The Promise of Private-Collective Innovation

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Chair of Strategic Management and Innovation
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"Why should thousands of top notch-programmers contribute freely to the provision of a public good?"

Lerner and Tirole (2000)
The Private–Collective Innovation Model

"Why should thousands of top notch-programmers contribute freely to the provision of a public good?"

Lerner and Tirole (2000)

What is the model of innovation behind open source software development?
The Private-Collective Innovation Model

**Private model:** Innovators appropriate private returns from their innovation related investments

*Development of Cray Supercomputer (NASA picture arch., 1986)*
# The Private-Collective Innovation Model

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<thead>
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Demsetz (1967)

Liebeskind (1996)
The Private-Collective Innovation Model

Collective model: Innovators relinquish control of innovation by unconditionally supplying it to a "common pool"

Northwest youth corps building a bridge (NWYC, 2000)
## The Private–Collective Innovation Model

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- Demsetz (1967)
- Olson (1967)
- Liebeskind (1996)
- Aldrich (1999), Stephan (1998)
The Private-Collective Innovation Model

Compound model: Innovators obtain rewards from private use and collective improvement

Linux Development Tree (IX, 1998)
# The Private-Collective Innovation Model

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The Private-Collective Innovation Model

"Why should thousands of top notch-programmers contribute freely to the provision of a public good?"

Lerner and Tirole (2000)

What is the model of innovation behind open source software development?

Programmers contribute freely to the provision of a public good because they garner private benefits from doing so.
### Motivations for private-collective innovation

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<td>* The motives of firm’s employees engaged in open source software development</td>
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<td>Ghosh et al. (2002)</td>
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**Research Focus (Examples)**

- Individual incentives
- Impact of firms’ participation on individual motives
- Impact of community participation on individual motives
- Relationship between incentives and technical design
- Characteristics of individual motives
- The motives of firm's employees engaged in open source software development
- Relationship between intrinsic and extrinsic motivation in producing a contribution to an open source software project

**Recent Contributions**

- Roberts et al.
- Bagozzi and Dholakia
- Baldwin and Clark

**Bagozzi and Dholakia**

- Psychological and social factors explaining engagement in open source software user groups (Linux user groups)
- Motivation to conduct mundane work in an open source software project

**Baldwin and Clark**

- Incentives for developers to join and contribute to a modular open source software architecture
- Relationship between an open source software architecture and free riding
Contents

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- The Knowledge Reuse Study

- Conclusion
The Freenet Study

- RESEARCH QUESTIONS:

  - How do people join a developer community?

  - Do newcomers specialize, and if yes, what causes this specialization?
The Freenet Study

356 individuals participated in Freenet developer discussion list
1.1% of population accounted for 50% of messages

30 Individuals (8.4%) wrote code for the project, all core-developers. High degree of concentration of developers with 4 developers (13%) committing 53% of the code.

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The Knowledge Reuse Study

- RESEARCH QUESTIONS:

  - Is private-collective innovation economically efficient?

  - What, if any, are the practices of knowledge reuse in open source software development:
    • what is reused (reuse inventory)?
    • when is it reused and by whom (reuse incidents)?
The Knowledge Reuse Study

- Findings I:

  - Knowledge reuse is extensive (3163 reuse incidents representing 16.9 million lines of code)!
  - Knowledge reuse inventory:

    • Algorithms and methods (used by all 21 informants, problem solving)
    • Software components (52 components)
    • Accredited lines of code (ALOC: 38,245)
Findings II

- The reuse of components (LOC) outweighs the reuse of accredited lines of code (ALOC).

- The efforts to search, integrate, and maintain knowledge relate to the knowledge reuse inventory.

- Reuse comes in two forms: Architectural and functional.
The Knowledge Reuse Study

Findings III:

- The frequency of knowledge reuse incidents (architectural and functional) relate to the stages of a developer’s active involvement in a project.

- Developer E: “Code reuse is just helping us to get the job done, so I can work on something that is more interesting”.
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Conclusion

- Private-collective innovation: A mix of incentives that incur public goods innovation with private investment

- Freenet study: Joining and contributing to private-collective innovation is costly

- Knowledge Reuse Study: Knowledge reuse allows innovators to mitigate the cost of joining and contributing to private-collective innovation
Conclusion

- The promise of private-collective innovation: Application in other fields of technical, organizational, and social innovation including...

  • Biotechnology (Bios initiative)
  • Pharmaceuticals (Virtual pharma)
  • Technical design (ThinkCycle)
  • Cultural goods (Wikipedia, OS music and arts)
References


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