# A Framework for Collective Open Source Innovation

## From Empirical Evidence to Computer Simulation

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Managing & Financing Innovation and
Entrepreneurial Activities, EPFL, 2005

# Main Arguments

- COSI may be an new way of producing innovations, a form of organization, with considerable impact
- A **puzzle** to theory because it should have collapsed under free-riding
- We seek to **explain** and **predict** when COSI appears, and how **sustainable** it is
- General model, with just few assumptions. Combines qualitative evidence and computer simulation

# COSI Defined

Collective Open Source Innovation

# COSI has Important Economic Impact

- **Open source software** has become a viable alternative to commercial products
  (Guth 2003; Lohr 2003)

- **File sharing** is extremely common, and arguably causes substantial losses
  (Madden & Lenhart 2003; Napster court case)

- **User forums** allow transfer of information and knowledge between strangers (Lakhani & von Hippel 2003)

# COSI is Created by Collectives

- ✓ Operate in coordination
- ✓ Accomplish innovative goals
- ✓ Create products and services, economic value and impact

- × No formal hierarchy or organization
- × Little social information and interaction
- × Goal-minded, relationships are often secondary

# Openly Available

- The products and services are freely available to anyone
- No attempt to limit access to and usage of goods, although technologically feasible
- No legal protection to content

# A Puzzle to Theory

Why COSI **emerges** and how it is **sustained?**

- Do contributors learn by giving?
- Sending a signal for the job market?
- Maybe a “community”?
- Is it based on generalized exchange?

# Theory Development Thru Qualitative Data

# Empirical Evidence

- Three Usenet groups, serve as a clearinghouse for requests for digital music
- Users post requests and digital music files
- Universal access, non-moderated

- Content analysis of 2,000 messages
- Semi-structured interviews

# Advantages of Research Site

- Most interaction is observable

  Little private communication

- Interaction is archived

  Easy to obtain and analyze

- Goods offered are generic

  Rules out learning benefits (von Hippel & von Krogh 2003)

- Identities are cloaked

  Rules out reputational effects (Lerner & Tirole 2002)

# Findings in Brief

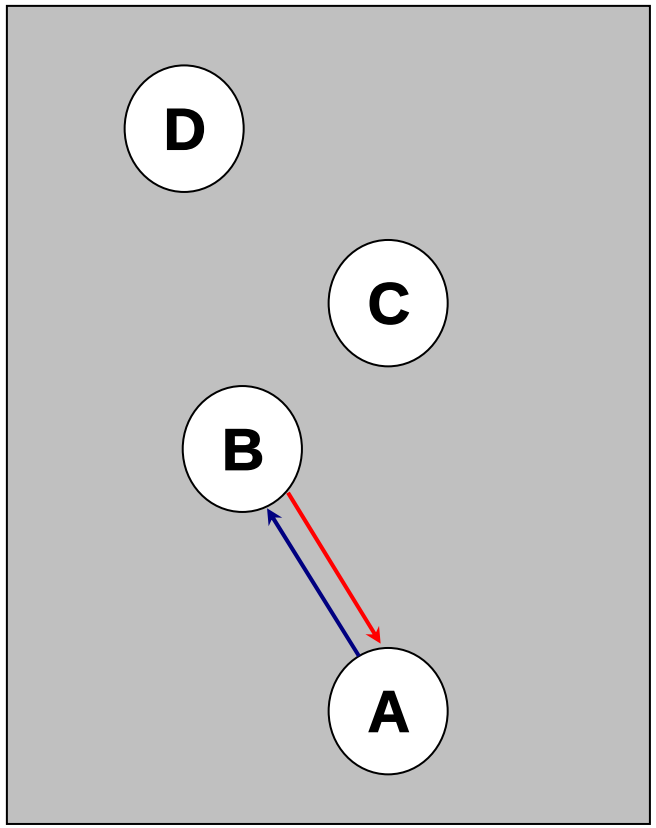
- An individual send a request
- Benefactor posts files in response or ad-hoc
- No payment or direct exchange
- Accessible to anyone
- Free riding is common and known to benefactors

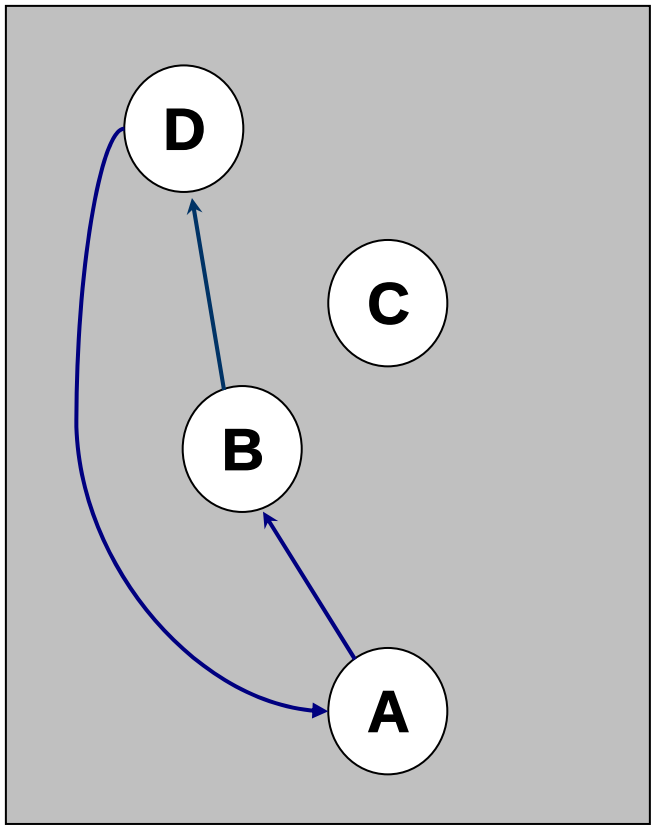
# Grounded Theory

# Framework

Collective Open Source Innovation is **generalized exchange** in goods that are **non-rival** and with **non-linear** utility. Thus, it can employ just little enforcement, even with opportunistic agents.

# Direct vs. Generalized Exchange



# Generalized Exchange

- A gives to B and receives from D
- Obligation to reciprocate to any other member (Ekeh 1974)

  Neither immediate reciprocity nor obligation to a specific benefactor
- Remains a theoretical puzzle
- Empirically documented

  e.g. pacific islanders, immigrant communities

  (Malinowski 1920; Portes & Sensenberger 1993)

# Non-Rival Good

When one's consumption of the good doesn't interfere with another's consumption of the same good.

- **Rival** goods: food, clothes, housing
- **Non-rival** goods: radio, road, safety

# Strong Non-linear Utility

When an additional unit of the good is worth much less than the preceding one (strong logistic utility).

- Money vs. technical advice

# Multiple Levels of Cooperation

Assume that individuals can be one of three types:

- Always cooperative
- Always opportunistic
- Discerning

(Kurzban & Houser, 2005)

# Framework

Collective Open Source Innovation is **generalized exchange** in goods that are **non-rival** and with **non-linear** utility in use. Thus, it can employ just little enforcement, even with opportunistic agents.

# Computer Simulation

Construct computer simulation based on grounded theory. Compare COSI to direct exchange and "standard" generalized exchange situations.

- Is COSI an equilibrium? If not, how long to decay?
- How sensitive to the characteristics of the good?
- How sensitive to the makeup of the population?
- When COSI is likely to happen, and how sustainable it is?

# Conclusions

- Collective open source innovation is prevalent and important
- Several distinct phenomena are actually manifestation of the same principle:
  - Generalized exchange
  - Non-rival good
  - Strong non-linear utility
- No need for explanations based on exogenous benefits or communal altruism


Thank You
Tack
TAK
תודה
Obrigado!
Gracias
شكراً
Vielen Dank
Grazie
Merci
Teşekkürler
ขอบคุณ
Bedankt

# Findings in Brief

- Individuals send requests for files
- Benefactor posts files in response or voluntarily
- No payment or direct exchange
- Accessible to anyone
- Free riding is common and acknowledged
- Strict adherence to established rules
- Little social “off-topic” interaction

# Perception of Fairness is Maintained

Why free-riding don't lead to withdrawal of contributions?

- People are less willing to punish an **unidentified** offender
  - Here free-riders are invisible

- More willing to assist an **identifiable** beneficiary (Small and Loewenstein 2003)
  - Here benefactors and beneficiaries are visible