Technology Transfer Challenges

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Ecosystem Requirements

- Culture of Innovation and Entrepreneurship
- University R&D and Knowledge Resources
- Supportive Public Policies and Incentives
- Private Sector R&D and Innovation Efforts
- Supportive Communities
Building an Ecosystem - Challenges

Culture of Innovation and Entrepreneurship

- Acceptance of risk and failure (cultural and legal)
- Low/no barriers to entrepreneurship
- Strong Science, Technology, Engineering, & Math throughout education
- Strong trust, trusted intermediaries and know-how networks (advocates, professional services, marketing, infrastructure, business)
- Supportive policies and programs
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<thead>
<tr>
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<th>Basic research</th>
<th>Applied research</th>
<th>Development</th>
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</thead>
<tbody>
<tr>
<td>Academic R&amp;D</td>
<td>76</td>
<td>21</td>
<td>3</td>
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<tr>
<td>Industrial R&amp;D</td>
<td>4</td>
<td>21</td>
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There is co-dependency here...!
Policies toward university commercialization vary:

- Bayh-Dole model (university IP ownership/responsibility)
- Taiwan/Korea Model (non-profit intermediaries)
- Faculty ownership w/ university & community mentoring

Universities can create many support structures to assist in commercialization (and further the cultural of innovation)

- Incubators (business start-up assistance and student training)
- Aggressive commercialization offices
- Entrepreneurs in Residence
- Business Plan competitions
What Recent Research Shows...

- Universities that value revenue maximization do more licensing.
- Universities that value regional economic development pursue more spin-offs.
Building an Ecosystem - Challenges

- **University R&D and Knowledge Resources**
  - Universities have a tradition of openness (confidentiality is difficult to maintain) and yet, they do not have a tradition of OPEN INNOVATION... (partnering across institutions and with different sectors)
  - University incentives to commercialization need to be tailored to the situation (e.g. rewarding tech transfer efforts with research grants or assistance; giving credit toward tenure to faculty commercialization efforts (e.g. TXA&MU policy resulted in major increase in patent disclosures by junior faculty w/in first year!)
Gap: University Startup Transfers

Not Venture-Ready

Needs:
- Business Incorporation
- Additional Feasibility or Development Research
- Legal Assistance with IP Management
- Sources for Contract Lab Work
- Hiring Skilled Researchers, Lab Techs and Business Operators
- Setting Up Business Structure, Financial Structure, Employee Incentive Packages
- Federal Regulatory Liaison
- Pre-Clinical Trials Approvals

Intermediate Assistance Resources:
- Incubator
- Angel Capital
- SBIC
- Product Development Fund
- SBIR/STTR
- Business Planning Mentoring
- Reconfigurable, Rental Lab Space
- Low Cost Training Programs
- Know-How Network

Licensed to startup: Faculty Led or Key Player

University Technology

$ VENTURE READY €

Failures
Gap: University-Company Transfers

**University Technology**

**Licensed to existing SME company**

- **Needs:**
  - Additional Feasibility or Development Research
  - Legal Assistance with IP Management
  - Sources for Contract Lab Work
  - Hiring Skilled Researchers, Lab Techs
  - Pre-Clinical Trials Approvals

- **Intermediate Assistance Resources:**
  - Incubator
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  - Product Development Fund
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  - Reconfigurable, Rental Lab Space
  - Low Cost Training Programs

**Internal Resources Sufficient**

**Not Market-Ready**

**Market / Full Trials READY**

**Failures**
Building an Ecosystem - Challenges

Public Policy

Remove Disincentives
if not enough, then
Provide Incentives
if not enough, then
Provide Support Structures
if not enough, then
Provide Programs

Wilson Policy Cascade

In a resource constrained world..
Building an Ecosystem - Challenges

Private Sector R&D and Knowledge Efforts

Cluster efforts (e.g. biotech, nanotechnology) tighten these connections)
Two Basic Forms of KTT to Commercial Applications:

Context

private sector
federal labs
universities
consortia

Gov’t R&D support

National/State
Support Legislation

private sector
corporate labs

process application
R&D/Mfg.
Marketing/Sales

ROI

start-up company

spin-out technologies

technology incubator

grandparents

Community
support, Culture

Indirect Policies: Tax, Regs,
Environmental, Liability, etc.
Goal of 4th Generation R&D

The point of action

Opportunity

Clarity

Research Development

New Markets

Current Markets

Internal Research Projects

External Research Projects
Building an Ecosystem - Challenges

- **Private Sector R&D and Knowledge Efforts**
  - Build collaborative partnerships with universities
  - Provide support to incubators, deal finders, etc. for technologies that are not market-ready.
  - Create clusters & build supportive supply chains
  - Develop innovative business models to drive R&D, product development and new market launches
University R&D is not only not market-ready – it will take twice as long and cost much more than expected to reach market readiness. Biotech takes the longest. Chemistry and IT takes the least.

Company R&D succeeds best with open innovation models.

Research databases, partner matching systems, knowledgeable participants and a good ecosystem make the processes work better, faster.

Practice, practice, practice