



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

# Innovation@Carolina

Innovation and Entrepreneurship  
at The University of North Carolina  
at Chapel Hill

Background and Sample of Current Activities  
A Working Report

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## About this Report

### To Members of the Innovation Circle

Chancellor Holden Thorp has asked you to serve on the Innovation Circle, a group of volunteer alumni, parents, and friends of the University, to help determine Carolina's future strategy for innovation and entrepreneurship.

So you can better understand the current state of innovation and entrepreneurship at UNC, this report presents a snapshot across the three missions of research, teaching, and service. As with any such report, it leaves out as much as it includes, especially considering this is a campus with more than 3,000 faculty members, 27,500 students and the report covers multiple years. Representative but not exhaustive, it will, however, present a starting point for your own explorations.

Determining impact through rigorous evaluation is always a challenge since it is often very expensive and requires long lag times between the event and the outcome. When possible, impact results are covered in the report, but it is weighed toward activities. The disparity between listing activities and impact might be attributed to a) the authors being unaware of certain impact studies, b) the stage of the initiative or c) their absence.

As you read this report, please note your questions and feedback, and either send them to Judith Cone ([Judith.cone@unc.edu](mailto:Judith.cone@unc.edu)—816.305.1073) or raise them at the January 15, 2010 meeting. All efforts will be made to answer questions prior to that meeting.

This background working document helps set the stage for the strategic deliberations and your ultimate contributions to Carolina's Innovation Roadmap due to be released in early fall, 2010. Your service is greatly appreciated.



This report presents a snapshot of innovation and entrepreneurship across the three missions of research, teaching, and service.

## Introduction from the Chancellor

### To Members of the Innovation Circle

The world needs Carolina, perhaps more than at any other time in history, and the demand is urgent. There is no shortage of grand challenges facing people and the planet—issues that cannot wait to be addressed. Already, our world-class faculty make significant advances in knowledge and educate some of the brightest students in the world. Our administrators, staff and donors create a dynamic and responsive system of leadership and support for Carolina. Yet, we have to go further. We know we must translate new knowledge into more practical applications, to create ideas, transform them, and ensure that they are applied for profound impact. We will accept nothing less than to change the world for the better.

Having a commitment to these ideals and then delivering on their promise are two wholly different dimensions. To have greater positive impact—to solve problems and create new benefit to society—will require that the entire Carolina Community focus on outcomes as well as on inputs; to translate ideas into extended value; and to be connected to the world so that our assumptions, knowledge, and processes are constantly challenged. Ours must be a culture that is motivated by vision translated into innovations; characterized by a sense of urgency, a commitment to rigor, based on data, measured for benefit and driven by an entrepreneurial spirit.

We proudly accept our role in the world community. As a scientist, an administrator, and an innovative entrepreneur, I have experienced first-hand the excitement, difficulty, and reward of translating vision into reality. Driving a culture conducive to unlocking the creative potential of people is one of the most important contributions I can make as Chancellor. To this end, I have asked Judith Cone, Kauffman Foundation

Senior Fellow and former Vice President, to join us and help me lead a strategic process that will culminate in a roadmap for systematic innovation and entrepreneurship at Carolina. Additionally, Lowry Caudill, distinguished alumnus, adjunct faculty member, donor, and entrepreneur, has agreed to serve as Chair of the Innovation Circle—a group of alumni and friends of the university who have agreed to think with us about this subject. Faculty, administrators, staff, students, and community leaders will all be a part of our ongoing strategic dialogue.

When the Carolina Community pulls together toward a goal, there is no stopping it. It will be exciting to experience the unfolding of ideas coming from a community of people who care so deeply as they streamline processes, acquire the resources to speed execution and deliver on their promise of positive impact. This document is just the start of a year-long process.

So that we have a common starting point for deliberations, a theoretical framework is included followed by a look at Carolina's accomplishments to date. It provides a snapshot of innovation at Carolina and compares us to other universities in a variety of categories. It is intended to serve as a primer of sorts, for those involved in our innovation conversation; to encourage us to embrace and build on our strengths and to begin to think about our needed improvements, problems, solutions, and opportunities.

Innovators see opportunity and bring value. They are comfortable with the reality that being innovative is an approach to life that means there is no certainty, no completeness. Carolina will never stop demanding more from itself. We will use the lens of innovation and entrepreneurship to help us translate ideas into positive impact. I appreciate your willingness to join us on this journey, and I look forward to our next steps together.

**Holden Thorp**  
*Chancellor*





## Innovation Circle Charter

### The Challenge

At his selection in 2008 as chancellor of the University of North Carolina at Chapel Hill, Holden Thorp called on all Carolina students, faculty, staff and alumni to take on an audacious mission:

*We have so much work ahead of us. Our to-do list is nothing less than the greatest problems of our time: cure diseases, and get those cures to all the people who need them. Find and invent clean energy. Inspire students in our public schools. Feed seven billion people. Describe the world, and replace conflict with understanding.*

In an increasingly inter-connected world faced with a daunting array of divergent and complex problems, the Academy is being called upon not only to educate our future leaders but also to provide answers and solutions. To do so, Carolina must find new ways to create value in its teaching, research and service through innovation and entrepreneurship. Our students must be encouraged to be innovators, problem solvers and creators of new knowledge. Our faculty and researchers must be recognized and rewarded for teamwork across traditional academic silos and for their commitment to turning ideas into enterprise. As one of the world's great public universities, Carolina must lead by creating a campuswide culture of innovation and entrepreneurship focused on real solutions for the great problems of our time.

### Building a Vision and Framework for Systematic Innovation and Entrepreneurship

With its celebrated history of leadership and discovery and under the direction of Chancellor Thorp,

himself an academic entrepreneur, the University is well positioned to take on this challenge. Launched in 2004, the *Carolina Entrepreneurial Initiative* has encouraged and supported programs across campus to teach and support enterprise creation and innovation. The new entrepreneurship minor and graduate certificate programs have tracks in commercial, social, artistic and scientific entrepreneurship. In the arts, new “creative campus” programs have coalesced performances, special seminars, and faculty music and art commissions around major societal questions such as the death penalty, race and gender. As a result, students and faculty have not only moved toward better understanding but also toward solutions. This summer, the Chancellor launched his Entrepreneurial Boot Camp, a four-day workshop that immersed sixteen dynamic faculty in the entrepreneurial experience. In 2010, the University will begin to award annual Carolina Innovation Scholarships to four entering freshmen to better prepare them to invent solutions and create value, no matter the field they choose.

But for Carolina to institutionalize its commitment to tackling the world's greatest challenges through innovation and entrepreneurship, it must develop a comprehensive roadmap. To do that, Chancellor Thorp is forming an advisory council of respected alumni and friends – the Chancellor's Innovation Circle – to be chaired by Distinguished Alumnus, Lowry Caudill (1979) and led by Judith Cone, the Chancellor's recently appointed special assistant for innovation and entrepreneurship. Judith comes to the University from the Ewing Marion Kauffman Foundation where she served most recently as Vice President for Emerging Strategies and the lead executive behind its very successful Kauffman Campuses Initiative, which helped start the Carolina Entrepreneurial Initiative. Judith and the Innovation Circle will address several key questions:

- ♦ What does it mean to be a university committed to innovation and entrepreneurship?
- ♦ What are Carolina's strengths to be maximized and the obstacles to overcome?
- ♦ How should Carolina proceed to incorporate innovation and entrepreneurship into its teaching, research and service missions?

## Memo

**To: Innovation Circle Members**

**From: Lowry Caudill, Chair,  
The Innovation Circle**

I am honored to have been asked by Chancellor Thorp to chair the Innovation Circle. Like many of you, I come to this task as both an alumnus and friend of this very special place. In the last few years I have also had the good fortune to experience Carolina's magic in ways I never would have imagined as a student; first, as a member of the Carolina First Campaign Steering Committee and now as an adjunct professor.

So, it is especially gratifying and humbling to be asked to lead this esteemed group of volunteers as we, on behalf of a place and people that mean so much to me, chart a course in the three areas that have guided my own personal success: academic discovery, innovation and entrepreneurship.

Our charge is to design an innovation roadmap that will position Carolina to successfully tackle, as Chancellor Thorp called it, a to-do list that is "nothing less than the greatest problems of our times." Yes, it is an audacious goal worthy of a great public university. And as you will learn from this working document, it is a challenge that Carolina has been preparing for during the last two hundred years.



It is no secret that major research universities sometimes seem to operate in mysterious and seemingly dysfunctional ways when

compared with successful enterprises outside of the academy. As an adjunct faculty member even I have come to see the real value in some of its seemingly byzantine ways: the importance of free expression and of deliberate, thoughtful reflection, just to name two. But I can assure you that this university and its faculty, students and staff are engaged beyond the Ivory Tower and wish to increase dramatically their positive impact on the world.

And that is where Carolina needs your help. So as you read through this first working document, a testament to its rich tradition of innovation, we ask that you begin to think about how Carolina can take the steps necessary to be the best public university in the world for innovation and entrepreneurship. It is an honor to have you at the table. Thank you for your service.

**Lowry Caudill**

*Co-Founder, Magellan Laboratories Incorporated*

*Adjunct Professor, UNC Chapel Hill*

## Memo



**To: Innovation Circle Members**

**From: Judith Cone, Special Assistant to the Chancellor for Innovation and Entrepreneurship**

When Chancellor Thorp extended an invitation to join Carolina and help him lead a strategic process about how innovation and entrepreneurship can propel UNC to greater contributions to society, I was honored and immediately accepted.

Arriving in August 2009, it took only a few days to gain even greater respect for the people and their accomplishments at this great university than I held previously. Having worked with faculty, staff, and students during the Kauffman Campuses Initiative, I already had been exposed to their remarkable work.

Success is a wonderful thing to be savored, but just for long enough. Held onto for too long, it breeds complacency, which is the first step to decline. Organizations of all types (governmental, educational, commercial, or social) have to be vigilant to avoid this trap. Case in point: we are living the nightmare of an automotive industry that failed to innovate fast enough. People are unemployed, vendors are closing their doors, retirement benefits are compromised and the ripple effect cascades further. Globally, social needs are escalating due to the economic crisis, wars, corrupt governments, environmental degradation and other causes. Universities are living through budget cuts and are under the relevancy microscope. Federal and state governments are looking at the investments in universities and wanting more.

Helping Carolina engage in a strategic conversation that will result in an innovation roadmap is my assignment. This initiative is less about the discreet tangible tactics that will emerge, although they will be important, than it is about creating a comprehensive approach regarding the conversion of ideas into action – about creating a culture of innovation. Culture is “that’s the way we do it here.” The dream is that at UNC the beliefs, attitudes, processes, and resources are aligned toward not only academic excellence but toward ever more bold ideas translated into practical value. The Innovation@Carolina strategic initiative seeks to answer the following question: **What would it take for Carolina to have the greatest ongoing impact on the world?** Admittedly, it is a grand question. Since success is a transitory state at best and seeds our destruction at worst, it behooves UNC to create a culture of systematic innovation and entrepreneurship that is self-renewing, that stretches the university’s ambitions, moves it beyond its comfort zone, and delivers novel and valuable benefits. Phrases such as “a culture of systematic innovation and entrepreneurship” require definitions and discussions. Through the various interchanges to come in the next several months, we will develop a common vocabulary that will lead to greater understanding. The following theoretical approach is how I view this subject and can seed our discussions. As with all strategic initiatives centered on dialogue with multiple groups of people, the conversations improve the models. Please view it as a beginning framework from which a Carolina theory will emerge that supports our future work. I look forward to working with you.

**Judith Cone**

*Special Assistant to the Chancellor for  
Innovation and Entrepreneurship  
Senior Fellow, Kauffman Foundation*



# Innovation @ Carolina

## A Theoretical Framework

Building a Culture of Systematic  
Innovation and Entrepreneurship  
at American Public  
Research Universities

By JUDITH CONE

## Introduction

What does the world need from its great public research universities? It requires what it always has—new knowledge that advances disciplines and eventually finds its way into practical value. Whether it is an author who inspires the world, a Nobel laureate who turns a discipline on its head, a social scientist whose research proves that certain foreign aid policies are detrimental, or a medical researcher who regenerates new organs for transplants; the benefits are multifaceted and many.

Yet some complain that research universities have failed to deliver on their promise, at least not at a level commensurate with the public investment. Calling on research universities to engage in both basic research and translation to practical value, Congress, state legislatures and other groups are making their policy cases. Others think of this debate less in terms of an indictment for underperformance than as an examination of future changing needs in society and the public research university's evolving role. What is undeniable is that

the complexity and velocity of societal needs and the accelerating demands on institutions far surpass any one research university's capacity to address.

Operating within such a volatile backdrop can strain universities because, like most large institutions, they are not typically nimble. Structurally, buildings are diffused across large campuses, and governance is similar to a federation, which can slow down decision-making. Tenured faculty sometimes view themselves as “independent contractors” seeking the best place to do their research but not necessarily engaged with the broader university. Career rewards come from research and publishing, not necessarily from their translation into practical value. Some researchers might even argue that it is not the role of research universities to drive toward practical value. Further, faculty and staff at some places can be so detached from the non-academic world that it is hardly surprising they lack a sense of urgency about their work. A sclerosis can occur from crippling bureaucracy and an over-commitment to an outdated sense of purity of the sector—standing apart rather than in the midst of the fray. By the time these universities and faculty members adjust to changing demands, the situation has shifted again and the cycle repeats. This is stimulus-response out of sync and behind the curve.

Viewed as a problem or an opportunity—nonetheless, the world demands more. The research university has to move beyond its current realities and tackle some of the biggest challenges of our times. This takes new approaches, more innovation and a new generation of entrepreneurs. It requires the alignment of values, processes and resources to achieve the expanded outcomes.

## Building on the Past

Public universities were established to provide practical benefit to society and, like most good ideas, they gained acceptance. The 1862 Morrill Land-Grant Acts were signed into law by Abraham Lincoln. Each eligible U.S. state was promised 30,000 acres of federal land to establish public



institutions of higher education in practical fields in addition to the liberal arts. It was and is a noble calling. It was felt that this system of educational institutions should focus on the relevant needs of the time—needs such as agriculture, engineering and teaching. Consider what it was like in the 1800s. The railroad industry was booming, shipping was revolutionized by the use of steam propulsion and iron in shipbuilding, and the agricultural sector was innovating and growing.

## Current Realities

Today, nearly 150 years later, the call for both public land-grant and research universities to address the needs of American society is as strong and even more widespread. The world is more complex, moves faster and is more interconnected than ever before. It is more dangerous and fragile. No one living in 1862 could have imagined the world today. The current needs and benefits go beyond American borders. They stretch globally and even into space. The seriousness and complexity of today's needs create a sense of urgency in moving new knowledge to societal benefit.

The need for new knowledge translated to practical value remains constant over time. The particular expression of it at any given period is a variable simultaneously driven by time, place, culture, resources, competitive landscape, needs and opportunities. This is reflected in the three missions of the university:

- ♦ **Teaching:** The world needs the university to prepare students for a future that does not exist so that upon graduation they have the current, deep-domain expertise and know-how to keep it refreshed. It wants students who view problems as opportunities, believe that they can and will contribute solutions, know their role in the global community, understand how to work in groups across disciplines, are intellectual explorers, have expanded horizons and are prepared for the next stage of their lives. And, for some, it wants great academic contributions.
- ♦ **Researching:** The world needs faculty and

students to create new understanding and knowledge through basic and problem-based investigation. The benefits of basic research are many. Creating the new is necessary but not sufficient. More of the discoveries by faculty and students need to be translated, communicated and applied so others can benefit.

- ♦ **Service:** The world needs the university to be actively in alliance with the outside world to best contribute solutions to the issues and challenges of communities, states and countries globally. For land-grant institutions, this link was always clearer than for research universities.

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The challenge is to bridge the gap between knowing and doing for the most profound impact possible.

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## Taking Thoughtful Action:

### Building a Culture of Systematic Innovation and Entrepreneurship

The evolving nature of society demands more. Most distinguished faculty, students, administrators, donors, parents, governments, citizens, entrepreneurs and industry leaders want profound impact from their universities. Most want to take on some of the pressing problems facing the world and want nothing less than answers to society's grand challenges. Perhaps they want to bring art and music to the masses, or to change academic disciplines. Their contributions are many and significant. The desire is real.

These people understand that standing still and enjoying the accolades from others (there are many) actually means moving backwards. They know that innovation is not optional—it is a requirement to deliver on the university's promise and to stay relevant. It means not stopping with the publication of an academic paper but taking action to translate that knowledge into positive academic, social, economic

or artistic impact. In the process, academic life can be enriched as new research topics are developed, techniques are tested, improved and put into practice and positive benefit and public value is created. The world needs the research university. To respond appropriately, the university must understand the world, develop new ideas and solutions, and ensure that those move effectively beyond the campus.

The challenge lies not so much in answering *what* the world needs but in figuring out *how* to go about delivering the greatest benefit across the three missions—given that no university can do everything, especially in the context of today’s world. The challenge is to bridge the gap between knowing and doing for the most profound impact possible within the context of each university.

Wrestling with the *how* question has led educators to study approaches that might help them go beyond the traditional. It is in this spirit we look at innovation and entrepreneurship—concepts that mean different things to different people. Not the traditional language of the Academy, we use these two terms because they denote attitudes and processes that connect and move ideas into practical use. Joseph Schumpeter, the noted economist, talked about the process of entrepreneurship as *incessantly revolutionizing from within*. Is it not the goal of research to uncover the new and novel discovery? Is it not the desire of faculty to constantly evolve new knowledge, challenge assumptions and invent new futures?

### A Systems Approach

Focusing on building a culture of systematic innovation and entrepreneurship enables the research university to do the following:

- ♦ Look at the entire ecosystem and its parts that have emerged over time and determine their appropriateness.
- ♦ Invite and encourage all aspects of the institution to think in terms of innovation, thus ensuring that the overall conversation shifts its focus to practical value (outputs) as well as to inputs and processes. Seemingly simple, this is a profound shift.



- ♦ Apply the term the *entrepreneurial mindset* to describe a particular type of beliefs and actions that drive toward practical results.
- ♦ Demand rigor, specific definitions of success, continuous measurement, evaluation and feedback loops throughout the innovation process.
- ♦ Be a campus community that provides the necessary translational pathways to move new ideas to action.

In gaining greater innovation, it is not enough to do projects, improve clunky processes or raise grant money. Important though they are, they are parts of the system, and it is the system that needs to be examined. Anything less will no doubt make improvements but will not set the stage for an organization that is flexible and responsive and unleashes the creative potential of people to advance knowledge and provide for public benefit.

Innovation and entrepreneurship are valuable processes for study by a university striving to deliver both the highest level of basic research and more value to end users. Having end users adopt an idea signals to the creators and translators that value has been recognized. In entrepreneurship, it is the covenant between the customer/end user and the enterprise: we provide you with value and you reward us. Successful entrepreneurs are innovators.



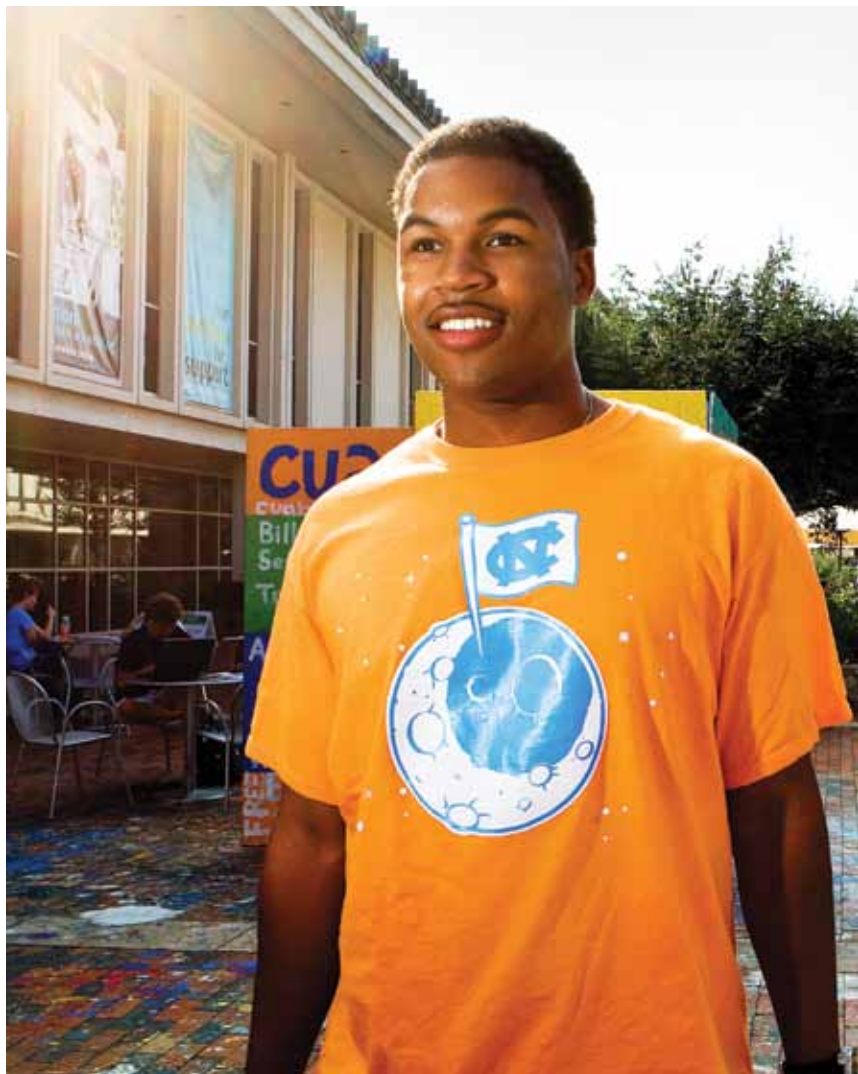
Innovation, like entrepreneurship, demands that same test of value to end users but is not limited to enterprise creation. Delivering positive profound impact requires that people think in certain ways and perform in particular manners. It means they focus on the value to be created for the end user/customer, have a proactive approach, see opportunities when others see problems and personally commit to doing whatever it takes to make real that imagined value. This is the entrepreneurial mindset in action.

An innovation is the successful implementation of a novel, valuable idea. Notice, it carries a three-part test: it must be novel and valuable and sufficiently implemented. Rarely does an innovation spring forth in spontaneous combustion, but is the result of a process. The three phases of the Innovation Process (ideation, translation and innovation) are illustrated in the story of penicillin. As we all know, penicillin is an antibiotic agent that is a natural inhibiting substance. Ernest Duchesne in 1896 noticed it and documented his observations. His work was reexamined by Fleming who set forth the proof that penicillin could destroy *Staphylococcus*. Fleming published his findings in 1929, thus ending the ideation phase and starting translation. In 1939, Oxford scientists further demonstrated penicillin's ability to kill infectious bacteria and conducted trials. So began the final part of its translation into practical use. The lack of mass manufacturing was a major barrier to implementation until Andrew Moyer solved that problem. He was granted a patent on the manufacturing process. The troops in World War II were in desperate need of this discovery, written about in 1896 and 1929, re-examined in 1939 and finally mass-produced and made widely available to them. Only at the point of it being sufficiently implemented did it qualify for our definition of innovation. At that point the innovation process was complete. An innovation that was novel, valuable and sufficiently implemented transformed medicine. It was a successful ending to a long process and the start of a completely new era. Today, there are penicillin-resistant microbes and the cycle of need-solution is in full swing. And so it goes.

Like innovation, entrepreneurship is a way of

viewing problems as opportunities. It comprises a specific series of actions that culminate in an enterprise that is deemed valuable by its customers and is meant to be sustainable. An entrepreneur has a vision of what could be, is intimately familiar with the consumer, harnesses resources not currently under control, and persuades and perseveres to create an enterprise that delivers value to the customer.

The oft-quoted story of Google illustrates. Two Stanford doctoral students needed a better search engine for their own research, so they created it. Finding that others valued it and being on a campus known for its entrepreneurial spirit, they created Google upon graduation. The rest is history. Unlike the long innovation process required for penicillin,





Google leapt on the scene. Its innovation process followed the same phases – ideation, translation, innovation – but did so in record time. Does Google meet the innovation test of novel, valuable and sufficiently implemented? Absolutely.

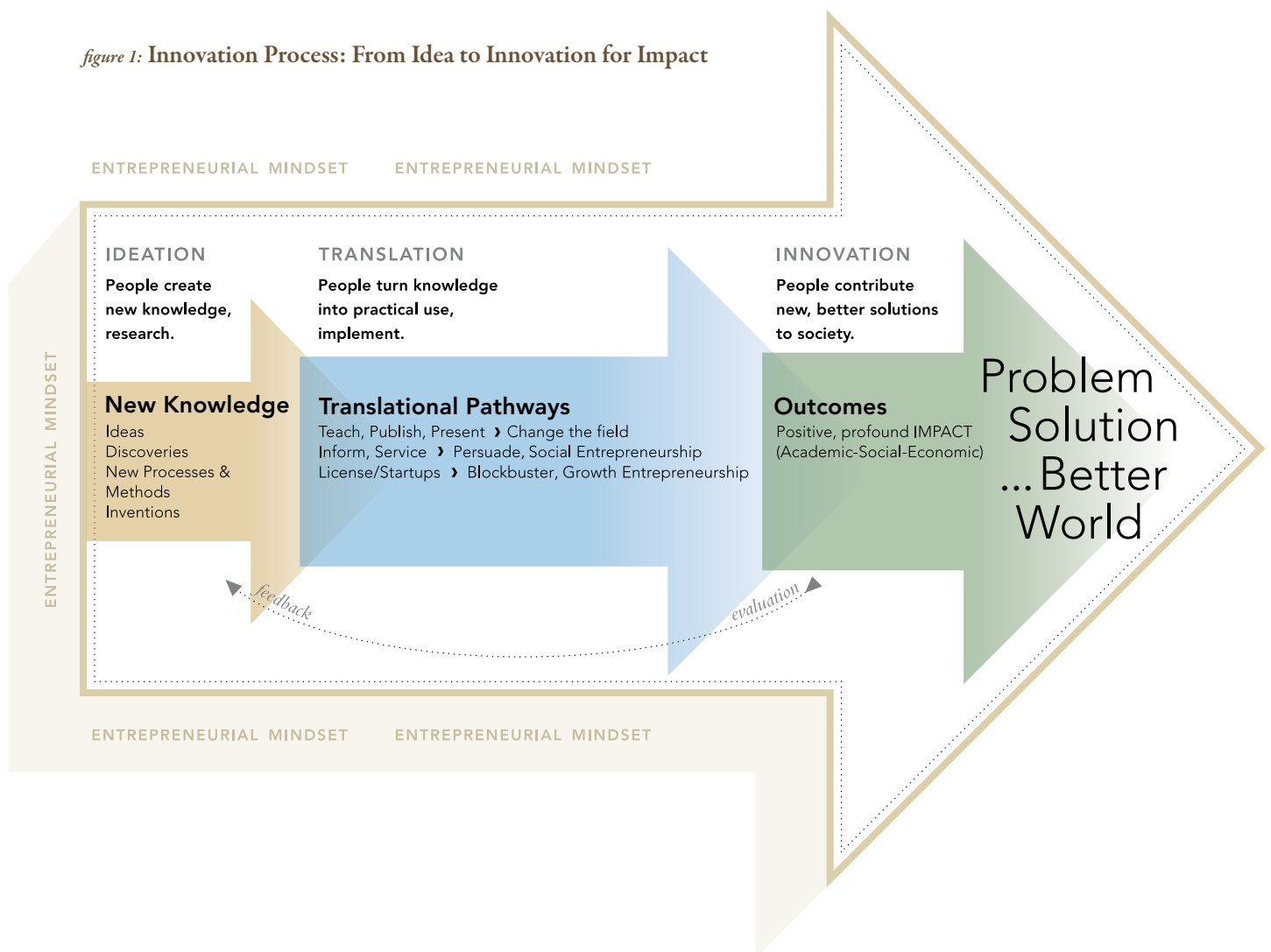
### An Innovation Process Framework

A process has related actions that are coordinated to achieve a particular result. The innovation process starts when problems/opportunities arise that need to and can be addressed. Often it is cyclical. Solutions are found, new problems are created by those solutions and novel discoveries reveal possibilities not even dreamed of by most. Knowledge

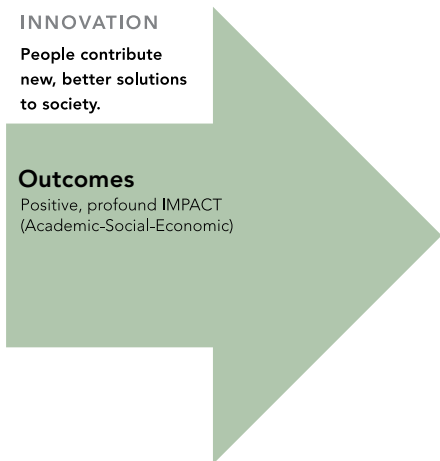
is constantly increased and sometimes catapulted by radical breakthroughs. In this discovery of new knowledge and its diffusion and application, universities are central in revealing unimagined needs and new solutions in an ever-changing context.

The three-phase innovation process starts with the end in mind. The faculty member or student then seeks the right balance between basic and applied research, creates translational pathways to move knowledge from theory to solutions, requires rigor throughout and builds in feedback loops and measurement protocols—all driven by an entrepreneurial mindset. The process can be shown as follows:

figure 1: Innovation Process: From Idea to Innovation for Impact



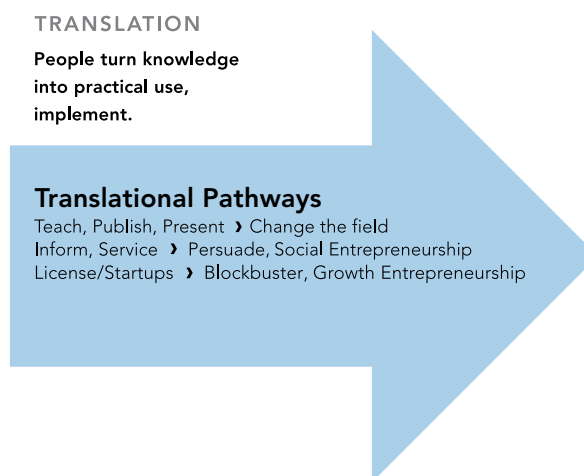
To understand this framework, it is helpful to look first at the desired outcome, Phase III Innovation.



**Phase III, Innovation, is the final phase of the innovation process and by definition delivers positive profound impact.** For universities committed to basic research and practical value, the focus is on discovery and the needs of society. Faculty members seek positive, profound academic, social, artistic and economic impact. They either see that their basic research is translated or work backwards from needs to research. There is clarity about what this means and how to measure effectiveness. In continuing through the model, it is helpful to move from the final phase, Innovation, to the first phase, Ideation.



**In Phase I, Ideation, new knowledge is created.** A complex research university plays a major role in ideation. It understands the necessity and benefits of creating knowledge in two ways. The first, basic research, provides a fundamental understanding of the world and holds the potential for significant breakthroughs that can transform society. The other, problem-based discovery, or applied research, engages in research targeted toward immediate applicability. Both types of research are required. The third and final phase, Translation, closes the gap between research and positive impact.



**Phase II, Translation, is the key to bridging ideation and positive impact.** The Academy traditionally excels at the early stages of translation. It knows how to teach, publish and present. It knows how to inform, create art and music, and do service – to a point. There are always outliers – those who change how we see ourselves or who translate knowledge into a social venture that is sustained over time and provides great benefit to its constituents. In other instances, new technologies are licensed to industry and new ventures are formed. A few explode with high growth or a blockbuster license.

Formalizing this translational part of the framework holds great potential for the university and for society. Calling upon university groups to drive toward impact beyond the traditional outputs of publication and teaching will require new ways of thinking, new resources, new knowledge, and alignment across the university. The world demands more; the university must find a way.

## Feedback, Measurement and the Entrepreneurial Mindset

Together, the three phases along with feedback loops, a demand for rigor throughout, outcome measurements and the entrepreneurial mindset provide the university with a framework from which to work. Evaluation is the ultimate verification.

## Summary

An Innovation Process Framework can provide the university community a way to talk about the ultimate outcomes of the university and explore how best to achieve the advancement of knowledge and maximum practical value to society. The world urgently needs additional contributions from universities. The optimum culture will prepare the university as it rapidly evolves to keep pace with an ever changing, interconnected world.

The world demands more;  
the university must find a way.

## Notes

# Innovation Carolina



## Laying the Cornerstone

A Tradition of Innovation  
and Entrepreneurship

The University of North Carolina at Chapel Hill began with an innovation. At a time when education was dominated by religious institutions, the State of North Carolina's new constitution proclaimed in 1776 that "All useful learning shall be duly encouraged and promoted in one or more universities." While it was not common at the time to talk about innovation or entrepreneurship, this plan to create a public university was an innovation. It required people who translated the vision into reality, taking responsibility for stewardship of the University. William Richardson Davie acted entrepreneurially when he introduced a bill in 1789 that began, "Whereas in all well regulated Governments, it is the indispensable duty of every Legislature to consult the Happiness of a rising generation and endeavour to fit them for an honourable discharge of the social duties of life, by paying the strictest attention to their education." When UNC opened its doors to students in 1793, it was the first of its kind – something new to the world.

The Morrill Land-Grant Acts of 1862 created another innovation in higher education. They expanded the idea that began at Carolina, creating land-grant institutions and laying the groundwork for universities to play a leadership role in teaching, research and service. This innovation had a transformative effect on higher education in the United States, and its impact continues to be felt around the world.

Carolina has developed a unique culture – the Carolina Way – that blends excellence with a spirit of generosity and engagement. There are many examples of Carolina innovation and entrepreneurship throughout history. Innovation – the creation



of value by implementing the novel – is part of Carolina's tradition. At a time when most colleges focused on classics and liberal arts, Carolina gave the natural sciences an early equal place. In the 1820s, professors Denison Olmstead and Elisha Mitchell prepared the nation's first geological survey, a useful contribution to the exploration of the new nation.

Now in its third century, UNC has provided education to 10 generations of students. The University has continued to experiment, innovate and stay relevant. UNC's academic offerings now span more than 100 fields, including bachelor's, master's and doctoral degrees as well as professional degrees in dentistry, medicine, pharmacy, city planning, business and law. There are currently 28,916 students studying at



figure 2a: Carolina by the Numbers:  
Full-Time Permanent Faculty by Division

TENURED AND TENURE TRACK FACULTY						
	Professors	Associate Professors	Assistant Professors	Total	Fixed Term	Grand Total
ACADEMIC AFFAIRS						
Arts & Sciences	375	199	165	739	172	911
Business	30	12	32	74	34	108
Education	18	11	6	35	14	49
Government	19	10	11	40	9	49
Info & Lib Sci	11	7	2	20	3	23
Journalism	12	11	15	38	6	44
Law	30	6	6	42	3	45
Social Work	13	6	4	23	43	66
<b>Subtotal</b>	<b>508</b>	<b>262</b>	<b>241</b>	<b>1,011</b>	<b>284</b>	<b>1,295</b>
HEALTH AFFAIRS						
Dentistry	28	21	10	59	47	106
Medicine	307	164	138	609	792	1,401
Nursing	16	12	10	38	63	101
Pharmacy	18	20	5	43	50	93
Public Health	66	41	20	127	84	211
<b>Subtotal</b>	<b>435</b>	<b>258</b>	<b>183</b>	<b>876</b>	<b>1,036</b>	<b>1,912</b>
OTHER UNITS*						
Other	5	2	1	8	8	16
<b>Grand Total</b>	<b>948</b>	<b>522</b>	<b>425</b>	<b>1,895</b>	<b>1,328</b>	<b>3,223</b>

\*Other Units include: Carolina Environmental Program and the Institute of Marine Sciences.

Source: Office of Institutional Research and Assessment, Personnel Data File and Human Resources Data Warehouse, Fall 2009

This represents the number of employees at UNC-Chapel Hill as of September 30, 2009.

Published November 3, 2009.

Carolina: 17,981 undergraduates, 8,386 graduate students and 2,549 professional students.

Its academic programs are world-renowned and highly regarded. The 3,223-member faculty is distinguished by its academic accomplishments, with Oliver Smithies, excellence professor of pathology

and laboratory medicine and a co-recipient of the 2007 Nobel Prize in Medicine, 10 members of the National Academy of Sciences, five members of the National Academy of Engineering, 19 members of the Institute of Medicine and 33 members of the American Academy of Arts and Sciences.

*figure 2b: Carolina by the Numbers:*  
Students by School and Education Level

	UNDERGRADUATE		GRADUATE		PROFESSIONAL		TOTAL	
	Headcount	FTE	Headcount	FTE	Headcount	FTE	Headcount	FTE
<b>SCHOOL</b>								
General College	8,084	8,081	0	0	0	0	8,084	8,081
Arts & Sciences	6,994	6,927.75	2,111	1,631.25	0	0	911	911
Business	648	645.50	747	730.75	0	0	108	108
Education	199	198.25	360	302.25	0	0	49	49
Government	0	0	63	62.25	0	0	49	49
Info & Lib Sci	22	20	372	332	0	0	23	23
Journalism	839	833.50	91	78.75	0	0	44	44
Law	0	0	0	0	758	758	758	758
Social Work	0	0	222	212.75	0	0	222	212.750
Dentistry	89	79	93	74.25	343	342.25	525	495.50
Medicine	70	69.25	747	574	779	770.25	1,596	1,413.50
Nursing	359	355	257	212.50	0	0	616	567.50
Pharmacy	0	0	117	86.75	589	589	706	675.75
Public Health	147	147	996	874.75	0	0	1,143	1,021.75
Continuing Studies	303	119.75	596	333.25	0	0	899	453
Off-campus Studies	148	71	1,476	1,045.25	80	45.25	1,704	1,161.50
Inter-Institutional Visitors	79	21.75	138	82.50	0	0	217	104.25
<b>Grand Total</b>	<b>17,981</b>	<b>17,568.75</b>	<b>8,386</b>	<b>6,633.25</b>	<b>2,549</b>	<b>2,504.75</b>	<b>28,916</b>	<b>26,706.75</b>

\* Full-time equivalent (FTE) is based on attempted resident and extension credit hours. The conversion of headcount to FTE is based on a minimum full-time load of 12 credit hours for undergraduate students and 9 credit hours for graduate and professional students.

Effective Fall 2009, counts of students earning the Doctor of Pharmacy (PharmD) include both students taking courses at UNC-Chapel Hill and students in the Doctor of Pharmacy Partnership Program attending Elizabeth City State University.

Effective Fall 2009, students earning the Doctor of Audiology (AuD) or Doctor of Physical Therapy (DPT) degrees are now reported as first professional students, whereas they were previously reported as graduate students. This change was required to comply with new reporting requirements from the U. S. Department of Education.

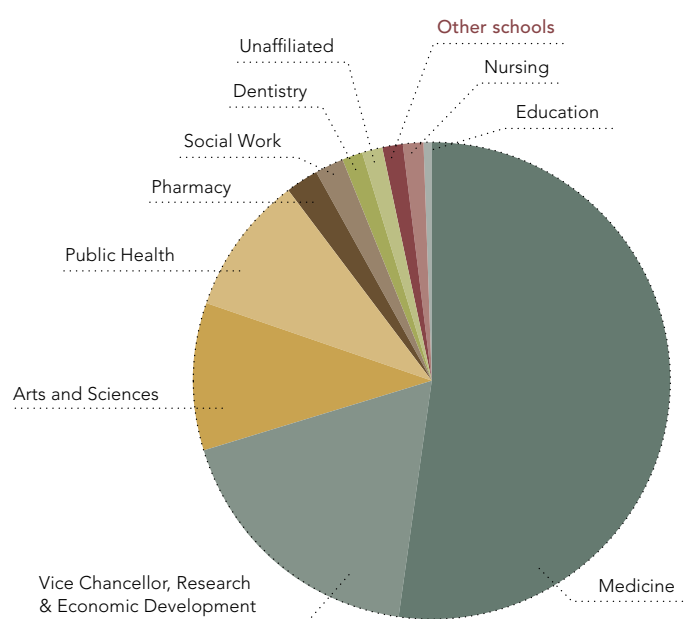
Source: Office of Institutional Research & Assessment (GA010).

As of Census, September 17, 2009

Research has been a part of Carolina's mission since the 1820s when President Caldwell traveled to Europe to purchase state-of-the-art scientific equipment. Since 1922, Carolina has belonged to the select group of American and Canadian campuses that form the Association of American Universities (AAU), an elite group of research universities. In 2009, Carolina's research grants and contracts totaled \$716 million, a full doubling of annual research

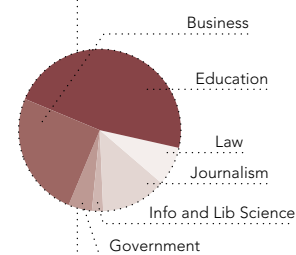
funding in a decade. One of Carolina's greatest research strengths lies in its multidisciplinary, collaborative nature. For example, the Carolina Population Center, directed by Barbara Entwisle, brings together 250 researchers in a collaborative setting focused on research to benefit world populations and respond to societal needs, creating a fertile context for the cross-pollination of ideas and resulting in \$54 million in research funding in 2009.

*figure 3: Fiscal Year 2008: Total Award Dollars (grants and contracts from government, industry and other) Colleges and Schools by Administrative Unit*



College / School, FY 2008	
College of Arts and Sciences	68,632,148
School of Dentistry	10,824,524
School of Education	3,739,146
School of Medicine	356,794,003
School of Nursing	8,591,167
Eshelman School of Pharmacy	16,570,070
Gillings School of Global Public Health	63,241,652
School of Social Work	12,048,468
Other Schools (see detail)	8,738,826
Unaffiliated*	9,277,926
Vice Chancellor, Research & Economic Development**	123,509,270
<b>Total</b>	<b>\$678,228,055</b>

Other Schools, Detail, FY 2008	
Business	2,207,182
Education	4,105,303
Government	685,920
Information and Library Science	1,147,239
Journalism and Mass Communication	202,382
Law	390,800
<b>Total, Other Schools</b>	<b>\$8,738,826</b>



\* Awards to University Officers such as the Ackland Museum, the Office of International Affairs, and WUNC-FM are included here.

\*\* Awards to centers and institutes such as the Carolina Population Center, the Frank Porter Graham Child Development Institute and the Sheps Center for Health Services Research are administered by the Vice Chancellor for Research & Economic Development.

## THE RESEARCH TRIANGLE PARK™ (RTP)



The Research Triangle Park™ (RTP) stands as a visible testament to the power of entrepreneurial thinking. Begun in the 1950s with a dream of transforming North Carolina's economy, RTP is the oldest and one of the largest research parks and a well-known corporate location. Anchored by three major research universities (UNC, Duke and N.C.

State), RTP has become a nexus for technology and life sciences firms. A concentration of corporate research-and-development facilities and a highly educated workforce have spawned a thriving entrepreneurial economy. The region surrounding the park now counts more than 1,800 home-grown firms. RTP also is headquarters of the Council for Entrepreneurial Development (CED), the largest entrepreneurial support organization in the United States with a membership of more than 5,000 people representing more than 1,100 companies.

Carolina's deeply rooted tradition of public service generates its own brand of entrepreneurial and civic spirit. The School of Government is an example of academic innovation with positive public impact. Tracing its origin to 1931, the School of Government was an innovation – the first organization of its kind to provide educational, advisory and research support for state and local governments. The visionary academic entrepreneur behind the idea was Albert Coates, a native North Carolinian from Johnston County, who as a law professor recognized “a gap between the law and government as it was taught in my Law School classroom and as it was practiced in the city halls, county courthouses, and the state capitol.” This model has been copied nationally and internationally.

As the world has changed, the University has responded, continuing to innovate and create value for the world.



## RESEARCH EXCELLENCE, SIGNIFICANT NATIONAL AWARDS 2008–2009

**Dmytro Arinkin**, assistant professor of mathematics, was awarded a Research Fellowship by the Alfred P. Sloan Foundation for outstanding early-career scientists. Arinkin plans to use the fellowship to further his collaborative mathematics research with the Langlands Project.

**Miriam Braunstein**, assistant professor of microbiology and immunology, was named a 2008 Burroughs Wellcome Fund Investigator in Pathogenesis of Infectious Disease. She will receive \$500,000 to support her research in understanding the protein export systems and exported proteins of *Mycobacterium tuberculosis* (the bacterium which causes tuberculosis) and the roles they play in pathogenesis.

**Thomas J. Campanella**, associate professor of city and regional planning was awarded a fellowship from the John Simon Guggenheim Memorial Foundation for research on the history of “Soul City,” North Carolina and the civil rights movement.

**Ian Davis**, assistant professor of pediatrics at the School of Medicine and Lineberger Cancer Center, was appointed as a Rita Allen Foundation Scholar, which supports scientists in the early stages of their research careers. Davis’s research involves the molecular genetics of childhood cancers.

**Arjun Deb**, assistant professor at the School of Medicine, has received the Ellison Medical Foundation’s 2008 New Scholar Award in Aging for his work in cardiac stem cell research. The New Scholar awards provide support for promising young investigators as they establish their own labs and organize new research programs.

**Joseph DeSimone**, Chancellor’s Eminent Professor of Chemistry, was chosen for the 2009 National Institutes of Health’s NIH Director’s Pioneer Award. DeSimone will use the award to develop new methods for delivering promising biological therapeutics to specific locations in the body in a safe and effective fashion.

DeSimone also received the 2008 Lemelson-MIT Prize for his work in green chemistry and for bringing that work from the lab into industry. The \$500,000 prize is awarded to “individuals who turn their ideas into inventions and innovations that change the world we live in and improve life for all of us.”

**Martin Doyle**, associate professor of geography and member of the UNC Institute for the Environment was awarded a fellowship from the John Simon Guggenheim Memorial Foundation for his project on the history of American rivers.

**Joseph “Alex” Duncan**, assistant professor of medicine in the division of infectious diseases, received the Burroughs Wellcome Fund Career Award in the Medical Sciences, which provides \$700,000 over five years to support young physician scientists through the transition from post-doctoral training to developing independent research careers as young faculty. Duncan is currently researching the role of specific pathogens in disease prevention and treatment.

**Carl Ernst**, the William R. Kenan, Jr. Distinguished Professor of Religious Studies and director of the Center for the Study of the Middle East and Muslim Civilizations was elected to the American Academy of Arts & Sciences. He specializes in Islamic studies, with a focus on West and South Asia and his published research is based on the study of Arabic, Persian and Urdu.

Ernst was awarded a fellowship from The John Simon Guggenheim Memorial Foundation in 2009 for a translation and a study of the poetry of al-Hallaj.

**Jeffrey Frelinger**, Kenan Distinguished professor, department of microbiology and immunology, was awarded the Franklin Fellowship offered by the U.S. Department of State. Franklin Fellows work on global issues of vital importance to the United States while enhancing their knowledge of foreign policy and government operations

**Banu Gökariksel**, assistant professor of geography, was selected to participate in the Mellon Foundation’s 2008 Sawyer Seminars program, which provides support for comparative research on the historical and cultural sources of contemporary developments.

**Michal Grinstein-Weiss** received the Smith Richardson Foundation Domestic Public Policy Research Fellowship for her study: Testing Long-Term Impacts of Individual Development Account and Asset Building on Social and Economic Well-Being. This work and her proposed papers have the potential to make a significant contribution to public policy concerning wealth creation, and ultimately to better the lives of low-income families.

*continued on next page*



## RESEARCH EXCELLENCE, CONTINUED

**Evelyne Huber**, Morehead Alumni Distinguished Professor and chairperson of the political science department was awarded a fellowship from The John Simon Guggenheim Memorial Foundation for research on politics, development, social policy and poverty and inequality in Latin America.

**Svetlana Lazebnik**, assistant professor of computer science, has received a Microsoft New Faculty Fellowship Award. This unrestricted \$200,000 gift from Microsoft Research is annually awarded to five early-career professors in recognition of innovative computing research. Lazebnik is exploring new ways for computers to interpret digital images. In 2008, Lazebnik received an NSF Early Career Development Award.

**Yufeng Liu**, Associate Professor of Statistics and Operations Research, won an NSF Faculty Early Career Development Award in 2008 to develop new statistical learning techniques that will allow scientists to analyze complex data with high prediction accuracy and increased interpretability.

**Garegin Papoian**, assistant professor of chemistry, received a Faculty Early Career Development Award from the National Science Foundation. These awards support the research of promising young faculty in the early stages of their careers in the chemical and life sciences. Papoian will use the award to develop detailed computational models of the way cells of higher organisms move around and sense their environment.

**Louis Perez**, the J. Carlyle Sitterson Professor of History in the College of Arts and Sciences, was elected to the American Academy of Arts & Sciences in 2008. His current research explores the sources of Cuban nationality and identity.

**Karin Pfennig**, received a \$1.5 million New Innovator Award from the National Institutes of Health. Pfennig, an assistant professor of biology in the College of Arts and Sciences, will use the award to fund experimental research in understanding how individuals' health status and external environment influence their behavior. Pfennig's work lies at the intersection of ecology, evolution and behavior.

**John F. Rawls**, assistant professor of cell and molecular physiology, was chosen as a 2008 Pew Scholar. The Pew Scholars Program in the Biomedical Sciences is designed to support young investigators of outstanding promise in the basic and clinical sciences relevant to the advancement of human health. Scholars are awarded \$60,000 per year for a four-year period.

**Steve Rogers**, assistant professor in biology, received the 2008 Beckman Young Investigators Award. The national award, given to 16 recipients by the Arnold and Mabel Beckman Foundation of Irvine, Calif., supports the research of promising young faculty members in the early stages of their careers in the chemical and life sciences.

**Sarah Shields**, associate professor of history, was selected to participate in the Mellon Foundation's 2008 Sawyer Seminars program, which provides support for comparative research on the historical and cultural sources of contemporary developments.

**John D. Stephens**, Gerhard E. Lenski, Jr. Distinguished Professor of Political Science and Sociology, and director of the UNC Center for European Studies was awarded a fellowship from The John Simon Guggenheim Memorial Foundation for research on politics, development, social policy and poverty and inequality in Latin America.

**Zefang Wang**, assistant professor of molecular biology, was awarded the Sloan Research Fellowships for outstanding early-career scientists by the Alfred P. Sloan Foundation. Wang plans to use his to fund his research in gene splicing. Wang also received the 2008 Beckman Young Investigators Award.

**Susan Wolf**, Edna J. Koury Professor of Philosophy, was named the 2009–2010 Phi Beta Kappa Romanell Lecturer. The Romanell-Phi Beta Kappa Professorship is intended to recognize not only distinguished achievement but also the recipient's contribution or potential contribution to public understanding of philosophy.

**Muhammad Yousaf**, assistant professor of chemistry, received a prestigious Faculty Early Career Development Award from the National Science Foundation. Yousaf will use the award to develop new surface chemistries to study how cells polarize and migrate.

# Innovation @ Carolina

## The Carolina Entrepreneurial Landscape

Planting the Seeds of an

Entrepreneurial Mindset

*The Princeton Review* and *Forbes.com* consistently rank Carolina among the most entrepreneurial campuses in the United States.<sup>1</sup> This is due in large part to the Kenan-Flagler Business School, which has been one of the nation's top business schools since it opened in 1919 and the Frank Hawkins Kenan Institute of Private Enterprise (Kenan Institute). Kenan-Flagler, named after philanthropist Mary Lily Kenan Flagler and her husband Henry Morrison Flagler, co-founder of the Standard Oil Company, has offered entrepreneurship education and research for decades. In 1986, the school's nonprofit economic-development and outreach arm, the Kenan Institute, opened with entrepreneurship as a major focus. Led by renowned entrepreneurship professor Rollie Tillman Jr., the

institute was soon home to an association of venture funders and the national Ernst & Young Entrepreneur of the Year Hall of Fame.

In 1992, Kenan-Flagler became one of the first business schools to formalize its course of study and research in entrepreneurship by creating the Center for Entrepreneurial Studies. The school offers concentrations for MBA and undergraduate students, and it created and hosts the annual Venture Capital Investment Competition for top MBA schools from around the world. Kenan-Flagler created the Center for Sustainable Enterprise in 1999 – one of the first business school programs in the country offering a curriculum and research program focused on sustainable business development and management. In addition, Kenan-

<sup>1</sup>Other recent awards include: Most Innovative Entrepreneurship Pedagogy Award, U.S. Association for Small Business and Entrepreneurship, 2004; No. 3, "Top Colleges for Entrepreneurs," *Entrepreneur*, 2005; Entrepreneurial Excellence Award for Community Impact, Council for Entrepreneurial Development, 2005; Global Consortium for Entrepreneurship Centers Award for Excellence in Enterprise Creation for the Launching the Venture Program, 2007; No. 10, Top Graduate Programs, *Princeton Review* and *Entrepreneur*, 2008; Global Consortium for Entrepreneurship Centers Education Award for Excellence in Specialty Entrepreneurship Education for the Venture Capital Investment Competition, 2008. UNC-Chapel Hill has also recently hosted two prominent entrepreneurship conferences, the 2005 National Consortium of Entrepreneurship Centers Directors Conference and the 2008 Babson/Kauffman Entrepreneurship Research Conference.

## UNC *Innovation* HISTORY TIMELINE



William R. Davie laying the cornerstone of East Building, 12 October 1793

**1789** The General Assembly charters the university on December 11th.

**1820s** Professors Denison Olmstead and Elisha Mitchell prepare the nation's first geological survey.

**1831** The first astronomical observatory at a state university is built under the direction of President Joseph Caldwell.



Telescope

**1842** Elisha Mitchell publishes the first geological maps of the state.

**1776** The North Carolina Constitution encourages the establishment of a public institution of higher education in the state.

**1795** The University of North Carolina formally opens in January. It is the first public university in the United States.



Joseph Caldwell

**1824** President Caldwell travels to Europe to purchase cutting edge textbooks and scientific equipment for the university.

**1845** The law school is established. It is among the first law schools in the nation.

Flagler has a strong MBA Entrepreneurship Club dedicated to provide educational and practical opportunities to inspire all Kenan-Flagler students towards entrepreneurial thinking.

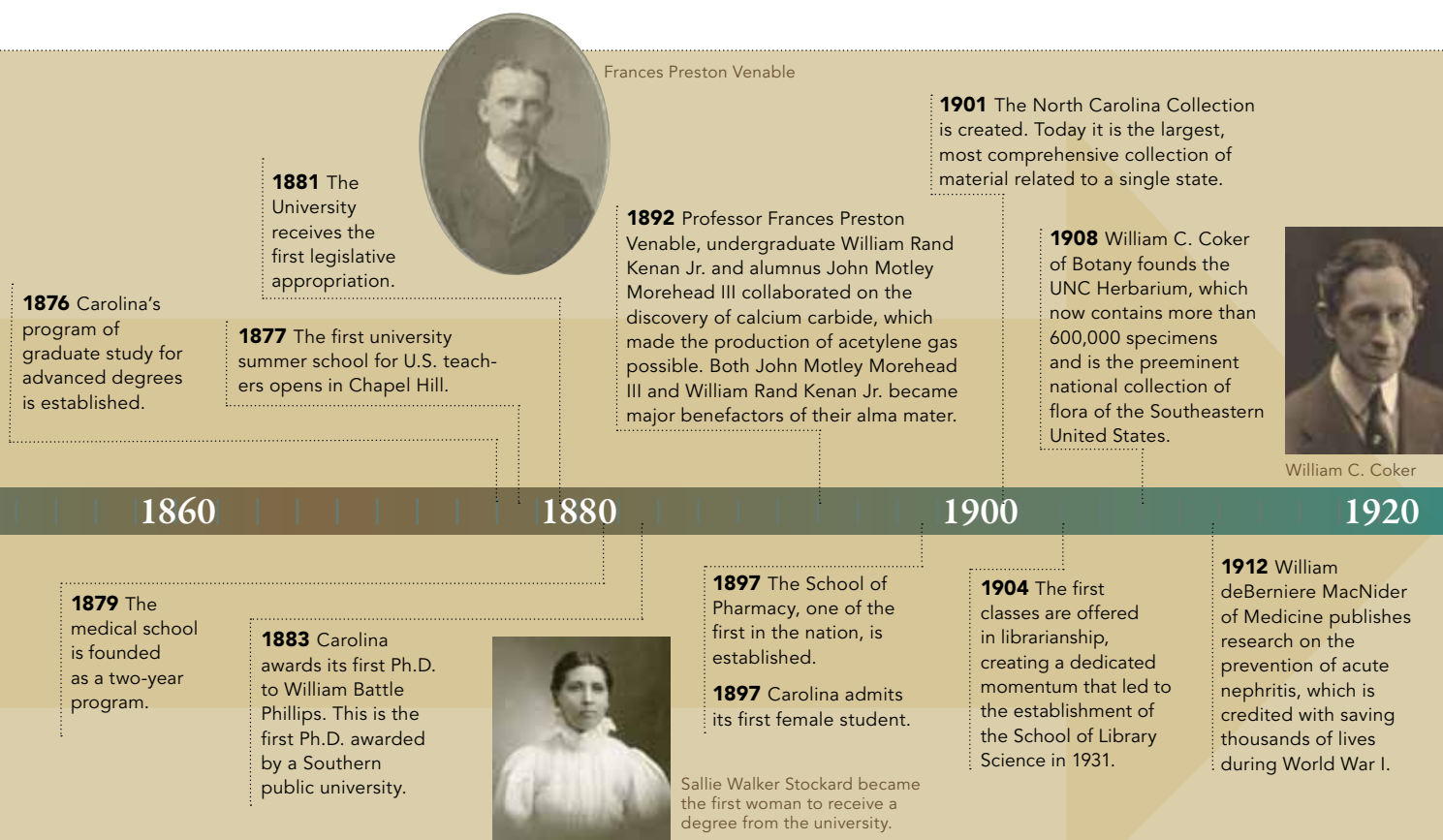
Against this backdrop, Carolina was primed when the Ewing Marion Kauffman Foundation (in 2004) launched its Kauffman Campuses Initiative. Foundation creator Ewing Marion Kauffman, founder of Marion Laboratories, saw building enterprise as one of the most effective ways to realize individual promise and spur the economy. Coincidentally, in 1992 when Kauffman was considering focusing his philanthropic resources on advancing entrepreneurship, he traveled to Chapel Hill to seek advice from the Kenan family. The Kauffman Foundation's campus initiative aimed to spread entrepreneurship widely

by transforming college campus life so that entrepreneurship would be as integral and natural a part of the college experience as dorms, cramming for exams and cheering for a winning basketball team.

## Carolina Entrepreneurial Initiative

UNC was among the eight pilot universities selected for this initiative after a rigorous proposal and selection process.<sup>2</sup> The Carolina Entrepreneurship Initiative (CEI) launched in 2004 with a five-year grant of \$3.5 million from the Kauffman Foundation and a 2 to 1 match from the university to provide \$7 million for a total of \$10.5 million covering 5 years. With funding ending in 2010, programs seeded by Kauffman grants are evaluating their futures.

<sup>2</sup>The eight original KCI campuses are: University of North Carolina-Chapel Hill; Florida International University; Howard University; University of Illinois at Urbana-Champaign; University of Rochester; University of Texas-El Paso; Wake Forest University; and Washington University in St. Louis. In December 2006, Kauffman awarded a second round of awards to the following institutions: Arizona State University; Georgetown University; Purdue University; Syracuse University; University of Wisconsin-Madison; University of Maryland-Baltimore County; and several northeast Ohio schools in partnership with the Burton D. Morgan Foundation, including: Baldwin-Wallace College; College of Wooster; Hiram College; Lake Erie College; and Oberlin College.



*figure 4: Current Campus-Wide Infrastructure for Innovation and Entrepreneurship\**

	Undergraduate Students	Graduate Students/Post Docs	Faculty/Staff
TEACHING			
	First Year Seminars	Graduate Certificate in Entrepreneurship	Workshops to encourage teaching entrepreneurship
	Undergraduate Minor in Entrepreneurship		
	Undergraduate and Graduate Business Degrees with Entrepreneurship Concentration		
	Financial Literacy Workshop		
RESEARCH			
	Kauffman Faculty Fellowships in Entrepreneurship	Faculty Research Seminars	
		Kauffman Next Generation Scholars Program	
		Sponsored Research & Scholarship	
VENTURE CREATION			
	Launching the Venture		
	Carolina Challenge		
	Business Accelerator for Sustainable Entrepreneurship (BASE)		
	Campus Y		
	APPLES / Service Learning Program		
GAME CHANGING			
	Entrepreneurship Club		CEI Innovations Fund
			Carolina Seminars in Entrepreneurship
			The Chancellor's Faculty Boot Camp
	Entrepreneurs/Executives-in-Residence		
	Carolina Women's Entrepreneurship Network		

\* This section focuses mainly on CEI-related activities. In future revisions this chart and supporting materials will be expanded. Suggestions for additional entries are appreciated by the authors.



The university turned to the Kenan Institute to develop and provide oversight for the CEI. The Kenan Institute was a natural host for the initiative. Named for entrepreneur Frank Hawkins Kenan, part of the Institute's mission is to bridge the business school with other parts of the university and to leverage the private sector for the greater public good. Kenan Institute director John D. Kasarda, also professor of sociology in the College of Arts and Sciences, was named director of the CEI. The Chancellor delegated overall development and management of the Initiative to an Executive Committee composed of the Dean of the College of Arts and Sciences, the Dean of the Kenan-Flagler Business School, the Dean of the Eshelman School of Pharmacy, and the Vice Chancellor for Research and Economic Development. From the beginning, CEI was designed to be collaborative, inclusive and incorporate entrepreneurial elements into existing programs. Positioning entrepreneurship as something inherent in much of what was already working well on campus allowed CEI to be



a catalyst for innovation.

CEI activities cover teaching, research and venture creation. There is something for everyone in the Carolina community. In addition, some activities are game changing, aimed at widening the conversation

**1922** Carolina becomes the 25th member of the Association of American Universities, an organization of American and Canadian institutions achieving distinction in graduate study and research.

**1922** The UNC Press is founded, becoming the oldest university press in the South and one of the oldest in the United States.

**1931** Law Professor Albert Coates founded what became the School of Government to provide educational, advisory, and research support for state and local governments. It is the first organization of its kind and has served as a model nationally and internationally.



Frank Porter Graham, left front, with 1906 freshman baseball team

**1935** Frank Porter Graham initiates a plan to reform college athletics by regulating the recruitment, eligibility, and subsidizing of student athletes. The National Association of State Universities and the Southern Conference adopted the Graham plan.

**1946** The Department of City and Regional Planning is founded and immediately initiates outreach workshops. The department created land-use plans and nurtured a tradition of community planning that became institutionalized in planning departments in local governments.

**1950** The Dental School is established.

1920

1930

1940

1950

**1924** The H. W. Odum Institute for Research in Social Science is established. It is the nation's oldest multidisciplinary social science university institute.

**1927** Zoology Professor Henry Van Peters Wilson is the first Carolina faculty member elected to the National Academy of Science. His work laid the groundwork for modern tissue-culture and experimental embryology.

**1937** Paul Green's *The Lost Colony* is produced as the first and longest-running outdoor historical drama. The production gave birth to the outdoor drama movement in the United States.

**1936** The School of Public Health, the nation's first public school of public health, is founded.

**1949** The Morehead Planetarium opened its doors as the first planetarium in the world associated with a university. Dozens of astronauts, including Neil Armstrong and John Glenn, have studied celestial navigation in the Planetarium.

**1952** Kenan-Flagler Business School offers one of the world's first executive education programs.

among faculty, bringing entrepreneurs to campus and encouraging women entrepreneurs. Each of the CEI activities is discussed briefly along with other activities that provide Carolina's infrastructure for innovation and entrepreneurship:



## Teaching:

**First Year Seminars:** This program introduces the concepts of entrepreneurship in diverse disciplines to entering first-year students in the College of Arts and Sciences. It is an extension of an existing and successful First Year Seminars program, which places students in small classes taught by the University's distinguished instructors to explore topics in depth. CEI seeds new seminars with a grant program designed to encourage faculty in diverse disciplines to explore how entrepreneurship relates to their areas of study and to engage students in that process of exploration and discovery. Nearly 1,200 students have participated in seminars on such diverse topics and disciplines as "Economic Saints and Villains: The Entrepreneurial Spirit in Early English Literature," (English) to "Policy Entrepreneurship and Public Private Partnerships" (public policy) to "Spanish Entrepreneurship" (romance languages).

**1953** Robert Langdell, Robert Wagner and Kenneth M. Brinkhous of Pathology develop the partial thromboplastin time test, a procedure that detects blood-clotting disorders. This test is now used thousands of times each day in clinical diagnosis.



Kenneth M. Brinkhous

**1953** Robert Langdell, Robert Wagner and Kenneth M. Brinkhous of pathology develop the first effective therapy for hemophilia.

**1957** With the publication of Stuart Chapin's seminal book, *Urban Land Use Planning*, Chapin became the leading figure in research and practice of creating sustainable cities long before the concept of sustainability came into vogue. The authors of the fifth edition are Department of City and Regional Planning faculty Phil Berke, Dave Godschalk, Ed Kaiser and Daniel Rodriguez.

**1958** Harvey Wagner, Professor of Operations, Technology and Information Management, transforms the practice of operations research with his groundbreaking book *Principles of Operations Research*.

**1959** The Research Triangle Park is founded.

**1959** James W. Prothro and Marian Irish publish *Politics of American Democracy*, an innovative American government textbook that sets the standard for future U.S. government textbooks.

1950



**1955** The first college radio program to be rebroadcast by a commercial network is a series of 13 programs on American History written by John Ehle and produced by John Clayton of the University's Communication Center.

**1956** George Simpson of the Odum Institute is appointed director of the Research Triangle Committee.

**1957** The Center for Urban and Regional Studies is established to support multi-disciplinary research on issues and problems faced by our nation's cities and regions. It is the second oldest university-based research center of its kind in the country.

1960

**1960** John Cassel, Al Tyroler and Bernare Greenberg begin the Evans County (Georgia) Cardiovascular and Cerebrovascular Epidemiology Study, considered the world's most famous non-governmentally administered cardiovascular study.

### Undergraduate Minor in Entrepreneurship:

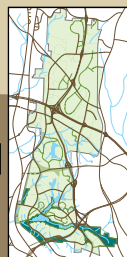
Housed in the Department of Economics, under the leadership of its Chair, John Akin, and Professor John Stewart, in the College of Arts and Sciences, the minor provides undergraduates outside of the business school with a solid grounding in entrepreneurship. Started in 2005, the program annually admits 100 students in their junior year. The minor starts with a fall gateway course that introduces students to the recognition and pursuit of opportunity. The second semester divides the class into four tracks: artistic, commercial, scientific and social. Courses are team taught by seasoned faculty members paired with practicing entrepreneurs and executives, such as Maryann Feldman, S.K. Heninger Distinguished Professor and Director of Undergraduate Studies in Public Policy, Buck Goldstein, co-founder of Information America and the minor's Entrepreneur in Residence, Lowry Caudill, co-founder of Magellan Laboratories, Emil Kang, UNC's executive director for the arts, Julia Sprunt Grumbles, a former senior executive with Turner

Broadcasting, and Kimberly Jenkins, a former executive at Microsoft.

Students then have a summer internship to provide the opportunity to work in an entrepreneurial or innovative environment. Internships are managed through a full-time coordinator who works with students to identify and secure an appropriate placement. Last year, 61 companies and nonprofits hosted UNC interns from the entrepreneurship minor. Each year, approximately 20 students are selected to have their internship experience in Beijing, China.

### Undergraduate and Graduate Business Degree with Entrepreneurship Concentration:

The Kenan-Flagler Business School's Center for Entrepreneurial Studies led by Clay Hamner, Director and Ted Zoller, Executive Director, provides entrepreneurship education programs for business students. The Center offers concentrations in entrepreneurship for MBAs and undergraduate business administration majors with a wide range of courses covering all aspects of creating and sustaining



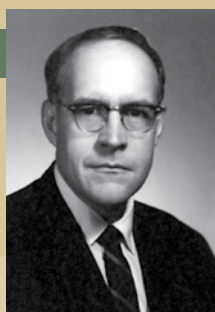
Map of Research Triangle Park

**1966** The Carolina Population Center (CPC) is established to promote interdisciplinary research to benefit world populations.

**1966** Fred W. Higgs, visiting professor, publishes one of the most influential papers in fundamental particle physics. The Higgs particle is frequently cited as a motivation for building ever more energetic accelerators, such as the Superconducting Super Collider.

**1972** Division TEACCH, the nation's first statewide program for teaching and educating autistic and other communication-handicapped children, receives the American Psychiatric Association's Gold Achievement Award. Since its inception TEACCH has served as a model for similar programs in the US and the world.

1970



Fred Brooks

**1964** The second independent department dedicated to computer science is established at Carolina and named the Department of Information Science. Fred Brooks is the founding chair.



**1972** Albert Collier, Frank Loda and Joseph Sparling begin Carolina Abecedarian Project, the longest and most intensive study ever undertaken on the effects of early education on low-income preschool children's intellectual development and academic performance. Results show that improvements can last into the teen years and beyond, and the project's findings strongly underscore the value of early education for youngsters.



new ventures. The undergraduate program offers 15 courses and the MBA concentration offers 35 courses. It also offers a wide range of extracurricular activities and programs, such as the Venture Capital Investment Competition, Undergraduate Venture Capital Investment Competition, two investment funds managed by business students, an annual Private Equity Conference, global business immersion opportunities, Carolina Challenge business-plan competition, Carolina Launch Program, numerous student organizations and a speaker series that brings renowned entrepreneurs to campus to interact with students.

**Graduate Certificate in Entrepreneurship:** Following a similar model and pedagogy as the minor, the Graduate Certificate was initiated in 2008. The Graduate Certificate in Entrepreneurship and its Introduction to Entrepreneurship course are open to UNC graduate students, doctoral candidates, post-docs, faculty and staff to complement their studies in traditional disciplines. It explores how entrepreneurship is changing their fields and helps them learn to conceive, plan and

execute new commercial and nonprofit ventures. Introduction to Entrepreneurship may be taken as a stand-alone, open-enrollment course. It is offered in three areas, based on students' interest: artistic, scientific (including medical and public health) and social. The certificate offers two sequences: one for those seeking to create new enterprises and one for those interested in developing "literacy" in the field of entrepreneurship.

**Financial Literacy Workshop:** Available to anyone in the university community, this three-hour, intensive program covers fundamental accounting and financial knowledge, such as how to read a balance sheet and how to manage a budget. Taught by C.J. Skender, professor of accounting from the Kenan-Flagler Business School, the program attracts more than 200 people each time it is offered.

**Workshops to encourage teaching entrepreneurship:** CEI has offered funding for interested teaching faculty to attend training programs to learn more about venture creation and effective pedagogical strategies for incorporating entrepreneurship into the classroom. Almost two dozen faculty members

**1974** With the publication of his seminal work, *Children of the Depression*, sociology professor Glen Elder becomes the leading figure in the creation and development of life course studies.

**1974** James W. York Jr. publishes the first formulation of the 58-year-old "initial value problem" associated with Einstein's general theory of relativity and gravitation.

**1976** Professors Shirley Weiss and Ray Burby complete their landmark study of residential satisfaction and behavior in planned communities. Their research on new towns compared to conventional communities remains the definitive work on new towns created in the 1960s and 70s.

**1981** Chemistry Professor James Jorgenson discovers capillary electrophoresis. An invention report is disclosed. No patent application is filed. Capillary electrophoresis was one of the key technologies used in sequencing the human genome.



James Jorgenson

**1974** Trihalomethanes, a byproduct of the chlorination of drinking water, first identified to be carcinogenic by researchers in the School of Public Health, led by Professors R.F. Christman and J.D. Johnson. The discovery led to regulation of public drinking water.



**1977** Fred Brooks' lab designs the first computer 3-D interfaces, which set the standard for computer and game graphics.

**1981** Work by Kathleen Sulik and Malcolm Johnston leads to the conclusion that alcohol-induced birth defects may arise as early as the third week after conception in humans.

**1981** Michael Knowles, John Gatzky Jr. and Richard Boucher discover that cystic fibrosis is the result of abnormal epithelial ion transport. This discovery is an important clue to why mucus clogs the lungs of cystic fibrosis sufferers.



1980

have attended the Price-Babson teaching seminars and the Graduate Education in Technology Commercialization Seminar at Georgia Tech University.

## Research:

**Kauffman Faculty Fellowships in Entrepreneurship:** This three-year pilot program directed by the Institute for the Arts and Humanities provided competitively awarded semester leaves for UNC faculty interested in pursuing projects that incorporated an entrepreneurial component into their research and teaching. For instance, computer science professor Gary Bishop used a fellowship semester to explore ways to generate new revenue streams to sustain his work developing enabling technology for children with disabilities. Anthropologist Brian Billman used his fellowship to help villagers in rural Peru create a new economic future by finding sustainable ways to preserve their rich archaeological sites through ecotourism and other strategies.

**Faculty Research Seminars:** The seminars, organized by Howard Aldrich, a world-renowned



scholar in entrepreneurial studies and professor of sociology, brings to campus eight to 10 scholars per year to discuss their research in entrepreneurial studies. Aldrich specifically invited scholars from different disciplines to demonstrate the highest

**1986** Barbara S Hulka leads a National Academy of Sciences study that highlights the health impact of secondhand smoke. This study reveals that nonsmokers face a 30 percent greater risk of developing lung cancer if their spouses smoke and that the children of smokers experience 50 percent more respiratory problems than the children of nonsmokers.

**1986** The Frank Hawkins Kenan Institute of Private Enterprise opens with a major focus on entrepreneurship research and outreach.



**1991** Jack N. Behrman, a retired UNC professor founds the MBA Enterprise Corps, which sends recently graduated MBAs on assignments in emerging-market countries. To date, over 600 volunteers have been assigned to countries in Africa, Asia, and Central and Eastern Europe.



**1992** ibiblio.org is launched and becomes one of the largest digital libraries on the World Wide Web. Professor Paul Jones and IT professional Judd Knott conceived the site as sunsite.unc.edu while the web was still in its infancy.

**1992** The National Computer Graphics Association bills UNC's Pixel-Planes 5 as "the world's fastest graphics computer." Five generations of Pixel-Planes have been designed, built and programmed at UNC. These computers are outgrowths of work first published in 1981 by Henry Fuchs and John Poulton.

## 1990

**1987** The School of Pharmacy establishes the Laboratory for Molecular Modeling, the first of its kind on a university campus. Using computer graphics and computation, researches are able to reduce the time and money necessary to design and test new drugs.

**1990** John D. Kasarda, director of the Kenan Institute of Private Enterprise, develops the concept for the Global TransPark, which becomes the international model for an air-cargo/ industrial complex.

**1992** Beverly Koller, John Snouwaert, Nadia Malouf, Richard Boucher and Oliver Smithies develop a strain of mice with cystic fibrosis. This model enables researchers to test new therapies for cystic fibrosis in a fast, thorough and safe manner. In 1993, the *Harvard Health Letter* describes this work as one of "the top ten advances of 1992."

**1994** David McConville, Michael Shoffner and Paul Jones initiate the first ever online streaming radio for WXYC, the student-run radio station, on November 7, 1994.

quality research and scholarship. The seminar helped establish a broader intellectual foundation for the cross-campus initiative.

**Kauffman Next Generation Scholars Program:** As a separate initiative, the Kauffman Foundation awarded \$300,000 to James H. Johnson Jr. to fund a bootcamp for junior faculty interested in research on minority and women's entrepreneurship. It brought leading senior scholars in minority and women's entrepreneurship together with junior faculty for a three-day intensive training and networking session. The grant also provided a research fund competition for young scholars' research following completion of the program.

**Sponsored Research and Scholarship:** An understanding of entrepreneurship requires strong disciplinary-based research coupled with insights from a range of disciplines. The study of innovation and entrepreneurship is an emerging field of study based on interdisciplinary research. At Carolina, individual faculty members, working within their academic departments, conduct sponsored research projects on a broad range of related topics.

## Venture Creation:

**Launching the Venture (LTV)** program helps early stage ideas move to implementation. Taught by Ted Zoller, this program is open to teams that include at least one UNC student, faculty or staff member. The four-course program provides hands-on training, extensive interaction with private-sector experts and serial entrepreneurs, and a comprehensive curriculum to turn nascent ventures into reality. Applicants must be committed to starting their business or nonprofit within 12 to 18 months. Each year, approximately 25 teams are selected after a careful review of submitted materials from more than 100 teams. The first module, "Opportunity Recognition and Team Building," is an optional introductory module for anyone in the UNC community who wants to learn business fundamentals and to evaluate an idea for a potential entrepreneurial venture. The goal of this program is to present a general overview of the field of entrepreneurship, in particular the skills necessary to determine whether an idea can become a true entrepreneurial

**1998** The Venture Capital Investment Competition® begins as an educational event for MBAs to learn about venture funding. VCIC® has evolved into a marketplace for entrepreneurs seeking investors and a training ground for future venture capitalists.



Family helped by the Carolina Covenant

**2003** Carolina establishes the Carolina Covenant to help low-income students get a world-class education without incurring debt. The program has expanded every year, with nearly 1,500 UNC students currently enrolled. Many colleges and universities have adopted the Carolina Covenant model.

## 2000

**1999** The Center for Sustainable Enterprise is one of the first business school programs in the country to offer a curriculum and conduct research on sustainable business.



**2001** Kiplinger's Personal Finance magazine ranks Carolina the No. 1 best value in American public higher education. The ranking has held consistently since then.







opportunity, and to assist individuals in assembling an entrepreneurial team to pursue the idea. The second module, the “Feasibility Phase,” begins in the fall and tests the marketability of the targeted product or service and reviews the fundamentals of a good business plan to ensure financial viability

of the venture. An expert base of coaches, drawn from the surrounding entrepreneur-rich Research Triangle region and representing expertise in marketing, technology and finance, meet regularly with the teams. Coaches volunteer their time. A smaller number of teams are selected to proceed to the third module, the “Planning Phase,” where the goal is to transform the business concept into an actionable business model and plan for a self-sustaining venture. The coaches continue to be intimately involved with their teams but they are now supplemented with a cohort of MBA students. In this intensive stage of the program, there is a legal clinic organized and run by regional law firms that focuses on issues related to legal organization and governance. Most of these ventures successfully launch following this phase, generally between eight to 15 ventures per year. A final module, the “Venture Finance Phase,” helps participants refine their financial models, determine capitalization requirements, learn about the different kinds of private and debt financing and develop a plan to attract capital. This module includes a clinic on financial modeling organized

**2004** The University Program in Cultural Studies begins an innovative multidisciplinary program encouraging interdisciplinary research and education in cultural studies, has been recognized internationally and replicated at other universities.

**2004** UNC launches the Carolina Entrepreneurial Initiative (CEI) to spread entrepreneurship across the campus.

**2006** The Town of Chapel Hill and the University sign a historic agreement to jointly reduce greenhouse gas emissions, becoming the first town-gown partnership of its type.

**2008** Joseph DeSimone, Professor of Chemistry, wins the 2008 Lemelson-MIT Prize for his ability to transfer his novel solutions from the lab to the marketplace in a range of fields including green manufacturing, medical devices and nanomedicine. The prize includes a \$500,000 award.



Joseph DeSimone

2010

**2004** The Carolina Leadership Academy, an innovative training program for student-athletes, coaches and athletic administrators, begins at UNC. The program's goal is to develop world-class leaders for a lifetime of success. Started at Carolina by Richard Baddour and John Blanchard, this visionary concept has been adopted by 11 other universities.

**2007** Oliver Smithies, Weatherspoon Eminent Distinguished Professor of Pathology and Laboratory Medicine, is a co-recipient of the 2007 Nobel Prize for Physiology or Medicine.

**2007** The National College Advising Corps, a groundbreaking program that hires recent college graduates and places them as college advisers in low-income high schools, begins at Carolina. Eleven institutions around the country have started chapters.



Oliver Smithies

## NOURISH INTERNATIONAL

Nourish International provides an example how cross-campus entrepreneurship at UNC, created by the Carolina Entrepreneurial Initiative, combined to nurture and support an entrepreneurial venture.

The idea for Nourish International took root in 2003 when then-sophomore Sindhura Citineni came across a United Nations' map of deaths from hunger and poverty while doing research for a class. She discovered a program at the medical school started by Kelly Fogelman called "Hunger Lunch," a project to sell rice, beans and cornbread to raise money and awareness of global hunger. Sindhura expanded the program campus-wide and started a weekly Hunger Lunch in the Pit.

Hunger Lunch received early support from UNC's APPLES Service-Learning Program, Carolina Center for Public Service and the Campus Y. Students raised more than \$7,500 in the first year, collecting donations from local businesses, writing grants and hosting the best lunch deal on campus. The proceeds were used to provide nutritional supplements to children in Sindhura's native city of Hyderabad, India. Joel Thomas, a biology major living in Sindhura's residence hall, volunteered at first and then became interested in exploring how the effort could be self-sustaining and how it might scale to other campuses. Several elements of UNC's entrepreneurial environment were crucial to the success of Nourish International. The Carolina Challenge, an annual business plan competition that brings students together with faculty and sponsors who coach students in the business-planning process, helped Sindhura, Joel and the 10 members of their team learn what it would take to make their venture successful. Joel was inspired to enroll in the minor in entrepreneurship, offered to undergraduates in the College of Arts and Sciences, which helped draw other entrepreneurially minded students, including Bryan Zandt and James Dillard, into the project. The next year, the 12-person team competed again in the Carolina Challenge and won a \$10,000 prize, which they used to make their plan a reality.

Through participation in Launching the Venture, and a series of workshops, the team members continued to move their idea forward, engaging UNC faculty members as mentors and board members. The Campus Y became their activity incubator as they recruited students and planned how to replicate their model beyond UNC and make it sustainable. In 2006, Nourish International incorporated as a 501(c)3 not-for-profit and the expansion began.

Today, Nourish International boasts chapters at 30 campuses in the United States. A Summer Institute invites students from across the country to UNC's FedEx Global Education Center to learn how to run ventures on their campuses, such as Hunger Lunch, to raise funds for sustainable development projects. Students then conduct those projects during the summer in collaboration with community partners around the world. Recent projects from partners in Mexico, Ecuador, Peru, Bolivia, Mali and India focused on health and sanitation, cultural tourism, fair trade and on microbusiness incubation.

### Where are the students involved in the creation of Nourish International now?

**Sindhura Citineni** – dental student at UNC

**Kelly Fogelman** – obstetrician in Greensboro

**Joel Thomas** – MBA student

**James Dillard** – executive director of Nourish International

**Kamal Menghrajani** – third-year medical student at UNC

**Naman Shah** – third-year medical student and doctoral candidate at UNC

**Matt Callahan** – Teach for America high school math and physics teacher in Oakland, Calif

**Ashley Hiser** – second-year masters of public health student at UNC

**Kevin Henderson** – materials science Ph.D. student in his fourth year at Northwestern University

**Lisa Bolton** – Teach for America teacher working in Durham, N.C.

**Tommy Thekkekandam** – joint law and MBA student in his fourth year at Duke University, recently accepted an offer to work at McKinsey starting next year.

**Amanda Sellers** – graduated '06

**Chandni Kalaria** – medical school student in her third year at University of Georgia

**Maria Thekkekandam** – second-year student at UNC Medical School

**Jim Cummings** – doctoral student at Stanford University.

The late **Eve Carson**, former student body president, also helped launch the organization.

by PricewaterhouseCoopers. Teams of accountants work with participants to develop sound financial models and projections for their ventures. Finally, regional equity firms and angel and venture-banking sources provide LTV teams a comprehensive understanding of venture finance and options for capitalizing different stages of growth. Most teams in Launching the Venture also participate in the Carolina Challenge, where they receive qualitative feedback on their ventures as they prepare to enter the market and launch. LTV has created more than 100 new ventures.

**Carolina Challenge:** The Carolina Challenge is an annual student-led business plan competition designed to promote entrepreneurship. Each Challenge team includes at least one UNC student, faculty or staff member. Activities span the academic year, beginning in the fall with recruitment and team-formation activities to attract the best ideas and demonstrate the value of participating in and winning the competition. Emphasis is placed on forming multi-disciplinary teams that have the breadth and depth of skills and knowledge to implement the venture idea. Once teams officially enter the competition in December, they gain access to a wide range of resources to help them learn how to turn their ideas into viable business plans. Finalists compete in the spring for \$50,000 in prize money at the final round of competition, presenting their plans to a panel of judges comprising successful entrepreneurs and business people as well as community and university leaders.

**Business Accelerator for Sustainable Entrepreneurship (BASE)** is the first accelerator in North Carolina designed specifically to support businesses that address the triple bottom line of financial profitability, social equity and environmental sustainability. Operated by Kenan-Flagler's Center for Sustainable Enterprise, directed by Al Segars, the program connects sustainable ventures to a range of business-development resources with the goal of accelerating their growth and impact.

**Campus Y:** The Campus Y, directed by Richard Harrill, plays a critical role as a social innovation incubator within the university, providing mentoring, professional training, co-curricular enrichment,



peer-to-peer learning and small grants that enable students to apply their passion for social justice beyond the campus. The Y is a space on campus with a supportive, extended community of social innovators and leaders, who help budding entrepreneurs develop program models, leadership structures and the networks needed to sustain their work.

**APPLES Service Learning Program** provides outreach to the community and gives students an opportunity to integrate their coursework with practical experience that fosters civic engagement. APPLES (Assisting People in Planning Learning Experiences in Service), led by director Jenny Huq, provides a range of programs that promote and encourage service responsive to the concerns of the state and contribute to the common good.



## Game Changers

**CEI Innovations Fund:** This program used a competitive process to select new efforts or programs to fill a need in entrepreneurship education, research or venture creation. Seed funding was provided for activities with a high potential for sustainability and impact.

**Carolina Seminars in Entrepreneurship:** A series of workshops, led in early years by Judith Wegner, chair of the UNC faculty, offered faculty in the arts and sciences the opportunity to discuss the relevance and impact of entrepreneurship on their work, their areas of study and higher education in general. Recently, the series has focused on specific topics, allowing organizers to draw from an ever-widening circle of faculty across campus. Participants have helped set a vision for scientific and artistic entrepreneurship and the graduate certificate in entrepreneurship and discussed how to expand the venture potential of the arts and humanities through technology.

**Entrepreneurs/Executives-in-residence (EIRs):** Burton “Buck” Goldstein, a UNC alumnus, was brought on board at the beginning of the CEI to work with faculty and students to promote CEI and teach classes. It was intended that the entrepreneur-in-residence would provide interested students and faculty a regular resource to help them discuss venture-creation strategies. This strategy has been so successful that it has been extended. Goldstein is now concentrating his time on the Minor and the First Year Seminars. Micah Gilmer has recently joined UNC as social entrepreneur-in-residence. The medical school has hired three entrepreneurs-in-residence: Tom Mercolino (therapeutics), Perry Genova (devices) and Joel Shaffer (drugs). Don Holzworth serves as executive-in-residence at the Gillings Innovation Center.

**The Chancellor’s Faculty Boot Camp:** In 2009, the Chancellor and the College of Arts and Sciences hosted the first of what will become an annual event. The four day workshop, titled “The Entrepreneurial Mindset—Maximizing Faculty Impact,” was designed to help faculty members identify opportunities, develop strategies, understand costs and

sources of finance, and develop high-performance cultures. Faculty were selected by the Chancellor from all schools of the university. The curriculum, adapted from the full-semester economics course, “Introduction to Entrepreneurship,” was developed and offered by the Office of the Chancellor and the Minor in Entrepreneurship and taught by the instructors from the Minor in Entrepreneurship.

**Carolina Women’s Entrepreneurship Network:** Julia Sprunt Grumbles, a former senior executive with Turner Broadcasting, sponsored the development of a program to support young female entrepreneurs. Meetings of the group include informal discussions with prominent female entrepreneurs who share their experiences and the gender challenges they have faced.

**Carolina Innovation Scholarships:** Inspired by the success of CEI and the minor in entrepreneurship, the Carolina Innovation Scholarship will launch in Fall 2010, due to the generous support of Doug Mackenzie. The highly competitive Carolina Innovation Scholarships will attract the most promising innovative and entrepreneurial young people to Carolina and will cover the full cost of tuition, fees, room, and board, renewable for four years. Sixteen Carolina Innovation Scholars—four in each of the upcoming entering classes—will prepare themselves to invent solutions and create value, whether in commerce, science, society, or the arts. Linked through the minor in entrepreneurship and through the mentoring of faculty, Innovation Scholars will major in disciplines of their choosing and take advantage of research and study-abroad opportunities across the university.

The Kauffman-sponsored Carolina Entrepreneurial Initiative had a profound impact. While only Kenan-Flagler offered courses in entrepreneurship in 2004, currently there are courses offered in seven of Carolina’s colleges. The number of departments on campus offering entrepreneurship courses increased from one to 20. The number of course offerings increased from 31 to 108. Simultaneously, the numbers of Carolina technologies and new ventures, both commercial and social, have increased. With Kauffman funds ending in 2010, the future of these programs is under review.

## Notes

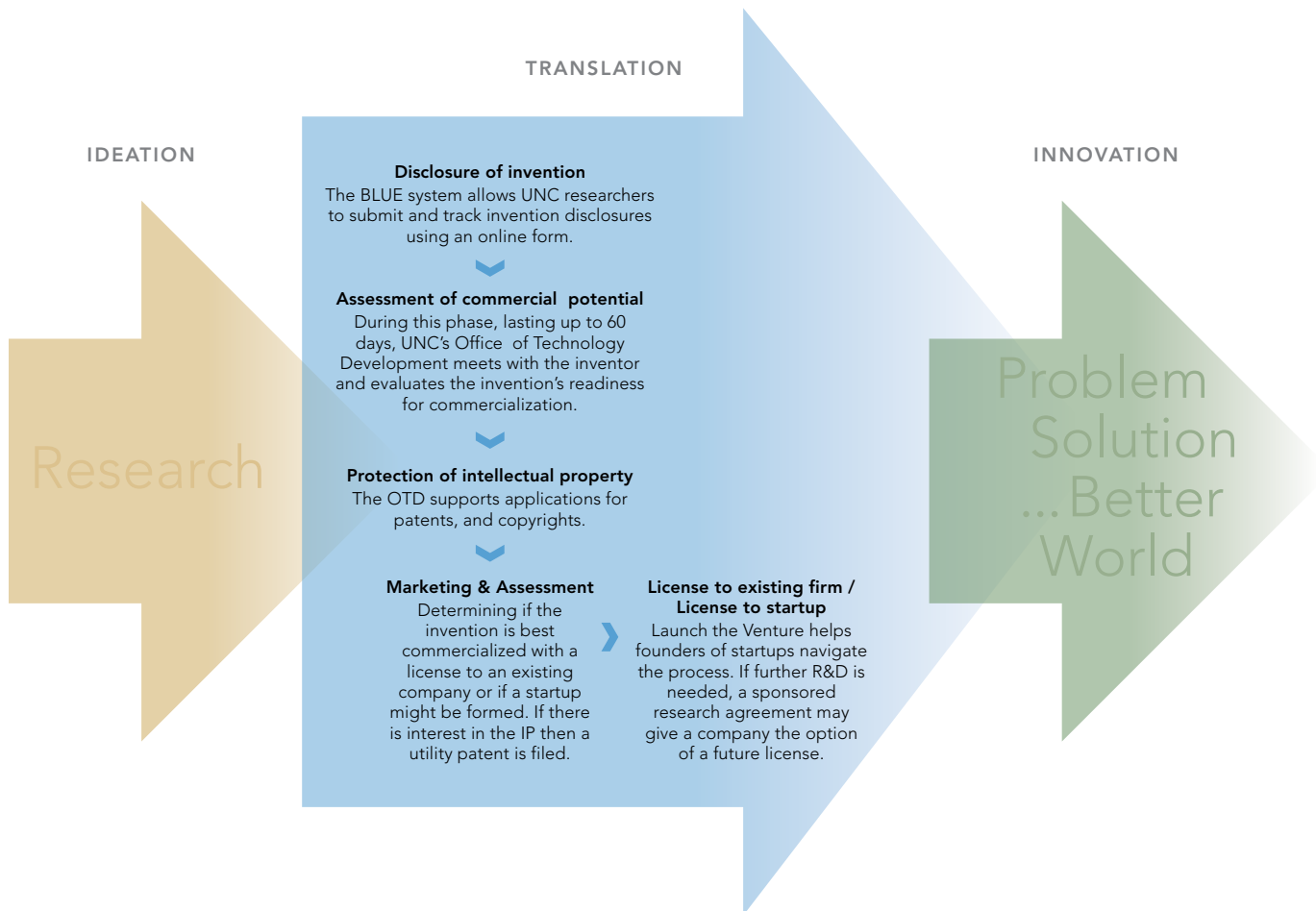
### Office of Technology Development

An important part of the Carolina entrepreneurial landscape is the Office of Technology Development (OTD). Headed by Cathy Innes, the office was established in 1995 to support the Bayh-Dole Act's mandate to leverage inventions resulting from government-sponsored research for the benefit of both the university and the greater community. Under the Bayh-Dole Act, the university has rights of ownership of any intellectual property that results from research funded by any federal government agency. Under law, the university has responsibility to help get these inventions to the market. OTD serves the university and the public by formally providing the translational function presented in Figure 5 [Technology Development Process at UNC]. OTD reports to Tony Waldrop, UNC's vice chancellor for research and economic development.





*figure 5: The Technology Development Process at UNC*



The transfer process usually begins with a researcher's report of an invention to the university—a discovery from sponsored research that yields an idea that results in an academic paper but may also have additional commercial potential. OTD then evaluates inventions, deciding if there is commercial potential and if the intellectual property can be best protected with patents, copyright, trademark or by other means. Once a decision has been made to invest in intellectual property protection, OTD works with outside counsel to make the appropriate legal filings. Initially, a provisional patent may be filed with a limited term of one year to allow time for a more

comprehensive assessment while still protecting the idea. On average, the total cost to file a patent application is \$30,000–\$50,000 for each country in which the patent is filed. Subsequently, OTD works with the inventor to craft a commercialization strategy based on the technology, the market and the inventor's preferences. The intellectual property can be licensed to an established company or a startup firm may be formed around the technology. OTD negotiated 200 licenses during 2004–2008: 91 (45 percent) to established firms and 109 (55 percent) to startup firms. Follow-on research projects to commercialize a technology often follow a licensing agreement.

## CAROLINA'S PEER INSTITUTIONS: 3 COHORTS

The University of Carolina at Chapel Hill compares itself to three groups of peer institutions.

Carolina is a member of the **Association of American Universities (AAU)**, a group of 60 research-intensive public and private universities in the U.S. Members of this elite group of institutions include:

Brandeis University  
Brown University  
California Institute of Technology  
Carnegie Mellon University  
Case Western Reserve University  
Columbia University  
Cornell University  
Duke University  
Emory University  
Harvard University  
Indiana University  
Iowa State University  
The Johns Hopkins University  
Massachusetts Institute of Technology  
Michigan State University  
New York University  
Northwestern University  
The Ohio State University  
The Pennsylvania State University  
Princeton University  
Purdue University  
Rice University  
Rutgers, The State University of New Jersey  
Stanford University  
Stony Brook University-State University of New York  
Syracuse University  
Texas A&M University  
Tulane University  
The University of Arizona  
University at Buffalo, The State University of New York  
University of California, Berkeley  
University of California, Davis  
University of California, Irvine  
University of California, Los Angeles  
University of California, San Diego  
University of California, Santa Barbara  
The University of Chicago  
University of Colorado at Boulder  
University of Florida  
University of Illinois at Urbana-Champaign

The University of Iowa  
The University of Kansas  
University of Maryland, College Park  
University of Michigan  
University of Minnesota, Twin Cities  
University of Missouri-Columbia  
University of Nebraska-Lincoln  
The University of North Carolina at Chapel Hill  
University of Oregon  
University of Pennsylvania  
University of Pittsburgh  
University of Rochester  
University of Southern California  
The University of Texas at Austin  
University of Virginia  
University of Washington  
The University of Wisconsin-Madison  
Vanderbilt University  
Washington University in St. Louis  
Yale University

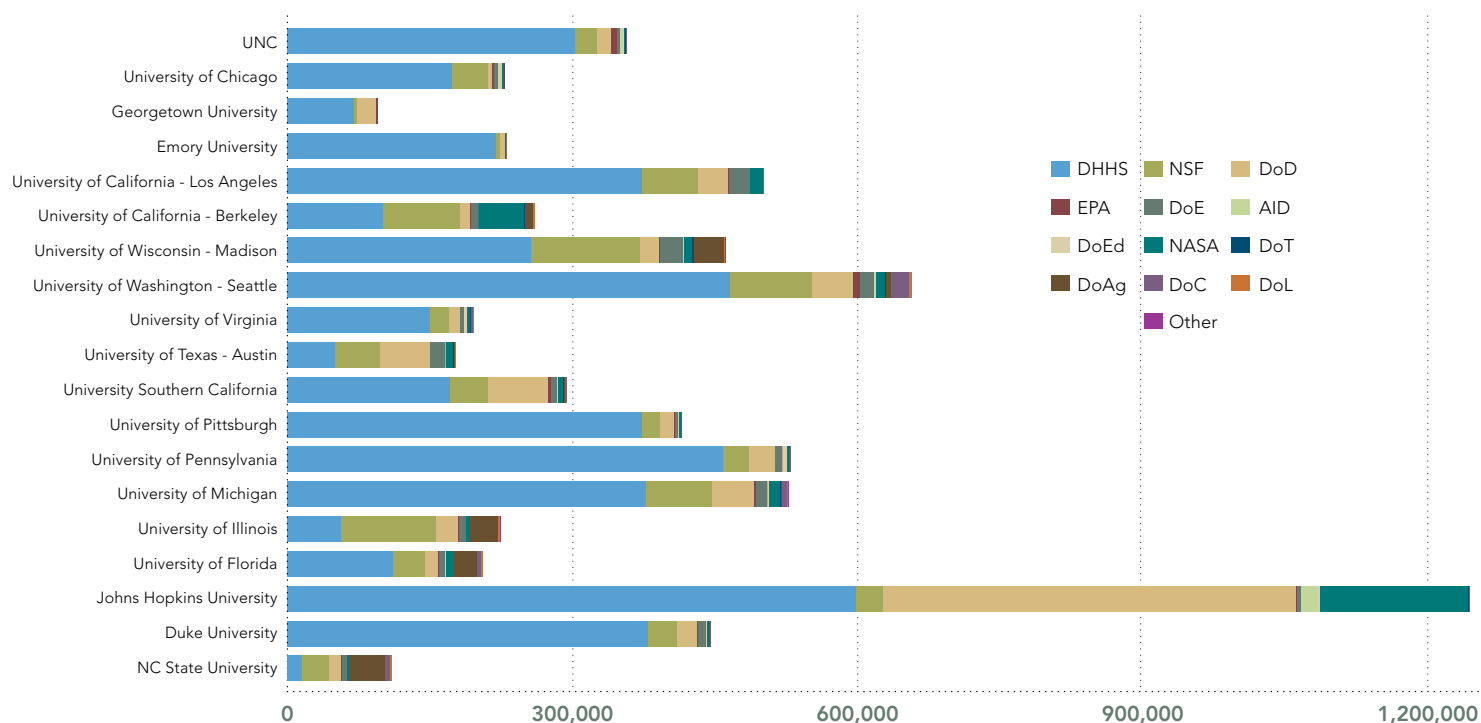
UNC also frequently uses a **Peer Group** of 15 schools for comparison. These schools are:

Duke University  
Emory University  
Johns Hopkins University  
University of California-Berkeley  
University of California-Los Angeles  
University of Florida  
University of Illinois  
University of Michigan  
University of Pennsylvania  
University of Pittsburgh  
University of Southern California  
University of Texas at Austin  
University of Virginia  
University of Washington – Seattle  
University of Wisconsin at Madison

For the purposes of evaluating technology transfer, a group of **Closest Peers** was identified based on level of research expenditure, the presence of a medical school, and the absence of an engineering school. These closest peers are:

Emory University  
Georgetown University  
University of Chicago

figure 6a: Federal Funding by Agency, UNC and Comparison Institutions



Source: NSF Division of Science Resources Statistics, Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions.

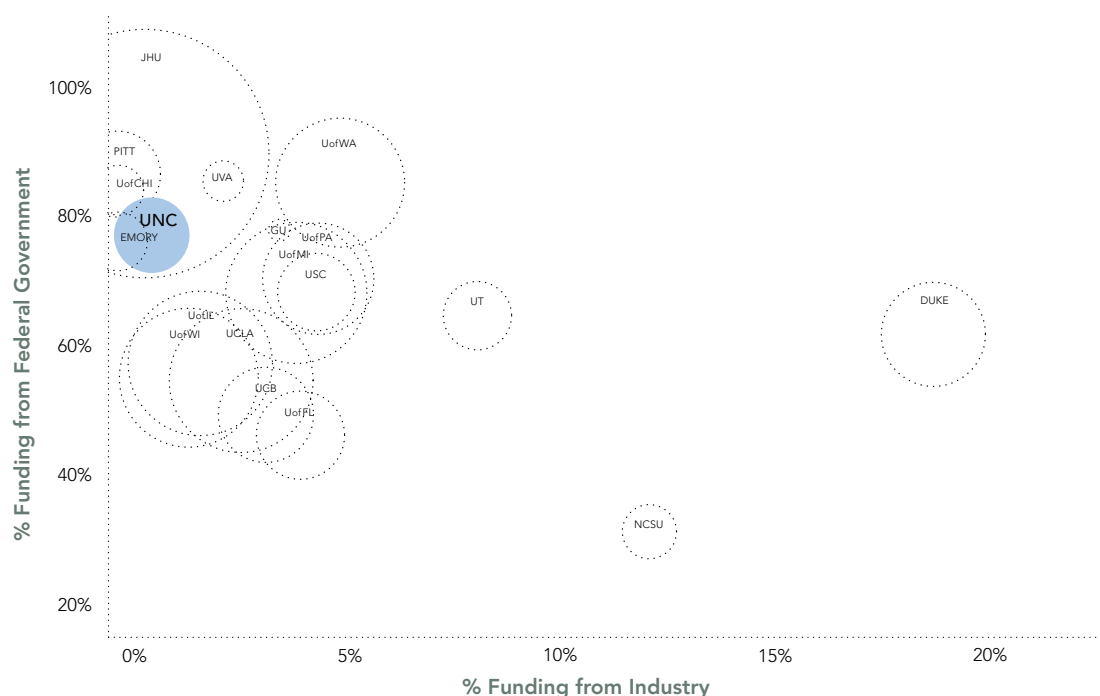
Three comparison groups are used in Figures 6a and 6b, see page 40. Plus, NC State University is included to allow comparison of the 3 major research universities in the Research Triangle Park area (Duke University, NC State University, and UNC-Chapel Hill).

UNC's Office of Technology Development has been integral to the commercialization of many products. Recent successful examples include AMP21, an environmentally friendly way to extend the life of wooden structures, brought to market by the UNC startup Applied Micro Products, and Stasilon, a bandage that improves wound healing, brought to market by UNC startup Entegriion and manufactured by eastern North Carolina textile company Carolina Weave.

OTD is important to UNC because of the large amount of federal research that is conducted at the university and the significant potential it holds for technology transfer. In 2007, the last year for which data are available from other institutions, UNC attracted \$382.3 million in federal funding,

placing it among the top 20 universities nationally and the top public university in the southern United States (see Figure 6a). At UNC, as most of its peers, most federal funding comes from the U.S. Department of Health and Human Services (DHHS) and its National Institutes of Health (NIH). Many of UNC's successfully transferred technologies have health-care applications because of the university's outstanding schools of medicine, dentistry, pharmacy, nursing and public health and strong life science programs, which allow it to successfully compete for NIH funding. UNC's second-largest source of federal funding is the National Science Foundation, the only federal agency that supports all fields of fundamental science and engineering except medicine.

*figure 6b: Research Expenditure Composition Comparisons to Carolina's Peers  
Federal Support vs. Industry Support*



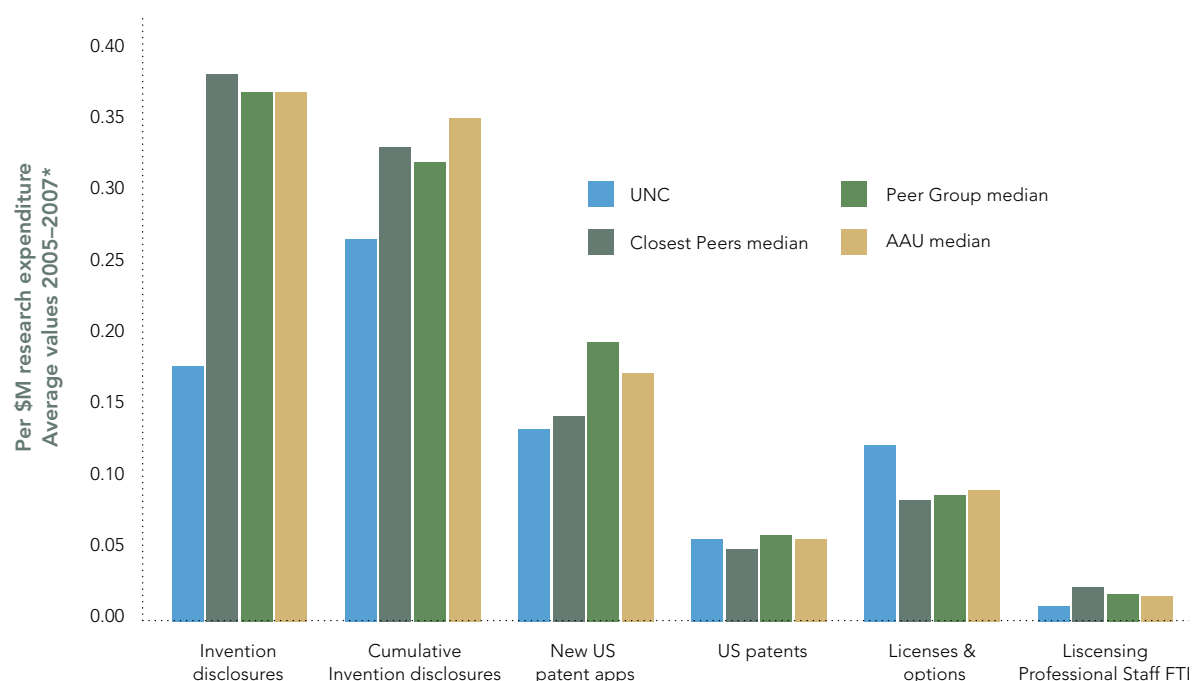
Source: NSF Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges.

Carolina's success with federally funded research has not translated into securing industry funding. In 2007, UNC received \$8,670 million in industry funding. Figure 6b plots the mix of industry and federal funding for Carolina and our peer institutions. UNC has a smaller share of its research sponsored by industry, which is similar to the peer group without engineering schools. By contrast, Duke University has an engineering school as well as extensive industry-sponsored research associated with clinical trials. North Carolina State University has industry-sponsored research associated with its engineering and agricultural programs and Centennial Campus. The University of Chicago is the most similar to UNC in terms of the amount and types of federal funding received. At the initial stage of the technology

transfer process, invention disclosure, UNC has performed somewhat below the level of most comparable institutions. UNC annually received 100 disclosures, on average from 2006–2008. However, OTD saw nearly a 40% increase in 2009, with 137 disclosures. To make comparisons to other comparable institutions, we normalize by the dollar amount of research funding.

With fewer invention disclosures, it is not surprising that at what is often the next stage in the technology transfer process, patent applications, UNC also had fewer applications than its peer group. On average, from 2005 to 2007, Carolina filed an average of 65.7 new patent applications. Carolina's rate of new patent applications is similar to that of Georgetown, Emory, and University of

**figure 7: UNC Technology Transfer Outcomes and Staffing  
Compared to Peer Institutions**



\* Invention disclosures reflects 2006–2007 average / Data from AUTM Licensing Activity Surveys, 2005–2007

Association of American Universities (AAU) is the group of 62 research-intensive public and private universities in the U.S. and Canada. The AAU analysis excludes the 2 Canadian institutions.

The Peer Group is the 15 institutions that UNC uses as a reference group.

The Closest Peer group includes Emory University, Georgetown University, and University of Chicago, which are similar in terms of research expenditures and also have medical school but do not have engineering schools.

Chicago—peers with medical schools and without engineering programs. Invention disclosures and patent applications can both be considered leading indicators in the technology pipeline. They also represent activity measures that, at least to some extent, can be influenced by university policy and available resources. Invention disclosures are directly tied to faculty participation in tech transfer.

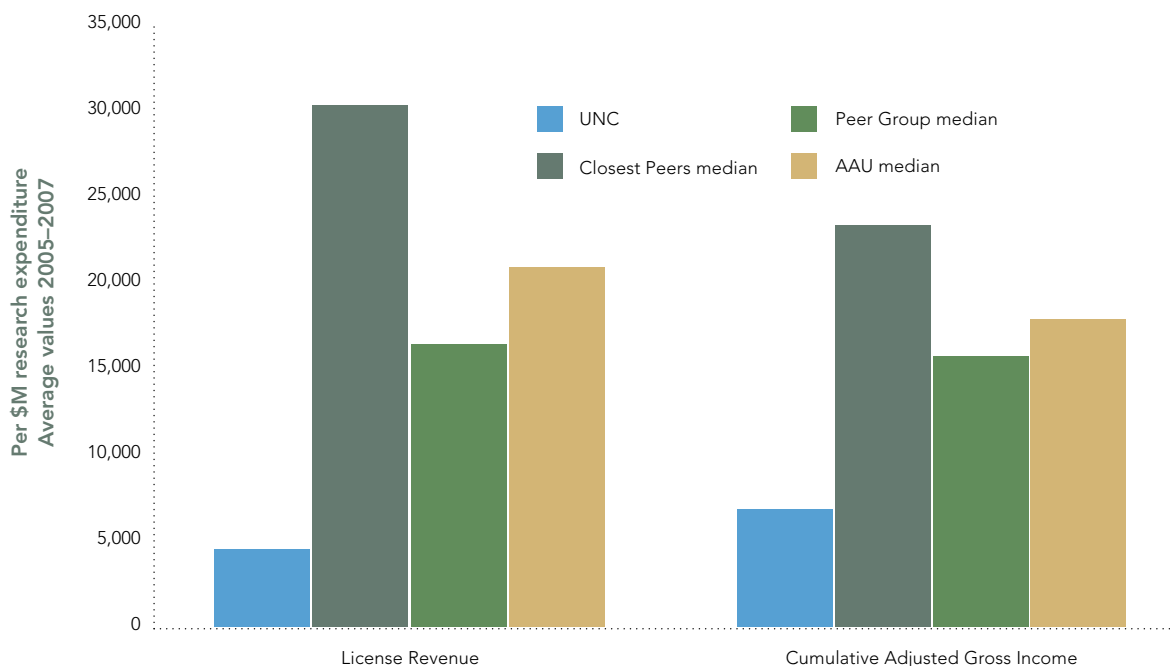
Carolina's level of patents applied for, and subsequently issued, is on par with comparable institutions. From 2005 to 2008, Carolina filed 126 patents or an average of 25 per year. This translated into 31 new U.S. patents issued to the University in 2008. Currently, Carolina's patent portfolio contains 678 issued U.S. patents and 720 foreign patents that provide intellectual property available for licensing.

In terms of the numbers of licenses and options executed per dollar of research, UNC performed fairly well compared to similar universities, executing an average of 61.7 licenses and options each year. UNC has 5 full-time licensing employees. Relative to its level of research expenditures, this is lower than comparison schools.

Carolina received less revenue from licensing than any of these comparable institutions, however, this figure has been steadily increasing over the past five years. In 2005, licensing revenue was under \$2 million. In 2008, licensing income was \$2.8 million, and the estimate is \$3 million for 2009. Across the spectrum of universities, licensing revenue is highly skewed, with blockbuster technologies producing large amounts of revenue for a handful of



*figure 8: UNC Technology Transfer Revenue Compared to Peer Institutions*



Data from AUTM Licensing Activity Surveys, 2005–2007

universities. Emory reported license income of \$585 million due to the blockbuster drug Emtriva in 2005. It is notable that the original discovery, and invention disclosure, was made in 1990, with patents granted in 1997. In 2004, the product Emtriva was approved by the U.S. Food and Drug Administration and introduced to the market for the treatment of HIV infection in combination with other anti-retroviral agents. Emory sold the future rights for the HIV/AIDS drug to Gilead Sciences and Royalty Pharma Emory and received a one-time lump sum payment. In general, licensing revenue is related to the length of time a university has been engaged in licensing: the most successful offices are the oldest. Reasons include the time it takes to gain acceptance with the faculty, establish credibility with companies

and set up appropriate procedures. The most salient reason is that university intellectual property is early stage, and it simply takes time to yield a return.

## Carolina Startups

Many Carolina ideas result in the launch of a new venture. Promoting new company formation is important to UNC because of its potential for creating jobs and wealth for North Carolina and beyond.

In the late 1970s, chemistry professor and RTP co-founder Bill Little began tracking startup companies in the region as an indicator of economic health and growth. What started as his personal interest is now the basis for a unique resource available to UNC researchers interested in studying the development

## JOSEPH M. DESIMONE, PH.D.



Professor Joseph DeSimone has made significant contributions to the field of chemistry and the greater scientific and public community with breakthroughs ranging from microelectronics to nano-medicine and lithography. DeSimone's group is heavily focused on learning how to bring the precision, uniformity and mass

production techniques associated with the fabrication of nanoscale features found in the microelectronics industry to the nano-medicine field for the fabrication and delivery of therapeutic, detection and imaging agents for the diagnosis and treatment of diseases.

In 2004, DeSimone launched Liquidia Technologies in RTP. Liquidia develops engineered, particle-based vaccines and therapeutics using a novel technology known as the PRINT® platform. With a particular focus on PRINT (Particle Replication in Non-wetting Templates), Liquidia creates rationally designed carriers for improved delivery of small molecule and biological cargos. Liquidia currently employs 37 people in RTP and has raised \$25 million in venture financing. DeSimone's laboratory and the PRINT technology recently became a foundation for the new \$25 million Carolina Center for Cancer Nanotechnology Excellence funded by the National Cancer Institute. DeSimone is the co-principal investigator of this newly established Center along with Dr. Rudy Juliano.

In 2002, DeSimone and Duke University cardiologist Dr. Richard Stack, co-founded Bioabsorbable Vascular

Solutions (BVS) to commercialize a fully bioabsorbable, drug-eluting stent. BVS was acquired by Guidant Corporation in 2003. The stents are now being evaluated in an international clinical trial for the treatment of coronary artery disease.

DeSimone has published more than 240 scientific articles. He has more than 115 patents issued in his name with more than 120 patents pending. In 2005, DeSimone was elected into the National Academy of Engineering and the American Academy of Arts and Sciences.

DeSimone has received 40 major awards and recognitions, including the 2009 NIH Director's Pioneer Award; the 2009 North Carolina Award, the highest honor the State of North Carolina bestows to recognize notable achievements of North Carolinians in the fields of literature, science, fine arts and public service; the \$500,000 Lemelson-MIT Prize for Invention and Innovation; 2008 Tar Heel of the Year by the Raleigh News & Observer; 2007 Collaboration Success Award from the Council for Chemical Research; 2005 ACS Award for Creative Invention; 2002 John Scott Award presented by the City Trusts, Philadelphia, for "the most deserving: men and women whose inventions have contributed in some outstanding way to the comfort, welfare and happiness of mankind; 2002 Engineering Excellence Award by DuPont; 2002 Wallace H. Carothers Award from the Delaware Section of the ACS; 2000 Oliver Max Gardner Award, given by the University of North Carolina Board of Governors to the individual who has made the greatest contribution to the human race during the scholars years. Among DeSimone's notable inventions is an environmentally friendly manufacturing process that relies on supercritical carbon dioxide instead of water and bio-persistent surfactants (detergents) for the creation of fluoropolymers or high-performance plastics, such as Teflon®.

of the region.<sup>3</sup> Little's data reveal that UNC faculty and staff have created 90 regional startups since the late 1970s (See Appendix Table). These 90 companies have raised more than \$600 million in private placement and public offerings during the past two decades. Each of these ventures has its own story that reveals the path of translating ideas into commercial ventures and the process of developing a company.

These data exclude the many companies started by Carolina graduates, which are more difficult to track. Based on Little's data, UNC graduates have created more than 100 startups that operate in the local area. They represent the full range of degrees: Doctoral recipients have started at least 19 new companies; master of science recipients have started at least 10; MBA graduates have created a minimum of 58 new local companies; undergraduate alumni have launched at least 25 ventures.



The first modern Carolina startup, MYCOsearch Inc., was created in 1979 based on an idea developed in Carolina's biology department. The company is noted to have developed the largest and most diverse collections of fungi and actinomycetes used for drug discovery. Oncogene Science acquired the company in 1996 for \$4.7 million. Despite a series of mergers and acquisitions that followed, a presence remains in RTP. Another early startup was Numerical Design, co-founded in 1983 by Turner Whitted, an adjunct professor of computer science. The technology was recursive ray tracing, and the application was computer graphics. In 2005, when Numerical Design merged with Emergent Game, it was valued at approximately \$12 million.

Two Carolina startups from the 1990s, Inspire Pharmaceuticals and Incara Pharmaceuticals, (now named Aeolus Pharmaceuticals) completed initial public offerings (IPO), the gold standard for new companies. For example, Inspire Pharmaceuticals grew from technology licensed from UNC in 1993 by Richard Boucher, a professor of medicine. Research conducted by a team at UNC's Cystic Fibrosis Research Center led to the discovery that uridine triphosphate, a naturally occurring compound in the body was capable of increasing airway surface. The discovery led to a license and formation of the startup. Continuing to work with UNC researchers, Inspire scientists immersed themselves in the emerging field of P2Y receptors and were soon recognized as industry leaders. Inspire completed an IPO in August 2000 with a market capitalization of approximately \$300 million. The company is still active and posted total revenues of \$70.5 million in 2008.

UNC continues to give birth to new companies with high-growth potential. Two recent examples are Liquidia, started by UNC chemistry professor Joe DeSimone, and NextRay, started by Etta Pisano, a professor of radiology. Their stories are illustrative of the UNC startup process and the resources that Carolina provides.

UNC's new-company pipeline is active, with 19 startups in various stages of viability. OTD is using

<sup>3</sup>The data have been verified, augmented and are maintained (by Maryann Feldman's research group). Corrections, additions and suggestions are appreciated as this is an active research project.

## ETTA D. PISANO, M.D.

Dr. Etta Pisano has taken her work in the field of medical imaging across the university, spanning multiple scientific disciplines and institutions and into the world of practical application. Pisano is vice dean for academic affairs at the UNC School of Medicine, Kenan Professor of Radiology and Biomedical Engineering, director of the UNC Biomedical Research Imaging Center (BRIC) and director of the N.C. Translational and Clinical Sciences (TraCS) Institute.

The collaborative and applied nature of Pisano's work is evident in her leadership of the interdisciplinary BRIC, the direction she brings to the TraCS Institute and her role in creating the startup company, NextRay Inc., to commercialize innovative research on diffraction enhanced imaging. This innovative technology produces more effective medical images with a fraction of the radiation exposure of traditional X-rays by generating X-ray photons through diffraction rather than absorption.

BRIC was established at UNC in 2005 to consolidate the university's capability in medical imaging with expertise from its joint Biomedical Engineering degree program with N.C. State University and serves as a statewide resource for image-based biomedical research. The center's dual missions are to advance the fast-paced field of biomedical imaging and serve university researchers' medical imaging needs. BRIC engages multiple academic disciplines that make use of innovations in biomedical imaging, including psychiatry, neurology, pathology, oncology, physics, biology, rheumatology, cardiology, gastroenterology, public health, genetics, neuroscience, psychology, radiology, nursing, dentistry, pharmacology, biomedical engineering, chemistry and others. Research groups within BRIC focus on applications in areas as wide ranging as the biopsychology of cognition and addiction, breast imaging, applied informatics and biostatistics.

The TraCS Institute, established in 2008, houses UNC's work on a Clinical and Translational Science Award from the National Institutes of Health. This award unites UNC and other U.S. medical research organizations into a consortium of 46 members dedicated to transforming the environment for medical and scientific research and training to translate laboratory breakthroughs into

improvements in human health. The institute provides a central portal for transforming translational research across North Carolina.

N.C. BioStart, a TraCS initiative, focuses on commercializing ideas from faculty research. It houses entrepreneurs-in-residence and assists faculty with business-plan development, technology transfer and other commercialization processes.

Pisano is personally engaged in entrepreneurship through NextRay, a startup company bringing diffraction enhanced imaging (DEI) to market. The company is being launched in partnership with a team of four Kenan-Flagler Business School MBAs who have won prizes in both the Carolina Challenge and the prestigious international Rice University business plan competition.

In 2008, Pisano was elected to the National Academy of Sciences Institute of Medicine. She is a fellow in the American College of Radiology and the Society of Breast Imaging and board certified in diagnostic radiology. Her many honors and awards in the areas of breast imaging and cancer detection include the Health Breakthrough award from *Ladies' Home Journal* in 2006 for her leadership of the Digital Mammographic Imaging Screening Trial, which demonstrated the reliability of digital mammograms and their advantages over film mammograms for young women and those with dense breast tissue. She has been an active mentor of women in science, founding the trans-UNC Working on Women in Science initiative and participating in UNC's Womentoring program and the Carolina Women's Center.





Launching the Venture, which it co-directs with Kenan-Flagler to help eight of these new ventures develop business plans. Launching the Venture has helped more than 100 companies get started through an intensive series of workshops, coaching and mentoring activities for teams of UNC students, faculty and staff who are serious and ready to launch new businesses and nonprofits.

Equally important to Carolina's mission of public service are its social and academic ventures, civic organizations and innovative ideas. Micah Gilmer, UNC's social entrepreneur-in-residence has created Project: Innovation to examine Carolina's assets and impact in social entrepreneurship and to help new social ventures launch. Figure 9 lists some examples of recent projects that exemplify Carolina not-for-profit startups.

Some innovations do not hold separate non-profit status but certainly qualify as social or academic ventures. One example is the National College Advising Corps (NCAC) begun in 2007. NCAC hires recent college graduates and places them as college advisers in low-income high schools

around the country. Launched with \$12 million in funding from the Jack Kent Cooke Foundation and additional support from the Lumina Foundation, NCAC now serves more than 37,000 students in 11 states. Nicole Hurd leads the National Corps, and Jennie Cox Bell leads the Carolina Corps, which is active in 51 North Carolina high schools. The programs are housed administratively in the Office of Undergraduate Admissions and are one example of staff entrepreneurship.

Another example of home grown innovation that is having impact at Carolina and beyond is the *Carolina Leadership Academy*. Director of Athletics, Dick Baddour set out to create a program that would develop leaders that became the Carolina Leadership Academy. As the nation's premier leadership development program in collegiate athletics, the Carolina Leadership Academy develops, challenges and supports student-athletes, coaches and staff in their continual quest to become world class leaders in athletics, academics and life. The program has now been replicated in other schools across the country.





figure 9: Examples of Social Ventures Coming out of UNC

NAME	ESTABLISHED	UNC FOUNDER	DEPARTMENT / FACULTY / SCHOOL
HOPE Garden	2009	David Baron	Biology
MedPLUS	2009	Emma Lawrence Emily Nix Lauren Slive	Public Policy/Psychology Mathematics/Economics Public Policy
Union Independent School (Durham)	2009	James H. Johnson	Business
Community Empowerment Fund	2009	Maggie West Jon Youg Alexis Seccombe Brian Swedenberg	Public Policy Photojournalism Comparative Literature Business
Silent Images	2007	David Johnson	Education
Not A Wear	2007	Mike Mallah	Biology
National Students of Ailing Fathers and Mothers Network Support Network	2006	Benjamin Chesson	Public Policy/Political Science
MOCHE, INC Mobilizing Opportunity through Community Heritage Empowerment	2006	Brian Billman Juliana Quist	Archaeology Public Health
Un Futuro Para Ti	2005	Rocco Ageenk Evelyn Ageenko	Political Science International Studies
Se7enth Swan Publishing Group	2005	Andre Wesson	Public Relations
Peace Goods	2005	Kyley Schmidt	MBA
The Humanity Campaign	2005	Ryan Allis	Economics
Health e-Lunch Kids	2005	Monica Tomasso	MBA
Solutions	2005	Micah Gilmer	Religious Studies
Global Giving	2004	Dennis Whittle	Religious Studies
Nourish International	2003	Sindhura Citiene Joel Thomas	Business Administration Biology
Africa Rising	2002	Jim Thomas	Epidemiology
Carolina for Kibera	2001	Rye Barcott	Peace, War and Defense
Student Environmental Action Coalition (SEAC)	1998	Alec Guettle Blan Holman Ericka Kurz James Langman	Political Science Political Science Political Science and English History
Cherokee Gives Back	1998	Tom Darden	City and Regional Planning
Empowerment, Inc	1996	Myles Presler	Interdisciplinary
Student Coalition for Action in Literacy Education (SCALE)	1989	Lisa Madry Clay Thorp	Public Policy Art History and Math

Source: Project: Innovation. Compiled by Emily Hylton, Sander Buitelssr, Carlos Toriello and Jessica Bruckert. Augmented with suggestions from the UNC community. Please send additions and comments to [innovation@unc.edu](mailto:innovation@unc.edu).

## Innovation and Entrepreneurial Engagement: Informal Technology Transfer

Carolina's innovative and entrepreneurial activity extends further, touching every department and administrative unit. Ideas originated by faculty to address society's grand challenges are often translated into practice, providing great benefit to society.

For example, archaeologist Brett Riggs followed the publication of his award-winning *Cherokee Heritage Trails Guidebook* (UNC Press, 2003) with a workshop he organized for modern Cherokee potters to study ancient ceramic pots. The result is a revitalization of ancient pottery styles that has become a commercial success and an economic boost to the artists and their communities.

Jay Swaminathan, professor of operations, technology and information management, responded to the settlement of a legal action against 20 major drug companies by designing an allocation algorithm for the nonprofit organization Medicine for the People in Need. The resulting method provides the basis for the efficient distribution of more \$150 million worth of drugs annually to uninsured people served by public clinics.



Barry M. Popkin of the Carolina Population Center as a result of his research has become a public advocate for taxing soda pop and other sugar-sweetened beverages with the impact of decreasing obesity.

UNC's Center for Community Capital, led by city and regional planning professor Roberto Quercia, has become the nation's leading center for research and policy analysis on the transformative power of capital on households and communities. The center's mission is to discover sustainable ways to expand economic opportunity to more people,

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Carolina's innovative and entrepreneurial activity extends further, touching every department and administrative unit.

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more effectively. Its in-depth analysis of the mortgage crisis and financial services issues has been featured prominently in the national debate on home ownership and abusive consumer financial practices, such as predatory lending. Center researchers have testified before Congress and government agencies at all levels, leading to public policy changes that expand capital access and protect consumers.

In social entrepreneurship, as in formal technology transfer, there is often a long time lag from research to impact. Environmental science and engineering professor Harvey Jeffries has been conducting smog chemistry studies since 1971. With the support of citizen groups in Houston, he proposed a new approach to achieving U.S. Environmental Protection Agency ozone standards that were adopted by Texas regulators in 2004. This approach was fully implemented by the end of 2007 and, for the first time in 30 years, Houston ozone levels have been reduced.

Faculty members who recognize problems and act on them often create whole new fields of inquiry. Daniel Okun joined UNC's public health faculty in 1952 and transformed what was then known as

*figure 10: Academic Citations Comparison to Peers*

Citations per faculty are the most widely accepted measure of research strength and faculty productivity at a university. The number of citations per faculty member is one of the few factors that can be used to compare institutions. Data on citations can be analyzed to determine the popularity and impact of specific articles, authors and publications and, therefore, the institution itself. *U.S. News & World Report's* "World's Best Universities" rankings are normalized so that the highest score is 100.

UNIVERSITY	CITATIONS PER FACULTY
University of California-Berkeley	100
University of California-Los Angeles	100
Johns Hopkins University	99
University of Washington	99
University of Pennsylvania	98
Duke University	93
University of Illinois-Urbana	93
Emory University	90
University of Chicago	88
University of Wisconsin at Madison	87
<b>University of North Carolina at Chapel Hill</b>	<b>82</b>
University of Michigan	81
University of Southern California	79
University of Virginia	77
University of Pittsburgh	76
University of Texas-Austin	65
Georgetown University	50

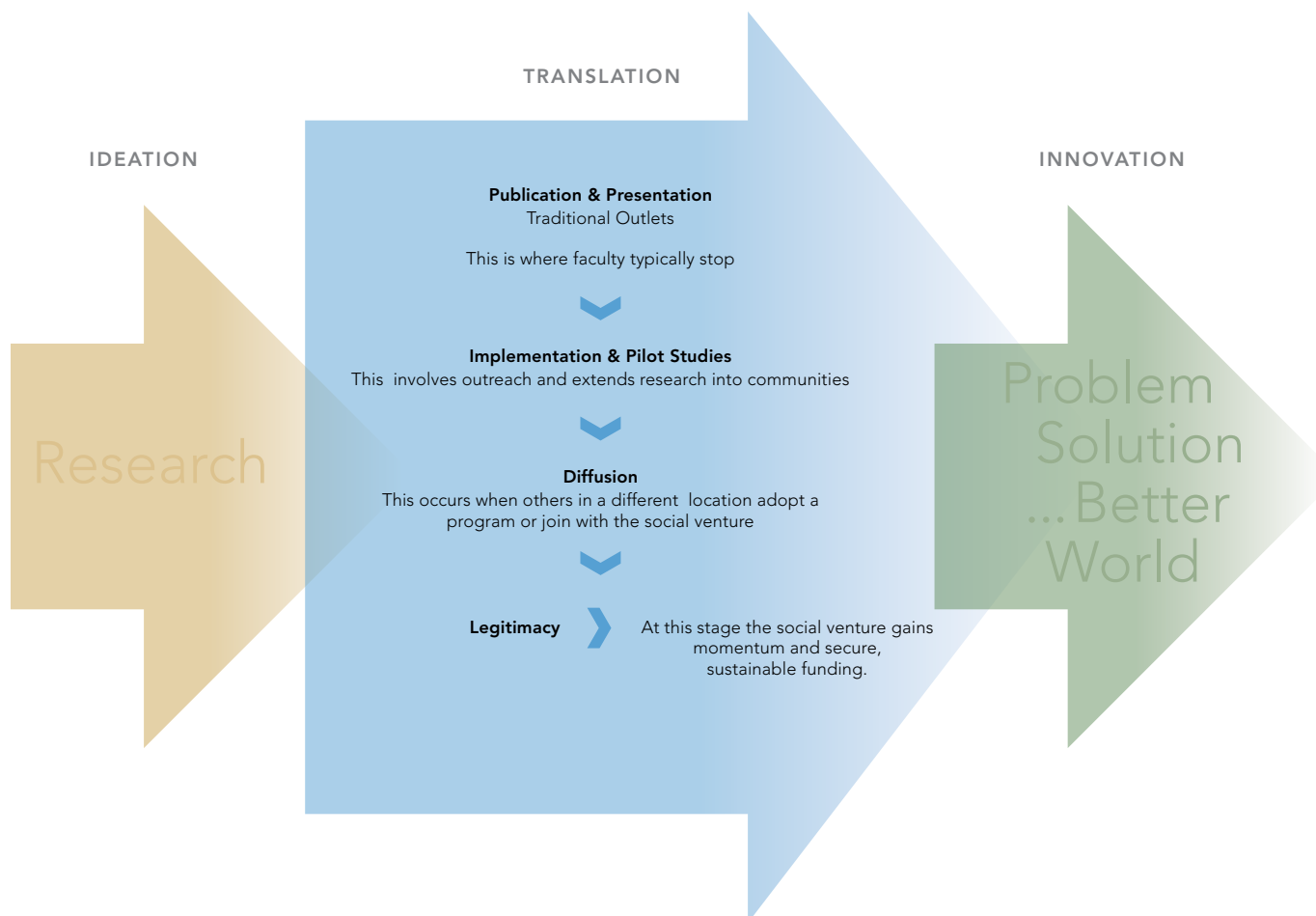
Source: *U.S. News & World Report*, World's Best Universities: Top 200. The universities listed here comprise define UNC's Academic Peer Group, the group of universities that provide a general performance benchmark. The University of Florida is part of Carolina's Academic Peer Group. However, it is not ranked by the U.S. News report. Georgetown and the University of Chicago have been added because they are similar to UNC in terms of elements related to innovation. These two universities, along with Emory University, do not have an engineering school, have strong medical schools and are similar in their dollar amounts of sponsored research.

“sanitary engineering” into the new field of environmental science, adding research in air pollution, aquatic and atmospheric science, and environmental management and policy. During his tenure as chair, the department grew from three to 25 faculty members. For his path-breaking work, Okun was the first engineer in North Carolina to be elected to the National Academy of Engineering and one of very few engineers ever elected to the Institute of Medicine. Another example is The H. W. Odum Institute for Research in Social Science, founded in 1924. It is the nation’s oldest multidisciplinary social science

university institute. Started by sociologist Howard Washington Odum, the institute provides training and courses, consulting services, data, software and facilities for social science research, regardless of school or department. Now led by Ken Bollen, the Odum Institute continues to stay on the cutting edge of research methods. Many other universities have adopted this model.

Entrepreneurial activity has a demonstrable effect on teaching as well as research. One of many examples comes from history professor Theda Perdue who created “Study Abroad in the Cherokee

figure 11: Social Innovation Process



Nation” as a three-week intensive program offered last summer in Tahlequah, Oklahoma, capital of the Cherokee Nation. This program introduced 12 students to Cherokee history, language, literature and culture. This entrepreneurial effort used seed funding from the Burch program. In 2010, the program will be longer and host more students. These few examples demonstrate the innovation and entrepreneurship at Carolina and the potential for all members of the UNC, regardless of discipline to fruitfully engage in extending their impact. Faculty focus on paper citations, however involvement in innovation and entrepreneurship increases relevance and has the potential to create reinforcing feedback that further enriches research and teaching. The Bayh-Dole Act does not extend to ideas in the arts and humanities, however there is a similar process that moves research forward to problem-solutions. University policy and resources can encourage and expedite this process.

## Notes





# Innovation @ Carolina

## Carolina Blue Sky

A New Day for Innovation  
and Entrepreneurship

During Chancellor Thorp's brief 18-month tenure, UNC has announced key policy changes and initiatives that position Carolina to become an innovator in higher education technology transfer. Carolina's patent and invention policy was revised in January 2009. A simple statement, "The University of North Carolina at Chapel Hill values and supports entrepreneurial activity by faculty," sets the tone for a cultural shift. The new policy, consistent with the University's goal of supporting the economic development of the State of North Carolina, emphasizes that entrepreneurial activities of Carolina faculty are considered part of their duties. In the new policy, entrepreneurial activities are defined broadly as contributing to the University's economic development, technology transfer and other public service goals. The new policy clarifies circumstances in which the University has ownership of intellectual property and those for which the inventor retains ownership, and provides guidelines for faculty use of University resources in support of entrepreneurial activities.

A notable new addition to the world of innovation in university technology licensing is the Carolina Express License, announced on Dec. 3, 2009. This innovation simplifies the negotiation of royalty rates and the ownership stake that the University takes in startup companies, one of the most contentious issues in technology development. Typically, licensing negotiations not only are time consuming but they place the University and faculty member in opposition at a time when they need to work together, while running up legal fees and diverting



resources. The express license simply asks that the owners of the startup pay the University an amount equal to 0.75 percent of the company's fair market value at the time of a liquidity event—a figure comparable to the terms of previous licensing contracts. The express license also mandates humanitarian or socially-responsible licensing that requires UNC spinoffs to make its licensed products available at affordable prices in the developing world. Catherine Innes of OTD worked with faculty, lawyers and local venture capitalists to craft the terms of the new license and has a target of shortening the time to license to three weeks. The express license makes licensing technology easier for faculty and should increase the number of startup companies.

A new related initiative is the University-Industry Alliance Group that will coordinate activities that involve multi-faceted relationships with companies. The objective is to streamline the process of working with UNC for existing firms in the same way that the Carolina Express License enables startup activity. The group includes participants from the Office of Sponsored Research, Office of Technology Development, Office of University Counsel, Corporate and Foundation Office, Office of Economic and Business Development, and the School of Medicine Dean's Office. The group aims to facilitate better and

## CAROLINA EXPRESS LICENSE

The Carolina Express License sets standard terms and fees which require minimum payment and obligation from UNC startups. Breaking with a practice common at other institutions, professors and others who choose the new express license agree simply to pay the university an amount equal to 0.75 percent of the company's fair-market value once it has gone public or merged with another company.

The royalty requirements – 2 percent of sales price for products that require approval by the U.S. Food and Drug Administration and 1 percent for all others – are also lower than those most universities demand. The express license provides startups with needed flexibility by eliminating the challenging negotiation for equity up front, which often pits a faculty member against the University. The Carolina Express License also eases some procedural and legal burdens by allowing the startup company to function independently 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 aims to make UNC-based spinouts even more attractive to investors and partners.

more corporate relationships and to create a consistent, campus-wide voice in negotiations with large and medium sized companies.

Several technology-specific initiatives focus on innovation and entrepreneurship. Carolina Launch Pad is a new pre-commercial business accelerator for early-stage information technology startups from the UNC community. It is a cross-campus partnership of the Renaissance Computing Institute (RENCI), Office of Technology Development and Kenan-Flagler Business School. Carolina Launch Pad offers a workspace where entrepreneurs can develop their ideas into viable businesses. It recently graduated its first class of five companies: MotionGen, providing digital images and data on a mobile device for dental education applications; Optimal Learning, which employs biofeedback for stress reduction; Dyzen, marketing Web-based software for the management of academic research labs; Ideabahn, a software company with a Web-based idea generation product; and Spherical Instruments Company, which has developed a patent-pending controller for interaction with games and other multimedia environments. Launch Pad is reviewing applications this month to welcome a new class of companies in January.

N.C. BioStart is another initiative destined to transform Carolina. It is part of the UNC's award-winning NCTraCS Institute, part of a National Institutes of Health-funded consortium of major research institutions focused on transforming the way clinical and translational research is accomplished. UNC Medical School vice dean Dr. Etta Pisano leads the TraCS Institute at UNC. Dr. Richard Boucher directs N.C. BioStart, which focuses specifically on commercialization of intellectual property in the areas of pharmaceuticals, medical devices, software and medical methodologies. N.C. BioStart aims to expand the program to N.C. State University in the second year and, ultimately, to all schools in the University of North Carolina system.

N.C. BioStart facilitates commercialization by building relationships with industry partners and funding sources; assisting with business-plan development, including market research and cost estimates; educating faculty about biotechnology

commercialization; and partnering with technology transfer offices. N.C. BioStart also offers the consultation services of UNC's new medical entrepreneurs in-residence. Mentioned earlier, three seasoned entrepreneurs joined the program this year to help faculty develop preliminary proposals into applications for commercialization grants of up to \$50,000. They focus on different technology areas:

- ♦ **Therapeutics** – Entrepreneur-in-Residence Tom Mercolino holds a Ph.D. in microbiology and immunology from UNC and is founder of AuthentiForm Technologies, LLC, a startup company focused on pharmaceutical dose authentication. He is a registered patent agent with expertise in business opportunities related to patent life extensions and generic medications.
- ♦ **Devices** – Entrepreneur-in-Residence Perry Genova holds master of science and doctoral degrees in biomedical engineering from UNC. He brings executive experience from the pharmaceutical industry, having worked with both GlaxoSmithKline and Kos Pharmaceuticals, and a commitment to teaching and mentoring.
- ♦ **Drugs** – Entrepreneur-in-Residence Joel Shaffer formerly worked in business development at GlaxoSmithKline and is a consultant to the pharmaceutical industry.

The Gillings Innovation Labs (GILs) is a new initiative of the Gillings School of Global Public Health. It is managed by Carolina Public Health Solutions. GIL provides funding for research, demonstration projects and teaching with the potential for high impact on public health issues in North Carolina and around the world. National subject matter experts rigorously review proposals for high-impact research, demonstration projects and teaching practices that focus on solving big public health problems. By focusing on specific challenges, GIL builds capacity to carry research forward.

There are currently 14 Gillings Innovation Labs. Some examples are:

- ♦ **Sustainable farming and health:** Alice Ammerman, principal investigator
- ♦ **Portable field tests for fecal contamination of water:** Mark Sobsey, principal investigator
- ♦ **Mental health system improvement:** Joseph Morrissey, principal investigator
- ♦ **Single-dose vaccine for multiple respiratory viruses in infants and children:** Ralph Baric, principal investigator
- ♦ **Innovative disease surveillance methods to link, analyze and manage large electronic data repository:** David Richardson, principal investigator
- ♦ **Center for Innovative Clinical Trials:** Joseph G. Ibrahim, principal investigator
- ♦ **Carolina Global Water Partnership,** Mark Sobsey, principal investigator

Finally, it is impossible to talk about Carolina's future without mentioning Carolina North, part of North Carolina's Millennial Campus initiative. Modeled after N.C. State University's Centennial Campus, Millennial Campuses are also being developed in Charlotte, Greensboro and Wilmington and at Appalachian State University, Western Carolina University and Fayetteville State University. The campuses represent specific exemptions from the state's Umstead Act to allow public-private partnerships to commercialize university-based discoveries.

Carolina North is planned as a 250-acre mixed-use development, located two miles from the main campus in Chapel Hill. Jack Evans is executive director and reports to Tony Waldrop. One of the first buildings planned for Carolina North is the Innovation Center, a business accelerator for startups commercializing UNC research. Zoning regulations and a development agreement were approved in 2009 to enable construction of the Innovation Center. Alexandria Real Estate Equities Inc., a private developer, plans to partner with UNC to build and operate the Innovation Center. Construction is planned to begin in approximately two years.

# Appendix

## Appendix



## *Appendix: The ABC's of Innovation and Entrepreneurship at Carolina: A Glossary of Terms*

### **A**

#### **Academic entrepreneurship**

Academic entrepreneurship refers to innovative faculty activities that contribute to the university's economic development, technology transfer or other public service goals.

#### **Artistic entrepreneurship**

Artistic entrepreneurship is one of the tracks in the undergraduate minor and graduate certificate in entrepreneurship and supports participants interested in starting or running an artistic venture, from a record label to a community symphony.

#### **Assisting People in Planning Learning Experiences in Service (APPLES)**

APPLES, created by students in 1990, builds sustainable, service-learning partnerships among students, faculty and communities. APPLES fosters socially aware and civically involved students through an enriched, community-based curriculum.

### **B**

#### **Business Accelerator for Sustainable Entrepreneurship (BASE)**

BASE, created by Kenan-Flagler's Center for Sustainable Enterprise with seed funding from the CEI Innovations Fund, is the first accelerator in North Carolina designed specifically to support businesses that address the triple bottom line of financial profitability, social equity, and environmental sustainability, with a focus on sustainable startups in rural North Carolina.

#### **Bayh-Dole Act of 1980**

The Bayh-Dole Act allows universities to take ownership of intellectual property resulting from federally-sponsored research and gives them the responsibility for commercializing such inventions.

### **C**

#### **Carolina Challenge**

Carolina Challenge is a year-long student-led business plan development program and competition with \$50,000 in prize money awarded each April.

#### **Carolina Entrepreneurial Initiative (CEI)**

CEI, enabled by seed funding from a 5-year \$3.5 million grant from the Kauffman Foundation matched with \$7 million, involves students, faculty and alumni in the transformation of ideas into sustainable enterprises to create commercial, societal, artistic, and educational value.

#### **Carolina Express License**

The Carolina Express License shortens the timeline for licensing intellectual property to faculty startups by providing uniform terms. The university requests an amount equal to 0.75 percent of the company's fair-market value at the time of an IPO or acquisition.

#### **Carolina Launch Pad**

Carolina Launch Pad is UNC's pre-commercial business accelerator for early-stage information technology startups from the university community housed at RENCi.

#### **Carolina North**

Carolina North, part of North Carolina's Millennial Campus initiative of public-private partnerships enabling commercialization of university-based research is being planned as a 250 acre mixed-use development located 2 miles from the main campus in Chapel Hill.

#### **Carolina Student Biotechnology Network**

The Carolina Student Biotechnology Network is a nonprofit student organization that promotes career development, education, entrepreneurship, and industry outreach for graduate students and postdoctoral scholars by, hosting events and providing services that allow members to explore and pursue life-science careers in areas beyond bench science.

#### **Center for Entrepreneurial Studies**

The Center for Entrepreneurial Studies was initiated in 1992 as a program at Kenan-Flagler to oversee the business school's curriculum, research and outreach related to entrepreneurship.

### **E**

#### **Entrepreneurial activities**

Entrepreneurial activities performed by a member of the university faculty as part of University duties are activities that contribute to the university's economic development, technology transfer or other public service goals.

#### **Entrepreneurial mindset or spirit**

An entrepreneurial mindset or spirit allows individuals to think at higher levels of complexity to recognize opportunities where others do not and then act upon that opportunity, energizing others, marshalling resources to create value in any organization a commercial enterprise, a non-profit organization or a university.

#### **Entrepreneur/Executive-in-Residence**

Entrepreneurs/Executives-in-Residence experienced

people who help faculty and students explore venture-creation strategies and professional opportunities. They serve as important bridges between the campus and the external world.

#### **Executive Development**

UNC Executive Development draws upon the power of real-world, applicable experiences from our faculty and staff, integrated with the knowledge our client partners share about the challenges they face and combines traditional with experiential and unique learning in open enrollment and custom executive education seminars.

### **F**

#### **Faculty Boot Camp**

The Chancellor's Faculty Boot Camp, based on the curriculum of the entrepreneurship minor and entitled "The Entrepreneurial Mindset – Maximizing Faculty Impact," was offered to 20 faculty members from across the university in 2009 and was designed to help attendees identify opportunities, develop strategies, understand costs and sources of finance and develop high-performance cultures.

#### **Feedback**

Feedback, a critical component of the business and research enterprises, makes use of information about current activities to measure progress and make continuous adjustments.

#### **Financial Literacy Workshop**

The Financial Literacy Workshop is a three-hour intensive program covering fundamental accounting and financial knowledge, such as how to read a balance sheet and how to manage a budget, taught by C.J. Skender, an award-winning professor of accounting from the Kenan-Flagler Business School and offered free to anyone in the university community.

### **G**

#### **Gillings Innovation Labs (GILs)**

GILs fund interdisciplinary partnerships led by faculty in the Gillings School of Global Public Health to achieve fundamental breakthroughs in public health to benefit North Carolina and the world.

#### **Global Entrepreneurship Week**

Global Entrepreneurship Week, sponsored by the Kauffman Foundation, is celebrated at Carolina with a menu of offerings for students, faculty, staff, and the community including high-profile speakers and panel discussions in commercial and social venturing, the campus-wide entrepreneurship fair, and the annual Financial Literacy Workshop.

#### **Graduate Certificate in Entrepreneurship**

The Graduate Certificate in Entrepreneurship is designed

for UNC graduate students, doctoral candidates, post-doctoral scholars, faculty and staff to complement their studies in traditional disciplines with an exploration of how entrepreneurship is changing their fields and learning experiences focused on how to conceive, plan and execute new commercial and nonprofit ventures.

### **H**

#### **Humanitarian Licensing**

Humanitarian licensing has provisions requiring that products based on university licenses be made available at affordable prices in the developing world. Also known as socially responsible licensing, this practice has been adopted by UNC.

### **I**

#### **Innovations Fund**

The Innovations Fund is a CEI grant program that uses a competitive process to select new efforts or programs for the initiative that fill a need in entrepreneurship education, research, or venture-creation and have a high potential for sustainability and impact.

#### **Innovation**

An innovation is the successful implementation of a novel, valuable idea.

#### **Invention disclosure**

An invention disclosure, also known as a Report of Innovation (ROI), is the formal reporting of an idea that might be patentable or have other commercial applications to the Office of Technology Development. Reporting is required for discoveries from federally funded research.

#### **Institute for the Arts and Humanities**

The Institute for the Arts and Humanities funds individual and collaborative research, showcases faculty work, develops faculty leaders and teachers and facilitates the formation of collaborative interdisciplinary communities that promote intellectual exchange and provides a venue for entrepreneurial activity.

### **K**

#### **Kenan-Flagler Private Equity Fund**

Kenan-Flagler Private Equity Fund, launched in 2007, is the first and only student-run fund associated with a leading U.S. business school that seeks to provide real returns to its limited partners and has more than \$1.3 million of committed capital under management.

### **L**

#### **Launching the Venture**

Launching the Venture is a 4-course sequence that has helped over 100 early stage ideas move to implementation

through intensive hands-on training, coaching and a comprehensive curriculum designed to turn nascent ventures into reality.

#### **Liquidia**

Liquidia, one of eight start-ups derived from research at the Center for Environmentally Responsible Solvents and Processes, is an RTP-based firm commercializing a platform technology with materials science and life science applications. It is based on the research of UNC faculty member Joseph DeSimone.

### **M**

#### **Minor in Entrepreneurship**

Minor in entrepreneurship in the College of Arts and Sciences is housed in the Department of Economics. This program is designed to provide undergraduate non-business majors with a solid grounding in entrepreneurship. The program admits 100 students per year.

#### **Minority Entrepreneurship Research**

Minority Entrepreneurship Research is a Kauffman Foundation-funded initiative designed to build a community of scholars focused on this important area of community and economic development. It brings together senior scholars from diverse disciplines and institutions to work with junior scholars in biennial research "boot camps" and research conferences.

### **N**

#### **NC BioStart**

NC BioStart at UNC's Translational and Clinical Sciences Institute focuses on commercialization of intellectual property in the areas of pharmaceuticals, medical devices, software, and medical methodologies and plans to expand its partnership to include all UNC system schools.

#### **New Venture Creation**

New Venture Creation is a two-course sequence offered in the Kenan-Flagler Business School where students develop business plans for a new business start-up, an innovation within an existing company, or a spin-off concept.

#### **NextRay**

The NextRay team of 4 Kenan-Flagler Business School students won 2nd place and prizes totaling more than \$142,000 in the 2009 Rice Business Plan Competition for their plan to commercialize medical imaging technology developed by Etta Pisano at the UNC Medical School.

#### **Non-exclusive licensing**

Non-exclusive licensing is a license granted to a third party that also allows the intellectual property to be licensed to additional parties, potentially resulting in broader application of the technology.

#### **Nourish International**

Nourish International is a Carolina student-founded social entrepreneurship venture dedicated to the elimination of poverty worldwide that has created a sustainable model and expanded to campuses across the U.S.

### **O**

#### **Office of Technology Development**

The Office of Technology Development supports the university community throughout the technology transfer process by securing and licensing intellectual property.

### **P**

#### **Patent**

Patents are a form of intellectual property protection for inventions that are novel, useful, and non-obvious. The term of a patent is 20 years.

#### **Project: Innovation**

Project: Innovation is an effort by UNC's social-entrepreneur-in-residence to support the university's social entrepreneurial ventures.

### **Q**

#### **Quintiles Transnational Corp.**

Quintiles, founded by Dennis Gillings, a UNC Public Health professor, has helped the Research Triangle Park area become a leader in the Contract Research Organization (CRO) industry.

### **R**

#### **Royalties**

Royalties are revenues the university receives from the licensing of intellectual property. Under the new Carolina Express License, royalty rates are set at 2 percent of sales price for products that require approval by the Food and Drug Administration and 1 percent for all others.

### **S**

#### **Scientific entrepreneurship**

Scientific entrepreneurship takes discoveries out the lab and into commercial products and processes. Both the Undergraduate Minor and the Graduate Certification offer programs of study in scientific entrepreneurship.

#### **Social entrepreneurship**

Social entrepreneurship contributes to the common welfare while requiring some kind of return on investment and resources that enable the venture to survive and grow. Social entrepreneurship is offered as a concentration through the undergraduate minor in entrepreneurship and

the graduate certificate in entrepreneurship. Kenan-Flagler offers a range of classes and programs for social entrepreneurship.

#### **Sponsored research**

Sponsored research is external funding of university research through contracts and grants subject to certain terms and conditions. Research is sponsored by government agencies, private companies and, and philanthropic organizations and foundations.

#### **Startup**

Startup refers to a company founded based on activity at the university, although the definition may be limited to firms that license technology or could be considered a broader category that incorporates student-led ventures and other companies started by members of the university community.

#### **T**

#### **Technology transfer**

Technology transfer, as defined by the Association of University Technology Managers is "a formal transfer of rights to use and commercialize new discoveries and innovations resulting from scientific research to another party."

#### **Translational research**

Translational research in medicine integrates findings from research into applications that benefit patient care.

#### **U**

#### **Undergraduate entrepreneurship minor**

Housed in the Economics department, the undergraduate entrepreneurship minor combines classroom and hands-on opportunities to learn about entrepreneurship to annual cohorts of 100 students in tracks focused on commercial, social, scientific, and artistic entrepreneurship.

#### **Undergraduate entrepreneurship major**

Undergraduate entrepreneurship major includes about 125 juniors and seniors in the Kenan-Flagler Business School's undergraduate business curriculum.

#### **V**

#### **Venture Capital Investment Competition®**

Venture Capital Investment Competition® began at Carolina as an educational event for MBAs to learn about venture funding. Directed by Patrick Vernon, this program has evolved into a marketplace and training ground for venture capitalists, growing to include 40 events in North America, Europe and Asia serving 500 students, 150 venture capitalists and 100 entrepreneurs.

#### **Virtual Laboratory software**

Virtual Laboratory software to manage grants, physical inventory, and purchasing for biomedical laboratories was licensed to startup company Dyzen, a participant in the Carolina Launch Pad program.

#### **Vinyl Records**

Vinyl Records is a newly created UNC student organization made up of a student-run record label and music incubator, launched through the Carolina Challenge.

#### **W**

#### **Women's Entrepreneurship Network**

The Women's Entrepreneurship Network connects women in the undergraduate entrepreneurship minor with successful women entrepreneurs.

#### **X**

#### **Xintek**

Xintek is a Research Triangle Park-based UNC startup commercializing Physics Professor Otto Zhou's technology by developing industrial applications of carbon nanotubes.

*Appendix: Carolina Faculty and Staff Start-ups*

COMPANY NAME	ESTABLISHED	UNC FOUNDER	DEPARTMENT / FACULTY / SCHOOL	STATUS
Mycosearch	1979	Barry Katz Barry Roberts	Biology	Acquired
Numerical Design (NDL)	1983	Turner Whitted	Computer Science	Acquired
Hemocellular Therapeutics (Entegriion)	1984	Thomas Fischer	Medicine	Acquired
Trancept Systems	1986	Nick England	Computer Science	Acquired
MathTensor	1991	Steve Christensen	Physics	Active
Merlin Pharmaceutical (Somatix)	1993	Richard Samulski	Pharmacology	Acquired
Inspire Pharmaceuticals	1993	Richard Boucher	Medicine	IPO
Incara (Aeolus) Pharmaceuticals	1994	Lola Reid	Pharmacology	IPO
Virtual Reality Games	1994	Warren Robinett	Computer Science	Closed
WebslingerZ	1995	Ethan Clauset	Library Science	Active
Micell Technologies	1996	Joseph DeSimone Timothy Romack James McClain	Chemistry	Active
AlphaVax	1997	Nancy Davis Robert Johnston	Microbiology Medicine	Active
Kucera Pharmaceuticals	1997	Khalid Ishaq Susan Morris-Natschke	Pharmacy	active
Xanthon	1997	Holden Thorp	Chemistry	Closed
Parion Sciences	1999	Richard Boucher	Medicine	Active
DarPharma	2000	Richard Mailman	Pharmacology	Acquired
Science Learning Resources	2000	Gary Duncan	Biomedical Engineering	Active
Micell Integrated Systems (MIS)	2000	Joseph DeSimone James McClain	Chemistry	Active
3rdTech	2000	Nick England	Computer Science	Active
DeltaSphere	2000	Nick England Lars Nyland	Computer Science	Active
HiBall Tracker	2000	Nick England Gregory Welch	Computer Science	Active
NanoManipulator	2000	Nick England	Computer Science	Active
LeukoMed	2000	Khalid Ishaq	Pharmacology	Active
Xintek (Applied Nanotechnologies)	2000	Otto Zhou	Physics	Active
Transplant Solutions	2000	John Lemasters	Cell Biology	Closed
Synecor	2000	William Starling	Biology	Active



COMPANY NAME	ESTABLISHED	UNC FOUNDER	DEPARTMENT / FACULTY / SCHOOL	STATUS
Ercole BioTech	2001	Ryszard Kole	Pharmacology	Acquired
Oriel Therapeutics	2001	Timothy Crowder	Biomedical Engineering	Active
Global Vaccines	2001	Robert Johnston	Medicine	Active
Qualyst (ADMETech)	2001	Dhiren Thakker Gary Pollack Kim Brouwer	Pharmacology	Active
Karyogen (Quantum Genomics)	2001	Terry Magnuson	Genetics	Closed
Hematrope Pharmaceuticals	2001	Don Gabriel	Medicine	Closed
Bioabsorbable Vascular Solutions (BVS)	2002	Joseph DeSimone	Chemistry	Acquired
Morphormics	2002	Edward Chaney Stephen Pizer	Computer Science Medicine	Active
iCardiogram	2002	James Loehr	Medicine	Active
Asklepios BioPharma	2002	Richard Samulski	Pharmacology	Active
InnerOptic	2003	Henry Fuchs Kurtis Keller	Computer Science	Active
3C Institute for Social Development	2003	Melissa DeRosier	Education	Active
InnerPulse (IRM)	2003	William Starling	Biology	Active
Digital Revolutions	2003	Brent Engel	Student Affairs (Technology and Systems Support)	Closed
NDimo	2004	Caterina Gallippi	Biology	Active
Theralogics	2004	Albert Baldwin	Biology	Active
Pharmatrophix	2004	Frank Longo	Medicine	Active
Liquidia Technologies	2005	Joseph DeSimone	Chemistry	Active
Algynomics	2005	Luda Diatchenko William Maixner	Dentistry	Active
AngleFix	2005	Laury Dahners	Medicine	Active
Navitas Research	2005	Charles Evans Christopher Clemens Russell Taylor	Physics/ Physics/ Computer Science	Active
Applied Micro Products	2005	Fred Pfaender	Public Health	Active
Remed Ease	2005	Amy Rix	Marketing and Recruitment staff with School of Nursing	Active
Addrenex Pharmaceuticals	2006	Joseph Horacek Moise Khayrallah	Psychiatry	Acquired
Vascular Pharmaceuticals	2006	Dave Clemmons	Biology	Active
Realtromins	2006	Keith Kocis	Biomedical Engineering	Active

COMPANY NAME	ESTABLISHED	UNC FOUNDER	DEPARTMENT / FACULTY / SCHOOL	STATUS
Viamet Pharmaceuticals	2006	Holden Thorp	Chemistry	Active
MegaWatt Solar	2006	Charles Evans Christopher Clemens Russell Taylor	Computer Science Physics	Active
NanoCor Therapeutics	2006	Richard Samulski	Pharmacology	Active
TransEnterix	2006	William Starling	Biology	Active
Mortgage Safe	2006	Ernie Patterson	Biology	Active
Epizyme	2007	Yi Zhang	Biochemistry	Active
Exigent Pharmaceuticals	2007	Matthew Redinbo	Chemistry	Active
Novan	2007	Mark Schoenfisch Nathan Stasko	Chemistry	Active
Invitrox	2007	Charles Johnson Don Gabriel	Chemistry Medicine	Active
Children's Integrative Medicine Clinic	2007	Hillary McClafferty	Medicine	Active
KryoSphere	2007	Eric Hallman Doug Baker Niel Jones	Eric Hallman (worked with Ted Zoller in the executive MBA program); Niel Jones (worked for UNC Lineberger Comprehensive Cancer Center)	Active
NC Fisher Research	2008	Nancy Fisher	Biology	Active
SolOrganic	2008	Wei You Andrew Stuart	Chemistry	Active
Advanced TeleCare.	2008	Rich Davis	Medicine	Active
Lung Bank of America	2008	Tom Egan	Medicine	Active
X-In8 Biologicals	2008	Tom Egan	Medicine	Active
SQWorks	2008	Christopher Rice	Management (kenan flagler)	Active
BioRxn	2009	Jeffrey MacDonald	Biomedical Engineering	Active
Allotropica	2009	Ed Samulski	Chemistry	Active
Clinical Sensors	2009	Mark Schoenfisch	Chemistry	Active
Dyzen	2009	Cam Patterson Holly McDonough	Medicine	Active
Enci Therapeutics	2009	Cam Patterson Holly McDonough	Medicine	Active
G-Zero	2009	Ned Sharpless	Medicine	Active
Hibernaid	2009	Laurence Katz	Medicine	Active
NextRay	2009	Etta Pisano	Medicine	Active
Katharos	2009	Melanie Joy	Pharmacology	Active

COMPANY NAME	ESTABLISHED	UNC FOUNDER	DEPARTMENT / FACULTY / SCHOOL	STATUS
Synereca	2009	Scott Singleton	Pharmacology	Active
Moche	2009	Brian Billman	Anthropology	Launching
Cell Microsystems	2009	Nancy Allbriton	Biomedical Engineering	Launching
IdentiZyme Defense Technologies	2009	Matt Redinbo	Chemistry	Launching
Optimal Learning	2009	Leslie Babinski	Education	Launching
Celluchip	2009	David Gerber	Medicine	Launching
MPA Analytics	2009	Blair Keagy	Medicine	Launching
Magnetics for Biomedical Discovery	2009	Richard Superfine	Physics/ Computer Science	Launching
MyHealtheLife	2009	Deb Tate	Psychology	Launching
HealthierFundraisers	2009	Alice Ammerman	Public Health	Launching
Gptrex	2009	Lisa Huggins Katherine O'Brien	GIS Coordinators	Active
WorkoutLog	2009	Jay Crooker	Meadowmont Wellness	Launching

## Notes



## Credits

### Design

UNC Design Services

### Photography

Contributed by Richard Cox,  
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THE UNIVERSITY  
*of* NORTH CAROLINA  
*at* CHAPEL HILL

