Invisible Labor in Open Source Software Ecosystems

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Introduction

Open source software involves more than just contributing code.

There are many tasks, from community management to security that are essential to open source.

Acknowledging this, open source should be considered more than a "project", but an "ecosystem".

Shifting our focus from projects to ecosystems is important because it reifies a long-held understanding in Computer-Supported Cooperative Work (CSCW): much of the labor performed in support of software development is undocumented, unattributed to individuals, and “practically invisible” to outsiders and newcomers.

Scope

Our paper sought to answer two questions:

- **RQ1**: How common is invisible labor in OSS ecosystems?
- **RQ2**: What factors affect how labor invisibly occurs in OSS ecosystems?

We undertook a series of workshops and interviews, culminating in a survey instrument that supported both qualitative and quantitative analysis.

Discussion

Our thematic analysis identifies a theme of attributing at ***cross-purposes*** — pursuing diverse motivations through conflicting attribution practices with limited resources — and its influence on the pervasiveness of invisible labor.

The most comprehensive review of OSS motivations to date by von Krogh & colleagues sifts OSS motivations into **extrinsic**, **intrinsic**, and **internalized extrinsic** drivers of participation.

While not mutually exclusive, individuals’ actions in pursuit of these motivations were often at cross-purposes with one another.

This tension was particularly evident between three distinct forms of attribution that participants spoke of: **expressive** attribution, **instrumental** attribution, and **non-attribution**.

Participants expressed frustration at not receiving attribution in the way they wanted:

- Those seeking the genuine thanks of expressive attribution disliked the automated systems of instrumental attribution.
- Those interested in instrumental attribution worried about how non-attribution hid work.
- For expressive attribution, they disliked the inconsistency, favoritism, and labor intensiveness.
- Advocates of non-attribution expressed frustration with any attention to attribution.

The abundance of studies that struggle with open source labor and its invisibility, paired with our work, reminds us of a pragmatic consideration: that we cannot measure all of labor, certainly not to the desired level of quality.

Reducing invisibility requires greater compensation.

While not all work should be fully visible, we join the feminist position that **workers should receive appropriate compensation for their work**.

Finding: Half of OSS May Not Receive Attribution

The data suggest that participants receive credit inconsistently for the work they do (Fig. 3a-b). However, they still feel moderately satisfied, regardless of how much credit they receive (Fig. 3c-d).

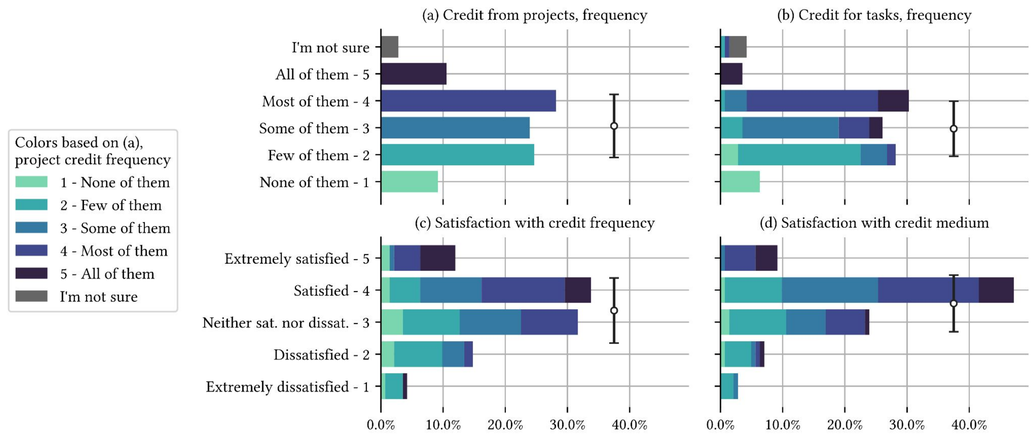

Fig. 3. Distributions of responses to questions about how often people receive credit (a) from specific projects and (b) for specific tasks; and distributions for how satisfied individuals are with (c) how often they receive credit and (d) the mediums through which they receive credit. Dots and error bars represent mean values with one standard deviation on the linearized scales.

Finding: Visibility Anchoring May Shift Beliefs

Asking participants about highly visible work (seen by ≥ 2 people) first in our series of questions increased participant frequency perceptions of partially visible work (seen by 1 other person) and decreased frequency perceptions of low visibility work (seen by nobody else) compared to those whom we asked about low visibility first.

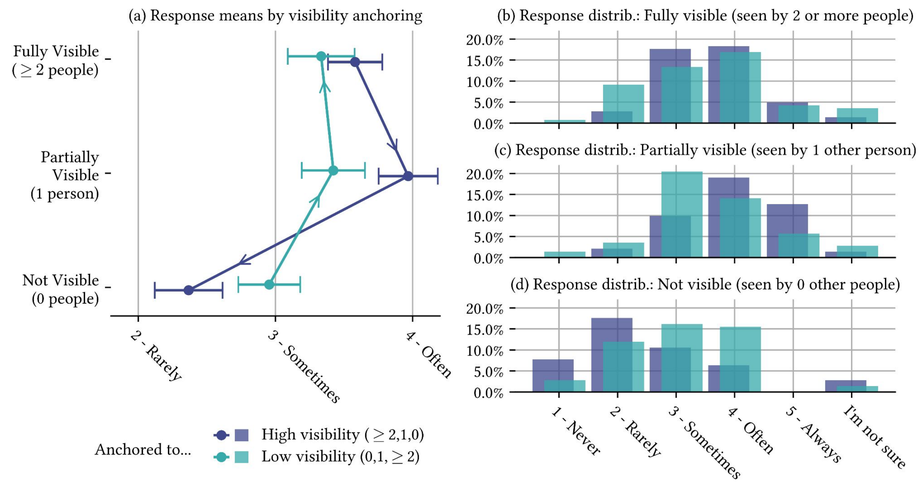

Fig. 4. Responses to “How often did {2 or more people, 1 other person, nobody else} know that you performed those tasks?” as described by response (a) means and (b-d) distributions. Participants who saw the questions in ascending order (0,1,≥ 2) tended to report that their work is more likely to be invisible (seen by nobody else) and less likely to be partially invisible (seen by 1 other person) than those who saw questions in the descending order (≥ 2,1,0).

Conclusion

Much of the work that happens in OSS ecosystems is not visible, not compensated, or both.

We found that approximately half of open source labour does not receive credit, and conflicting motivations amidst attribution practices may be partially responsible.

We demonstrated that anchoring labour to the concept of visibility may lead participants to overestimate the visibility of their work, and decrease its importance to them.

Designing attribution and compensation systems may help open source ecosystems better satisfy the varied motivations of their participants.

You can download a digital version of this paper, and read more about our work, by scanning the QR code, or going to:

whodoesthe.dev/about

About this Project

The Open Source Complex Ecosystems and Networks (**OCEAN**) Project stems from an unrestricted gift from the **Google Open Source Programs Office** to the **Vermont Complex Systems Center**. Our research partners used this gift to build a community-oriented body of research focused on understanding how open source platforms are used and what makes technology-rich environments thrive.

OCEAN's goal is to understand the health of the open source communities.

References

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