


# Strategy for Performing Critical Projects in a Data Center Using DevSecOps Approach and Risk Management

Edgar Oswaldo Diaz, National Institute of Statistics and Geography (INEGI), Aguascalientes, Mexico

 <https://orcid.org/0000-0002-3695-7715>

Mirna Muñoz, CIMAT, Guanajuato, Mexico

## ABSTRACT

This article describes the new needs that launched the evolution of the DevSecOps + Risk Management approach as well as a brief description of it. Also, the article presents two cases in which the DevSecOps approach was implemented. The results of implementing the approach showed that the implantation allows: (1) reinforcing the implementation of critical projects in the data center; (2) providing a strategy to automate the processes of critical mission projects in a successfully way; (3) generating added value in the timely delivery of information, with levels of service oriented to the end customer satisfaction; (4) enabling the establishment of adequate service levels to keep operational continuity and; (5) allowing both a quantitative and qualitative analysis of risk.

## KEYWORDS

Data Centers, Development Operations Approach, Devop, Informatics Security, Quality Assurance, Risk Management Practices, Software Engineering Practices, Technology Infrastructure

## 1. INTRODUCTION

Data Centers have evolved significantly in recent years and Mexico is not the exception because this country has around 20 percent of the Latin American Data Centers (Judge, 2016). With the creation of Data Centers, a new challenge came up, that is the management of workflows, version control, software products release and risk management while the security is reinforcing and considering people and technology. As an answer to this challenge, Development and Operations (DevOps) approach emerged.

In organization such as The National Institute of Statistics and Geography (INEGI by its Spanish acronym) (INEGI, 2018) Data Centers have been implemented as a response to the increasing need of managing critical projects in Mexico.

INEGI is a public organism of the government of México. It is in charge of a set of important activities such as: (1) regulating and coordinating the national system of statistical and geographical information; (2) carrying out national censuses; (3) the integration the system of national accounts;

DOI: 10.4018/IJITSA.2020010104

and (4) the elaboration of the national consumer price indexes, as well as the national producer price indexes. Besides, it is the National Cartographic Agency of México.

To achieve these activities, INEGI develops information systems in multiple technologies such as Internet, mobile devices, and services cloud in order to disseminate the statistical and geographical information for the Mexican government decision making. Also, INEGI provides this data to companies that request the access to the data.

Therefore, to be able to manage this type of projects, INEGI has established a Data Center [TIER IV], that means, it has an availability of 99.995%, 2N+1 fully redundant infrastructure and protection from electrical failure, having 32 disperse geographic points and a central node that covers all Mexican territory, so that, it is possible to have a distribution of data capture and data recollection centers, as well as, information center points and statistical and geographical products sale points.

Then, the project management must be carried out based on risk management in order to control the behavior in the operation of automated processes with quality indicators and to reduce eventualities in the workflow. In this way, it is possible to develop software systems reducing the delivery time to the market and optimizing the delivery life cycle, and making possible to evolve a continuous deployment paradigm (Lwakatare et al., 2015).

In this context, the previously implemented DevOps approach (Muñoz & Díaz, 2017) should have been evolved to an approach that contains information security practices and risk management to meet the needs of critical projects performance.

Then, this paper describes the implementation of the evolved approach named as “DevSecOps approach and risk management best practices”. This approach aims to perform projects in the Data Center of INEGI, as a strategy to meet a set of needs related to IT services management through information technologies, software engineering, quality assurance and security, and risk management, so that it is possible to manage workflows, version control, release software products, risk management and security reinforcement, considering people and technology processes.

Therefore, the goal of this paper is to give an overview of the DevSecOps and Risk Management approach, as well as its implementation to establish strategies to perform four critical projects of a Data Center of INEGI. After the introduction, the rest of the paper is structured as follows: section 2 presents the core concepts related with this research; section 3 provides a brief description of the DevSecOps and Risk Management approach; section 4 shows the project’s performance using the DevSecOps and Risk Management approach; and finally, section 5 presents the conclusions and next steps.

## 2. CORE CONCEPTS

This section presents the core concepts that will be used throughout all the paper:

- **Data Center:** A Data Center is a facility within an organization, which is in charge of centralizing operations and the IT equipment focused on storing, managing and deploying the information of the organization (Robertazzi, 2012). Due to its importance, Data Centers are vital for the day-to-day operation continuity because they host the most critical systems of an organization (Robertazzi, 2012). Besides the above mentioned, in Data Centers the reliability and security are two key aspects with high priority (Kant & Mohapatra, 2004). According to its application domain, Data Center can be classified, in two types (Callou et al., 2014): (1) Internet oriented that supports few applications, typically it is browser-based, and often has many unknown users; and (2) enterprise or internal that supports several applications that go from standard to customized applications, and has few well-known users;
- **DevSecOps:** The term DevSecOps is an abbreviation of three words: Developers, Security and Operations that arose from the need of building software systems with a reduction on the time for

11 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: [www.igi-global.com/article/strategy-for-performing-critical-projects-in-a-data-center-using-devsecops-approach-and-risk-management/240765](http://www.igi-global.com/article/strategy-for-performing-critical-projects-in-a-data-center-using-devsecops-approach-and-risk-management/240765)

## Related Content

---

### Fog Caching and a Trace-Based Analysis of its Offload Effect

Marat Zhanikeev (2017). *International Journal of Information Technologies and Systems Approach* (pp. 50-68).

[www.irma-international.org/article/fog-caching-and-a-trace-based-analysis-of-its-offload-effect/178223](http://www.irma-international.org/article/fog-caching-and-a-trace-based-analysis-of-its-offload-effect/178223)

### Application of Biogeography-Based Optimization to Antennas and Wireless Communications

Sotirios K. Goudos (2021). *Encyclopedia of Information Science and Technology, Fifth Edition* (pp. 950-966).

[www.irma-international.org/chapter/application-of-biogeography-based-optimization-to-antennas-and-wireless-communications/260242](http://www.irma-international.org/chapter/application-of-biogeography-based-optimization-to-antennas-and-wireless-communications/260242)

### Implementation of a Service Management Office Into a World Food Company in Latin America

Teresa Lucio-Nieto and Dora Luz Gonzalez-Bañales (2021). *International Journal of Information Technologies and Systems Approach* (pp. 116-135).

[www.irma-international.org/article/implementation-of-a-service-management-office-into-a-world-food-company-in-latin-america/272762](http://www.irma-international.org/article/implementation-of-a-service-management-office-into-a-world-food-company-in-latin-america/272762)

### Information Seeking Models in the Digital Age

Mudasir Khazer Rather and Shabir Ahmad Ganaie (2018). *Encyclopedia of Information Science and Technology, Fourth Edition* (pp. 4515-4527).

[www.irma-international.org/chapter/information-seeking-models-in-the-digital-age/184159](http://www.irma-international.org/chapter/information-seeking-models-in-the-digital-age/184159)

### Better Use Case Diagrams by Using Work System Snapshots

Narasimha Bolloju and Steven Alter (2016). *International Journal of Information Technologies and Systems Approach* (pp. 1-22).

[www.irma-international.org/article/better-use-case-diagrams-by-using-work-system-snapshots/152882](http://www.irma-international.org/article/better-use-case-diagrams-by-using-work-system-snapshots/152882)