreach that will enhance the state’s competitiveness without decreasing support for teaching, basic research and scholarship.

5.7 – UNC should encourage and facilitate interdisciplinary and inter-institutional collaboration among its institutions.

5.8 – UNC should continue efforts to establish accountability and performance measures that ensure and demonstrate transparently its success in carrying out its missions.

For full UNC Tomorrow Commission report: http://www.northcarolina.edu/nctomorrow/reports/commission/Final_Report.pdf

vations, and UNC institutions compete for these awards with great success. In the past five fiscal years, UNC institutions have secured more than one billion dollars annually in sponsored research. Almost two-thirds of these awards are from federal sponsors such as the National Institutes of Health and the National Science Foundation. While North Carolina consistently ranks well above the national average in academic research and development (R&D) funding, our industry-based R&D is well below that of the leading state and also well below the expected level given the strength of North Carolina’s academic R&D capacities¹. This is an important point, as university-industry partnerships are known to create a more favorable environment for innovation and growth of competitive businesses in our country². Less than 6.5% of UNC’s sponsored research funding came from industry partners in FY2008, and 87% of those awards were for less than \$1M. The UNC Board of Governors has set increasing “collaborative research” with industry as one of the University’s strategic priorities³. Growth in industry funding would also bring needed diversification to the UNC sponsored research portfolio, which is disproportionately comprised of federal funds.

Sponsored research dollars prime the pump of an innovation pipeline, the outputs of which are most commonly captured in numbers of invention disclosures, patents, licenses and options, start-up companies, and licensing income. In 2006, the latest year for which full information is available, six UNC campuses active in technology commercialization disclosed a total of 435 inventions and filed 272 patent applications. Companies seeking to commercialize these discoveries paid the six campuses \$5.4 million⁴. In the last 10 years, UNC has formed over 100 companies from licensable technologies generated at eight of the 16 constituent universities. When these metrics are used to draw comparisons across campuses in the United States, some UNC institutions excel in areas while others significantly underperform. The notion, however, that such metrics do not capture the breadth and full value of technology commercialization activity is met with widespread agreement. In order to realize the full benefits of this work, we must find new ways to describe and measure the success and value of the full range of innovation activities. These metrics must be expanded to encourage other critical behaviors that are necessary in order to realize the full benefits of this work. As such, this initiative will result in our improved ability to describe and measure the success and value of the full range of innovation activities at UNC.

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Initiative Overview

To understand how UNC can transfer more technologies and commercializable ideas to society—and do it better than anyone else—university administrators, faculty entrepreneurs, and industry and public sector partners launched an initiative to understand our innovation pipeline and determine the most valuable ways to improve it. Three teams, co-led by UNC and IBM representatives and comprised of university, private and public sector partners, closely examined UNC innovation and technology development efforts through the lenses of university culture, industry partnerships, and economic development⁵. In their efforts to talk with key stakeholders, analyze exemplary cases within and outside of UNC, and review policies and practices, two foundational ideas surfaced repeatedly across the three teams. These ideas—that we cannot take too narrow or complacent a view

¹ From “Advancing Innovation in North Carolina: An Innovation Framework for Competing and Prospering in the Interconnected Global Economy” by the Office of Science and Technology, December 2008.

² Porter and Stern (2001) “National Innovative Capacity,” *The Global Competitiveness Report 2001-2002*

³ UNC Board of Governors, Long Range Plan, 2006 Update, p. 27.

⁴ 2006 U. S. Annual Licensing Survey, Association of University Technology Managers

⁵ See Appendix A for team and team membership details

of this work and its impacts, and that partnership and collaboration make the technology commercialization process both higher impact and less painful—form the basis of a UNC innovation and technology development vision and six specific recommendations aimed to move us closer to the vision through refocused UNC innovation and commercialization efforts.

How we should view innovation and technology development

The University’s three-part mission of teaching, research, and service is time-honored and widely known. Our emphases on critical thinking skills, investment in cutting edge research, and extension of university resources into communities reveal, however, the centrality of innovation and technology development to the work of the University. Teams found that at present, innovation and technology transfer are either too narrowly or too loosely defined within UNC. Some relegate the commercial activities of faculty and staff to the scope and responsibility of a single and peripheral “technology transfer office.” On the other hand, some assume that “everybody’s already doing it” through the traditional knowledge-sharing means of publication and presentation. Both perspectives demonstrate the need to take a more intentional approach to this work within UNC. A more robust yet clear understanding of innovation and technology development is needed, lest we neglect our unique capacity and duty as a public university to transform economies and quality of life through discovery and applied knowledge.

In order to sharpen UNC’s inconsistent conception of innovation and technology development, teams identified and reviewed various types of innovation and technology development efforts within UNC along with their associated results.

Case studies included the following:

- A one-off “transaction,” a deal in which a university “licensed” a technology to a private company
- An open collaborative research effort, in which a university and a private company worked together using “open” intellectual property
- A university-based start-up company
- A center in which industry members get a “first look” at jointly-developed technologies
- A public-private network formed for the purpose of economic development and commercialization
- A research-based technology development group
- A long-standing, multi-faceted industry-sponsored research relationship

Teams found that the motivations and the results of UNC faculty, staff and students involved in innovation and technology development efforts centered around the following common themes:

- Research differentiation and worldwide leadership in an area
- Production of highly competitive graduates through unique opportunities and skill development
- Professional growth through a challenging and worthwhile entrepreneurial endeavor that extends the impact of one’s research
- Creation of solutions to the world’s biggest problems
- Access to the best minds and resources in the world through innovation and commercialization partnerships
- Impact on economic development, at multiple levels

As this list clearly demonstrates, the scope of innovation and technology development activity lies well beyond the duties of a single office and highlights a type of scholarly activity that faculty may choose to pursue—one that has the potential to combine research, instruction and service responsibilities but may not always result in traditional forms of scholarly dissemination and documentation as products. This broadened understanding of the scope of innovation and technology development activity within UNC must be used when interpreting and implementing the vision and recommendations in this report.

Let's focus on partnerships, not transactions

Within each of the three teams, a productive conversation on innovation and technology development was difficult to have without reference to *collaboration*, *relationship*, and *partnership* – whether internal to the organization or with external partners. Yet, in ways both big and small, teams found that UNC lacks structures, policies, and strategies that, if in place, could yield more valuable relationships—particularly regarding industry relationships. To make the pursuit of robust, high-value public-private partnerships of primary concern presents a significant departure from the normal mode of one-off technology commercialization transactions.

We must identify common goals with public and private sector partners, value each others' strengths and perspectives, and work toward progress and solutions that benefit all stakeholders.

The complexity of the problems we face demands better communication than ever—within campuses, among different campuses, and between campuses and business partners working on solving the same problems. This is especially true for public universities with clear responsibilities to serve the people who support them. We must identify common goals with public and private sector partners, value each others' strengths and perspectives, and work toward progress and solutions that benefit all stakeholders.

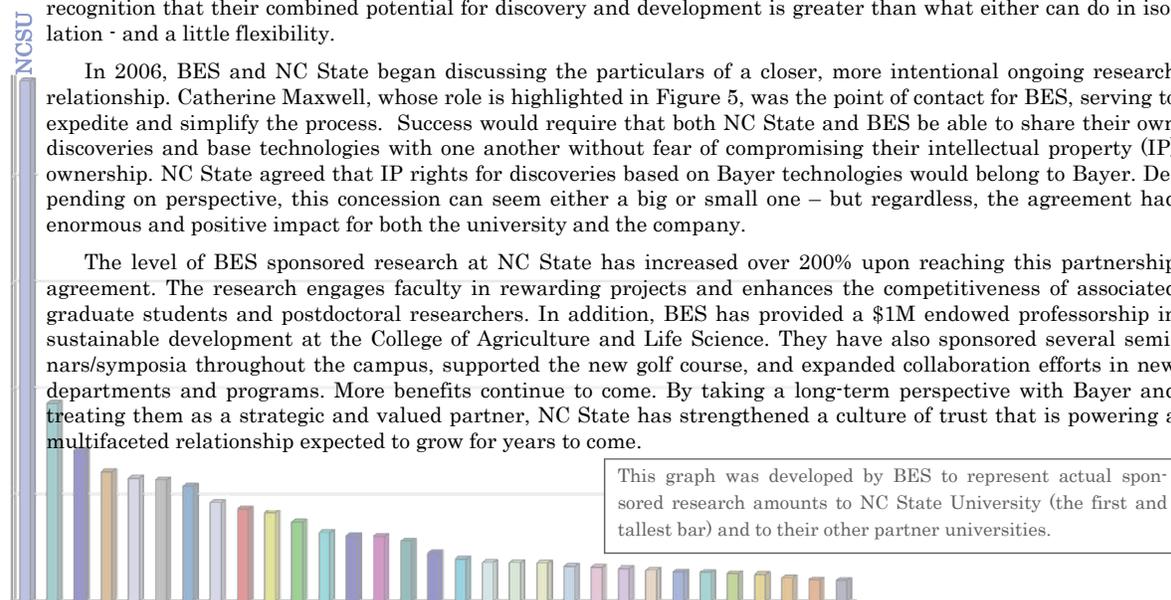
Simple steps can be taken to improve many types of innovation and technology development partnerships, but teams found that some actions hold more long-term value than others. In particular, teams noted the enormous potential that could be reached through emphasis on long-term and multi-faceted relationships with interested industry partners (see Figure 2). These are the relationships that have the potential to generate the most benefits to all involved parties, and potentially to society. Another high-payoff strategy is to build open collaborative relationships around intellectual property (see Figure 9). The recommendations in this report should be enacted in a way that focuses on and creates innovation and commercialization partnerships of the highest value.

Figure 2: Taking the Long View of Partnership

Bayer Environmental Science (BES) and NC State University have worked together for many years to advance plant health and turf management research. Recently, that partnership has skyrocketed to new levels through recognition that their combined potential for discovery and development is greater than what either can do in isolation - and a little flexibility.

In 2006, BES and NC State began discussing the particulars of a closer, more intentional ongoing research relationship. Catherine Maxwell, whose role is highlighted in Figure 5, was the point of contact for BES, serving to expedite and simplify the process. Success would require that both NC State and BES be able to share their own discoveries and base technologies with one another without fear of compromising their intellectual property (IP) ownership. NC State agreed that IP rights for discoveries based on Bayer technologies would belong to Bayer. Depending on perspective, this concession can seem either a big or small one – but regardless, the agreement had enormous and positive impact for both the university and the company.

The level of BES sponsored research at NC State has increased over 200% upon reaching this partnership agreement. The research engages faculty in rewarding projects and enhances the competitiveness of associated graduate students and postdoctoral researchers. In addition, BES has provided a \$1M endowed professorship in sustainable development at the College of Agriculture and Life Science. They have also sponsored several seminars/symposia throughout the campus, supported the new golf course, and expanded collaboration efforts in new departments and programs. More benefits continue to come. By taking a long-term perspective with Bayer and treating them as a strategic and valued partner, NC State has strengthened a culture of trust that is powering a multifaceted relationship expected to grow for years to come.



Over the next year UNC General Administration, our campuses and our partners will be working together to implement these recommendations (see pg. 17).

The UNC Vision for Innovation and Technology Development

These two core ideas, combined with the desire to create and make available more technologies and to do so faster and better, form the basis of a vision for University involvement in innovation and technology development:

The University of North Carolina and its constituent institutions will engage in high-value research and commercialization partnerships, with both public and private sector partners, to work together to pioneer new ways to innovate and commercialize technologies – ways that accelerate global and local economic development and position UNC as the “go-to” place for collaborators who also seek to find solutions to the world’s toughest problems.

We will accomplish this vision by excelling in strategic research areas within institutions and across UNC, by supporting innovative individuals, and by modeling inspired, efficient technology commercialization processes.

Teams determined fundamental changes that are needed in the way we think about, structure, measure, and support the translation of UNC technologies into useful commercial and social products. Recommendations described in this report encourage UNC to reach the vision—to move from a predominant mode of patenting, protecting, and complex negotiating for one-off revenues toward a more strategic, higher-payoff technology development model focused on mentoring, partnership, and marketing. With such changes, we can expect near term gains, such

as increased entrepreneurial activity among faculty, staff and students, greater clarity about UNC R&D strengths, faster translation of UNC discoveries into innovations, and improved UNC-industry relationships. We can also expect longer term gains for the state, such as new jobs, increased revenues, closer industry ties, and improved quality of life. As UNC pursues the following recommendations, the teams believe UNC and North Carolina will be placed on a trajectory towards distinction and maximum impact through innovation.

Recommendations described in this report encourage UNC to reach the vision – to move from a predominant mode of patenting, protecting, and complex negotiating for one-off revenues toward a more strategic, higher-payoff technology development model focused on mentoring, partnership, and marketing.

Recommendations

Innovation and technology development are complex, multifaceted enterprises, and as such, the following recommendations should not be considered comprehensive in scope. Rather, the recommendations target foundational and far-reaching change upon which additional future goals and plans can be built and realized as we work to achieve the vision for innovation and technology development in UNC.

Excel in Strategic Research Areas

Recommendation 1 Conduct competitive analyses to identify unique strengths in research and intellectual property at each UNC institution.

Recommendation 2 Identify, articulate, and seek to combine each UNC institution’s strengths and

mission-appropriate role in technology development within a University strategy.

UNC's research and development expertise and capacities are distributed among its 16 universities, spanning over 560 miles and consisting of more than 40,000 annual graduates, 270 centers and institutes, 7,500 active sponsored projects, and 15,000 faculty. While the magnitude of those figures is impressive, the breadth of our potential poses challenges—on both the institutional and system levels—in understanding, evaluating, and accessing opportunities to innovate, partner, and hasten the commercialization of our technologies. In order to fuel the innovation economy of our state and beyond, the distributed capacities of the University must be more intimately known, effectively communicated, and strategically developed with existing and desired public and private sector partners.

Per the first recommendation, UNC institutions must capture high-quality, strategic information on competitive R&D and intellectual property strengths. UNC's industry partners in research and development regularly reiterated this point to the teams. Our institutions must know what they are good at—in fact, what they're better at than anyone else in

the world—in order to advance to a position of local, national, and global leadership in innovation and collaboration. One partner from a multi-sector Fortune 500 company noted that “every university is ‘super in nanotechnology,’” and it is no longer good enough to stop at such broad claims. As universities worldwide are nurturing competitive research programs and inviting collaboration with industry, our institutions must be much more specific about what we have to offer. Progress in understanding and communicating our expertise, strategically and comparatively, will set UNC institutions apart from other universities across the globe.

In addition to realizing and developing the innovation assets of individual campuses, we must also seek and develop areas where combined institutional strengths will yield greater results than what individual campuses could accomplish alone. While not all institutions are home to globally competitive research programs, all can play a part to strengthen the potential of the whole⁶—a potential that has not yet been nurtured or harnessed in the realm of technology commercialization. Per the second recommendation, each UNC institution must be able to envision an interdependent innovation network in North Carolina and see a role for itself within it. This may also include sharing resources to accomplish essential technology development processes. Figure 3 illustrates some of the exemplary innovation programs from campuses with different missions and strengths and

Figure 3: Optimizing in Place: The Role of Each UNC Institution in Innovation

Not all UNC institutions have the diverse research portfolios and assets of a flagship university, but all institutions can contribute to the UNC's effort to increase our impact through innovation and technology development. Several UNC schools are already working to hone and strengthen their unique capabilities towards a greater UNC technology development effort overall. For example:

Western Carolina University (WCU) boasts a strong regional identity. The university's mission and strategic plan emphasize that the future of the university and the well-being of the region rely heavily on one another. For this reason, WCU proactively builds public-private partnerships in the local community—an approach that influences what innovation and technology development look like at WCU. WCU is home to the Center for Rapid Product Realization, a state-of-the-art translational “research to concept to design to prototype” center. Leveraging the resources of the University and the expertise of its faculty and students, the Center catalyzes the development of innovative new products, processes, and services for entrepreneurs as well as partners across business and industry broadly—including those in traditional sectors like furniture and emerging ones like aerospace/automotive. The Center also works with partners in existing business to increase the productivity and decrease costs in the design and manufacture of existing products. As such, it serves as a system-wide resource, working to bridge the divide between university “theoretical” research, and industry-desired “working” products.

UNC Wilmington (UNCW) is one of several UNC institutions conducting excellent education and research programs in marine science. To capitalize on their strength in this area, UNCW launched MARBIONC, an economic development organization administered by the Center for Marine Science. MARBIONC develops university intellectual property as multiple inventions and processes—working closely with industry partners from various market segments to ensure that the Center's intellectual property is developed to meet specific and varied needs of the marketplace. The MARBIONC model positions UNCW to lead and assist the system in the commercialization of marine-based technologies.

⁶Bhide, Amar. February 2009. Where innovation creates value. *McKinsey Quarterly*.

with implications and utility for the greater University.

If UNC can understand and enact the transfer of university technologies differently than we do now—in ways that both value and capitalize on unique institutional characteristics as well as combined potentials—then our institutions will realize new efficiencies, synergistic opportunities, and greater economic impact through technology development, particularly in North Carolina.

“Visionary” Ideas:

- Invest in shared information systems around research expertise and capabilities. Presently, electronic research administration tools developed at UNC -Chapel Hill are being implemented across the system and have the potential to capture and analyze disciplinary expertise on an individual, campus, and system level. Additional resources are needed to speed the realization and development of this capability.
- Hold regular (possibly themed, via technology or in person) innovation summits within UNC to encourage intra- and inter-disciplinary collaboration and strategy-building around identified strengths.

Support Innovative Individuals

Recommendation 3 Evaluate and enhance support of entrepreneurial faculty, staff, and students and form comprehensive mentoring strategies within and among campuses.

Recommendation 4 Launch and execute a comprehensive effort to recognize entrepreneurship and technology development in department- and campus-level reappointment, promotion, and tenure (RPT) policies and through other reward and incentive programs for faculty, staff and students.

For UNC to accomplish its vision for innovation and technology development, the University must be able to attract and retain the most talented and entrepreneurial individuals—both in exist-

Figure 4: Promoting a Culture of Innovation through Campus Reward Policy

Integration of technology commercialization and economic development into campus reward and recognition policies and processes is essential to instill a culture of innovation in UNC. Some institutions are already adding innovation principles into their reappointment, promotion and tenure (RPT) policies. UNC Chapel Hill’s Eshelman School of Pharmacy recently integrated “The Scholarship of Application” to their promotion and tenure policy, emphasizing the importance of translating theoretical discoveries into practical use. The policy includes patent publication and commercialization of intellectual property as a specific example of this type of scholarly work.

Other UNC institutions are making changes to their reward policies on campus levels. Both North Carolina State University and Western Carolina University have integrated principles of innovation and application into their campus-wide RPT guidance. NCSU has identified “Technological and Managerial Innovation” as an integral criterion for decisions about faculty reappointment, promotion and tenure, while WCU emphasizes the importance of the “scholarship of application” in their reward policies. These changes emphasize campus-identified goals to provide new products, processes, and services needed by society at a reasonable cost while promoting the importance of innovation as a central mission of the University of North Carolina overall. Policy changes such as these must be modeled and also reinforced through other fundamental changes in the campus support system for entrepreneurs.

ing areas of strength as well as in emerging or targeted ones. We must ensure that both institutional and UNC policies value and enable entrepreneurship and that we develop and support programs that enhance the abilities of these talented individuals.

Our innovators must be encouraged, mentored, and developed. Throughout this process, several UNC innovators particularly noted the challenges that await (and sometimes deter) a first-time inventor. First-time inventors have numerous questions about processes, options, legalities and more. Improvements are needed in the mentoring of new inventors, in making traditional routes for technology commercialization (licensing/start-ups) more transparent to new inventors, and in demystifying conflicts of interest and commitment. The flagship campuses have highly-regarded support programs in place for faculty, staff and student entrepreneurs, such as Launch the Venture at UNC Chapel Hill and the Accelerating Commercialization of Technologies (ACT) project at NC State. Careful thought should be given to expansion of such proven programs in

appropriate ways that would either allow other UNC constituent institutions to access the programs or to participate in a modified version. Strategic expansion of such mentoring models could both pool multi-campus fiscal and human resources as well as foster cross-pollination of ideas among the most innovative individuals in our system.

In addition to creating a positive environment for innovative individuals, we must also ensure that appropriate reward and recognition systems are in place. Teams found that innovation and technology development efforts within UNC yield far more benefits to individuals, institutions, and beyond than are currently recognized. Innovation and technology development activities often become serial entrepreneurial endeavors that seed professional opportunities for students, attract additional faculty and partner involvement, and invite direct engagement in local or regional economic development.

At present, our reward structures are anchored in major milestones with deferred rewards (such as tenure, patents and royalties) and centered on individual accomplishments. Time-honored reward and recognition practices must be updated, but new means of reward and recognition are also needed to acknowledge and encourage these broader impacts. At the individual level, reappointment, promotion and tenure (RPT) policies and practices must be broadened to acknowledge forms of innovation and technology commercialization as scholarly activity in addition to basic research, publication and presentations (see Figure 4 for examples). At the same time, these policies and practices must be further adapted to encourage and recognize that multidisciplinary collaboration is essential for innovation. New vehicles of recognition should be developed to reward individuals at multiple points along the innovation pipeline. New models are also needed to define and reward shared accountability across the networks of people who influence innovation and technology development across an institution. These models will reward not only the innovators, but also the administrators and staff that successfully enable high-value outputs. Teams began a preliminary examination of reward programs and incentive policies used in industry settings, which could be adapted to help UNC broaden the innovation pipeline and more fully acknowledge the collaborative work of innovation.

Policies and practices must be further adapted to encourage and recognize that multidisciplinary collaboration is essential for innovation. New vehicles of recognition should be developed to reward individuals at multiple points along the innovation pipeline.

“Visionary” Ideas:

- Formalize existing department- or college-level faculty as “Entrepreneurs in Residence” who can serve to mentor other entrepreneurial faculty colleagues and form a network of change agents across the campus.

Model Inspired, Efficient Technology Development Processes

Recommendation 5 Pilot new marketing-focused and relationship-based staffing models for technology development.

Recommendation 6 Create and disseminate UNC technology commercialization legal guidance documents and other aids to form a toolbox of resources to aid faculty, staff and partners in making negotiations simpler and faster.

In addition to strategic information and a cadre of ready innovators, our fullest potential can only be reached through a recalibration of the prevalent innovation and technology transfer model in UNC. The predominant mode of patenting, protecting, and complex negotiating for one-off revenues must shift toward more strategic, higher-payoff models focused on marketing, business development, and relationship management—all ideas that were welcomed by both public and private partners during our process. Such an approach, both at the campus and University levels, will improve our ability to ascertain the needs and interests of our partners, ease negotiations, and foster long-term relationships with strategic partners. New infrastructures and processes for the commer-

cialization of university technology are needed to accomplish the vision.

UNC and constituent institutions must first acknowledge and understand the entire infrastructure, or ecosystem, that influences and enables innovation and technology development. Multiple campus offices influence innovation and commercialization relationships, yet they operate in isolation from one another as silos and lack incentive to change this mode of operation. A more collaborative, interconnected ecosystem approach would transform technology development from a peripheral activity—which is now often considered the purview of a single, understaffed (or non-existent) office—to a central one linked to broader campus engagement efforts with distributed responsibility for this complicated work. An ecosystem model—linking the offices of technology transfer, sponsored research, development and other stakeholders—would also benefit our partners in innovation, creating a knowledgeable and coordinated network across the campus that is well positioned to develop and nurture a comprehensive relationship. Improved internal coordination and purposefulness is essential.

Multiple campus offices influence innovation and commercialization relationships, yet they operate in isolation from one another as silos and lack incentive to change this mode of operation.

As we reconsider technology development infrastructures, new roles may also be needed. Industry partners discussed with the teams several specific, useful relationship management roles present at some other universities. *Industry liaisons* serve as entry points to the university (or department or college), connecting industry partners to individuals of interest and helping with logistical arrangements. *Project managers* are intimately familiar with the ongoing work of faculty within a certain unit and assist the faculty members in moving projects incrementally closer to commercialization opportunities through additional trials, screening tests or other means. By moving projects purposefully towards a commercialization end, this individual helps the faculty realize greater success while simultaneously increasing the value of the innovation. *Business developers* serve as “connective tissue” between the campus silos (technology transfer offices, sponsored research offices, development, and others) to make sure that relationships are being fully maximized and nurtured. The idea of a single point of contact is attractive to industry, but it must be supported by a functional network of individuals working towards the same goals. And, it would be well matched by industry’s willingness to provide universities with the same. Figure 5 describes one such role in place at NC State University.

This new approach also requires clear legal guidance and policies as well as other tools to accelerate and simplify technology commercialization. Throughout this process, technology transfer and sponsored programs directors, faculty, and external partners alike confirmed that clarification of key legal issues at a system level would provide much needed consistency, transparency, flexibility and efficiency when pursuing technology commercialization and other collaborative

Figure 5: Building a Corporate Partnership Ecosystem—New Roles in Collaboration



While industries usually start a relationship with a campus through a single faculty contact, department-level project, or service office, they often desire a more holistic relationship with the university. We can foster such relationships by placing a greater emphasis on the potential which lies in the sum of the parts at each UNC campus. Catherine Maxwell, Executive Director of the NC Agricultural & Life Sciences Research Foundation, helps industry partners get the most out of their relationship with NC State. Working in collaboration with the college research office, Maxwell provides industry partners with connectivity and access between disconnected department or offices. Providing information about faculty, policies and practices, Maxwell helps industry partners identify and schedule conversations with the right people to get things done. Foundation staffers even sweat the small stuff—like directions and parking—which our teams heard are more important than we might think at first. Maxwell brokers opportunities for conversations, which sometimes lead to new collaborations (for example, see figure 2). The important thing is that the brokering is happening, and industry partners are pleased with CALS’ investment in this role.

Clarification of key legal issues at a system level would provide much needed consistency, transparency, flexibility and efficiency when pursuing technology commercialization and other collaborative agreements.

agreements. Areas requiring legal clarification and interpretation include the Bayh-Dole Act, IRS Procedure 2007-47 (which addresses complex intersections between public funding and private business use) as well as the policy and legal issues related to start-up company formation, conflict of interest, gifts and deliver-

ables, overhead rate issues, and bond issues.

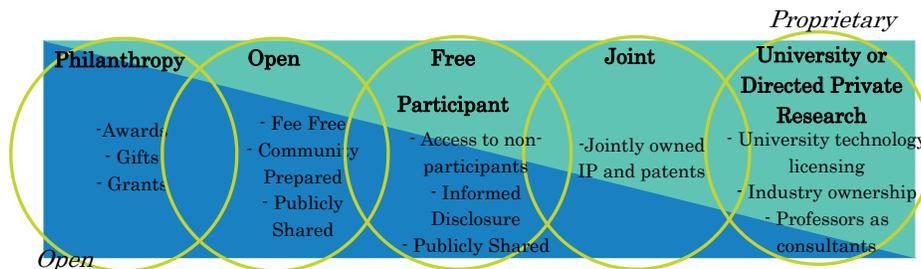
Additional tools can increase the efficiency with which we enter and execute technology commercialization agreements. One essential step is ensuring up front that partner expectations for IP ownership are known and communicated. Team members agreed that tools such as the “slider” developed by IBM (see Figure 6) are useful in engaging potential partners in a conversation about what shared goals and intentions they have for the relationship. If middle ground cannot be reached, then parties move on, with relationship intact and no additional time lost to fruitless negotiation. Template agreements can also be created for certain cases, such as the Carolina Express Start-up License (also in Figure 6). More simple processes and agreements must be developed for negotiations involving intellectual property from *multiple* UNC campuses, a situation which is expected to grow as a result of this initiative. Comprehensive legal guidance on innovation and technology commercialization policies and procedures will allow UNC and industry partners to reach agreements with new levels of speed, confidence, and trust as well as encourage consistency and complementary practices across the University.

Figure 6: Negotiating Made Easy: New Tools in Collaboration

The Carolina Express License

At UNC-Chapel Hill, innovative ideas are not just forming in the laboratories and classrooms. A change to the “nuts and bolts” business of technology commercialization is expected to make it quicker, easier, and more attractive for UNC faculty and staff to form start-up companies. The Carolina Express License sets standard terms and fees which require minimum payment and obligation from start-ups to UNC in the early years of their development. It provides start-ups with needed flexibility by eliminating the challenging negotiation for equity up front, which often pits a faculty member against the university, and instead requires a cash payment upon liquidation. The Carolina Express License also eases some procedural and legal burdens by allowing the start-up company to function independent of UNC when seeking approvals for sub-license agreements. By emphasizing early-stage development and virtually eliminating the need for lengthy negotiations, the Carolina Express License Agreement will make UNC-based spinouts even more attractive to investors and partners. Increasing the number of companies starting in North Carolina, while improving the relationships between those new companies and the university, will pay major dividends through increased industry-university partnerships and continued economic development in North Carolina.

The University-Industry Collaboration Slider



Developed at IBM, this “slider” tool assists universities and their commercialization partners to more quickly reconcile their expectations for impending collaborations, leading to increased efficiency in negotiations.

Figure 7: Funding our Focus on Innovation and Technology Development

When devising new funding models and strategies to implement recommendations with associated costs, campus administrators and faculty must strive to have those models reflect the innovation and collaboration emphasized in this report.

- Successful innovation and technology development depends on a complicated network of campus actors, yet our funding models are organized in silos, much like the units themselves. A funding model for innovation and technology development should better reflect the interconnection and interdependency that truly exists. Campuses can arrange, for example, for certain percentages of F&A funds from sponsored research awards or industry-sponsored gifts and endowments to flow directly into support for innovation and technology development activities.
- Innovation incentive programs could be funded through the merit salary increase monies that are available after state mandated cost-of-living salary increases are made from institutional allocations.
- Campuses can invest in home-grown innovations that would, once developed, achieve efficiencies on the campus. Energy and information technology products are areas where such a strategy may prove very effective. A short-term investment up front from related units (facilities and maintenance, information technology, etc.) would yield them long-term gain. This strategy achieves “proof of concept”, creates marketing fodder, recognizes the innovator, and helps the campus realize long-term cost savings and other benefits. College-level foundations may develop programs to invest in promising early-stage technologies from the college. (See Figure 9 for an example of such in-house innovation.)
- Other levels of reallocation and reprioritization of existing university resources are encouraged, particularly to realize greater collaboration and synergies between units that could enhance innovation and technology development efforts.

“Visionary” Ideas

- Create shared campus-level databases and information systems among sponsored research, technology transfer, and development that track contacts and relationships with R&D and commercialization partners. Use this information to identify multi-faceted campus relationships and potential strategic, high-value innovation partnerships.
- Declare an “IP-Free Zone” in a particular space of work, where any university-created intellectual property would be openly available for collaborative development.

Next Steps

The recommendations lay the important groundwork for UNC to initiate its commitment to the innovation and technology development vision that will enable the translation of university discoveries into solutions to the world’s problems. Success and progress require that systemic change take place both inside and outside the academy in areas of policy and practice that currently restrict our ability to bring University innovations to bear on societal problems. We will move forward to do our part, however, utilizing the following plans for leadership, resources, and metrics.

Leadership

The success of this initiative and realization of these recommendations demands the presence of ongoing leadership support that permeates each campus. The UNC and IBM co-leaders and project coordinators, along with UNC GA representatives from legal and human resources, will continue to facilitate the overall initiative and implementation. At the onset of the implementation period, campuses will be asked to identify leadership teams, to be comprised of at least the following individuals. These teams—chosen and overseen by University Chancellors and their Chief Research Officers—will be responsible for the implementation of recommendations on the campus-level, for participating in full or via liaison in the GA-led or collaborative implementations, and for communicating progress at regular points in the implementation process. Additionally, we encourage campuses

where possible to identify an individual with one of the following roles who has also been involved in the UNC Tomorrow Phase II promotion and tenure review process.

- Chancellor and Chief Research Officer
 - Technology transfer officer/contact
 - Legal counsel
 - Sponsored research representative
 - University development representative
 - Faculty entrepreneurs / research leaders
 - Dean or associate dean –level representative
 - Department head-level representative
 - Related personnel, such as directors of programs for faculty or student entrepreneurs, etc.
 - 1-2 industry or economic development partners

Resources

Although many of the report recommendations can be accomplished with little or no new financial resources needed, the conduct of competitive analyses (Recommendation 1), enhancement of mentoring programs (Recommendation 3), and piloting of new models (Recommendation 5) will require new or increased investments. At the institution level, in accordance with UNC Tomorrow, campuses are encouraged to reprioritize and reallocate resources. Figure 7 suggests ways that campuses can resource the innovation and technology development vision by building new plans and models based on collaboration, shared goals, and inventive ideas. Expanded accountability for innovation and technology development across a campus will help, but ultimately, care must be taken to position the offices and roles related to the innovation network for greater flexibility and responsiveness through firm operational funding.

At the state level, commercialization and gap funding—dedicated resources for the development of early-stage university technologies into commercial products—are often the missing link in university technology development efforts. Other states have developed programs and dedicated funds to minimize the commercialization “valley of death” and ease the burden of patenting costs. North Carolina has considered the same but must raise this need to a new level of importance.

Implementation Timeline and Leadership

Implementation of the recommendations will involve numerous tasks. Tasks are shown by estimated start date and length of time needed to address. Check-in meetings will be held with the campus-based implementation teams throughout the year.

Action (Related Recommendation)	Leadership	2009				2010								
		S	O	N	D	J	F	M	A	M	J	J	A	S
Identify pilot campus(es) that will pioneer new innovation/technology development model (Rec. 5).	GA													
At each campus, baseline time to agreements, ratio of negotiations begun to licenses/deals completed, and other targets that will indicate effectiveness of legal aids/tools (Rec. 6).	CT													
Assess baseline levels of departmental RPT policies that recognize entrepreneurial activity (Rec. 3a).	CT													

GA: UNC General Administration staff lead with campus participation
 CT: Campus teams lead with UNC General Administration support
 IF: Inter-institutional collaboration required, coordinated by UNC GA
 PC: Pilot campus(es) only

Continued

Action (Related Recommendation)	Leadership	2009				2010								
		S	O	N	D	J	F	M	A	M	J	J	A	S
Develop an "Entrepreneur as Scholarship" presentation that can be used by campuses to communicate the vision and expectations of RPT change (Rec. 3a).	GA	█												
Hold campus-based discussions with department and college-level voting faculty on implications of RPT changes and determine strategy to seek evidence of increased recognition (Rec. 3a).	CT	█	█	█	█	█	█	█	█	█	█	█	█	█
Develop, with help from human resources and legal professionals, guidance, parameters and/or potential models for comprehensive innovation incentives programs (Rec. 3b).	GA		█											
Pilot campus(es) map the innovation process/pipeline/network, including existing roles and organization (Rec. 5).	PC		█											
Review and revise UNC technology transfer policies (Section 500 of the UNC policy manual,) to align with the UNC vision for innovation and technology development (Rec. 6.)	GA		█											
Convene UNC and partner legal counsel to develop the toolbox of legal aids to simplify and ease negotiations (Rec. 6).	GA		█											
With assistance from IBM and their IP landscape analysis tools, benchmark intellectual property assets at each campus, and combine with other available data on sponsored research (Rec. 1).	GA		█	█										
Campuses review and determine how to adopt/adapt comprehensive innovation incentive program model (Rec. 3b).	CT		█	█	█									
Create training aids to educate UNC innovators, administrators and staff on key legal issues central to innovation and technology development (Rec. 6).	GA		█											
Create UNC website to house legal guidance and toolbox (Rec. 6).	GA		█											
Conduct on-campus trainings and education on legal aids and toolbox as needed (Rec. 6).	GA		█	█	█	█	█	█	█	█	█	█	█	█
Campuses use data from competitive IP/research analyses to identify a key focus area in which they would like to target growth in innovation and technology development (Rec. 1).	CT				█									
Determine baseline data on the focus area for the Innovation Index (see p. 20) (Rec. 1).	CT				█									
Update campus-level policies to align with the UNC vision for innovation and technology development (Rec. 6).	CT				█									
Institute system faculty compensation reporting practices to heighten transparency and minimize conflicts of interest (Rec. 6).	II				█									

GA: UNC General Administration staff lead with campus participation
CT: Campus teams lead with UNC General Administration support
II: Inter-institutional collaboration required, coordinated by UNC GA
PC: Pilot campus(es) only

Action (Related Recommendation)	Leadership	2009				2010								
		S	O	N	D	J	F	M	A	M	J	J	A	S
With assistance from a facilitation team, pilot campus(es) use information gathered to develop a new model and shared goals that reflect the UNC innovation and technology development vision (Rec. 5).	PC													
Campuses use competitive research analysis data and identified focus area as basis for marketing campaigns, resource strategies, invention disclosure triage, and other decision-making (Rec. 1,5).	CT													
UNC uses competitive research analyses and data to identify potential synergies in key areas of interest to stakeholders, such as green energy, military/defense, life sciences and biotechnology, and financial services (Rec. 2).	GA													
Campuses articulate a mission-appropriate role in technology development that could be part of a University-wide innovation strategy (Rec. 2).	CT													
Institute Board of Governors-level award with criteria that reflect the values inherent in the vision for innovation and technology development in UNC (Rec. 3b).	GA													
Inventory campus-based programs for entrepreneurial faculty and students, including purpose, methods, target audience, and historical participation (Rec. 4).	CT													
Benchmark participation in entrepreneurial support programs for Innovation Index (Rec. 4)	CT													
Innovation strategy for UNC is developed to build on core institutional strengths and capabilities (Rec. 2).	II													
Determine spaces for collaboration, synergy within and across campus entrepreneurial support programs and efforts (Rec. 4).	II													
Determine long-term strategy for investment and development of tools for research/IP analytics and administration (Rec. 1,2).	GA													
Pilot campus(es) create new roles, if needed, and implement model (Rec. 5).	PC													
Measure progress in focus areas, RPT policy adoption, participation in mentoring programs, time to agreement, for the Innovation Index (All Recs.).	CT													
Phase II Report on Progress completed.	GA													

GA: UNC General Administration staff lead with campus participation
CT: Campus teams lead with UNC General Administration support
II: Inter-institutional collaboration required, coordinated by UNC GA
PC: Pilot campus(es) only

Metrics

During the year of implementation, as outlined in the timeline, each campus will be asked to benchmark several variables. In the next year (2010-2011), campuses will be asked to follow progress according to the index:

Figure 8: The Innovation and Technology Development Implementation Index

Variable	Weight	Campus A
EXCEL IN STRATEGIC RESEARCH AREAS		
10% increase in total sponsored research award dollars in strategic research area (Rec. 1)	10	5
20% increase in # inventions disclosed in strategic research area (Rec. 1)	10	0
Increase in ratio of licensed patents to # of patents filed in strategic research area (Rec. 1)	5	0
100% increase in Inter-institutional IP agreements (to be defined) with UNC sister campuses (Rec. 2)	5	10
SUPPORT INNOVATIVE INDIVIDUALS		
100% of departments recognize entrepreneurial activity in RPT policies (Rec 3)	10	8
50% increase in # faculty participating in UNC entrepreneurship and/or mentoring programs (Rec 4)	5	0
MODEL INSPIRED, EFFICIENT TECHNOLOGY DEVELOPMENT PROCESSES		
50% increase in # industry partners with relationships (to be defined) in development, sponsored research, and technology transfer offices (Rec 5)	10	0
50% decrease in time to agreement on licenses, in months (Rec 6)	10	6
OVERALL		
100% increase in # “high-value partnerships created (to be defined)	10	10
100% increase in # of open IP collaborations started (to be defined) (Rec. 1)	10	10
100% increase in # commercialization partners who enter more than one IP agreement (to be defined) with the campus	10	5
30% increase in campus resources dedicated to innovation and technology transfer (to be clarified)	5	5
INNOVATION INDEX SCORE	100	59

The Index is meant to be dynamic and adjustable. In the implementation year this index will guide campuses in achieving the goals associated with the recommendations. We predict that these changes will then lead to progress in other measurable outcomes that can be added to the index at a later time, such as numbers of licenses, patents, and startups. An example with Campus A demonstrates how the Index is to be used. If Campus A met the target, then it received all of the weighted points possible. In the example, the institution achieved a 5% increase in sponsored research awards dollars in an identified strategic research area. Since they achieved half of the 10% increase goal, they received 5 points of the possible 10 in the index.

By positioning the campuses for success through an expanded outlook on technology development and a focus on collaboration—made manifest in key organizational changes and new strategic approaches—UNC and North Carolina will be well positioned to lead the way in reaping the full benefits of quality partnerships and economic progress through innovation.

Figure 9: Being the Vision: Virtual “Cloud” Computing at NC State University

Partnership, flexibility, and far-reaching benefits—these notions are at the heart of our UNC vision for technology development, and the Virtual Computing Lab (VCL) at NC State demonstrates how the payoff can be significant when these values are front and center.

Dr. Mladen Vouk, as part of an extensive team of faculty and students from NC State, has openly collaborated over the past 5 years with Dr. Andy Rindos and many others from IBM to develop virtual 'cloud' computing—a low cost, location-free virtual IT service. VCL allows faculty and students in university or K-12 educational settings to access sophisticated computing tools and technologies at any time from any computer location. The NC State VCL represents a significant innovation that is improving educational access throughout the world. The VCL now serves not only the 30,000+ students and faculty at NCSU, but also is available to the entire UNC community, as well as at a host of North Carolina community college locations. The VCL model is additionally being adopted and developed at universities in Georgia, South Carolina, Virginia, Maryland, and abroad.

Early in the development, the VCL team approached Billy Houghteling, Director of the Office of Technology Transfer, to discuss their intellectual property options. Realizing the cross-cutting potential of the technology, as well as the development requirements ahead, Houghteling, Vouk, and the team decided to proceed in an open collaborative manner, allowing IBM and others to contribute to the technology development while building and sharing improvements. Indeed, the power of this innovation and the acceleration of its growth is attributed by all involved to the 'open' and joint development approach.

Supported in part through the President's Strategic Initiative Fund, multiple IBM University Research and local IBM Center for Advanced Studies Awards, and other public and private contributions, this collaboration is producing many UNC benefits. "NC State's decision to innovate in an open and collaborative way has allowed us to share research costs and build strong and lasting partnerships," says Vouk. Over the last five years over 60,000 faculty and students have used cloud computing to access the tools needed for education and research. NC State has also gained worldwide leadership in emerging information technology—attracting millions in increased research funding, developing contacts with hundreds of faculty from over 30 universities worldwide, opening new internships for students, and creating jobs for our graduates and North Carolina citizens.



Pictured left to right: Andy Rindos, IBM; Billy Houghteling and Mladen Vouk, NC State University

Appendix A:

Phase I of the Initiative – Teams and Tasks

In February 2009, UNC leaders, in partnership with executives from International Business Machines (IBM), initiated a process to examine innovation and technology development within the UNC system. IBM brought to the process their experiences as world leader in patents and as a company that makes significant and continuous investments in the process of innovation. In addition, co-leadership with IBM helped to reduce the risk of conducting an effort that was too insular. Three working teams were formed around strategic areas of interest, and each team was co-led by individuals from UNC and IBM. Teams were comprised of technology transfer officers, senior administrators within UNC, entrepreneurial faculty, legal counsel, industry partners from a variety of sectors, government partners, and venture capitalists. Two project coordinators, Courtney Thornton from UNC and Lou Masi from IBM, engaged with each team and helped to coalesce their work.

Team	Co-Leads	Members	Focus Area(s)	Information Source(s)
Powering innovative cultures on our campuses	Tony Waldrop, Vice Chancellor for Research and Economic Development, UNC-CH, Brian Verminski, IP Attorney, IBM	Tom Bradicich, IBM Joe DeSimone, UNC-CH Garhen Kong, Intersouth Reid Leonard, Merck Carl Mahler, UNCC William Piazza, IBM	Reward and recognition, innovation infrastructures, and other supports for faculty, staff and student innovators	Review of system and other campus' policies and programs Team members
Stimulating economic development through innovation and technology development	Leslie Boney, Associate Vice President for Economic Research, Policy and Planning, UNC GA, Lou Masi, Project Executive, Strategic Alliances, IBM Doug Balog, VP, Blades and Modular Development, IBM	Rick Carlisle, Dogwood Equity Curtis Charles, FSU Margaret Dardess, UNC-CH Billy Houghteling, NCSU Stephanie McGarrah, DOC Jerry McGuire, UNCG Bob McMahan, WCU Andy Rindos, IBM Ken Tindall, NCBC Mladen Vouk, NCSU Bob Wilhelm, UNCC	How to understand, capture, track and communicate the economic impacts of UNC innovation, particularly in North Carolina	Identification and analyses of 7 case studies in innovative practice (start-ups, open innovation, one-off licensing deals, etc.) Team members
Enhancing university-industry partnerships	Steve Leath, Vice President for Research, UNC GA, Raj Desai, Vice President Strategic Alliances, IBM	Tom Beaty, Waters Corporation Nick Hamon, Bayer Environmental Science David Harrison, UNC GA Cathy Innes, UNC-CH Ken Kriva, Philip Morris Mark Montgomery, Inspire Pharmaceuticals David Neiman, ASU Matt Ronning, NCSU Dawn Tew, IBM Marti Van Scott, ECU	Identifying common university and industry goals in innovation and improving policies and practices towards more effective and beneficial partnerships	Interviews with 7 UNC industry partners with multi-faceted, multi-campus relationships Team members

Between February and June 2009, each team met regularly to gather and analyze information, discuss the findings, and craft recommendations. During this time, project coordinators also convened the team co-leaders separately on three occasions to discuss their progress, to determine cross-over issues surfacing in more than one group, and to ensure that all institutional levels of innovation and technology transfer activity in the system would find representation in the results.

The following provides more details on the work conducted within each team.

Culture Team

The Culture Team utilized feedback from a questionnaire to UNC chief research and technology transfer officers. Questions focused on existing reward policies and practices, innovation programs and infrastructures, and innovation and incentive strategies, as well as perceived barriers. The team followed up to gather detailed information on specific issues, such as royalty policies across UNC and other campuses and state laws regarding incentive policies. Each Culture Team member also discussed his perspective on the issues or barriers related to institutional culture and innovation.

Economic Development Team

Early in the team discussions, IBM presented a “slider” (see p.15) that represents various types of collaborations around intellectual property, from open and shared to proprietary and sole-owned. The Economic Development team augmented the slider to include additional scenarios found in higher education settings and then used the slider to identify case studies of successful relationships and structures for innovation, inside and outside the University that spanned the slider spectrum and that represented multiple universities in the system. The case study interviews focused on motivations and intended outcomes, actual work and commercialization processes, and the intended and unintended outcomes of the efforts. These case analyses formed the basis of a broader understanding of outcomes associated with technology development work. If such outcomes can be more often and more easily realized or replicated, then greater economic impact through UNC will be the natural byproduct. The team also used feedback from a questionnaire to UNC chief research and technology transfer officers. Questions focused on measurements and strategies to capture the economic impact of innovation.

Industry-University Partnership Team

The University-Industry partnership team used information from technology commercialization deals and sponsored research databases to identify industry sponsors who had worked with multiple universities in multiple ways. A list of approximately fifteen industry partners was developed, and seven were targeted for interviews. These seven represented companies of varied size and industry sector. Interview questions identified the type(s) of collaborations the partner had entered with UNC and solicited details on the collaboration, its outcomes, and its successes and challenges. Industry partners were also asked to make general comparisons on interactions with UNC institutions and with other universities. Notes from the interviews were summarized and sent to industry partners for review and comment.

Appendix B:

UNC Commercialization Metrics and Index

Institution (Establishment of Technology Transfer Office, if applicable)	Total Sponsored Research Awards in FY08 (\$M)*	Industry Sponsored awards in FY08 (\$M/% Total)*	2007 License Income (\$M)	Total FTE in technology transfer office / capacity**	2007 Licensing FTE	2007 Inventions Disclosed	2007 Patents Filed	2007 Number Startups	2007 Licenses Executed	Cum. Active Licenses (2007 report)
Campuses reporting to Association of University Technology Transfer Managers (AUTM) annual survey										
East Carolina (1995)	44.9	5.7 / 12.6	0.33	4.62	2	15	2	0	3	7
NC A&T State	45.8	1.1 / 2.5	NR	3.5	2	NR	NR	NR	NR	NR
NC State (1984)	213.7	23.0 / 10.7	NR	16	5	172	115	5	106	639
UNC Chapel Hill (1985)	678.2	38.3 / 5.7	2.13	12	5	113	72	0	89	248
UNC Charlotte (1993)	35.6	2.3 / 6.5	0.08	4	1	50	24	1	0	32
UNC Greensboro (2002)	38.7	0.46 / 1.2	0.17	3	2	18	6	1	1	7
Remaining Campuses										
Appalachian State	15.2	0.3 / 2		<1						
Elizabeth City State	12.1	0.2 / 1.2		0						
Fayetteville State	6.9	.003 / .06		0						
NC Central	9.8	0.04 / .39		0.5						
UNC Asheville	4.6	0 / 0		1.5 (in Sponsored Programs)						
UNC Pembroke	4.2	0.004 / 0.10		0						
UNC Wilmington	20.3	0.75 / 3.7		1	0.5					
UNC School of the Arts	0.1	0 / 0		0						
Winston Salem State	9.0	0.39 / .43		0						
Western Carolina	5.6	0 / 0		0 (2 people as						

24Note: Data sources include *UNC sponsored programs database, **2008 email correspondence with technology transfer contacts, and remaining from 2007 AUTM licensing survey summary data. NR indicate reported.

Acknowledgements

The work team leaders and initiative coordinators from UNC and IBM thank the following individuals for their support in this initial phase of work:

Team members on each of the three work streams:

Industry partners who shared their time and insights via interviews with the university-industry partnership team:

Contacts at NCSU, UNCC, UNCG, UNCW, UNC-CH, WCU and the NC Biotechnology Center who provided case study details for the economic development team:

Leslie Boney, UNC Office of Economic Development Research, Policy, and Planning; John Kelly III, IBM Senior Vice President and Director of Research; Louis Masi, IBM's Project Executive; Raj Desai, Vice President, IBM Business Development; Brian Verminski, Attorney, IP Law, IBM TJ Watson Research Center; and Pat Toole, Vice President and IBM Chief Information Officer, for their continued leadership and ongoing participation.

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Photos by Roger Winstead of NC State University.

This report was prepared by the UNC Office of Research and Sponsored Programs.

Dr. Steven Leath, Vice President for Research and Sponsored Programs

Dr. Courtney Thornton, Director of Research

For more information, contact research@northcarolina.edu

“Competitiveness advances when the public and private sectors together promote a favorable environment for innovation.”

-Porter and Stern (2001) “National Innovative Capacity,” *The Global Competitiveness Report 2001-2002*.