

Assessing Creative and Scientific Commons

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The problem

- How should we evaluate the performance of the scientific and creative commons?
 - What do we mean by performance?
 - Why do we want to know?

Creative and scientific commons

- Examples:
 - Free and open source software
 - Open access scientific and engineering preprint databases
 - Databases - common use licensing of data contributed to repositories
 - Cross-licensing of patented research tools, materials transfer licensing on RAND terms
- Most of the above have some form of contract associated with them, implied or otherwise

Performance

- Multi-dimensional:
 - Ease of submission, updating
 - Ease of access, use, search
 - Comprehensiveness
 - Accuracy and quality
 - In some cases, the ability to use the contents for statistical purposes
- “efficiency” - better outcomes at lower cost

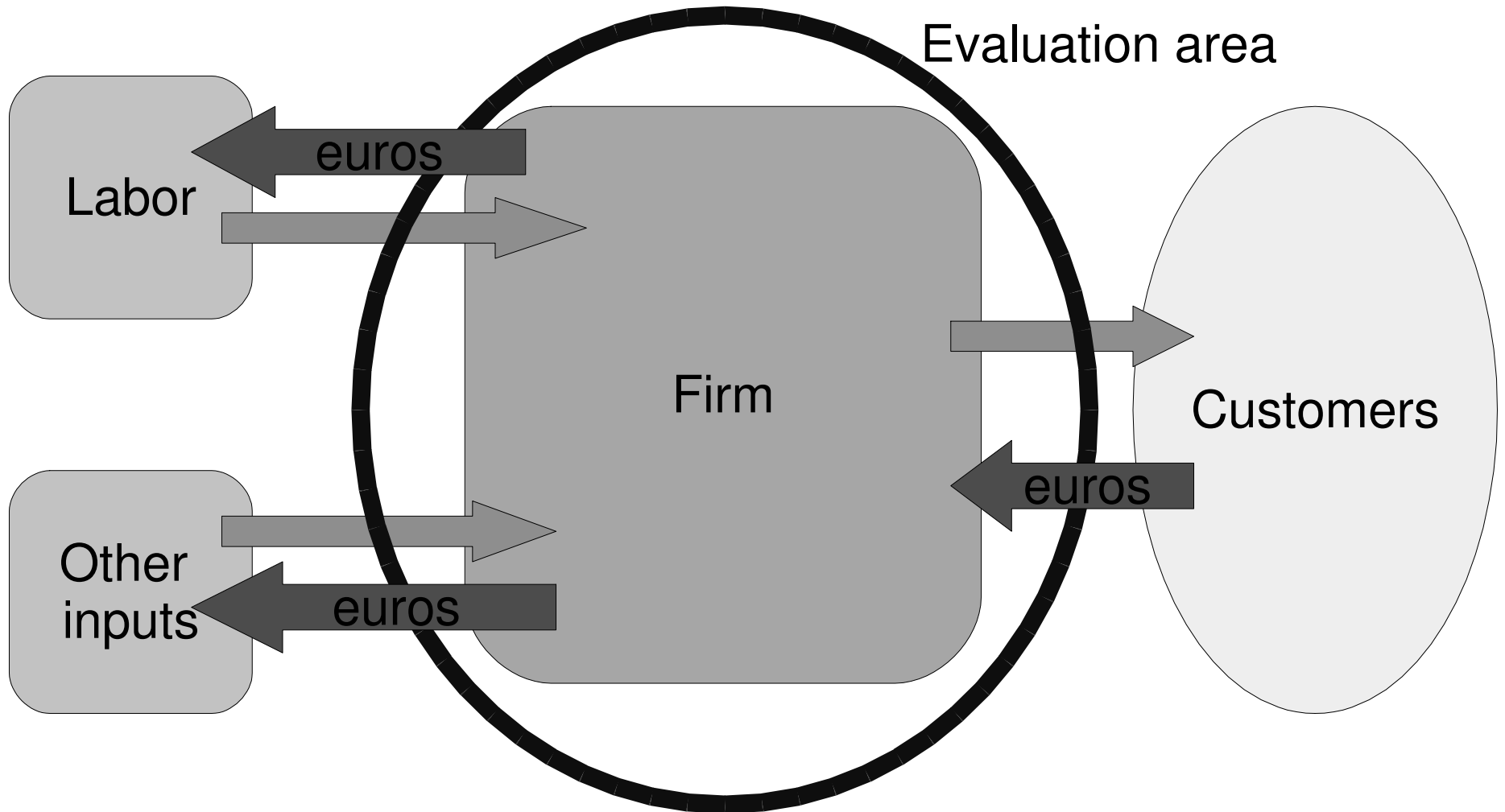
Why do we want to know?

- To compare and evaluate different methods of organizing such commons
- To allocate funds to help in the provision and maintenance of such commons
- To establish best practices in organizing commons
- ...other reasons?

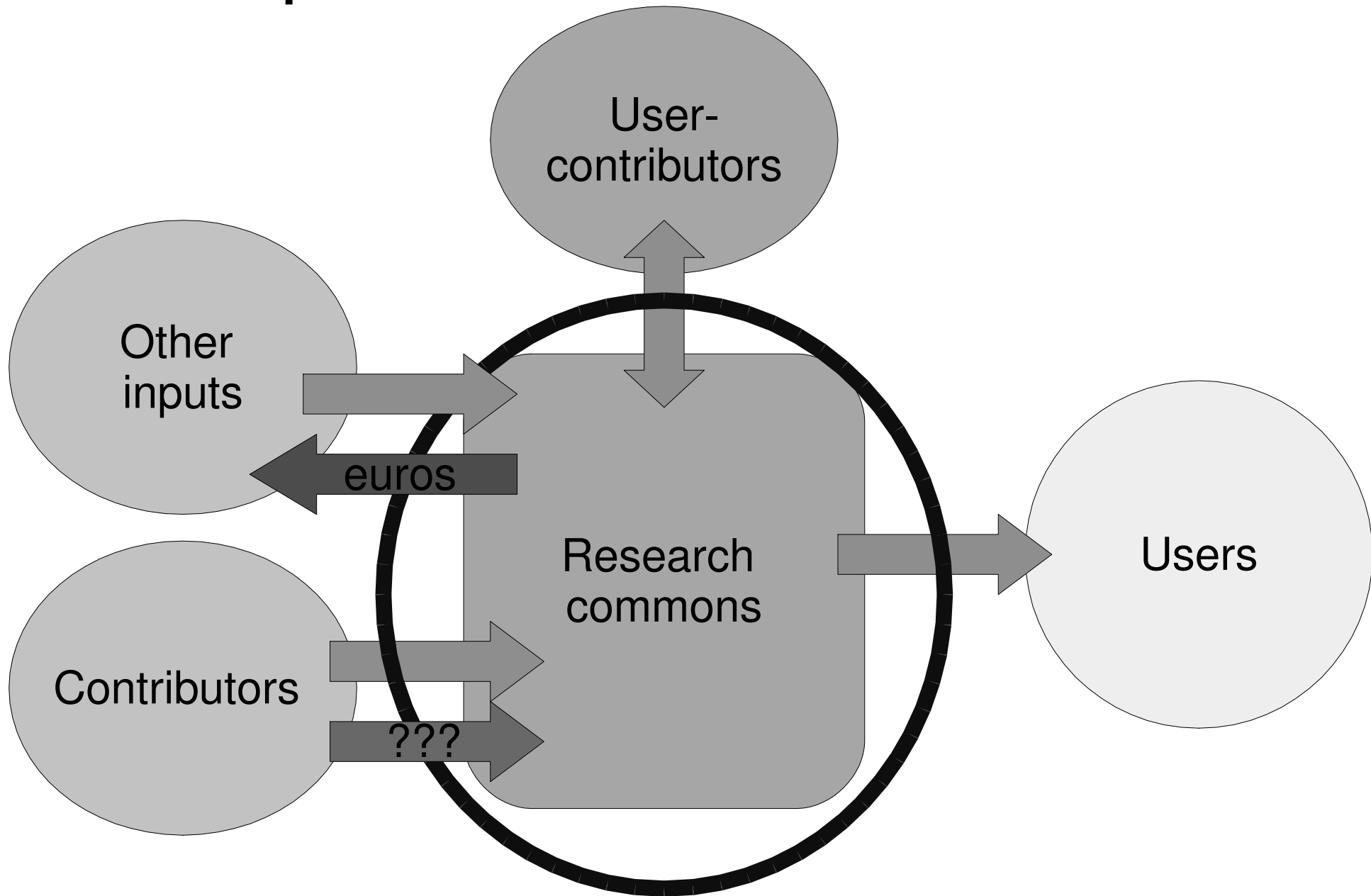
Conventional economic evaluation

- Productivity or profitability of a “closed” system (firm, line of business, etc.)
 - Measurement principle: output less input
- Aggregation over different types of outputs and inputs performed by measuring them in terms of monetary units
 - feasible and appropriate in a market system because of the willingness-to-pay test

For-profit firm



Open access commons



Three differences

- Lack of market-mediated transactions that would provide appropriate aggregation.
 - Input suppliers may incur costs.
 - But not always (survey evidence)
 - Some participants are both customers and contributors.
- => Suggests that we need a different approach to measurement.

Inputs and outputs (1)

- Costing the inputs has two pieces:
 - The usual methodologies apply to inputs like computing power, website maintenance, telecommunications, etc.
 - More important – the willingness of users to contribute and the quality of their contributions
 - May be useful to subsume these into the output measures (assume that input cost is uniform across quality)

Inputs and outputs (2)

- Like evaluating basic research where a large share of benefits are produced as “externalities” or “public goods”
 - see David, Mowery, Steinmueller 1992 on the supercollider
- Output has two parts:
 - enabling of future research
 - input to a variety of private profit-making activity
- Valuing the output - “willingness to use”

“Willingness to use”

- *Willingness to pay* assigns a value to a transaction by observing that at a certain price, the transaction takes place.
 - Allows comparison of “apples and oranges”
- *Willingness to use* assigns “value” from the observation that an individual finds the database or repository useful enough to access it.

Measures of willingness to use

- Website hits
- Downloads
- Citations to included papers, databases, etc.
- Willingness to contribute
-

next few slides review these for different types of commons

Open source software

- Tracking contributions:
 - Code is usually signed (but not always by employing firm- see next slide)
 - Comes in units (lines) that are measurable
 - Information on re-use available
 - Quite a bit now known on this topic
- Tracking use and quality:
 - Require registration before download
 - Speed of bug correction
 - Growth of firms producing complementary outputs

Funding Linux Kernel development

Contributors	K-HCM*	GHH**
Unknown individuals	33.2%	
Red Hat	11.8%	1.1%
Novell	9.7%	0.0%
Linux Foundation	8.1%	0.1%
IBM	7.9%	2.9%
Intel	4.3%	0.7%
“Amateurs”	3.9%	
SGI	2.2%	1.5%
MIPS	1.5%	0.3%
Hewlett-Packard	1.3%	1.2%

*Kroah-Hartman, Corbet, McPherson, Linux Foundation Report, March 2008

**Ghosh, Haaland, Hall June 2008 – for sarge release of Debian

Science and engineering preprint databases

- Measuring input
 - Number of contributions (relative to discipline)
 - Geographical spread?
 - Time lags?
- Measuring output
 - Downloads
 - Citations to papers in the database – changes in citation practice – see next slide

Gaulé and Maystre 2008

- Previous work:
 - Computer science conference articles freely available over the web cited substantially more than those that were not (Lawrence 2001)
 - Citations rates of articles freely available on the web substantially higher than those that were not (Antelman 2004; Harnad and Brody 2004)
 - Open access articles from PNAS receive a higher number of citations controlling for... (Eysenbach 2006)
- Their work attempts to distinguish quality from diffusion:
 - PNAS experimented with authors' paying for open access - authors chose open access for higher quality articles and they are more highly cited (but not after instrumenting by funding)

Databases and research tools

- Measures are similar
- Costs are higher
- Quality and accuracy more to the forefront
 - Track corrections?
 - User evaluations?
- License counts, citation counts
- More difficult: trace from research output to downstream output

Citations

- We know quite a bit about patent citations, less about paper or data citations. Summary:
 - They are correlated with economic and spillover value and with the resources spent to obtain the invention, but still explain less than half of the variability
 - They are very skew (also in the case of paper citations) but so is invention value
 - Getting good measures requires waiting
 - Practices change over time and across disciplines
 - Most of this carries over to other citations

Some suggestions

- Effectiveness of a collection (contents plus distribution):
 - Web views or downloads (possibly adjusted for database or repository size)
- Value of a collection:
 - Citations per hit (adjusted for time period and type of collection)
 - Need a variety of statistics – mean is not enough, may also want median or top 10 per cent

Caution

- Comparing firm-level productivities is difficult due to heterogeneity of activities and intertemporal fluctuations
- The problem is even more difficult here due to the lack of a uniform measure (monetary value)
- As in the case of various research assessment exercises, it is essential to supplement numerical evaluation with qualitative evaluation.