Beyond Best Practices: 
New Developments in Open Innovation

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Agenda for the Talk

• Definition and Motivation for Open Innovation
• The Exponential Paradox
• Recent Research in Open Innovation
• Concluding Thoughts
The Rise of Open Innovation

• In 2003, I did a Google search on the term “open innovation”
  • Received about 200 page links
  • “open” and “innovation” had appeared in same sentence
• For this talk, I did another search, nearly 20 years later
  • Received 2 billion page links
  • Now open innovation has become a distinct concept
  • Though open innovation had multiple potential meanings

• Open innovation has spread throughout the world
  • Tech industry
  • Consumer products
  • Energy
  • Materials
  • Finance
  • Automotive

• And that is just the first page of LinkedIn results!
Open Innovation Definition

• Definition: “a distributed innovation process involving knowledge flows across organizational boundaries, for both pecuniary and non-pecuniary reasons”
  • Chesbrough and Bogers, 2014
Open innovation is NOT (just)

• Open source
• Crowdsourcing
• IP licensing
• University collaborations
• Startup engagement
• Venture capital, corporate VC
• Supplier-driven innovation
• User innovation

Each of these involves knowledge flows across organizational boundaries
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Open Innovation has greatly expanded the intake of new technologies

- Ideas
- Crowds
- Contests
- Universities
- Startups
- Spinoffs
- Licensing
- Intermediaries
- Suppliers
- Customers
But congestion can be the result

- Evaluations
- Legal
- HR
- Finance
- Purchasing

Need support capacity to manage wider intake

The Exponential Paradox

- The Pace of Technology is Accelerating
- Exponential Technologies
- The Lifespan of F500 companies is shortening

- Yet US productivity growth is slowing down
  - US wage growth is even more stagnant
Where is the exponential growth?

![U.S. Total Factor Business Productivity Graph](image)

Average annualized growth rate, 1947-1969: 1.9%
Average annualized growth rate, 1966-2004: 1.6%
35% gap

Source: Center for the Study of Income and Productivity, Federal Reserve Bank of San Francisco, The Economist

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![Productivity growth in 67 countries, 1950-2015](image)

Productivity growth in 67 countries, 1950-2015
Average hourly productivity growth

Source: OECD "Productivity Trends in 67 Countries", 2017
Investing in our future

Federal R&D as Share of GDP

The Best vs. the Rest

Labour productivity: value added per worker (2001-2013)

Notes: the global frontier is measured by the average of log labour productivity for the top 5% of companies with the highest productivity levels within each 2-digit industry. Laggards capture the average log productivity of all the other firms. Unweighted averages across 2-digit industries are shown for manufacturing and services, normalized to 0 in the starting year. The time period is 2001-2013. The vertical axes represent log-differences from the starting year; for instance, the frontier in manufacturing has a value of about 0.3 in the final year, which corresponds to approximately 30% higher in productivity in 2013 compared to 2001. Services refer to non-financial business sector services. See details in Section 3.3.
Open Innovation Results

- Widen the intake
- More eyes on the problem
- Unusual sources for novel solutions
- Useful knowledge is abundant
- Expand downstream capacity

THE THREE FACETS OF INNOVATION

- Innovation Generation
- Innovation Dissemination
- Innovation Absorption

Open up internally
- Open up externally
- Reduce friction
- Move people

Train People
- Complete the Solution
- Align with BU’s
- Align with Biz Model
- Or find a New Biz Model

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  ✓
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Extending Open Innovation:  
Tracing Knowledge Flows from Corporate Venture Capital

Tobias Gutman, Christopher, Chochoiek, Henry Chesbrough

*winner, Best Paper Award, WOIC 2021*  
*forthcoming, California Management Review, 2023*
Inside-In Knowledge Flows

• Technically, not covered by OI definition
  – But critically important to achieve the desired innovation outcomes
• Overcome internal siloes between innovation groups and BU’s
  – Remember the logjam?
• Practices
  – Educate and guide senior level strategic decisions
  – Create reciprocal exchanges between CVC and domain experts in BU’s
  – Recruit and inspire intrapreneurs; share venture best practices with them
Outside-Out Knowledge Flows

- Also technically outside definition of open innovation
- Orchestrate external knowledge across ecosystem
  - Examples: connect promising startup to leading customer; certification programs for external complementors to support customers
- Practices
  - Curate and validate promising ventures, match with partners and customers
  - Use your operations as a test-bed to validate new external technologies
  - Share venture knowledge with other external VC investors, syndicate investment

How IBM Failed to Prosper from Watson

Jialei Yang, Henry Chesbrough, Pia Hurmelinna-Laukkanen
California Management Review, 2022, 64:3, 24-48

- Watson was technical leader in AI, won Jeopardy in 2011
- IBM invested significantly behind it
- IBM signed many partnerships with hospitals to apply Watson
- And it largely failed! (Watson was sold to Francisco Partners in early 2022)
Hypothesis vs. Result

• AI could help radiologists identify cancer
• Hospitals would welcome better diagnoses
• Error rates would be very low

• IBM can co-create directly with customers

Hypothesis vs. Result

• AI did fine with typical cases, but struggled with corner cases
• MD Anderson audit: $60M (not including staff time), no benefit
• False positive errors very expensive
• False negative errors even worse
• Lack of third-party support meant no exploration of alternative uses for Watson
What IBM’s experience teaches us

- The best applications for General-purpose technologies (GPTs) are unclear ex ante
- IBM did many things right, built many complementary assets
  - But was way too closed in its Go-To-Market for Watson
  - A Black Box: no APIs, no SDKs, no reference designs, no third party support
- Open innovation helps appropriate value from GPTs, because it enables multiple market experiments to take place in parallel to find good markets
  - Updates and qualifies Teece (1986) Profiting from Innovation framework
  - An open community may be a valuable complementary asset
Motivations for the Research

Evidence of Open Innovation’s impact on business performance is mixed:

- Surveys use proxy measures, often have limited response rate
- Knowledge flows are difficult to observe
- Several studies of Open Innovation and Firm Performance Show Mixed Results

Natural language processing (NLP) approaches are moving into the social sciences:

- Private Equity firms using NLP to create better measures of ESG
- Can we better measure Open Innovation practices with NLP methods?
- With more data, can we explain the mixed results for Open Innovation and Firm Performance?

Data

Open innovation Practices:

- Russell 3000 Index Stocks (98% US public equity market).
- Business section of each firm’s 10-K report to SEC for text extraction.

Firm financial performance:

- Tobin’s Q (2017 - 2019): firm market value/replacement cost of its assets
- Control variables (firm size; capital intensity; prior performance (ROA); R&D intensity; year fixed effect; sector fixed effect). WRDS CRSP Database.
Selected topics of OIPs derived from keywords

<table>
<thead>
<tr>
<th>Topics</th>
<th>Key words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Network &amp; community</td>
<td>data, advertis, campaign, measur, platform, buyer, collect, technolog, content, third-parti</td>
</tr>
<tr>
<td>2. Customer engagement</td>
<td>custom, softwar, solut, partner, data, servic, provid, platform, manag, applic</td>
</tr>
<tr>
<td>3. Partnership &amp; joint venture activities</td>
<td>properti, partnership, oper, interest, real, joint_ventur, estat, partner, manag, million</td>
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<tr>
<td>4. Industry-academia collaboration</td>
<td>Program, institute, educ, student, author, school, univers, titl, require, educ_program</td>
</tr>
<tr>
<td>5. Contracts &amp; IP licensing</td>
<td>licens, agreement, patent, product, develop, commerci, certain, collabor, grant, exclus</td>
</tr>
<tr>
<td>6. Bilateral transactional activities</td>
<td>franchise, restaur, oper, develop, agreement, franchis, sale, market, local, licens</td>
</tr>
</tbody>
</table>
OIP distribution: not evenly distributed. OIP5 (Contract & IP licensing) and OIP3 (Partnership & joint venture activities) are adopted more frequently compared to other OIPs.

Missing OIPs: Two OIPs were not found in our corpus: crowdsourcing and intermediaries.

### The relationship between OIPs and firm performance

#### OIP impacts on firm performance

<table>
<thead>
<tr>
<th>OIP</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
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<td>(0.207)</td>
<td>1.590***</td>
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<td>OIP4</td>
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<td>(0.414)</td>
<td>1.327***</td>
<td>(0.414)</td>
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<tr>
<td>OIP5</td>
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<td>0.329**</td>
<td>(0.164)</td>
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<tr>
<td>OIP6</td>
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<td>1.513***</td>
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<td>OIP_sum</td>
<td>0.657***</td>
<td>(0.109)</td>
<td>0.657***</td>
<td>(0.109)</td>
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#### Internal R&D moderation effect

<table>
<thead>
<tr>
<th>OIP</th>
<th>Model 5</th>
<th>Model 6</th>
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<tr>
<td>OIP5</td>
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<td>OIP6</td>
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<td>RDI*OIP2</td>
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<tr>
<td>RDI*OIP3</td>
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<tr>
<td>RDI*OIP4</td>
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<td>(0.640)</td>
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<tr>
<td>RDI*OIP6</td>
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<td>(30.813)</td>
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</table>

Control variables: Yes
No. of Obs.: 6590
R-squared: 0.360

Control variables: Yes
No. of Obs.: 6590
R-squared: 0.406
Discussion

- New methods allow new insights!
  - 3,000 firms able to be measured, across 11 sectors
  - Open innovation is associated with improved firm performance
  - BUT, open innovation practices vary in their performance impact
  - AND, the impact of open innovation practices varies by economic sector
  - THEREFORE, **no uniform set of Best Practices exists** to practice open innovation effectively.

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Open Innovation Challenges Today?

- The Dark Side of Open Innovation
  - Who owns the data?
  - What rights do users have?
  - When is licensing pro-competitive, and when is it anti-competitive?

- From Globalization to Resilience
  - Is Closed Innovation making a comeback?
  - How will geopolitical tensions affect the use of Open Innovation?
  - Can Open Innovation contribute to the achievement of the SDGs?

The Growth of Open Innovation Institutions

- Several dedicated conference events each year
  - OUI
  - AOM PDW (also Best Scholar-Practitioner award at AOM this year)
  - WOIC
- Weekly research seminar on open innovation at Berkeley
- Several special issues and special sections on Open Innovation
- Several dedicated Chairs in Open Innovation
  - LUISS
  - TU/e
  - Purdue Engineering School
- Many young Open Innovation scholars receiving promotions
- Today’s PICMET Fellow award – may it inspire others to go further
2003

2006

2006

2011

2014

2019

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