The Impact of Research and Technology Commercialization

By
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Recognition from Highest Levels of Government

President Obama:

“We’ve got to make sure that the technological breakthroughs that come to define the 21st century take root ..”

“Our government has to invest in innovation”

“That’s how we are going to build the industries of the future ... because we make smarter products using better technology”
Good News, Bad News

**Good News** - The visibility of technology transfer continues to increase
- Greater awareness & participation
- More resources allocated

**Bad News** - The visibility of technology transfer continues to increase
- Increased awareness generates increased expectations
- Lack of understanding of T2 creates problems
  - Proposed patent legislation
Lab to Market – It Works!

A Very Virtuous Cycle

The University

Startup Company

Medium Size Company

Large Company

% of Revenue

Profits & Tax Revenue

Jobs

Products & Services

US, State and Local Governments

The University Licensing

Office of Technology Licensing
UNIVERSITY OF FLORIDA

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Gainesville, FL

Population:
City: 127,488
Alachua County: 253,451
Median Age: 25

Largest Employers:
- University of Florida
- Publix Supermarkets
- UF Health
- Nationwide Insurance
• 14th Largest Research University in U.S.
• In FY 2014 UF OTL ranks in top
  • Licenses Executed
  • Patents Filed
  • Startups Created
# Largest Employers in Florida

<table>
<thead>
<tr>
<th>#</th>
<th>Employer</th>
<th>City</th>
<th>Number of Employees</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>University of Florida</td>
<td>Gainesville</td>
<td>35,000</td>
</tr>
<tr>
<td>2</td>
<td>Florida Hospital Orlando</td>
<td>Orlando</td>
<td>16,000</td>
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<tr>
<td>3</td>
<td>Pensacola Naval Air Station</td>
<td>Pensacola</td>
<td>15,000</td>
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<tr>
<td>4</td>
<td>Orlando Health</td>
<td>Orlando</td>
<td>14,000</td>
</tr>
<tr>
<td>5</td>
<td>University of South Florida</td>
<td>Tampa</td>
<td>13,584</td>
</tr>
<tr>
<td>6</td>
<td>University of Central Florida</td>
<td>Orlando</td>
<td>10,554</td>
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<tr>
<td>7</td>
<td>Memorial Regional Hospital</td>
<td>Hollywood</td>
<td>10,000</td>
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<tr>
<td>8</td>
<td>West Kendall Baptist Hospital</td>
<td>Miami</td>
<td>10,000</td>
</tr>
<tr>
<td>9</td>
<td>Gimbel &amp; Associates</td>
<td>Fort Lauderdale</td>
<td>9,999</td>
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<tr>
<td>10</td>
<td>Disney Quest</td>
<td>Lake Buena Vista</td>
<td>9,000</td>
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## UF Patents & Licensing

<table>
<thead>
<tr>
<th></th>
<th>Research Awards</th>
<th>Invention Disclosures</th>
<th>Licenses/Options Executed</th>
<th>Start-ups</th>
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<tbody>
<tr>
<td>2013/14</td>
<td>$702M</td>
<td>295</td>
<td>87</td>
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<tr>
<td>2012/13</td>
<td>641</td>
<td>297</td>
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<tr>
<td>2011/12</td>
<td>644</td>
<td>324</td>
<td>79</td>
<td>15</td>
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<tr>
<td>2010/11</td>
<td>619</td>
<td>298</td>
<td>78</td>
<td>12</td>
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<tr>
<td>2009/10</td>
<td>678</td>
<td>279</td>
<td>67</td>
<td>9</td>
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<tr>
<td>2008/09</td>
<td>574</td>
<td>271</td>
<td>72</td>
<td>10</td>
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<tr>
<td>2007/08</td>
<td>562</td>
<td>299</td>
<td>75</td>
<td>14</td>
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<tr>
<td>2006/07</td>
<td>583</td>
<td>327</td>
<td>74</td>
<td>9</td>
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<tr>
<td>2005/06</td>
<td>519</td>
<td>260</td>
<td>73</td>
<td>10</td>
</tr>
<tr>
<td>2004/05</td>
<td>494</td>
<td>274</td>
<td>66</td>
<td>13</td>
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<tr>
<td>2003/04</td>
<td>475</td>
<td>280</td>
<td>64</td>
<td>8</td>
</tr>
</tbody>
</table>
Gatorade launched a whole new industry.

Sentricon is a colony elimination technology for termite control.

Trusopt is a treatment for glaucoma - Merck.
Innovation R&D Hotbeds

MIT, Caltech – And the Gators?
How the University of Florida moved to the Major league of technology startups

BusinessWeek May 21, 2007
Regeneration Technologies, Inc. is a UF spin-off and the leading provider of sterile biological implants for surgeries around the world – enabling people to stay active longer.

- Currently employs 1100 people
- Sale of RTI stock provided $30 million each for new research buildings at UF
UF TechConnect

- UF Tech Connect – an EDA University Center housed in OTL located in the universities incubator connects:
  - New discoveries
  - Entrepreneurs
  - Investors
  - Facilities
- Since 2002 TechConnect client companies have:
  - Created over 2300 jobs
  - Generated over $1 Billion in private investment
  - Garnered over $600 million in public funding
Florida Innovation Hub at UF

Shortening discovery to market
50,000 square feet multi-use incubator
Opened in October 2011
60+ companies – 763 jobs - >$50 million private investment
Tech transfer, startup companies highlighted as drivers of the economy in 2009-10 UF Annual Financial Report

President’s Message

When it comes to moving innovations and ideas from the laboratory to the marketplace, it is not surprising that the University of Florida has a strong track record. We have been committed to technology commercialization for three decades.
Bayh-Dole Act of 1980

- Gave universities/researchers the opportunity to **patent** and reap **financial rewards** from technologies
- Gave industry a mechanism to generate return on investment for developing and marketing university technologies
- Has stimulated industrial productivity and innovation in the U.S.
  - Federal agencies prior to Bayh-Dole had a dismal rate of success
  - 28,000 inventions disclosed; less than 5% commercialized
• Association of University Technology Managers (AUTM)
  – nonprofit organization
  – international membership
    • more than 3,000 technology managers and business executives
    • Representing more than 300 universities, research institutions and teaching hospitals as well as numerous businesses and government organizations

AUTM Annual Survey
www.autm.net/metrics
Tech Transfer Nationwide

- 26,014 invention disclosures
- 6,554 total licenses and options executed
- $65.1 billion total sponsored research expenditures
- $2.8 billion total licensing income
- 24,555 total U.S. patent applications

*Based on responses to AUTM FY2013 Licensing Survey*
Tech Transfer Role in U.S. Economy

• AUTM's statistics for 2013:
  – U.S. institutions formed 818 startup companies
  – Seventy institutions reported 15,741 employees by 1,383 operational startups
    • Average of 11.38 employees per startup
  • Startups are going to have the biggest impact on the health of U.S. economy
    – Multipliers of 2 – 7 depending upon who you believe
University Inventions Changed the World

Georgetown University
CAT Scan

Indiana University
Fluoride Toothpaste

University of Toronto
Electron Microscope

University of Toronto
Insulin

University of Pittsburgh
Polio Vaccine
University Inventions Changed the World

- Cornell University: Pap Smear
- University of Minnesota: Heart-Lung Machine
- University of Minnesota: Pacemaker
- University of Florida: Trusopt
- State University of New York: MRI Scanner
University Inventions Changed the World

University of Pennsylvania

- Electric Computer -
University Inventions Changed the World

University of Illinois

Carnegie-Mellon

Stanford

Google

MIT

Akamai

Yahoo!

Mosaic

Eudora
They invented a patient simulator for medical education.

Licensed by Medical Education Technologies, Inc. (METI)

“it’s not the moment of invention; it’s realizing you changed the world.”

Produced interactive human patient simulators for medical education.

“it was a long gestation for me.”

Acquired by CAE Healthcare for $130M in 2011

Dr. Samsun Lampotang, Professor of Anesthesiology; Dr. Michael Good, Dean of the College of Medicine
Discovered a gene therapy that restores patients' sight

"It was so long, 35 years ago, that we introduced it into human patients. It wasn't until ten years later when two more labs showed it would keep working over time, that I knew we had something."

Licensed by Applied Genetic Technologies Corporation (AGTC)

Creates gene therapies for preventing and treating a wide range of diseases

Holds more than 40 US and foreign patents with five products in active development

Has raised more than $90 million in venture capital

Dr. Nicholas Muzykanski, Eminent Scholar in the Department of Molecular Genetics & Microbiology
He discovered a nerve-regeneration technology.

- Licensed by AxoGen, Inc.
- Restoring sensation to thousands of patients with peripheral nerve damage
- Completed more than $38 million in financing through 2013

“Our society wants to grant funds for research aimed to improve the human condition. Sound science and, then, keen entrepreneurialism can bring this to fruition.” — Dr. David F. Muir, Professor of Pediatrics and Neuroscience
GrooveShark – music streaming co.

- Licensed Technology in 2006
- 50,000 million users
- Grew to 165 employees
- Offered $80 million – said NO
- Sued and closed doors in 2015
Discovered and brought six drugs to clinical trials, including an iron-binding compound that removes heavy metals from the blood of patients who receive regular transfusions.

Licensed to FerroKin Biosciences, Inc.

Acquired by international pharmaceutical firm Shire plc for $100 million and additional milestone payments of up to $325M in 2012.

“There are no eureka moments in biomedical research. The great moment is when you realize you’ve got something far enough to take to clinical trials. You look at a guy dying from pancreatic cancer and say, this is going to help this guy. That’s the moment.”

Dr. Raymond Bergeron, Emeritus Graduate Research Professor
OFFICE OF TECHNOLOGY LICENSING

THE SPIRIT OF INNOVATION
January

“We’re amazed by the expertise of our researchers here at UF.”

Office of Technology Licensing
The Spirit of Innovation

Melanie Campos, Licensing Associate
April Kilburn, Assistant Director

www.otl.ufl.edu
“We’re part of something big. It’s like putting together a puzzle, the pieces coming together for a greater purpose.”

“Working here is a great learning experience. We’re on the cutting edge of research conducted at UF, and we’re making a difference.”

“It is an honor to have the opportunity to work with a company and watch it reach its milestones one step at a time, and finally to achieve its first commercial sale! We feel like part of the company team!”

“We are fortunate to have the most amazing team working with the most brilliant faculty at the most incredible research institution. Doesn’t get much better.”

Interns: Quentin Thomas, Cole Sullivan, Helle Dharla, Cameron Murphy, Mitchell Herring

Patti Reineke, Contracts Administrator
Amber Allen, Accountant

Kathy Sohar, UF Tech Connect® Coordinator
Carla Buddensieg, StartUpQuest Coordinator
Sarah Gravina, Entrepreneurial Outreach Program Coordinator

David Day, Director
Jane Mulr, Associate Director
• American entrepreneurship lacks diversity:
  – 87 percent of U.S. venture capital-backed business founders are white
  – 12 percent are Asian
  – less than 1 percent are African American
  – Less than 3 percent of companies that receive venture capital funding have a woman CEO
Empowering Women in Technology Startups®

**Mission:** Educate, inspire and empower women to pursue leadership roles in technology-based companies worldwide

- Experiential learning program
- Launched in 2012 by the University of Florida
- Four programs conducted to date
- Over 200 women empowered
- Goal: 50 women in 50 states in 50 weeks
Empowering Women in Technology Startups®

- Prequalified 7 patented technologies
- Virtual teams with an experienced woman entrepreneur mentor
- Provide entrepreneurial training over ten weeks
- Participants develop a business plan and investor presentation
- Planning to replicate this program around the country
- www.ewits.org
Entrepreneurs Play an Important Role in U.S. Economy

- 99.7% of companies in U.S. have fewer than 100 employees
- Those same companies provide 82.4% of all jobs
- 62.9% of businesses employ between 2 and 9 people

Source: Florida Trend January 2011
How These Companies Start?

- Identify compelling problem your technology solves
- Identify how it is better than current solutions
- Identify who will pay for your solution
- Find entrepreneur to create a business plan
- Find someone willing to invest in the opportunity
Critical Components for Creating Technology-based Companies - Technology

• Technology – Most abundant resource
  – AUTM's statistics for 2013 = 26,014 disclosures

• Vast majority of early stage discoveries require additional development before they become products in the market
Critical Components for Creating Technology-based Companies - Entrepreneurs

• Two Fundamental Approaches to Finding Entrepreneurs to Start Companies
  – Recruit experienced entrepreneurs
  – Implement programs to grow our own
    • Entrepreneurial Boot camps
    • Capstone projects
    • eWiTS: Empowering Women in Technology Startups
Critical Components for Creating Technology-based Companies - Funding

• Funding – Follows opportunity appropriately matched with an experienced entrepreneur
  – Catch 22 for new entrepreneurs

• Today’s funding environment has changed
  – Fewer VCs investing later stage
  – New forms of bootstrapping
    • Crowdfunding
  – More government funding programs
    • Both federal & state
Critical Components for Creating Technology-based Companies - Facilities

• Facilities – Incubators provide space for companies to start and a venue to foster connections among critical components
  – Programmatic component is more important than facility

• NBIA: 80% of companies getting their start in an incubator are still thriving 5 years later
Critical Components for Creating Technology-based Companies – Technology Transfer

- Technology Transfer focused on new business creation:
  - Expertise
  - Resources
  - Support from government, community & research institution
Critical Components for Creating Technology-based Companies

• Technology
• Entrepreneurs
• Funding
• Facilities
• Technology Transfer expertise
Measuring Success

Major Challenge Everywhere
- Many studies on the topic
- Some good, some???
Tech Transfer has Many Masters

Many masters with competing interests

- Faculty = sponsored research money
- Industry = technologies close to market for free
- VC’s = technologies that can generate minimum 10x return
- University administration = licensing revenue
- Government = jobs and taxes
Unfortunately the companies who license the technologies have far more control over these impacts than the Technology Transfer Offices
Biotechnology Industry Organization Study

Estimates between 1996-2013 university patent licensing bolstered:

- U.S. gross industry output by $1.18\text{Trillion}$
- U.S gross domestic production by $518\text{ Billion}$
- supporting $3,824,000\text{ jobs}$
Economic Impact


Growth in economic impact of university patent licensing is significantly greater than US GDP for same period
Measuring Success

Social Impact

= 

• Whole New Industries
• Cures for Diseases
• Reduction in Healthcare Costs
• Increased Food Supply
Gatorade developed to reduce heat-related conditions -- launched a whole new sports drink industry

U.S. Market Alone = $7.4 Billion
Emma Whitehead has her Leukemia cured by HIV cells.

The University of Pennsylvania and St. Jude’s.
Reduced Health Care Costs

Hospital Acquired Infection Estimates in the U.S Alone:
• 1.7 million hospital-associated infections
• Over 100,000 deaths each year
• Economic impact is billions of dollars


Tracey of California - life devastated by hospital acquired infection.
Technologies to Prevent Hospital Acquired Infections

Xhale’s HyGreen technology – a hand-hygiene system to safeguard health during hospital visits

Sharklet Technologies – a topographical pattern of shark skin prevents hospital acquired infections from growing
Technologies for Reducing Hunger

3.5 Million Children Die Each Year From **Hunger**

Dr. Borlaug at Purdue University developed successive generations of wheat varieties with disease resistance and exceedingly high yield potential - "saved more lives than any other person who has ever lived."
Measuring Success

Impact on Real People = Making the world a better place
Aims to promote public understanding of how academic research and technology transfer benefit the public.

www.betterworldproject.org

also “PUT A FACE ON IT” campaign
The Pacifier Activated Lullaby (PAL)

Exo-skeleton is worn on the back and legs, making it possible for some wheelchair users to walk again.
Purdue crop storage system designed to prevent insects from destroying stored grains

Fighting Childhood Obesity - Coordinated Approach to Childhood Health (CATCH)
Making the World a Better Place
Keys to Success

• Support from the highest university officials
  – Resources
  – Recognition

• Clear established goals agreed upon by TTO and TTO Management

• Recognition by all that T2 success takes a long time

• Regular communications with all constituents

• Regular updates on successes achieved
  – Human Nature to Complain
  – Must Balance Complaints with Successes
Important to Remember:

What is easy to count isn’t always important and what is important isn’t always easy to count.
Our Future is so Bright - We wear shades!
Thank You!

Jane Muir
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