

# Optimizing Decision-Making Processes : The Experience of the Institutional Management Information System at the Universidad del Rosario

Saluma Castillo Guerra<sup>1</sup>[0000-0002-2333-7429] y Catalina Zapata Florez<sup>2</sup>[0009-0002-0474-0359]

<sup>1</sup> Gestora de Información Estratégica, Universidad del Rosario.  
saluma.castillo@urosario.edu.co

<sup>2</sup> Coordinadora de Planeación y Efectividad Insitucional, Universidad del Rosario .  
catalina.zapataf@urosario.edu.co

**Abstract.** This document explores the design, stages, functionalities and improvements of the Institutional Management Information System at Universidad del Rosario, Colombia. Followed by the first version, the current system innovates in design and conceptualization. Data users can monitor statistics and strategic indicators, design new measures, and download automatically internal and external reports. These improvements contribute to the use and transformation of data into knowledge for decision-making. Therefore, the implementation of this data system has provided a solution, in terms of response time to requests, attention to quality rules and making informed decisions. It is suggested to ensure high-quality, accurate, and useful data for promoting an institutional culture based on data.

**Keywords:** University management, statistical data, information system, decision-making processes, information processing, governance and data culture.

## 1 Introduction

Universidad del Rosario (UR) was founded in 1653 and has been accredited since 2005. In 2018, an information data system was implemented with the aim of providing accurate information to support decision-making. However, in 2023, this system was transformed into an Institutional Management Information System (SII). This new system integrates all the transactional information systems of the university and automates data processing to generate statistics, indicators, reports, and models, improving the quality of information and the decision-making process. This document explores in detail the design, stages, functionalities and improvements of the UR SII.

## 2 Theoretical Framework

Data-informed decision-making is essential for the strategic planning and development of higher education institutions (HEIs), in an increasingly competitive environment due to demographic changes and education costs (Webber and Zheng 2020; Gagliardi and Turk 2017; Swing and Ross 2016). To achieve the correct use of data

for decision-making, three components are needed: institutional leaders committed to the use of data for decision-making and the formation of analysis teams to process them and generate knowledge; technology that provides tools to access and have updated information; and information culture that ensures good data governance, infrastructure, reporting, knowledge sharing, and the engagement of all staff (Webber and Zheng 2020; Nguyen et al. 2020; Abdul-Hamid 2017).

In the technological field, a comprehensive information system (SII) is essential in the first stage of the decision-making process since it allows access to data and information that, together with interpretation, is transformed into knowledge that allows a decision to be made. (Webber and Zheng 2020; Barzaga et al. 2019, Nguyen et al. 2020; Chaurasia et al. 2018). This SII must integrate data from multiple sources, have a documented and standardized governance system, allow for effective visualization and reporting, and work with different types of data architectures (Webber and Zheng 2020).

A SII in an HEI must collect, store, process, analyze and present information through a portal that facilitates navigation, which automates data processing, offers quick access to updated information, reduces the time spent in the collection and elimination of data. duplications and ensures a transparent and sustainable information process guarantee informed decision-making (Cassidy, 2006; García-Holgado et al., 2015, Khamdamov et al. 2021).

### **3 Methods**

As a consequence of an increase number of requests for information, different definitions of statistics and indicators, and the need to design applications for monitoring and data integration, between 2020 and 2022, work groups were held with managers and administrative areas to identify and define the battery of statistics and indicators that would be part of the SII to improve the decision-making process.

The SII has five domains: professors, students, graduates, financial sustainability, and programs, which required the consolidation of five sources of information as shown in Figure 1. For this, a layered architecture was developed, one that ensures the veracity, security and confidentiality of the data to organize, access and analyze information.

### **4 Results**

Currently, the SII compiles 144 statistics and 74 indicators. Of these, only the graduate's module is not connected with the other sources of information. The visual environment allows not only to analyze the behavior of institutional metrics but also to build internal reports and external control entities, create new metrics using a calculator and new databases, through on-demand self-service. Additionally, it provides a

detailed overview of the governance module, usage patterns, charging processes, data validation, and audit follow-up to SNIES reports.

There are four types of users with different roles and permissions to access: public, official, analytical and administrator. The sensitive information is anonymized to protect personal data, processes were established and implemented allowing the analytical user to provide the classified and reserved variables required for the generation of knowledge. Regarding traceability and update, a semester cut-off date for processing and loading the data set was defined. Previous to this, a quality check must be executed, in order to guarantee accuracy, precision, completeness and consistency when publishing the data. Quality management involves sending alerts and self-managed follow-up by the tool between the Planning Department and the data administrator defined in the Institutional Data Governance policy.

## **5 Discussion**

The system has had a significant impact on the efficiency and productivity of analysts to easily access institutional information. The new functionalities of the system have benefited directors and their work teams in strategic planning and decision-making. It has reduced response times to information requests from and to the university, democratized data access, and optimized data storage, processing, and analysis processes. Similarly, the incorporation of growth rates in the data visualization has allowed decision-makers to have greater clarity to evaluate institutional processes since the tool can be used to support historical behavior and as a measure of the magnitude of changes in statistics.

This transformation has also contributed to the beginning of a data-based culture and has promoted trust due to continuous quality monitoring. For instance, the adequacy of the data reading and validation rules decreased the number of typographical errors during the information-gathering process, reducing the number of inconsistencies that facilitate the delivery processes and improving the effectiveness of information management.

## **6 Conclusions**

Technological tools are essential for data-informed decision-making. In this context, the SII such as the one used by the university, which integrates transactional information systems and automates data processing, allows clear visualization of indicators and statistics, as well as the generation of personalized reports and calculations. This enhances the decision-making process by guaranteeing timely access to quality information for the generation of knowledge. However, to use this tool effectively, it is crucial to strengthen data governance and culture, which will increase efficiency and reliability.

## 7 Limitations and Future Research

The SII contains indicators and statistics mainly related to teaching, but extension and research must be included to extend decision-making to all areas.

On the other hand, although the SII has quality rules and inconsistency alerts, it cannot guarantee the correctness of the data within the required deadlines. Therefore, it is essential to ensure, through data governance and culture, the quality in the collection, reading, and updating of information to achieve efficient operation and use of the system.

## References

- Abdul-Hamid, H. (2017). *Data for learning: Building a smart education data system*. Washington, DC: World Bank.
- Barzaga, O. S., Juan, V. H. J., Hugo, N. J. V., & Arroyo, M. V. (2019). Gestión de la información y toma de decisiones en organizaciones educativas. *Revista de Ciencias Sociales (RCS)*, 120–130.
- Cassidy, T. (2006). Education Management Information Systems (EMIS) in Latin America and the Caribbean: Lessons and Challenges. *The Inter-American Development Bank Regional Policy Dialogue*, 1–53.
- Chaurasia, S. S., Kodwani, D., Lachhwani, H., & Ketkar, M. A. (2018). Big data academic and learning analytics: Connecting the dots for academic excellence in higher education. *International Journal of Educational Management*, 32(6), 1099–1117. <https://doi.org/10.1108/ijem-08-2017-0199>
- Gagliardi, J. S., & Turk, J. M. (2017). The data-enabled executive: using analytics for student success and sustainability. American Council on Education. <https://apo.org.au/node/124511>
- García-Holgado, A., & García-Peñalvo, F. J. (2015). Estudio sobre la evolución de las soluciones tecnológicas para dar soporte a la gestión de la información. <http://hdl.handle.net/10366/125415>.
- Khamdamov, U., Abdullaev, A., Sultanov, K., & Elov, J. (2021). Models of integration of higher education management information systems. 2021 International Conference on Information Science and Communications Technologies (ICISCT).

Nguyen, A., Gardner, L., & Sheridan, D. (2020). Data analytics in higher education: An integrated view. *Journal of information systems education*, 31(1), 61–71. <https://aisel.aisnet.org/jise/vol31/iss1/5/>

Swing, R. L., & Ross, L. E. (2016). A new vision for institutional research. *Change*, 48(2), 6–13. <https://doi.org/10.1080/00091383.2016.1163132>

Webber, K. L., & Zheng, H. Y. (Eds.). (2020). *Big data on campus: Data analytics and decision making in higher education*. Johns Hopkins University Press.