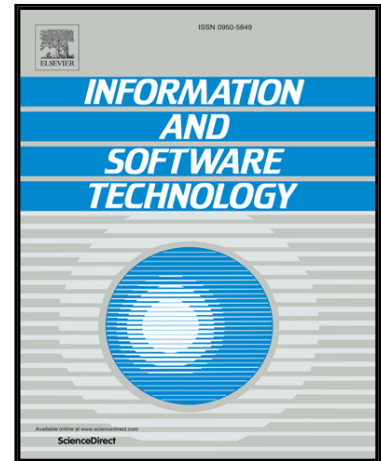


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# A Theory of Openness for Software Engineering Tools in Software Organizations

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## Abstract

**Context.** The increased use of Open Source Software (OSS) affects how software-intensive product development organizations (SIPDO) innovate and compete, moving them towards Open Innovation (OI). Specifically, software engineering tools have the potential for OI, but require better understanding regarding what to develop internally and what to acquire from outside the organization, and how to cooperate with potential competitors.

**Aim.** This paper aims at synthesizing a theory of openness for software engineering tools in SIPDOs, that can be utilized by managers in defining more efficient strategies towards OSS communities.

**Method.** We synthesize empirical evidence from a systematic mapping study, a case study, and a survey, using a narrative method. The synthesis method entails four steps: (1) Developing a preliminary synthesis, (2) Exploring the relationship between studies, (3) Assessing the validity of the synthesis, and (4) Theory formation.

**Result.** We present a theory of openness for OSS tools in software engineering in relation to four constructs: (1) Strategy, (2) Triggers, (3) Outcomes, and (4) Level of openness.

**Conclusion.** The theory reasons that openness provides opportunities to reduce the development cost and development time. Furthermore, OI positively impacts on the process and product innovation, but it requires investment by organizations in OSS communities. By betting on openness,

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