Emerging trends and practices in university innovation and entrepreneurship

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Personal background

• 30 years TTO/economic development director in 6 universities – in NC (Duke, NC State, UNC); CA (Scripps); VA (UVa); and Saudi Arabia (KAUST)

• Former AUTM President; testimony in US Congress about innovation; advisor to elected officials and university boards/presidents

• Have helped launch/manage >125 start-up companies and >30 university-industry research centers

• Innovation and technology transfer consultant to World Bank, AAAS, WIPO, BIO, PhRMA, APEC, Qatar Foundation, multiple universities, etc.

• Extensive experience on numerous government and NGO boards and committees related to innovation and economic impact
Why is technology transfer important?

• Creating economic value (ROI) for public investment in research
• Promotes creation of new products, services, companies, jobs
• Institutional reputation/prestige, recruitment, etc.
• Because it’s awesome...
  • [http://www.onlineuniversities.com/blog/2012/08/100-important-innovations-that-came-from-university-research/](http://www.onlineuniversities.com/blog/2012/08/100-important-innovations-that-came-from-university-research/)

Flu shots, seat belts, internet, ultrasound, penicillin, insulin....
Is technology transfer only for STEM?

- SHORT ANSWER – NO!
- Know-how, show-how, technical assistance, and other forms of knowledge and expertise can be commercialized
- Unique knowledge applied to focused market need
- Intellectual property for non-STEM not as important – speed to market is!
University benefits from technology transfer

• Commercialize new products, services, processes based on university research discoveries
• Start new companies, attract investment/jobs
• Facilitate new sources of industry research support
• Enhance university research environment; perform cutting edge research
• Connect university research to economic and social development (relevance)
• Facilitate **talent recruitment/retention**
• Enhance university reputation / stature
Beginnings (1980’s) of academic commercialization in US: Tech transfer 1.0...

Inventors Disclose  
University Protects IP 
University Licenses IP to Industry

Oversimplified illustration of traditional technology transfer model – but note:

- relatively passive “technology push” model (no “market pull”)
- assumes technology assets ready for commercialization
- little reflection of critical nature of building partnerships and “innovation ecosystems”
- no reflection of how to manage and leverage innovation assets to create value (or to de-risk) and to accelerate progress toward clinic / markets
TTO 1.0 Core Functions

• Encourage invention disclosures – requires marketing to faculty and culture change
• Assessment of inventions; market; patentability
• Manage patenting process
• License negotiation and management
• Market research capacity; broker research deals
• Networking (w/ companies, agencies, NGOs, etc.)
• Manage and balance competing expectations / objectives
• ~85% of US TTO revenue made by 30 institutions; more than ½ do NOT break even
1990’s/2000’s: Growth of innovation economy drives academia’s role in economic development

- Huge growth in R&D outsourcing by industry - the innovation pipeline from universities of growing importance

- US gets more than half its economic growth from industries that barely existed a decade ago (“The Economist”, April 2001)

- Need for “knowledge workers” - ¾ of new jobs are found in entrepreneurial companies fueled by innovations

- Global competition in knowledge generation – innovate to stay ahead and to compete! (including universities)

- Universities increasingly asked to address Return On Investment in terms of new companies, new jobs, products, etc.
Other innovation economy factors...

• Rate of growth in government R&D funding is flattening – so private sector partnerships are critical to supplement research support

• Industry and venture capital moving “upstream”; technology gap is widening

• Geography of innovation is critical – knowledge workers want to live, work and play in stimulating environments (science parks; innovation districts) – universities are key

• Universities TTOs are being asked to be all things... product developers, economic developers, innovation district developers, global health experts, collaboration managers, revenue generators, investors, management recruiters....
How are TLOs addressing challenges?

- Shift in focus from “traditional licensing” to economic and business development and partnering; from deals revenue to public benefit
- Proof of concept / translational research resources (gap funding) becoming more critical as traditional investors focus upstream
- Innovation and design thinking taught to faculty and students – how to use knowledge and expertise to solve real challenges
- Redefining mechanisms for University interface with private sector to drive innovation economy (licensing, start-ups, research funding, innovation cluster development, etc.)
- Increased interest and scrutiny in technology transfer – impact metrics important than ever
The re-engineered university innovation ecosystem: TTO 2.0 and beyond

• All of 1.0, PLUS...
• Enhanced development/sharing of innovation, knowledge, materials, compound libraries, discovery tools, etc.
• New models of collaboration with industry, foundations, etc. – including innovation districts
• Aggressive commitment to customer-driven research
• Willingness to change policies and procedures (IP, T&P, awards / recognition)
• University leadership/commitment/patience
• Creation of open innovation systems for pre-competitive space
• Commitment to internal partnering and multi-disciplinary collaboration within university - “Innovation is everywhere!”
What does impact look like?

A personal look back....
April 14, 2016
MIT Enterprise Forum named KAUST’s Dr. Osman Bakr, Associate Professor, and Ahmed Alfaadhel, PhD candidate, as two of their Top Five Innovators Under 35

May 9, 2016
Entrepreneur Magazine ME awarded KAUST Innovation with a KSA Enterprise Agility Award for Education Institute of the Year

December 15, 2015
5 startups in top 100 (and 3 in top 10) recognized at Forbes Middle East: Entrepreneurs Shaping Saudi Arabia’s Future 2015
UVA Innovation: University of Virginia

- Transformed stagnant tech transfer 1.0 model into national model for innovation advancement
- Focus on proof-of-concept and milestones led to 22:1 ROI in translational research programs
- All tech transfer 1.0 measures increased – but so did jobs, companies, products, services, investment
- Additional metrics – NCATS and NHLBI studied processes; US Chamber made major award; invited by White House to attend signing of AIA
- Charlottesville - #1 in US for venture investment growth 2010-2015; one of four top places in US for startup creation
North Carolina Civics Lesson – 1960’s

“I’m from North Carolina and my state produces more hosiery, towels and cigarettes than any other state!”
North Carolina economy – 1950s-1960s

- Big 3 industries were textiles, furniture and tobacco (farming)
- NC 49th out of 50 in per capita income
- Basic economic development strategy – cheap land, cheap labor, low taxes
- Result – bad schools, poor public services, brain drain
- WELL KNOWN FOR: Pepsi, cigarettes, furniture, textiles, Krispy Kreme, NASCAR, barbecue
- BUT... excellent universities; and
- Visionary leaders (government, business, universities)
The RTP environment today

- Research expenditures at 3 universities – more than $2.6B
- #3 Biotech state in US
- #1 place for technology businesses (Silicon Valley Leadership Group)
- #1 best places for business and careers (Forbes)
- #1 in Aggregated Innovation Capacity (Metropolitan New Economy Index)
- UNC, Duke & NC State in top 10 patent strength index
- 1989 (1st 30 years) – 60 firms; 30,000 employees; most firms mid to large sized (era of modest university tech transfer)
- 2002 – 150+ R&D firms; 45,000+ employees; 52% have less than 10 employees (era of major university tech transfer); 86% have less than 250 employees
- 1500+ start-ups since 1970; 34% of current companies are start-ups
RTP key success factors

- University research excellence must be maintained
- Catalyzed development of technology transfer capacity – and regional entrepreneurial eco-system
- Strong community-building entities
- Willingness to stay the course – (“all overnight successes aren’t!”)
- Access to capital and entrepreneurial management are key
- Lack of competition among players; willingness to partner – especially universities (culture of “hyper-collaboration”)
- Innovation embraced in universities – innovation now part of “weave and fabric” of RTP institutions