The Promise of Private-Collective Innovation

European Academy of Management, Oslo May 18 2006

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Contents

- The "private-collective" innovation model
- Research on private-collective innovation
- The Freenet Study
- The Knowledge Reuse Study
- Conclusion

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)

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

Private model
Innovation supported by private investments and private return appropriation
Innovation encouraged through intellectual property protection
Free-revealing and uncompensated knowledge spill-over reduce innovators profits
Monopoly control granted to innovators represents a loss to society relative to free use by all of knowledge created
Demsetz (1967)
Liebeskind (1996)

The Private-Collective Innovation Model

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

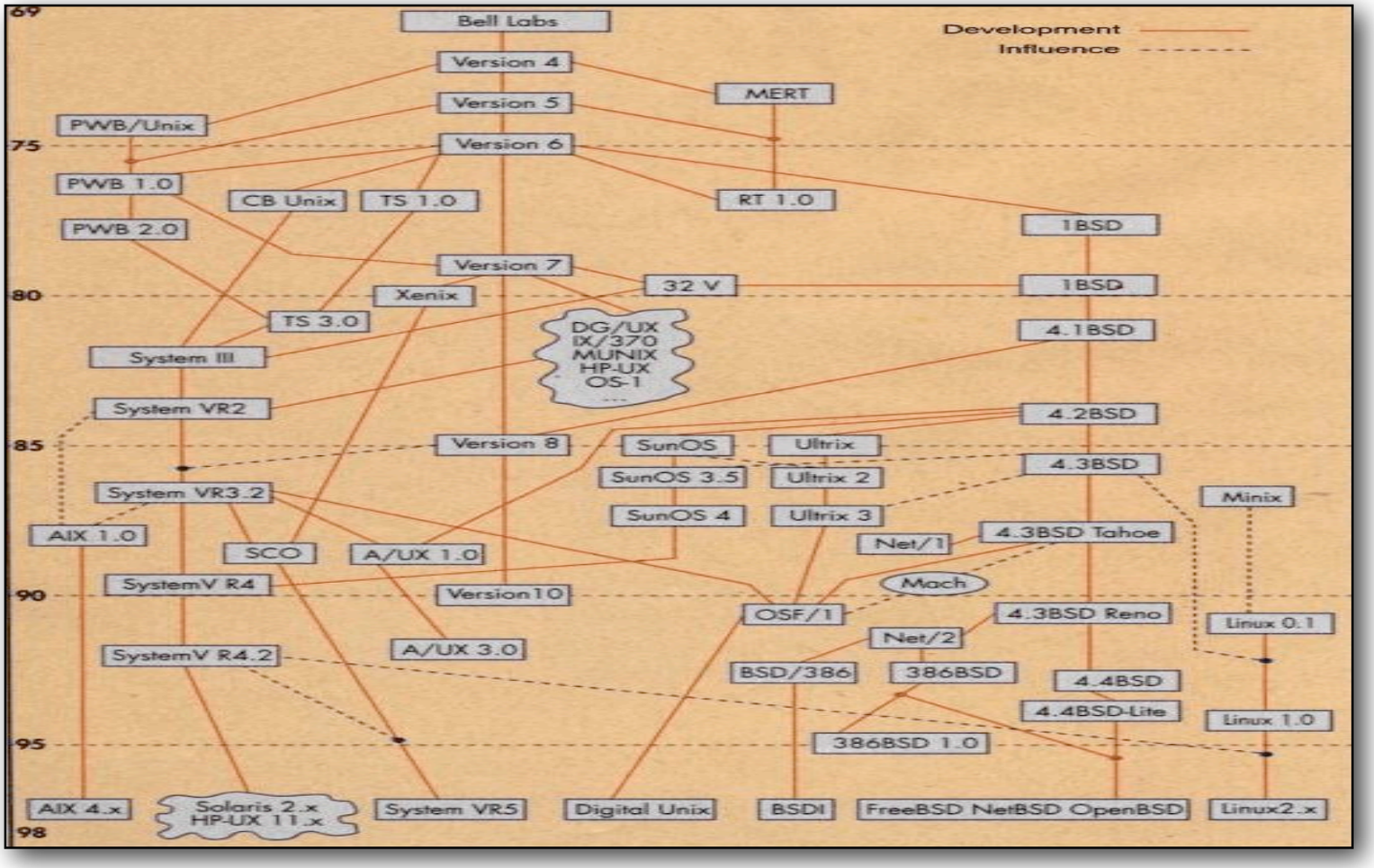
Northwest youth corps building a bridge (NWYC, 2000)

The Private-Collective Innovation Model

Private model	Collective model
Innovation supported by private investments and private return appropriation	Provision of public goods (non-excludable and non-rival)
Innovation encouraged through intellectual property protection	Innovation encouraged through monetary, reputational or other subsidy
Free-revealing and uncompensated knowledge spill-over reduce innovators profits	Free rider problem a threat to continuous innovation
Monopoly control granted to innovators represents a loss to society relative to free use by all of knowledge created	Innovator relinquish control of knowledge produced, avoids social loss problem
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

Private model	Collective model	Compound model
Innovation supported by private investments and private return appropriation	Provision of public goods (non-excludable and non-rival)	Developers use private resources to privately invest in innovation, and they reveal the innovation
Innovation encouraged through intellectual property protection	Innovation encouraged through monetary, reputational or other subsidy	Innovation encouraged by private use and collective improvement
Free-revealing and uncompensated knowledge spillover reduce innovators profits	Free rider problem a threat to continuous innovation	Free rider problem mediated by private rewards from collective innovation
Monopoly control granted to innovators represents a loss to society relative to free use by all of knowledge created	Innovator relinquish control of knowledge produced, avoids social loss problem	Innovator relinquish control of knowledge produced, avoids social loss problem
Demsetz (1967)	Olson (1967), Stephan (1998)	Von Hippel and von Krogh (2003)
Liebeskind (1996)	Aldrich (1999), Stephan (1998)	

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.

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Research on private-collective innovation

Motivations for private-collective innovation

Some prior contributions	*Research Focus (Examples)*	*Recent Contributions*
Bergquist and Ljungberg (2001) Dalle and David (2003) Franke and von Hippel (2003) Ghosh et al. (2002) Hann et al. (2006) Hars and Ou (2002) Hertel et al. (2003) Lakhani and von Hippel (2003) Lakhani et al. (2002) Lerner and Tirole (2001) Osterloh et al. (2004) Stenborg (2004) von Hippel and von Krogh (2003) Zeitlyn (2003)	• Individual incentives • Impact of firms' participation on individual motives • Impact of community participation on individual motives • Relationship between incentives and technical design	**Roberts et al.** • 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 **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

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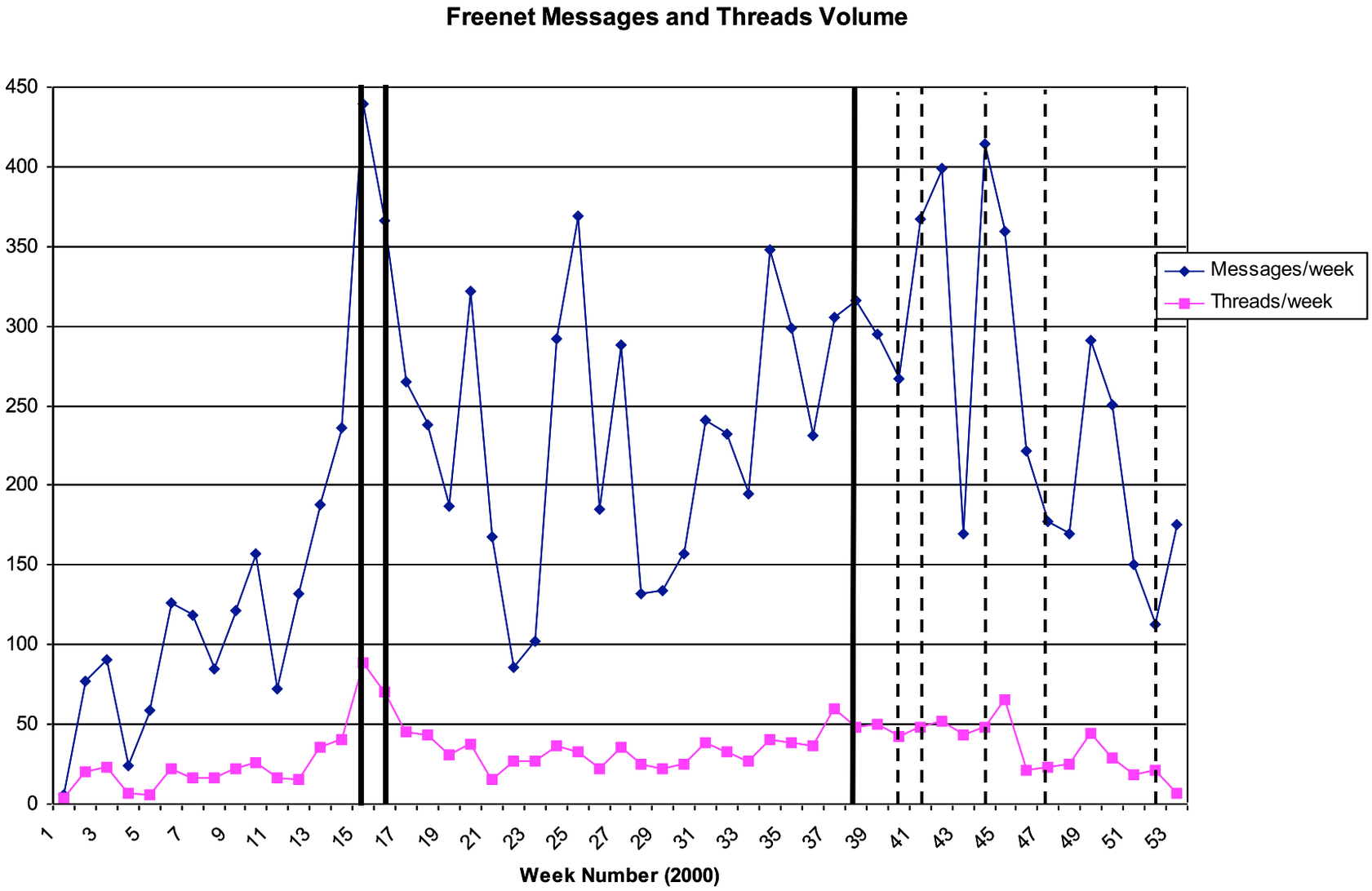
The Freenet Study

- RESEARCH QUESTIONS:
  - How do people join a developer community?
  - Do newcomers specialize, and if yes, what causes this specialization?

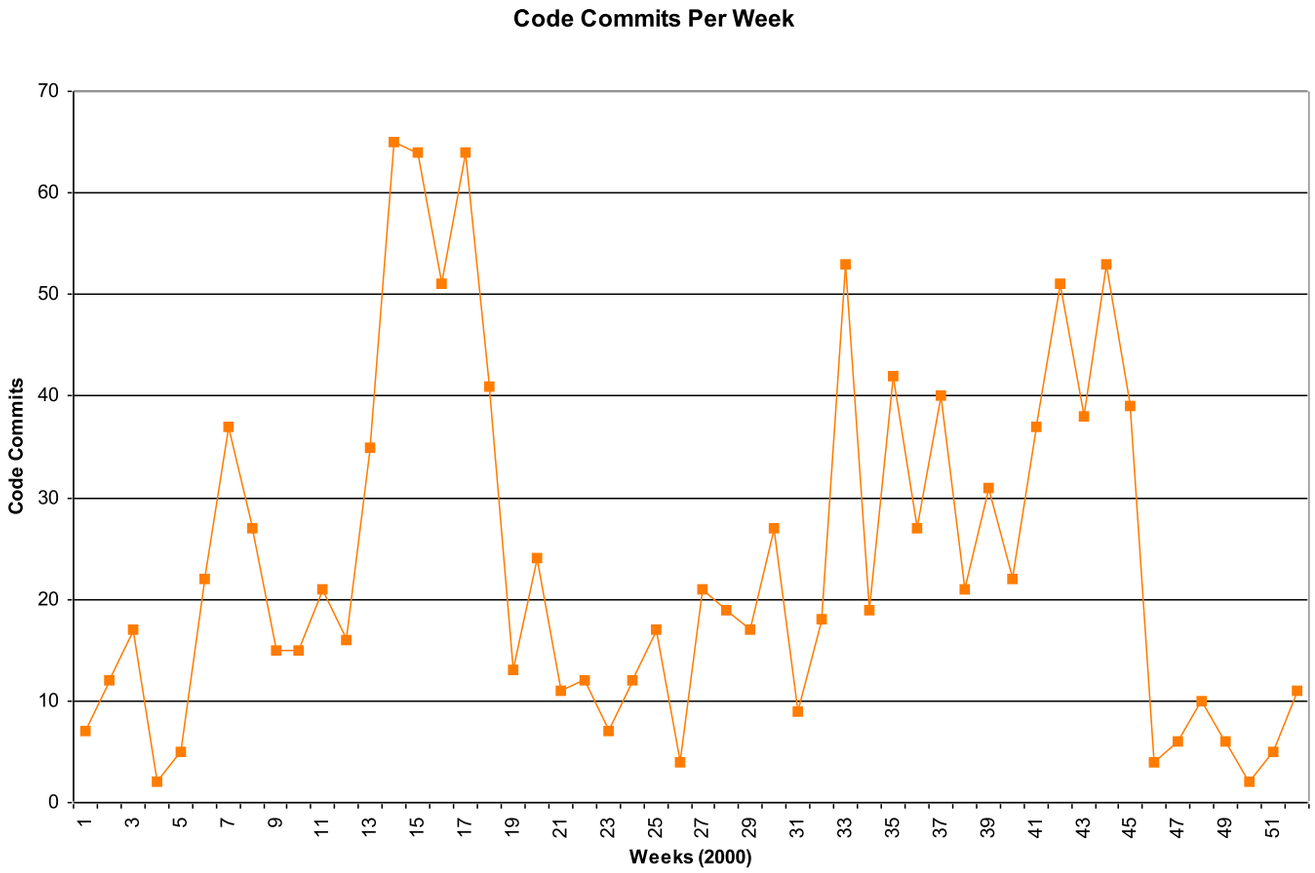
The Freenet Study



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

Source: von Krogh, Spaeth, and Lakhani (2003)

The Freenet Study



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.

Source: von Krogh, Spaeth, Lakhani (2003)

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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)

The Knowledge Reuse Study

- 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)

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