

# Quantifying Open-Source Governance Across 10 Software Ecosystems

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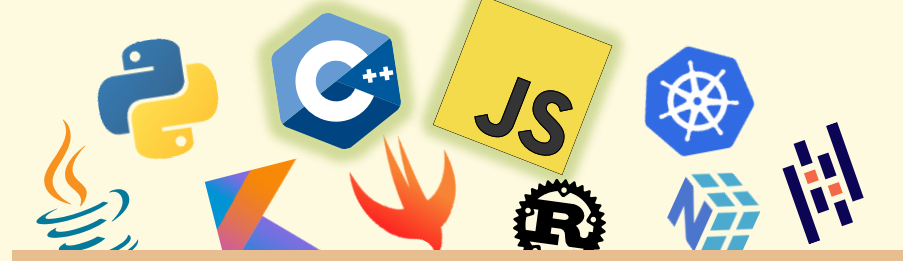
## 1 RQ: Can proposals operationalize open-source governance?

**Status:** Open-source software underpins 90% of commercial software stacks.  
**Problem:** Underlying governance rules remain difficult to evaluate.  
**Background:** Software enhancement proposals record proposed changes to the software.  
**Goal:** Explorative analysis of measuring governance structures in open-source projects through software enhancement proposals.

## 2 5 dimensions of governance

-  **Independence:** Free from company control. HHI of contributor corporate affiliation.
-  **Pluralism:** Protects competing viewpoints. Gini coefficient of proposal authorship.
-  **Representation:** Gives contributors a voice. Gini coefficient of comment distribution.
-  **Decentralized decision-making:** Spreads authority publicly. Betweenness centrality on person network.
-  **Autonomous participation:** Supports newcomers. Fraction newcomer authorship rate.

## 3 Analyzing proposal archives

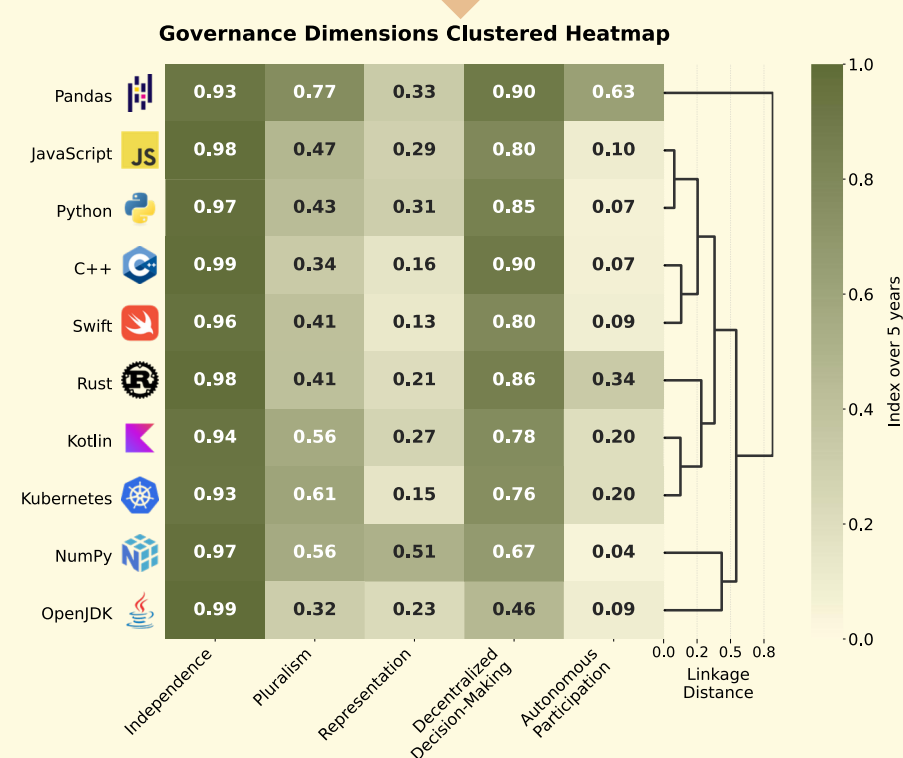


**Scrape the proposal archives**

13,060 proposals

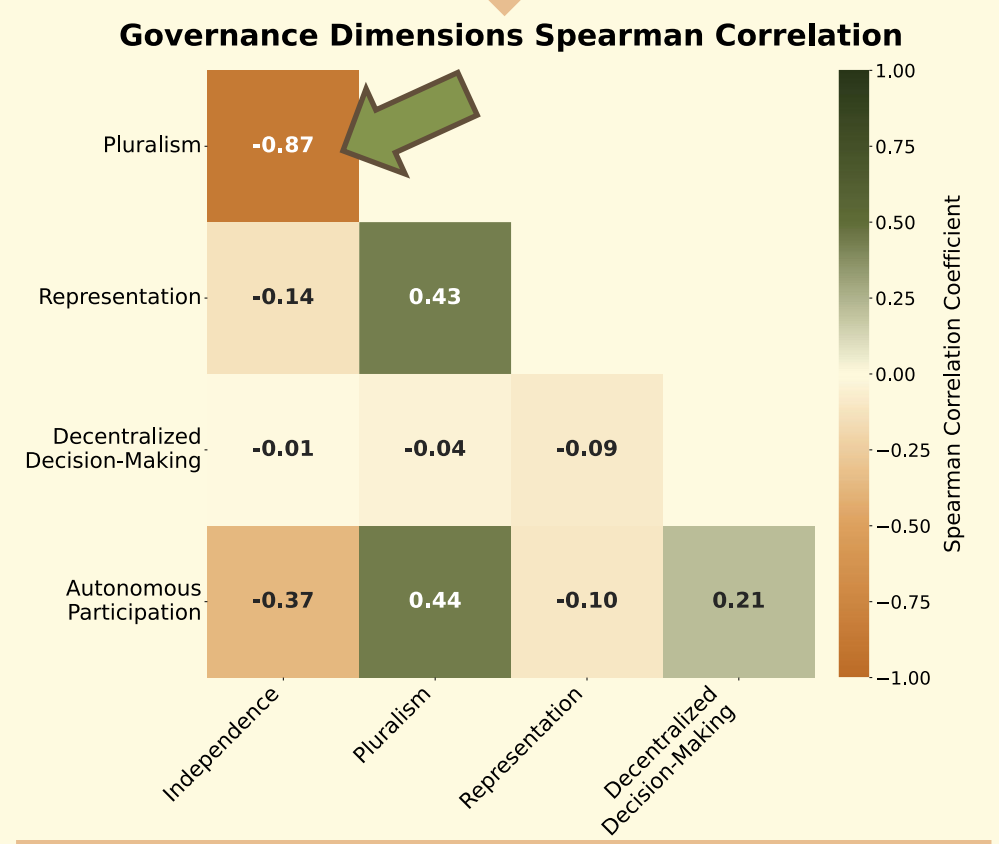
296,194 comments	98,163 authors	18,914 Affiliations
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**Cluster projects with the five dimensions**



- 1) Language committee: Python, JS, C++, Swift
- 2) Infrastructure: Rust, Kubernetes, Kotlin
- 3) Outliers: Pandas, NumPy, OpenJDK

**Compute dimensions discriminant ability**



**Identify patterns**

- | Governance dimensions   | Dimensions correlation   |
|---|--|
| <ul style="list-style-type: none"> <li>• Confidence intervals around <math>\pm 0.05</math>.</li> <li>• Independence is uniformly high.</li> <li>• Participation varies most.</li> </ul> | <ul style="list-style-type: none"> <li>• Wide confidence intervals (<math>\pm 0.6</math>) mean all patterns are exploratory.</li> <li>• Independence and Pluralism trade off (<math>\rho = -0.87</math>).</li> </ul> |

## 4 Discussion

**RQ answer:** The governance dimensions:

- Are computable.
- Do not collapse into a single index confirming they measure different things.
- Show distinct project groups.

**Explanations for the project groups**

1. Cost of changing language syntax.
2. Modular engineering.
3. Each their own unique aspect.

**Consistent with previous work**

- Different project stats = different project values
- Outliers can also be found in previous literature.

## 5 Conclusion

SEPs do not capture all governance, but they do provide an auditable and scalable way to compare governance across ecosystems.

Future work could apply this method to other projects & extend it with additional data.