

**Knowledge products
and Knowledge Artifacts :
How should we deal with
Napster, Linux, SNP et al. ?**

By

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New Challenges to the Patent System

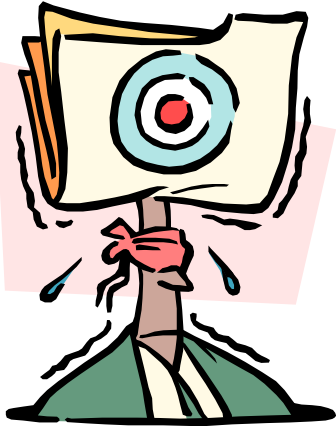
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What do we mean by knowledge products?

Commodities whose physical properties resemble that of knowledge.

- **First generation:** *ex. books, paintings ---cannot be replicated at low cost.*
- **Second generation:** *ex. cassettes, CDs ---can be replicated but replications can be exchanged only on a small, informal, scale.*
- **Third generation:** *Any product that is an encapsulation of information, which is replicable at low cost and tradable on the internet.*



Controversies generated by third generation knowledge products.....a few examples

Napster



Artistes and Recording companies were unhappy.

Linux

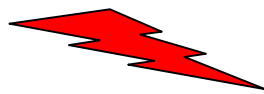


Established competing companies felt threatened.

SNP



Small firms were unhappy.



The Digital Millennium Copyright Act (1998)

Thoughts of Economists (1/3)

Quah (1999)

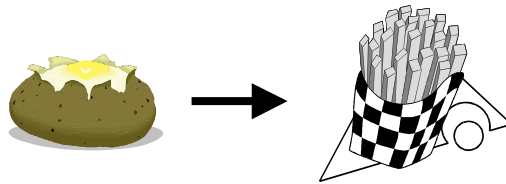
- *“Software has all the same physical and economic properties as traditional forms of knowledge. The same holds for information in electronic and biological (carbon-based) libraries, pharmaceuticals, and databases, including new media, video-entertainment and broadcasting. Thus, the resource-allocation difficulties for producing and distributing knowledge described above emerge with equal force for these knowledge-products”.*

Quah D., 1999, *The Weightless Economy in Economic Development*, LSE Economic Department

- *“I will refer to all such products as intellectual assets or knowledge products – even if, for instance, a Spice Girls MP3 file might typically be viewed as neither knowledge nor intellectual”.* (ibid.)

Thoughts of Economists (2/3)


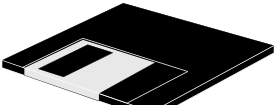
Boldrin and Levine (2002)



“When you buy a potato, you can eat it, throw it away, plant it or make it into a sculpture. Current law allows producers of a CDs and books to take this freedom away from you. When you buy a potato you can use the “ idea ” of a potato embodied in it to make better potatoes or to invent french fries. Current law allows producers of computer software or medical drugs to take this freedom away from you. It is again this distorted extension of IPRs that we argue” M.Boldrin et D.Levine (AER, 2002)

Thoughts of Economists (3/3)

Two problems with the theoretical framework

- Does not permit distinction between the different types of knowledge products.  = 

- Does not permit differential policy treatment of conventional products and knowledge products.



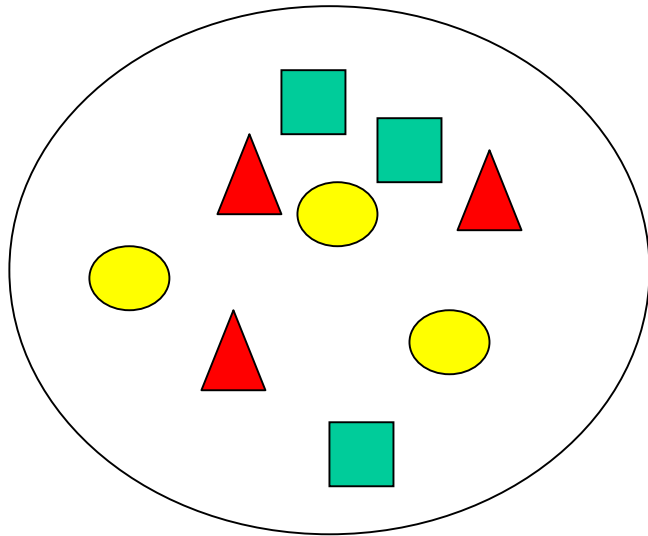
Our Research Questions

- **Can we develop a theoretical framework that permits the distinction between different kinds of knowledge products?**
- **With such a theoretical framework what can we say about IPR and each kind of knowledge product?**

The Von Weizsäcker Model

The traditional general
Equilibrium model:

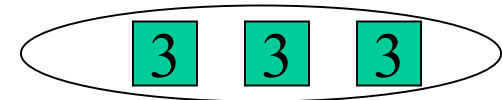
Simultaneous clearing
of markets



**Economic System = Ordered
sequence of activities**

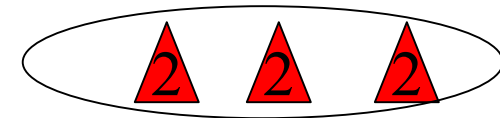
Sequential clearing of markets

3- Innovation



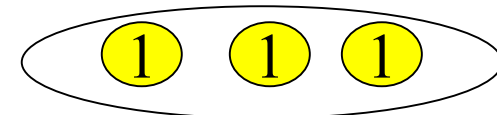
(knowledge products market)

2- Production



(Producers goods market)

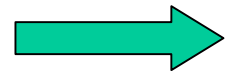
1- Consumption



(Consumer goods market)

Assumption of the Von Weizsäcker Model

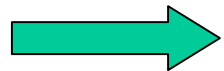
- Higher competition at any activity level



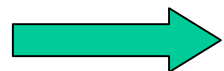
More Agents Active at that activity;



More Output at that activity;



More Input available for lower activity;



Less profit for any quantity sold from higher activity;

Consequence of the Von Weizsäcker Assumption

- **The output of any activity level is :**



An increasing function of competition of higher activities.



A decreasing function of competition of lower activities.



There is interdependence between activities and an inherent tension between the competition at the different activity levels.

The central result of the Von Weizsäcker Model

**Public Policy (competition policy and IPR policy)
should be such that :**

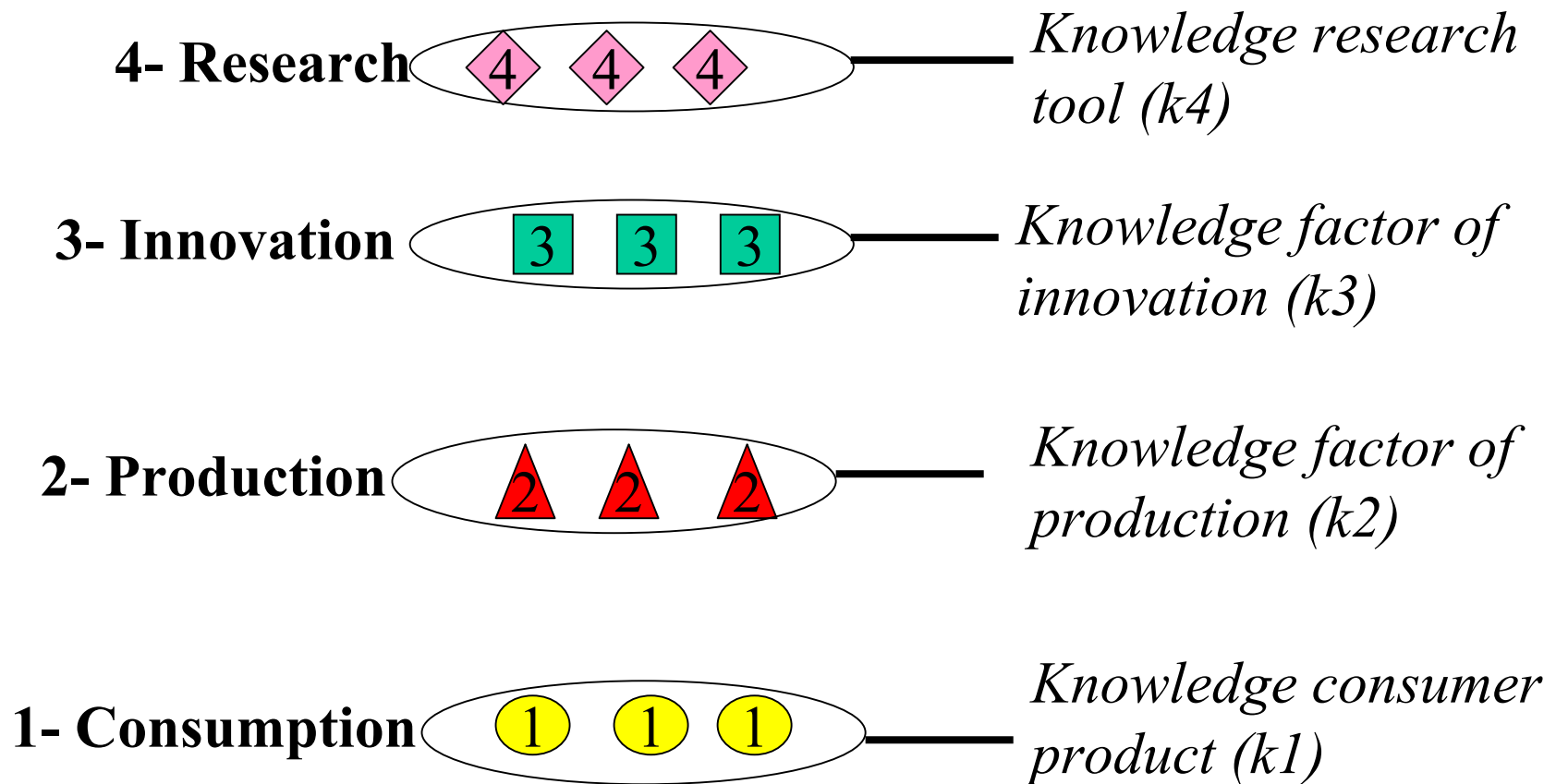
- Competition is limited at lower activities;**
- Competition is promoted at higher activities;**

**in order to maximize the consumption possibilities
and consumer welfare.**

Extension of the Von Weizsäcker framework

- Explicit introduction of a higher activity level.
- Consideration of knowledge products at all levels. All exhibit same properties:
 - Non rival.
 - Low cost of reproduction and transfer.
- Consideration of a digital economy where the cost of imposing private property rights increases :
 - as we move to higher activity level;
 - when we consider knowledge products rather than conventional products.

Incorporation of knowledge products in a sequential activities model (1/2)

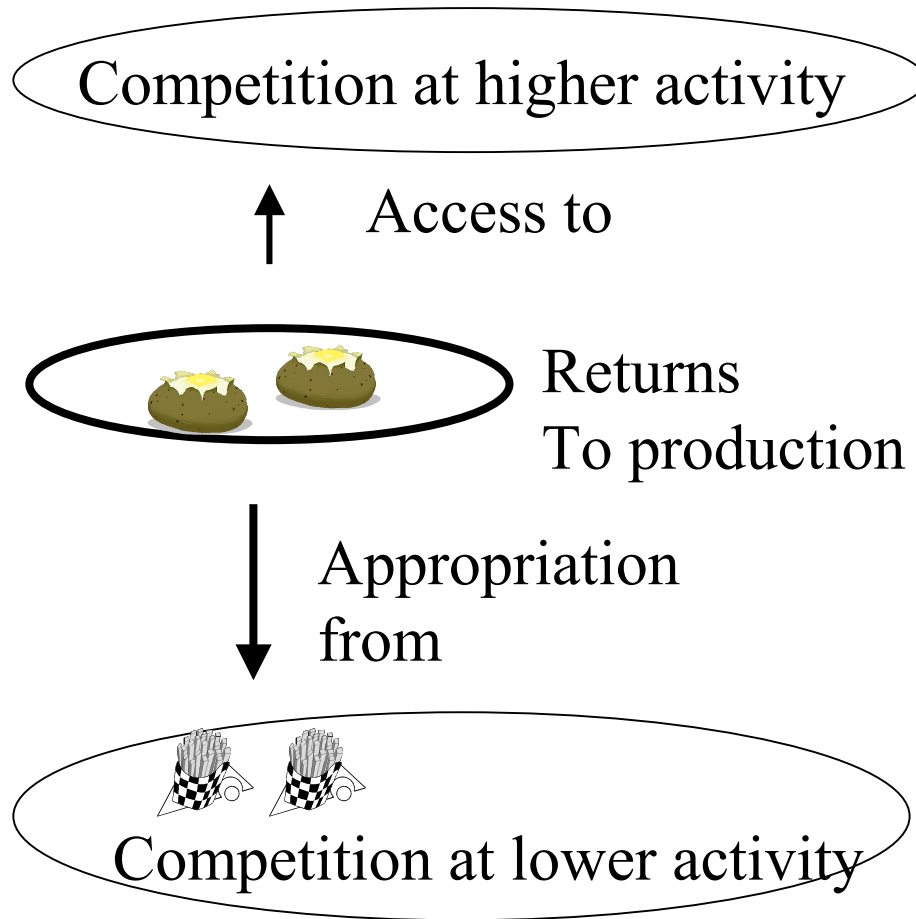


Incorporation of knowledge products in a sequential activities model (2/2)

Level		Type of knowledge product Examples
4- Research	k4	Scientific database, Scientific software (SNP)
3-Innovation	k3	Combinatorial Chemistry, Customers databases (Linux)
2-Production	k2	Blue print, design software for IC devices, expert systems
1-Consumption	k1	Painting, book, music, film (Napster)

Inter-activity dependence in a conventional economy

Conventional products



• **Output in any activity depends on competition in higher and lower activities.**

• **Free access to output at any level leads to two types of allocation problems:**

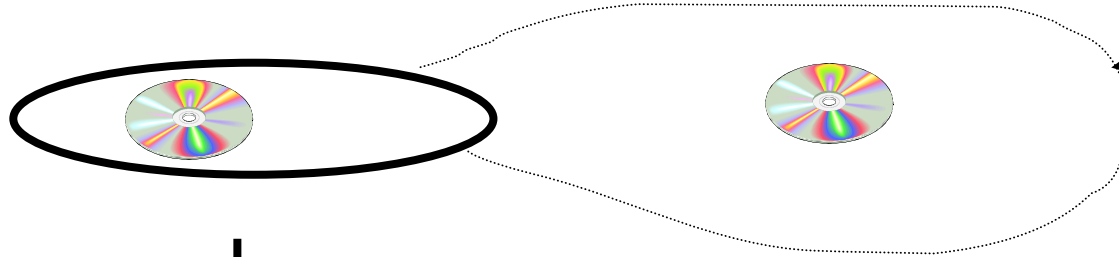
P1: Tragedy of the commons at the same level;
P2: Disincentives at the next higher level.

Inter-activity dependence in a digital economy

Knowledge products

Competition at higher activity

↑ Access to



↓ Appropriation from

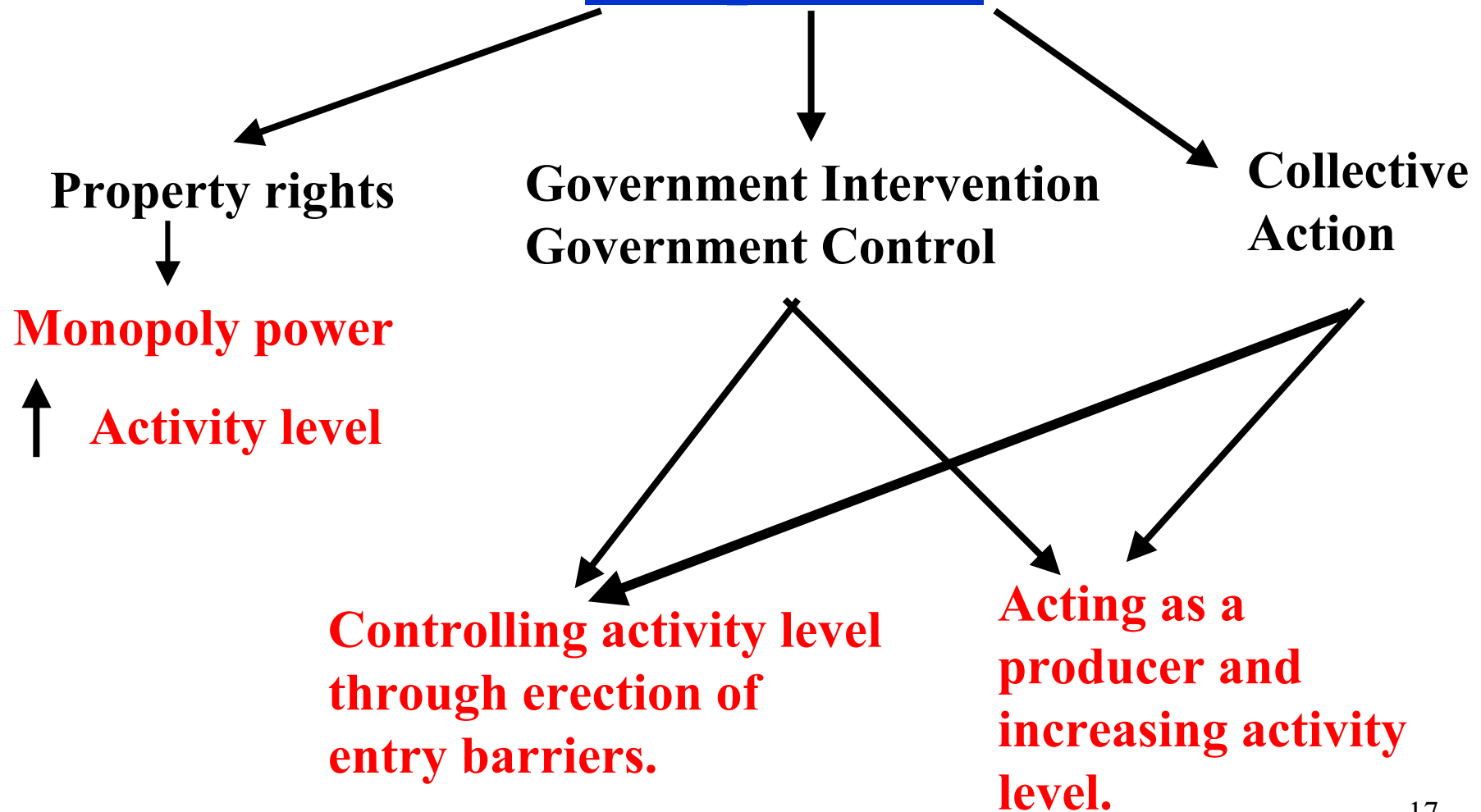
Competition at higher activity

Output in any activity depends on :

- **competition in higher and lower activities.**
- **Secondary effects.**

Secondary impact on competition at the same level

The policy options to control competition



Impact of Free access

Knowledge product	Free access means	Impact at same level = Tragedy of the commons P1	Impact at higher level P2
4-Research tool			
3-Factor of Innovation	Free access to results of basic research	Patent races, common pool problems, R&D duplication.	Disincentives for the creation of basic knowledge.
2-Factor of Production	No manufacturing secret	Too many firms; Too many brands.	Disincentives for innovation.
1-Knowledge consumption good	Free consumption goods	Over consumption	Disincentives for production.

Solutions to free access problems

Knowledge product	To reduce	Solution to problem at same activity	Solution at higher activity to disincentives problem
3-Factor of Innovation	Free access to results of basic research	Barriers to entry	<u>Property rights on research tools</u> ; Government sponsored basic research; research cooperation
2-Factor of Production	No manufacturing secret	Barriers to entry	<u>Property rights on production processes</u> ; Public sector R&D, Collective creation of innovation.
1-Knowledge consumption good	Free consumption goods	Regulation of consumption	<u>Property rights on resale of knowledge consumption goods</u> ; Government production, Collectives

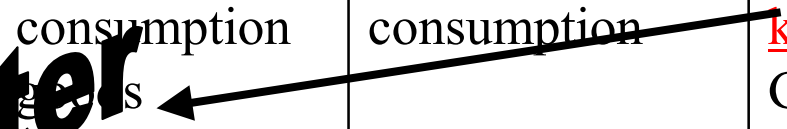
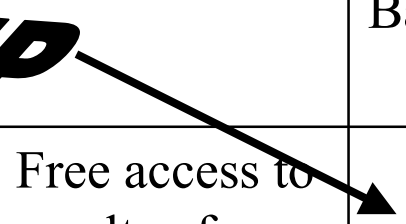
Coming back to SNP, Linux and Napster

Knowledge product	To reduce	Solution to problem at same activity	Solution at higher activity to disincentives problem
4-Research tool		Barriers to entry	
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2-Factor of Production	No manufacturing secret	Barriers to entry	Collective creation of innovation.
1-Knowledge consumption good	Free consumption	Regulation of consumption	<u>Property rights on resale of knowledge consumption goods</u> ; Government production, Collectives

SNP

Linux

Napster



Conclusion

- **Closing Napster can be justified as being a solution to the problem of appropriation of profit from sales of knowledge consumer products.**
- **Linux is a collective action for increasing the supply and circulation of a knowledge factor of innovation. Such an activity can only augment the production of lower activities.**
- **SNP is an example of a collective action to create an entry barrier for accessing a knowledge research tools market in order to create innovations.**

Where to now?

- **This is just a framework....**
- **We have gathered a number of elements.**
- **A beginning....**
- **Towards a more complete model.**