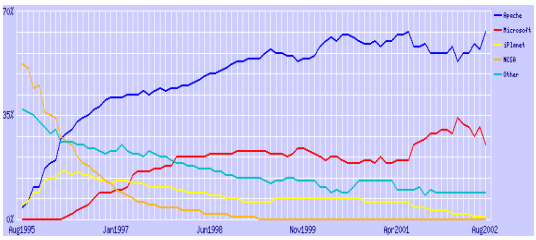
Free Software and Commons-Based Peer-Production

Overview

- Free software
  - Characteristics
  - Institutional framework
- Commons-Based Peer-Production
- Economic analysis
  - Motivation
  - Organization
  - Economic Value
- Business models
- Thematic Analysis

Free Software

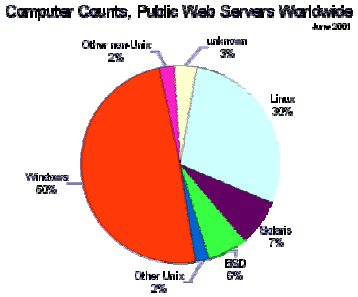
- Getting harder to ignore success



Apache market share 1995-08/2002 Source: Netcraft Survey Sept. 2002

Free Software

- Getting harder to ignore success



Source: Netcraft Survey Sept. 2001

Free Software

- Proprietary software depends on exclusion
  - Use permitted in exchange for payment
  - "Learning" often prevented altogether to prevent copying and competition
  - Customization usually only within controlled parameters
  - No redistribution permitted, so as to enable collection by owner

Free Software

- Proprietary software depends on exclusion
- Free software limits owners' control
  - Use for any purpose
  - Study source code
  - Adapt for own use
  - Redistribute copies
  - Make and distribute modifications
    - Notification of changes
    - Copyleft

Free Software

- Proprietary software depends on exclusion
- Free software limits control
- Identifying characteristic is cluster of uses permitted, not absence of a price ("free speech" not "free beer")

Anatomy of Free Software

- Raymond, Moody
- One or more programmers write a program & release it on the Net
- Others use, modify, extend, or test it
- Mechanism for communicating, identifying and incorporating additions/patches into a common version (led by initiator/leader/group)
- Volunteers with different levels of commitment and influence focus on testing, fixing, and extending

The Institutional Framework

- Property, open access, & copyleft
  - Property is institutional core of market & firm-based production
    - parameters of exclusion permit charging a price and controlling output of employees

The Institutional Framework

- Property, open access, & copyleft
  - Property is institutional core of market & firm-based production
  - Public domain/open access
    - Dedication to the public domain makes software free
    - Allows anyone to use, modify, redistribute
    - Weakness: ease of defection/reappropriation by downstream actors may cause demoralization and *ex ante* non-participation by peers

The Institutional Framework

- Property, open access, & copyleft
  - Property is institutional core of market & firm-based production
  - Public domain/open access
  - Copyleft is a cluster of licensing provisions that rely on the control property rights provide to make software "free" while protecting against some defections that an open-access commons approach permits

The Institutional Framework

- Property, open access, & copyleft
- Institutional parameters of copyleft
  - Freedom to redistribute the program, for free or for money
    - Distribution must be in, or accompanied by, source code, so as to enable modification
    - Means you cannot redistribute with a prohibition on recipients to redistribute
    - Eliminates incorporation into business models designed around exclusion from the program, thereby eliminating certain incentives for defection

The Institutional Framework

- Property, open access, & copyleft
- Institutional parameters of copyleft
  - Freedom to redistribute the program
  - Freedom to modify and distribute
    - Provided distribution is under same terms as original work was licensed
      - Prevents use of others' efforts and failure to return one's cumulative contribution to the common pool
    - Clear notifications of changes and attribution (could be distribution of base plus patches)
      - Crucial to reputation/peer-review based quality control

The Institutional Framework

- Property, open access, & copyleft
- Institutional parameters of copyleft
  - Freedom to redistribute the program
  - Freedom to modify and distribute
  - Covenants run with the program
    - To downstream users
    - To derivative & collective works, but not to parallel distributions
    - Prevents failures to impose licensing conditions by recipients from allowing re-appropriation by downstream users

The Institutional Framework

- Property, open access, & copyleft
- Institutional parameters of copyleft
  - Freedom to redistribute the program
  - Freedom to modify and distribute
  - Covenants run with the program
  - GPL & Open Source definition do not discriminate between commercial and noncommercial free software

The Institutional Framework

- Property, open access, & copyleft
- Institutional parameters of copyleft
  - Freedom to redistribute the program
  - Freedom to modify and distribute
  - Covenants run with the program
  - Permits commercial and noncommercial
  - Major current question: what counts as "modification" as opposed to just running an application using functionalities from a GPL program

The Institutional Framework

- Property, open access, & copyleft
- Institutional parameters of copyleft
- Copyleft vs. public domain
  - Reduces incentives to adopt a proprietary strategy
  - Reduces opportunities for "defection"
    - Building on work of others who contributed to a common enterprise and failing to contribute the product to the common pool
  - Retains the integrity of contributions as part of the peer-review process

Peer Production All Around

- Peer production
  - various sized collections of individuals
  - effectively produce information goods
  - without price signals or managerial commands
- Human parallel to distributed computing?
  - Various @home projects
  - Gnutella, Freenet

Peer Production All Around

- Academic research
- The Web
- Content (Clickworkers, K-5, Wikipedia MMOGs)
- Relevance/accreditation
  - commercial utilization--Amazon, Google
  - volunteer--open directory project, slashdot
- Distribution
  - physical--Gnutella
  - value added--Distributed Proofreading

Why would anyone do it?

Diverse Motivations

- OSS economics literature maps the diverse appropriation mechanisms
  - Intrinsic
    - Hedonic
    - Community ethics
  - Extrinsic
    - Supply-side--human capital, reputation
    - Demand-side--service contracts, widgets

Diverse Motivations

- OSS literature
- Diverse motivations

$$R = M_s + H + SP_{p,\ jalt}$$

- Rewards, monetary /*s* (satiation), hedonic, socio-psychological /*p* (professionalism or prostitution from M to self), */ j, alt* jealousy or altruism (from M to others)
- Except if *p* is positive, there are ranges where nonproprietary production draws effort that proprietary production does not

Diverse Motivations

- OSS literature
- Diverse motivations
- Initial implications
  - Where component contributions are too fine grained to transact around, peer production dominates

Diverse Motivations

- OSS literature
- Diverse motivations
- Initial implications
  - Fine-grained collaboration
  - When *p* is positive or neutral, adding money to social psychological rewards will likely improve participation

Diverse Motivations

- OSS literature
- Diverse motivations
- Initial implications
  - Fine-grained collaboration
  - *p* is positive combinations dominate
  - When *p* negative, total rewards depend on absolute values of *s* and *p*
    - individuals with high *s* and *p*<< 0 for the behavior will only participate in nonproprietary organizational forms
    - low *s*, low *p*, we will see mix
    - high negative *p* will likely result in socio-economic bifurcation of activity (like sex)

Diverse Motivations

- OSS literature
- Diverse motivations
- Initial implications
  - Fine-grained collaboration
  - *p* is positive combinations dominate
  - When *p* negative, total rewards depend on absolute values of *s* and *p*
  - "Managing" a peer-production enterprise involves, importantly, cultural management of the *p* value
    - High negative *p* will make using straight-forward money steering impossible

Organization, not incentives

- Peer production limited not by total cost or complexity of project, but by
  - modularity (how many can participate, how varied is scope of investment)
  - granularity (minimal investment to participate)
  - cost of integration

Organization, not incentives

- Peer production limited by modularity, granularity, integration
- Given a sufficiently large number of contributions, "incentives" at the macro sustainability level are trivial
  - *e.g.*, a few thousand "players", a few hundred young people "on their way", and a few or tens paid to participate for indirect appropriation will become effective

Value

- As capital component in information production declines, human creativity becomes salient economic good
- By comparison to firms and markets peer-production has
  - information gains
  - allocation gains

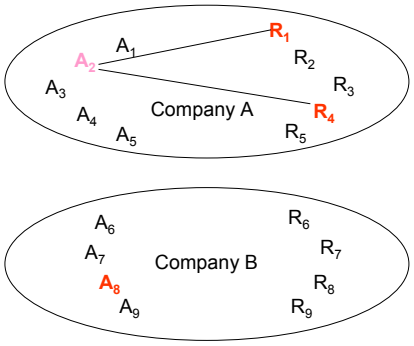
Value

- Information gains
  - Human capital highly variable
    - time, task, mood, context, raw information materials, project
  - Difficult to specify completely for either market or hierarchy control
  - In peer-production agents self-identify for, and self-define tasks
    - Have best information about ability in time
    - Mechanisms for correcting misperceptions necessary: *e.g.* "peer review"

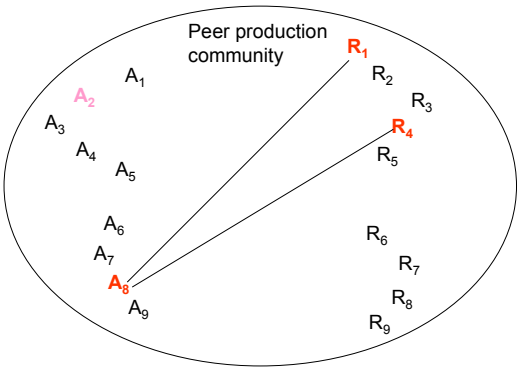
Value

- Information gains
- **Allocation gains**
  - **Firms and markets use property & contract to reduce uncertainty of availability of agents & resources**
  - **Individuals highly variable in fit to resources, projects, and each other**
  - **Substantial increasing returns to size of**
    - **set of agents permitted to act**
    - **set of resources they may act upon**
    - **set of projects they may pursue**

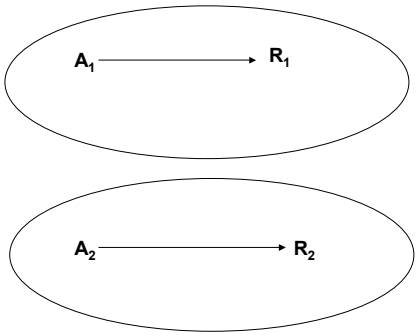
Agents and resources separated into firms



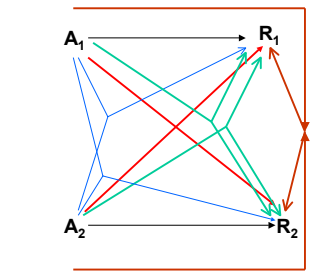
Agents and resources in common enterprise space



Agents and resources option value when separated in bounded spaces



Agents and resources option value when combined



The Commons Problem

- **Different kinds of commons have different solutions**
- **Information only a provisioning problem, not an allocation problem**
- **Primary concerns**
  - **Defection through unilateral appropriation undermines intrinsic and extrinsic motivations**
  - **Poor judgment of participants**
  - **Providing the integration function**

The Commons Problem

- Primary approaches to defection
  - Formal rules, technological constraints, social norms to prevent defections (GPL, Slash, Wikipedia on objectivity)
  - redundancy & averaging out--technical plus human (Clickworkers)
- Primary approaches to integration
  - iterative peer production of integration
  - reintroduction of market and hierarchy with low cost and no residual appropriation

Business models

- Surfers
  - Cost reduction & improved quality
    - Google, Amazon
    - www.Live365.com
    - IBM, HP (widgets)
  - Translation into the price system
    - Services/customization/massification (Red Hat)
- Toolmakers
  - SourceForge, OSDN
  - Massive Multiplayer Online Games

Wrap-up

- Diverse motivations with complex relationships to money
- Peer-production, not OSS
- Anti-defection mechanisms
  - Formal rules, technical constraints, social norms
  - Iteration of integration, redundancy
- Business
  - Integration without residual appropriation
  - surfers and toolmakers