

# The Hows, Whys and Wherefores of Open Source or

*Open source as a market reaction to regulation of the software industry*

or

*Why everything you've ever been told about IP is wrong.*



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## Ethics – Pogue Article

*"I borrow a CD from the library. Who thinks that's wrong?" (No hands go up.)*

*"I own a certain CD, but it got scratched. So I borrow the same CD from the library and rip it to my computer." (A couple of hands.)*

*"I have 2,000 vinyl records. So I borrow some of the same albums on CD from the library and rip those."*

...

*Finally, with mock exasperation, I said, "O.K., let's try one that's a little less complicated: You want a movie or an album. You don't want to pay for it. So you download it."*

...

*"Who thinks that might be wrong?"*

*Two hands out of 500.*

<http://pogue.blogs.nytimes.com/2007/12/20/the-generational-divide-in-copyright-morality/>

- A key assumption underlies these questions.

# Overview



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- Intro
- Economic justifications for software copyright
- Counter examples, analysis, should theory be reconsidered?
- Some figures on software industry and why
- Have we seen any of this before?
- Thoughts on property, free software and liberty

## Software Copyright?



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- Bill Gates' letter to Hobbyists 1976  
*"As the majority of hobbyists must be aware, most of you steal your software.... Who cares if the people who worked on it get paid?... Is this fair? ...One thing you do do is prevent good software from being written. Who can afford to do professional work for nothing?"*  
[http://en.wikipedia.org/wiki/Image:Bill\\_Gates\\_Letter\\_to\\_Hobbyists.jpg](http://en.wikipedia.org/wiki/Image:Bill_Gates_Letter_to_Hobbyists.jpg)
- CONTU Report 1978  
<http://digital-law-online.info/CONTU/PDF/index.html>
- Apple Case (1983)
- Changes to the Copyright Act effected within 6 months of the decision
- Did not wait for the High Court appeal (1986 – affirmed the decision).

# Part 1 – The Funding Problem



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- Collective Consumption
- Excludability
- Public Goods

5

# Collective Consumption Goods



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- Consumption by one consumer does not reduce consumption by any other
- Also “non rivalrous”
- Television broadcast
- Theatre?

6

# Excludability



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- How easy is it to exclude others from using a good once it is produced?
- Nonexcludable = difficult to exclude others from use
  - Matter of degree
  - National defence
  - Software?
- If a good is nonexcludable each person has incentive to consume without paying for production or maintenance (as it will be available to them anyway)
- “free riding”
- Tragedy of the Commons

7

# Public Goods



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- Goods which are:
  - Non rivalrous or collective consumption and
  - Non excludable
- Incentive to free ride creates financing problem
- Results in “Market Failure” - ie underproduction of the good
- (Argument is that, therefore software will not be produced unless there are special rights restricting the exploitation of software.)

8

# Ethics – Economics



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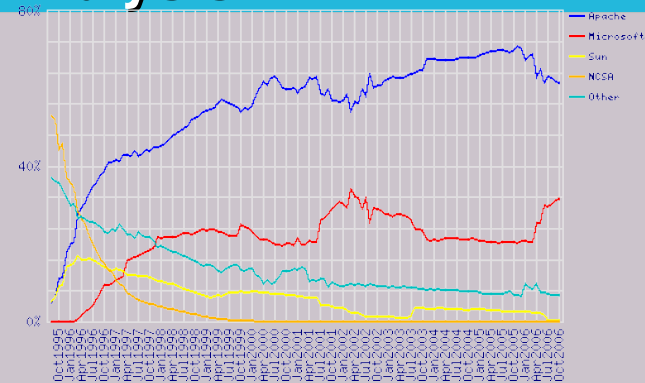
- Economic arguments
- Economists typically sidestep questions of ethics by focussing on efficiency – ie if the pie is bigger does it matter how it came to get bigger or how it is divided?
- Economic arguments not without ethical dimension implicit questions about whether:
  - efficiency is to be traded off against other benefits
  - equity of distribution of benefits of production

9

# Part 2 – Counter Examples and Analysis



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- Web server software, Available at no charge, FOSS
- Runs 61.44% of all internet sites (Netcraft October 06) NB: upswing in April 06 from Microsoft agreement with GoDaddy to park inactive domain names on Windows Server 2003

[http://news.netcraft.com/archives/web\\_server\\_survey.html](http://news.netcraft.com/archives/web_server_survey.html)

10

# Some examples of things which don't exist



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- Linux, Apache, MySQL, PHP, Email
- Internet protocols
- Vast majority of information available over the internet – compare its closed predecessors Comuserve/AOL/Prodigy/MSN
- How is their existence possible - even in theory?
- Once created, how can they compete with closed source?
- Is there something wrong with the theory?

11

# Part 3 – Rethinking the Theory



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- Software development assumption – indivisibility:
  - Driven by firms (ie non-collaborative, in house at one software developer)
  - Speculative/“big bang” model?

12

## Assumptions – Development Driven by Firms?



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- Coase's Theory of the Firm
- Firms arise as a response to transaction costs in market.  
[http://people.bu.edu/vaguire/courses/bu332/nature\\_firm.pdf](http://people.bu.edu/vaguire/courses/bu332/nature_firm.pdf)
- Coase's arguments about firms implicitly assumed
- Do they remain true in a networked world?
- Coase's penguin  
<http://www.benkler.org/CoasesPenguin.PDF>
- Need for a firm is a *consequence of and not a justification* for imposition of copyright (as copyrights create transaction costs)

13

## Assumptions about IP – Speculative Model/ Big Bang



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- Linux kernel estimated at US\$200 million-US\$600 million to code from scratch (kernel represents about 50MB of the 2.4GB of a typical generalist GNU/Linux distribution)
- Debian Sarge 3.1 estimated at USD\$8Billion (year 2000 USD) worth of development  
<http://www.upgrade-cepis.org/issues/2005/3/upgrade-vol-VI-3.html>
- Clearly can develop very expensive systems without the need for amortising development costs into licence fees.
- Software:
  - is highly *divisible* and
  - may be recombined in different configurations
- Funding problem from public goods analysis is therefore questionable.

14

## Part 4 - Consequences of Current Approach



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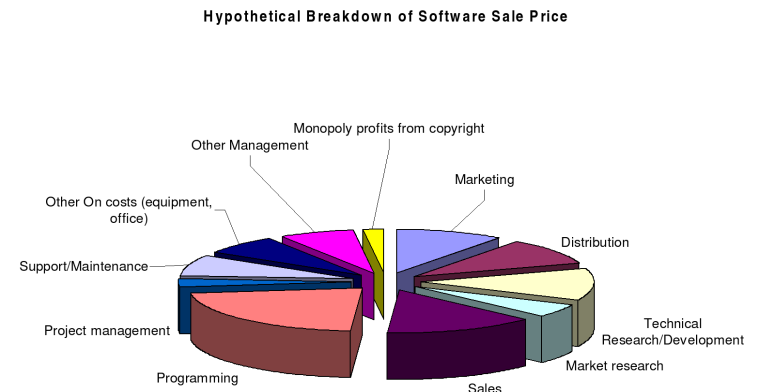
- Record of copyright in
  - producing software?
  - creating a competitive software market?
  - productivity?

15

## Hypothetical Breakdown of Software Sale Price



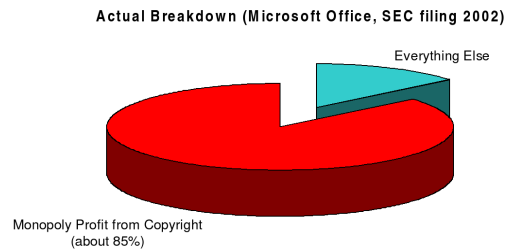
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# Actual Breakdown of Software Sale Price



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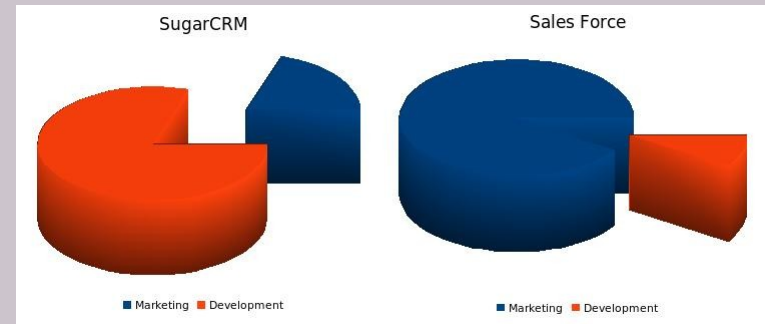


Reference: <http://zdnet.com.com/2100-1104-966219.html> (November 2002)

# John Roberts on Development Spend



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Closed source (Sales Force): For every \$1 spent on software development, \$10 is spent on marketing

Open Source (SugarCRM): for every \$4 spent on development, \$1 is spent on marketing

Source: John Roberts at OSBC 2006, quoted in

<http://asay.blogspot.com/2006/02/john-roberts-osbc-keynote-commercial.html>

18

# Part 5 – What Could Go Wrong?



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- Natural Monopolies
- Network Effects/Externalities
- Lack of Contestability

19

# The Software market today – Natural Monopolies



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- Where average cost decreases with increasing demand
- Eg: software, telecommunications?  
[http://en.wikipedia.org/wiki/Natural\\_monopoly](http://en.wikipedia.org/wiki/Natural_monopoly)
- Tends to:
  - be a winner take all game
  - (may prefer first movers, tends to entrench position of incumbents)

20

# The Software market today

## – Network Externalities



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- Other people's use of good increases good's utility
- Eg: telephone networks, .doc format
- Tends to:
  - prefer first movers,
  - entrench position of incumbents
- Margolis and Leibowitz dispute the existence of network externalities see

<http://www.utdallas.edu/~liebowitz/jep.html>

21

# The Software market today

## - Contestability



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- Describes difficulty competitors have in entering a market
- Software markets do not appear to be very contestable at a product area level
- Customer lock in, high switching costs
- Lack of contestability possibly a result of natural monopoly nature, network externalities involved

22

# Nobel Prize

## Winners' Views



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- Schumpeter (1883-1950)
  - This is a good thing
  - Increases profits for incumbents, causes aspiring monopolists to fight hard for the ground
  - Drives innovation
  - “Creative destruction”
- Stiglitz (2005)
  - *The economic rationale for intellectual property is that faster innovation offsets the enormous costs of such inefficiencies. But it has become increasingly clear that excessively strong or badly formulated intellectual property rights may actually impede innovation – and not just by increasing the price of research.*
  - *Monopolists may have much less incentive to innovate than they would if they had to compete. Modern research has shown that the great economist Joseph Schumpeter was wrong in thinking that competition in innovation leads to a succession of firms.*

23

[http://www.dailytimes.com.pk/default.asp?page=story\\_16-8-2005\\_pg5\\_12](http://www.dailytimes.com.pk/default.asp?page=story_16-8-2005_pg5_12)

# Part 6 – Back to the Future



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- Who here is a usufructuary? (usus = use, fructus = fruit)
- Beowulf – communal “ownership”
- After William the Bastard – mixed communal/Feudal “ownership”
- (historians disagree on timing/ordering here)

24

# Feudal Period



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- Public services provisioned by direct levies on service
- In return for grant of land you must provide services to me
- “knight service” but also obligations to repair bridges, protect cattle, help churches etc.

25

# Consequences



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- All land held by king/overlord
- No automatic right to alienate (eg sell) land without King's consent –
- Heirs needed to pay to inherit (called “incidents of tenure”)

26

# Subinfeudation



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- Could subinfeudate –
  - inheritance problems (right of wardship);
  - uncertainty of title (eg default by higher up lord)
- Mense lords engaged in schemes to avoid inheritance taxes, wardship

27

# End of Subinfeudation



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- Over time complex pyramid of subinfeudation – rights in land diffused
- Difficult for overlords to enforce services
- In the end King abolished subinfeudation (Quia Emptores 1290). Alienation of land permitted without king's/overlord's consent but purchaser then had unmediated relationship with King/overlord.

28

# After end of Subinfeudation



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- Over time feudal pyramid collapsed and land began to be aggregated
- Over even more time, enclosure acts
- At start everyone except the King were usufructuraries – people with a right to use the land without an ownership right
- Over time transformed into a system in which had direct ownership (Scotland took a little longer than elsewhere – Feudal tenure being abolished by statute in 2004)

29

# Part 7 – About Property



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- Demsetz on Property
- Discussion of IP as property
- Comparison vs free software

30

# Property rights



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*“Primary function of property rights is that of guiding incentives to achieve a greater internalisation of externalities”*

Harold Demsetz “Toward a Theory of Property”

The American Economic Review Volume 57, Issue 2 May, 1967, 347-359

<http://www.compilerpress.atfreeweb.com/Anno%20Demsetz%20Property%20Rights.htm>

- Feudal example, subinfeudation imposed a cost on Overlords (and the King) in enforcing the feudal obligations owed to them.

31

# About Intellectual Property



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- Copyright Act has the effect of manufacturing excludability
- For the purpose of internalising an externality.
- Exactly what externality is being internalised?
- Is it negative?
- Do we try to create regimes to internalise these externalities in other situations?
- Looking at flowers from across the road.

32

# Intellectual Property?



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- If you sell property, you cease to control its exercise – relationship ends upon paying sale price
- Not true of “intellectual property”
- Copyright not exercised as a right to possession or use, but a negative right to prevent others from using.

33

# About Intellectual Property - Boldrin + Levine



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- “Intellectual Property” is in the first copy – note: excludable, possibly rival
- “Intellectual Monopoly” is Government intervention to restrict use of and acts in relation to an idea/copy post the sale of that idea/copy.

<http://levine.sscnet.ucla.edu/general/intellectual/against.htm>

34

# Property Nature Comparison



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- Hammer – no post sale use restrictions, no restrictions on modifications, no limits on resupply or on supply
- Which of these seems more like property?
  - Closed Source software: use restrictions (may be variously based/styled), modification, resupply, on supply prohibited rights in the nature of usufruct
  - (Have we reinvented feudalism?)
  - Open Source – no post sale use restrictions, no restrictions on modifications, some limits on resupply or on supply but aimed at preventing reversion to closed source – rights more in the nature of property

35

# Part 8 – The Unreasonable Effectiveness of Free Software



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- Ethical basis of Free Software
- Success of Linux/Apache licensing
- Hayek on:
  - division of information in society
  - linkage between freedom and productivity

36

# RMS' View of Ethics



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*Free software is a matter of liberty, not price. ...*

*Free software is a matter of the users' freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom, for the users of the software:*

*\* The freedom to run the program, for any purpose (freedom 0).*

*\* The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this.*

*\* The freedom to redistribute copies so you can help your neighbor (freedom 2).*

*\* The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.*

*A program is free software if users have all of these freedoms...*

<http://www.gnu.org/philosophy/free-sw.html>

37

# FSF Chronology



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GNU Project launched – 1983 <-note date

GNU Manifesto – 1985

<http://www.gnu.org/gnu/manifesto.html>

First Free Software Definition – Feb 1986

GPL, LGPL together account for about 85%-90% of all projects on Sourceforge

38

# Linux, Apache



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- Linux (1991)
  - Originally distributed under purpose based restriction (no commercial use)
  - Adopted GPL -> ? -> profit!
  - Choice not made on ethical grounds
- Apache (Feb 1995? - unclear)
  - Early version of Apache Licence – broad use rights, no warranty
  - organisational certainty and liberal licensing (inter alia) led to success of project

39

# Proof is in the Pudding?



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## Article: Proprietary vendors lose £30bn to open source

*Open-source software is successfully displacing proprietary applications in many large companies and eating into the annual revenues of proprietary software vendors by \$60bn (£30bn) a year, according to research.*

...

*"Open-source software is raising havoc throughout the software market," said Standish Group chairman Jim Johnson...*

*The study ... states that if open-source products and services were calculated at commercial prices, open source as a whole would be equivalent to the largest software company in the world, with revenues exceeding the combined income of Microsoft, Oracle and Computer Associates.*

<http://news.zdnet.co.uk/software/0,1000000121,39397439,00.htm>

40

# Economic Value of Freedom - Hayek



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- Information is divided among all participants in society
- Each knows best how to achieve their goals
- System is too complex for central planners to anticipate
- => a centrally planned economy will always be less productive

41

# Hayek Quote



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*"The enemies of liberty have always based their arguments on the contention that order in human affairs requires that some should give orders and others obey. Much of the opposition to a system of freedom under general law arises from the inability to conceive of an effective co-ordination of human activities without deliberate organization by a commanding intelligence. ... [The orderliness of social activity] cannot be the result of a unified direction if we want individuals to adjust their actions to the particular circumstances largely known only to them and never known in their totality to any one mind. Order with reference to society thus means essentially that individual action is guided by successful forethought, that people not only make effective use of their knowledge but can also foresee with a high degree of confidence what collaboration they can expect from others."*

F. A Hayek, *The Constitution of Liberty*, Routledge Classics, 2006 @ 140.

42

# Pogue Article Again



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- Implicity draws a distinction between producers and consumers
- Is this distinction relevant any more?
- What would be the answers if reformulated - eg:
  - you sell a movie to a person but prohibit them from making a "safety copy" etc?
  - you sell a television show to a network then prevent viewers from recording it/borrowing recordings from their friends?
  - etc.

43

# Conclusion



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- Funding Problem might be overstated
- "Intellectual property" seems more like a return to feudalism than an evolution of property
- Free Software definition is a statement about ethics.
  - Applies how/whether software "protected".
  - Driven by underlying concern for freedom
  - Imposes ethical obligation to not interfere with others' freedom
- Promoting freedom is consistent with promoting the economy and is likely positively linked.

44

# Thank You



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45

# References



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The following papers:

TCO: Why Free Software's Long Run TCO Must be Lower  
Policy: Four Free Software Fallacies  
The term "Lock in": Lock in Software  
Access Regimes and Govt: Draft Software Access Regime White  
Paper

Available from:

<http://www.opensourcelaw.biz/publications>

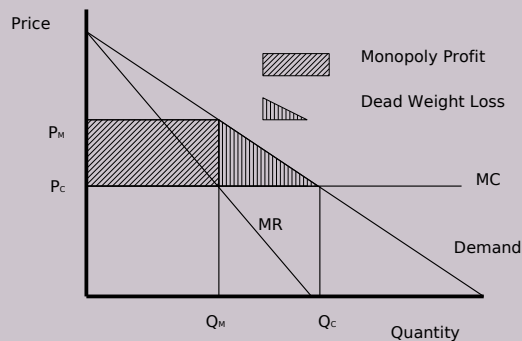
46

# About Monopolies (diversion)



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Pricing in a Monopoly



Note: assumes marginal cost to produce  
is independent of quantity

- Efficiency – that which maximises wealth across an economy

47

# Other Problems with Government intervention in markets



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- Rent seeking behaviour (Gordon Tulloch)  
[http://www.thelockeinstitute.org/journals/luminary\\_v1\\_n2\\_p2.html](http://www.thelockeinstitute.org/journals/luminary_v1_n2_p2.html)
- Distortion of market – overcommit resources to one sector at expense of others
- These aspects explain much of the disparity between price predicted by classical economics (marginal cost of production) and actual price in the market.

48