Going Farther Together: The Impact of Social Capital on Sustained Participation in Open Source

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STRUDEL
SOCIO-TECHNICAL RESEARCH USING DATA EXCAVATION LAB

Carnegie Mellon University
School of Computer Science

isr institute for SOFTWARE RESEARCH

Maintain, or suffer

https://w3techs.com/technologies/history_overview/web_server

(Greenstein and Nagel, 2016)

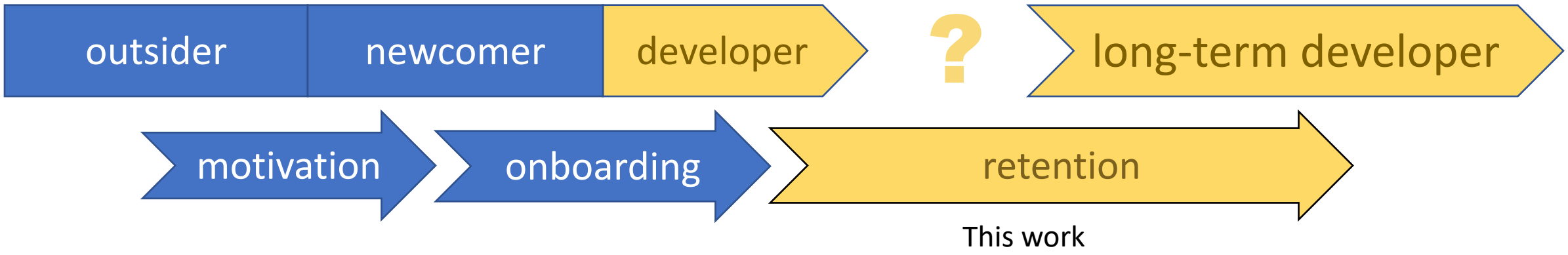
Open-source experience boosts resumes

Employers (and job seekers) use open-source experience to make inferences (or form impressions) about a candidate's technical skills.

(Marlow et al., 2013)

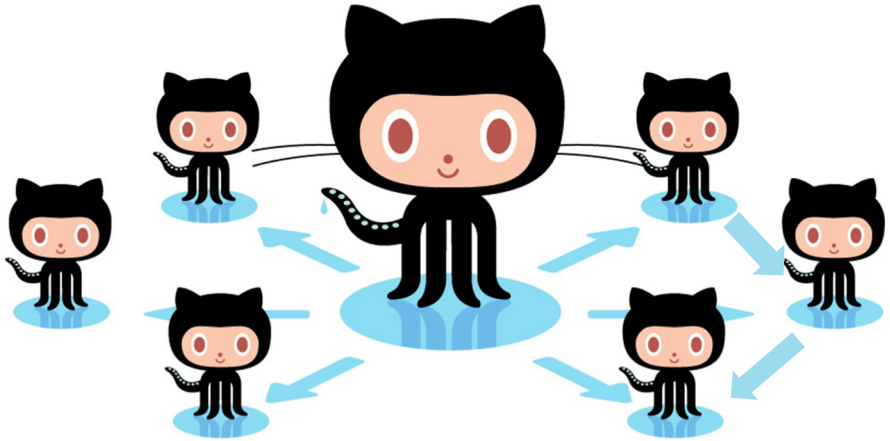
https://codeformore.com/how-to-write-up-open-source-experience-when-you-dont-have-any/

Knowledge gap

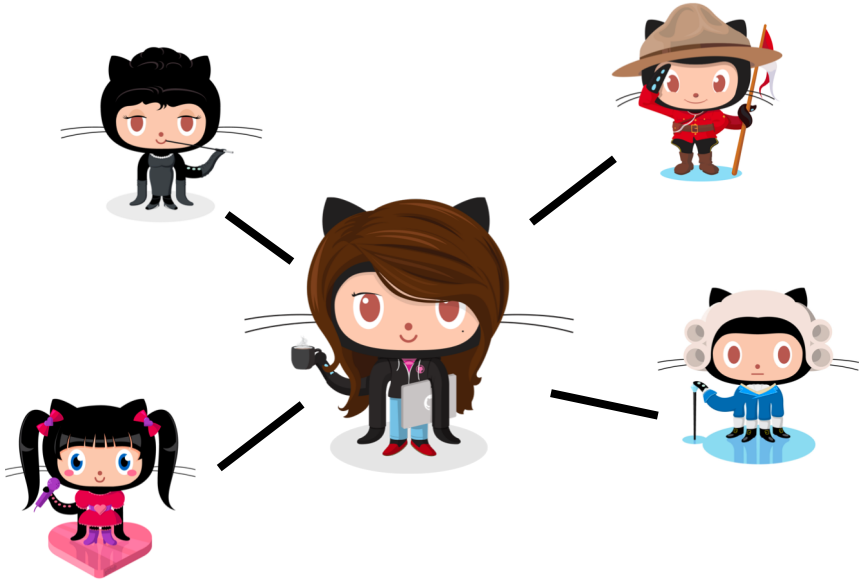


RESULT HIGHLIGHTS: Social capital explains sustained participation

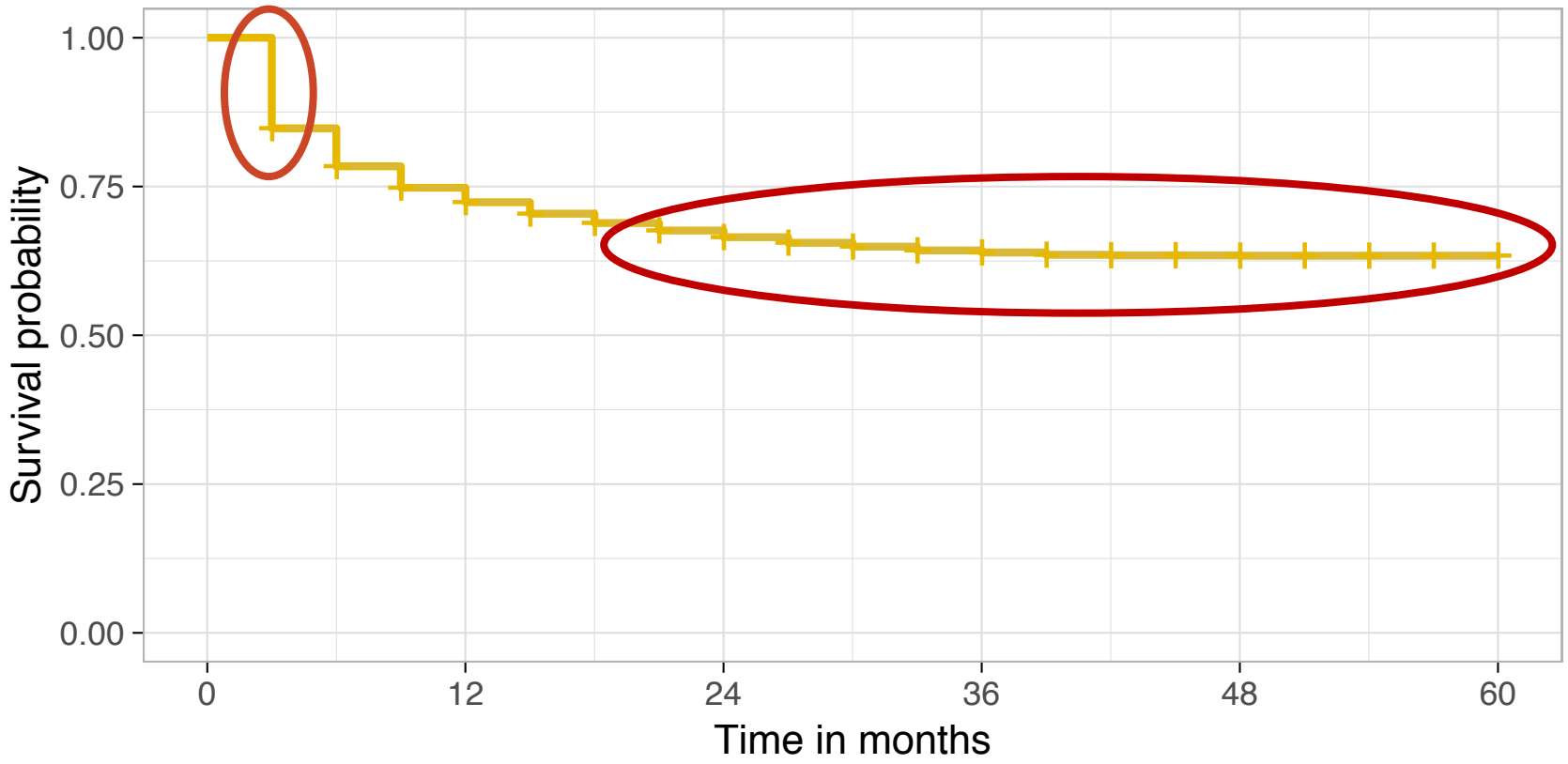
Higher social capital



Being part of teams with more diverse information, especially for women

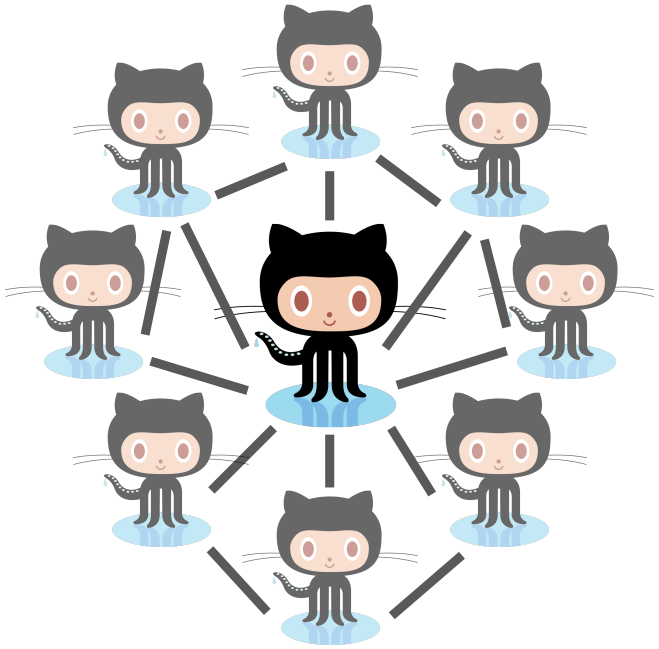


~40% of GitHub contributors disengage



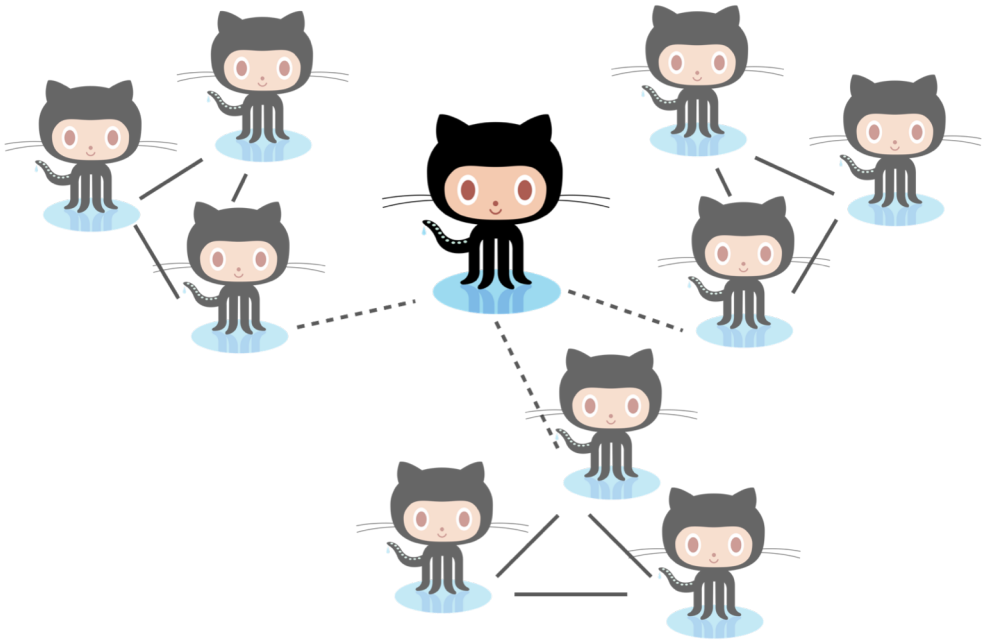
Social capital theory for sustainable participation

Bonding social capital:
benefiting from strongly connected network



Willingness to continue
(Coleman, 1990)

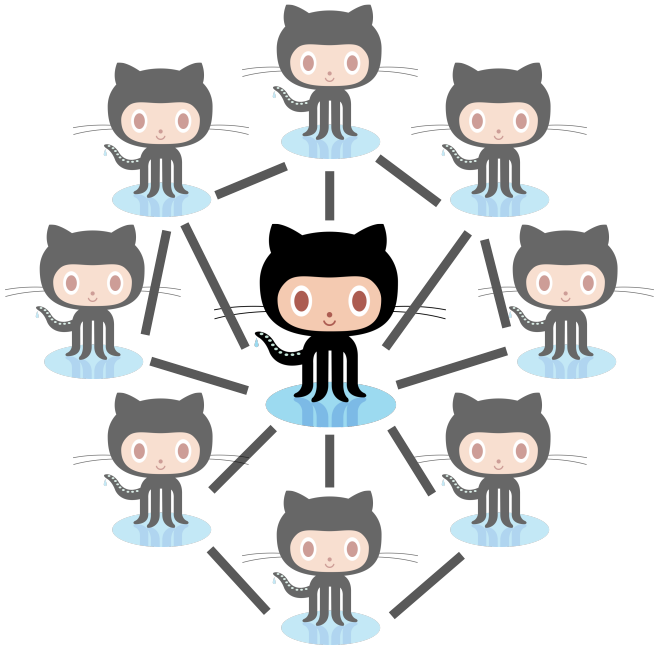
Bridging social capital:
benefiting from network with diverse info



Opportunity to continue
(Burt, 1998, 2001)

H1: more social capital ~ more prolonged engagement

Bonding social capital:
benefiting from strongly connected network



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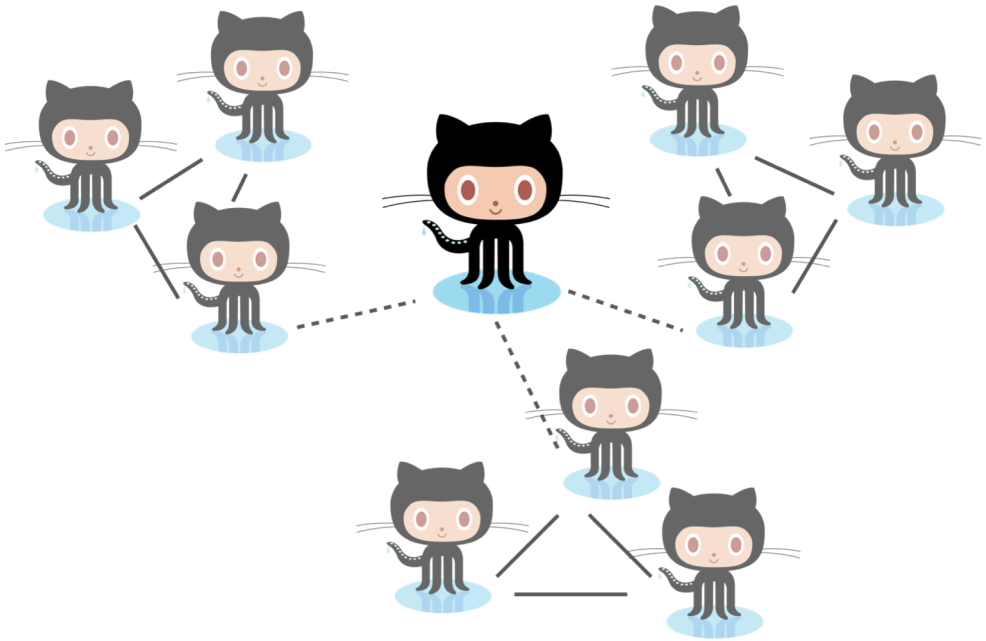

Opportunity to continue
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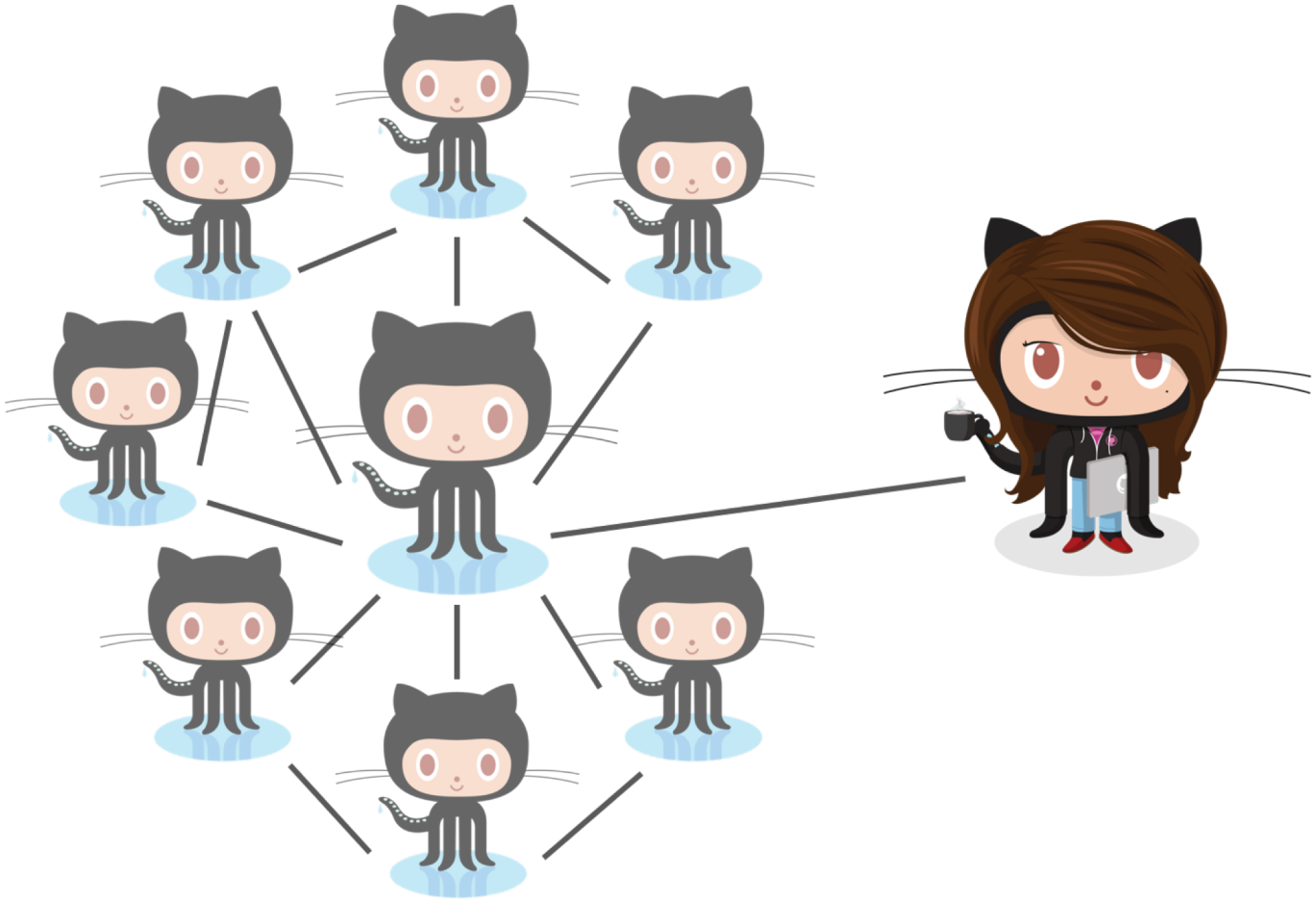
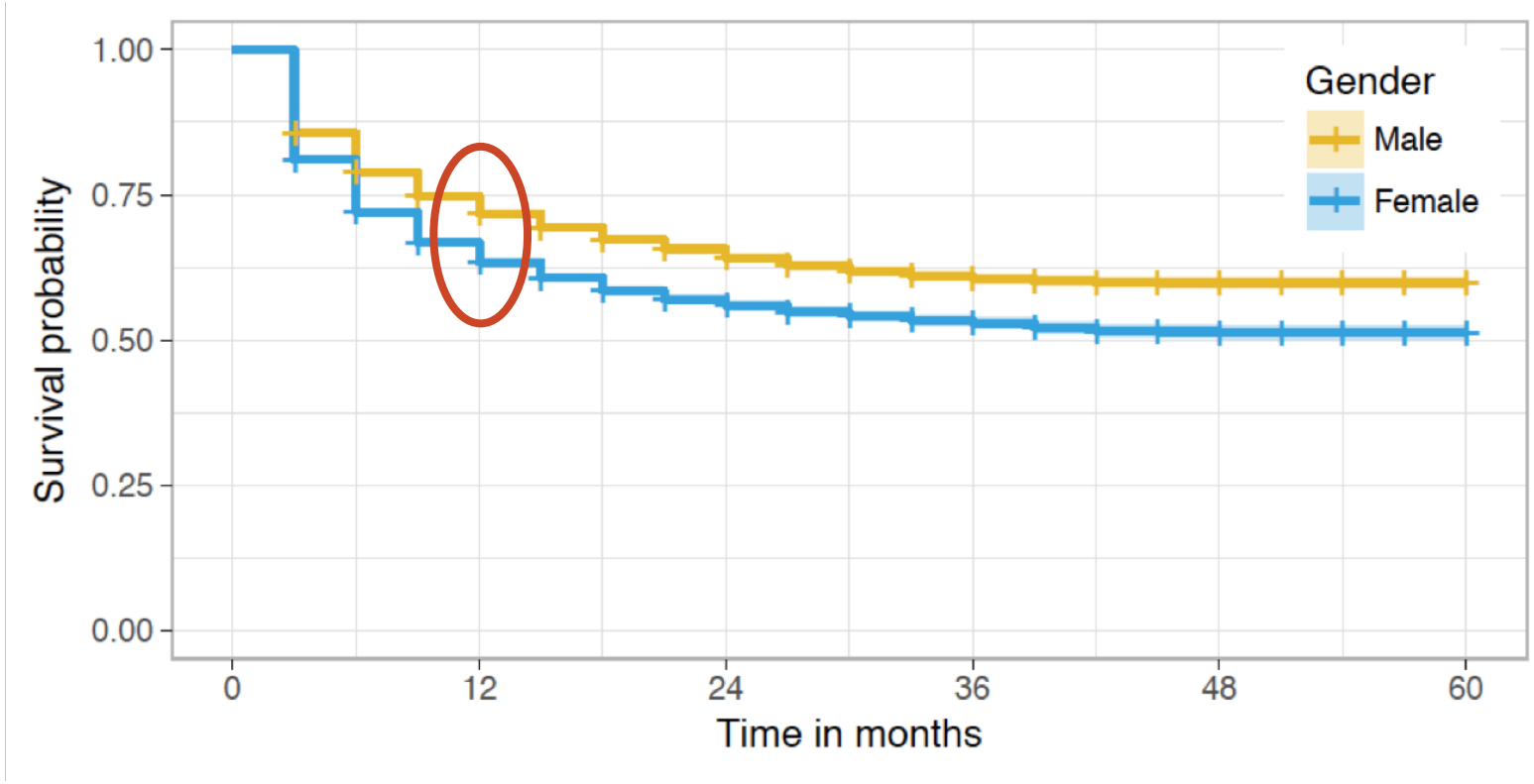
Cohesive networks might foster discrimination / exclusion



On GitHub, women disengage earlier than men

After one year ca. 70% of men are still active but only ca. 60% of women



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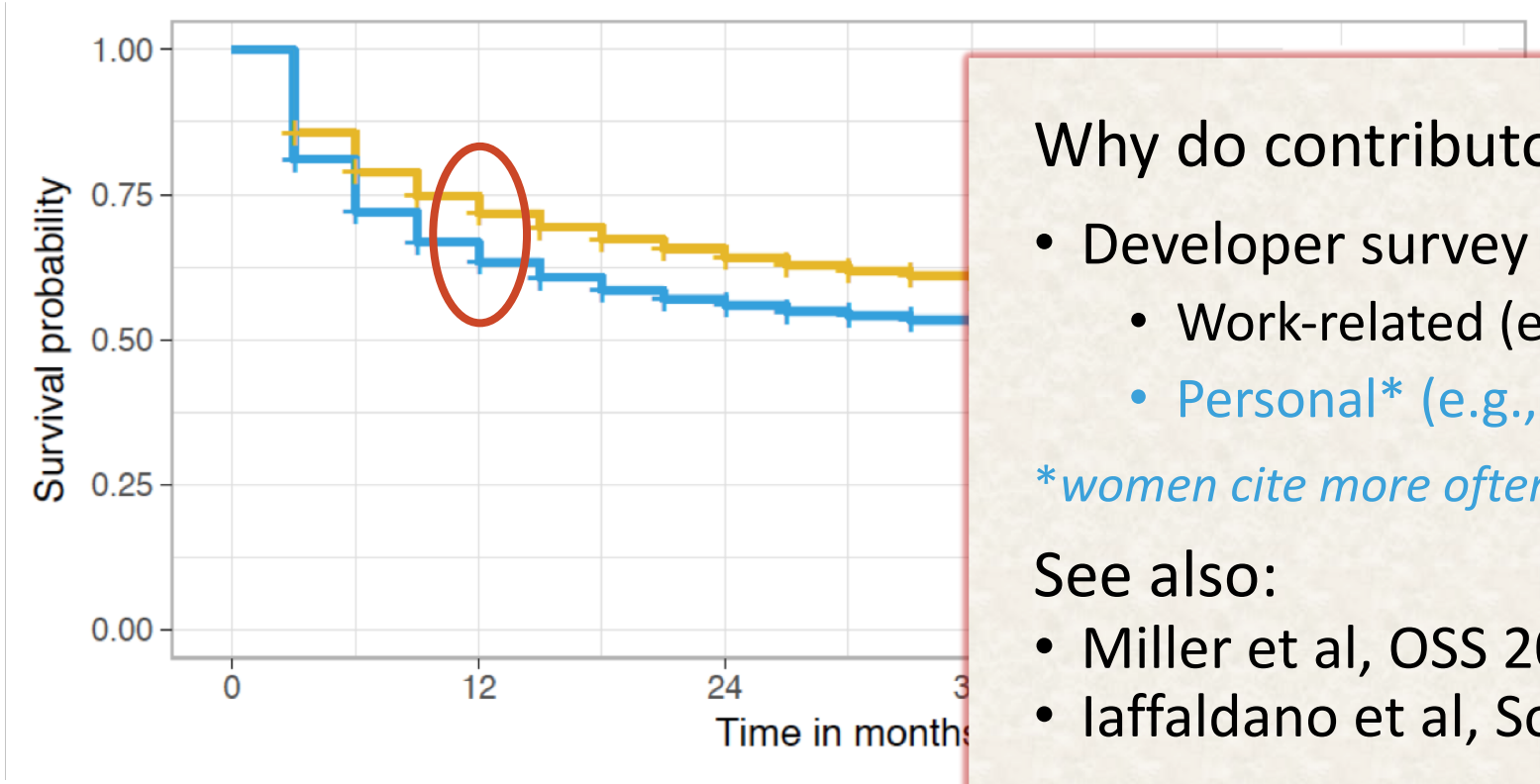


Why do contributors disengage?

- Developer survey in our paper:
  - Work-related (e.g., new job)
  - Personal* (e.g., different hobby)

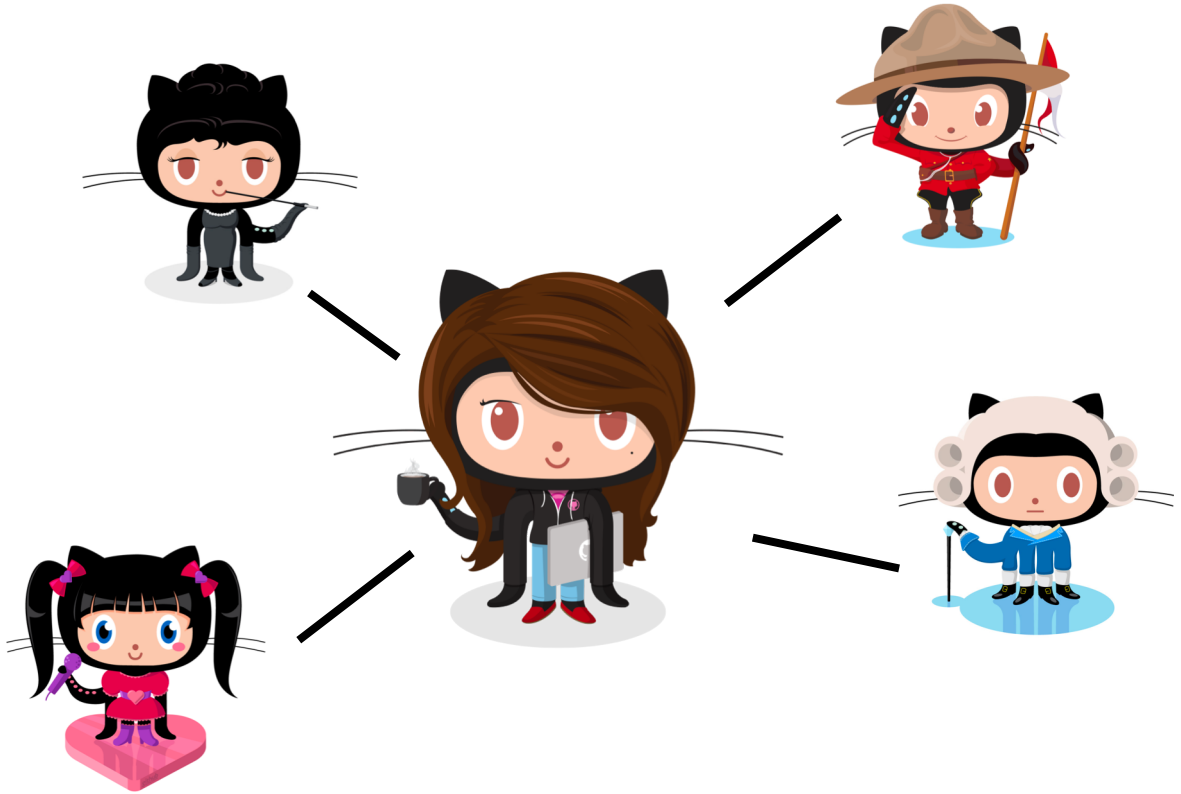
**women cite more often than men*

See also:

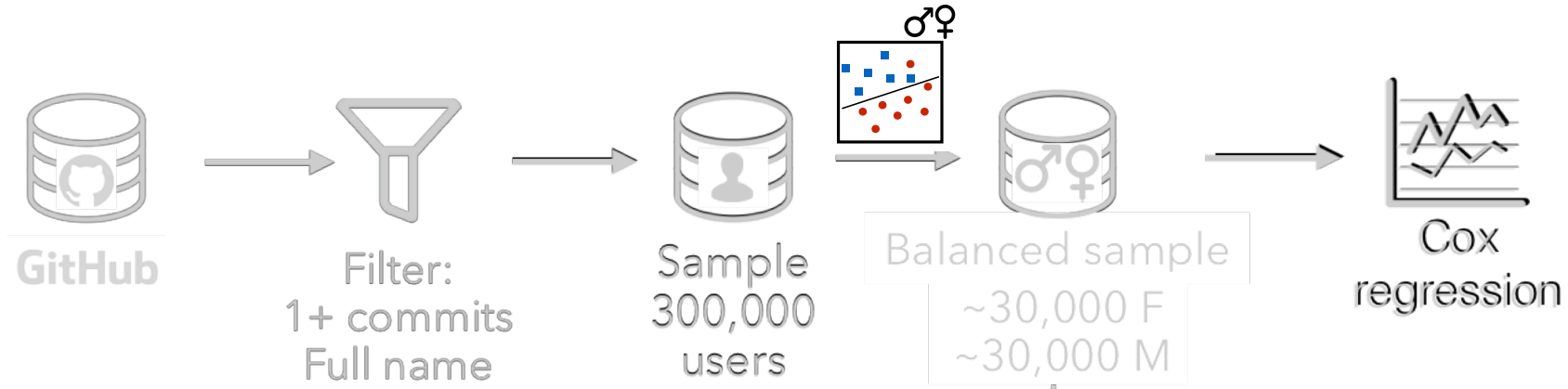
- Miller et al, OSS 2019
- Iaffaldano et al, SoHeal 2019

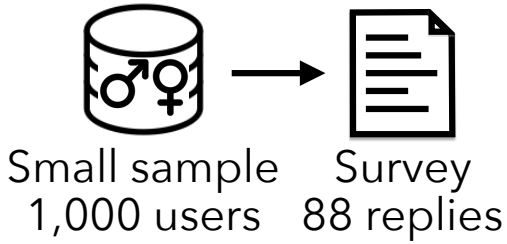
H2: Teams with more diverse information ~ more prolonged engagement, esp. for women

Information diversity should reduce the risk of demographic-based echo chambers.



Large-scale mixed-methods study



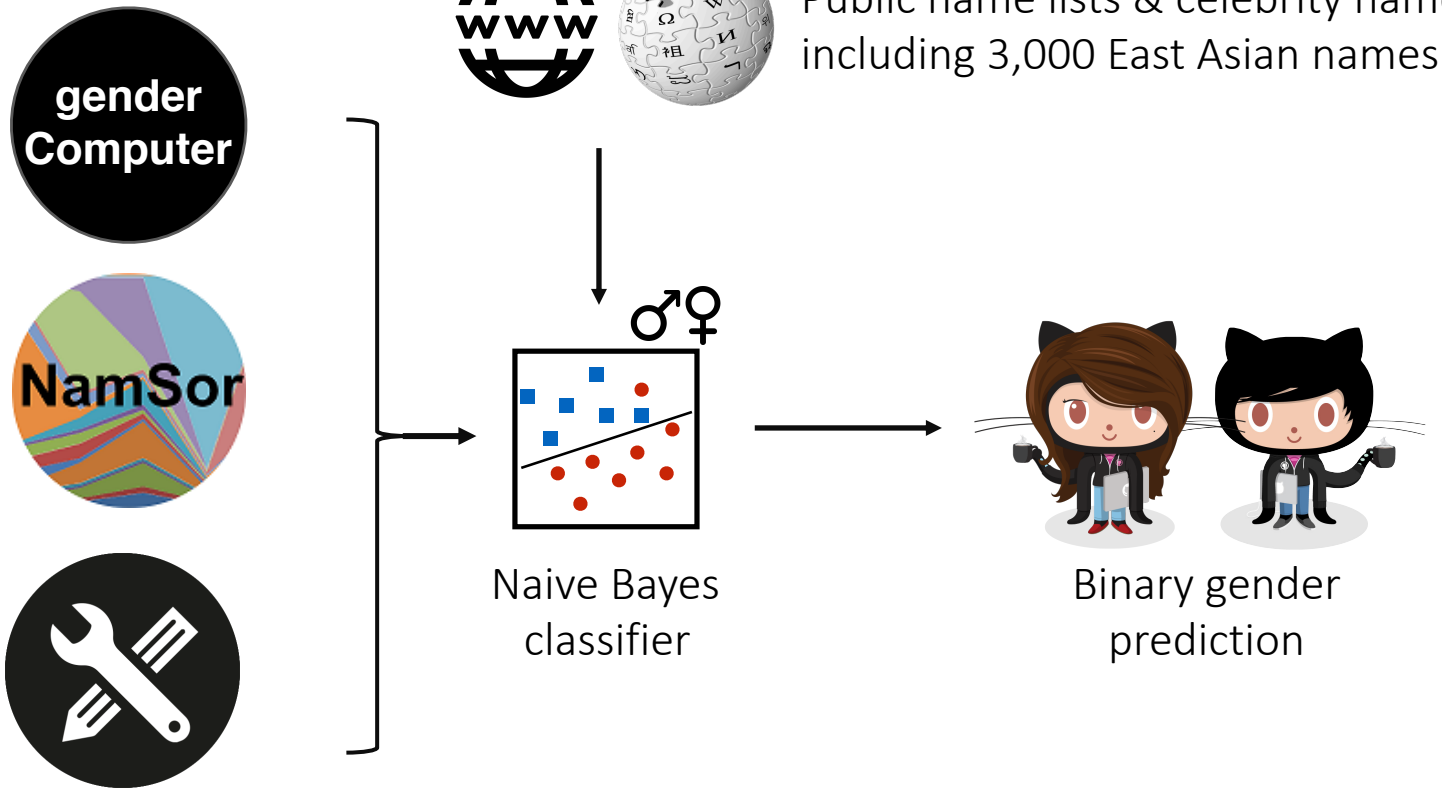


Inferring gender from names

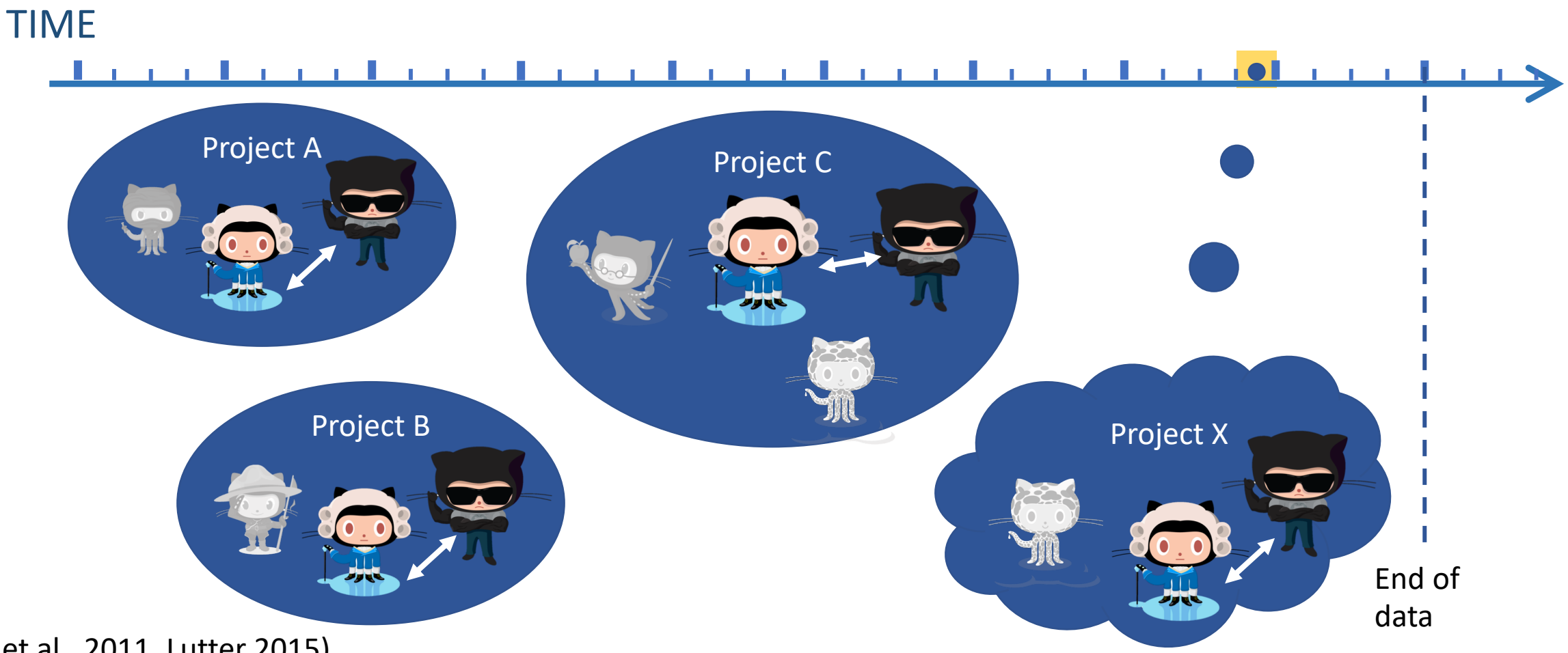
https://github.com/tue-mdse/genderComputer

https://www.namsor.com

name features, e.g., the last two characters

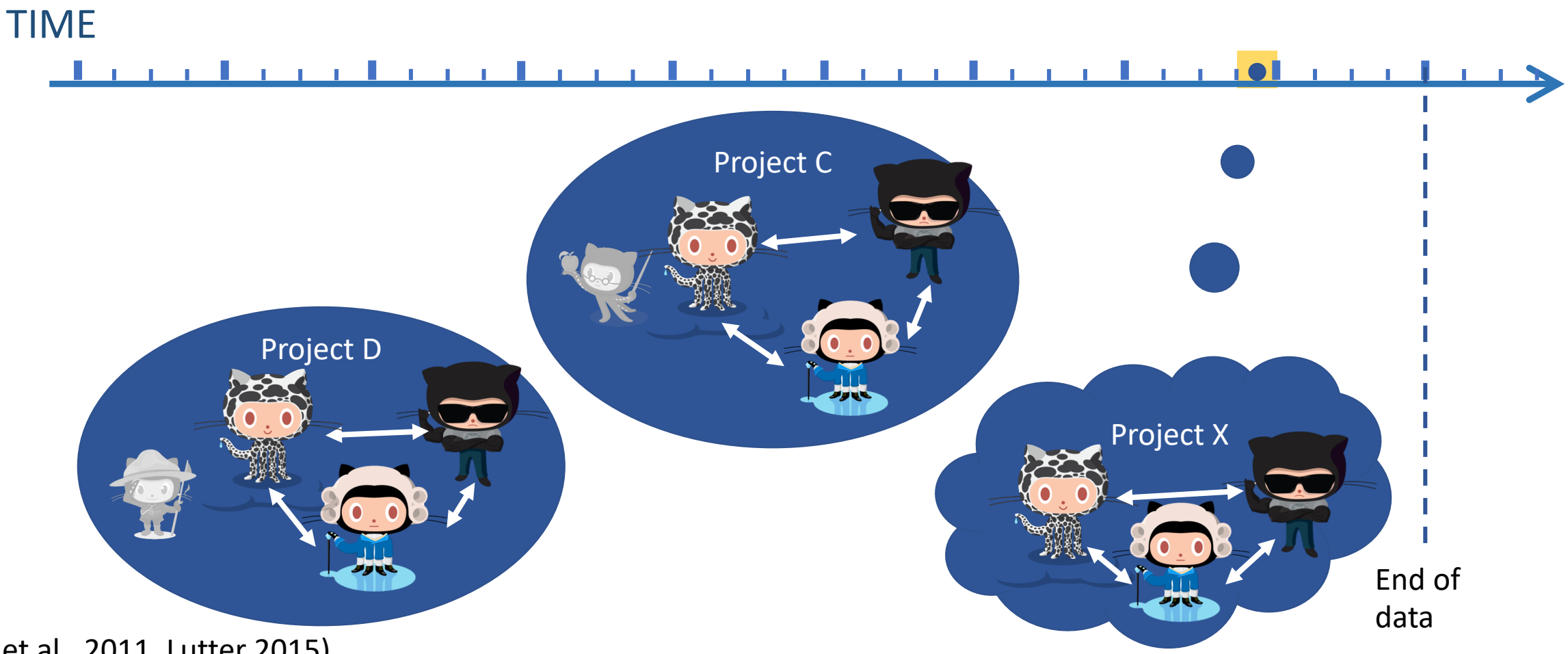


Bonding social capital – Team Familiarity



(de Vaan et al., 2011, Lutter 2015)

Bonding social capital – Recurring Cohesion



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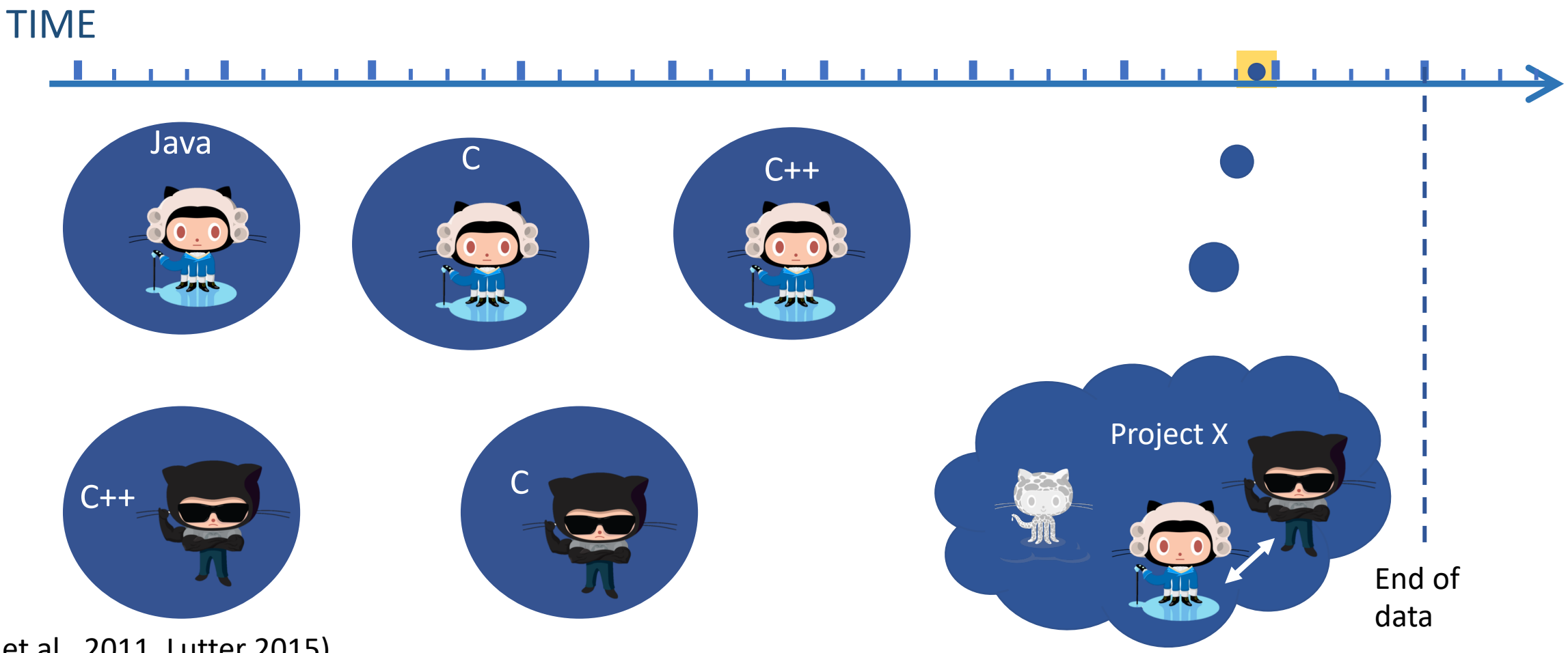
Bridging social capital – Language Diversity



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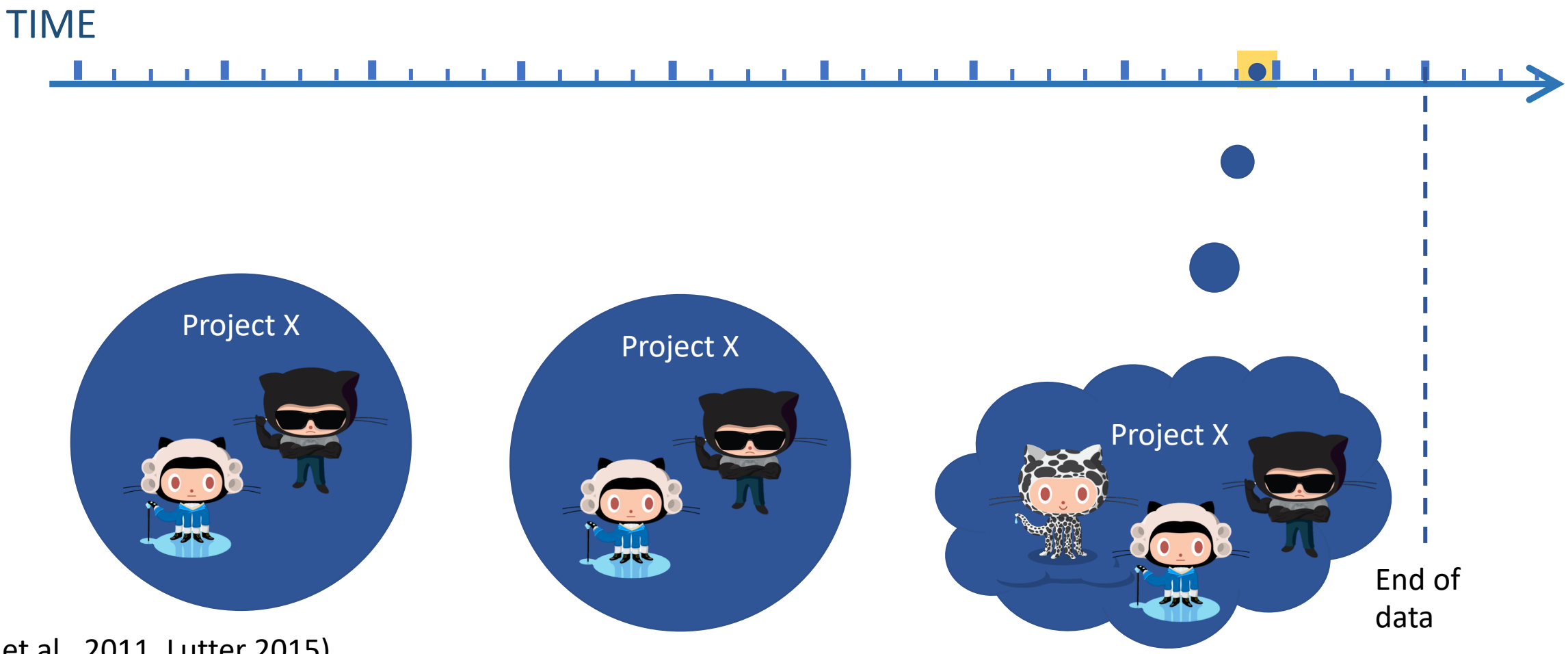
Bridging social capital – Share of Newcomers



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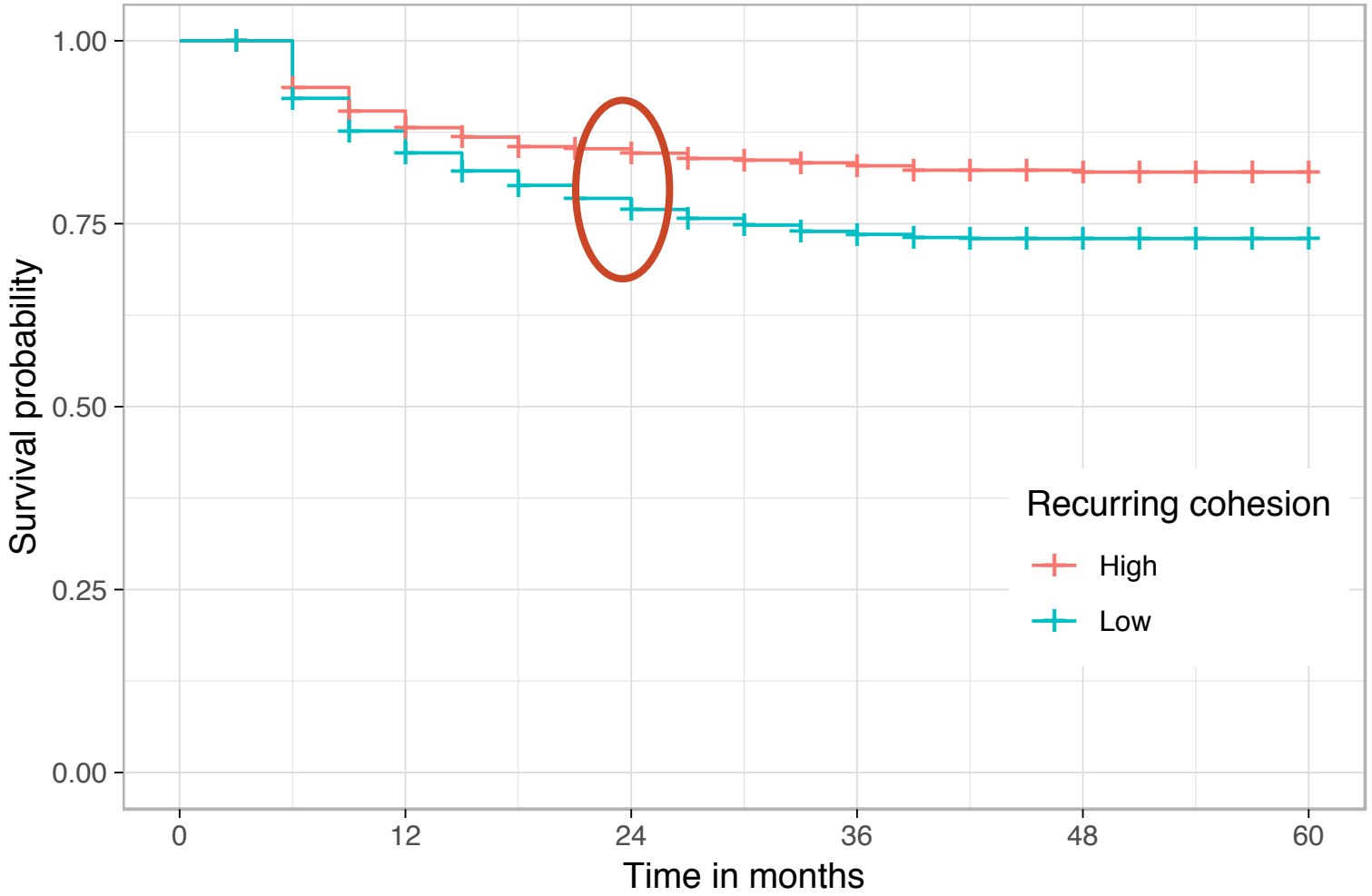
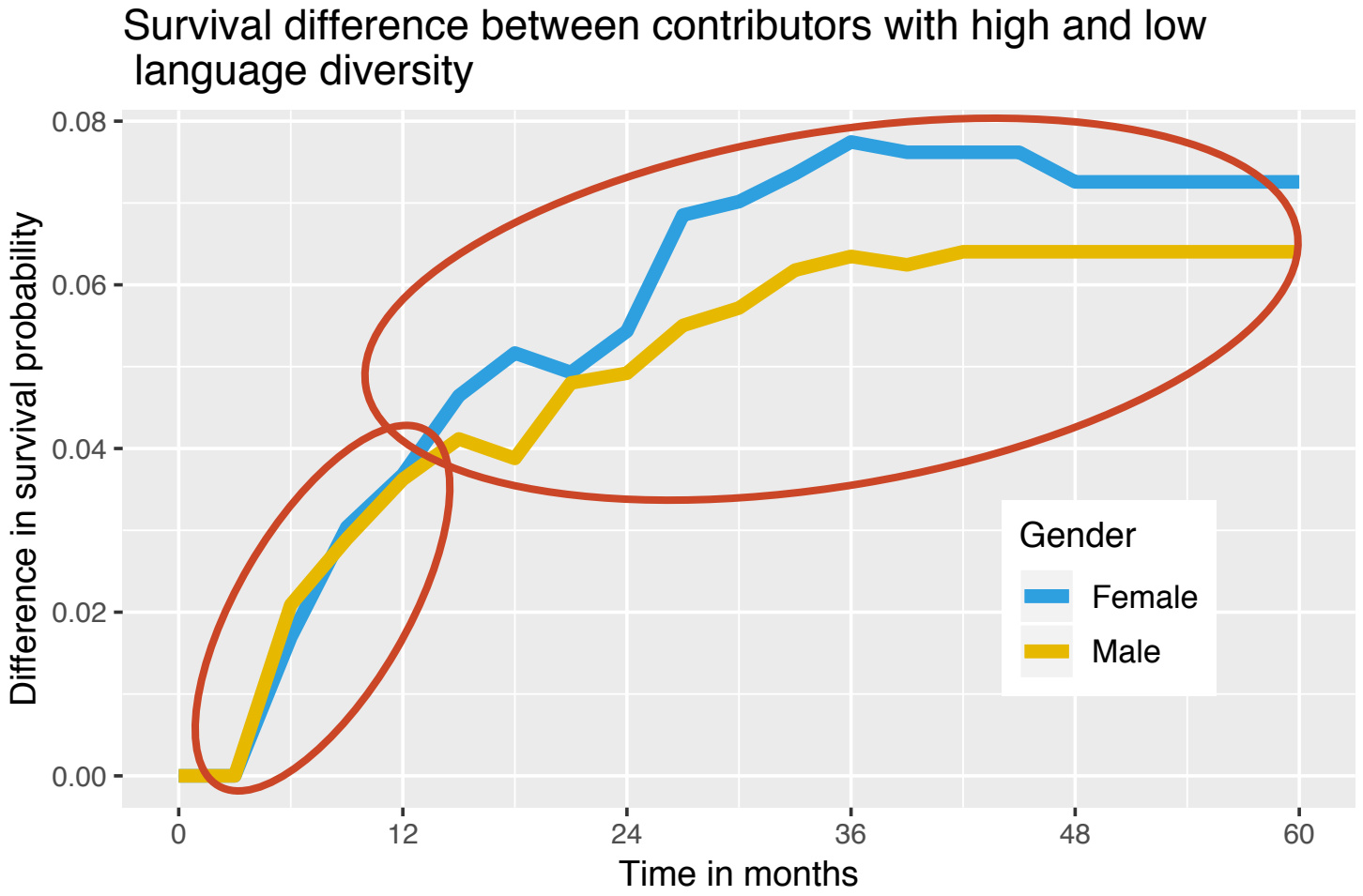
COX regression model

Contributor	Time	Active	Social capital	Control variables
	2008 Jan – Mar	True	Team familiarity Recurring cohesion Language diversity Share of newcomers	Project size Project owner ……
	2008 Jan – Mar	True	Team familiarity Recurring cohesion Language diversity Share of newcomers	Project size Project owner ……
	2009 Apr – Jun	False	Team familiarity Recurring cohesion Language diversity Share of newcomers	Project Size Not project owner ……

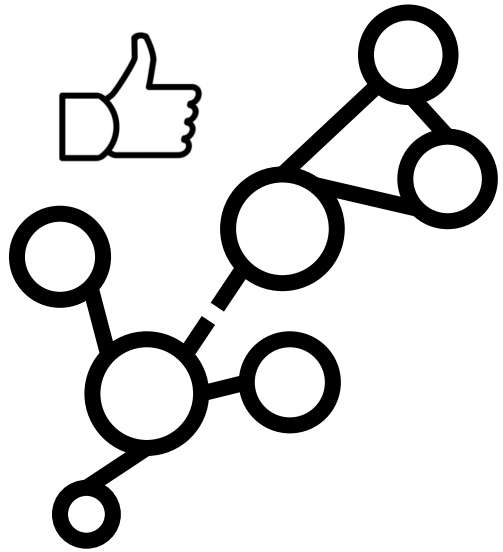
H1: more social capital ~ more prolonged engagement



H2: Language diversity interacts with gender

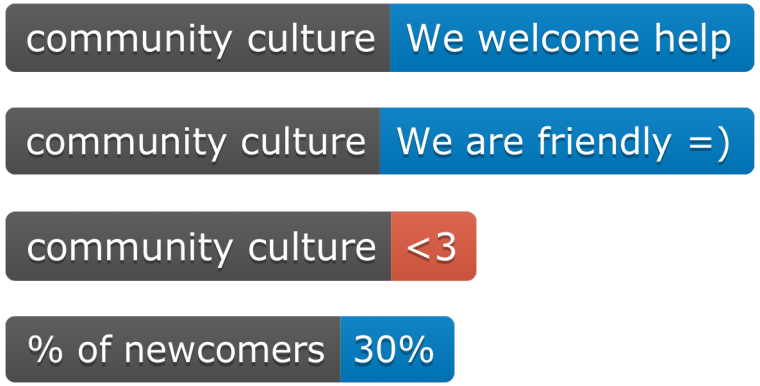


What next?



Recommend projects that can help build social capital

Offer mentorship



Use badges to show a community's culture

Social capital explains prolonged engagement

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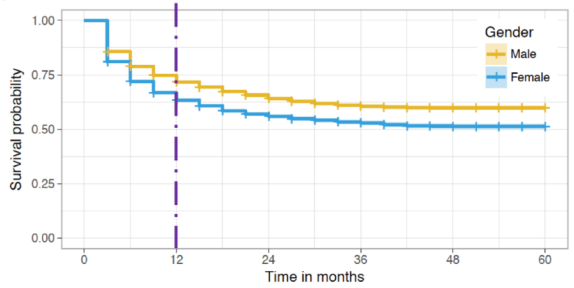

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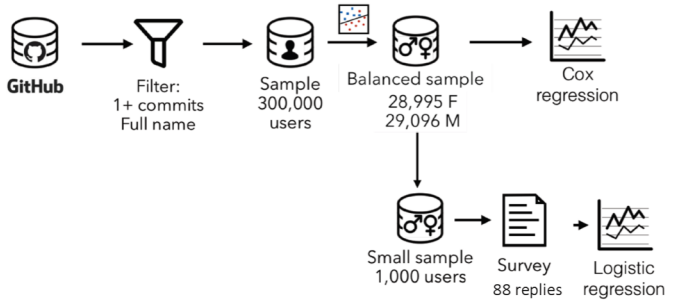
Large-scale mixed-methods study



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Social capital explains sustained participation

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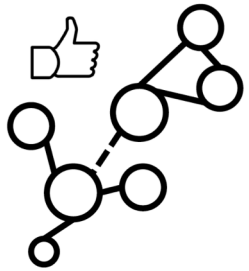
What can we do?



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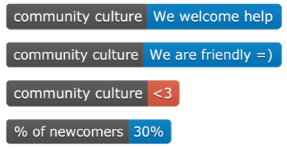

Use badges to show a community's culture

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Code and data:

DOI 10.5281/zenodo.2566684