Inner Source Definition, Benefits, and Challenges

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Abstract: Inner source (IS) is the use of open source software development practices within an organization. The organization still develops proprietary software but internally opens up its development. The research area lacks a systematic assessment of known research work: No model exists that defines IS thoroughly. Various case studies provide insights into IS programs in a specific context but only few publications apply a broader perspective. To resolve this, we performed an extensive literature survey and analyzed 43 IS related publications. Using qualitative data analysis methods, we developed a model of elements that constitute IS. We present a classification framework for IS and apply it to lay out a map of known IS endeavors. Further, we present qualitative models summarizing the benefits and challenges of IS. This article is an extended abstract of [CR17].

Keywords: inner source; taxonomy; open collaboration; internal open source; software development methods; software engineering; software development efficiency; software development productivity

1 Contributions and Approach

The article presents an extensive literature survey. In detail, its contributions are:

- A theoretical model of elements that constitute inner source (IS).
- A classification framework for IS programs and projects.
- Qualitative models summarizing reported IS benefits and adoption challenges.

We followed a two phase research approach:

First, in the selection phase, we identified relevant IS literature using selected online databases. We searched with variety of phrases (including inner source, internal open source, ...) and read abstracts or full publications to decide on inclusion. This resulted in 43 publications.

Second, in the analysis phase, we analyzed and systematically arranged the literature. Using the inductive theory generation method [Th06], we identified key elements constituting IS as well as benefits and challenges of IS adoption.

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During analysis, we found contradicting elements of IS. For example, one organization internally opened all their source code, while another selected specific components. We used such contradicting observations and preexisting IS classifications to develop a classification framework of IS.

2 Results

Theoretical Model of IS Elements We found four key elements that constitute IS. An *(1) open environment* is created by opening up development artifacts, inviting external contributors, and establishing open communication. *(2) Shared cultural values* are internalized by individuals within the organization. Empowered by the open environment and shared cultural values, *(3) communities around software* form. *(4) Inner source development practices* are exercised by a project-specific or program-wide community.

Classification Framework for IS We found that IS programs differ on at least three dimensions; IS projects on at least two dimensions. For each of these dimensions, our framework lays out the classes we observed in literature. Figure 1 gives an overview of the framework.

Fig. 1: Classification framework for IS

Dimensions of IS **Programs**			Dimensions of IS **Projects**	
Prevalence	Degree of Self-Organization	Internal Economics	Governance	Objective
Universal	Free Task Choice & Free Component Choice	Local-Library	Single Organizational Unit	Exploration-Oriented
Selective	Assigned Tasks & Free Component Choice	Private-Market	Multiple Organizational Units	Utility-Oriented
Project-Specific	Assigned Tasks & Assigned Components		All Organizational Units	Service-Oriented

Benefits and Challenges Literature reported seven benefits of IS adoption (including increased development efficiency, higher code quality, and quicker development cycles). However, the large majority of surveyed literature neither validated the observed IS benefits nor discussed their generalizability. Literature reported eight challenges of IS adoption (including resistance from employees and diversity of the involved organizational units).

References

[CR17] Capraro, Maximilian; Riehle, Dirk: Inner source definition, benefits, and challenges. ACM Computing Surveys (CSUR), 49(4):67, 2017.

[Th06] Thomas, David R: A general inductive approach for analyzing qualitative evaluation data. American journal of Evaluation, 27(2):237–246, June 2006.