

PSECO-IM: An Approach for Incident Management to Support Governance in Proprietary Software Ecosystems

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Abstract. *A proprietary software ecosystem (SECO) concerns data concentrated on a technological platform with contributions protected by intellectual property. The platform that supports the business initiatives is developed using different technologies with integration points, promoting a network of dependencies and architectural complexities. Systems downtime (incidents) causes major image and financial upheavals for organizations. To mitigate the risks of incidents, the IT management team should implement strategies based on governance mechanisms to sustain the platform. This work aims to develop and evaluate a process-based approach (PSECO-IM) for incident management to support the IT management team in governing a technology platform architecture in a proprietary SECO. This work is based on Work System Theory (WSF), in which the systems in organizations should be seen as work systems and technologies as components of work systems. As a final result, we got positive feedback on the relevance of our proposal from the organization's practitioners, such as: i) mitigating the opening of incidents; ii) measuring the health of the proprietary SECO through new metrics and indicators; and iii) discovering patterns in software projects that may represent a chance of opening incidents. We argue that this work contributes to the Information Systems area since it covers studies on three pillars: people, process, and technology, such as tacit knowledge, low-quality software, governance, incident management, and proprietary SECO.*

1. Introduction

The challenge of maintaining a sustainable platform have become a priority for large organizations based on the survey performed by Gartner Group¹. The applications comprising the architecture of a proprietary software ecosystems (SECO) platform are built using several technologies combined with dozens of integration points, creating a network of dependencies and complexities. These complex systems may behave unpredictably providing applications downtime and interruptions (incidents) [Grieves and Vickers 2017].

Sustaining the technological platform of the proprietary SECO requires governance mechanisms related to internal and external developers, IT service providers, and

¹Gartner is the world's leading research and advisory company

IT managers to mitigate the risks of disruptions [Dhungana et al. 2010]. However, the market pressure for a state-of-the-art solution for every business need causes organizations to work at a highly accelerated pace, passing this anxiety to the IT project team that must deliver results in an increasingly short time [Xu et al. 2018]. The result is a software project delivered with low quality, producing incidents in the organization environment.

This work aims to develop and evaluate a process-based approach (PSECO-IM) for incident management to support the IT management team in the governance of a technology platform architecture in a proprietary SECO. It contributes to Grand Research Challenges in Information Systems [Boscarioli et al. 2017], more specifically related to “Chapter 4: Information Systems and the Open World Challenges”.

2. Research Methodology

The main objective of this work is to answer the following question: “**How can an incident management approach support IT management in the governance of a proprietary SECO’s technology platform?**”. Our research methodology consists of the following scientific methods:

- **Ad hoc Literature Review:** we studied the literature on SECO and some research challenges were identified, mainly covering the topics: SECO governance mechanisms, SECO health, and SECO incident management process;
- **Exploratory Study:** we investigated the governance mechanisms of software assets in a proprietary SECO of a large international organization;
- **Longitudinal Literature Study:** the study was performed on SECO, extending an existing study that covered 2006 to 2015 of Alves *et al.* [Alves et al. 2017] to provide an update on SECO governance mechanisms and SECO health metrics;
- **Participative Case Study (1):** we discussed the governance strategies practiced in the proprietary SECO of a large international organization;
- **Rapid Review Study:** based on discussions of the participative case study, this method was chosen to provide a body of knowledge bounded to practical problems, to investigate keystone’s issues to handle incident management, and to explore the keystone’s strategies to model incident management process;
- **Approach for SECO Incident Management Process:** we described an incident management approach (PSECO-IM) to be explored within the relationships in the proprietary SECO of large international organization. In addition, a tool to support the decision-making of the IT management team was developed;
- **Focus Group:** this method was applied to assess the effectiveness of the PSECO-IM approach for incident management to support governance in the proprietary SECO based on the experts’ opinions; and
- **Participative Case Study (2):** this study aimed to evaluate the PSECO-IM approach’s contributions to incident management in the proprietary SECO and the support tool to help the IT management team in the governance of a technology platform architecture of large international organization.

3. Main Results and Contributions

The research results revealed that to meet the market pressure for state-of-the-art solutions, IT managers try to implement more projects than they can. As consequences, new

software releases bring new production defects (incidents). This behavior leads to customer dissatisfaction. Considering the new strategies to implement governance mechanisms related to proprietary SECO health metrics, our work takes a position that quality and reliability are critical aspects of maintaining a sustainable SECO.

We evaluated a process-based approach (PSECO-IM) and a support tool² to assist the IT management team with the governance of the technology platform in a proprietary SECO. Two studies were performed: focus group and participative case study in a large international organization. Based on the opinions of industry experts (practitioners such as IT managers, developers, and business analysts) and according to percentages results of agreement, we concluded that results from both studies were positive, fulfilling the goals they set themselves. The full results are detailed in the Master's thesis [Costa 2022].

Finally, we derived practical implications for the academic community and the software industry business. For the academic community, the definition of governance strategies can affect the proprietary SECO health through governance mechanisms. Choosing the right health metrics to provide operational indicators aiming to improve efficiency, support decision making, and increase participants' satisfaction remains a challenge because the actions to implement the strategies depend on three pillars: people, process, and technology. For the software industry practitioners, it is worth paying attention in the workforce capacity planning. We noticed that tacit knowledge concentrated on a few people results in low-quality software products and several defects.

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²Web-based application architecture deployed at <http://incident-identification.herokuapp.com>