

“Towards Innovating A New Knowledge Commons”

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Towards A New Knowledge Commons

"If they can get you asking the wrong questions, they don't have to worry about [your] answers."

[Thomas Pynchon, Gravity's Rainbow (1973)]

The Commons

– A working definition

The commons is **an independent resource** [cultural or natural: knowledge, land, water or air] that is **held ‘in common’** and is generally **not strictly regulated** by the state or **influenced** by the market [Benkler, Lessig, Ostrom].

Collaborative Production In A Networked Economy

Market Based ***Non-market Based***

Decentralised

Centralised

Collaborative Production In A Networked Economy

Market Based *Non-market Based*

Decentralised **Price System**

Centralised

Collaborative Production In A Networked Economy

Market Based *Non-market Based*

Decentralised **Price System**

Centralised **Firm Competition**

Collaborative Production In A Networked Economy

Market Based

Non-market Based

Decentralised

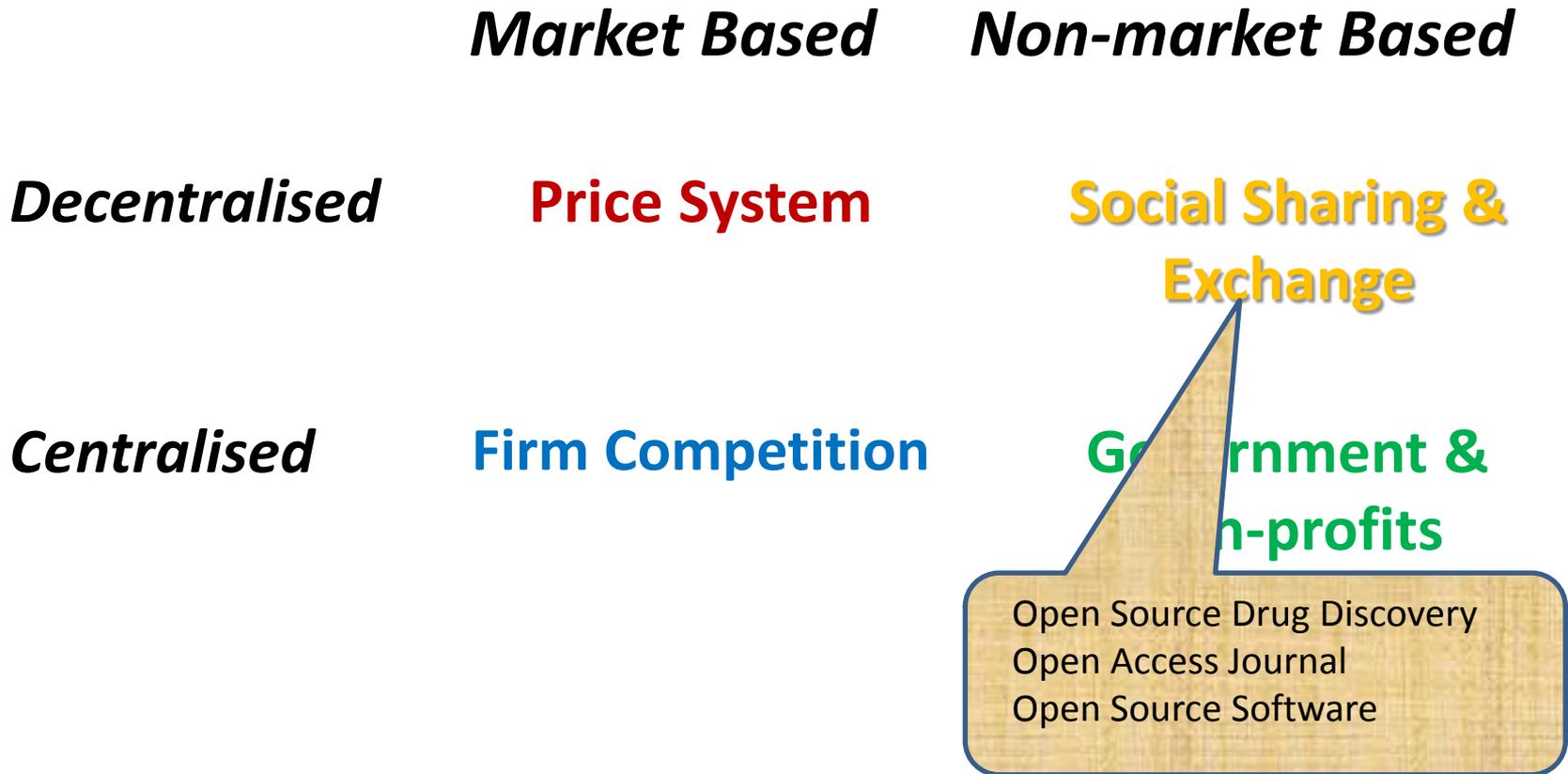
Price System

Centralised

Firm Competition

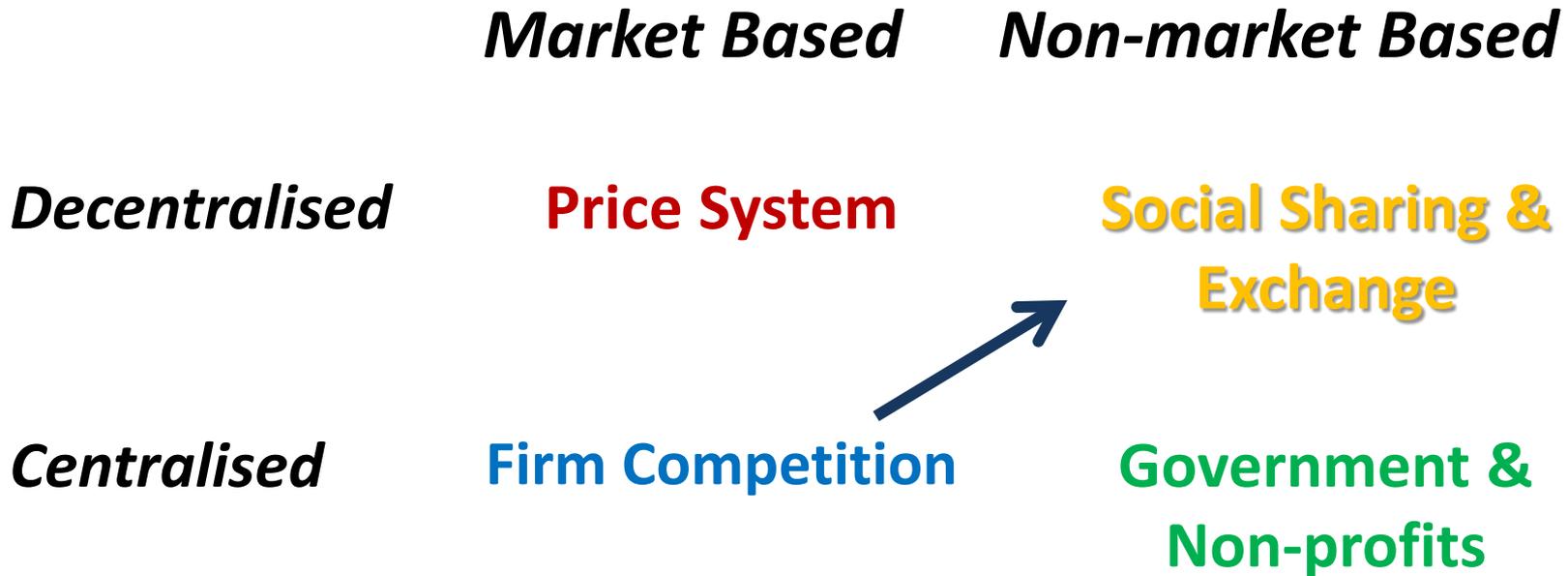
**Government &
Non-profits**

Collaborative Production In A Networked Economy



Source: Yochai Benkler, *The Wealth Of Networks*, YUP, 2006.

Collaborative Production In A Networked Economy



Reversal of two trends:

away from concentration & commercialization towards a decentralized, collaborative and often nonproprietary model [network + computing device + human computation].

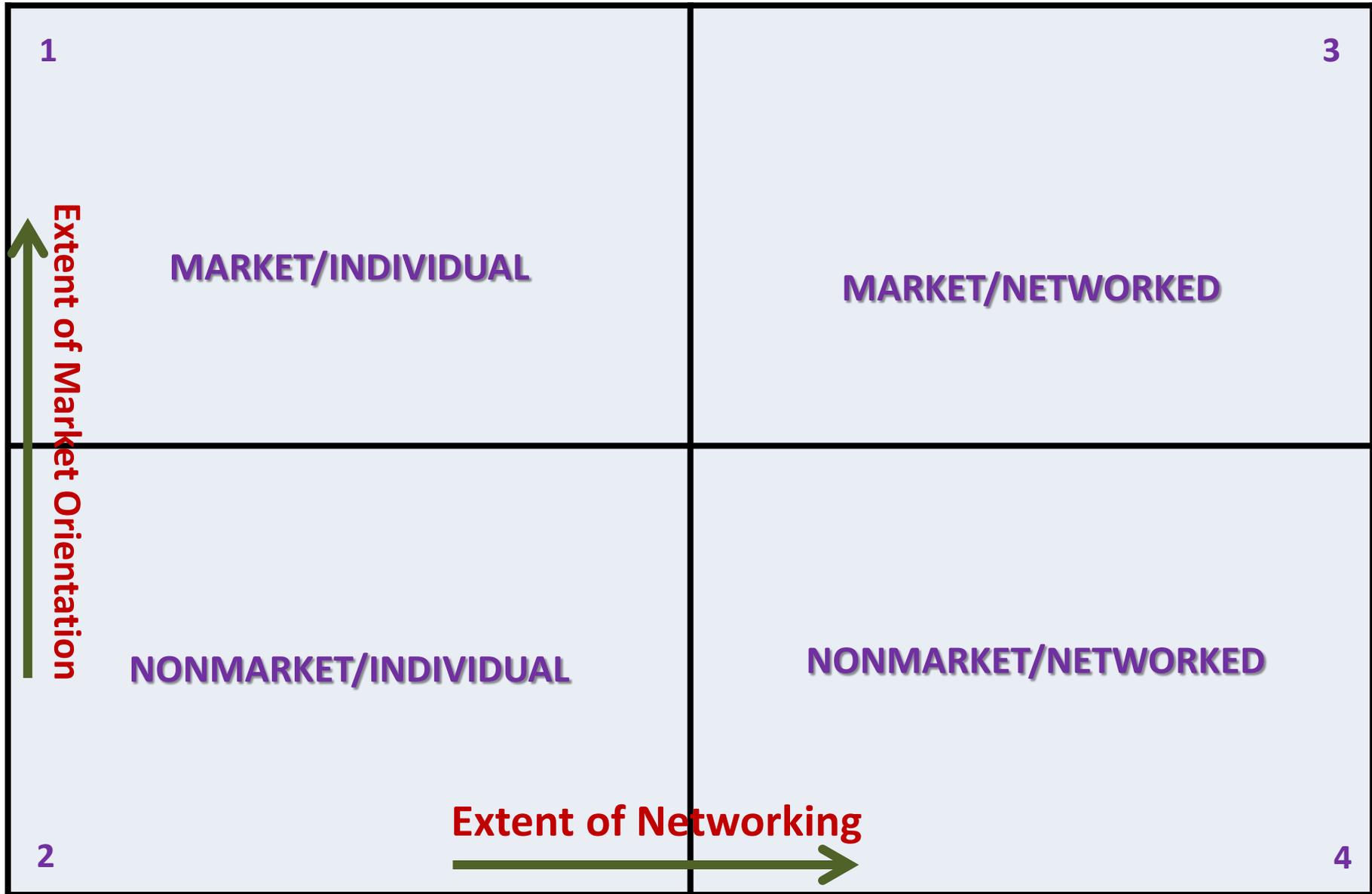
Historical Evidence

Impact Of Markets & Networks On Technological Innovation: 1800 To Present



Source: Steven Johnson, *Where Good Ideas Come From* (Riverhead Books, NY 2010)

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Impact Of Markets & Networks On Technological Innovation: 1800 To Present

| | |
|---|---|
| <p>1</p> <p>Tesla Coil Gatling Gun Nylon Vulcanized Rubber Revolver Dynamite AC Motor Air-conditioning Transistor</p> <p>MARKET/INDIVIDUAL</p> | <p>3</p> <p>MARKET/NETWORKED</p> |
| <p>Spectroscope $E=mc^2$ Nitroglycerine Cell Nucleus X Rays Double Helix Superconductors</p> <p>Hormones Bunsen Burner Stethoscope Benzene Structure Blood Groups CT Scan Neutron</p> <p>2</p> <p>NONMARKET/INDIVIDUAL</p> | <p>4</p> <p>NONMARKET/NETWORKED</p> |

Impact Of Markets & Networks On Technological Innovation: 1800 To Present

| | |
|--|--|
| <p> Tesla Coil Gatling Gun Nylon Vulcanized Rubber Revolver Dynamite AC Motor Air-conditioning Transistor </p> <p>1 MARKET/INDIVIDUAL</p> | <p> Airplane Induction Motor Moving Assembly Line Electric Motor Telegraph Elevator Plastic Telephone Automobile </p> <p> Steel Contact Lenses Locomotive Refrigerator Sewing Machine Typewriter Internal Combustion Lightbulb Radio </p> <p>MARKET/NETWORKED 3</p> |
| <p> Spectroscope E=mc² B Nitroglycerine Cell Nucleus X Rays Double Helix Superconductors </p> <p> Hormones Bunsen Burner Stethoscope Benzene Structure Blood Groups CT Scan Neutron </p> <p>2 NONMARKET/INDIVIDUAL</p> | <p> Braille Enzymes Mitochondria Internet Radar Oncogenes MRI Endorphins </p> <p> GPS Radioactivity Anesthesia Oral Contraceptives Periodic Table Radiography Chloroform Infant Incubator </p> <p> Quantum Mechanics Penicillin Vitamins Germ Theory Chemical Bonds Computer Aspirin GUI </p> <p>NONMARKET/NETWORKED 4</p> |

Impact Of Markets & Networks On Technological Innovation: 1800 To Present

- ♣ Solo amateur innovation [quadrant 1] surrenders much of its lead to the rising power of networks and commerce [quadrant 3 & 4].
- ♣ But the most dramatic change lies along the horizontal axis, in a mass migration from individual break-throughs [on the left] to the creative insights of the group [on the right].
- ♣ **[Inventors]:** Michael Faraday, Jonas Salk, William Sturgeon, W.A. Burt, Louis Braille, Barthelemy Thimonnier, Alexander Graham Bell, Nicolaus August Otto, Melville Bissell, Thomas Edison, Eadweard Muybridge , Joseph Wilson Swan, John Milne ...

Standing On The Shoulder Of Giants

- ♠ Knowledge – for centuries - advanced collectively and relationally.
- ♠ Current configuration of IP does not **adequately recognize** the intangible, reproducible or shared aspects of knowledge creation.
- ♠ Current IP regime may have the **paradoxical** effect of **undermining** the very creativity that it was established to protect.

Impact of IPR On Collaborative Social Production

- Strengthening IPR increases the prices that those who invest in producing information today must pay to those who did so yesterday.
- We need to recognise that non/anti rivalrous nature of information flows produces an economics of abundance rather than scarcity.

$$Pr_{\text{today}} = Pr_{\text{yesterday}} + IP \text{ [copyright, patent, TM, ID, etc.]}$$

If IP = 0 <information produced at marginal cost & hence a good candidate for non-proprietary production>

If IP = high <price of innovation rapidly increases – anti commons>

Implication

Raw Material Of The Knowledge Economy [KE]

- ♣ Chief raw material of the KE is **CODE** - software or genetic
- ♣ Software, “will deeply **accelerate** the rate of innovation ... as it is the **rate-limiting step** in the information economy” [Weber 2004]
- ♣ **Q: In A Global Context:**
 - Who owns these codes? [Not Developing countries]**
 - Can code, however, be easily distributed? [Yes]**
 - Can it add to the new commons? [Most, Certainly Yes]**

Code: A Spill Over Good

CODE: A 'Spill Over' Good

- [OSS] **Anti-rivalrous** rather than merely non-rivalrous: value actually **increases** with the simultaneous use by another [Weber, 2004].
- As code is easily **dispersed, forked, mutated & shared**, fixing it into clear IP fragments is difficult.
- Legal Landscape **Littered with S/W Litigation**: s/w patent Trolls, MSN vs Google, Samsung vs Apple, Motorola vs Apple, ...

Open Source Disruption

- ♣ “Open Source”: an instance of major cleavage developing within the global information economy.
- ♣ **Open Source Disruption: Harbingers of “new commons”**
 - ♠ Removes raw material/code “[away] ... from the control of [centralised entities] company or govt., & turns it into ... a **valuable** commons, because it **cannot be depleted by overuse**” (e.g., Matlab versus Scilab), [Weber 2004].
 - ♠ Possibly **reduce returns** to the existing [proprietary] owners of IP by creating new competition.

A New Commons

- ♣ The new commons “make it possible to imagine a **shared global infrastructure that is far less expensive** than a similarly global and shared infrastructure would necessarily have been in a physical environment (think railroads, or even container shipping).”
- ♣ For the **industrial information economy**, the pressure from such social production is **experienced mostly as pure threat**.
- ♣ A **clash** between the old and the new practices has driven much of policy-making, legislation, and litigation in this area.

Conclusion

- ♠ Innovations happen not necessarily under the influence of the market or the state but under favourable conditions that obtain within a collaborative structure of a networked knowledge commons.
- ♠ IP must not get in the way of such a commons building exercise.
- ♠ A knowledge commons, like Jonas Salk's deliberately unpatented Polio Vaccine, can spread through the world, redistributing global resources, in favour of addressing problems of developing countries.



Beware The Threat Of An Anti-commons

Replication And Codification Of Information

♣ Codification Of Biotech Information:

1. Information exists as a continuum of “codification”: from codified to the uncoded
2. Proportion that remains “uncoded” depends on the technology’s newness and complexity.
3. Most biotech information is “uncoded” & therefore not easily replicable.
4. Biotech innovation occurs closer towards the “uncoded” end.
5. Market mechanisms transfer such “uncoded” information in a more costly way than non-market mechanisms (Hope, 2008).
6. For “uncoded” information, the decentralized innovation is more efficient than the central co-ordination, e.g., “commons based peer production” [Yochai Benkler] & “user innovation network” [Eric Von Hippel].

Social Production

- ♣ Social production is changing the relationship of firms to individuals outside of them, and through this changing the strategies that firms internally are exploring.
- ♣ Consumers are changing into users—more active & productive than the consumers of the industrial information economy. [user-based innovation - Eric von Hippel]
- ♣ For the industrial information economy, the pressure from social production is experienced as pure threat.
- ♣ A clash between the old and the new practices has driven much of policy-making, legislation, and litigation in this area.

The

- A spill over anti-rivalrous commons
 - The generative power of open platforms
 - Codification of all knowledge
- The Adjacent Self
 - [the history of the carbon atom].
 - Biomineralisation [steven johnson]
 - Trapping atmospheric carbon dioxide [calera.com]

Ingredients Of Peer Based Production

First: Existing information and culture:

- A non-rival good with real marginal cost equal to zero.
- Economics defines a market as producing a good efficiently only when it is pricing the good at its marginal cost
- A good like information which can never be sold at its marginal cost, is a candidate for substantial non-market production.

Information Infrastructure

- ♣ Three functional elements of the information infrastructure:
 - ♣ a) Shared, b) Global, and c) Digital, none of which fully depends on the other.
 - ♣ Present infrastructure is either: a) global without being shared, or b) digital without being global.
- ♣ **The new commons “make it possible to imagine a shared global infrastructure that is far less expensive than a similarly global and shared infrastructure would necessarily have been in a physical environment (think railroads, or even container shipping).”**

Goldcorp Inc. [www.goldcorp.com]

Goldcorp is the lowest-cost and fastest growing senior gold producer with operations and development projects situated in low political risk countries throughout the Americas.

A Canadian company headquartered in Vancouver, Canada, Goldcorp employs more than 10,000 people worldwide.

Red Lake Gold mine is Canada's largest gold mine, and in **2009 produced 623,000 ounces at a cash cost of \$288/oz.** It is also one of the world's richest gold mines and lowest cost producers.



Goldcorp Challenge:

- Challenged industry's No# 1 rule: "Don't share your proprietary data"
- Released some **400 megabytes** worth of information about **55,000 acres of property** on its web-site.
- A total of **\$575,000** in prize money available to participants who submitted the best methods and estimates.
- **~1000 virtual prospectors** from 50 countries got busy crunching the data.
- Contestants identified 110 targets on the Red Lake property, more than 80% of which yielded substantial quantities of gold. **8 million ounces of gold** have been found—worth well **over \$3 billion**.
- An under-performing \$100 million company into a **\$9 billion** juggernaut while transforming a backwards mining site in Northern Ontario into one of the most innovative and profitable properties in the industry.
- One hundred dollars invested in the company in 1993 is worth more than **\$3,000 today**.

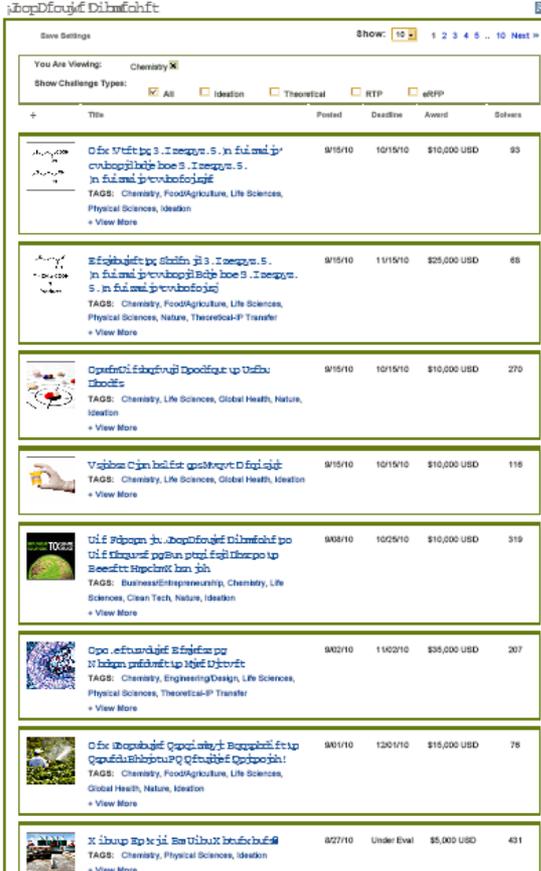
New Business Models in Knowledge Economy

InnoCentive [<http://www2.innocentive.com/>]

A “Crowd Sourcing Model”

Inception in 2001:

1. Total Solvers: 200,000+ from 200 countries
2. Total Challenges Posted: 1044
3. Total Solution Submissions: 19,346
4. Total Awards Given: 685
5. Total Award Dollars Posted: \$24.2 million
6. Range of awards: \$5,000 to \$1 million based on the complexity of the problem
7. Total Dollars Awarded: \$5.3 million
8. Average Success Rate: 50%



The screenshot displays the InnoCentive website interface for the Chemistry category. It features a search bar, filter options for challenge types (All, Ideation, Theoretical, RTP, eRFP), and a table of active challenges. Each challenge entry includes a title, tags, posted and deadline dates, award amount, and the number of solvers.

| Title | Posted | Deadline | Award | Solvers |
|--|---------|------------|--------------|---------|
| On the synthesis of... in the field of... TAGS: Chemistry, Food/Agriculture, Life Sciences, Physical Sciences, Ideation | 9/15/10 | 10/15/10 | \$10,000 USD | 93 |
| ... TAGS: Chemistry, Food/Agriculture, Life Sciences, Physical Sciences, Nature, Theoretical-P Transfer | 9/15/10 | 11/15/10 | \$25,000 USD | 66 |
| ... TAGS: Chemistry, Life Sciences, Global Health, Nature, Ideation | 9/15/10 | 10/15/10 | \$10,000 USD | 270 |
| ... TAGS: Chemistry, Life Sciences, Global Health, Ideation | 9/15/10 | 10/15/10 | \$10,000 USD | 116 |
| ... TAGS: Business/Entrepreneurship, Chemistry, Life Sciences, Clean Tech, Nature, Ideation | 9/30/10 | 10/25/10 | \$10,000 USD | 319 |
| ... TAGS: Chemistry, Engineering/Design, Life Sciences, Physical Sciences, Theoretical-P Transfer | 9/30/10 | 11/02/10 | \$35,000 USD | 207 |
| ... TAGS: Chemistry, Food/Agriculture, Life Sciences, Global Health, Nature, Ideation | 9/30/10 | 12/31/10 | \$15,000 USD | 76 |
| ... TAGS: Chemistry, Physical Sciences, Ideation | 8/27/10 | Under Eval | \$5,000 USD | 431 |

Replication And Codification Of Information

♣ Market oriented assumptions on information flows [Thomas Mandeville (1996)]:

1. Replication reduces incentive in further investment.
2. Market is the primary mechanism for the exchange of information.
3. Central co-ordination of research activity is more efficient than decentralized innovation.

Redistributive Effect Of The New Commons

- ♣ Open source initiatives:
 - the harbingers of the “new commons”
 - chief outcome would be to create a redistributive effect.

- ♣ Both in the North and South of the global economy, the impact of the new commons will:
 - a) Reduce returns to the existing [proprietary] owners of IP by creating new competition for their products &
 - b) Shift assets and incomes from resource heavy North to resource depleted South [Weber and Bussel]

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[Thomas Pynchon, Gravity's Rainbow (1973)]

The Wrong Question:

Why are efficiency, market incentives and a strong IP regime, the most significant factors that influence new innovations?