

# Using IPR to expand the research commons for Science: New moves in 'legal jujitsu'

By

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*The point of the presentation, in a nutshell—*

The creation of “scientific research commons” by cooperative pooling and open access cross-licensing of research tool-sets is a practical proposal. It provides an institutional remedy for the harms that can result from the expanded use of IPR protections and the market as a means of promoting the production of international public goods that take the form of scientific and technical information.

**Policy Implication:** National funding agencies should agree to exercise their respective authorities to impose compulsory licensing of IPR in complementary research “tool sets”, and should set management rules for the irrevocable assignment to regulated “common pool” foundations of all IPR of that kind whenever it arises from publicly supported research.

*This is the argument in seven steps - 1*

- Prop. 1: Scientific and technical research in the modern world entails the production of international public goods by means of international public goods.
- Prop. 2: There are three pure types of institutional solution for the allocation problems in the production and distribution of information that result from the latter's public goods properties: *Property*, *Patronage* and *(Public) Provision*.
- Prop. 3: Each of the “3 P's” offers an imperfect solution, and most of the successful modern economies employ all of them in some degree, but the mixture has shifted towards *Property*.
- Prop. 4: The “Property solution”, creates legal monopoly rights to exploit of new information, and improves the market allocation of resources in information production through the incentive effects; but also inhibits information use—including that for research itself.

*The argument in seven steps - 2*

- Prop.5: Information disclosed and left in the public domain enables the efficient growth of knowledge through the conduct of “open science” research, so long as (a) patronage is available and (b) “enclosure” of the public domain does not impede access to the research tools.
- Prop.6: There are conditions under which IPR in research tools is particularly damaging to scientific progress, and these also are the conditions in which “common-use pooling” of information resources is likely to be both socially efficient and a dominant private strategy.
- Prop.7: IPR owners can contractually construct “information commons” that emulate public domain conditions which will be sustainable against opportunistic “enclosure”, and in the case of a non-exhaustible resources (information), there is good reason not to exclude any contributor of IPR to the research commons -- so long as the additions are complements of information in the existing pool.

*The Commons is a Remedy for the Anti-commons--  
the historical travesty of the “Tragedy”*

the ever-popular fictitious illustration:

“The *anticommons* is a play on words and refers to the ‘tragedy of the commons’ which is taught in freshman economics. In the tragedy of the commons peasants in early modern Britain overgrazed shared pastures (‘the commons’) because the absence of private property eliminated incentives to conserve.” -- Scotchmer (2004:88)

the historical reality:

Contrary to the historical fantasy of a “common pool problem” promulgated in the influential essay by Garrett Hardin (1968), this “tragedy” never was: from the 13<sup>th</sup> century onwards, the records of Europe's agrarian communes detail regulations adopted “by common consent” of the villeins (tenants) to control the exercise of rights of common grazing on the fallow fields, the meadows, and the stubble-fields (the post-harvest grain-fields) of the village's arable land. Internal management accompanied exclusion of strangers.

The historical experience of successfully managed  
Common Property Resources

- By the ‘early modern era’ in Britain, and equally in the more densely settle arable farming regions of northern Europe, the management of common grazing rights prescribed *stinting*: tenants in the village were allocated “stints” that specified the numbers of specific animals that commoners could put on the fallow or common pasture lands, apportioning these rights in relation to the size of their holdings in the arable field, and sometimes in the meadow-land.
- The terrier of Salford Manor, in Oxfordshire records the following two items among the by-laws adopted by common consent of the “inhabitants” on 17th September, 1592:
 

“1. Imprimis it is agreed that every inhabitant may kepe for every three acres of follow [fallow] that he hath within this parryssh eight sheepe and not above upon payne for every sheepe he shall kepe above that rate to fortye every tyme xij d [ 12 pence, i.e. one shilling]”;  
“7. Item that every may kepe for every five acres of land in one field [referring to the three open-fields of the arable land in the village] foure kyne [kine referring to ‘cows’] and not above upon payne of iij s. iij d. [shillings and 3 pence].”

Source: Salford Manor, No.368, in the Codrington Library (All Souls College, Oxford), transcribed and printed as doc. 216 in Ault (1965: Appendix, p. 93)

*The Commons in tangible exhaustible resources lives!*

Collective possession of exhaustible resources did, and does not translate into a chaotic struggle for possession among neighbors, nor does it result in the egalitarian distribution of use-rights.

A growing number of contemporary empirical studies -- following Ostrom (1990) -- show that common pool resources can be managed successfully under a variety of common property regimes, in the developing and the developed world.

Even in western Europe today, such arrangements based upon *de jure* common use rights (*res communes*) that date from the Middle Ages have survived in the Swiss Alps and Northern Italy—e.g., the Magnifica Comunità di Fiemme, in the valley of Avisio (Trento) -- where they still govern the use of tens of thousands of hectares of alpine forests, pasture and meadow land.

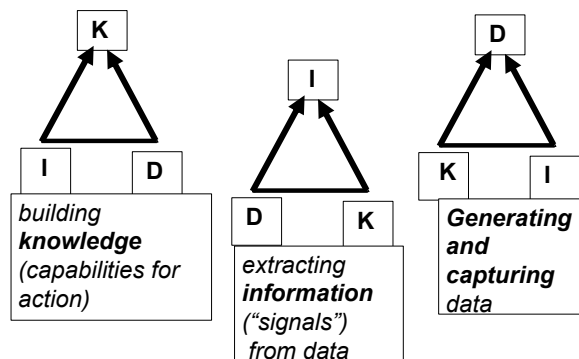
*Unpacking the propositions...*

beginning with some economics of "knowledge", "information" and "data"...

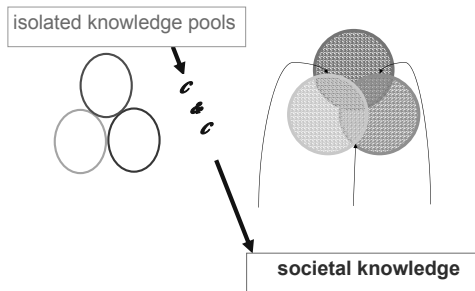
**Knowledge as a human capability -- its relationships with information and data**

- knowledge is the capability formed from information
- information is the signal(s) extracted from data -- using knowledge
- information is translated into actions (based on knowledge), including the generation and capture of data

**Knowledge as a human capability -- the "K I D - triangles"**



**Information and societal knowledge -- socio-cultural constructs and resources**



*Codification and Communication forms societal (common) knowledge, augmenting individual capabilities with shared "tools",*

*A Primer on the Economics of Research - 1*

- Information is
  - an output of research, derived from "data" and knowledge
  - a key research input, too
  - useable for cumulatively generating recombinant novelties
  - not a normal (private) commodity but has *public goods* features
- Properties of "pure public goods":
  - infinite expansibility*, i.e., negligible marginal transfer costs and *non-rival* use
  - indivisibility* and substantial fixed costs of creation
  - significant costs of exclusion from access and possession

## Thomas Jefferson recognized the “public goods” properties of ideas and information...in 1813

“If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea, which an individual may exclusively possess as long as he keeps it to himself; but the moment it is divulged, it forces itself into the possession of every one, and the receiver cannot dispossess himself of it. Its peculiar character, too, is that no one possesses the less, because every other possesses the whole of it. He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me.

“That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature, when she made them, like fire, expansible over all space, without lessening their density in any point, and like the air in which we breathe, move, and have our physical being, incapable of confinement or exclusive appropriation.”

Classic economic analysis in “public finance” identifies three solutions for the problem of providing “public goods” (e.g., water and lighting utilities)

- tax-financed subsidies
- monopoly
- direct public provision.

Correspondingly, we identify:

“**The 3 P’s**” -- co-existing institutionalized solutions for the problems posed by information-goods:

- **Patronage** – and the ‘open science’ reward system
- **Property** — IPR monopoly rights
- **Procurement** -- public production and/or “sourcing”

## Patronage supports the Republic of Science

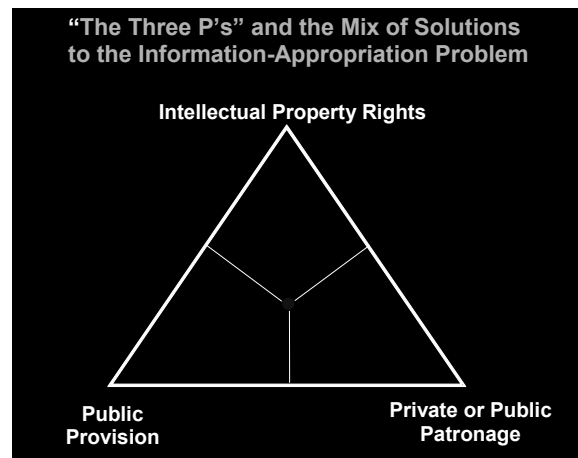
*Stylized norms and procedural arrangements of the “open science” research mode:*

- rewards based upon collegiate reputational status
- reputation based on peer-appraisal of ‘scientific contributions’
- eligibility for evaluation based upon non-ascriptive characteristics
- substantial autonomy of individual scientists in design and research conduct is expected (and with this goes responsibility for the research)
- ‘a scientific contribution’ requires validation of the researcher’s claim to priority in discovery or invention

## A Primer on the Economics of Knowledge-2

Economic implications of the public goods properties of information:

- Competitive markets fail to allocate ‘public goods’ efficiently
  - ‘transactions externalities’ – try to sell a secret for its full information value
- ‘mc pricing’ leaves most costs uncovered, even at large scale
- External use benefits not properly valued by private willingness-to-pay



## Institutional features and resource allocation in the “Open Science”

*Functionality of the cooperative system that promotes rapid cumulative growth in reliable knowledge:*

- “collegiate reputational reward structure” (CRRS) provides incentives and signals for agents’ effort allocation decisions
- scientific reputational standing is based on community acknowledgement of claims to “priority of discovery”
- incentive compatibility of priority with the norm of *open-ness* (full disclosure) :
  - asymmetric information → problems of input monitoring → monitoring of output, with rewards for priority → rapid disclosure
- *disclosure, skepticism and disinterestedness* → validation of results → promotes rapid “closure” (effective consensus)
- *universalism* prevents “homogenization” of social communications network structure → protecting deviant opinion from premature formation of consensus (dogmatic belief)

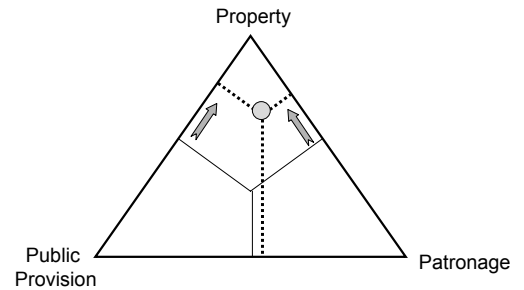
## Macro-institutional complementarities and the place of open science in the "ST&I system"

The "3 P's" are alternative (i.e., substitute) solutions for the appropriability problem, why do they co-exist productively in modern economies?

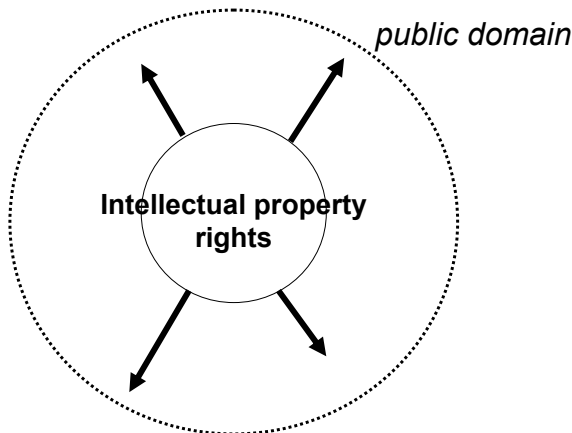
- Proprietary, commercially-oriented R&D is suited for maximizing the volume of economic 'rents' extracted from an existing stock of knowledge, but does not sustain its profitability in the long run
- Open science is suited for exploratory research that maximizes the growth of the stock of reliable knowledge, but is not able to support itself
- Agency and security problems make it most expedient for government mission agencies to carry out some of the research on which their action must be based (e.g. public health actions space research, weapons production)

## The Present & Future of Open Science

*The optimum is not clearly identified, but we can tell when changes are pushing the system out of balance.*



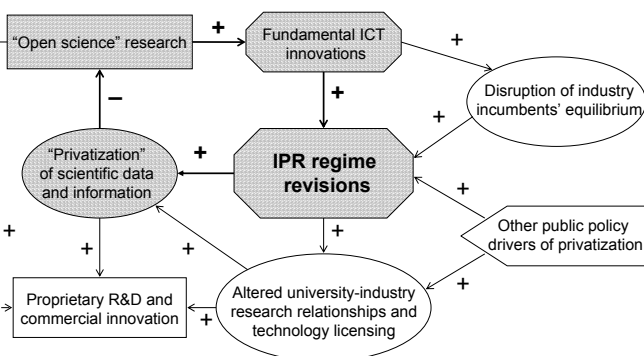
**Fiscal pressures to "privatization" government information production, reinforced by stronger and more comprehensive IPR protections, and the disruptive effects of ICT innovation, and contributing to a drift toward the "property" pole.**



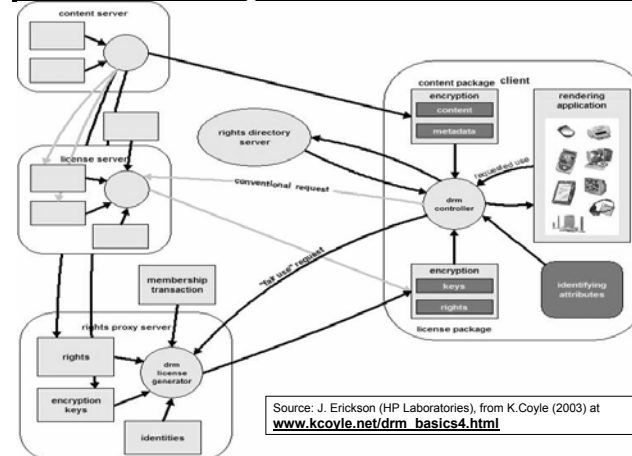
## Property – successive expansion of the IPR regime

- Reinforcement of international conventions by bilateral agreements
- TRIPs Agreement: 'harmonized' national IP treatment at developed country levels; created obstacles to recourse to compulsory licensing
- Extensions of the domain of patenting in the U.S.:
  - living organisms: *Diamond v. Chakrabarty* (1980)
  - software : *Diamond v. Diehr* (1981)
  - business models: *State Street Decision* (2000).
- *Sui generis* protections:
  - copyrights in semi-conductor mask work (1980)
  - EC directive on the legal protection of databases (1996)
- ICT advances as drivers of IPR regime changes:
  - "self-help" technologies (water-marking, encryption, trusted systems: foreclosure of effective "fair use" exclusions)
  - legal restraints on decryption of material that is protected by copyright law: U.S. DMCA (1998); EU InfoSoc Directive (2002)

## An historical irony: the digital technology boomerang comes back... ...and hits 'open science'



## ...trusted systems -- a software weapon against creative and innovative reuse of digital content

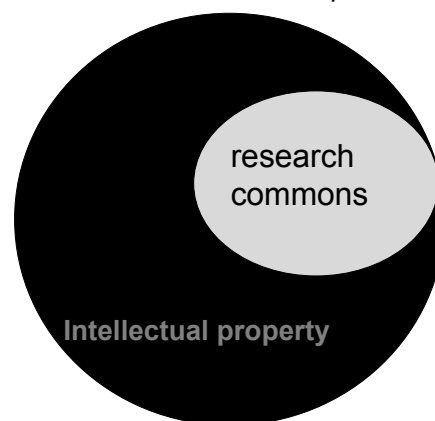


Source: J. Erickson (HP Laboratories), from K.Coyle (2003) at [www.kcoyle.net/drm\\_basics4.html](http://www.kcoyle.net/drm_basics4.html)

## Some unintended consequences of stronger IPR protection for results from public R&D

- “Anti-commons” effects: patent thickets and royalty-stacking raise barriers to exploratory, high risk research
- PROs emphasis on obtaining and exploiting IPR weakens norms of trust and cooperation among researchers
- IPR distribution conflicts complicates negotiations between developed and developing country research institutions, blocking some projects in extreme cases (e.g., the U.C. Davis and the abandonment of the Andean strawberry project)
- Database utilization encumbered by imposition of “pass-through” licensing conditions and legal protection of encryption systems
- Deep-linking and database federation impeded by non-compatible digital rights management (DRM) and “trusted” systems

*public domain*



## What is to be done?

**Creating a “research commons” --by licensing intellectual property to provide common-use rights:**

Open access publishing of scientific preprints, and self-archived pdfs of published articles

The Creative Commons (“some rights reserved”) approach to licensing of scholarly and creative cultural information products (text, images, sound): offering a menu of standard licenses—<http://creativecommons.org>

## What is to be done?

**-- Creating a “research commons” by licensing of intellectual property:**

- Free and Open Source Software approach to ensuring access to software tools, using copyright licensing terms: GNU GPL (“copyleft” principle) requires distributors of code to do so on the same, open source, royalty free, attribution basis on which they received the code.
- Science Commons: common use licensing of data contributed to repositories, cross-licensing of patented research tools, pre-commitment to materials transfer licensing on RAND terms
- *G/SCI* – the Global Information Commons for Science Initiative: a support facility for ‘bottom-up’ commons-building initiatives, and programs for coordination among “top down” public agency support actions.

*This is a preliminary and incomplete version of the presentation*

**Additional material will be presented, including some treatment of the following topics:**

- The anatomy of the anti-commons problem
- A generalized anti-commons problem—search-space degradation
- “Collection societies” –another problem rather than a solution
- Concrete experiments in constructing research commons, initiated within specific scientific research communities

