Changing Industrial R&D Strategy: Open Innovation

NSF I/UCRC Annual Meeting
Arlington, VA.

Dr. John Tao, O-Innovation Advisors LLC
Overview

• Context – My Background
• Open Innovation Basics
• Various routes to collaborate / acquire Tech.
• Deal between Large Co’s and Start-up’s
My Background

- Air Products: ‘74–’08: Corp. Dir. Tech. Partnership
- Weyerhaeuser: ‘08–’11: VP, Open Innovation
- Led Open Innovation since ‘95
- Co-Founder of Xunergy Technology LLC
- NSF Adcomm member Bus. & Operations
- Larta Industrial Advisory Board
- Consultant to start-ups and fortune 500’s
O-Innovation Advisors LLC

Consulting Offerings:

– Government Contracting
– Partnering/Cooperation
– Intellectual Asset Management
– Licensing
Outline

- Context – My Background
- **Open Innovation Basics**
- Various routes to collaborate / acquire Tech.
- Deal between Large Co’s and Start-up’s
“Most of the smart people in the world don’t work for your company.”

*Bill Joy, Former Chief Scientist, Sun Microsystems*
“We very much believe that we are never going to invent everything inside the company, and that we need to have the spirit of open innovation to be as good a technical company as we want to be.”

Jeff Immelt, Chairman and CEO, General Electric
In a world where so many people now have education and cheap tools of innovation, innovation that happens from the bottom up tends to be chaotic and smart. Innovation that happens from top down tends to be orderly but dumb.

..... Sweet spot for innovation today is moving down.”

Curtis Carson
CEO, SRI International

Because all the people together are smarter than any individual alone and all the people now have the tools to invent and collaborate.
Why do we need Open Innovation?

Your companies are 99.99996% of the world population is outside!

Networks needed!!
Open Innovation

Classical Definition:
Using external technology/resources to supplement internal R&D and commercialization efforts

- Sponsored R&D
- Technical consortia
- Service Providers
- In-Licensing
Classical Open Innovation: The Spectrum of Engagement

- low
  - do nothing
  - wait
  - watch
  - search
- high
  - acquisition
  - joint venture
  - joint manufacturing
  - minority equity
  - strategic alliance
  - joint development
  - In license
  - contract research

Degree of Commitment & Difficulty in Decision Making
Open Innovation (OI) Redefined

“Open for Business”

• Barriers to OI
  – External
  – Internal

• Optimized Technology Transfer
  – Into the company (classical)
  – From the company
  – Within the company

• Strategy
  – Maximize value creation and extraction
"Open Innovation vs. Closed Innovation model

Open Innovation vs. Closed
"Open for Business"
Open Innovation Redefined

Idea
Feasibility
Prototype
Sales

Government Funding

Corporate R&D
Global Divisional R&D
Global Business Units & Technical Service

Sponsored R&D
Consortia

Joint Development
In-License

VC Funds Start-ups
Joint Venture
Out License

Spin Outs

Acquisition
Out License
Sales
Open Innovation in Practice

Enablers: Intellectual Asset Management, Project Management, Early Business Development

License in/Res. contract
Joint Dev.
Acquire
Spin out
Divest
Commercial product

Government $
External Network
Internal Ideas & Needs
License out
Innovation Changes – “flat world”

- Global business complexity ↑
- Pace of innovation ↑
- Cost of energy ↑
- Product cost pressures ↑
- External / Internal Innovation ratio ↑
- Access to external technology ↑
- US Eng / Science talents ↓
- Energy / Environmental sustainability drivers ↑
Why Embrace Open Innovation?

- Increased pressure for faster, better and lower cost new product development
- No single company has > 1% of global R&D capacity\(^{(1)}\)
- Reduced inflow of scientific talent to the US\(^{(2)}\)
- Meet Growth Targets
  - P&G CEO sets goal to have 50% of innovations acquired from outside the company\(^{(3)}\)

7 pillars support effective technology scouting

Understanding and adoption of external technology

**People**
Do we have the right individuals in scouting roles?

**Org.**
Is our program organized and connected to succeed?

**Needs**
Do we know what technology the business needs to grow?

**Sources**
Do we have access to the networks and info sources to find tech?

**Contact**
How do we interact productively with technology developers?

**Handoff**
How do we ensure the tech we find gets adopted and makes a difference?

**Metrics**
How do we measure and judge our scouts and scouting program?
Companies place emphasis on direct contact...

“For each of the following tools, rate how extensively your scouting program makes use of it”

- University relationships
- Govt./national lab relationships
- Corporate VC investments
- VC relationships
- "Crowdsourcing" or OI tools
- Technology brokers
- Direct contact with start-ups
- Direct contact with academics
- Direct contact with other corps

Average rating (1-5 scale)

n = 109
Benefits of Open Innovation

No longer a question of *if*, but *how* you should leverage Open Innovation for Maximum Value

**Value created through**
Combined approach of internal innovation and externally tapping the global innovation community

**Value created by**
internal innovation with limited external network

**SPEED**

- Aggressively evaluate multiple new
  - Technologies
  - Acquisition targets
  - Business models
  - Partners
- Greater results, less effort
- Mitigate risk
- Foster solutions and synergies outside enterprise bias
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Companies cannot develop the new supply systems alone

- University Research
- Contract Inst. Research
- Government labs
- Venture companies
- Industrial partners

Need Open Innovation

People Manufacturing

- New products
- New Processes
- New Materials
- Novel Energy
- Renewables
- New feedstock
- Solutions
University Research

- ERC
- IUCRC
- Individual Project w/ specific PI
- University Alliance
University Alliance

• Partner: Pennsylvania State University

• Partnership
  – Strategic R&D Alliance at University level
  – Over 80 projects in ten years

• Strategic Value
  – Pre-negotiated IP terms
  – Speed to market
IUCRC Benefits

- Networking with customers/competitors
- Pre-competitive focused research
- Quick learning and cost avoidance
- Leveraged funding
- Recruitment of students
- Relationship with world class PI’s
- IP (+/-)
Government Sponsored Research

• Partner: US Government    DOE

• Partnership
  – Development of new high temperature gas separation technology

• Strategic Value
  – Supplements internal R&D
Sponsored R&D

• Partners: Russian Institutes, Universities

• Partnership
  – Over 100 projects since 1992

• Strategic Value
  – Window on emerging technology (hydrogen storage)
  – Process improvements for core technologies (distillation, gas liquifaction, hydrogen production)
In Licensing

• Partner: University of Connecticut
• Partnership
  – License to conductive polymer technology targeted to organic displays
• Strategic Value
  – A new product offering
  – Emerging market
Technology Intermediaries

- Nine Sigma
- Innocentive
- Yet2.com
- Your encore
- Ocean Tomo
- Gerson Lehrman Group
- SpecialChem
Developing a venture capital portfolio

- **Before seeking deal flow**: Need to start with some basic analysis of value drivers and approach alternatives
- Venture funds are differentiated strongly by approach
  - Stage
  - Investment size
  - Sector
  - Portfolio Breadth
  - Exit Strategy- CMEA vs Next Big Thing
  - Corporate Partnering
- Understanding the differences in approach is the key requirement prior to use of the venture model
- Deal flow and portfolio development flows directly from these early decisions
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<th><strong>Fund I</strong></th>
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<tr>
<td>$70MM</td>
<td>$180MM</td>
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<td>Focus = early stage, material startups; Deal Flow = 200+</td>
<td>Focus – clean &amp; sustainable technology</td>
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<td>LP’s were mostly strategic</td>
<td>Early to mid-stage; Deal Flow = 300+</td>
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<td>LP’s heavily weighted w/financials</td>
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From a strategic LP perspective, the first step is the most important.

All other steps are driven by early decisions on where we target.

Requires the input from the 12 strategic LP’s.

Huge opportunity for leverage through proactive interaction with.
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What small Co’s bring:

- Innovative Culture
- Entrepreneurial Spirit
- Risks Takers
- Speed/Agility
- Disruptive technology
What big Co’s bring

- Investment $’s/Resources
- Channel to market/ Sales and marketing
- Supply chain
- Scale-up equipment/ Engineering
- Scale Manufacturing/Operation
- Management/Organization skills
- E H&S + Permitting
Type of Deals

- Acquisition
- Sale of Technology
- Eng./Scale-up/demo
- Licensing
- Marketing Alliance
- Joint Venture
- Equity investor
- Joint Develop.
- Contract Manuf.
- Distributorship
Typical Term Sheet

• Parties
• Purpose
• Conduct of Program/Scope
• Schedule
• Confidentiality
• Ownership of IP: Foreground
• Fees
• Term/Termination
Watch-outs

- Business Models
- Position in Value Chain
- Competitive Products
- Cultural differences
- Strategy / vision
- Risks/Options/BATNA
- Pace of decision making
- Stage of development/IPR
- Valuations
Other issues to consider

• Strategic Alignment
• Long term relationship vs. one time deal
• Who is the decision maker
• Trust issues
• Communications
Thank You!

License in
Spin in
Acquire
Spin out
Divest
License out

Government $
External Network
Internal Ideas & Needs

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