

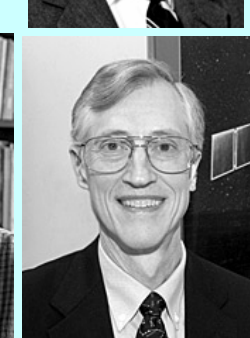
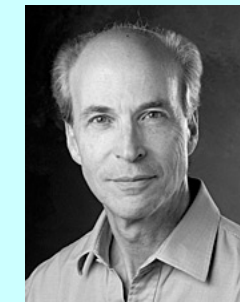
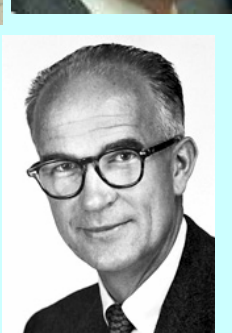
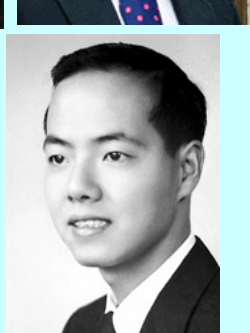
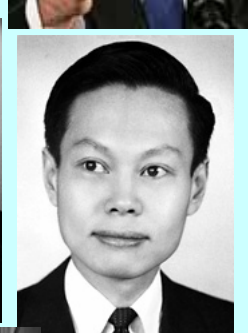
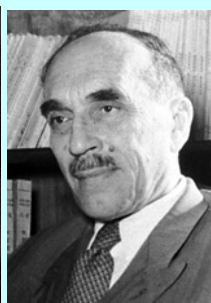
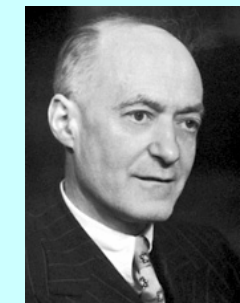
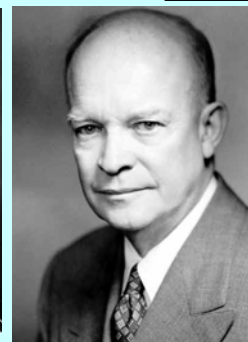
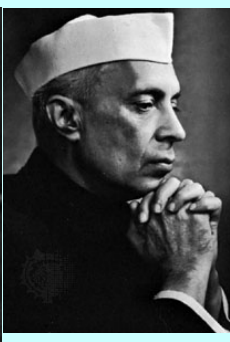
21st Century Knowledge





































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50 years



										Nobel Laureates Chemistry 1956		Nobel Laureate Literature 1956	Physics Nobel Laureates 1956-57									
Nikita Khrushchev			Dwight Eisenhower			René Coty		Konrad Adenauer		Nikolay Semenov			Yang Chen Ning		William Shockley		Walter Brattain					
Nobusuke Kishi		Jawaharwal Nehru		Harold Macmillan		Mao Tse Tung		Cyril Hinshelwood				Albert Camus	Lee Tsung-Dao			John Bardeen						
																						
																						
Shinzo Abe		Manmohan Singh		Gordon Brown		Wen Jiabao		Roger Kornberg Nobel Laureate Chemistry 2006		Orhan Pamuk Nobel Laureate Literature 2006		Craig Mello			John Mather		George Smoot					
Vladimir Putin		George Bush		Nicolas Sarkozy		Angela Merkel		Edmund Phelps Nobel Prize Economics 2006		Andrew Fire Nobel Laureate Literature 2006		Muhammad Yunus Nobel Laureate for Peace 2006			John Mather Physics Nobel Laureates 2006		George Smoot					
										Nobel Prize Economics 2006		Nobel Laureate Medicine 2006										

Global Science Commons and Sustainability

This session has several premises:

- 1. That achieving higher levels of sustainability requires an improvement in the 'science commons'**
- 2. 'Anti-commons' outcomes negatively affect social welfare**
- 3. That firms have insufficient knowledge for the range of innovative activities in which they engage**
- 4. That 1, 2, and 3 'add up' to create a positive sum outcome for all actors**

I agree with 1, 2 and 3 but not with 4

There are a considerable number of situations in which each of the first three premises can be true, but where 4 won't follow because of possibilities for some actors to gain at other's expense.

In these situations, we cannot expect actors to voluntarily co-operate with the creation of 'science commons' (or more broadly 'knowledge commons')

There are also cases where 1, 2, and 3 will fail to add up because of problems with markets and regulation.

'Science Commons'

The term has several meaning:

- 1. Science is a public good – because of its information content, it is most likely to create benefit if it is generally and freely available**
This is a statement of a desirable social norm
- 2. Commercial interests may wish to 'enclose' parts of this commons in order to achieve greater private return**
Commons may not exist without some form of intervention
- 3. Scientific knowledge is a common cultural heritage and removing barriers to access is a natural extension of human rights**
Access to commons requires proactive measures

Each of these meanings has different implications for policy action either by interest groups or governments

- 1. Science is a public good – because of its information content, it is most likely to create benefit if it is generally and freely available**

Stephen M. Babcock (1843–1931) -- Professor, University of Wisconsin, US

Professor Babcock invented a simple and reliable test for measuring the butter fat content of milk. He refused to take out a patent for his invention and is reported to have said ‘this is what the taxpayers of the State of Wisconsin pay my salary for doing.’

Donald Knuth (1938-) – Professor, Stanford University, US

Professor Knuth designed TeX, software for typesetting mathematical equations. Knuth reserved the right to control what is called TeX in order to assure that the same input file would produce the same outputs, but otherwise placed his software in the ‘public domain.’

He has also stated that much of the progress in computer science made in his lifetime would have been impossible if software had been patentable.

2. Commercial interests may wish to 'enclose' this commons in order to achieve greater private return

In the same year as Shockley, Bardeen and Brattain were being awarded their Nobel prize, AT&T agreed to the first conferences under the terms of the 1956 Consent Decree (to an anticompetitive behaviour action taken against the company) which barred the company from engaging in unregulated businesses

AT&T provided the technology to all interested parties (including Sony) for a \$25,000 fee to cover administrative costs.

What would have been the history of the semiconductor industry without this action?

The general argument made today is that intellectual property is necessary for innovative investment.

Despite this, most companies report that patents and copyrights are of less importance than other means of 'appropriating' the returns from innovation (compared to time to market or secrecy)

3. Scientific knowledge is a common cultural heritage and removing barriers to accessing is a natural extension of human rights

The industrialised world has benefited enormously from the mobility of scientists and inventors as well as their ideas

Viewing science as a common cultural heritage of human beings is a natural way to return this benefit to the world

This viewpoint not only accords with basic ethical principles, it also enhances the legitimacy of systems of market exchange which might otherwise be mistrusted as sources of advantage for those who dominate international market transactions

As a principle for organising access, this means taking into account differences in access capabilities and experience – potentially a very broad agenda requiring serious thought about the resources required

The Counter Argument: Markets for Knowledge

The enormous complexity of our world makes finding, verifying and applying knowledge in many cases more costly than producing it

Intellectual property and other market arrangements for the sale of knowledge are a solution to this problem.

They may also provide further incentives for the production of knowledge (but this is incidental)

Because the value of information cannot be determined by a purchaser there is the possibility that ‘bad’ information may crowd ‘good’ information out of the market.

Markets for knowledge also address this problem

Ultimately, these issues suggest regulation rather than monopoly, but it is important to note this argument because it is of key importance in what follows

Is there social value in intellectual property?

- 1. Intellectual property can provide a basis for action. Without it, the argument can be made that 'imitators' will flood the market.**
Note: This is about sociology not economics. Other ways to gain benefits from taking action exist and typically predominate.
- 2. Intellectual property can prevent 'development races' in which companies attempt to gain first mover advantages from being first to market a new technology.**
Note: The cost of protection, however, remains the monopoly granted to the developer. Society may benefit from protecting inventions that are expensive to develop (such as thoroughly tested pharmaceuticals)
- 3. Intellectual property can provide resources for activities such as promoting, training, and supporting adaptation of protected technologies.**
Note: These activities can be supported in other ways if there is political will to do so.

The Republic of Science versus the Republic of Commerce

As my colleagues Paul A. David and Partha Dasgupta have observed, science operates within an incentive system that is different than commerce

‘Priority’ – being the first to discover *and disclose* new knowledge is the basis for reputation.

Without disclosure, there can be no priority

Reputation is a basis for patronage. Those who have demonstrated that they can produce important knowledge receive resources to make more discoveries

In commerce, disclosure reduces competitive advantage. Firms may disclose to gain access to networks, to advertise their achievements, or to reward scientists and engineers – they do not pursue disclosure as their purpose.

Practical Issues

This brief review sets the stage for considering how aims of extending ‘science commons’ (in all three meanings) can be pursued.

Basic Principles:

- 1. Critical reflection is needed**
‘Commons’ is not a synonym for utopia
- 2. Some regulation may be necessary**
To assure that the commons is not ‘enclosed’
To provide recognition for those contributing (reputation)
- 3. Some organisation may be necessary**
Healthy communities need points of reference and norms

Critical Reflection is Needed ...

Over the previous year the characteristics of the average Internet user have changed dramatically as many new people are introduced to the Net through services such as America Online, aimed primarily at home users. The current Web usage is likely to be insignificant in comparison to the potential for usage once the much vaulted "Information Super Highway" reaches into peoples' homes.

It is perhaps unlikely that the services eventually offered domestically on the Information Super Highway will be direct descendants of the World-Wide Web, but what is clear is that WWW offers an excellent testing ground for the types of services that will eventually be commonplace. As such, the WWW may play a key role in influencing how such systems develop. **At worst such a system may just become a glorified video delivery system and integrated home shopping network with a built in method of tracking your purchases and sending you personalized junk e-mail. At its best such a system could provide truly interactive capabilities, allowing not only large corporations and publishers but also individuals and communities to publish information and interact through the network, while maintaining individual privacy.** The outcome will have a major impact on the quality of life in the 21st century, influencing the way we work, play, shop, and even how we are governed.

Tony Johnson, 'Spinning the World Wide Web,' SLAC Beamline, Autumn 1994

<http://www-sld.slac.stanford.edu/sldwww/beamline/contents.html>

1. Critical reflection is needed

Knowledge commons construction is vulnerable to several problems:

- 1. Excess variety with inadequate selection**
- 2. Leader exhaustion**
- 3. 'Forking' and community gridlock**

It is inevitably very difficult to anticipate and make allowances for the variety of ways that communities may wish to use information

- 1. Problems of ontologies and standards**
- 2. Accommodating synoptic and derivative uses**

Persistence is not guaranteed

- 1. Ephemeral initiatives can reduce 'reputation' of the method**
- 2. Indirect funding is an issue**

Sustainability initiatives suffer from factionalism

- No prospect of consensus on priorities or definitions**
- Existence of a spectrum of intensity of views**

2. Some regulation may be necessary

While economics provides the tools for producing 'more' it relies on individual action to define 'better'

More and better in markets is resolved by competition and customer sovereignty

The corresponding idea in the case of knowledge commons is 'reputation' – but reputation is only as strong as the community norm

Weak community norms lead to large negotiation costs

Private actors have an incentive to expropriate knowledge commons, to build toll booths to access them, and to create necessary complements

Even if information has 'post-scarcity economics' features, wealth creation requires the creation of scarcity where it need not exist

3. Some organisation may be necessary

Variety can be a cost as well as a benefit – initiatives to construct commons have costs to those participating in initiatives that are bypassed by more popular or more widely used alternatives

This raises further problems with regard to access since initiatives tend to be either mono-language (e.g. English) or language based (e.g. multi-language nature of Wikipedia)

Proactive measures against the formation of ‘anti-commons’ requires discipline and energy

In sustainability, the question of where to begin is substantial and as yet unresolved (partly because of the divided nature of viewpoints previously noted)

Organisation (co-ordination) can reduce wasteful variety but can also suppress innovation

Conclusions

The formation of knowledge commons is a major opportunity to improve human welfare

There are substantive problems in the creation of knowledge commons, some of which are difficult to overcome

Tools to address problems exist but critical reflection, regulation, and organisation are still needed (it is not only a technical problem)

In the area of sustainability – the problem of selecting priorities is a major impediment to the formation of knowledge commons