Open Innovation: Bottom-up & Peer-to-Peer

Dipl.-Inform. Robert A. Gehring

Technische Universität Berlin
Informatik und Gesellschaft

Institut für Weltwirtschaft (Kiel)
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The Network Society 1

„ Das Charakteristische der gegenwärtigen technologischen Revolution ist nicht die zentrale Bedeutung von Wissen und Information, sondern die Anwendung dieses Wissens und dieser Information zur Erzeugung neuen Wissens und zur Entwicklung von Geräten zur Informationsverarbeitung und zur Kommunikation, wobei es zu einer kumulativen Rückkopplungsspirale zwischen der Innovation und ihrem Einsatz kommt.“

Manuel Castells (2001): Das Informationszeitalter I. Die Netzwerkgesellschaft, Opladen: Leske + Budrich, S. 34.

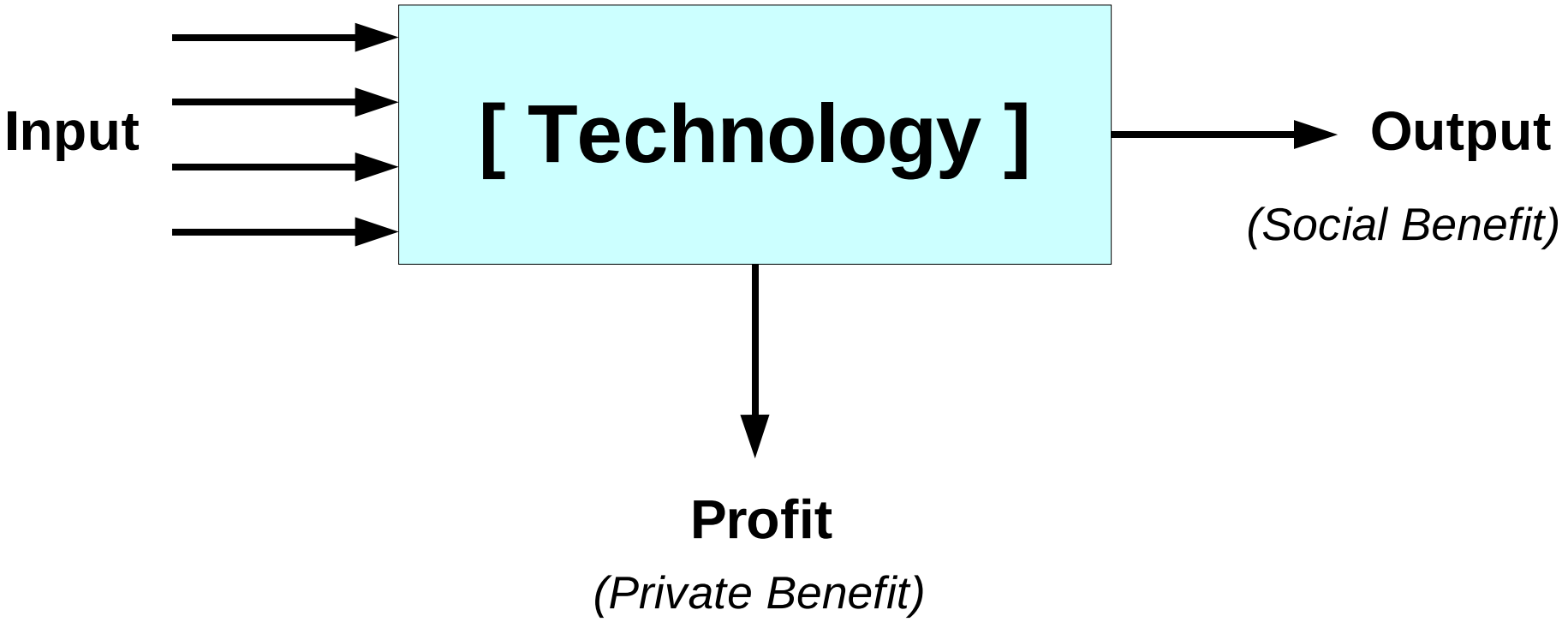
The Network Society 2

„ [D]ie Anwender [haben] die Technologie *durch Verwenden* gelernt, haben am Ende die Systeme neu konfiguriert und neue Anwendungen herausgefunden.
...
Die neuen Informationstechnologien sind nicht einfach Werkzeuge, die benutzt werden, sondern Prozesse, die entwickelt werden (müssen). Anwender [können] Entwickler werden. Also können Anwender die Kontrolle über die Technologie übernehmen.“

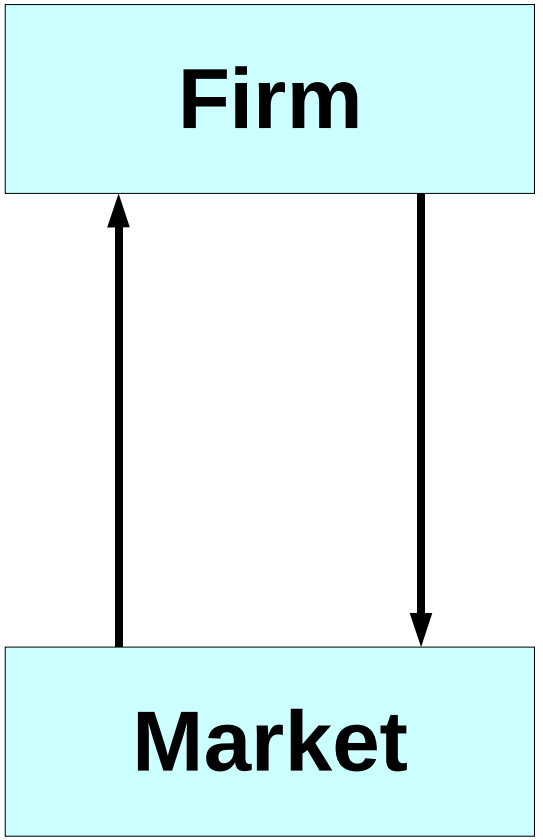
Manuel Castells (2001): Das Informationszeitalter I. Die Netzwerkgesellschaft, Opladen: Leske + Budrich, S. 34.

The Theory of the Firm 1

(simple neoclassical model)



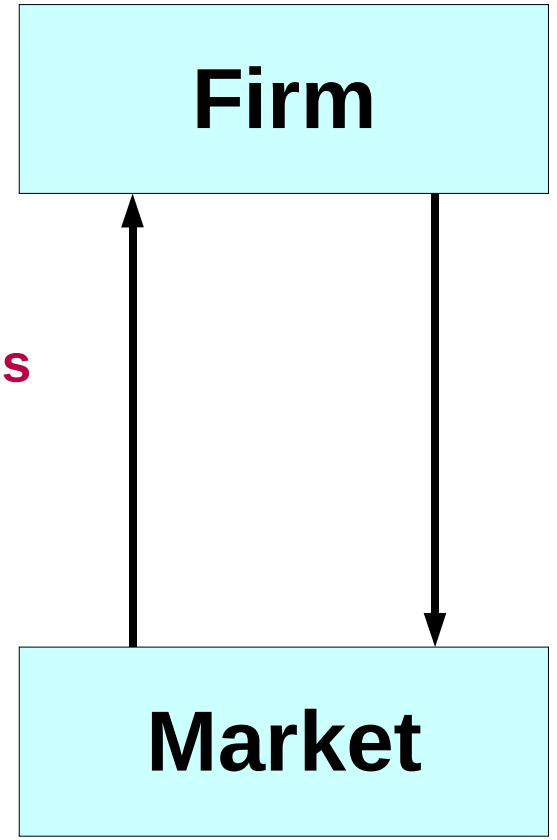
The Theory of the Firm 2 (Coase 1937) – Two Ways of Organizing Production



Production Costs

Production Costs

The Theory of the Firm 3 (Coase 1937) – Two Ways of Organizing Production



Transfer of Resources (i.e. Property Rights)

Production Costs

Transaction Costs:

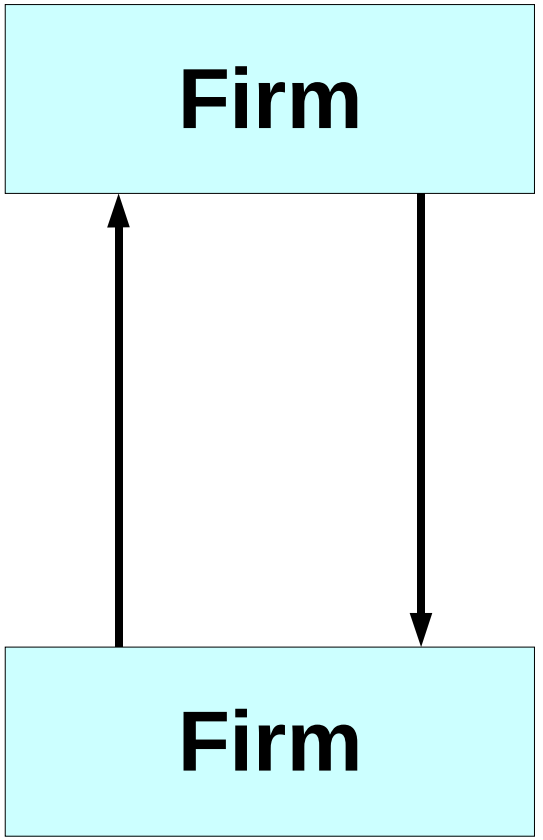
- Seeking
- Contracting
- Enforcing
- etc.

Production Costs

The Theory of the Firm 4 – The Principal-Agent-Version

Principal

„Outsourcing“
(i.e. Contracting)



Agent

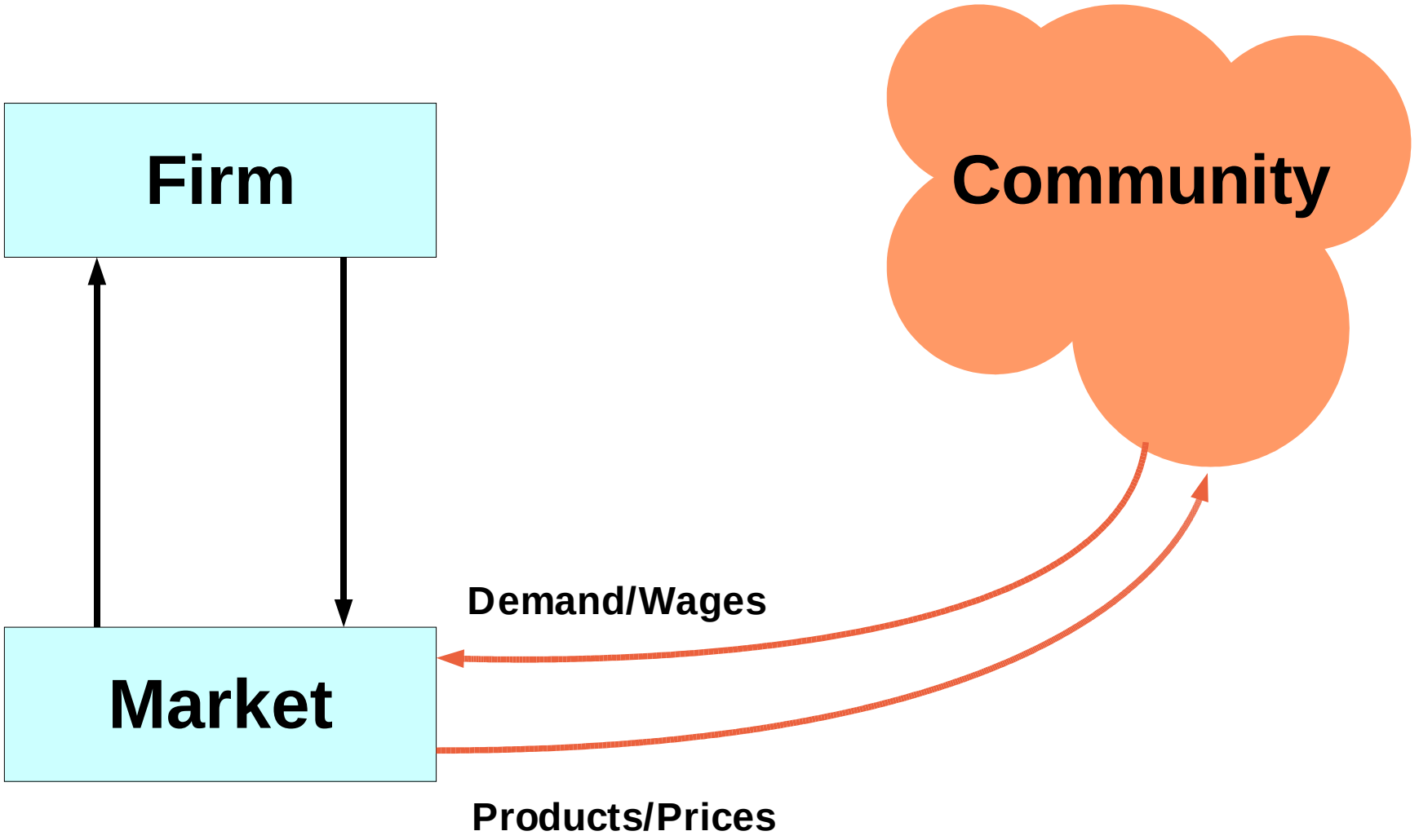
Goals

Asymmetric Information Problems:

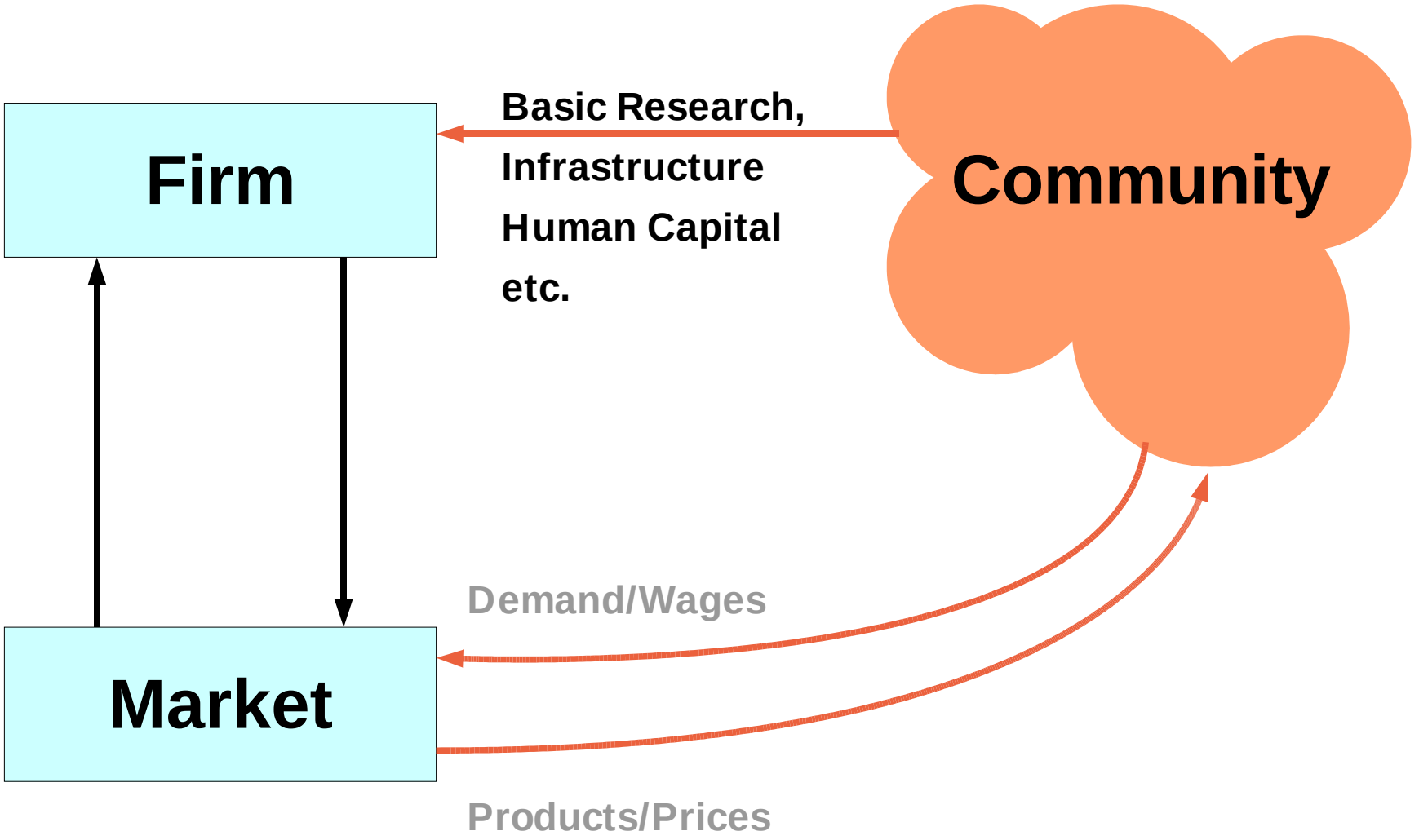
- Moral hazard
- Adverse selection
- Signaling
- etc.

Goals

The Theory of the Firm 5 (2004) – *More* Ways of Organizing Production 1



The Theory of the Firm 6 (2004) – *More* Ways of Organizing Production 2



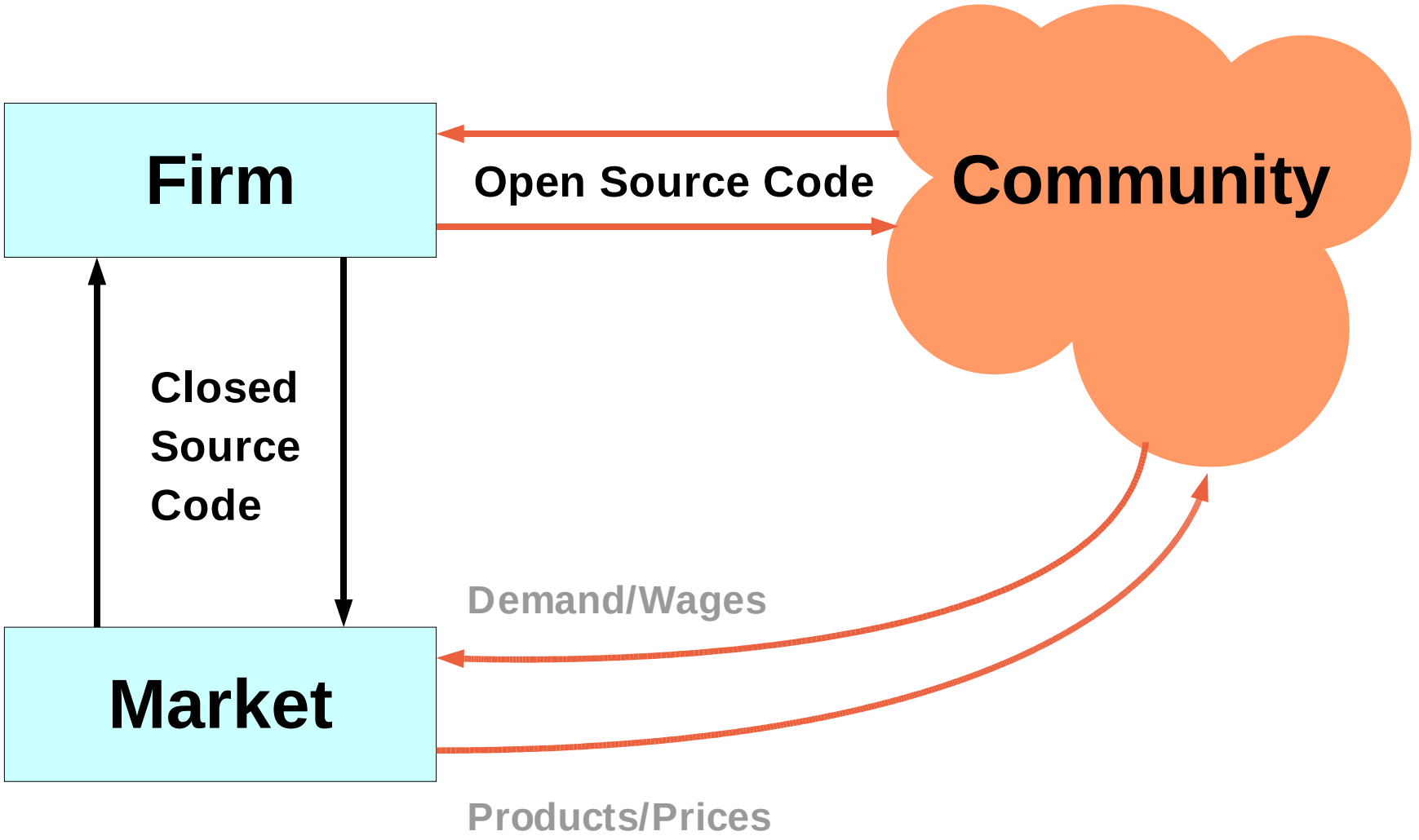
Properties of Software (in short)

- High development costs for first copy *of a product* („ sunk costs“)
- Low marginal costs for additional copies
- Public good properties
  - Nonrival consumption
  - Nonexclusion
  - Free rider problem
- Incremental, sequential development after initial development
- Complementary components (e.g. operating system + application program)
  - Components-based systems (replacement, modification possible)
  - (In)compatibility

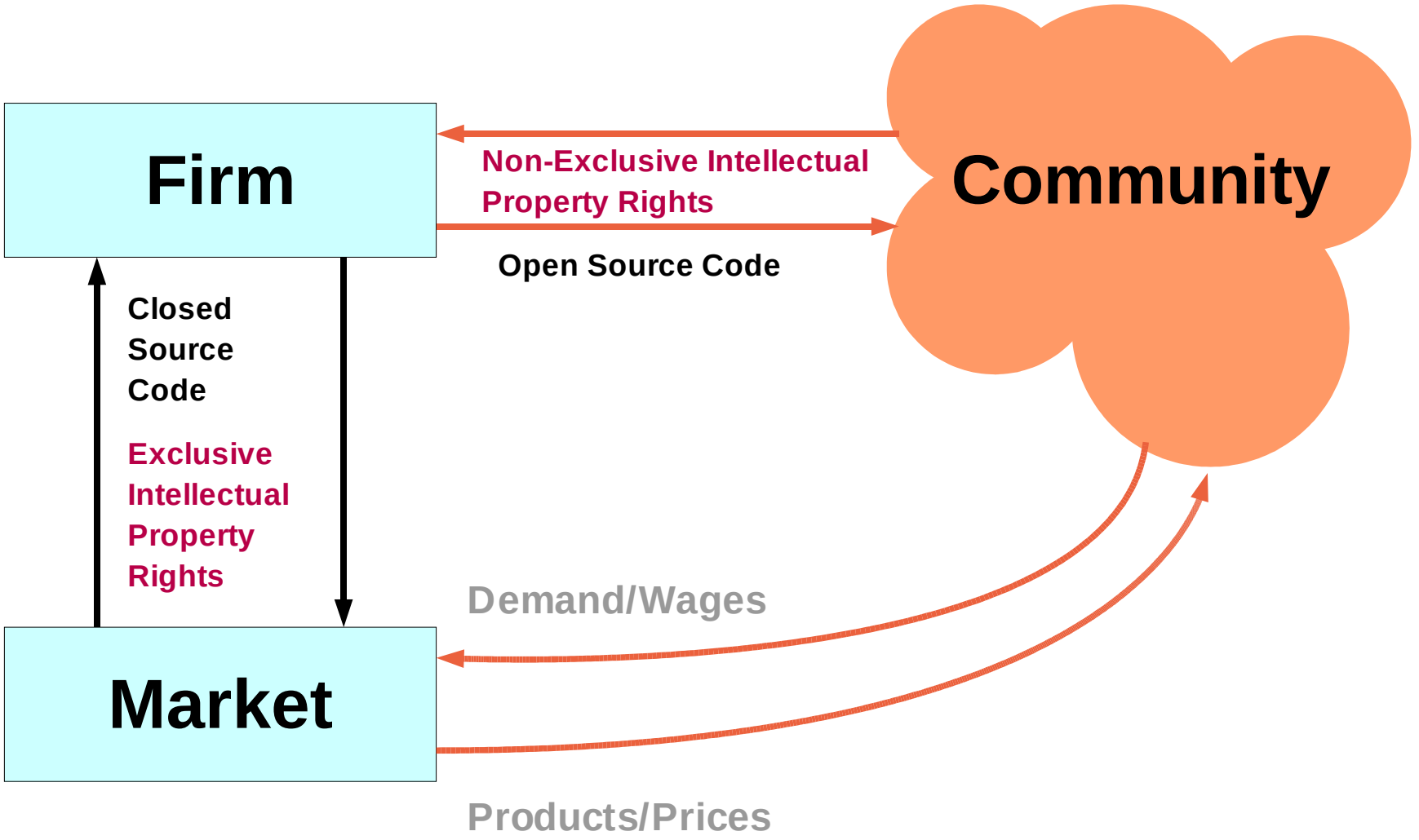
Properties of the Software Market (in short)

- Network externalities
- „ Winner-take-all“ -market
  - Favors dominant players
  - Favors strategic behavior
- Overlapping (intellectual) property rights
  - [Trade secrets] (to hide in binary code and/or NDA)
  - Copyright (expression)
  - Patents (function = „ ideas put into action“)
  - Trademarks
- Information goods => asymmetric information problems

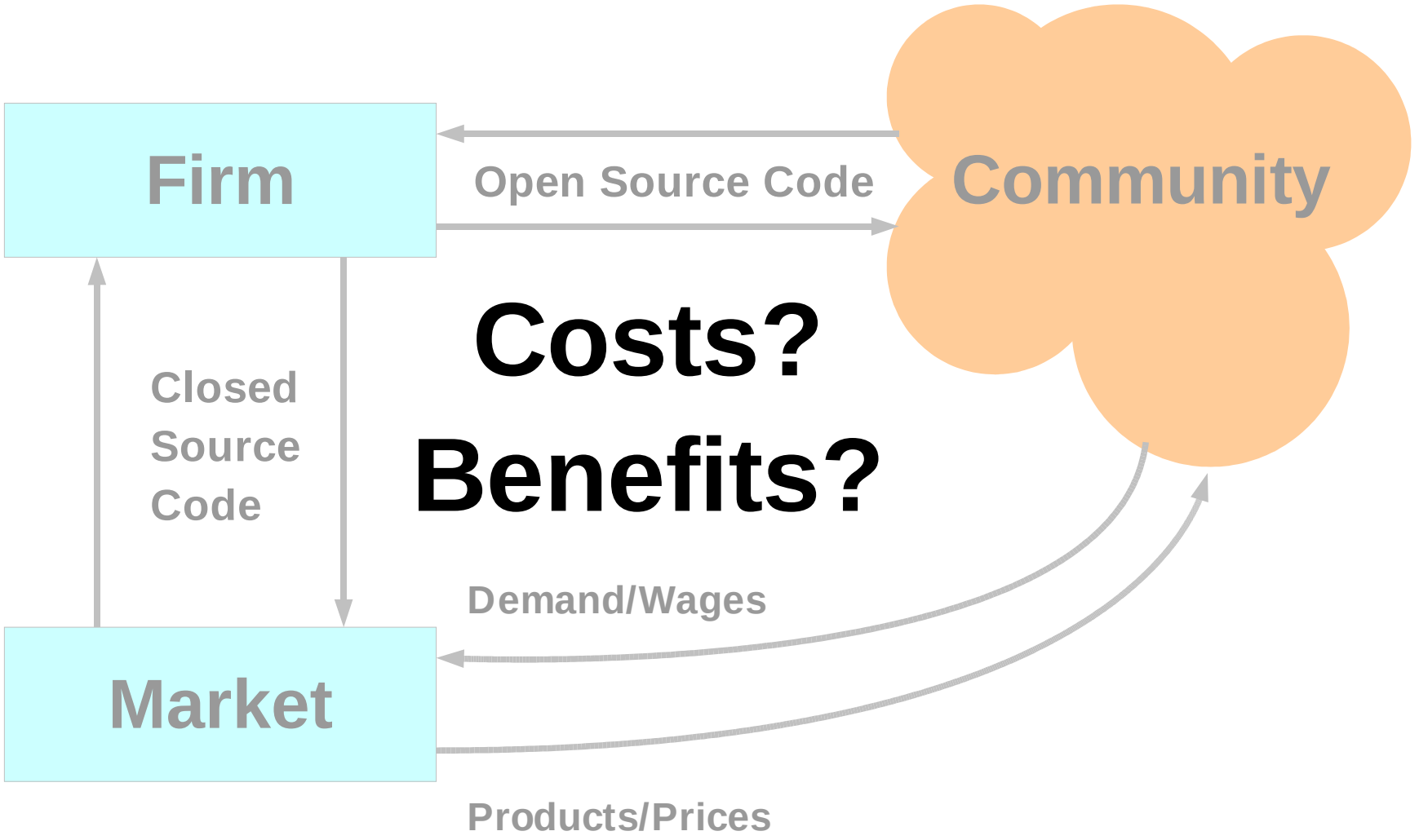
The Theory of the Firm 7 (2004) – Ways of Organizing Software Production 1



The Theory of the Firm 8 (2004) – Ways of Organizing Software Production 2



The Theory of the Firm 9 (2004) – Ways of Organizing Software Production 3



Transaction Costs Compared

- Prorietary Closed Source Code
  - Seeking:
    - Low (monopoly)
    - High (depending on market fragmentation)
  - Contracting:
    - High (monopoly)
    - Low-High (depending on IPR-fragmentation)
    - Prohibitive (extreme IPR-fragmentation ? „ anticommons“)
  - Enforcing: varying
- Open Source Code
  - Seeking:
    - Low (central repositories)
    - High (special demands)
  - Contracting: negligible (due to nonexclusive IPRs)
  - Enforcing: low (almost negligible)

Asymmetric Information Problems

- Proprietary Closed Source Code
  - Moral hazard: frequently
  - Adverse selection: common
  - Signaling: hard, only indirectly
    - Branding
    - Advertising
    - Liability
- Open Source Code
  - Moral hazard: hard
  - Adverse selection: hard
  - Signaling: easier, access to source code and open communication reveal
    - „ hidden characteristics“ (of developers)
    - „ hidden properties“ (of product)

Costs and Structure

„[T]he structure of an industry may change rapidly as costs shift.“

Dennis W. Carlton & Jeffrey M. Perloff (2000): Modern Industrial Organization, Reading, MA: Addison-Wesley, p. 6.

Open Innovation & the Community (e.g.) I

- Eric von Hippel (1988): **The Sources of Innovation**, Oxford University Press.
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Open Innovation & the Community (e.g.) 2

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- Ilkka Tuomi (2003): **Networks of Innovation**, Oxford University Press.
- Henry W. Chesbrough (2003): **The Era of Open Innovation**, MIT Sloan Management Review, Spring 2003, pp. 35-41.
- Nikolaus Franke & Eric von Hippel (2003): **Satisfying heterogeneous user needs via innovation toolkits: The case of Apache security software**, Research Policy, Vol 32, Iss. 7, pp. 1199-1215.
- Robert A. Gehring & Bernd Lutterbeck, Hrsg. (2004): **Open Source Jahrbuch 2004**, Lehmanns Media.
- Steven Weber (2004): **The Success of Open Source**, Harvard University Press.
- Eric von Hippel (forthcoming 2005): **Open source software projects as „user innovation networks“ - no manufacturer required**.
- OECD data, Eurostat data, ...

Open Innovation: How, When & Why...

- **No doubt: Innovation in the community is a matter of fact!**

- **But...**

  - **How...**
  - **When...**
  - **Why...**

  ... does it happen?

Motivational Aspects 1: Incentives to Innovate

- User innovates when:
  - expected benefits outweigh costs (von Hippel 2001);
  - opportunity costs are low (small, incremental innovative steps are cheap to integrate with source code access);
  - not to innovate is costly (e.g., for reasons of security).
- When „ agency-based“ (i.e. firm-based) innovation is too costly:
  - User: *costs of changing code* vs. *costs of getting code changed*
  - „ Sticky“ information (von Hippel 2005), i.e. information is hard to transfer from principal (user) to agent (firm).
  - „ Agency costs“ are too high (e.g., due to strategic behaviour).
  - Small, incremental innovative steps vs. product-innovation.

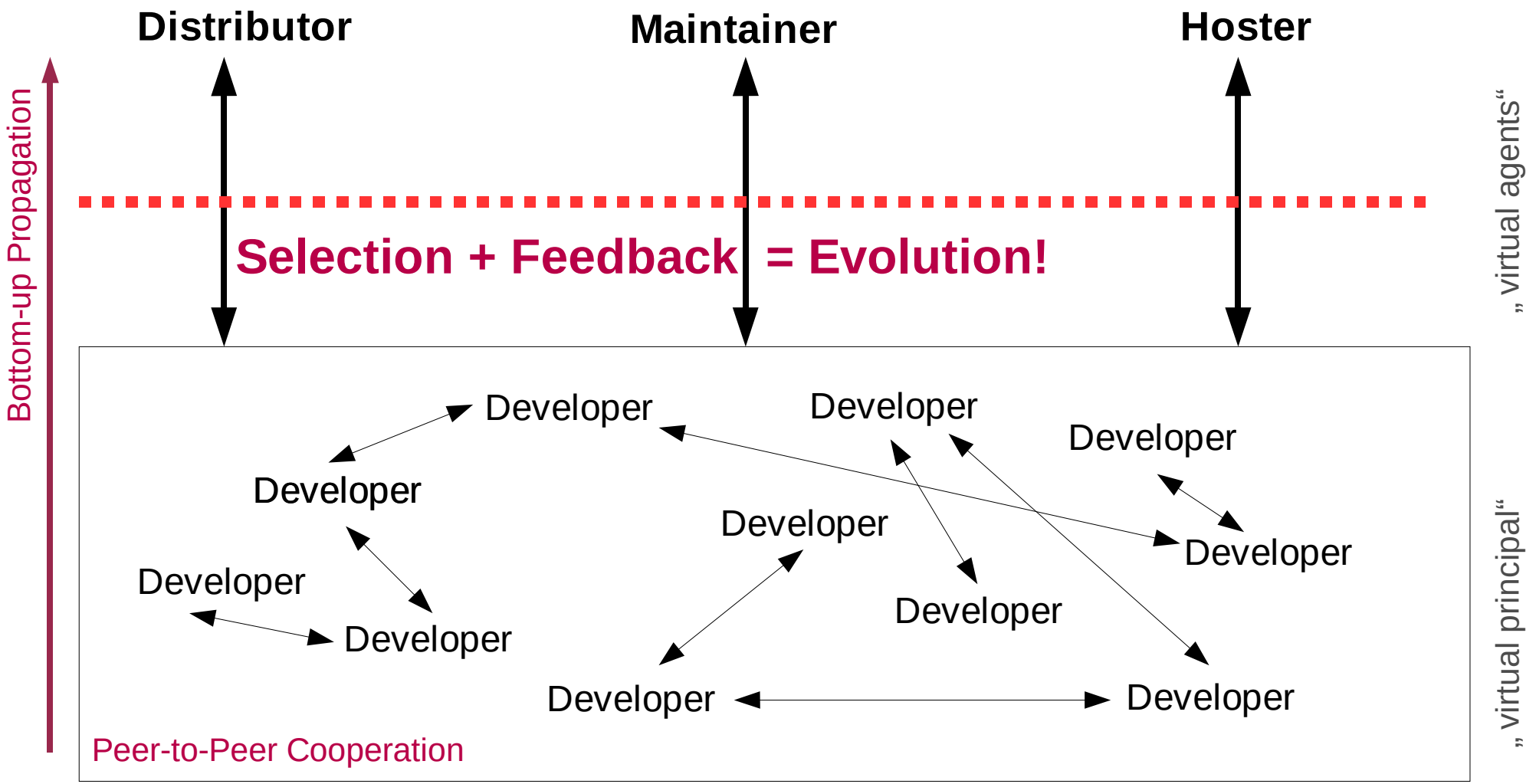
Motivational Aspects 2: Incentives to Reveal Innovation

- Outsourcing production (e.g. promote individual innovation into mainstream distribution in order to avoid costs of reimplemention with next release).
- Costly to hide (information security).
- Expected loss (from foregone IP protection) is low because rivalry with potential adopters is low (Harhoff u.a. 2000).
  - User-user vs. Competitor-competitor.
- Expectation of rivals to reveal innovation anyway (Lakhani & von Hippel 2000).
- Costs of revealing are low and small benefit is available (e.g. reputation, reciprocity, enhanced possibilities for information exchange, etc.) (Lerner & Tirole 2000, von Krogh 1998).

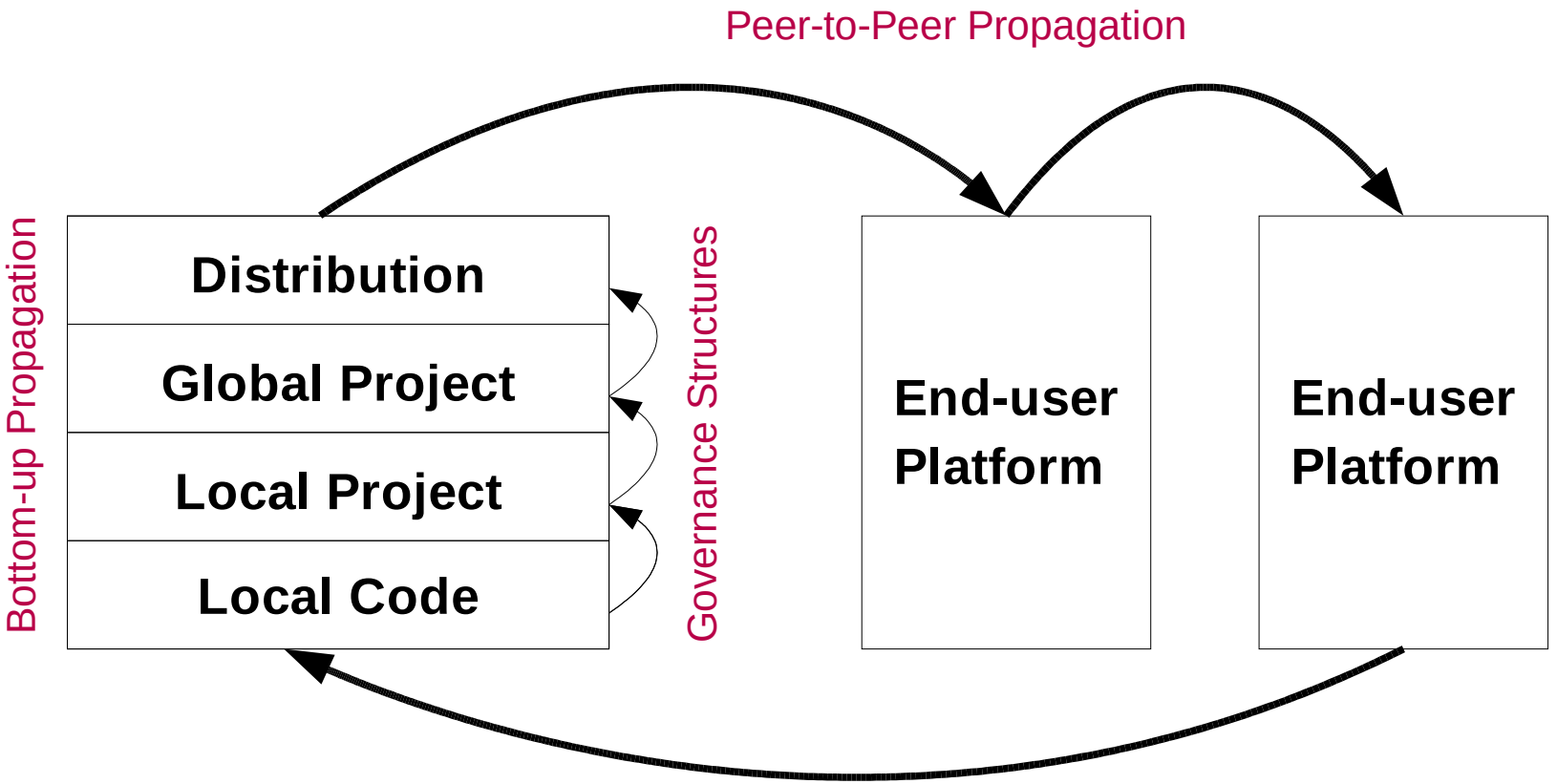
Motivational Aspects 3:
Incentives to Reveal Innovation

- Positive externalities (e.g. security enhancements in networked environment) (Gehring 2004).
- Strategic behavior (e.g. avoid lock-in, enter market, promote competition etc.).
- Intrinsic motivation („ Just for fun.“)
- [Erkenntnisse aus `behavioral economics' verweisen auf weitere Motive.]

Organizational Aspects 1



Organizational Aspects 2



Further Information...

- http://ig.cs.tu-berlin.de/forschung/OpenSource/
- http://www.Think-Ahead.Org
- http://opensource.mit.edu