Overview of Precompetitive Collaboration for Institute of Medicine Workshop

February 10, 2010

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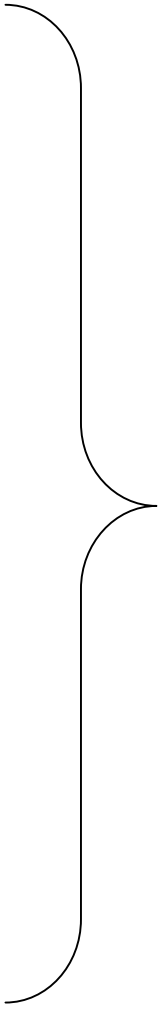
What I plan to address (and not)

What I plan to address	What I'll leave for other speakers
• **Define** the phenomenon • **Describe** the range of models • **Derive** some initial insights about these models	• **Predict** where it's all heading • **Prescribe** specific best practices and tactics • **Propose** how to proceed – How to address the larger hurdles (e.g., legal/IP issues, culture)

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”

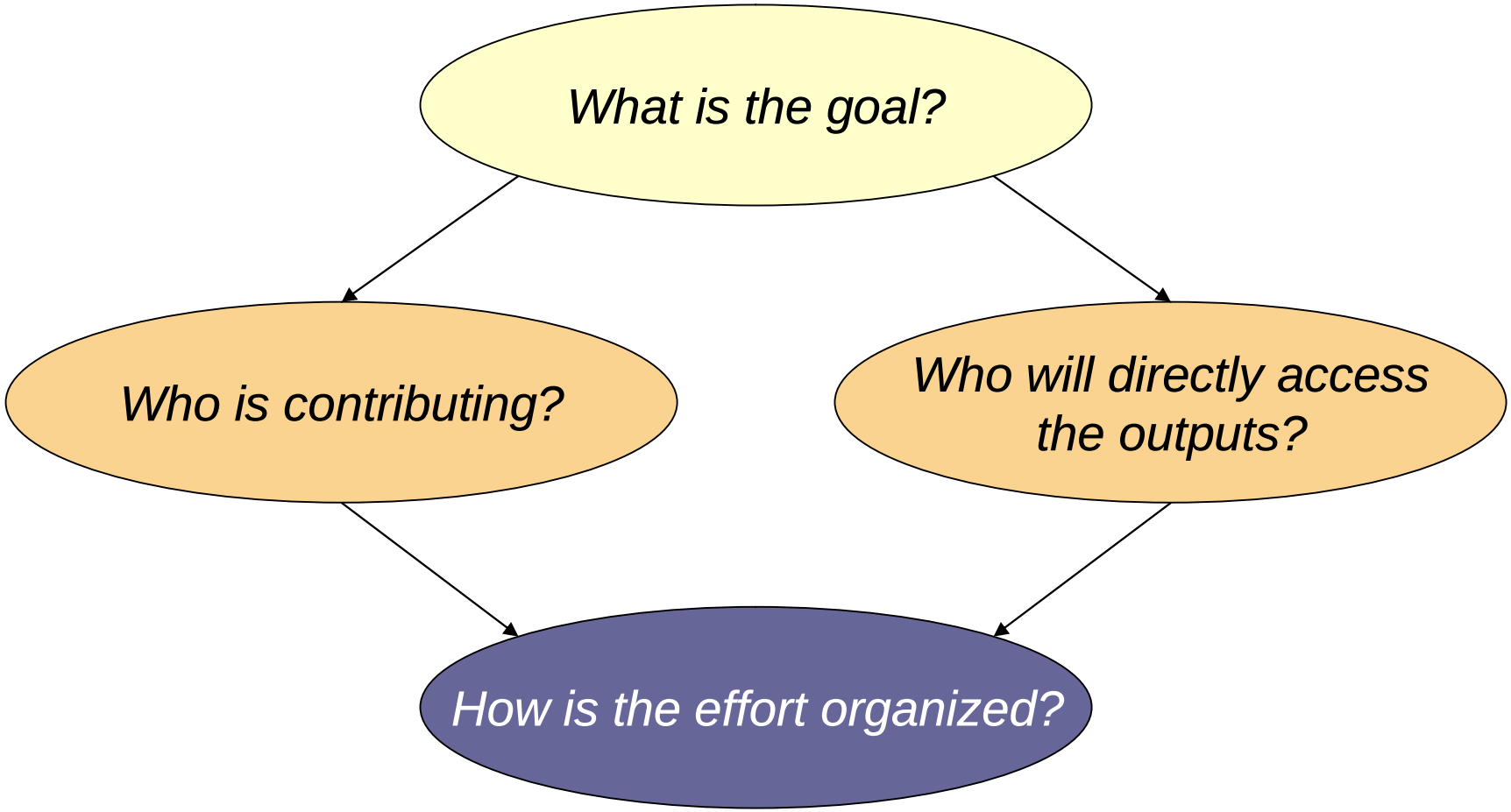
“Open source”

“Open innovation”

“Distributed innovation”

“Crowdsourcing”

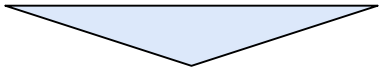
Framing the phenomenon



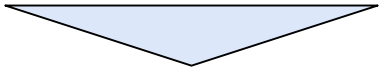
What is the goal?

What do these collaborations have in common?

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



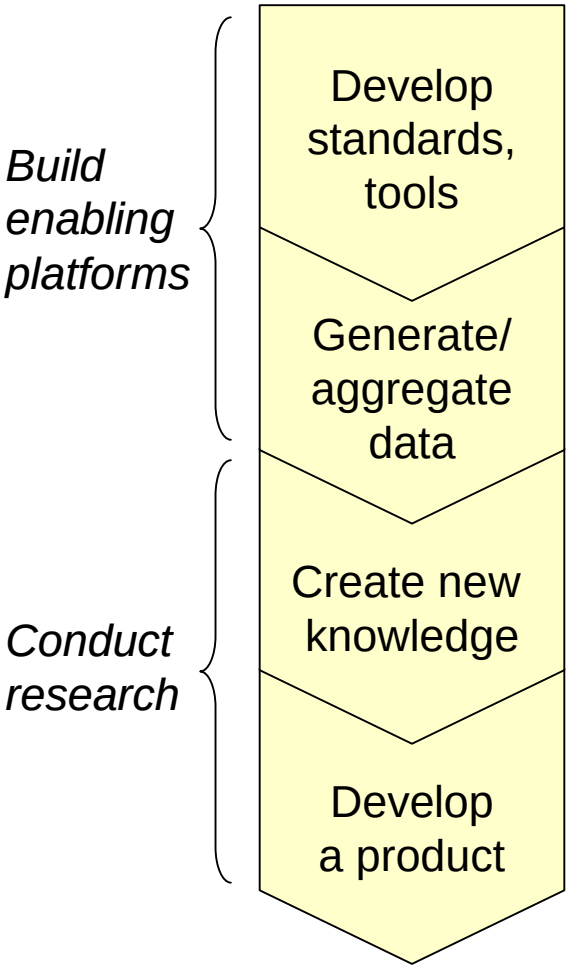
…that cannot be feasibly tackled by a single organization …



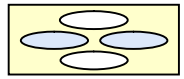
…and cannot be exploited as a standalone profit-making opportunity

What is the goal?

What are the outputs?



- 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



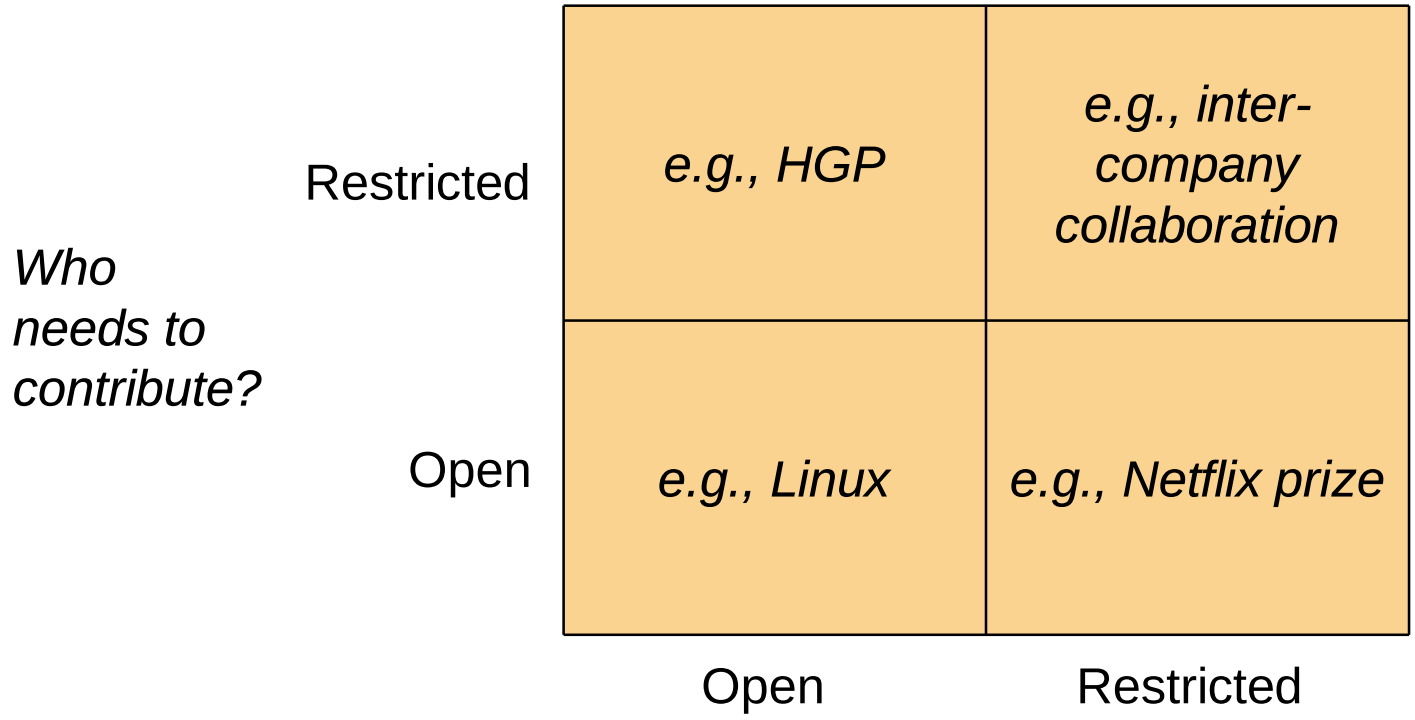
Who are the players?

How open/closed is the collaboration?

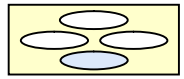
	Who needs to contribute?	Who will access the outputs?
Collaboration more likely to be open if…	• Low barriers to entry • Need for quantity of input outweighs quality control • Novel perspectives are sought from diverse fields	• Output cannot be directly monetized • Problem would benefit from ongoing development
Collaboration more likely to be restricted if…	• High barriers to entry (e.g., cost of equipment) • Need for high levels of coordination and quality control	• Output closer to commercialization • Tied to cost to fund the effort – to avoid free riders • Proprietary IP in outputs

Who are the players?

Open vs. closed: four possible combinations



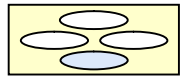
Inter-organizational research collaborations



Collaboration goals:

Participants/ beneficiaries:	Build enabling platforms		Conduct research	
	Develop standards/tools	Generate/ aggregate data	Create new knowledge	Develop a product
Open participation Open output				
Restricted participation Open output				
Open participation Restricted output				
Restricted participation Restricted output				

Inter-organizational research collaborations



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Open participation Open output	Linux	Crystallography OD		Pink Army Coop
	Wikipedia	PatientsLikeMe		India OSDD
	Synaptic Leap	Sage		
	Open Health NLP			
Restricted participation Open output	CDISC	HGP	Biomarkers Consort	
	Pistoia	Alliance for Cell Sig	Diabetes Genetics Init	
	C-Path	SNP Consortium	Innovative Meds Init	
		HapMap	CCMX	
		RNAi	SAEC	
		Signaling Gateway		
Open participation Restricted output				Prize4Life
				X Prize Genomics
				InnoCentive
				Netflix Prize
				P&G Connect/Develop
Restricted participation Restricted output	Sematech	CERN		Biogen bi^3
		Fermilab		Siemens Tech to Bus
		SLAC		Merck-AZ
				Pfizer-GSK
				MMRF
				CHDI

Academic / public only Academic / industry Industry only Foundation

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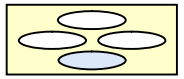
Eight models of precompetitive collaboration



Collaboration goals:

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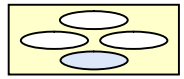
Open participation Open output	Linux Wikipedia Synaptic Leap Open Health NLP *1. Open source initiatives*	Crystallography OD PatientsLikeMe Sage		Pink Army Coop India OSDD
Restricted participation Open output	CDISC Pistoia C-Path	HGP Alliance for Cell Sig SNP Consortium HapMap RNAi Signaling Gateway	Biomarkers Consort Diabetes Genetics Init Innovative Meds Init CCMX SAEC	*4. Public-private consortia for knowledge creation*
Open participation Restricted output			*5. Prizes* *6. Innovation incubators* *7. Industry complementors* *8. Virtual pharma companies*	Prize4Life X Prize Genomics InnoCentive Netflix Prize P&G Connect/Develop Biogen bi^3 Siemens Tech to Bus Merck-AZ Pfizer-GSK MMRF CHDI
Restricted participation Restricted output	Sematech *2. Industry consortia for process innovation*	CERN Fermilab SLAC *3. Discovery-enabling consortia*		

Academic / public only Academic / industry Industry only Foundation

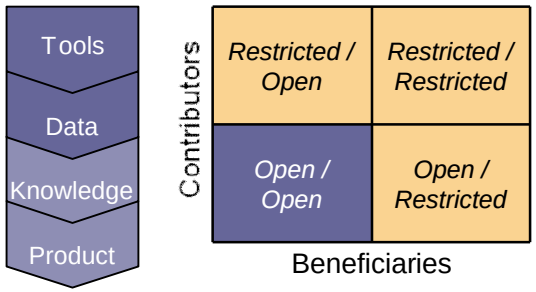


Eight models of precompetitive collaboration

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

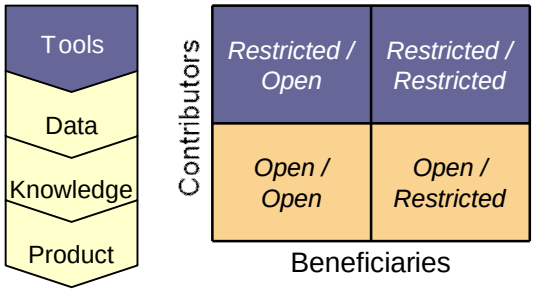


- Why do it?
  - Leverages the broadest spectrum of researchers to address a problem
  - Allows anyone to freely access fruits of research

- 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

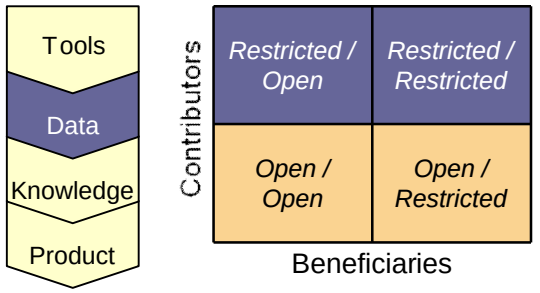


- Why do it?
  - Creating standards facilitates industry communication and innovation
  - Pooling resources leverages investment, minimizes risk in technology devt

- 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

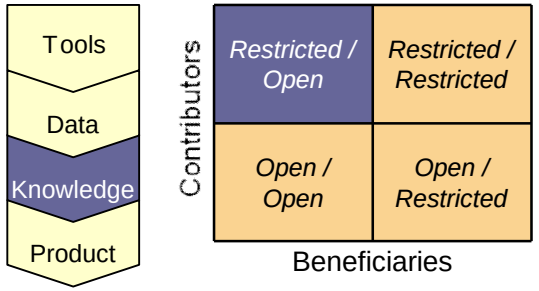


- Why do it?
  - Sheer scale of data needed cannot be achieved by any one player alone
  - Data warehouses, while not immediately monetizable, are of high value for future discovery
  - Putting data in public domain can be a defensive move – to ensure freedom to operate

- 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

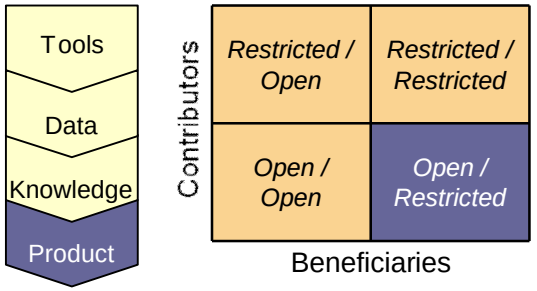


- Why do it?
  - Key research challenge with no immediate market potential but essential downstream value
  - Provides opportunity for closer academia/industry partnerships than “sponsored research”

- 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

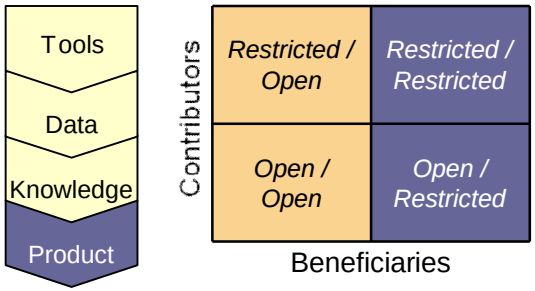


- Why do it?
  - Broad range of contributors leverages talent from diverse fields
  - Can produce critical incremental solutions or catalyze game-changing innovation
  - Large prizes generate publicity – and thus more potential contributors
  - Return on investment can be substantial vs. in-house R&D

- 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 bi^3, Siemens Technology to Business, P&G Connect + Develop

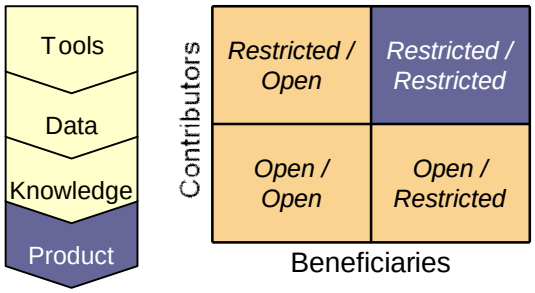


- Why do it?
  - Leverages external ideas to fill pipeline of host company beyond what's internally possible
  - Unlocks outside creative capital that would otherwise lie dormant
  - Fills gap between basic "sponsored research" and VC-targeted late-stage research
  - Hedges risk for both host company 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
  - E.g. Merck-AZ: combined use of two anticancer compounds, Pfizer-GSK in HIV: Viiv Healthcare, Intel-Microsoft (Nehalem / Windows 7)

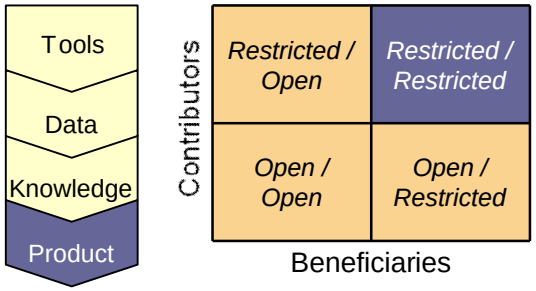


- Why do it?
  - Value of what companies provide together is greater than the sum of what they could provide separately
  - Enables companies to monetize assets that would be of limited value in isolation
  - Unlocks dormant IP through new business models (particularly relevant to pharma)

- 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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- Peter Diamandis, X Prize Foundation
- Steven Friend, Sage
- Rainer Fuchs, Biogen Idec
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- Nick Lynch, Pistoia
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