Building a Theory of Open Online Collaboration Using System Dynamics Modeling

(Work in Progress)

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Open Online Collaboration Communities are...

- online communities
- formed by loosely connected groups of people
- using the Internet as a medium for carrying out collaborative projects
- producing and disseminating information products.

Two Examples

- Open Source Software Development Communities
- Instructional Material Development Communities

Literature Places OSS in Online Communities

- Markus, Manville and Agres (2000)
- Stanoevska and Schmid (2001)

Classifications for Online Communities

- Hagel and Armstrong (1997)
- Lazar, J. and J. Preece (1998)
- Stanoevska and Schmid (2001)

Hagel and Armstrong (1997)

- ...
- ...
- Transaction Communities
- ...

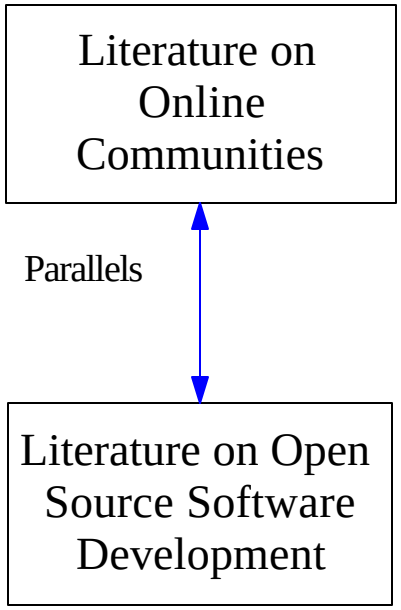
Stanoevska and Schmid (2001)

- ...
- Task-and-goal-oriented communities
  - ...
  - ...
  - Design Communities
- ...
- ...

Research Opportunity

- Dynamic interactions between the determinants of success have not been fully explored and theorized yet.
- No means to test system-wide policies to improve performance.

Research Design



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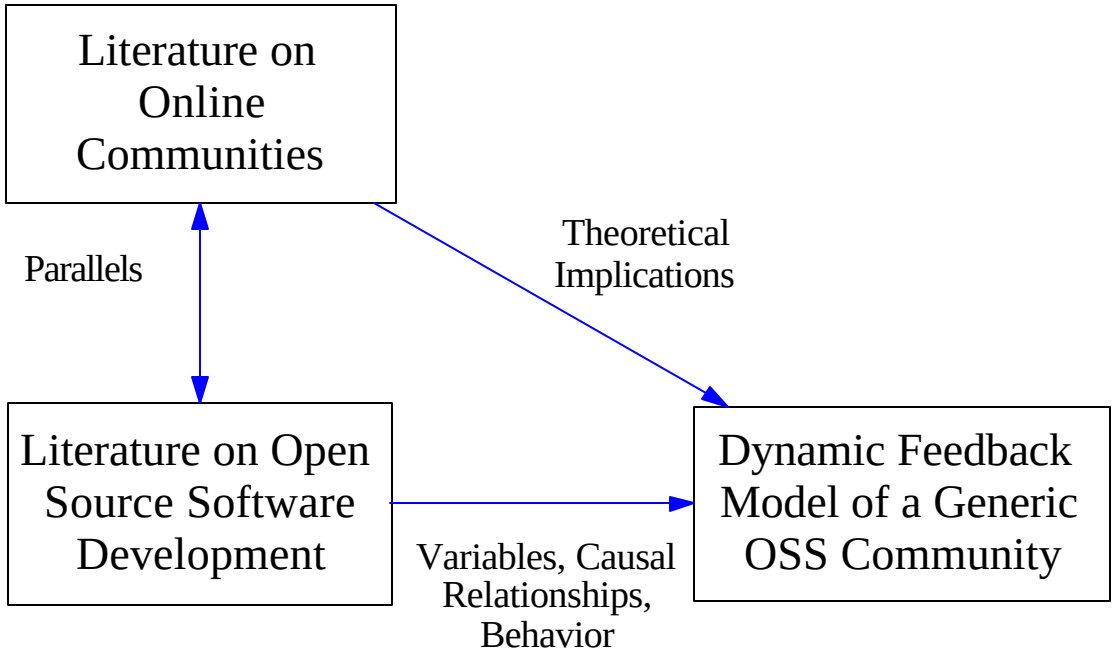

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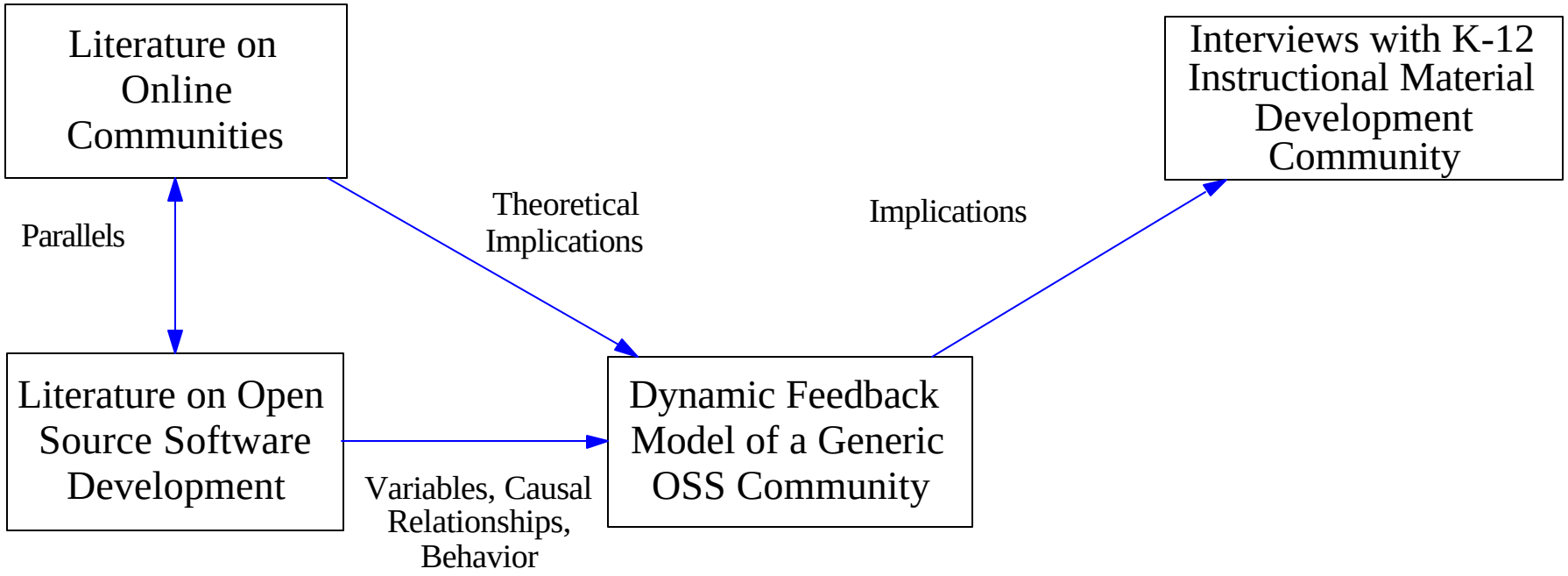

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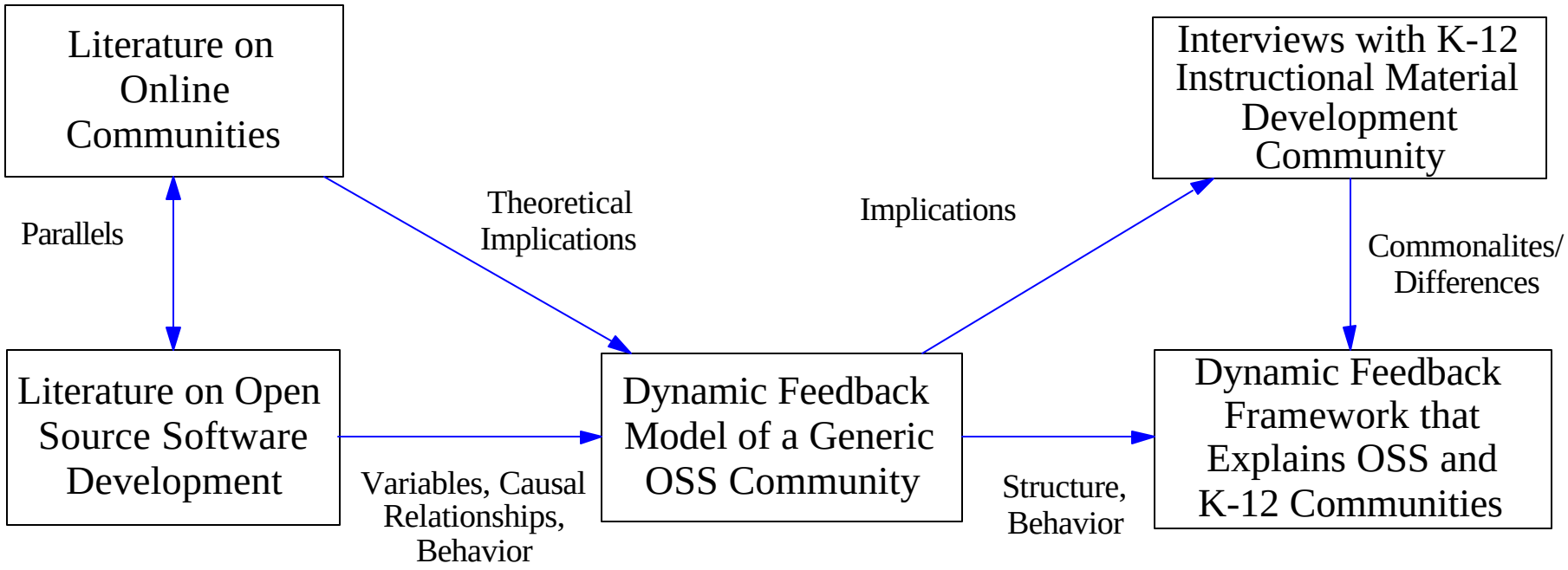


Theoretical Approaches to the Study of Online Communities

Gift Economies	Barbrook, 1998; Ghosh, 1998; Kollock, 1999; Bays and Mowbray, 2001	Raymond, 2001
Public Goods	Kollock, 1999; Millen, 2000; Wasko and Teigland, 2002	Hawkins, 2001; Bessen, 2002
Social Informatics	Turoff and Hiltz, 1982; Hiltz, 1986; Preece, 2000	Raymond, 2001; Fogel and Bar, 2001

Gift Exchange

- Between parties who have an existing relationship, or are aiming to build an ongoing relationship;

- Not instantaneous - a gift is not necessarily reciprocated by the giving of a ‘counter-gift’ right away.

Applying Gift Economies to OCs

- A ‘digital gift’ can be given to a group of people instead of a single individual, with no or a non-significant additional cost;
- A gift is not necessarily reciprocated by the beneficiary, but by someone else that takes part in the generalized exchange.

Implications for Online Communities

- A relatively larger community would motivate contributors to a greater extent.

Public Goods

- "Non-excludable"
  (too hard, too costly, or impossible to exclude the non-payers from benefiting),
- "Non-rival" consumption
  (consumption by an individual does not hinder other individuals' consumption of the same good).

Private vs. Public Goods

	Rival	Non-rival
Excludable	**Food**	**TV broadcasts**
Non-excludable	**City streets**	**National defense**

(adapted from Bucovetsky, 2001)

Digital Goods as Public Goods

	Rival	Non-rival
Excludable	**Food**	**Digital goods**
Non-excludable	**City streets**	**National defense**

(adapted from Bucovetsky, 2001)

Digital Goods as Public Goods

	Rival	Non-rival
Excludable	**Food**	**Digital goods**
Non-excludable	**City streets**	**Open source D.G.**

(adapted from Bucovetsky, 2001)

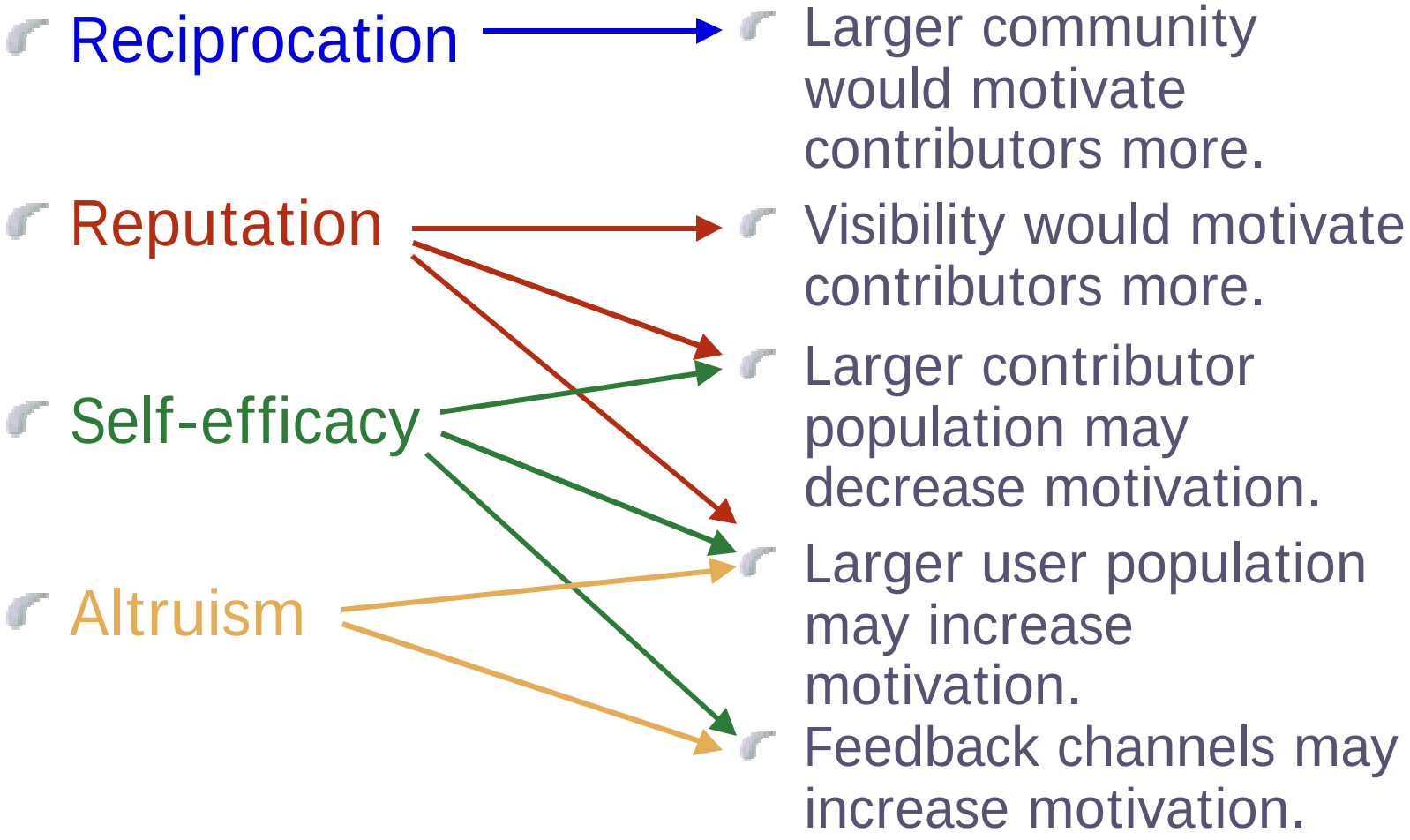
Two Challenges in Production

- Motivating individuals
- Coordinating motivated individuals

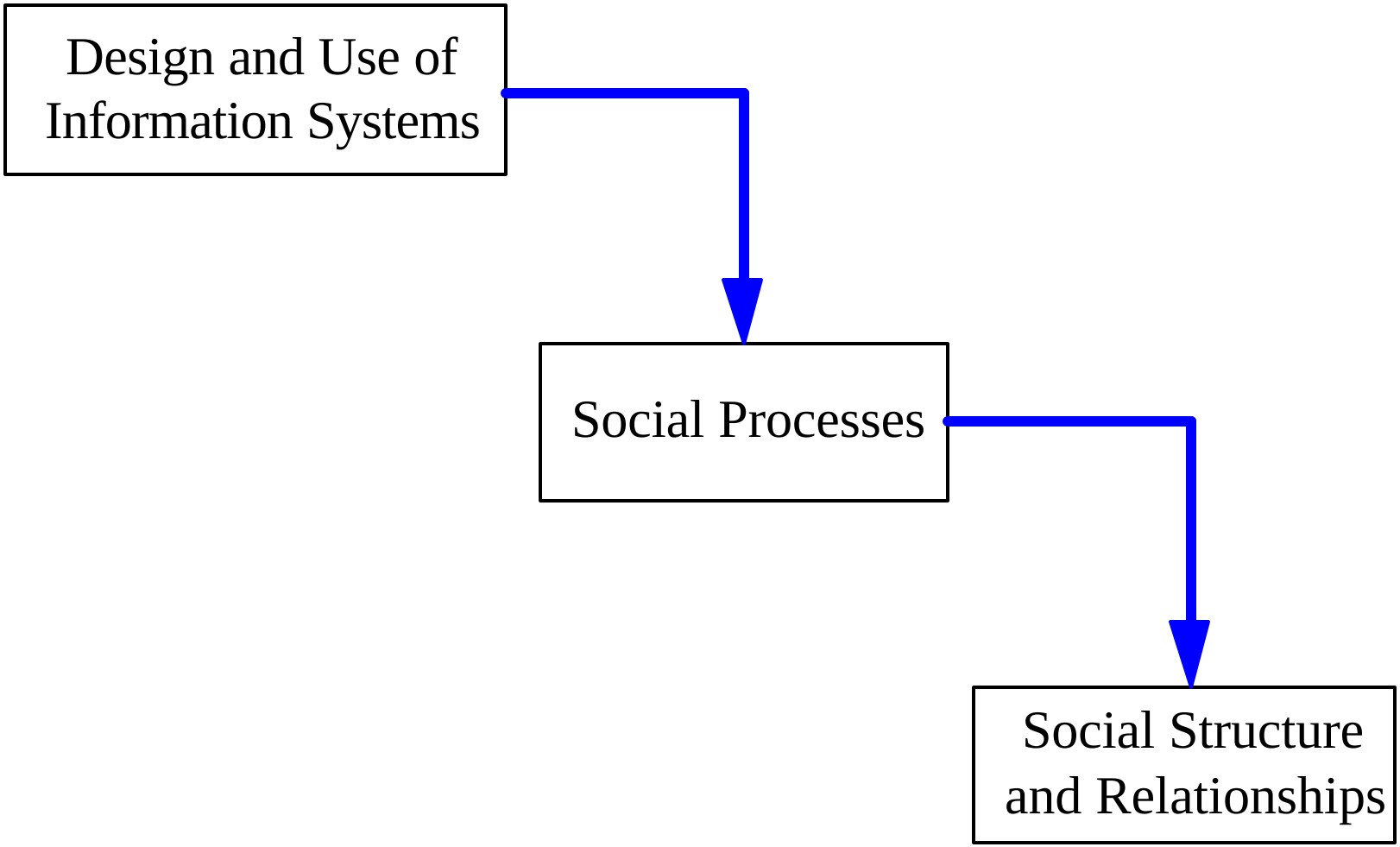
Motivation Factors

- Expectation of generalized reciprocation,
- Reputation (ego, and opportunities),
- Feeling of self-efficacy,
- Benefits to other members of the community (altruism).

Motivations → Implications



Social Informatics



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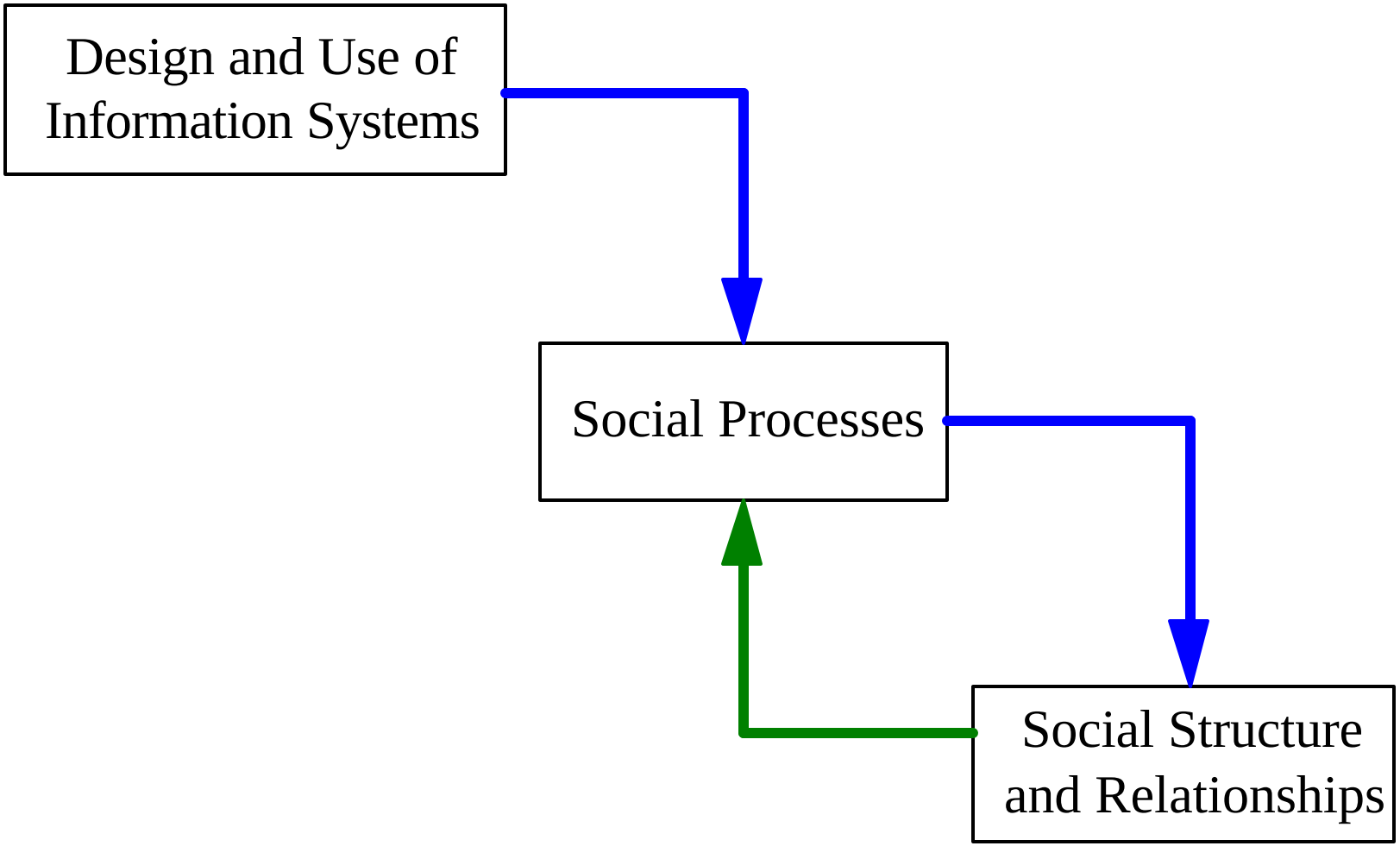

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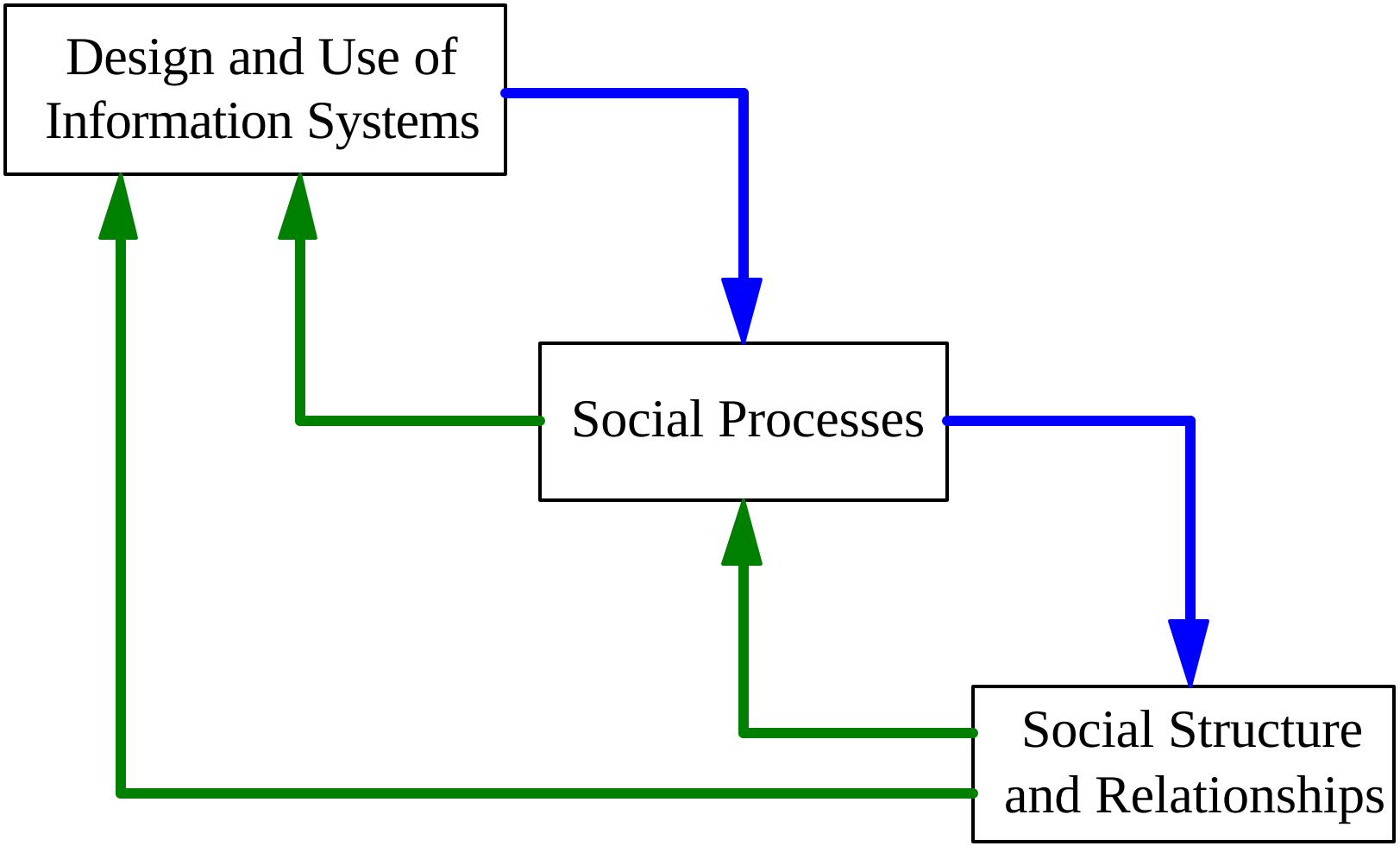


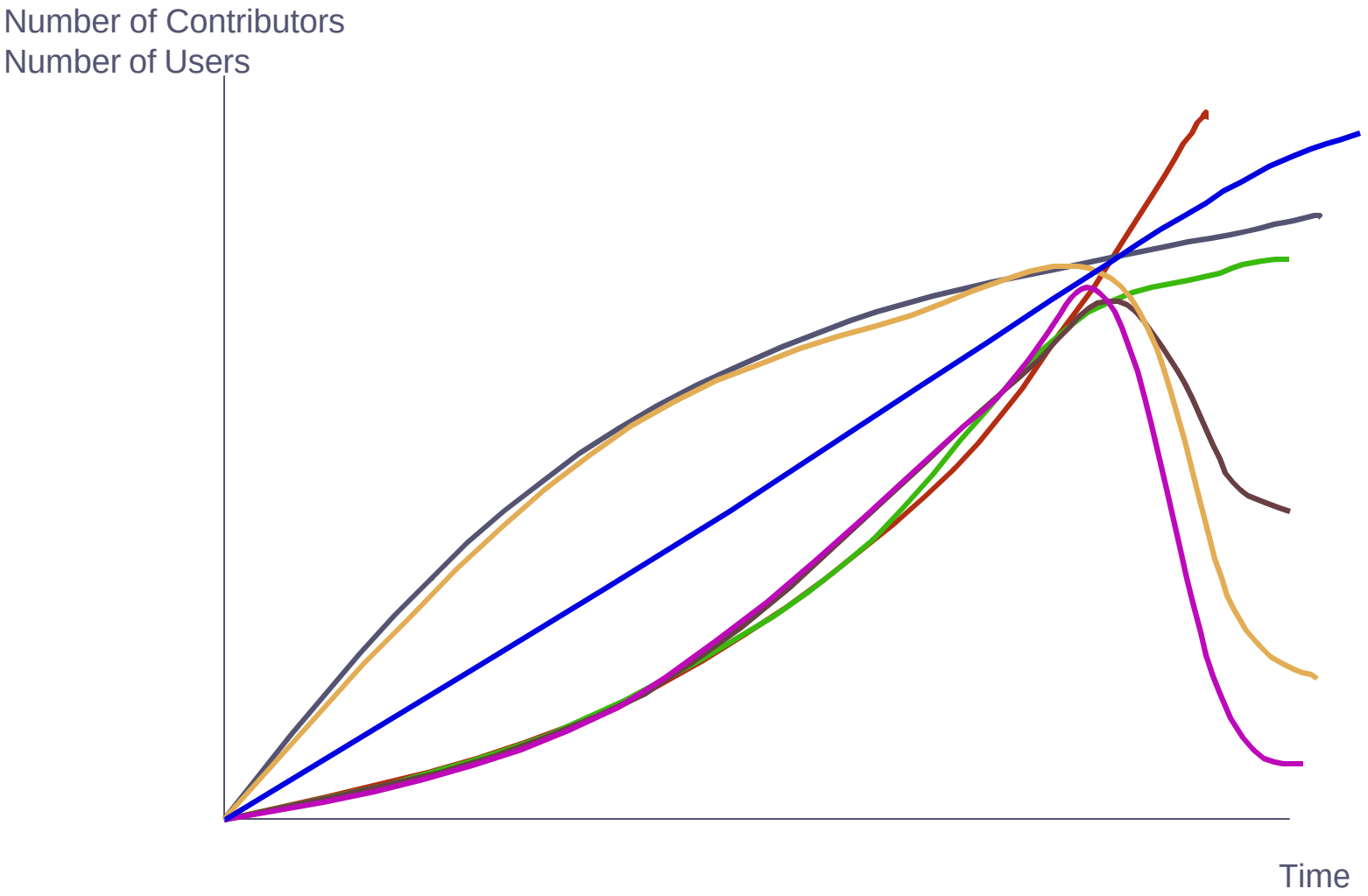
Implications for Online Communities

- Software and media have influence on which community rules can be implemented, and to what extend.
- Software, media, and community rules have impact on participation, collaboration, and productivity.

Implications for Online Communities

- Low barriers to entry and contribution would increase participation.
- Accessibility and usability of end-products would increase user population.

Generic Behavior of Successful OOCCs



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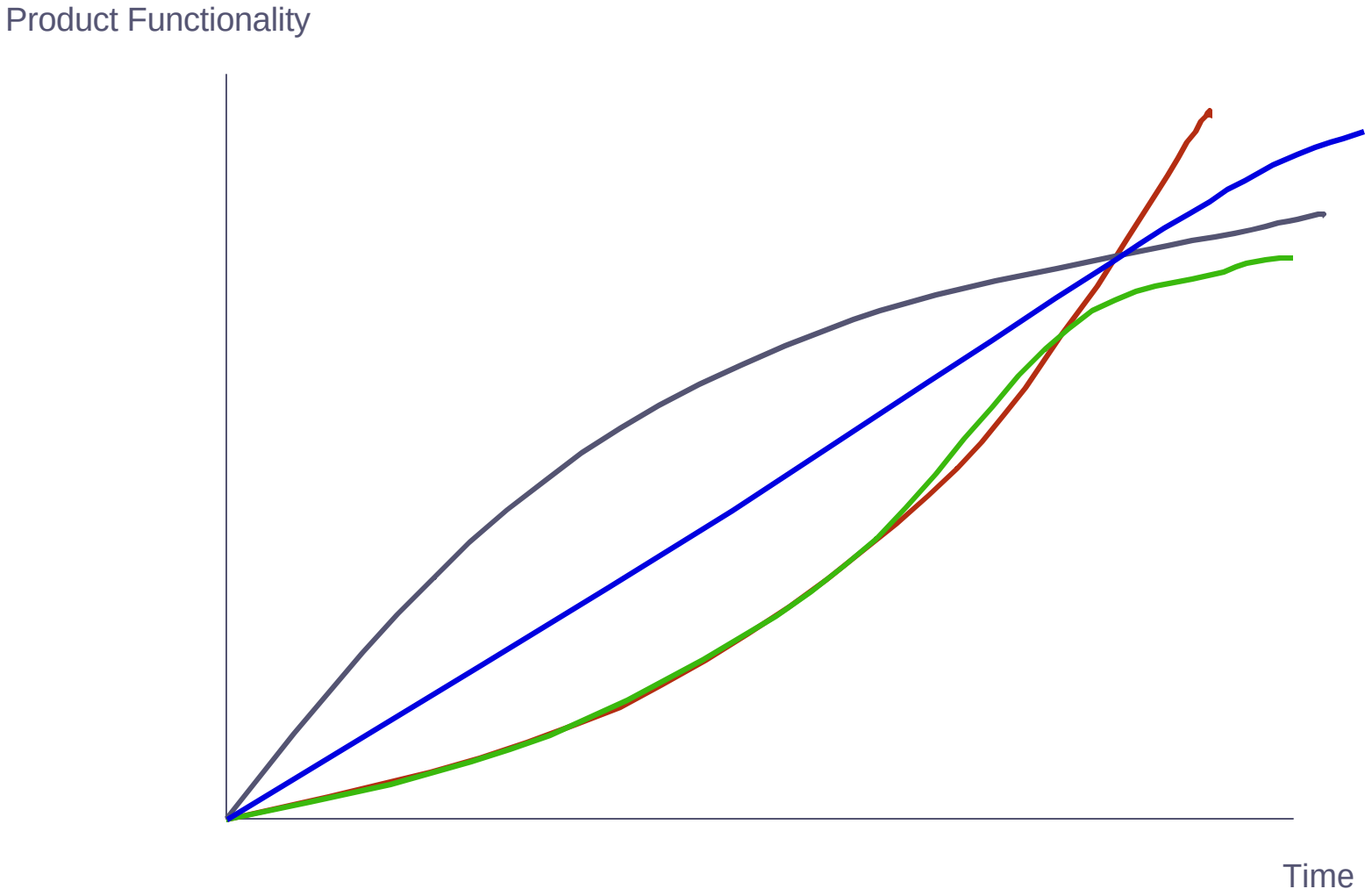
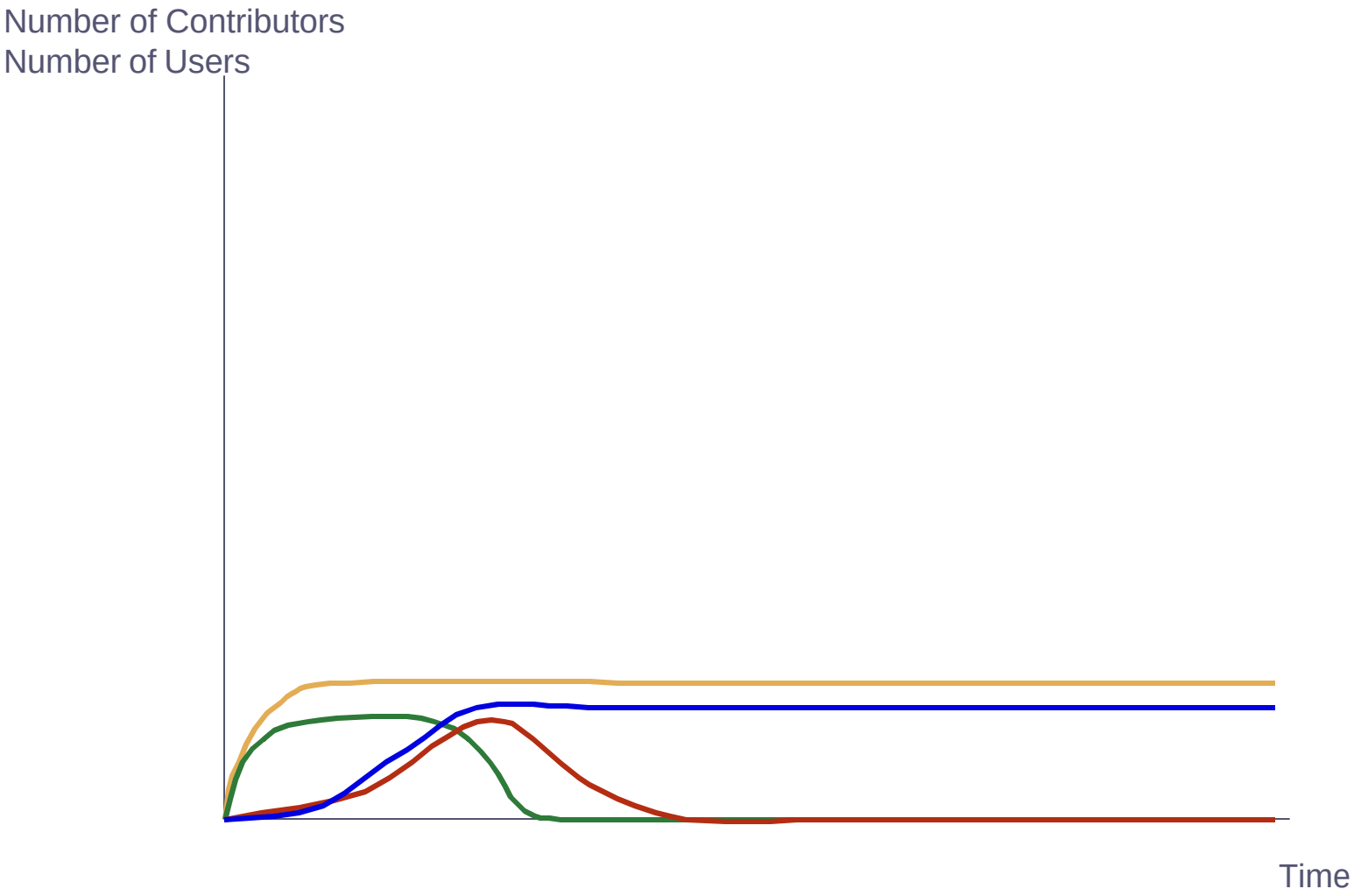
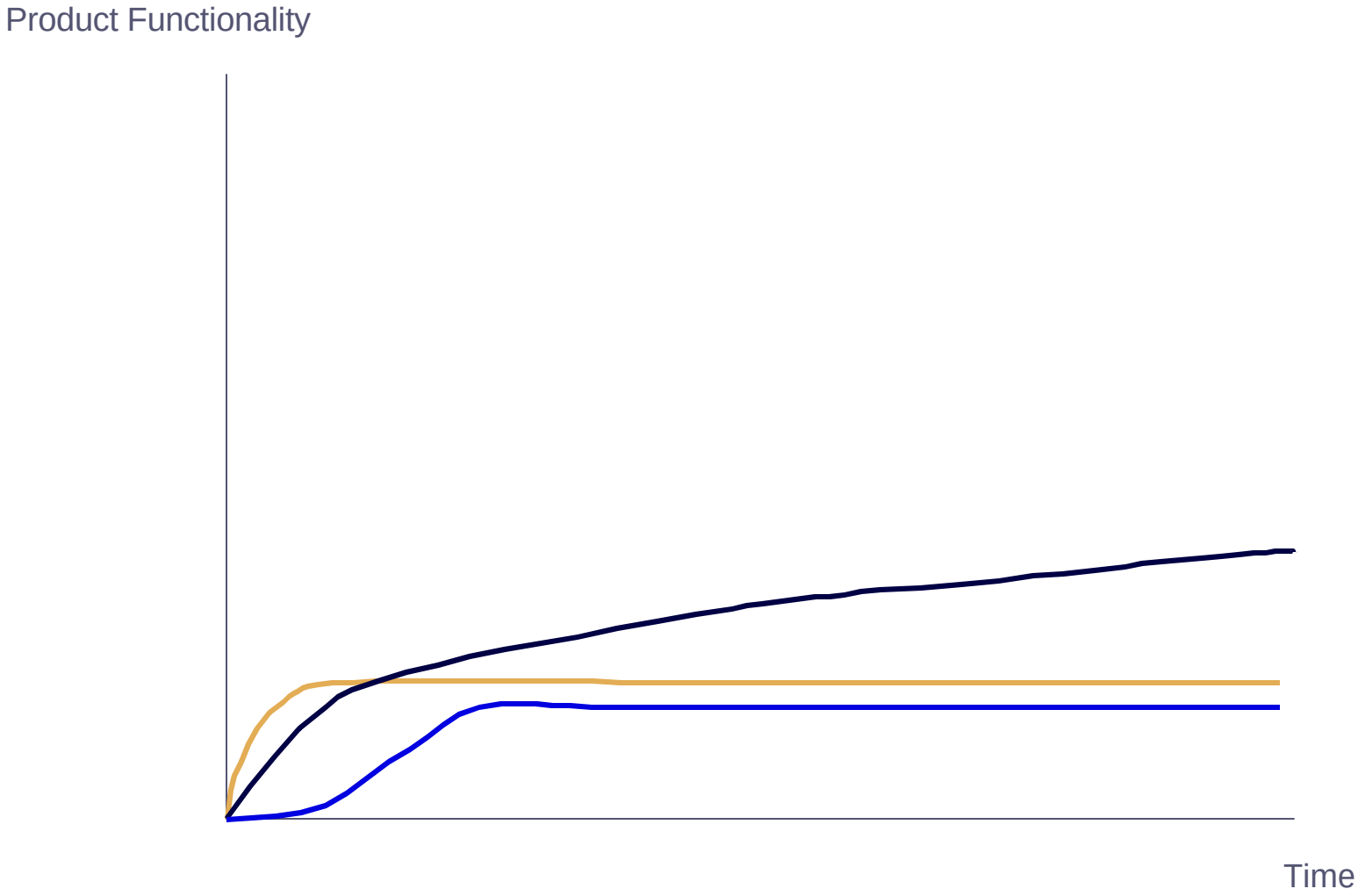


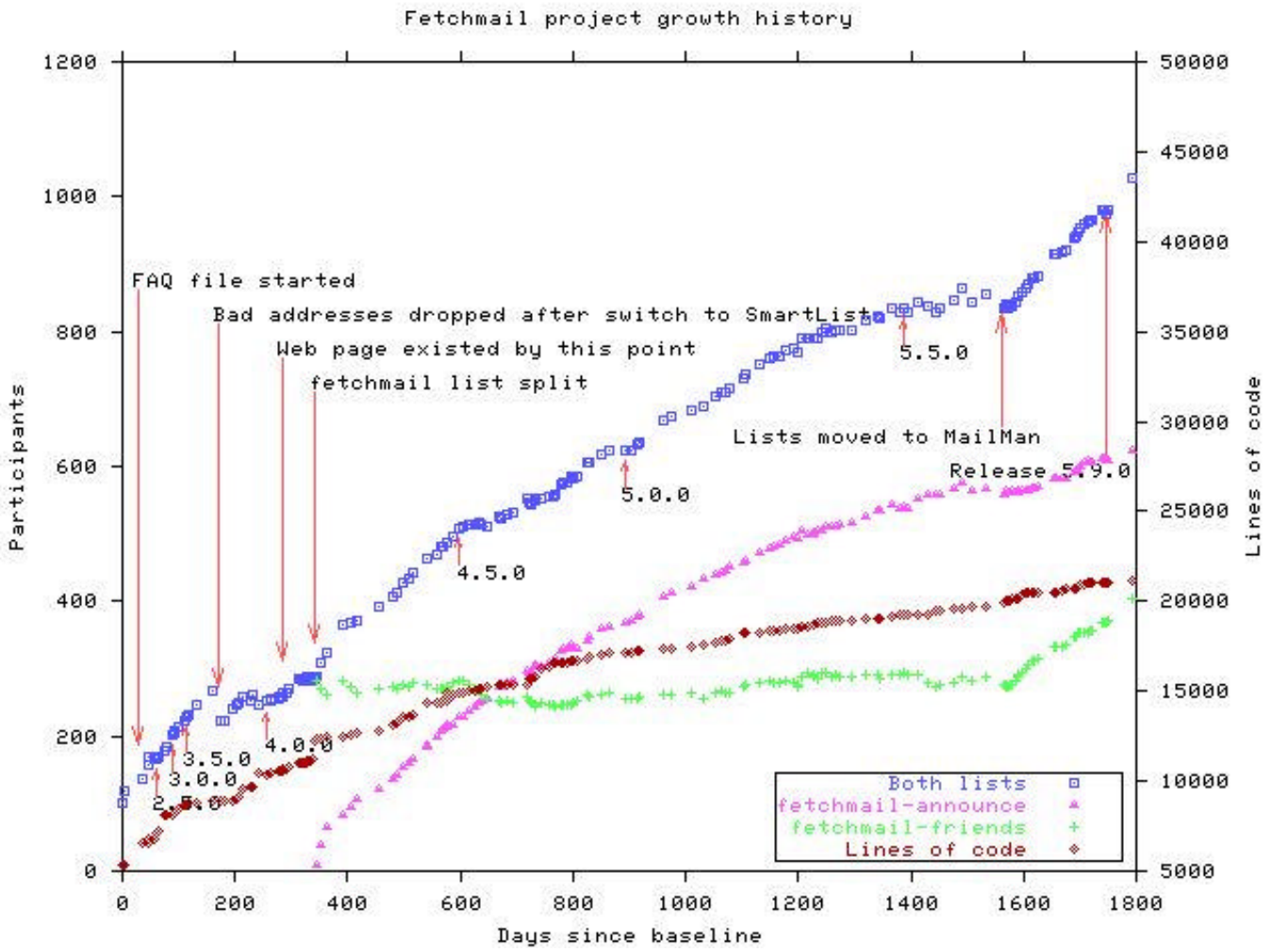
Generic Behavior of Unsuccessful OOCCs



Generic Behavior of Unsuccessful OOCCs

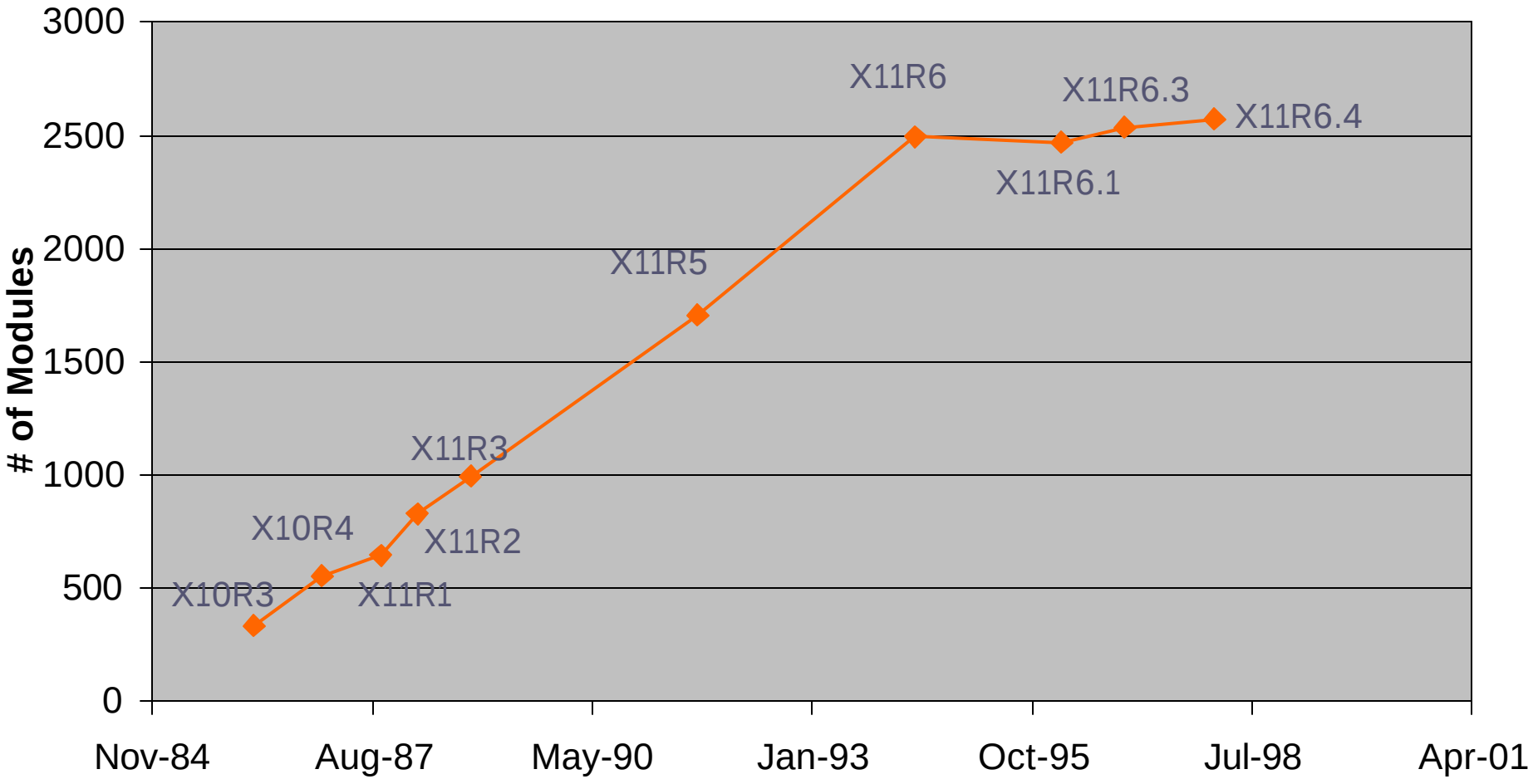


Growth of Fetchmail



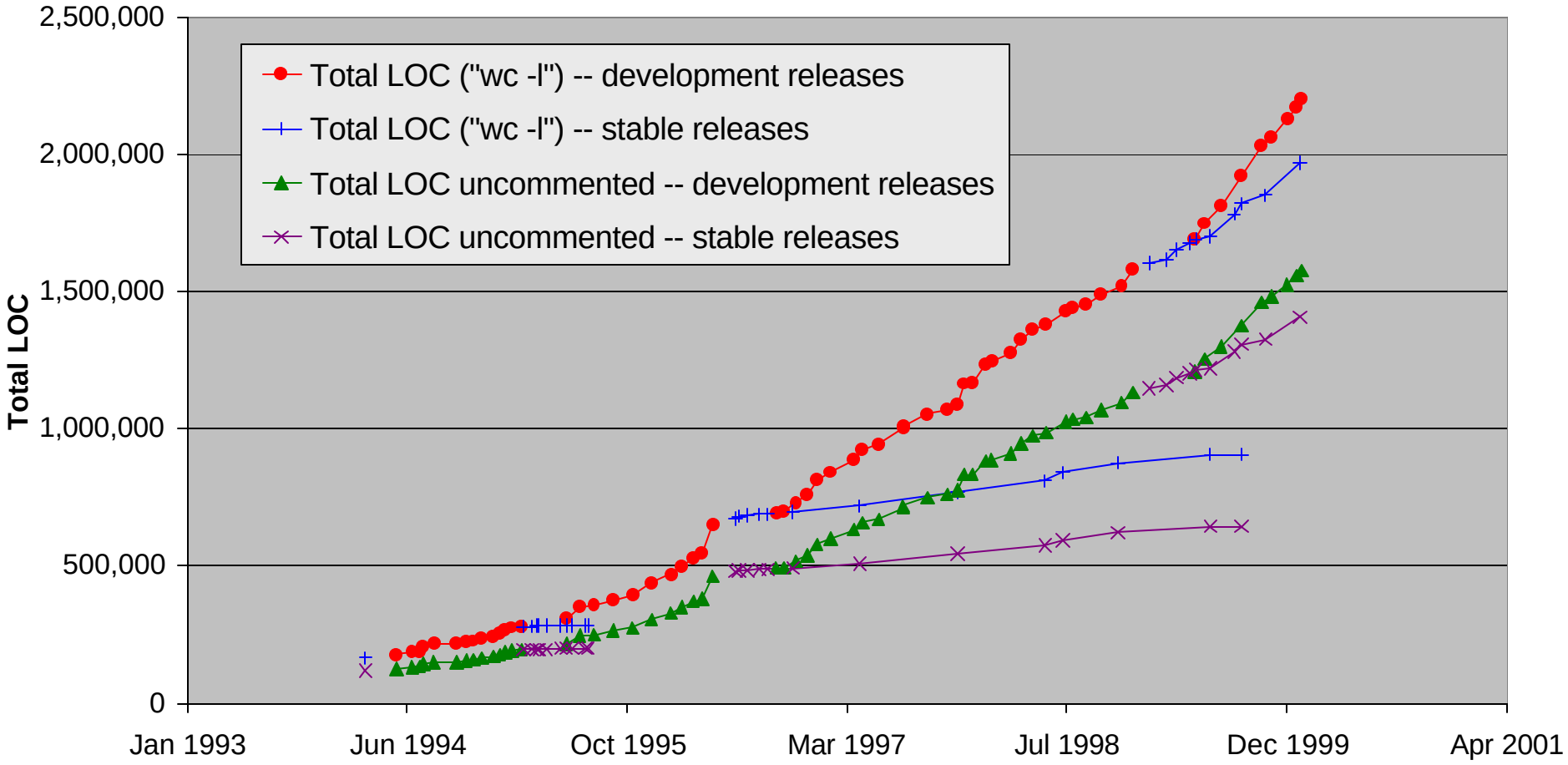
From: Eric S. Raymond, “The fetchmail Home Page”, http://tuxedo.org/~esr/fetchmail/

Growth of X Windows



From: Michael W. Godfrey, “Understanding Software Evolution”, Software Architecture Group - Department of Computer Science - University of Waterloo

Growth of Linux



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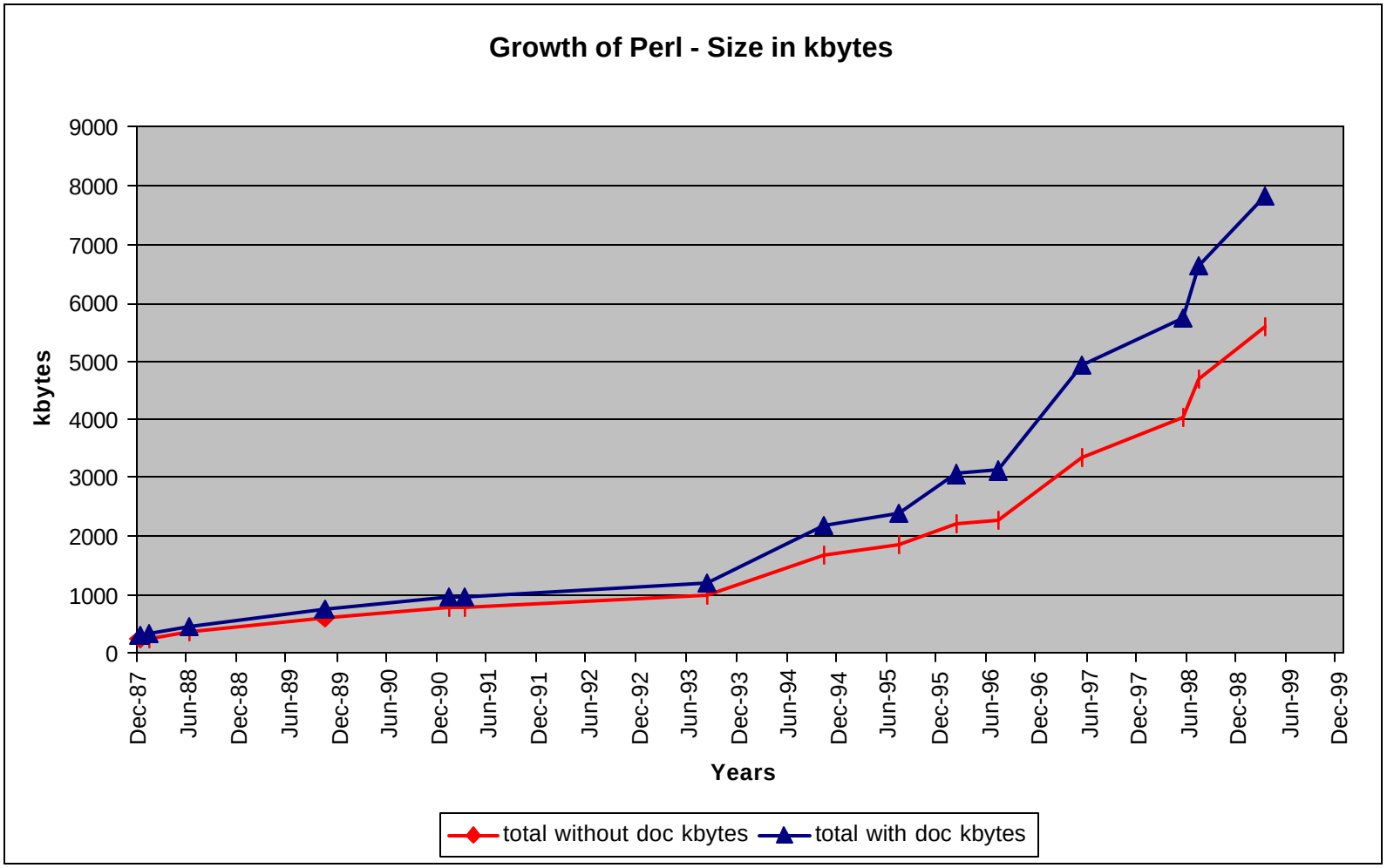
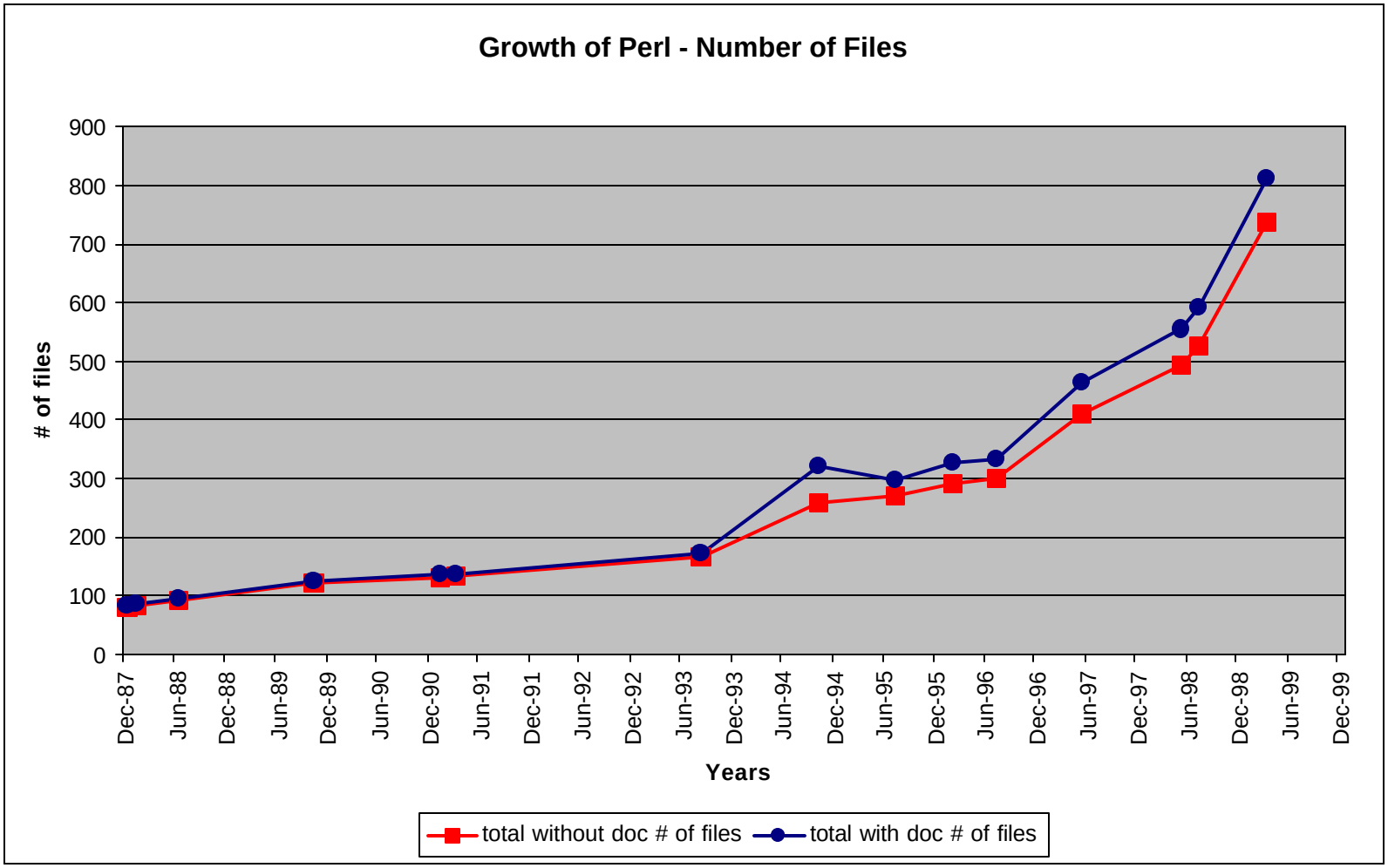
Growth of Perl



From: www.perldoc.com

Growth of Perl



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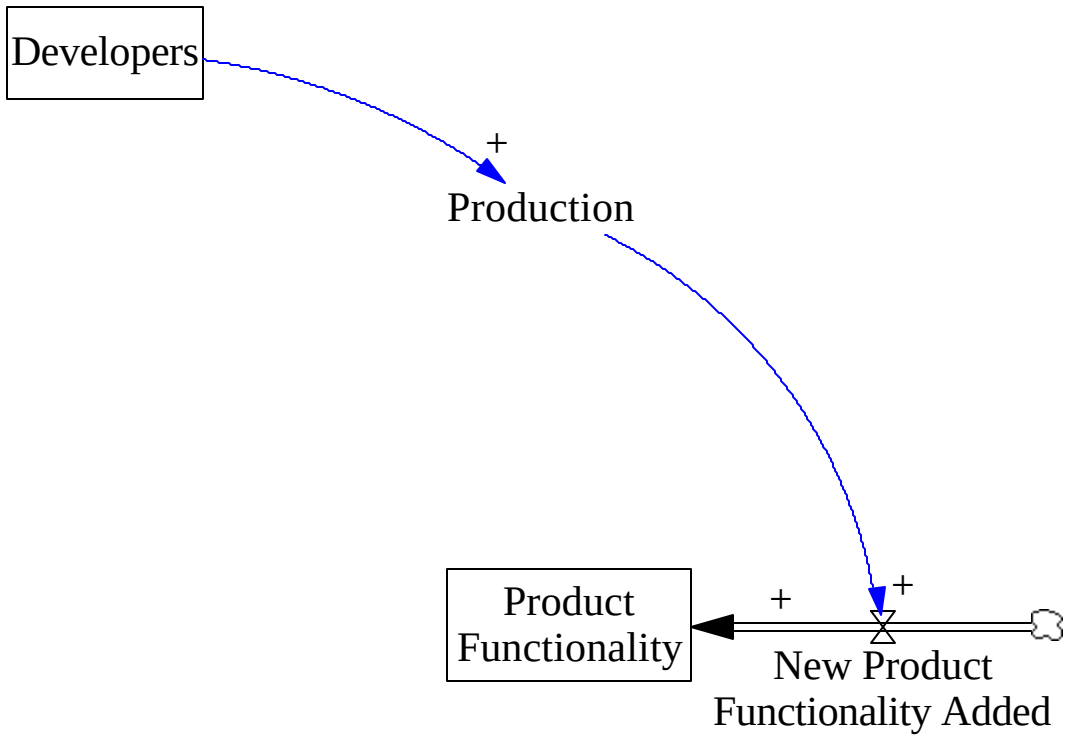
Developers
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New Product
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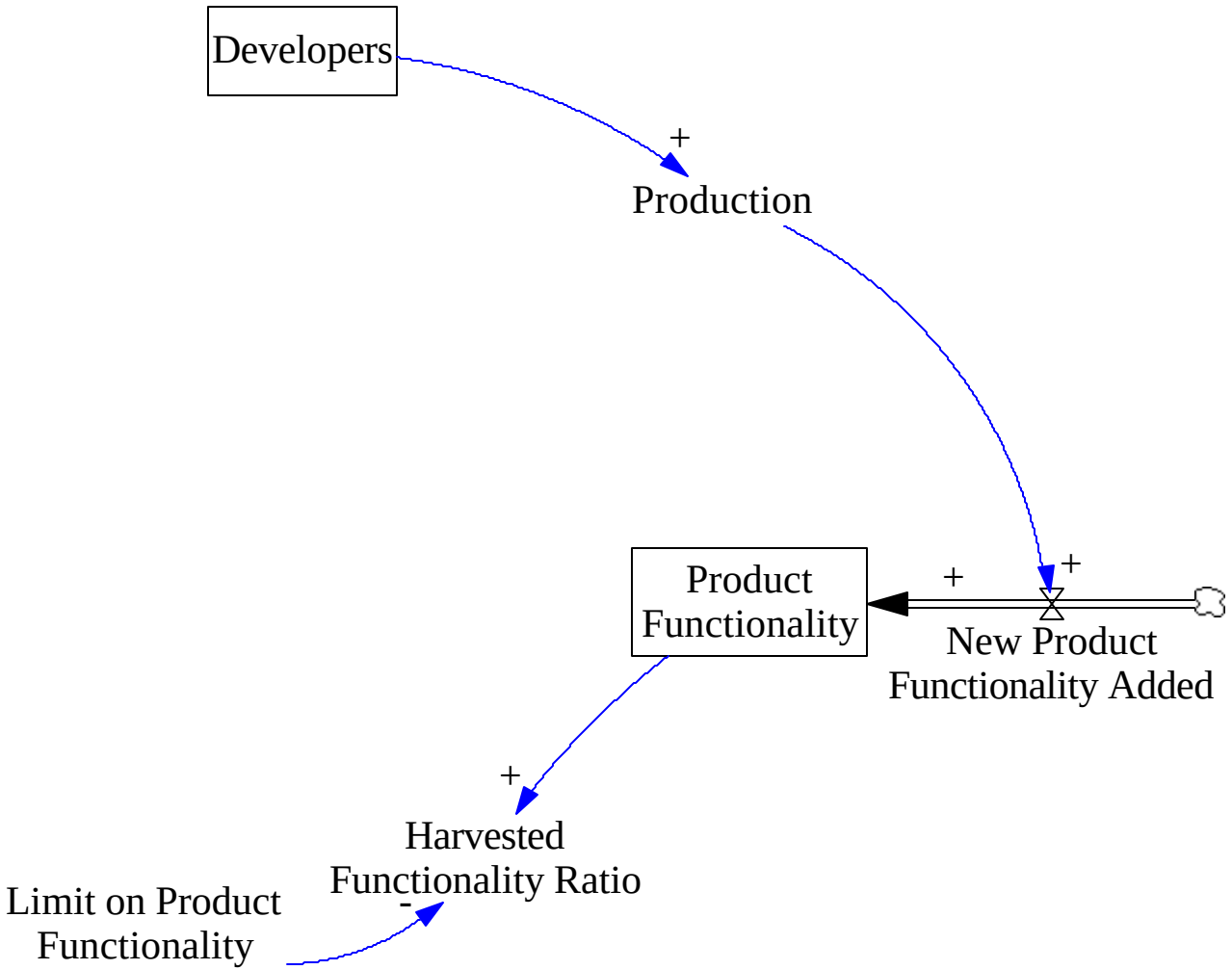
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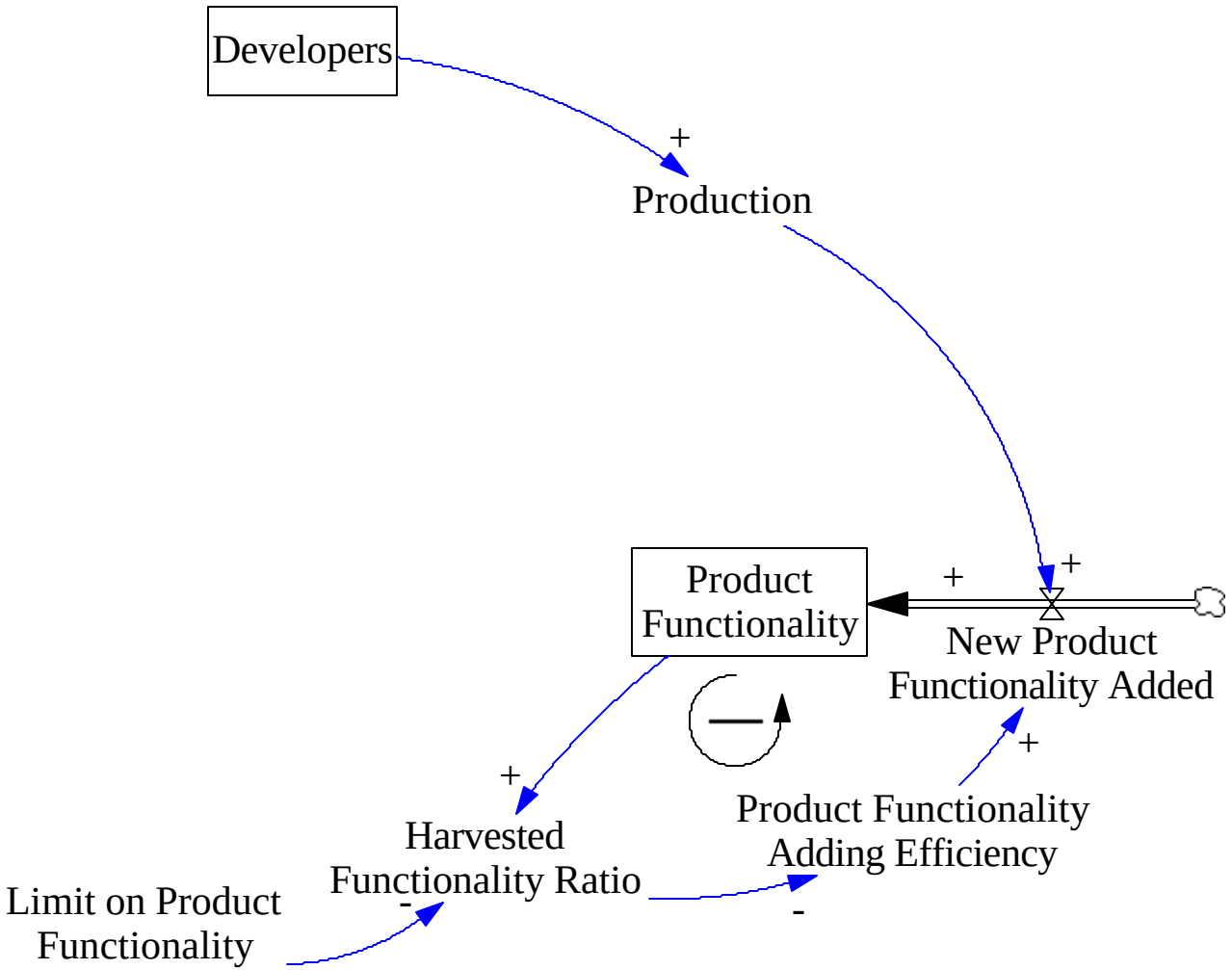
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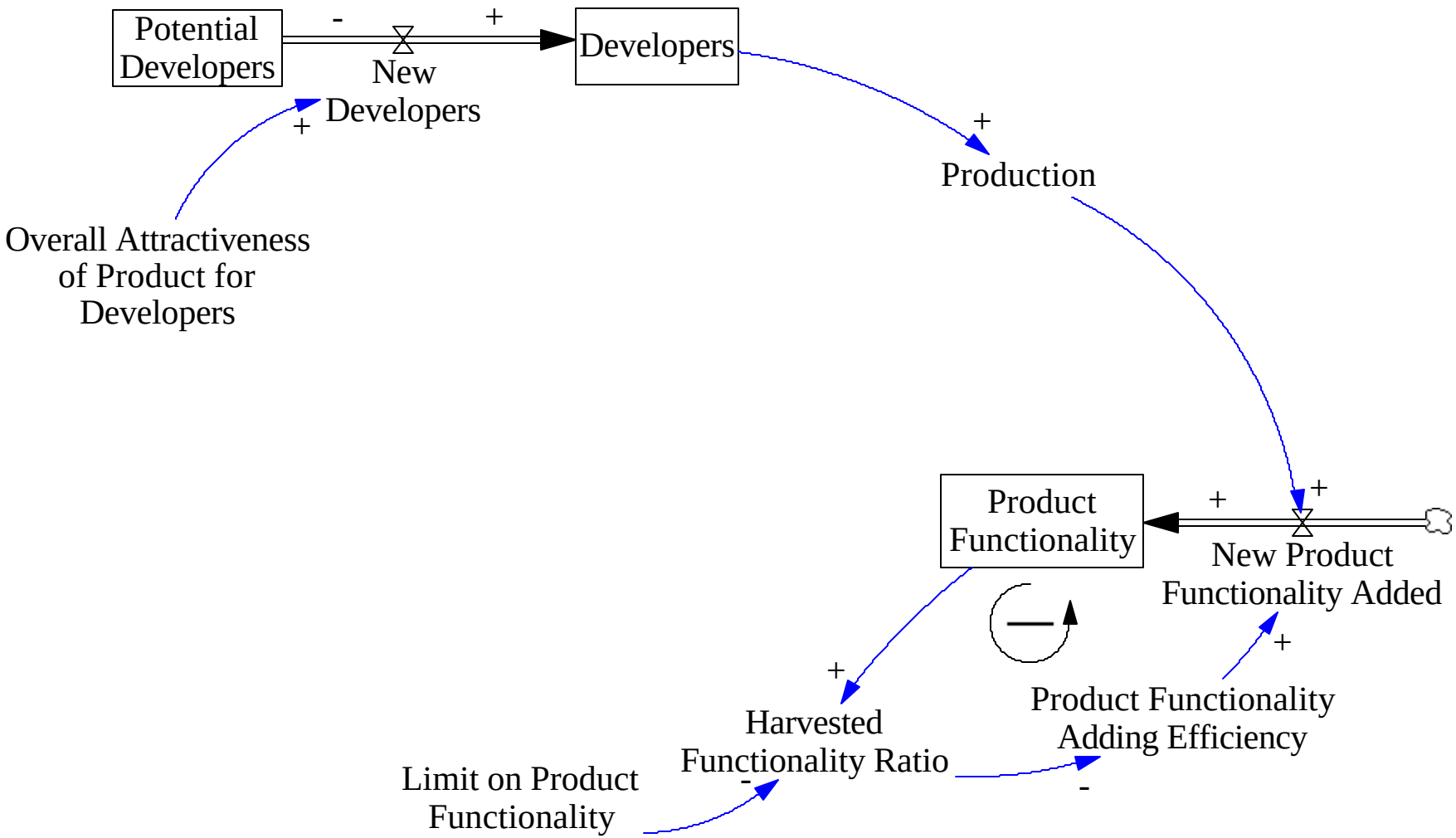
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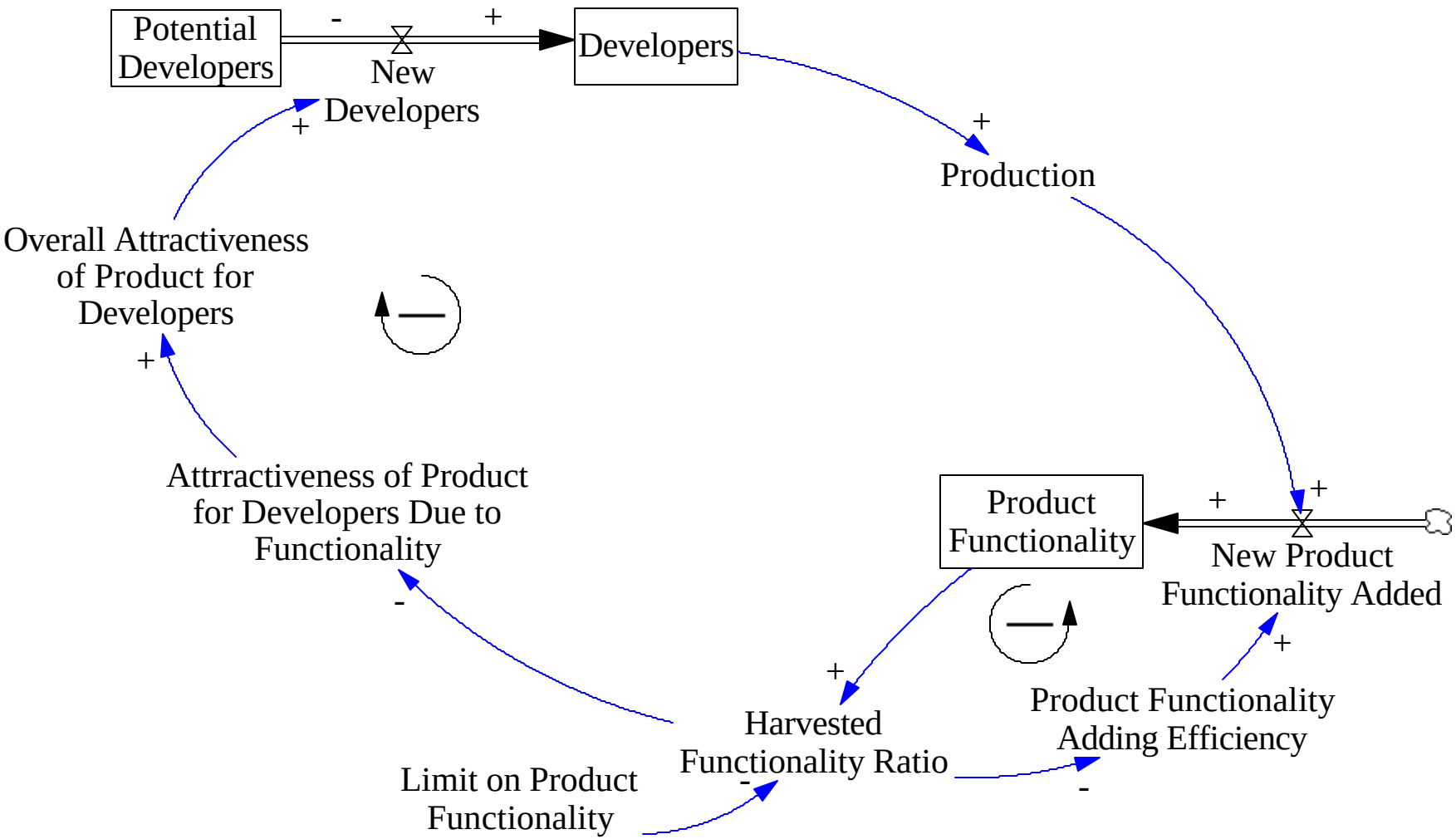
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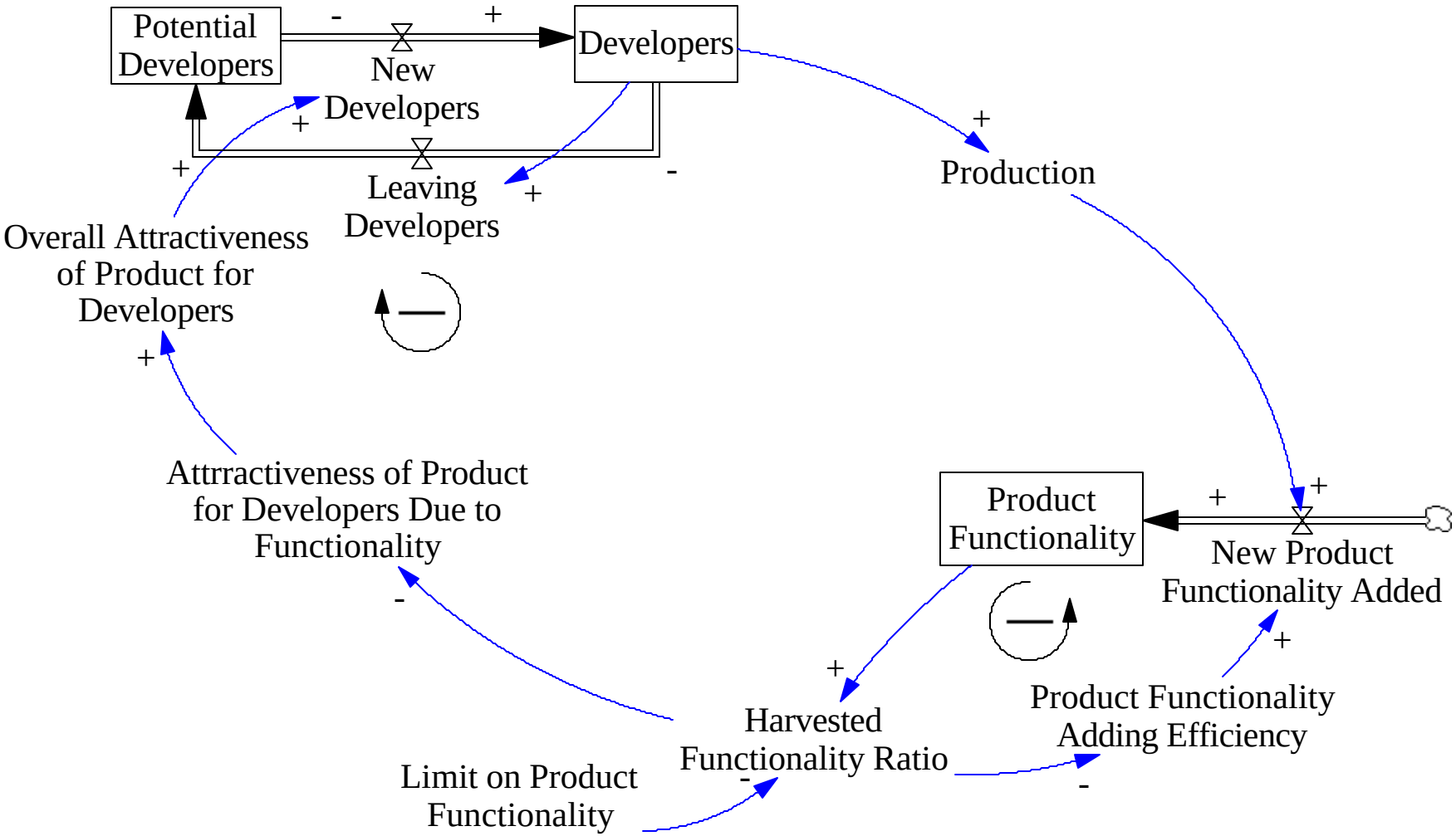
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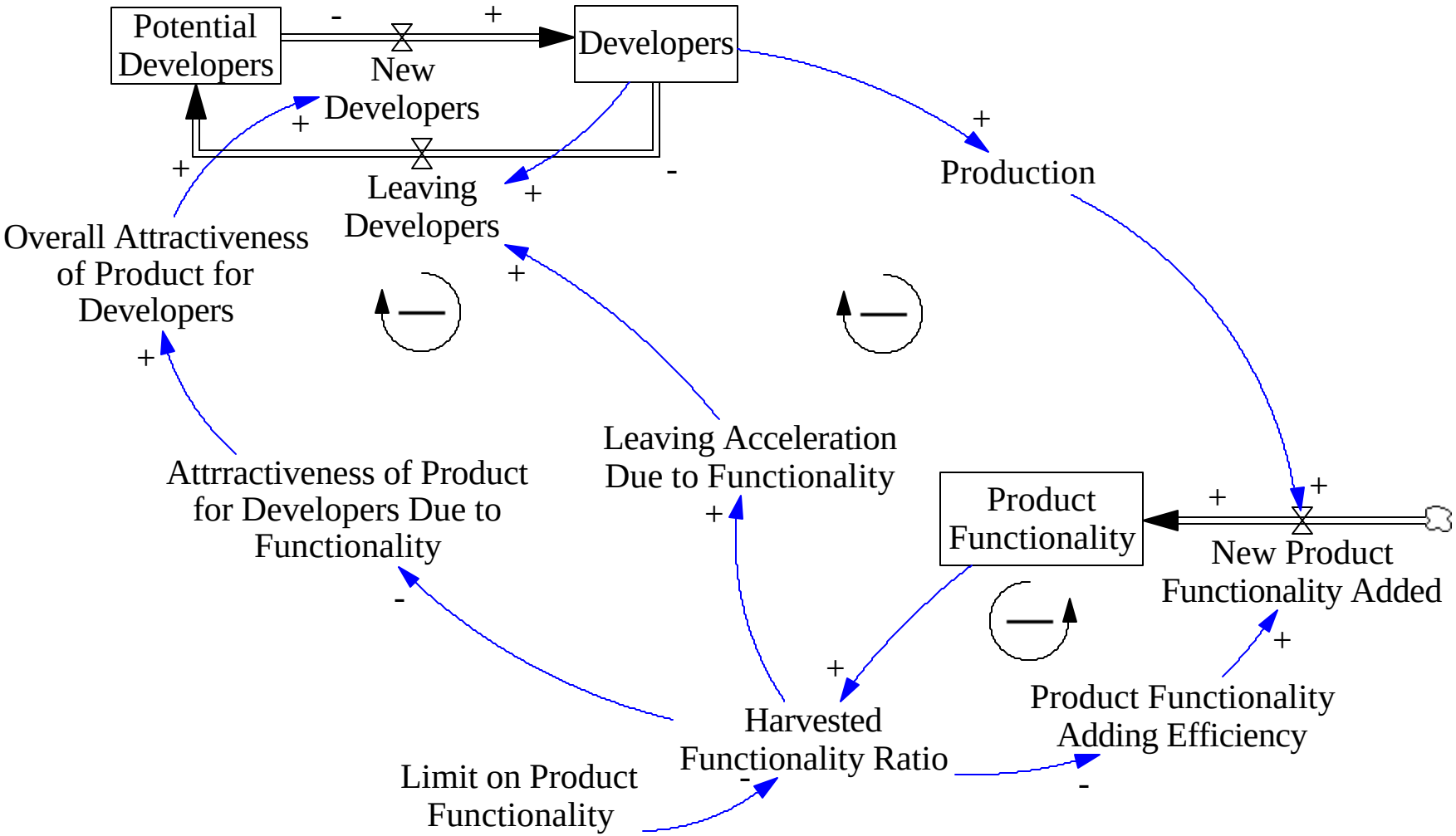
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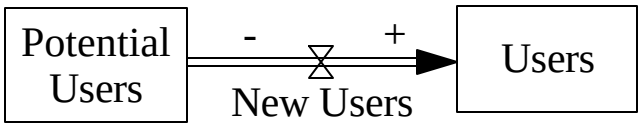
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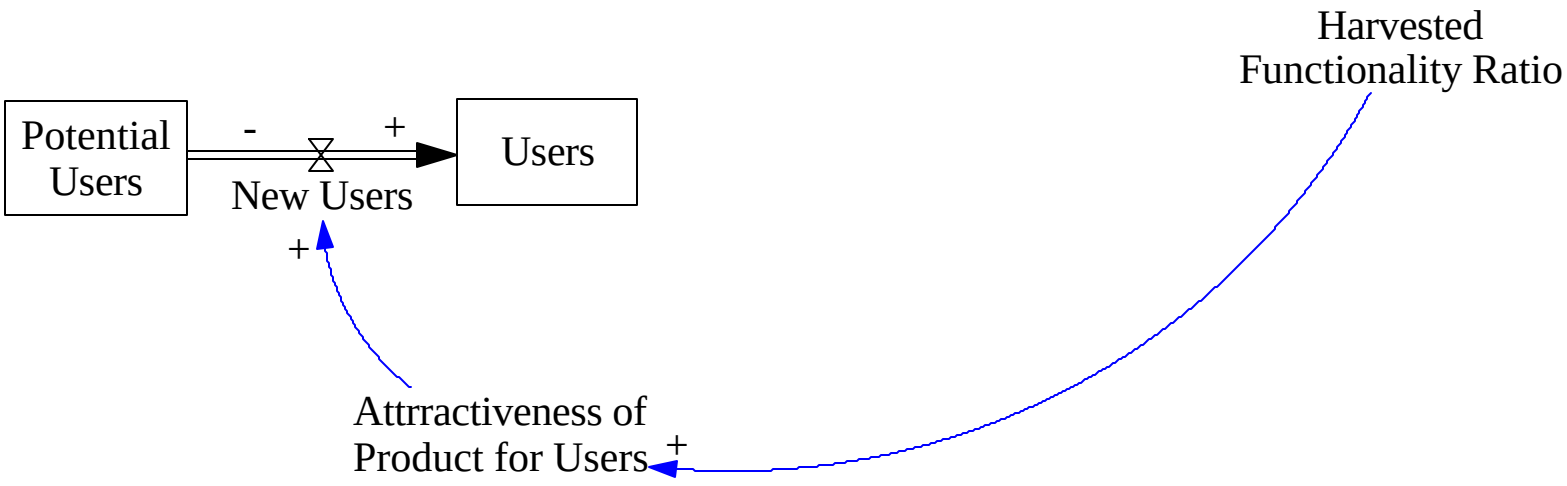
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Attrractiveness of
Product for Users
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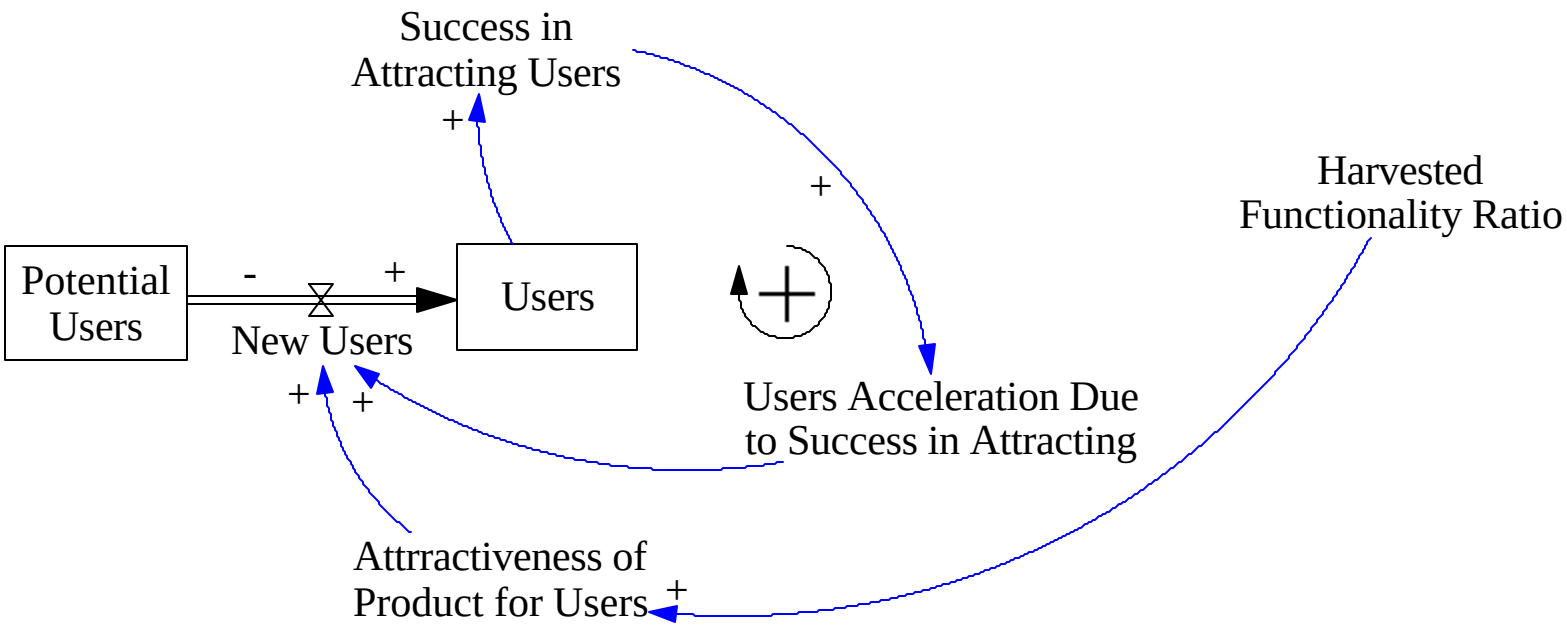
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Product for Users
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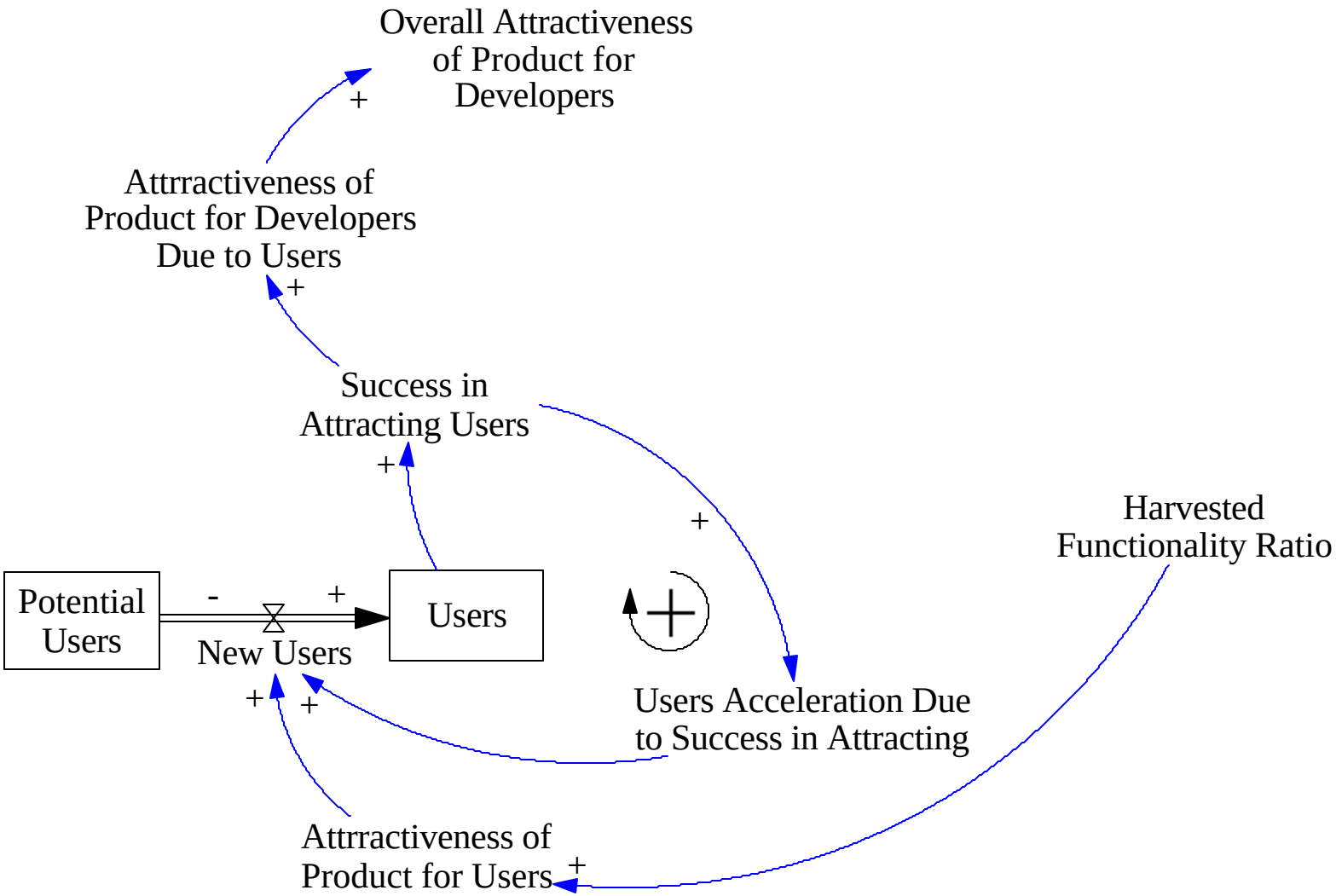
Overall Attractiveness of Product for Developers
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Attrractiveness of Product for Developers Due to Users
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Success in Attracting Users
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Users Acceleration Due to Success in Attracting
Attrractiveness of Product for Users
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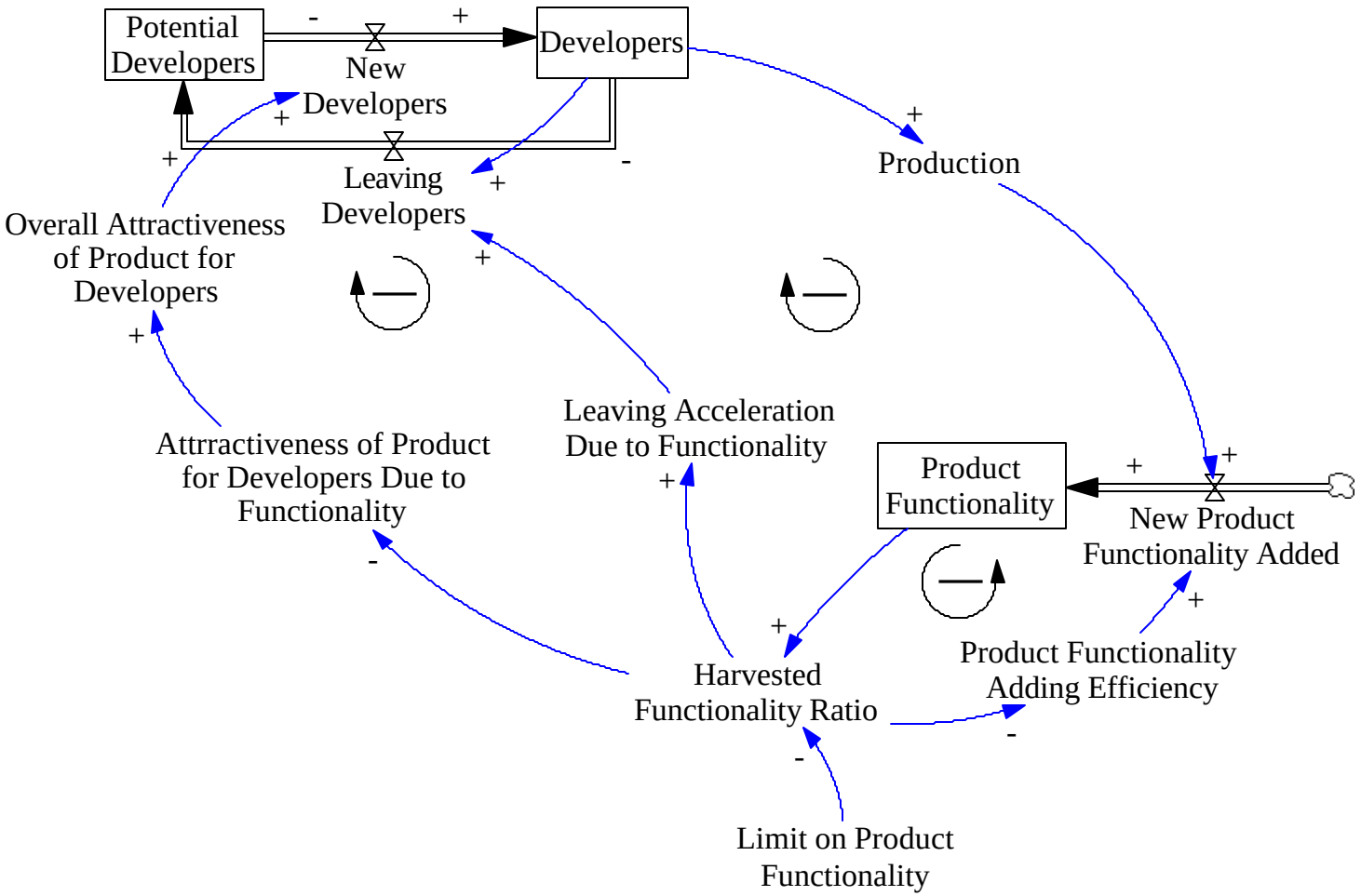
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Product Functionality Adding Efficiency
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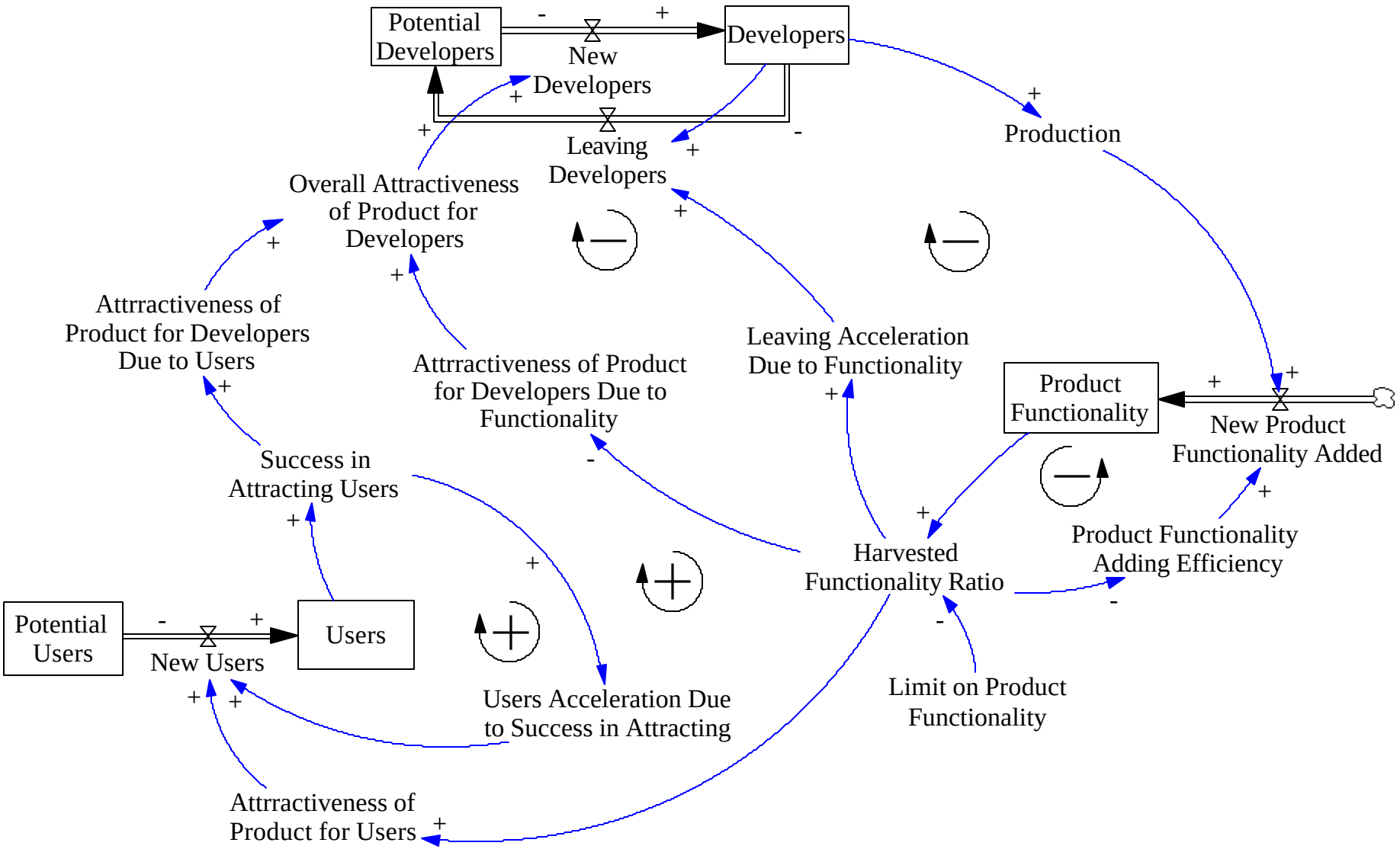
Limit on Product Functionality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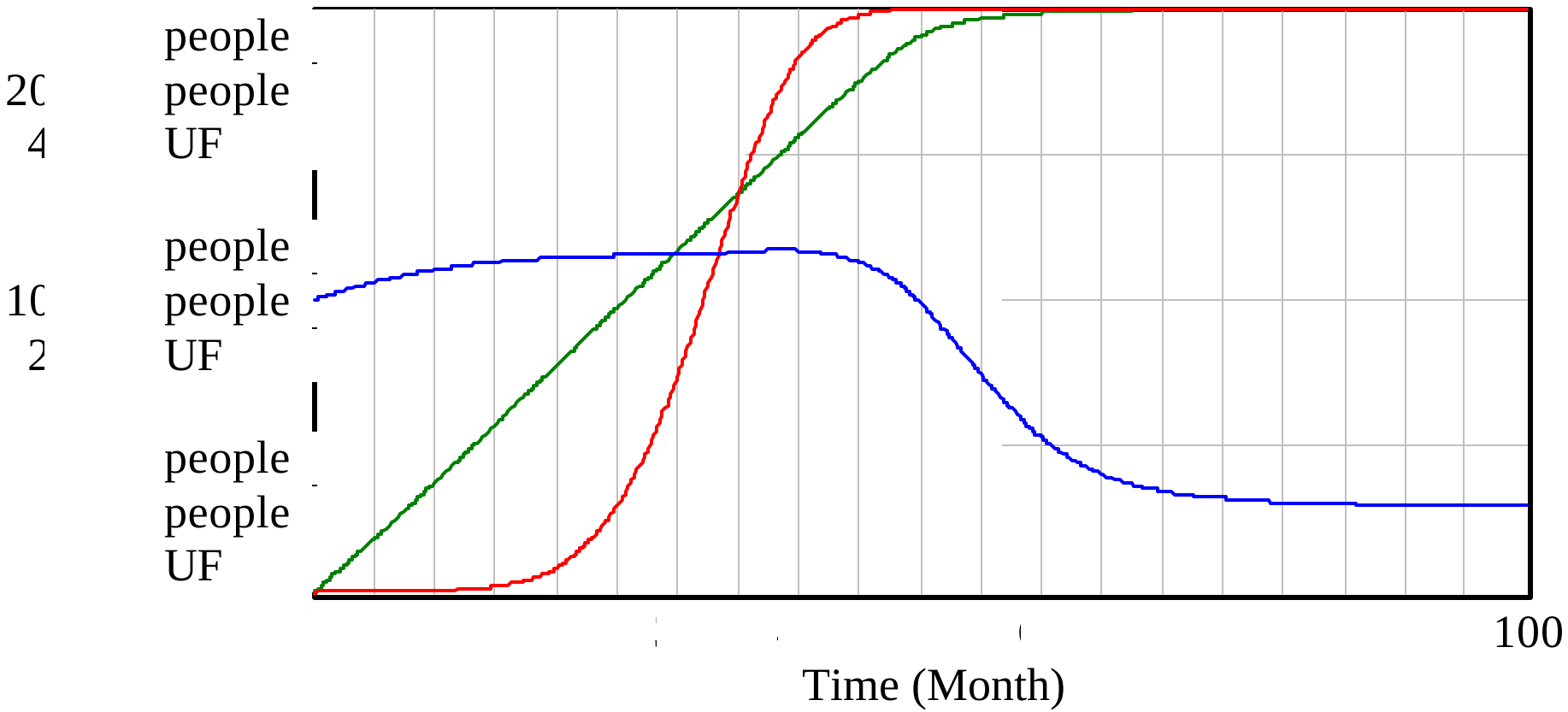
Main Indicators

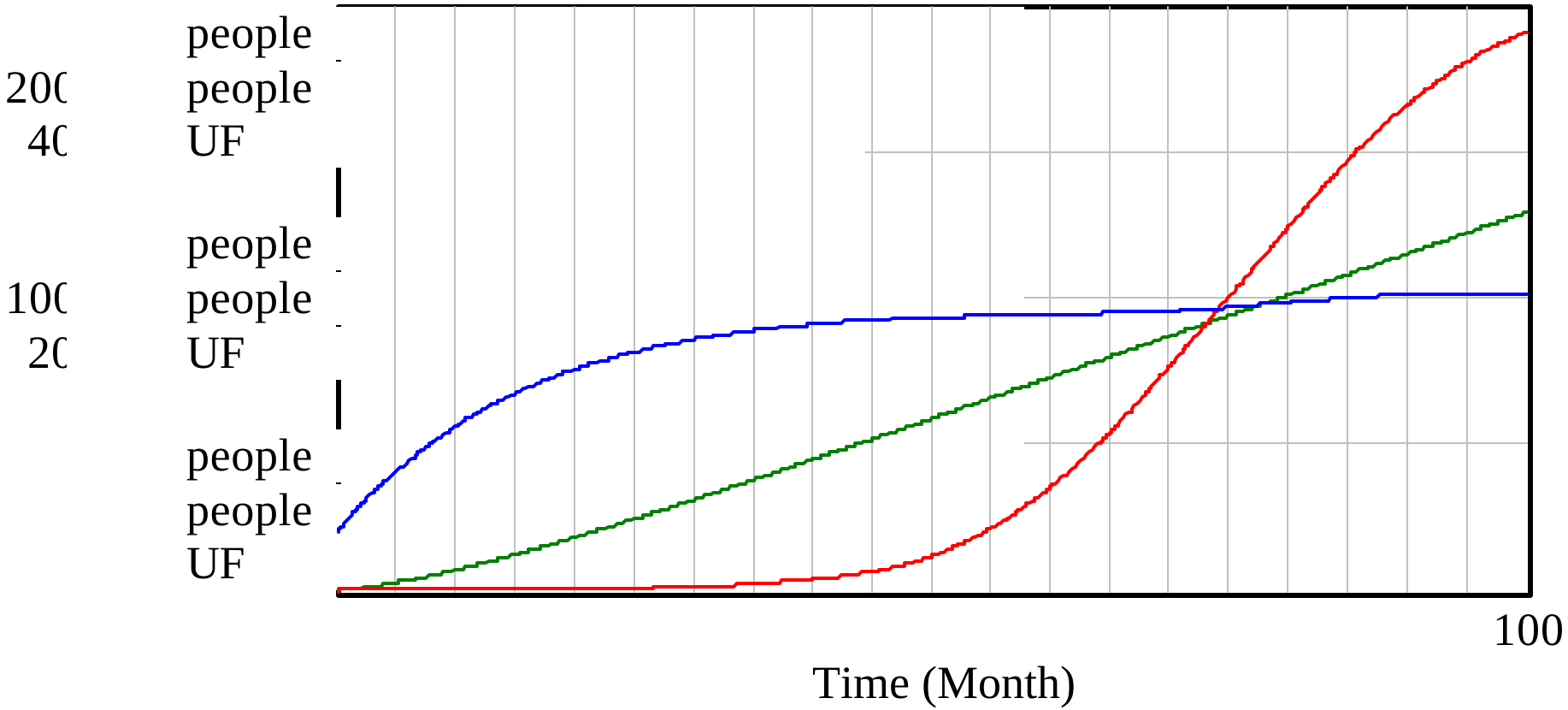


Developers : 02_base — people

Users : 02_base — people

Product Functionality : 02_base — UF

Main Indicators

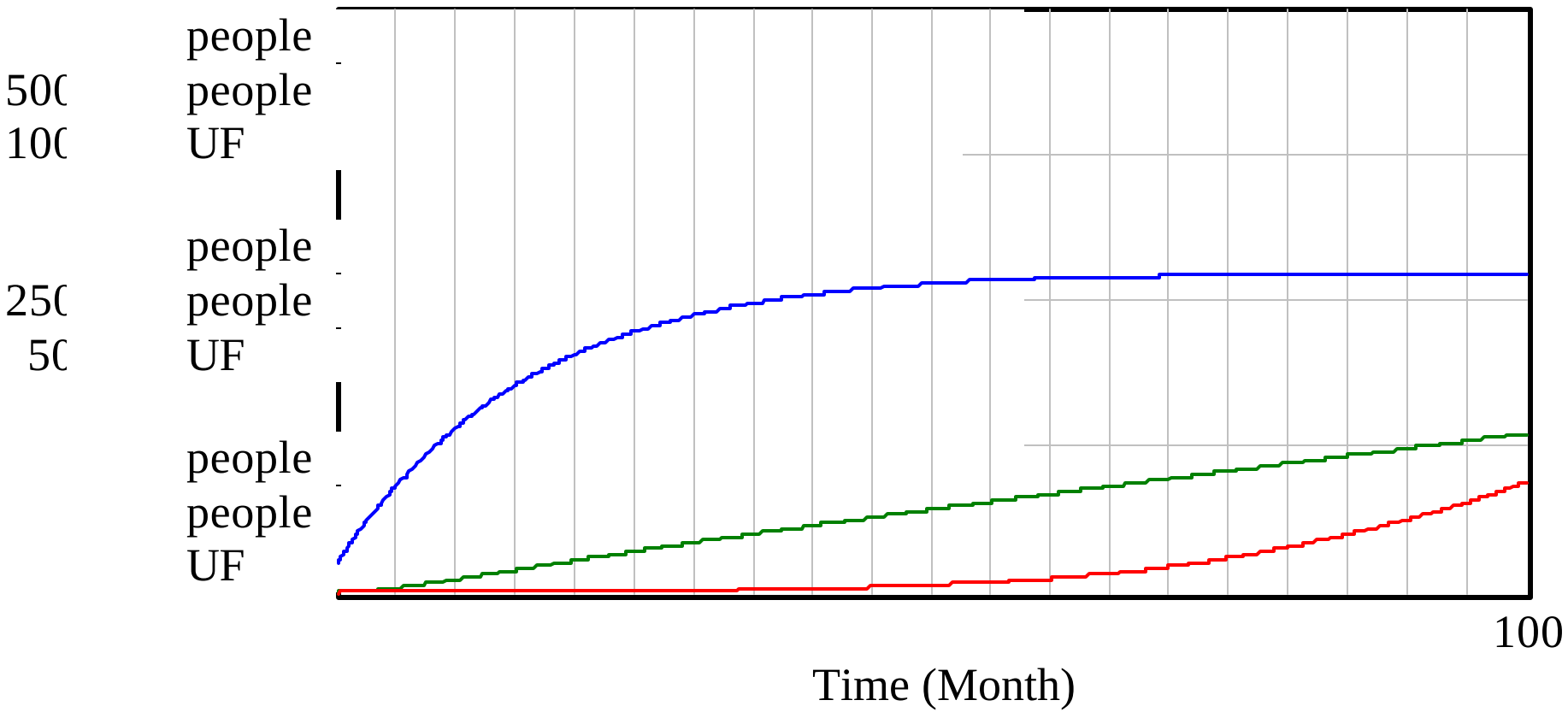


Developers : 02_base_hi_pot — people

Users : 02_base_hi_pot — people

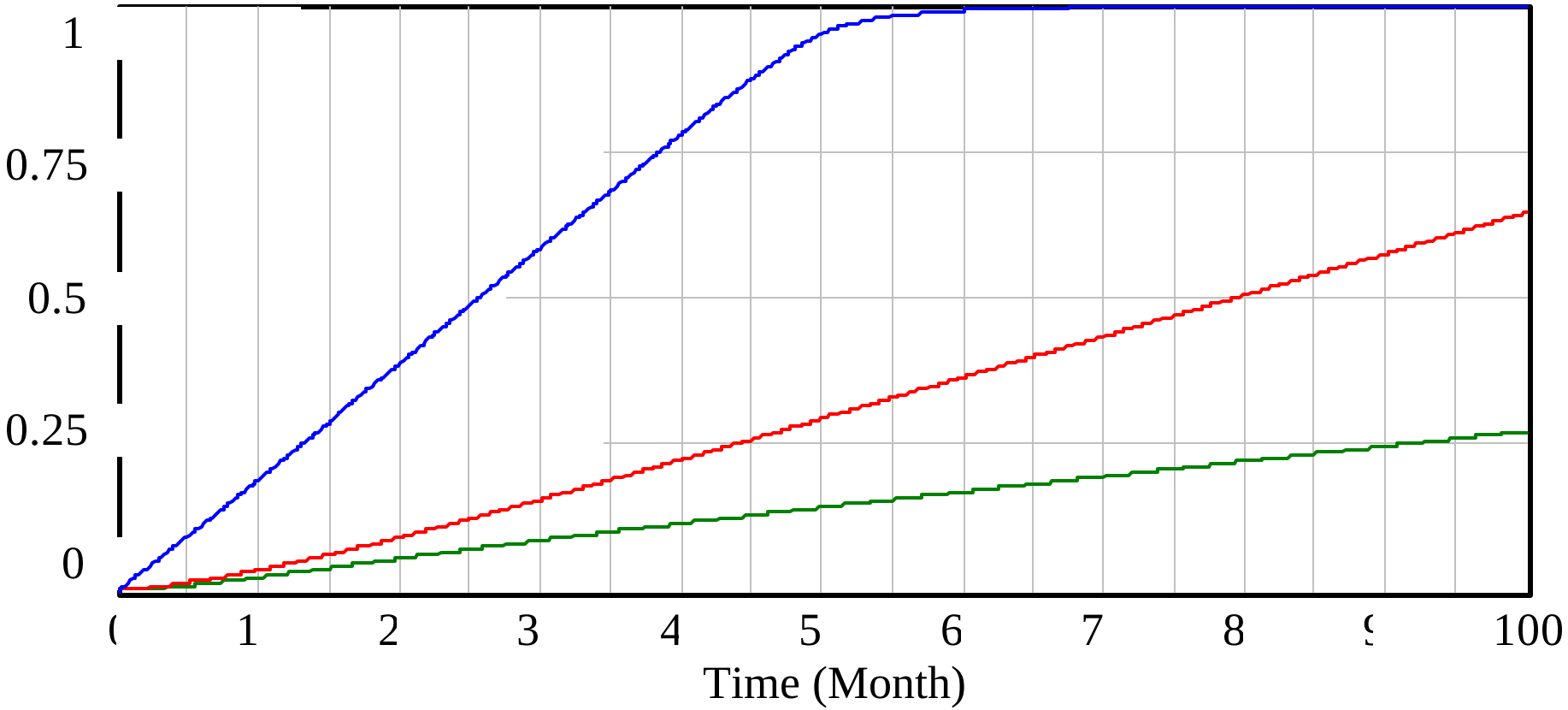
Product Functionality : 02_base_hi_pot — UF

Main Indicators

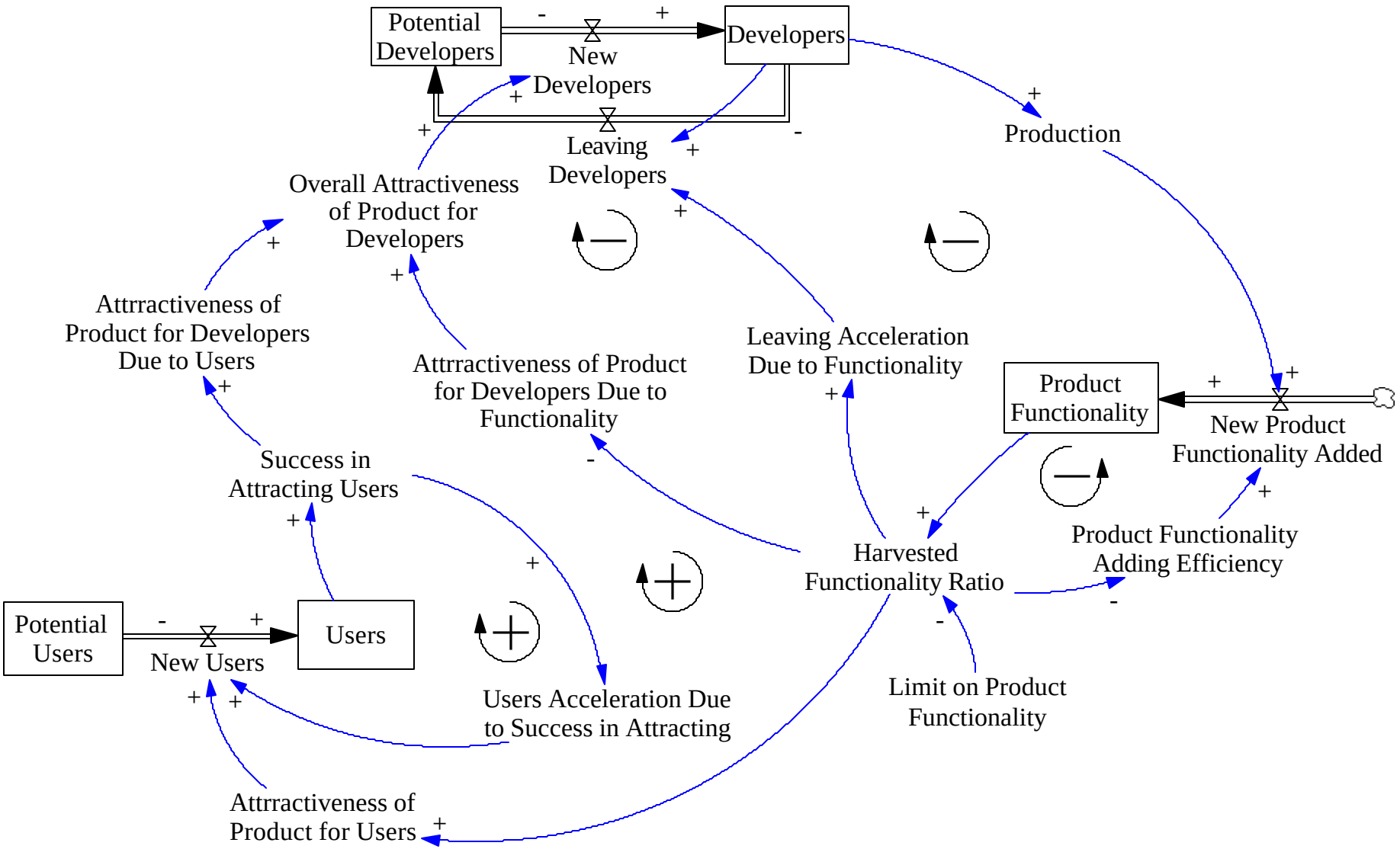


Developers : 02_base_very_hi_pot — people
Users : 02_base_very_hi_pot — people
Product Functionality : 02_base_very_hi_pot — UF

Graph for Harvested Functionality Ratio



Harvested Functionality Ratio : 02_base Dmnl
Harvested Functionality Ratio : 02_base_hi_pot Dmnl
Harvested Functionality Ratio : 02_base_very_hi_pot Dmnl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Users Acceleration Due to Success in Attracting
Limit on Product Functionality
Attrractiveness of Product for Users

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