Assessing Creative and Scientific Commons

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The problem

- How should we evaluate the perfomance 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

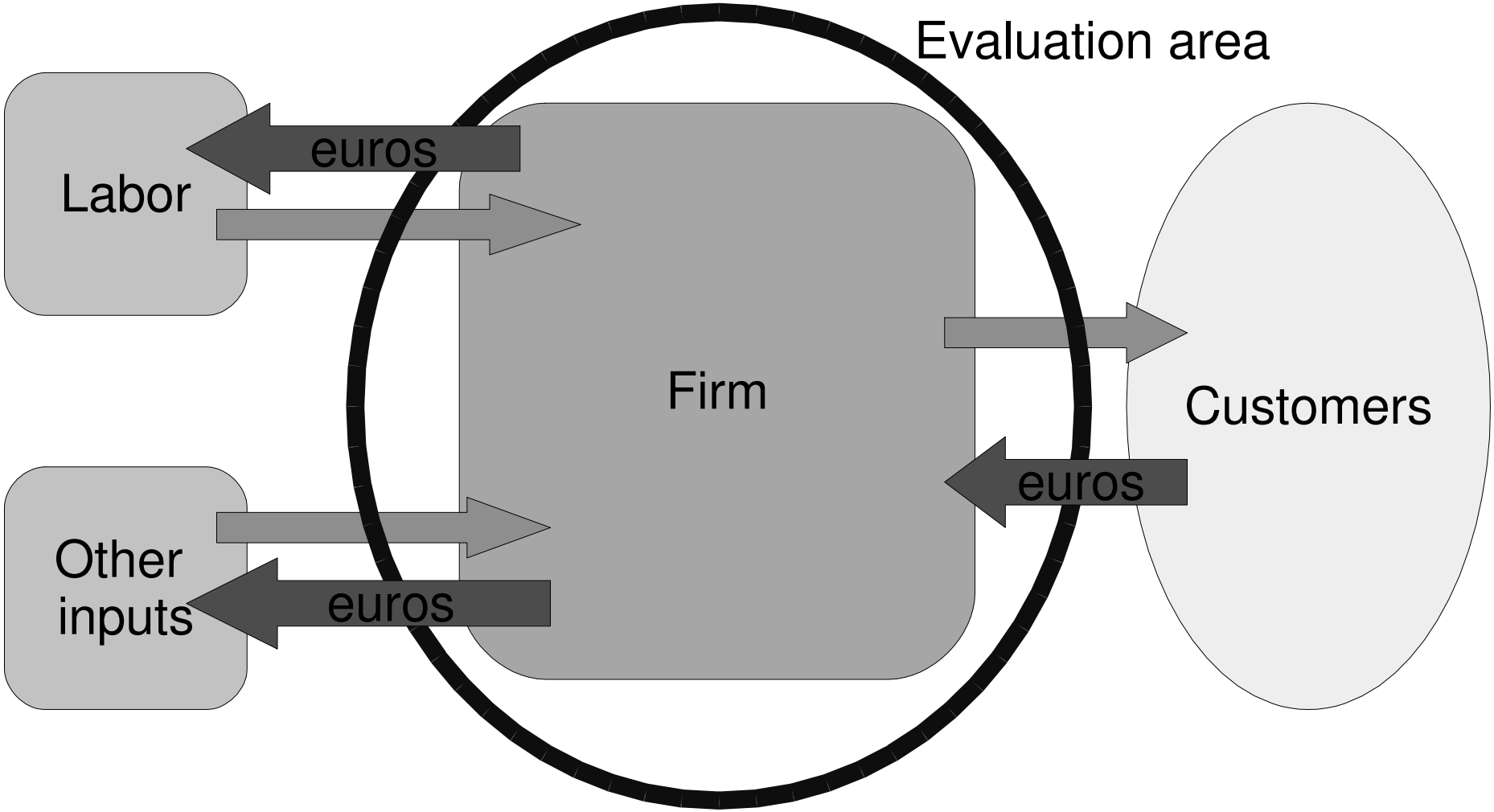
Why do we want to know?

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

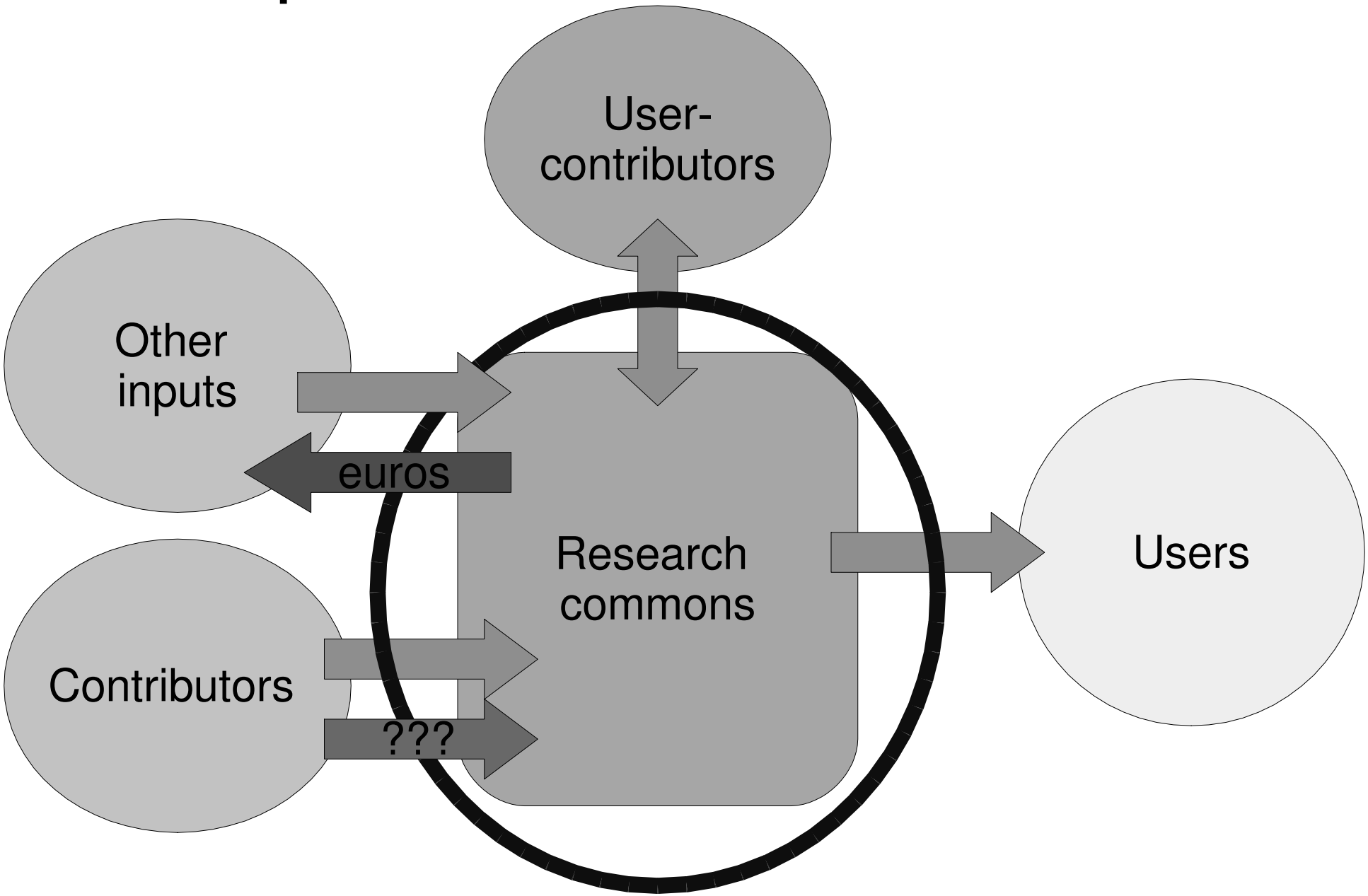
Conventional economic evaluation

- 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 maintainance, 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

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 evalution with qualitative evaluation.