# Is there a market for ideas?

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**Markets for Technology:**
**Strategy and Industry Evolution**

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# Motivation

- Markets for ideas & technology have high potential social returns
  - A single idea may be valuable to many users and in many applications, often in contexts far removed from the locus of invention
  - The value of an idea depends on "matching" with complementary assets
  - Efficient markets for ideas can provide efficient signals for future investment

- Despite this promise, markets for ideas are empirically rare
  - Trade in technology and ideas is modest in many sectors
  - More importantly, most trade occurs through isolated transactions as opposed to organized markets. The outside option in most negotiations over ideas is additional costly search or internal development, rather than the ability of buyers (sellers) to play sellers (buyers) off against each other
  - Intriguingly, the most active and robust institutions for knowledge exchange – for example, the Republic of Science, the blogosphere -- share the characteristic that the "price" of knowledge is exactly equal to zero

# Is there a Market for Ideas?

- We combine two distinct prior literatures
  - Economic analysis of the requirements & challenges of market design
    - Market Thickness, Lack of Congestion, Market Safety, and Repugnance
  - Markets for Technology
    - Non-Excludability and Non-Rivalry

- The nature of ideas undermines the market for ideas

- The most robust markets for ideas are those where ideas are free (repugnance)

- Formal intellectual property rights may not simply facilitate isolated transactions but play a crucial role in overcoming key challenges in establishing efficient markets for ideas

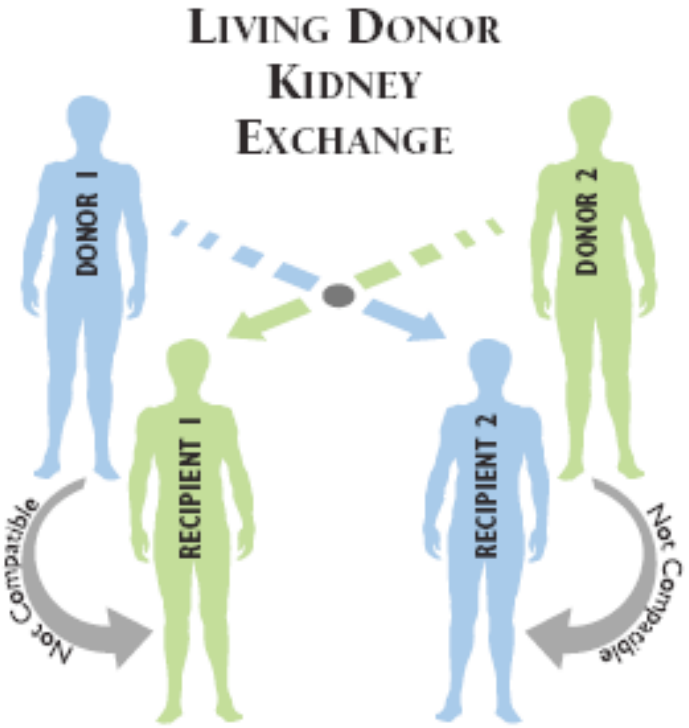
# Outline

- **Lessons from Market Design**
- How does the nature of ideas impact the market for ideas?
- The impact of institutions on the market for ideas
- Repugnance in the market for ideas

# Economists as Engineers

- While many facets of the game theory revolution were simply a theoretical exercise, key branches– most notably, mechanism design – offer powerful if abstract insights into the efficiency and limitations of alternative market allocation mechanisms when buyers and sellers possess private information
- Over the past twenty years, (some) game theorists have become deeply involved in practical market design
  - FCC Spectrum Auction (Wilson, Milgrom, McAfee, Kramton)
  - National Medical Resident Matching Program (Roth)
  - NYC and Boston Public School Choice programs (Roth)
  - Internet Advertising Position Auctions (Varian (Google), McAfee (Yahoo), Athey (Microsoft)
  - Etc….
- Rather than simply "apply" the theory, real-world applications have opened up new insights into the requirements for efficient market operation, and raised new theoretical challenges

# Kidney Exchange:
# Market Design in Action




While many kidney disease patients have willing donors, incompatible blood and antibody types limit donations. A market for voluntary living donor kidney exchange dramatically enhances the scope for donation, even though the market must operate in the complete absence of prices.

# What have we learned from market design? (Roth,Hahn Lecture, 2007)

- Three criterion for effective markets and allocations systems (p. 3)
  - **Market Thickness:** a sufficient proportion of potential market participants must be ready to come together ready to transact with one another
  - **Lack of Congestion:** individual transactions must be structured so that market participants can consider enough alternative possible transactions to arrive at satisfactory ones
  - **Market Safety:** participation must be safe and simple, compared to transacting outside of the marketplace, or engaging in strategic behavior that reduces overall welfare

- An important lesson from real-world market design (p. 4)
  - **Repugnance:** social norms place significant informal and formal restrictions on the ability to use prices to facilitate allocation (kidneys, sex, voting)

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# What is a *Market* for ideas?

- An efficient Market for Ideas is characterized by three features:
  - *Endogenous Outside Options:* The *outside options* of buyers and sellers is, generically, an alternative transaction in the same exchange environment (i.e., taking a competing offer)
  - *Transparent Pricing:* The *price* of all completed transactions is transparent to all buyers and sellers
  - *Stable Allocations:* In a one-to-one stable market allocation, each buyer and seller is in the best "match" they can get, given the other matches.
- By and large, most research on markets for technology or ideas have either assumed the market away or assumed its operation:
  - Bilateral transactions isolated from buyer/seller competition (AFG, Lerner and Merges, Anand and Khanna, Aghion and Tirole, GHS, etc)
  - Market transactions where price is determined by imperfect competition among buyers & sellers (AFG, Pisano, Levine, Ziedonis, Gans and Stern, etc)
  - Hellman (2007) explicitly analyzes the role of search costs in markets for technology, but assumes that market structure is given

# The Nature of Ideas

- We focus on two properties of ideas which impact the challenge of market design in the market for ideas
  - Refines Romer (1990)

- ***Value Rivalry*:** Whether the value of an idea declines when others have access to the idea
  - High Value Rivalry: Financial Engineering Algorithm, Process Innovation
  - Low Value Rivalry: Music, Medical Knowledge

- ***User Reproducibility:*** The cost to users of reproducing the idea for other potential users
  - High User Reproducibility: Digital Music (and other digital goods)
  - Low User Reproducibility: Tacit process innovation

# The Impact of Value Rivalry on the Market for Ideas

- In many cases, the value of accessing an idea by a potential buyer is highest if the "secret" is maintained between buyer and seller
  - Anton and Yao exploit this insight to examine the bargaining power available to an ideas producer in the case of bilateral exchange

- If the value of ideas is declining to users in the number of other users who *know* the idea, the ability of an ideas seller to expose that idea to multiple potential buyers for an exclusive sale declines
- Limitations on disclosure by sellers reduces the ability of buyers to evaluate the relative value of different ideas in the market
- ***Value Rivalry*** results in congestion. If the market is operational, incentives to pre-empt the market, or place restrictions on buyers and sellers to avoid competitive bidding and comparative evaluation

Imagine a stock market in which buyers and sellers couldn't find out the prices at which anyone else sold a share of stock. If you wanted to buy (or sell) a share of stock, you would have to guess what it was worth…. Willing buyers and sellers would often miss each other. The price at which a sale did close would vary widely from sale to sale. And those who had a source of private or inside information would be able to exploit others…. Surely no one would intentionally design a system in which trades had to be "blind" in this way.

Patents, however, exist in just such a blind market. Want to know if you are getting a good deal on a patent license or technology acquisition? Too bad.

Lemley and Myrhvold, 2008

# The Impact of User Reproducibility on the Market for Ideas

- In many settings, an idea can be *reproduced by users* at essentially zero marginal cost, and there are significant limitations on whether the seller can control how users exploit or distribute the idea
  - The low MC of reproduction is a fundamental feature of information goods
- In an organized market, the first user/buyer has incentives to *also* becoming a *seller* of the same idea (Boldrin and Levine). Competition between the initial ideas producer and the initial buyer will, under zero MC, result in a zero price.
- This expectation of a zero price induces an externality among buyers about who should "subsidize" the first purchase, undermining the effective operation of a market with price > 0

- ***User Reproducibility*** results in a failure of market safety. Individuals have incentives to engage in strategic behavior that undermines the social welfare arising from market allocation.

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# Engineering the Market for Ideas

- The ability to achieve efficiency in the market for ideas depends on the development of institutions, policies, and market rules that limit the impact of *value rivalry* and *user reproducibility.*

- Formal Intellectual Property Exchanges

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INTELLECTUAL CAPITAL EQUITY

- Key Trade Conferences

Bio
BIOTECHNOLOGY
INDUSTRY ORGANIZATION

- Transparent Platforms

- Standard Setting Organizations

# The Impact of Intellectual Property Righs on the Market for Ideas

- Traditionally, formal IPR such as patents have been rated as having only a modest importance in capturing the rents from innovation (Levin, et al, 1986; Cohen, et al, 2003).
- Work on markets for technology have emphasized the crucial role of formal IPR in bilateral transactions by providing a means for contractibility and overcoming Arrow's disclosure problem (AFG, GHS)
- However, formal IPR play a new role in market design. They allow a single seller to disclose an idea to *multiple* potential buyers (addressing value rivalry), and, through licensing restrictions, limit the scope of ideas purchase to limit future competition in the market for ideas (limiting the impact of user reproducibility)
  - In the absence of strong relational mechanisms, an efficient market for ideas depends on transforming underlying ideas into property rights

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# GPS based systems and applications

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**Seller:**
NASA

**Featured IP Assets:**
US 6,211,822; US 6,278,404; US 6,593,879; US 6,594,582; US 6,760,664; US 6,844,856

**Opening Bid:**
$75,000
Please Inquire Regarding Bidding Process

## Lot Summary:

Ocean Tomo Federal Services, LLC, is offering exclusive licenses to NASA Goddard Space Flight Center inventions. This lot comprises a diverse portfolio of six U.S. patents and one domestic application directed to global positioning technologies. The technologies disclosed by the offered patents relate to methods and apparatus for processing global positioning signals.

Among the six U.S. patents offered in this Lot, U.S. Patent Application No. 11/239,458 discloses a method and apparatus for processing GPS signals. Specifically, the invention relates to techniques for acquiring and tracking GPS signals. The disclosed invention makes it possible to use GPS signals to provide autonomous, onboard navigation capabilities for geostationary satellites. This next generation technology advances the techniques disclosed in U.S. Patent No. 6,211,822, which is also included within this Lot.

Further improvements relating to GPS receivers are embodied within U.S. Patent No. 6,844,856. This invention relates generally to an airborne antenna system and more specifically to a GPS antenna orientation device for use with an aircraft. Airborne surveying operations require exact geographic locations and GPS antennas can provide this accuracy. The present invention addresses the problem of cycle slips, introduced with the GPS antenna oriented in non-vertical positions, by rotating the receiver in an opposite direction of roll.

The remaining patents offered in this Lot are directed to improvements in the field of processing GPS signals and technologies that improve the accuracy and efficiency of GPS receivers. Each makes a significant technical advancement in the field of global positioning and offers an opportunity to leverage the technology to reduce manufacturing expenses while increasing signal processing efficiencies.

Given the broad scope of this patent portfolio, this Lot offers an opportunity to obtain the exclusive use of next generation global positioning technology. The offered patent assets are pertinent to companies operating in a number of industries, including surveying, navigation, machine guidance, wireless platforms, and telecommunications infrastructure.

## Sample Forward Citation Analysis:

- Boeing Company, The
- Cue Corporation
- General Dynamics Corporation
- Hexagon AB
- Motorola, Inc.
- Nokia Siemens Networks Oy
- Northrop Grumman Corporation
- QUALCOMM Incorporated
- Samsung Electronics Co., Ltd.
- SiRF Technology, Inc.
- Toyota Motor Corporation
- U.S. Air Force, The
- Verizon Communications Inc.

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*… as we enjoy great advantages from the inventions of others, we should be glad of an opportunity to serve others by any invention of ours; and this we should do freely and generously.*

# Information Wants to be Free (Brand, 1984)

- In many settings, strong moral and values-based arguments regarding the fact that the price of an idea should be identical to its marginal cost – zero
  - "From the consumer's perspective, though, there is a huge difference between cheap and free. Give a product away and it can go viral. Charge a single cent for it and you're in an entirely different business, one of clawing and scratching for every customer. The psychology of "free" is powerful indeed, as any marketer will tell you….. the truth is that zero is one market and any other price is another. In many cases, that's the difference between a great market and none at all." (Chris Anderson)
  - While consumers are certainly interested in ideas at the lowest price, some of the strongest voices against prices for ideas are those who produce and supply ideas
- Most robust and active markets for formal ideas exchange are precisely those where the price of the ideas is equal to zero
  - Scientific norms in which the price of an idea is the "thin" property right of scientific credit is taken for granted, and seems like a natural approach
  - No room for micro-payments, persistent failures of DRM & SW subscription models; no pushback against advertising-supported models

# Are Ideas a Repugnant Good?

- Repugnant goods are those for which there are strong social norms (or even legal constraints) on exchange at a positive price (or at all)

- ***Should the following be permitted….***
- ***Steve Jobs charging a price >> MC for the iPhone?***
- ***A pharmaceutical firm charging a price >> MC for baldness treatment?***
- ***A pharmaceutical firm charging a price >> MC for a malaria treatment discovered with public funds?***
- ***The right for a record label to prohibit an artist from playing their own music, with heavy penalties for infringement?***
- ***An auction between you and your health insurance company to exclusively access your genetic profile?***
- ***Secret payments by the government to journalists and bloggers to express particular opinions as their own?***
- ***The sale of credit for a discovery by a student to a faculty member?***