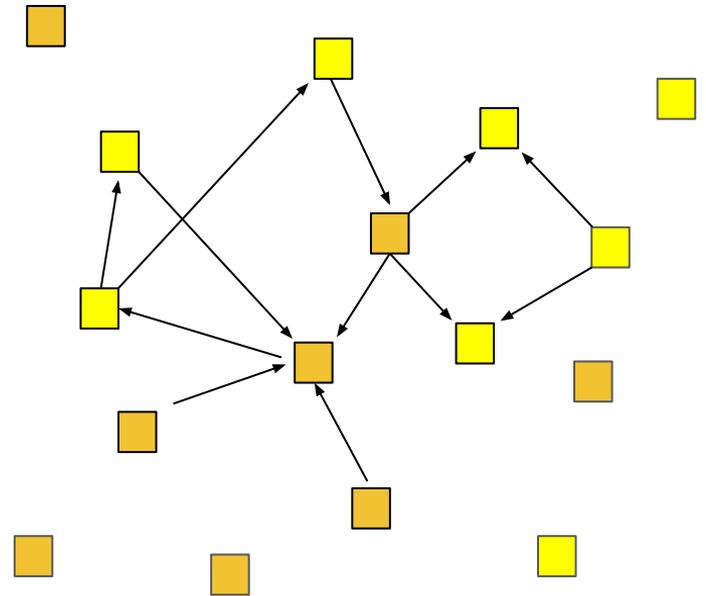
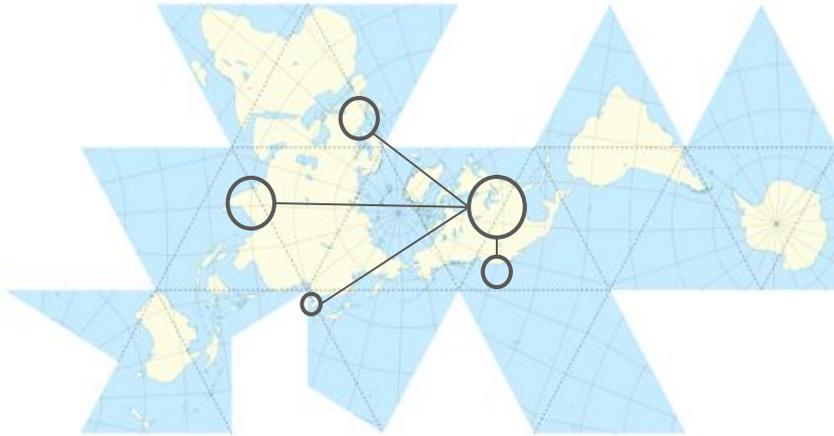


Reconfigure from all over: the case of interdisciplinary open-source communities



Bradly Alicea

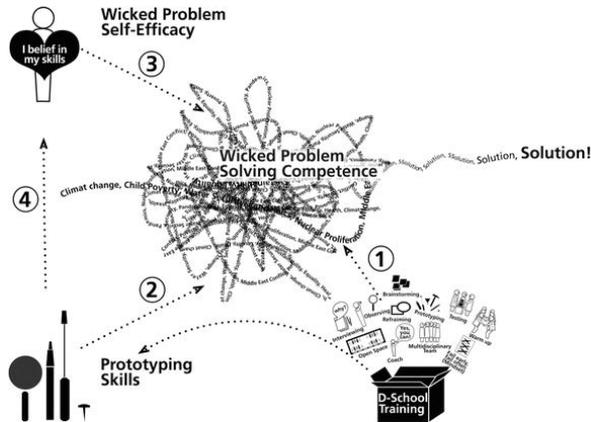


OpenWorm Foundation, Orthogonal Research and
Education Lab, Rokwire Initiative (UIUC)

Spontaneous Interdisciplinarity

How do we bring members of different disciplines together in open source communities to solve common problems?

Wicked Problems



C.P. Snow's "Two Cultures"



Jobst, B. And Meinel, C. (2013). How prototyping helps to solve wicked problems. *Design Thinking Research*, 105-113.

Spontaneous Interdisciplinarity

Research Policy 42 (2013) 1138–1151



The rise and fall of interdisciplinary research: The case of open source innovation

Christina Raasch^{a,b,*}, Viktor Lee^{b,1}, Sebastian Spaeth^c, Cornelius Herstatt^b

^a Technische Universität München, TUM School of Management, Germany

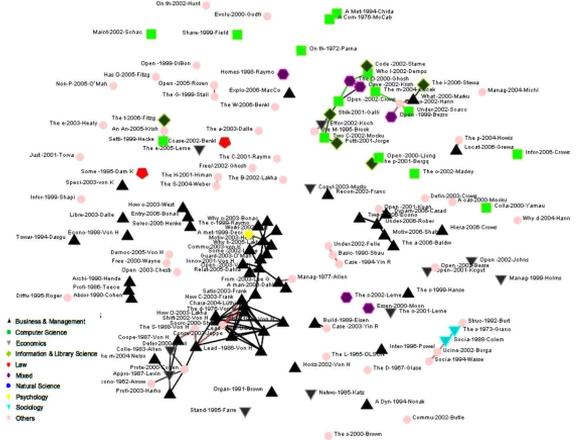
^b Hamburg University of Technology (TUHH), Germany

^c Hamburg University, School of Business, Economics and Social Sciences, Germany

Two trends in open source community innovation:

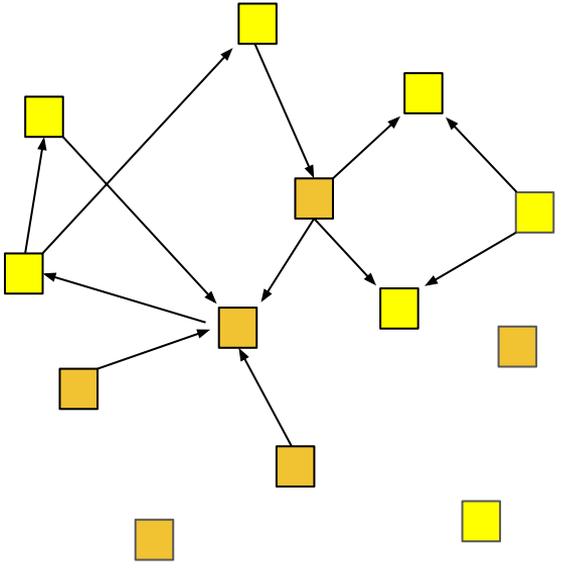
- high-involvement exchange declines quickly, and collaborations tend to decompose into parallel (and disconnected) groups.

The way research problems (and communities) are organized, particularly modularizing research processes, is key to mitigating these trends.

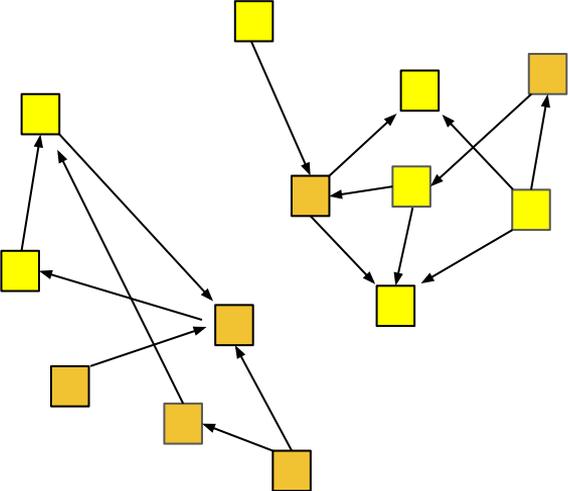


Fragmented co-citation network, Figure 6

Community networks disconnect and reconnect over time. Seasonal and random fluctuations in people onboarding and leaving.



Community networks disconnect and reconnect over time. Seasonal and random fluctuations in people onboarding and leaving.



Community networks tend to be heterogeneous. Whether they also form self-contained cliques is up to the community.

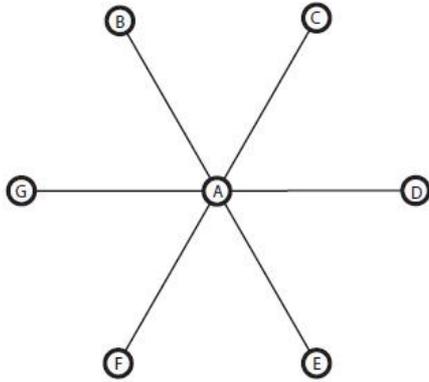
What is the structure of networks for open-source collaboration?

- open-source communities are transient, flexible, and heterarchical.

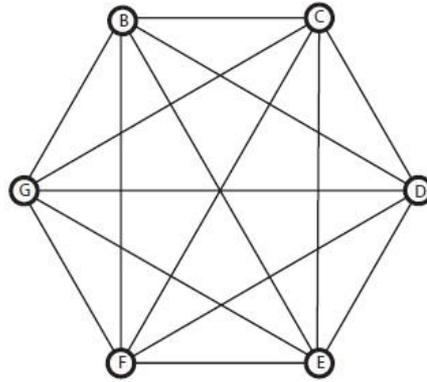
Heterarchy: nodes can be ranked in a number of different ways.

- aside from project leader initiatives, numerous ways to become connected into and gain connectivity in network.
- low barrier to entry in the network means that preferential attachment rule is not generally applicable.
- open-source networks have multiple functions and objectives.

hierarchic "star-shaped" structure

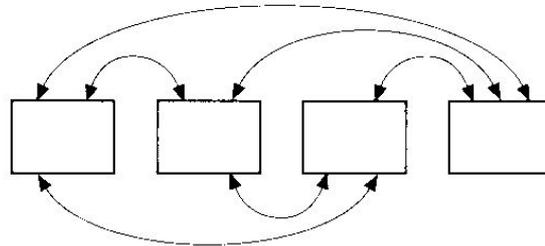


heterarchic "universal" structure

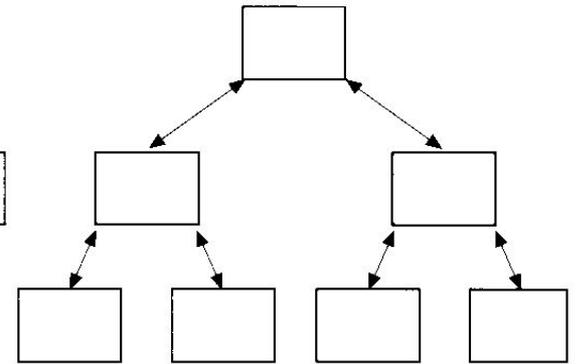


COURTESY: Wikimedia Commons
<https://commons.wikimedia.org/wiki/File:Rb295f1.jpg>

COURTESY: Heterarchical Systems vs
Hierarchical Systems, Humanity +
<https://hplussmagazine.com/2014/03/20/heterarchical-systems-vs-hierarchical-systems/>

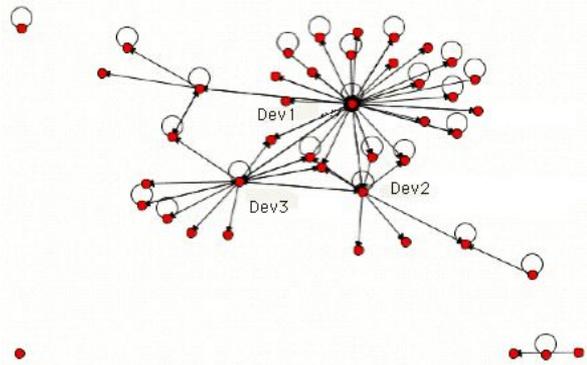


Heterarchy



Hierarchy

How do we redraw network structure over time (based on identity) to find optimal expertise reconfigurations?

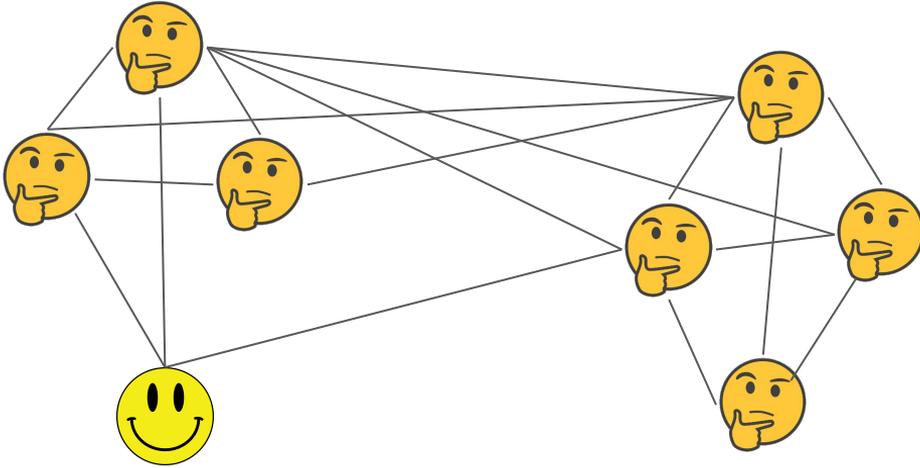


Example of network structure in an open source community.
Map of openrpg bug report interactions.



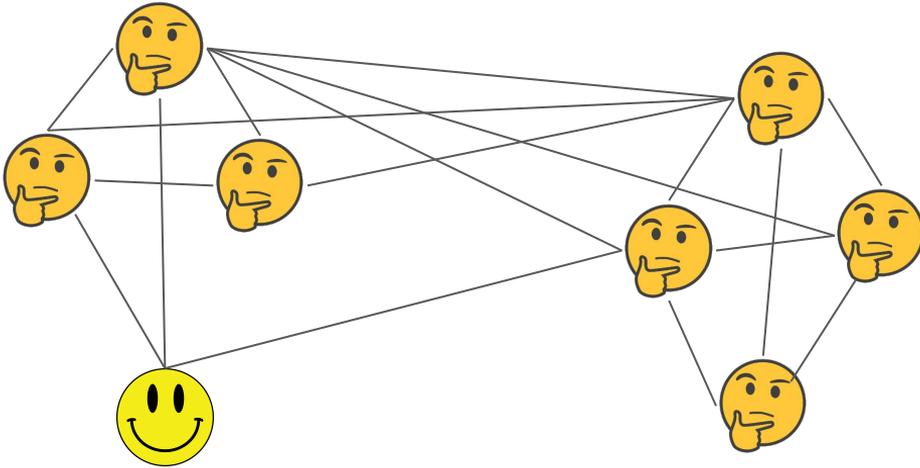
Generic Growing Network.

Selective Disconnection with Intentional Interconnectivity



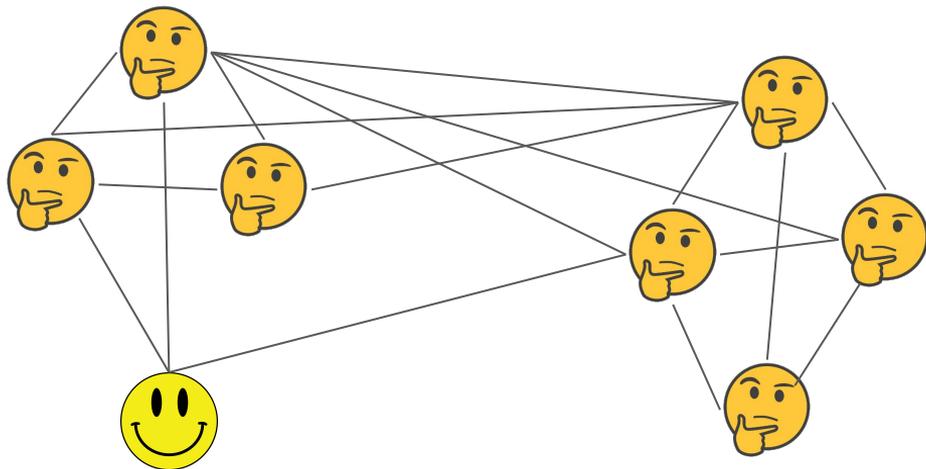
Reconfigurability of Expertise = flexibility in membership between different modules of the network over time.

Selective Disconnection with Intentional Interconnectivity

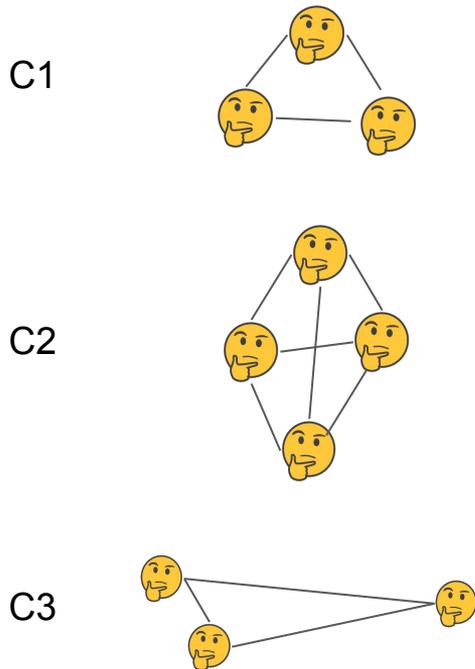


Alternative to Network Statistics: Soft (Fuzzy)
Classification for Clique Membership per
unit time.

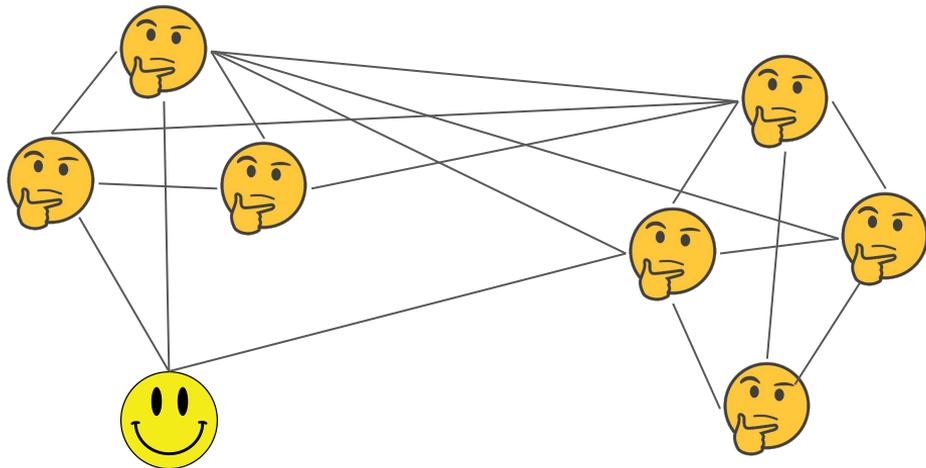
Selective Disconnection with Intentional Interconnectivity



Alternative to Network Statistics: Soft (Fuzzy)
Classification for Clique Membership per
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Selective Disconnection with Intentional Interconnectivity

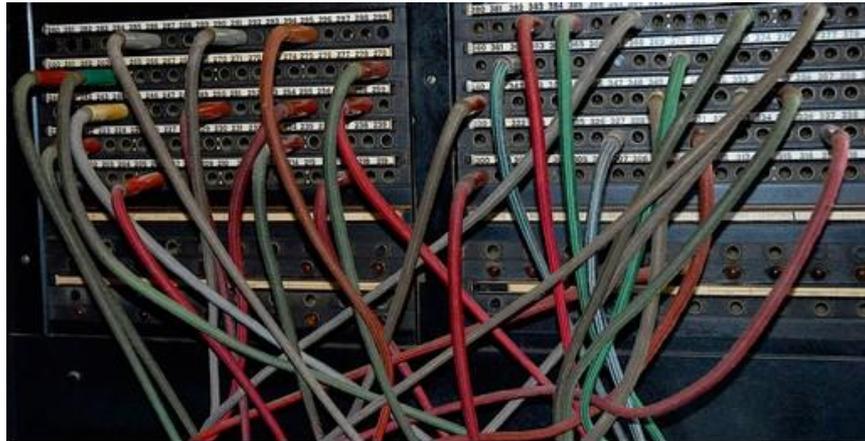


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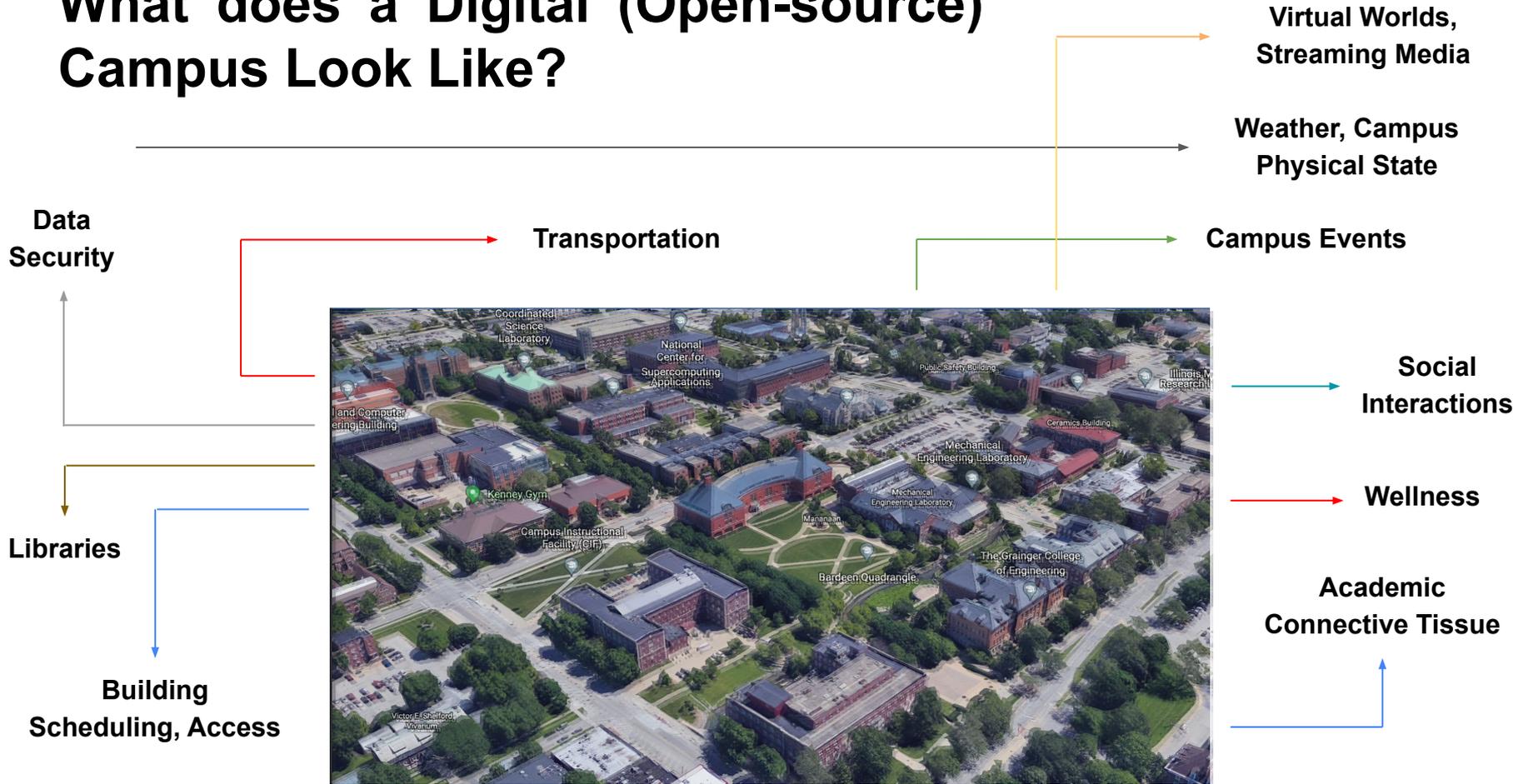
	C1	C2	C3
t₀	0.0	0.25	0.0
t₁	0.66	0.25	0.0
t₂	0.33	0.0	0.33

Reconfigurability of Complex Academic Institutions

How can we leverage community expertise from a wide range of campus units or topical interest areas?

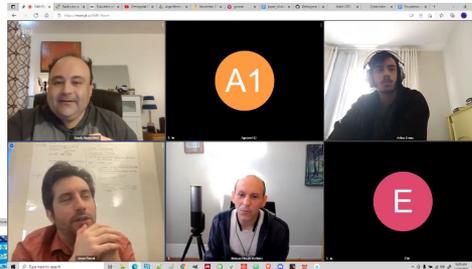
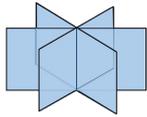


What does a Digital (Open-source) Campus Look Like?

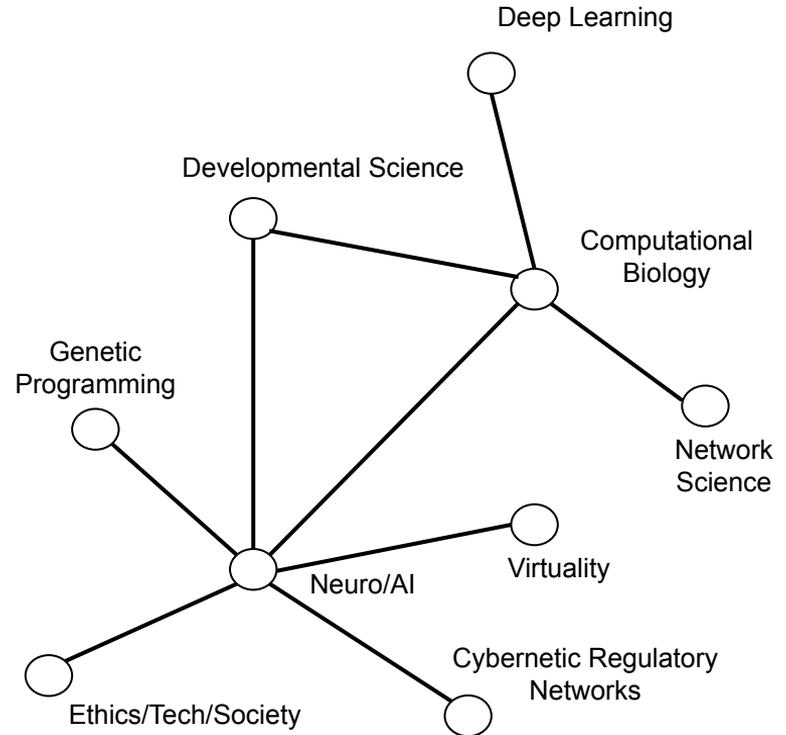


Zooming in on Academic Interests: an Alt-Ac Community Example

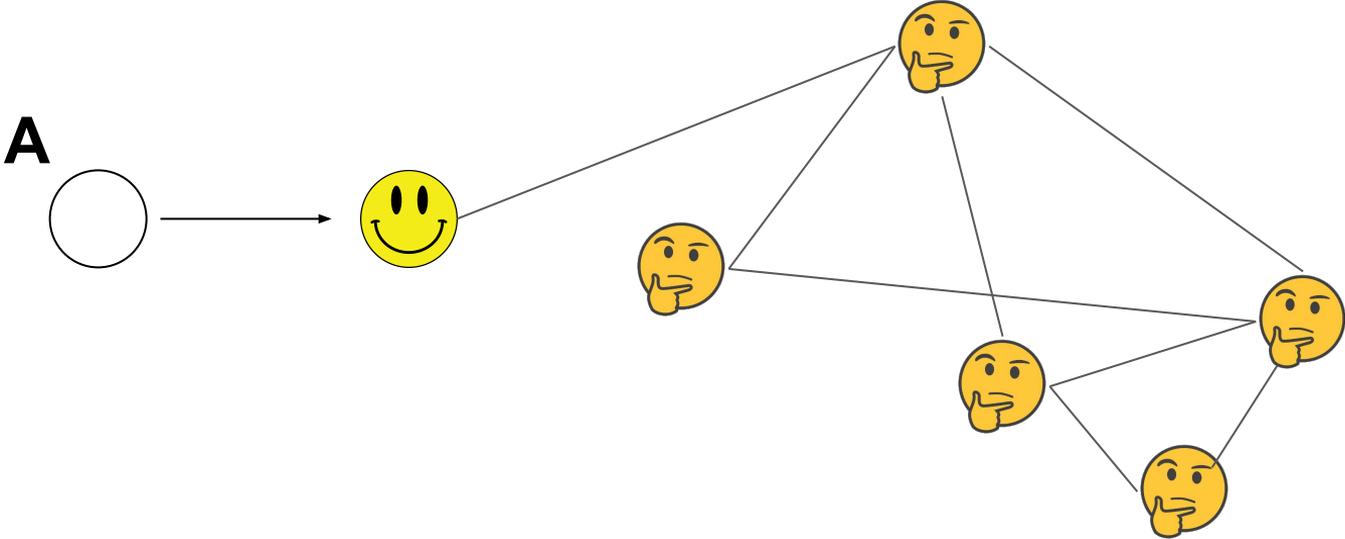
Orthogonal Research and Education Laboratory



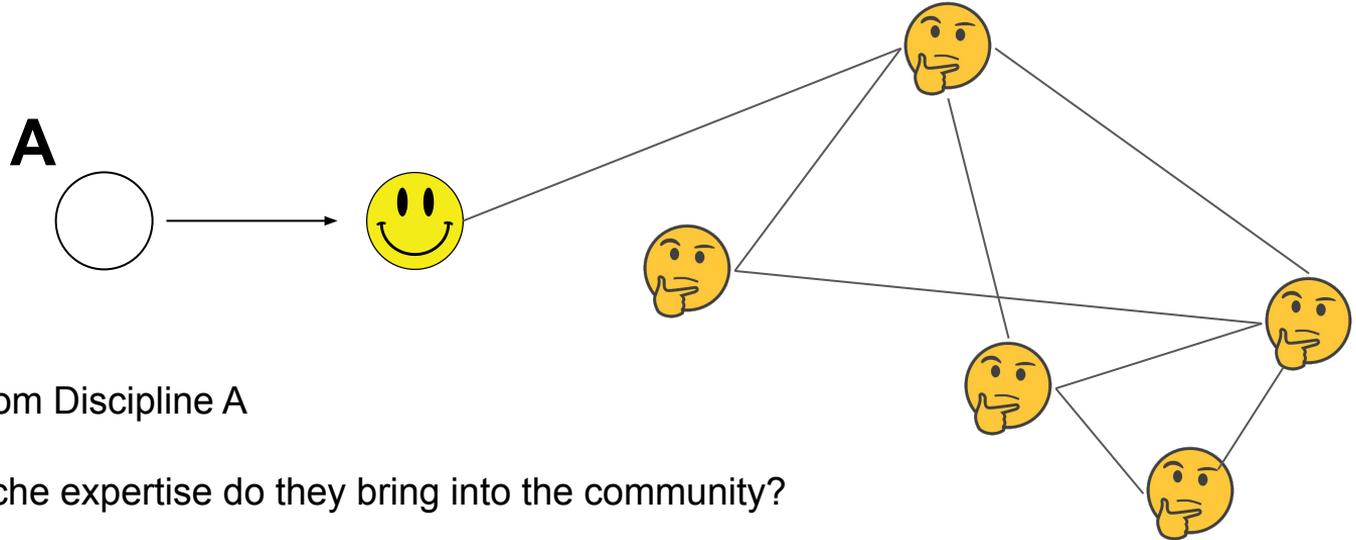
Topical Connectivity



Which contributors and disciplines are your greatest sources of contributor activity?



Which contributors and disciplines are your greatest sources of contributor activity?



Input of contributor from Discipline A

- What kind of niche expertise do they bring into the community?
- do they act as a conduit (bring more contributors from Discipline A)?
- duration of contribution, intensity of contribution: what is the magnitude of their contribution history?

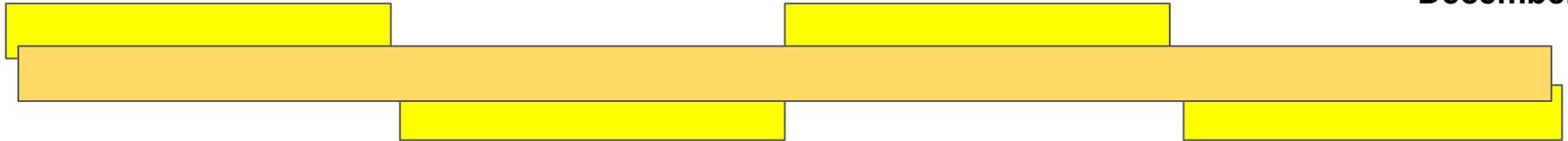
Reconfigurability of Disciplinarity

How can we leverage community expertise for a multi-stage, year-long, community-driven project?

January

July

December

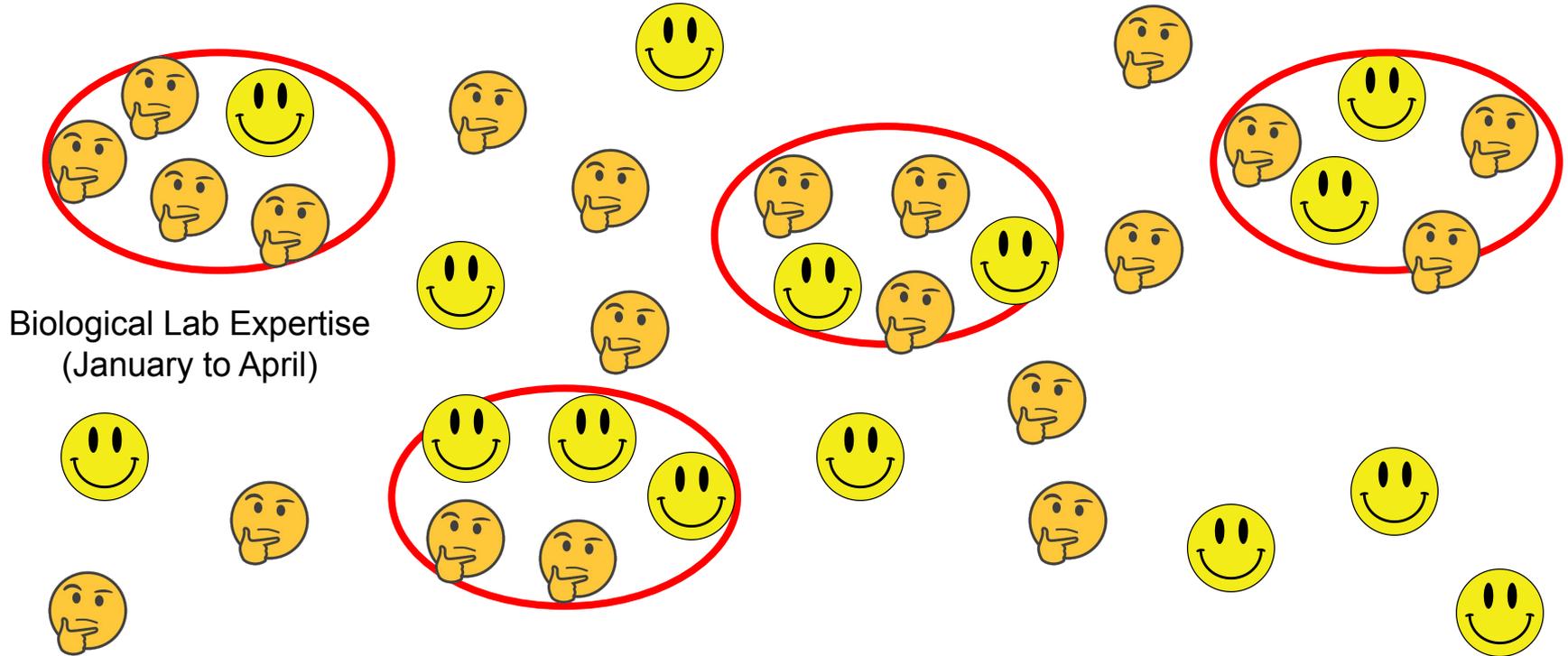


April

September

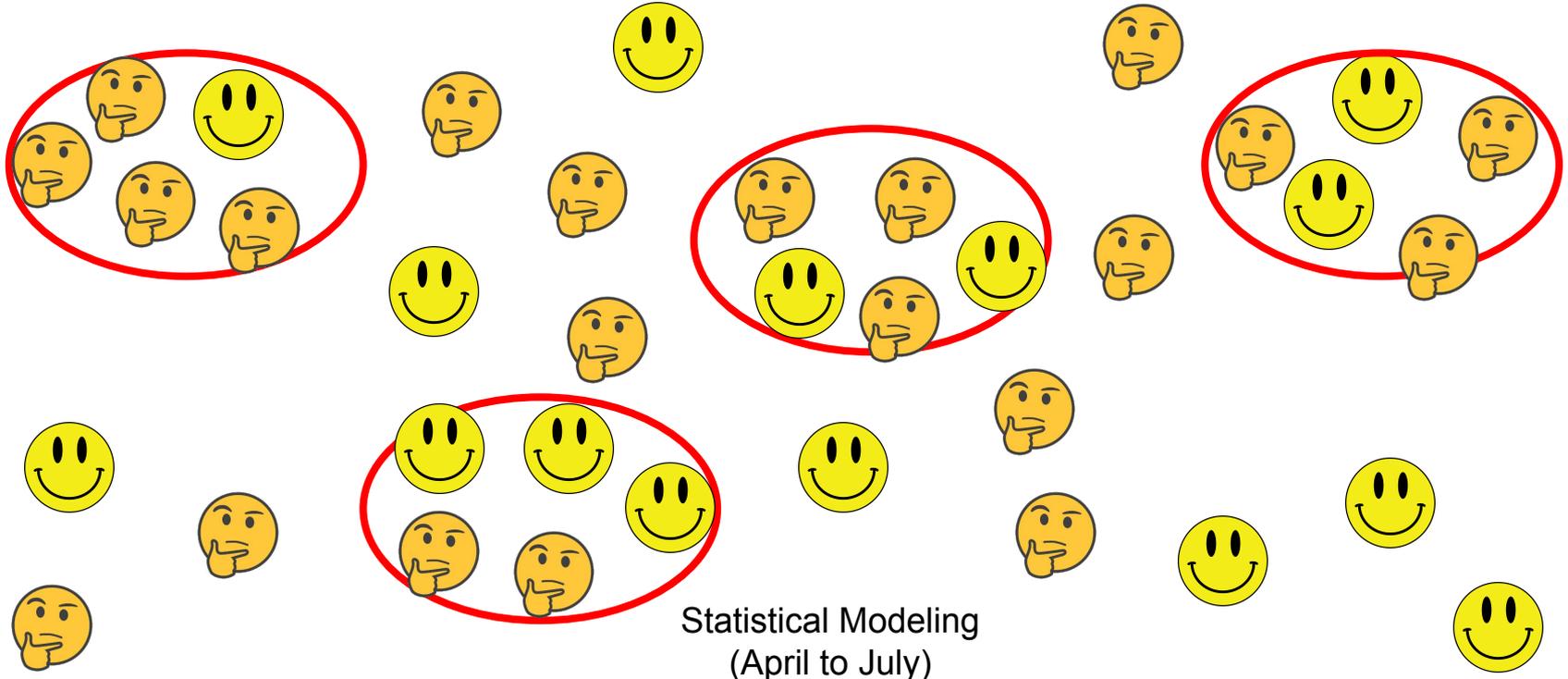
Reconfigurability of Disciplinarity

Optimists and Pessimists



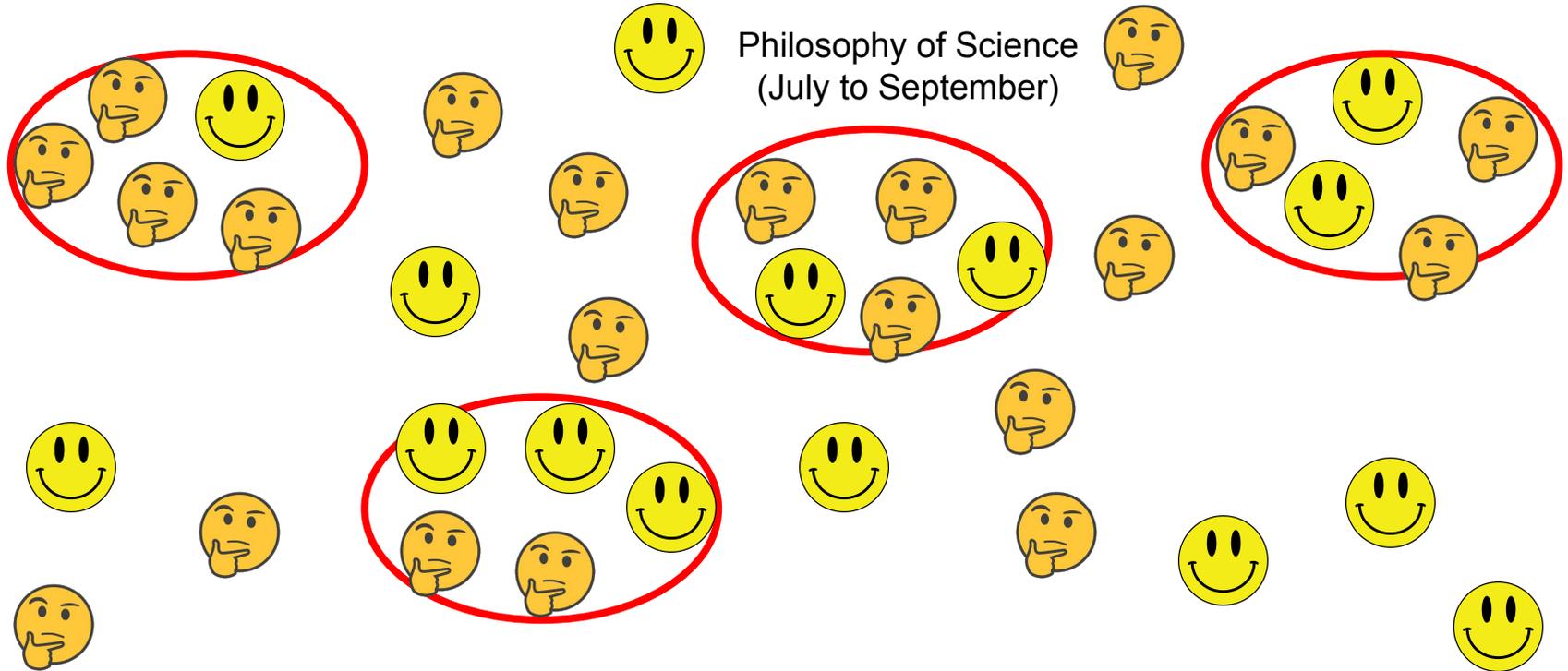
Reconfigurability of Disciplinarity

Optimists and Pessimists



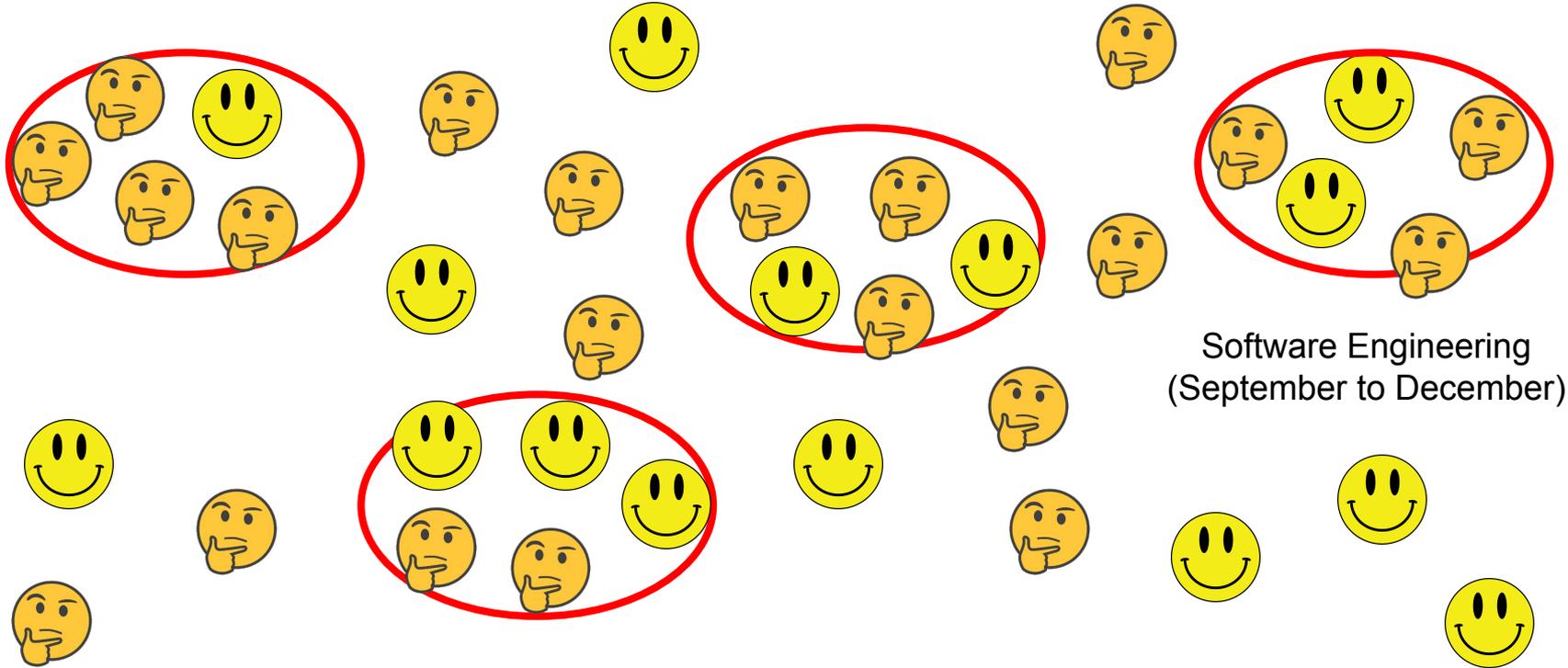
Reconfigurability of Disciplinarity

Optimists and Pessimists



Reconfigurability of Disciplinarity

Optimists and Pessimists



Software Engineering
(September to December)

Thanks for your attention!

Join our communities!

Rokwire Community:

<https://launchpass.com/rokwirecommunity>

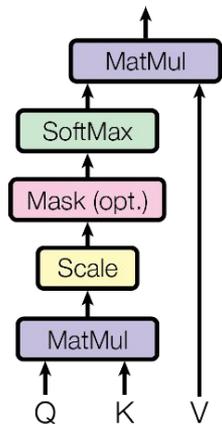
OpenWorm Foundation:

<https://launchpass.com/openworm>

Orthogonal Lab:

<https://launchpass.com/orthogonal-research>

Scaled Dot-Product Attention



Multi-Head Attention

