Never Alone: How Collaboration has Changed and is Changing in Software Development

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2018-2019 Distinguished Speaker Series
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University of California - Irvine
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collaborate to innovate
by leveraging talent at remote sites
proximity to customers
distributed issue resolution 2.5 times longer than co-located
Paraphrased

Conway's Law

The structure of software will mirror the structure of the organisation that built it for example

Organisation

- Small distributed teams
- Large colocated teams

Software

- Modular, service architecture
- Monolithic architecture

are more likely to produce
OUR INVESTIGATION

IBM Jazz development Team, 2007
no practically significant delay due to distance

Effective communication through a core set of contributors
FOCUS ON PERFORMANCE

Hierarchical

Brokers

Complete

Build Result 1 OK

Build Result 2 ERROR

Build Result 3 OK

SCM Repository

Network 2

Network 3

time
Communication model predicted about 70% of failed builds

from Co-located to Distributed

communication matters!
from Co-located to Distributed

collaboration quality greatly affects software success
Closed source, corporate-led contributions, intra- and inter-organizational partnerships.
trust

awareness

cultural affinity

aligned autonomy
Innovate through decentralized, large contributor base

EARLY STUDIES OF OSS

socio-technical congruence
the more active contributors are also the more active communicators

Bird, C.: Sociotechnical coordination and collaboration in open source software, ICSM 2011
from **Closed** to **Open**

communication medium might not matter!
from Closed to Open
governance based on quality of work
THE GITHUB REVOLUTION
Blincoe, K., F. Harrison, N. Kaur, D. Damian: Reference Coupling: An Exploration of Inter-project Technical Dependencies and their Characteristics within Large Software Ecosystems, Information and Software Technology, 2019
communities are highly interconnected
the largest connected component: 57% (about 10K projects)
largest connected (giant) component in Github

Blincoe, K, F. Harrison, N. Kaur, D. Damian: Reference Coupling: An Exploration of Inter-project Technical Dependencies and their Characteristics within Large Software Ecosystems, Information and Software Technology, 2019
SOCIAL BEHAVIOUR ALIGNED WITH TECHNICAL DEPENDENCIES?

Project Owners followed by other Owners in their ecosystem
Mike Evans, vice president of technical business development at Red Hat.

“As a software company, it’s impossible to keep up if you have to write every line of code yourself, instead of using solutions that multiple organizations and countless individuals are developing collectively on a massive scale”
THE COOPERITION ERA
“[O pen] Software is becoming the leading technique by which companies both compete and collaborate with one another”

Mike Milinkovich, executive director of the Eclipse Foundation and a board member of the Open Source Initiative
Social Network Measures and Influence in the Ecosystem
Influence through:

**issues reported and included in release**

**issues interacted with and included in release**
collaboration patterns linked to influence in the ecosystem
2006: Apple releases WebKit

2007-2008: Apple releases the iPhone

2008-2011: Nokia - Intel further apart

2011-2013: Nokia - Intel further apart

Samsung and Apple coopetition

Nokia and Intel break out due to Nokia-Microsoft partnership

**Teixera, J.: Understanding Coopetition in the Open-Open-Source Arena: The cases of WebKit and OpenStack, OpenSym, 2014**
from Cooperation to Coopetition

the Customer is King
from Cooperation to Coopetition

Increased collaboration $\rightarrow$ competitive advantage
Open source platform and ecosystem, community contributions, software grows organically
PROPRIETARY PLATFORMS
IBM Collaborative Lifecycle Management

The IBM Rational Collaborative Lifecycle Management Solution is a set of seamlessly integrated application lifecycle management (ALM) tools that work together as one. Use Collaborative Lifecycle Management (CLM) to manage requirements, plan projects, track changes, and manage quality, all on a single platform.

Capabilities

Collaborative Lifecycle Management provides the following capabilities:

- Define and manage requirements with IBM Rational DOORS® Next Generation
- Plan, track work, and manage source with IBM® Rational Team Concert™
- Develop and execute your test plan with IBM Rational® Quality Manager
jazz.net: open issue tracker
Atlassian's open issue tracker

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Diagram:

- Git
- Github
- RTC
- RRC
- Reporting
- RSA
- RQM
- SAP

- Consumer 1
- Consumer 2
- Consumer 3
- Consumer 4
Knauss, E. et al: Continuous clarification and emergent requirements flows in open-commercial software ecosystems, REJurnal, 2018
Knauss, E. et al: Continuous clarification and emergent requirements flows in open-commercial software ecosystems, RE Journal, 2018
openness

trade-offs

Act globally: strategic RE

Act proprietarily, confidential RE

Act locally: ‘just-in-time’ RE

Act openly, transparent RE
Closed source, open stakeholder communication, corporate-led contributions, inter-organizational partnerships
COLLABORATION AT SCALE
PROPRIETARY PLATFORMS

- AWS
- Android Developers
- Facebook
- WeChat
- eBay
- Amazon.ca Prime
Real Friends  Paperback – May 2 2017
by Shannon Hale (Author), LeUyen Pham (Illustrator)

🌟🌟🌟🌟🌟  19 customer reviews

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‘Fresh and funny.’ — New York Times Book Review

Newbery Honor author Shannon Hale and New York Times bestselling illustrator LeUyen Pham join forces in this graphic memoir about how hard it is to find your real friends—and why it’s worth the journey.

When best friends are not forever . . .

Shannon and Adrienne have been best friends ever since they were little. But one day, Adrienne starts hanging out with Jen, the most popular girl in class and the leader of a circle of friends called The Group. Everyone in The Group wants to be Jen's #1, and some girls would do anything to stay . . .
Amazon's Virtuous Cycle

The Power of Network Effects for Mega Growth

Lower Cost Structure → Lower Prices

Selection → Customer Experience

Growth

Sellers → Traffic
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Accounting software with all the time-saving tools you need to grow your small business. Xero is secure and reliable and our experts are here to support you 24/7.

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  - ★★★★☆ (40)
  - Your comprehensive software tool for Electrical, Plumbing, Security, Heat Pump, HVAC,

- WorkflowMax
  - Time Tracking, Invoicing + Jobs
  - ★★★★☆ (92)
  - A Xero product offering all-in-one workflow. Over 10,000 service businesses trust

- Vend
  - Inventory, Point of Sale
  - ★★★★☆ (98)
  - Run the world’s best retail with point of sale & inventory software retailers love.

- Unleashed
  - Inventory Software
  - ★★★★☆ (234)
  - Unleashed provides online inventory software for Xero, allowing accurate costs.

- Tradify
  - Time Tracking, Invoicing + Jobs
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  - The complete job solution for trades contractors. Easy
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from Product to Platform

providing the best products to developing the best network of complementors (collaborators)
from Product to Platform

from end-user oriented to end-user and partner-oriented
THE BUSINESS FLYWHEEL
A BETTER METAPHOR TO VISUALIZE YOUR BUSINESS

From the FUNNEL
CUSTOMER ENERGY IS LOST AT THE BOTTOM. YOU START FRESH WITH EACH NEW SET.

To the FLYWHEEL
CUSTOMER ENERGY AND MOMENTUM IS HARNESSED. REDUCE FRICTION TO SPIN FASTER.

HAPPY CUSTOMERS SPEED YOU UP
MORE CUSTOMERS MAKE THE WHEEL BIGGER

ATTRACT
CUSTOMERS
HAPPY CUSTOMERS FEED GROWTH

ENGAGE
from Product to Platform

from self-reliant to team player
from Product to Platform

shared risk management in developing software
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XERO ACQUIRES TORONTO’S HUBDOC FOR $70 MILLION USD
Open API platform ecosystem, self-regulated community contributions, inter-organizational partnerships
strategic governance

quality of integrations

platform innovation to enable external product innovation
OPEN COLLABORATION AND INNOVATION AT SCALE

COLLABORATIVE INNOVATION
CO-INNOVATION AT LARGE SCALE
A RESEARCH AGENDA

Models of innovation within different types of ecosystems

Ecosystem tradeoffs and implications for Software Engineering platform openness $\leftrightarrow$ quality of integrations
THANK YOU
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