Overview of Precompetitive Collaboration for Institute of Medicine Workshop

February 10, 2010
## What I plan to address (and not)

<table>
<thead>
<tr>
<th>What I plan to address</th>
<th>What I’ll leave for other speakers</th>
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</thead>
<tbody>
<tr>
<td>• <strong>Define</strong> the phenomenon</td>
<td>• <strong>Predict</strong> where it’s all heading</td>
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<tr>
<td>• <strong>Describe</strong> the range of models</td>
<td>• <strong>Prescribe</strong> specific best practices and tactics</td>
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<tr>
<td>• <strong>Derive</strong> some initial insights about these models</td>
<td>• <strong>Propose</strong> how to proceed</td>
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<td></td>
<td>– How to address the larger hurdles (e.g., legal/IP issues, culture)</td>
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What is this phenomenon we are defining?

- Linux
- Wikipedia
- Sematech
- Fermilab
- Human Genome Project
- SNP Consortium
- HapMap
- Biomarkers Consortium
- X Prize Genomics
- InnoCentive
- Pistoia
- Alliance for Cellular Signaling
- Merck-AstraZeneca
- Pink Army Collaborative
- ...

What is it??

- "Precompetitive collaboration"
- "Public-private partnerships"
- "Open source"
- "Open innovation"
- "Distributed innovation"
- "Crowdsourcing"
Framing the phenomenon

- What is the goal?
- Who is contributing?
- Who will directly access the outputs?
- How is the effort organized?
What is the goal?
What do these collaborations have in common?

They are focused on a shared challenge that is critical for progress…

…that cannot be feasibly tackled by a single organization …

…and cannot be exploited as a standalone profit-making opportunity
What is the goal?
What are the outputs?

**Build enabling platforms**
- Develop standards, tools

**Conduct research**
- Generate/aggregate data
- Create new knowledge
- Develop a product

- Develop the necessary infrastructure and methods to allow for more efficient data sharing and R&D process innovation
- Use those tools to aggregate, generate, and integrate data to achieve necessary scale for research
- Transform that data into new knowledge by accessing resources and capabilities across organizations
- Turn that knowledge into a product by accessing resources and capabilities across organizations
**Who are the players?**

**How open/closed is the collaboration?**

<table>
<thead>
<tr>
<th>Collaboration more likely to be open if…</th>
<th>Collaboration more likely to be restricted if…</th>
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<tbody>
<tr>
<td>Who needs to contribute?</td>
<td>Who will access the outputs?</td>
</tr>
<tr>
<td>• Low barriers to entry</td>
<td>• Output cannot be directly monetized</td>
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<tr>
<td>• Need for quantity of input outweighs quality control</td>
<td>• Problem would benefit from ongoing development</td>
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<tr>
<td>• Novel perspectives are sought from diverse fields</td>
<td>• Output closer to commercialization</td>
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<td></td>
<td>• Tied to cost to fund the effort – to avoid free riders</td>
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<td></td>
<td>• Proprietary IP in outputs</td>
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</table>
Who are the players?

Open vs. closed: four possible combinations

Who needs to contribute?

Restricted

Open

e.g., HGP

e.g., Netflix prize

Who will directly access the outputs?

e.g., inter-company collaboration

e.g., Linux
Inter-organizational research collaborations

<table>
<thead>
<tr>
<th>Participants/beneficiaries:</th>
<th>Build enabling platforms</th>
<th>Conduct research</th>
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<td>Open participation</td>
<td>Develop standards/tools</td>
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**Collaboration goals:**

- Open participation: Open output
- Restricted participation: Restricted output
Inter-organizational research collaborations

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<td>Open output</td>
<td>Academic/public only</td>
<td>Academic/industry</td>
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<tr>
<td>Restricted output</td>
<td>Industry only</td>
<td>Foundation</td>
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<td>Bimarkers Consort</td>
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<td>Diabetes Genetics Init</td>
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<td>C-Path</td>
<td>Innovative Meds Init</td>
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Eight models of precompetitive collaboration

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<td>7. <em>Industry complementors</em></td>
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<td>8. <em>Virtual pharma companies</em></td>
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Eight models of precompetitive collaboration

1. Open source initiatives
2. Industry consortia for R&D process innovation
3. Discovery-enabling consortia
4. Public-private consortia for knowledge creation
5. Prizes
6. Innovation incubators/insourcing
7. Industry complementor relationships
8. Virtual pharma companies
1. Open source initiatives

• Description
  – Build collaborative platforms / infrastructure / standards to create open networks for innovation
  – E.g., Linux, Wikipedia, Sage, PatientsLikeMe

• Why do it?
  – Leverages the broadest spectrum of researchers to address a problem
  – Allows anyone to freely access fruits of research

• Challenges and lessons learned
  – Hurdles (e.g., culture, IP) likely greater in biomedicine than software
  – Successful profit models can be built around open source output (e.g. Red Hat)
  – Even open networks require central oversight (e.g. Linux, Wikipedia)
2. Industry consortia for R&D process innovation

- Description
  - Consortia of industry members to improve non-competitive aspects of R&D process
  - Can be organized / facilitated by third parties
  - E.g., Sematech, Pistoia, C-Path, CDISC

- Why do it?
  - Creating standards facilitates industry communication and innovation
  - Pooling resources leverages investment, minimizes risk in technology devt

- Challenges and lessons learned
  - Critical mass of participants is necessary if new standards are to take hold
  - While industry-centric by definition, academic input can broaden perspective
  - Important to build trust via proactive agreement on how IP will be shared
3. Discovery-enabling consortia

- **Description**
  - Consortia of academia and/or industry providing critical mass to generate scale of data needed for innovation
  - E.g., Human Genome Project, SNP Consortium, Alliance for Cellular Signaling, CERN, Fermilab

- **Why do it?**
  - Sheer scale of data needed cannot be achieved by any one player alone
  - Data warehouses, while not immediately monetizable, are of high value for future discovery
  - Putting data in public domain can be a defensive move – to ensure freedom to operate

- **Challenges and lessons learned**
  - More likely to succeed if a sense of urgency and/or built-in demand/application for output
  - Aligning differing industry/academic goals upfront facilitates coordination and progress
  - Dedicated project management is often necessary to coordinate larger efforts
4. Public-private consortia for knowledge creation

• Description
  – Collaborations between industry and academia to create upstream knowledge to enable downstream innovation
  – E.g., Diabetes Genetics Initiative (Novartis-Broad-Lund), Biomarkers Consortium, Serious Adverse Event Consortium

• Why do it?
  – Key research challenge with no immediate market potential but essential downstream value
  – Provides opportunity for closer academia/industry partnerships than “sponsored research”

• Challenges and lessons learned
  – Must align differing industry / academic goals to encourage contribution from all partners
  – Project management with explicit milestones ensures coordination among disparate parties
  – Small consortia may be better equipped to address certain issues -- e.g., regulatory issues related to tissue sharing
5. Prizes

- **Description**
  - Solicit innovative solutions via a transactional relationship, sponsored by industry or foundations, directly or via a third party
  - E.g. InnoCentive, Archon X Prize Genomics, Netflix prize

- **Why do it?**
  - Broad range of contributors leverages talent from diverse fields
  - Can produce critical incremental solutions or catalyze game-changing innovation
  - Large prizes generate publicity – and thus more potential contributors
  - Return on investment can be substantial vs. in-house R&D

- **Challenges and lessons learned**
  - For smaller prizes, must find ways to break problem down into discrete, solvable parts
  - For all prizes, must have clearly-defined objectives and metrics
  - Need to establish a process for integrating external solution into in-house R&D pipeline
6. Innovation incubators/insourcing

- **Description**
  - Sponsored research, brought in-house with additional resources to conduct work
  - E.g. Biogen Idec bi³, Siemens Technology to Business, P&G Connect + Develop

- **Why do it?**
  - Leverages external ideas to fill pipeline of host company beyond what’s internally possible
  - Unlocks outside creative capital that would otherwise lie dormant
  - Fills gap between basic “sponsored research” and VC-targeted late-stage research
  - Hedges risk for both host company and potential academic / entrepreneurial collaborators

- **Challenges and lessons learned**
  - Integration of outside talent into host organization / culture can pose a challenge
  - Insourcing development costs can be a financial disincentive vs. traditional VC investing
7. Industry complementor relationships

• Description
  – Focused collaboration between a small number of competitors for mutual benefit

• Why do it?
  – Value of what companies provide together is greater than the sum of what they could provide separately
  – Enables companies to monetize assets that would be of limited value in isolation
  – Unlocks dormant IP through new business models (particularly relevant to pharma)

• Challenges and lessons learned
  – Challenge of getting over trust hurdle in sharing late-stage IP with competitors
  – Smaller collaborations make it easier to negotiate IP / sharing policies
8. Virtual pharma companies

• Description
  – Collaborations driven by foundations to develop drugs
  – E.g. Multiple Myeloma Research Foundation, CHDI Foundation (Huntington’s), Myelin Repair Foundation

• Why do it?
  – Provides way forward for neglected and rare diseases with little market potential
  – Virtual nature allows funds to target participants with greatest expertise and value
  – Drives progress by “forcing” open collaboration and data sharing as a condition of funding

• Challenges and lessons learned
  – Foundations add value via project mgmt, coordination across diverse research platforms
  – IP must be protected to make clinical trials / commercialization through pharmas profitable
  – Getting large pharma to perform necessary trials remains a challenge
Some parting thoughts:
Precompetitive collaboration and value creation

- Precompetitive collaboration may be viewed, through the lens of economics, as a means of creating and unlocking value

- Precompetitive collaboration aims to increase the value “pie”
  - …by enabling innovation that would not have occurred otherwise
  - …and reducing the cost of innovation (e.g., technology development)

- Businesses can cooperate to increase the size of the pie while they continue to compete around how to divide it

- Where successful, a win/win for industry, academia… and society
Acknowledgements

- David Altshuler, SNP Consortium, HapMap, Diabetes Genetics Initiative
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- Bruce Chrisman, Fermilab
- Peter Diamandis, X Prize Foundation
- Steven Friend, Sage
- Rainer Fuchs, Biogen Idec
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- Karim Lakhani, Harvard Business School
- Nick Lynch, Pistoia
- Bill Spencer, Sematech
- Chris Streeter, AltshulerGray LLC
- John Wagner, Biomarkers Consortium
- John Wilbanks, Science Commons
- Ray Woosley, Critical Path Institute