New Perspectives on Managing University Intellectual Property and Intellectual Capital

New Modes of Capitalization and Catalysis to Move University Scientific and Technological Research to Commercial Success

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President/CEO
Alfred E. Mann Foundation for Biomedical Engineering

August 29, 2008
US Universities: Net Licensing Income as a % of Total Sponsored Research

Average ROI from 1991-2006 = 2.5%
Returns

- ROI: Return on Investment
- ROI: Return on Innovation
- Return to the Inventor
- Return to the University
- Return to the Research-subsidizing Taxpayer
- Return to the Patient
The Commercialization of Compelling Ideas is Critical!

◆ Innovation fuels the entrepreneurial enterprise and both are keys to a thriving economy

◆ As a world, we are failing to develop and commercialize the majority of promising research

◆ Discoveries that could lead to new medical devices, therapeutic drugs, and other life-saving or life-enhancing technologies are languishing within the walls of our universities… or the university IP resides in the hands of small companies with inadequate capital for development
Impediments to Successful Commercialization of Innovation

- Commercialization output from universities has failed to keep pace with research-dollar input

- Interest by faculty to develop research with commercial potential lags behind their desire to perform the search for new knowledge

- Commercial potential of basic research and consequent IP is under-developed... with the university, the inventor, and the public provider of research dollars not receiving the potential benefit of their investments

- Handoff of IP to industry can get bogged down in negotiations, bureaucratic overload, and unrealistic university expectations of returns (UIDP, IP vs. IC).
# Differences Between Academia and Industry

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<thead>
<tr>
<th></th>
<th>Academia</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main focus</strong></td>
<td>Generating and disseminating new knowledge</td>
<td>Commercialization of ideas for profit</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>Limited resources</td>
<td>Often substantial resources available</td>
</tr>
<tr>
<td><strong>Financial motivation</strong></td>
<td>Money not the critical incentive for performance</td>
<td>Money important incentive to boost performance</td>
</tr>
<tr>
<td><strong>Pace of research</strong></td>
<td>Outcomes driven by desire for high quality research</td>
<td>Time to market is critical and permeates most every decision</td>
</tr>
<tr>
<td><strong>Career achievement</strong></td>
<td>Tenure based on publications not entrepreneurship</td>
<td>Value of research outcome often based mostly on revenue generated</td>
</tr>
<tr>
<td><strong>Information exchange</strong></td>
<td>Free exchange of ideas</td>
<td>Intellectual property becomes corporate asset</td>
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### Major Differences Between Academia and Industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>Academia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secrecy</td>
<td>Publish or perish</td>
</tr>
<tr>
<td>Development work</td>
<td>Curiosity-driven</td>
</tr>
<tr>
<td>Supervision</td>
<td>Academic freedom</td>
</tr>
<tr>
<td>Must show return on investment</td>
<td>Long-term</td>
</tr>
<tr>
<td>Risk taking</td>
<td>Avoids commercial risks</td>
</tr>
</tbody>
</table>
Funding Hurdles for S&T Development

"Gap" funding needed
The Valley of Death
The Valley of Death

Available Resources

Academic Research

Established Market & Product

Ideas at Risk

Basic Research

Commercial Products
Flying Over the Valley of Death: Accelerating from Discovery to Project

Meeting of the Government-University Industry Research Roundtable
Feb. 12-13, 2008
2101 Constitution Ave
The Lecture Room
Washington, DC
The Valley of Death

Federally Funded Basic Research Creates New Ideas

Capital to Develop Ideas To Innovation

No Capital

Applied Research & Innovation

Source: Charles W. Wessner, Ph.D., The National Academies
The Darwinian Sea

The "Struggle for Life" in a Sea of Technical and Entrepreneurship Risk.
Branscomb’s Darwinian Sea

The Struggle of Inventions to Become Innovations

“Struggle for Life” in a Sea of Technical and Entrepreneurship Risks

Source: Charles W. Wessner, Ph.D., The National Academies
Small Firms Actually Face Many Hurdles

Crossing the Valley of Death and the Darwinian Sea only to Arrive in the Jungle of Prosperity

Innovation & New Businesses Must Swim Past:
- Management Failure
- Technology Obsolescence
- Alternative Business Models
- Debilitating Legal Proceedings
- Hostile Acquisitions

Source: Charles W. Wessner, Ph.D., The National Academies
Life Science Technologies Funding Life Cycle

Idea
Out-license or Start-up
The Valley of Death

The Capital Lifecycle

Investigation
- Proof of Concept

Feasibility
- Seed
- Start-up

Development

Introduction
- Early
- First, Second, etc.

Growth

Maturity
- Equity Markets, Banks

Valley of Death
Research Discoveries: “Valley of Death”

Sources of capital:
- Grants
- Specialized Investment funds and/or angels
- “National” funds based locally and their syndicate partners elsewhere
- Specialized programs, friends/family
- Funds with side agreements to source locally
- Investment funds and/or angels
- Specialized programs, friends/family

Deal stage:
- Pre-seed
- Early/seed-staged venture capital
- 2nd round venture capital
- Mezzanine venture capital pre-IPO or sale
- R&D Innovation
- Venture formation
- Engineering prototype – service models
- Prototypes, pilot projects, test beds, human trials
- Products/service introduction
- Sales
- Break even
- Positive cash flow

Cumulative Cash Flow

Typical firm functions:
- 2 years for IT-comm. Services… 5-7 years for devices and equipment… Many years for drugs
The Cash Flow Valley of Death As a Function of Development Stage

Cash flow

- Technology Creation
- Marked Focused Biz and Product Development
- Early Commercialization

Time

Successful

Moderately Successful

Unsuccessful

Typical, primary investors

Feds

Entrepreneur and seed/angel investors

Venture capitalists

Stock owners

Public sector

Private sector
CROSSING THE VALLEY OF DEATH

A chasm has opened up between biomedical researchers and the patients who need their discoveries. Declan Butler asks how the ground shifted and whether the US National Institutes of Health can bridge the gap.
## Traditional Sources of Venture Capital

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends, Family, Founders, Fools</td>
<td>Easiest to get</td>
<td>Small investments</td>
</tr>
<tr>
<td>(&quot;Bootstrap&quot;)</td>
<td>Quick to decide</td>
<td>Low value add</td>
</tr>
<tr>
<td></td>
<td>Non-financial motives</td>
<td></td>
</tr>
<tr>
<td>Government grants</td>
<td>Non-dilutive</td>
<td>Usual focus on basic studies</td>
</tr>
<tr>
<td></td>
<td>Validation of technology</td>
<td>No value add</td>
</tr>
<tr>
<td></td>
<td>VCs generally favorable</td>
<td>Restrictions on use</td>
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The New Venture Capital Collective

- Venture Philanthropy
- Directed Philanthropy
- Philanthrocapitalism
- Philanthroentrepreneurism
- Creative Capitalism
The New Venture Capital Collective

- New vs. Old Philanthropy
- Engaged Philanthropy
- Strategic Philanthropy
- Effective Philanthropy
- Disruptive Philanthropy
Philanthropic Potential to Fill the Gap

$55 Trillion in the next 40 years
Minding the Gap

Some Interesting New Models for Commercialization
Enablement Driven by the New Venture Capital

- Disease-focused Foundations
- Coulter Foundation
- European Commission (EC)
- Organization for Economic Co-operation and Development (OECD) initiatives
- Italian Banking Foundations
- Philanthropreneurs: Asia and U.S.
Venture Philanthropy from the Disease Foundations Can Fill the Gap in Financing

Grants & “Bootstrapping”

2-4 years

“Valley of Death”

2-3 years

3-4 years

RESEARCH (in vitro/lab)

DEVELOPMENT (proof-of-concept)

CLINICAL TRIALS (Phase 1 and 2)

Potential exits

VC investment

Grants & "Bootstrapping"

"Valley of Death"

2-4 years 2-3 years 3-4 years
Disease Foundations: Accelerated Commercialization

- Accelerated Brain Cancer Cures
- Adenoid Cystic Carcinoma Research Foundation
- Alzheimer Drug Discovery Foundation
- ALS Therapy Development Foundation
- The ALS Association
- Avon Foundation
- Bill & Melinda Gates Foundation
- Children's Brain Tumor Foundation
- Children's Cause for Cancer Advocacy
- CONRAD
- Cure Huntington's Disease Initiative
- Cystic Fibrosis Foundation
- Dystonia Medical Research Foundation
- Epilepsy Therapy Development Project
- Families of SMA
- Foundation Fighting Blindness
- High Q Foundation
- Huntington's Disease Society of America
- International AIDS Vaccine Initiative
- Juvenile Diabetes Research Foundation
- Leukemia & Lymphoma Society
- Michael J. Fox Foundation for Parkinson's Research
- Multiple Myeloma Research Foundation
- Muscular Dystrophy Association
- Myelin Repair Project
- National Multiple Sclerosis Society
- PATH
- SMA Foundation
- TB Alliance

SAN DIEGO COMPANIES: $64M 2007
## Selected Non-Profit Foundations Investing in Industry

<table>
<thead>
<tr>
<th>Charity (Focus)</th>
<th>Main Forms of Investment</th>
<th>Selected Firms Spun Out or (Co)-Seeded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystic Fibrosis Foundation</td>
<td>Royalties; milestone-based grants</td>
<td>Allon Therapeutics; Zapaq</td>
</tr>
<tr>
<td>Alzheimer’s Drug Discovery Foundation (Alzheimer’s disease and cognitive again)</td>
<td>Convertible notes; milestone-based grants</td>
<td>Marine Pharmaceuticals</td>
</tr>
<tr>
<td>Juvenile Diabetes Research Foundation</td>
<td>Milestone-driven grants; equity; royalties</td>
<td></td>
</tr>
<tr>
<td>Epilepsy Therapy Development Project</td>
<td>Equity; grants</td>
<td></td>
</tr>
<tr>
<td>Leukemia &amp; Lymphoma Society (blood cancers)</td>
<td>Grants</td>
<td></td>
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<tr>
<td>Michael J. Fox Foundation (Parkinson’s)</td>
<td>Grants; royalties</td>
<td>Alsgen</td>
</tr>
<tr>
<td>Stanley Medical Research Institute (schizophrenia and bipolar disorder)</td>
<td>Grants; equity; royalties</td>
<td>Accelerate Cnacer Therapeutics (ACT Biotech)</td>
</tr>
<tr>
<td>Blanchette Rockefeller Neurosciences Inst. (Alzheimer’s and neurological disorders)</td>
<td>Equity</td>
<td>Neuroscience research Venture Inc.</td>
</tr>
<tr>
<td>ABC2 (brain cancer)</td>
<td>Grants</td>
<td></td>
</tr>
<tr>
<td>ALS Therapy Development Foundation (Lou Gehrig’s disease)</td>
<td>Grants; equity</td>
<td></td>
</tr>
<tr>
<td>Multiple Myeloma Research Foundation</td>
<td>Grants</td>
<td></td>
</tr>
<tr>
<td>Melanoma Therapeutics Foundation</td>
<td>Equity; royalties</td>
<td></td>
</tr>
<tr>
<td>Families of Spinal Muscular Atrophy</td>
<td>Grants</td>
<td></td>
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Coulter Foundation

- IP -> commercial cycle
- Seed capital awards to link faculty to new university commercialization processes
- Biomedical engineering focus
- 9 universities
- $1,000,000/yr, 5 yrs
- 2-3 universities, $10m endowment
OECD and EC Initiatives

- European Commission:
  - Reports from the Committee on Research and Philanthropy
    - Dec 2007: “Engaging Philanthropy for University Research” (note: applied and basic research)

NOTE:
- European Forum on Philanthropy and Research Funding is meeting December 2 in Milan.
- EU Meeting on Venture Philanthropy is in the planning process
The Private Foundations of the Italian Banks and Technology Transfer

INTERNATIONAL CONFERENCE
Thursday, February 14\textsuperscript{th} 2008

Exploitation of Scientific & Technological Research

Fondazione Cariplo and partners
1. The exploitation of scientific & technological research:
   International context analysis

2. An international view on financial schemes for technology transfer
   funding

3. Analysis of the venture capital in technology transfer in Italy

4. The new Technology Transfer Fund “TT Venture”:
   an innovative financial instrument
The Commitment

- Fondazione Cariplo
- In concert with the foundations of the 17 largest Italian banks
- TT Venture is a closed-end fund with a 12 year term. The Foundations have underwritten 50 million Euros/yr as their initial commitment to TT Venture.
- The Foundations have other investment activities and their traditional philanthropy activities. TT Venture is one of their commitments to Italian R&D, but as today it is the only one with a market approach (for profit).
- Probability of success? U.S. banks?
Philanthropreneurs and Their Foundations

Asia:
- Cyrus Tang (China)
- Terry Kuo (Taiwan)
- Ryu Geun-cheol (Korea)

U.S.
- Gates (Buffett)
- Mann
The New Venture Capital Collective

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- Creative Capitalism (http://creativecapitalismblog.com)
How to Fix Capitalism

In these tough times, it's easy to forget that during the past century, the world has gotten better. But billions have not been able to benefit from capitalism's miracle. Here's how to help them.

**creative + capitalism**

**creative adj.**
1. marked by the ability or power to create
2. having the quality of something imaginative

**capitalism n.**
1. an economic system marked by private ownership, in which a free market distributes goods

**creative capitalist**
Accelerating the Movement of University IP
Towards the Commercial Marketplace
Alfred Mann’s vision:
To enhance the flow of university biomedical research into the stream of commercialization by speeding the transfer of technology.

Alfred Mann’s plan:
To create 12-15 Institutes for Biomedical Development at elite universities and to provide the financial and business resources to guide the commercialization of promising research...with funding of $150 m to $200 m each. The Alfred Mann Institute at USC is the first of these, followed by the Technion University, followed by Purdue, followed by.....
The Execution Gap: Death or Dearth of Capital?

Grants and sponsored research

Basic research, discovery

Early-stage venture equity

Feasibility study

Engineering model

Product design

Clinical trials

Product development

‘Valley of Death’

Late-stage private and public equity

Commercialization and clinical use

Market roll-out

Distribution channels

Manufacturing

FDA
Alfred E. Mann Institutes: A Bridge Across the Funding Gap

Grants and sponsored research

Basic research, discovery

Feasibility study

Engineering model

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Private equity

Late-stage private and public equity

‘Valley of Death’
Who is Philanthropreneur Alfred E. Mann?

- Alfred E. Mann is an 82 year old serial entrepreneur living in Los Angeles.
- He has founded 17 successful biomedical and aerospace companies.
- He has taken two companies public and has sold seven of the companies, earning more than $10 billion dollars.
- 8th most prominent U.S. philanthropist.
- 3rd largest U.S. supporter of research outside the U.S.
- Mr. Mann desires to use the vast bulk of his acquired wealth to benefit mankind and has established the Alfred E. Mann Foundation for Biomedical Engineering to manage the distribution of these monies.
Timeline of Alfred E. Mann Companies

**AEROSPACE**

- Spectrolab '56
- Heliotek '60
- Quallion '95
- Stellar '02

**MEDICAL**

- Pacesetter '69
- MRG '85
- Advanced Bionics '92
- MannKind '97
- MRPA '01
- Implant Acoustics '02
- DermaPort '05
- MiniMed '86
- Second Sight '98
- Implanted Bionics '92
- NeuroSystec '04

The Early Years... 1985

- 1990
- 1995
- 2000
- 2005

**Green = Company Sold**
**What is an AMI?**

**Alfred E. Mann Institute**

A university-based Institute that expedites the development of biomedical technologies to improve human health for later stage private industry transfers.

- A significant number of universities will be selected to establish an Alfred E. Mann Institute on their campus.
- The AMIs are university co-governed
- Projects will be selected and funded by undiluteable capital to develop medical devices, pharmaceuticals, and biologics
- Substantial value for universities and inventors, and most importantly, the patient, will be created
- After value enhancing development, the AMI manages licensing, sale, spinout negotiation at meaningfully higher rates
- Philanthropic operations extend into perpetuity under the university umbrella
What is Next for TT on Steroids?

- 12-15 more Institutes after 8-10 years? How many cycles?
- Mann peer activities?
- International activities?
- Specialized smaller scale projects for colleges or departments or organizations?
- Larger scale projects?
  - Regional AMI’s
  - NIH
  - Federal labs
  - AMI Consortium
  - Regional accelerator funds
  - Mann Foundation Development Corporation
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