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Governance in Open Source Software Development Projects: A Model for Managing Network-Centric Edge Organizations

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Abstract

Open source software development (OSSD) is a community-oriented, network-centric approach to building complex software systems. OSSD projects are typically organized as edge organizations that lack an explicit management regime to control and coordinate decentralized project work. However, a growing number of OSSD projects are developing, delivering, and supporting large-scale software systems that are displacing proprietary software alternatives. The U.S. Department of Defense is now committed to the adoption and deployment of software-intensive systems with open architectures and OSS components for application areas including command and control systems. Thus, we ask what do we understand about how mission-critical software applications like command and control systems can be developed, deployed, and supported following an OSSD approach?

Recent empirical studies of OSSD projects reveal that OSS developers often self-organize into a meritocratic organizational form where “virtual project management” practices and “role migration processes” emerge in ways that effectively control semi-autonomous OSS developers and coordinate project activities to produce reliable software systems. In this paper, we examine how such practices enable and empower network-centric edge organizations like OSSD projects, as well as where and how such practices might be applied to the development, deployment, and support of decentralized command and control systems.

Outline

The proposed paper will draw on recent results from empirical studies of OSSD conducted by the author and his research team [e.g., Jensen and Scacchi 2005, 2007, Scacchi 2007, Scacchi, et al. 2007], as well as studies governance processes in OSSD project now in progress. This will include in-depth examination of up to three large OSSD projects whose developers are globally dispersed, involve small groups of tightly-knit “core developers” and large diffuse groups of OSS contributors, and whose projects have been underway for more than five years. These projects involve OSS developers from many different nations spanning North and South America, Europe, and Asia. Each of these projects has also produced a separate non-profit organizational entity that serves to provide a corporate interface to both for-profit enterprises and government agencies. The non-profit entity however does not control or direct the OSSD project, but instead serves to provide general policy direction for how the project will interact with other external enterprises for purposes of product and patent licensing. Nonetheless, the paper will examine how meritocratic practices in OSSD projects have coalesced into a self-organizing form that enables these projects to act in a coherent and progressive manner, but without an explicit project management regime. Of particular interest in how these practices span from the motivations of individual OSS developers, through the resources they mobilize in support of project work, how OSSD project teams self-organize to control and coordinate project activities and work product development, how multiple
independent OSSD project form alliances and inter-project software ecosystems, and how the overall collective action across OSSD projects gives rise to an international social movement. All of these practices can then be framed as possible options for understanding how network-centric edge organizations can operate without an explicit centralized command authority, yet act in a self-organizing manner to effectively realize a decentralized approach to command and control of a dispersed, somewhat autonomous work force. This in turn can then be used to both understand (a) the possible roles of OSSD organizational practices in the development, deployment, and support of future command and control systems, and (b) where and how such practices could be used in support of contemporary military engagements and cyber warfare.

References


