How Is Value Created Within An Inner Source Environment?

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Abstract
Awareness and indeed adoption of open source practices inside corporate entities, something termed Inner Source, has become quite popular in recent years. However, the majority of research efforts focus on industry-driven Inner Source adoption with little or no conceptual accounts of how value is created and sustained within Inner Source environments. This research-in-progress explains how an Inner Source Capability Maturity Model (IS-CMM) can offer a structure to guide Inner Source strategies and sustaining value co-creation.

Author Keywords
Open Source Software; Inner Source; Strategy; Value Creation; Capability Maturity Model.

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Systems and Software; Software Management; Software process models; Systems and Software.

Introduction
Within the software sector, organizations strive to adopt continuous process improvement approaches to manage software practices and adapt to change. This also presents significant challenges in terms of control and mitigating risks associated with projects. Thus, organizations are becoming more 'open' in term of software development, which has led to the adoption of Inner Source. However, we need mechanisms to support and guide Inner Source strategies to generate value as the practice matures. Delivering value consistently and predictably is an essential, but often elusive, business goal. This research sets out to examine how Inner Source strategies can be supported in terms of establishing specific metrics, value and governance of practices. Addressing this gap has considerable implications for practitioners who are motivating the need to adopt Inner Source practices or who are seeking approaches to justify its adoption within organizations.

Theoretical Background
Open Source Software (OSS) may be described as original source code that is made freely available, redistributed and modified. Thus, organizations

increasingly adopt OSS development practices to support their internal software development processes, nowadays often referred to as Inner Source. Inner Source development methods must be tailored within the confines of a specific organizational context. Much of the Inner Source definitions share Dinkelacker et al. [1] description, i.e.:

- Inner Source leverages practices from open source development.
- "Open" to all developers behind the firewall to bring the benefits of OSS development.
- Smaller community of developers (within an organization) participate in Inner Source projects.

However, Inner Source is not a defined methodology per se, but rather, "a philosophy, using those practices from open source communities that can greatly add value to an organization's development approach" [2]. Yet, research indicates that Inner Source can enjoy improved engineering and management practices to enable different units to improve their performance, achieve better results and gain higher levels of team performance. This calls for more scientific approaches towards the study, design, and implementation of Inner Source strategies. Achieving such benefits also presents challenges for traditional software practices. Indeed, evolving a process without truly understanding how practice is impacted upon can lead to issues and ultimately fail to support organizations in continuously improving software practices. One can begin to uncover the dynamics and value co-creation of Inner Source and can begin to provide impetus and direction for Inner Source strategies. Value co-creation is considered a management strategy whereby two or more parties (e.g. organizations, departments, or colleagues) collaborate to share specific capabilities in order to jointly produce a mutually valued outcome. Within an Inner Source context, it provides organizations with new configurations of existing work systems.

Key Challenges for Inner Source

While much of the emerging literature has focused on how Inner Source development enables organizations to improve software development efficiency through a shared set of assets [3], it remains unclear as to how organizations assess or measure such improvements. Perhaps, this presents one of the key barriers in promoting the uptake of Inner Source practices across industry. Furthermore, organizations face a challenge to successfully transition to a new software development practice or philosophy and changing team dynamics without a clear road map on how they can successfully manage such change to enjoy the reported benefits of Inner Source [4]. For example, at a wider perspective, Wesselius [3] suggests "much has been written on OSS development, but there is little literature on applying OSS principles inside a company. Can companies do it successfully? And, more specifically, how can they turn systems groups (software consumers) into suppliers on the internal software market?"(p. 60). We therefore need to examine how value is created and captured within an Inner Source environment and develop models to better guide organizations in assessing the value in its adoption [5]. In a recent extensive study, Capraro and Riehle [5] identify the need to evaluate Inner Source benefits. They caution that the validity and generalizability of Inner Source benefits is unclear and call for research in this area.

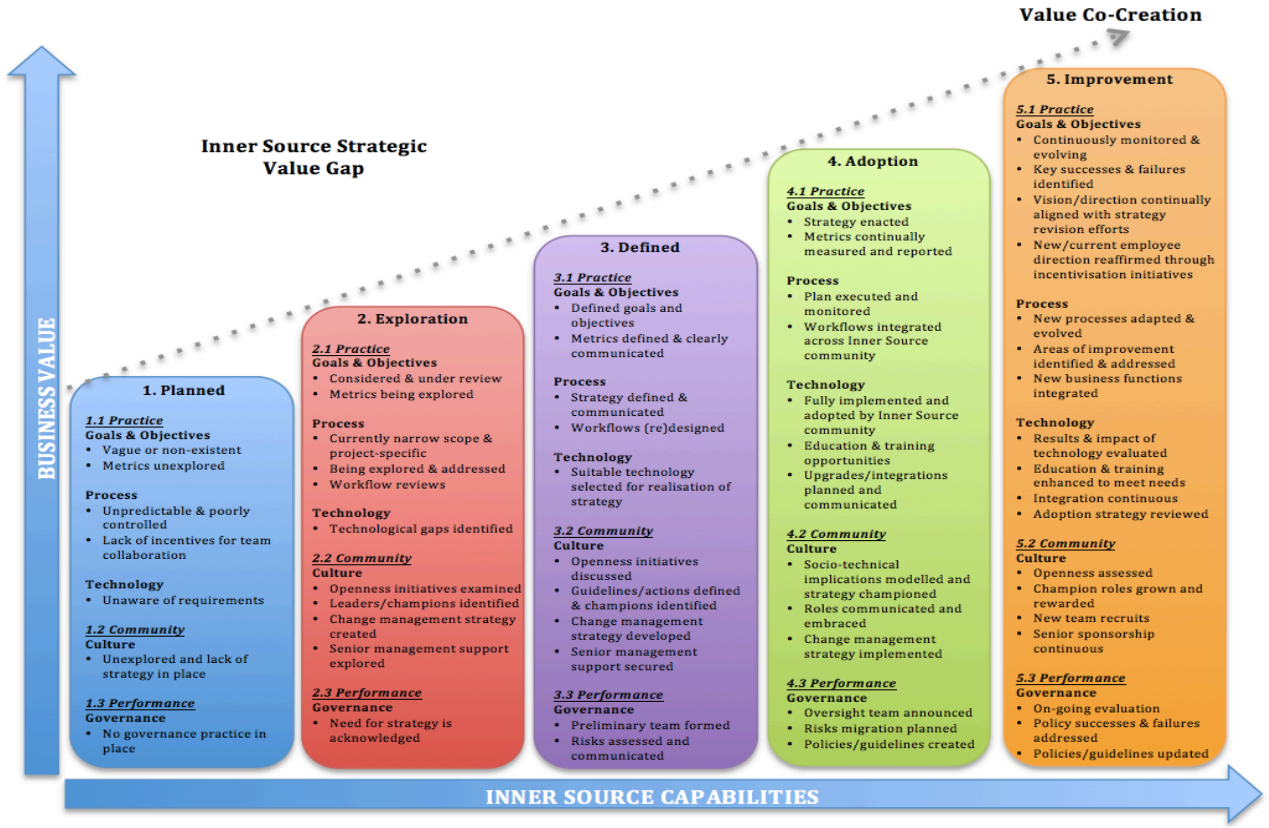

Figure 1: Inner Source Capability Maturity Model (IS-CMM). This illustrates the five levels of maturity as an approach towards closing the Inner Source strategic value gap though value co-creation activities.

Towards an Inner Source Capability Maturity Model

Continuous process improvement is based on many small, evolutionary steps rather than revolutionary innovations. The capability maturity model (CMM) approach has significant promise for Inner Source practices as it "provides a framework for organizing these evolutionary steps into five maturity levels that lay successive foundations for continuous process improvement" [6] (p. 7). The CMM prescribes five maturity levels, which can support organizations in measuring the maturity of an organization's software process and ultimately evaluate its capability to sustain Inner Source projects and prioritize improvement efforts. As a conceptual contribution the Inner Source Capability Maturity Model (IS-CMM) adopts the key elements for Inner Source project management, namely, practice (goals and objectives, process, technology); community (culture); and performance

(governance). The five capability maturity stages are outlined as follows:

1. *Planned*: examines the key drivers for change in software practice.
2. *Exploration*: examines where current practice can be improved through the adoption of Inner Source.
3. *Defined*: the processes are characterized, identify business goals, risks and desired culture with Inner Source practices and re-aligning the strategy.
4. *Adoption*: processes are monitored, measured and controlled as part of project management.
5. *Improvement*: examines whether the organization has achieved their goals and focuses on sustaining value within a continuous improvement cycle.

The IS-CMM outlines initial efforts on bringing about some structure to assess how value is created within an Inner Source environment. There is also a need to identify specific Inner Source factors including critical capabilities; building blocks; maturity assessment questions; and practice, outcomes, metrics to support organizations adopt a scientific approach in assessing maturity and opportunities of an Inner Source strategy.

Discussion & Conclusion

Software engineering continues to be challenging for large corporations, often due to organizational structures, constraints and processes. This research-in-progress, presents the initial steps in guiding Inner Source strategy and presents the IS-CMM. The IS-CMM will guide the next phase of this research and uncover the configuration of resources and capabilities across a socio-technical network. Unpacking the nature of service capabilities allows us to understand the primary components of value co-creation and their contribution towards service maturity [7].

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