What are the characteristic community smells influencing the sustainability of open-source repository software communities?

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Agenda

1. Evaluating open-source software
2. Borrowing from software engineering research
3. What are “community smells”?
4. Methodology and research questions
5. Community smells detected with csDetector software
6. How we can mitigate the smells
7. Limitations
8. Conclusion and future research questions
9. Q & A

How to tell if an open-source software project is sustainable?

Open-source software generates lots of trace data

Are there tools that can automate the evaluation of this data to gain insight into project sustainability?

What aspects of the data should we pay attention to?

Current state of open-source software evaluation in libraries

Focus on features only

Misses the point that users should contribute to open-source software projects (reciprocity)

Photo by Shunya Koide on Unsplash

From the software engineering research literature

Evaluate at the project or ecosystem level

- Actors
- Software
- Orchestration (Linåker et al., 2022)

Network modelling

Kaiaulu, CodeFace, CodeFace4Smells

Community health

Nagappan et al., 2008: Importance of community information

Lumbard, Goggins, Germonprez: CHAOSS

Damian A. Tamburri et al.: “community smells”

Photo by Jenna Day on Unsplash

csDetector

GitHub Repository: https://GitHub.com/Nuri22/csDetector

Almarimi, N., Ouni, A., Chouchen, M., & Mkaouer, M. W. (2021). csDetector: An open source tool for community smells detection. In D. Spinellis, G. Gousios, M. Chechik, & M. Di Penta (Eds.), ESEC/FSE 2021: Proceedings of the 29th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering (pp. 1560–1564). ACM. https://doi.org/10.1145/3468264.3473121

Results of analysis (dataset):

Lasou, Pierre; Neugebauer, Tomasz, 2024, "Community smells detection on scholarly communication open source software using csDetector", https://doi.org/10.5683/SP3/34MYPI , Borealis, V1

csDetector

GitHub

GraphQL

ConvoKit

Journal of the American Society for Information Science and Technology

Research Article | Full Access

Sentiment strength detection for the social web

Mike Thelwall, Kevan Buckley, Georgios Paltoglou

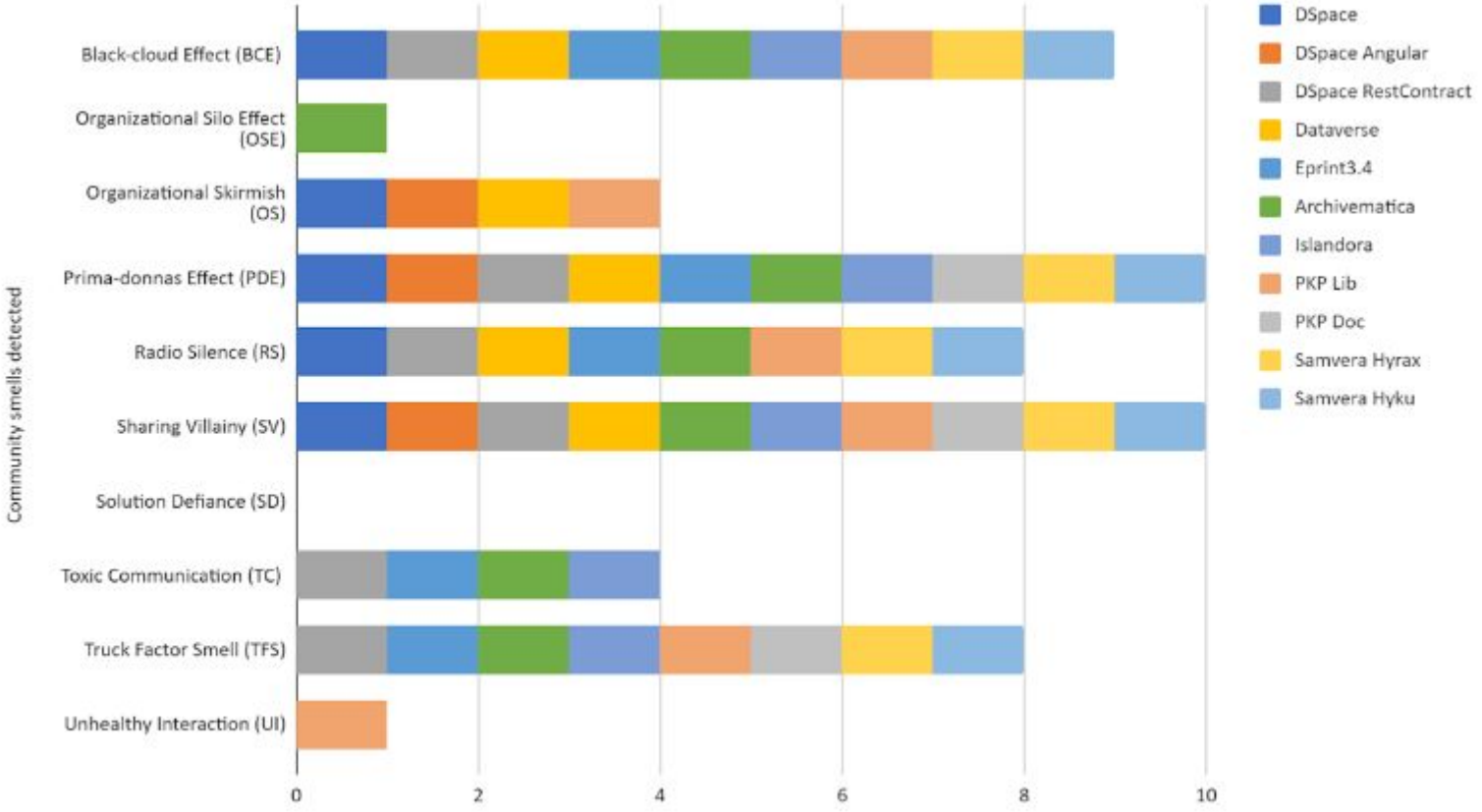
spaCy

```
nlp = spacy.load("en_core_web_sm")
```

Community smells detected with csDetector

1. Organizational Silo Effect
2. Black-cloud Effect
3. Prima-donnas Effect
4. Sharing Villainy
5. Organizational Skirmish
6. Solution Defiance
7. Radio Silence
8. Truck Factor Smell
9. Unhealthy Interaction
10. Toxic Communication

Community smells detected in scholarly communications OS projects



What the community smells mean

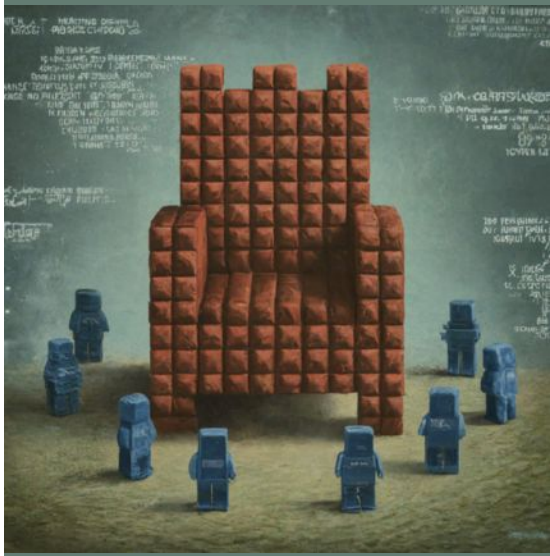
Black-cloud effect

- Black cloud of confusion
- Back-and-forth messages repeated and/or misinterpreted
- Lack of structured communication

What the community smells mean

Prima-donnas effect

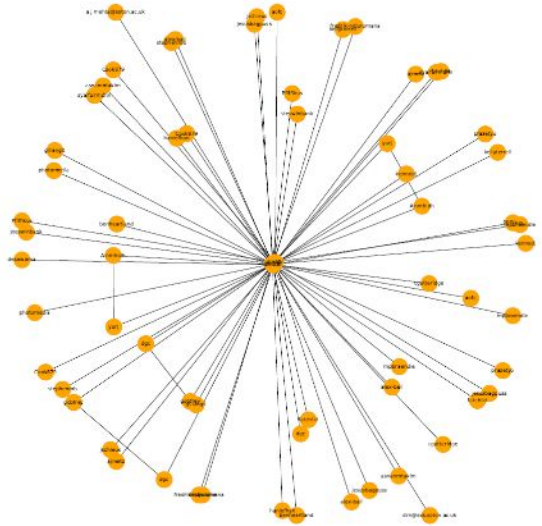
- Proposals from new members not easily accepted
- Small group controls the codebase



What the community smells mean

Truck factor

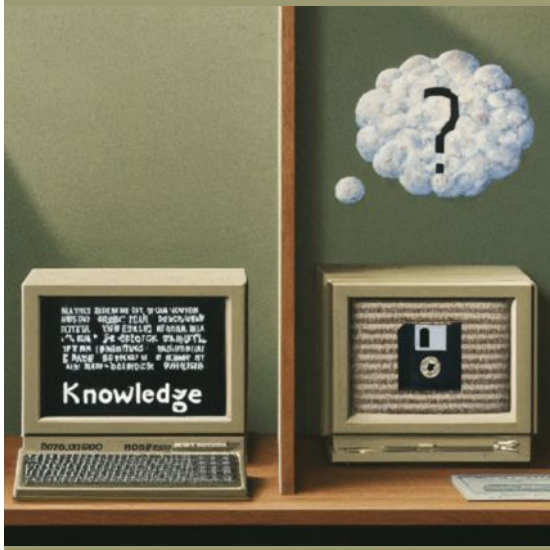
- Knowledge concentrated in too few developers
- Lack of redundancy creates risk



What the community smells mean

Sharing villainy

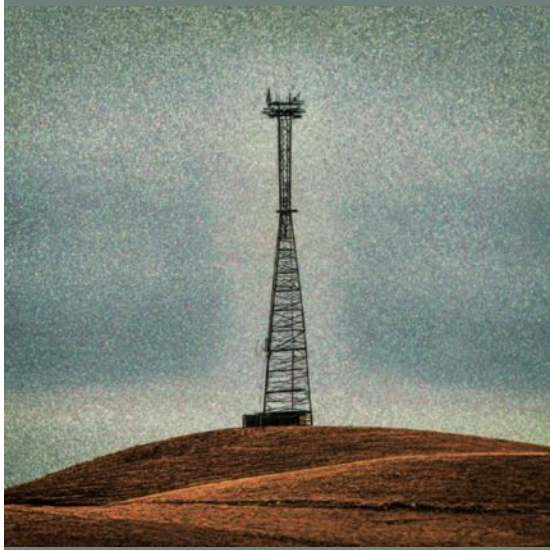
- Perception of knowledge sharing as a waste of time and effort
- Limited engagement resulting in outdated/incorrect information being shared



What the community smells mean

Radio silence

- Issues and decisions take a long time to resolve
- Formal organizational structures and procedures create delays
- Waiting for changes to be certified

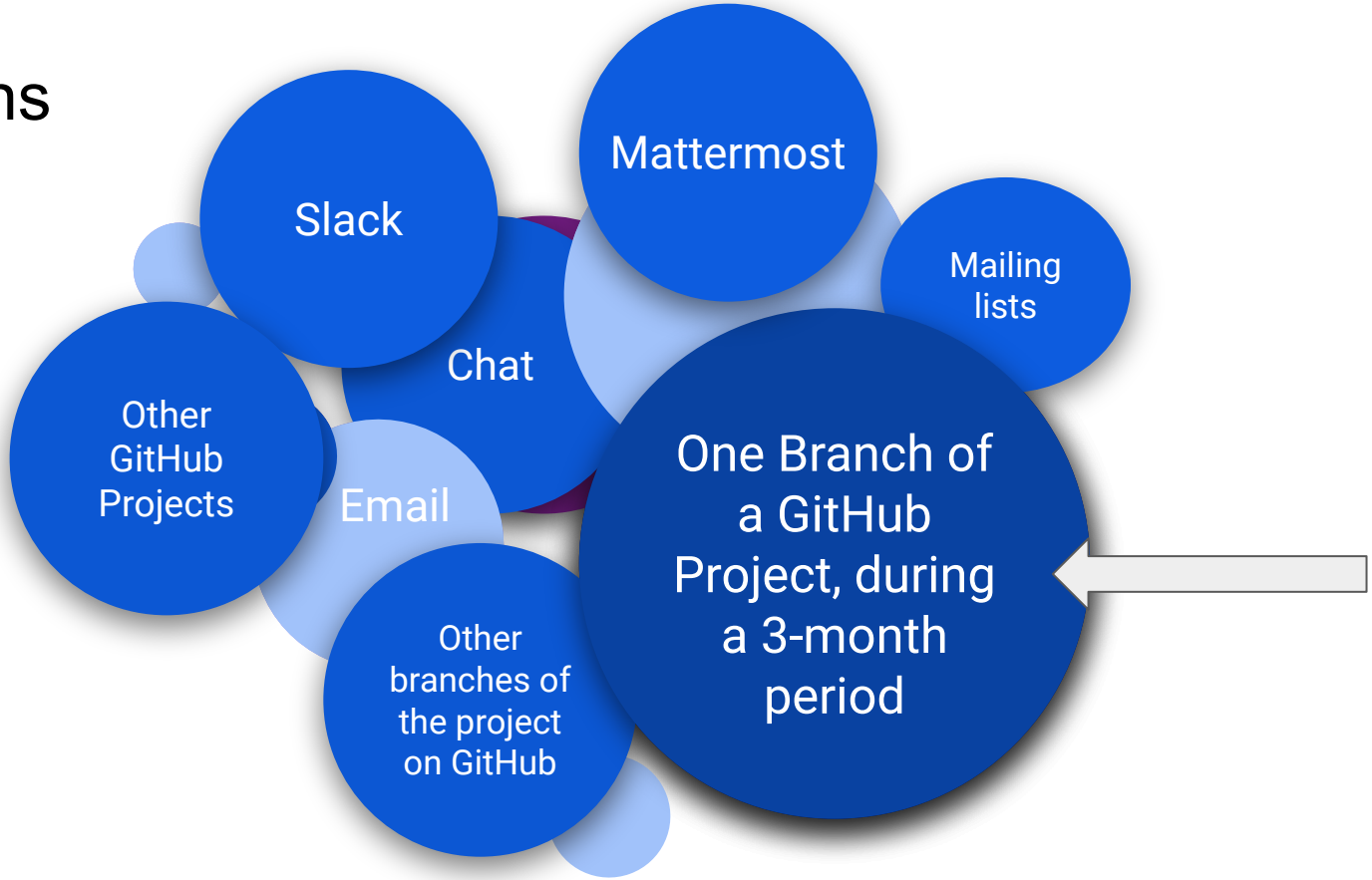


Mitigation strategies summary

- Online learning community, led by dedicated tutoring & coaching (RS)
- Social wikis (SV) (PD)
- Culture conveyors, ambassadors of organizational culture (SV) (PD)
- Face-to-face meetings (SV)
- Contingency planning and mentoring (TF)
- Communication plan revised regularly for structured communication between members (BC)

Photo by Joshua Hibbert on Unsplash

Limitations



Conclusion and future questions

csDetector can be part of an approach to support evidence-based decision making about open-source software