

## The technological transfer of the Integral School Control System in the National Technological Institute of Mexico

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### Abstract

The Sistema Integral Control Escolar (SICE) is a software product developed to systematize the academic and administrative processes of the Instituto Tecnológico Superior del Sur de Guanajuato (ITSUR). This paper discusses the stage of technological transfer of SICE software within the system of technological institutes in Mexico. Strategies are plotted to find possible candidates.

An implementation plan was created that should be implemented when the technology transfer is approved with another institution. A mechanism of continuous improvement is proposed that has contributed to the maturation of the SICE platform. Monitoring and technical support is provided in the operation of each of the system modules.

The results show the approved implantations and the economic income generated for the ITSUR. It created a protocol for the attention and execution of technology transfer, so it is concluded that this stage is and will remain an opportunity to understand and apply strategies in the creation of software products.

**software, technological transfer, academic process**

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## Introduction

The Comprehensive School Control System (SICE) is a software product developed to systematize the academic and administrative processes of the Higher Technological Institute of the South of Guanajuato (ITSUR).

(Vega Olvera, Alcantar Ortiz, & Martínez López, 2015) mention in their article that 3 different platforms have been generated for the SICE system, for which they represent 3 solutions for users of desktop, web and mobile platforms.

SICE is a software project that has been developed under the methodology of the ITSUR Software Development Center (CDS). The CDS has currently accredited level 3 of CMMi, as they claim (Martínez López, Vega Olvera, & Morales Orozco, 2015) in their article, highlighting the collaboration of teachers and students in software development.

The SICE platform is a software solution that systematizes the academic and administrative processes based on a quality management system ISO-9001-2000 (SGC), and on academic-administrative guidelines for traditional and competency-based curricula. of some internal processes proper to the institution.

The ITSUR is within a SGC multi-site scheme, which is implemented in various technological institutes throughout the country. Within the multisite framework cross-audits are carried out, which have allowed other institutions to know the SICE platform, giving guidelines to be a software solution that can be implemented in other institutes in the country, generating technology transfer.

The CDS of ITSUR has set itself the objective of transferring the SICE software platform to other technological institutes in Mexico, seeking the consolidation of a robust, secure and scalable software solution.

To carry out the technology transfer, the following strategies were proposed:

- Study of the solutions available in the market.
- Dimensioning of candidates for technology transfer.
- Creation of the SICE software product concept.
- Planning the implementation of the solution.
- Compilation of lessons learned in implementation execution.
- Monitoring and technical support in the operation of the SICE system

## Theoretical Framework

(Mendivil, 2015), through a collection of data on higher education institutions, counts 262 technological institutes, of which 132 are federal and 130 decentralized from the state government. A survey conducted by CDS of the ITSUR to a population of technologists of growing creation (no more than ten years) was obtained that of 20 technological, 15 implement software for the administration of academic-administrative processes and 5 do not have any.

In the same survey it was obtained that of the 15 that had a solution 10 they wanted to change the software for a better one.

The software solutions implemented in most of the technologies are two: The Integral Information System (SII) and the CONNECT system.

The SICE platform has the statistics module, module for study plans by competences, being functionalities that other software does not implement. Additionally, the SICE platform offers a mobile application for Android devices for the notification and consultation of academic information. (Vega Flores, Morales, & Vega Olvera, 2017) show in their article that the application has an acceptance level of 4.8 on a scale of 1 to 5.

### Methodology

The methodology to make possible the technological transfer was carried out in stages **Stage of analysis of available solutions:** 2 software were found as competition, the SII system and CONNECT system. An analysis of advantages and disadvantages was made in comparison with the SICE platform.

### Candidate dimension stage for technology transfer

The following criteria were established for the transfer: The technology must be of recent creation, must have a maximum of ten if it has been created, and be located in the center, west, east and east from the south of the country.

In the **stage of creation of the product**, strategies were sought to present and disseminate the product. I'm heading to perform the following actions:

- Generate digital advertising of the SICE product to expose its advantages in digital media.
- Promote the product in the digital media of the CDS, Facebook, Twitter.

- Generate a trial version that allows prospects to know the platform

Created the concept of the product, the information generated should be sent to the selected technologists. The detailed information must be sent via email.

The execution of these first stages places the SICE platform as a software alternative for the administration of academic processes of the country's technological institutes.

For the next phase of the project, the implementation planning stage is executed. In this stage, an implementation plan is created with the different activities to be carried out during the on-site implementation.

The next stage, compilation of lessons learned, aims to create a log that lessons learned will be recorded during the on-site implementation period.

The first 3 stages were carried out in the period July-December 2014, creating a marketing concept that allows the SICE platform to be offered as an information technology solution.

The last 2 stages are activities that must be executed at the moment in which the technology transfer is authorized, as well as giving a follow-up and technical support in the operation of each one of the modules of the system.

The technical support and maintenance is finished after all the modules contained in the system have been put into operation. To execute the operation of all modules, a one-year school year is required.

### Results

Figure 1 shows the database of candidates for the technological transfer of the SICE platform.

Figure 1 Prospect database for technology transfer

(Own Elaboration)

Digital advertising of the product was generated for its promotion in social networks, emails and on-site presentations, Figure 2 shows digital advertising. A trial version was also created so that prospects can test the functionalities of the SICE platform.



Figure 2 SICE digital advertising

(Own Elaboration)

To date, of the 35 prospects for technology transfer. Table 1 shows the 6 institutions that have implemented the SICE.

Technological	State
Higher Technological Institute of Ciudad Hidalgo	Michoacán
Superior Technological Institute of Tacámbaro	Michoacán
Higher Technological Institute of Cocula	Jalisco
Superior Technological Institute of the Grullo	Jalisco
Higher Technological Institute of Jerez	Zacatecas
Higher Technological Institute of Salvatierra	Guanajuato
Higher Technological Institute of Tlatlahuquitepec	Puebla

Table 1 Institutions with the SICE platform

(Own Elaboration)

The technological transfer of the SICE platform has generated revenues of approximately half a million pesos to the ITSUR.

A protocol for the attention and execution of technology transfer was created.

There is planning for the implementation of the platform on site. During this stage, lessons learned are recorded. This mechanism of continuous improvement contributes to the consolidation of a robust, safe and scalable solution.

To date, in this stage of technology transfer, 7 teachers, 15 students and 5 administrative staff have been involved..

**Conclusions**

The technological transfer stage of the SICE platform is and will continue to be an opportunity to understand and apply the marketing part of a software product.

The project can be cataloged as a successful pilot test in the transfer of the innovation and technological development that is being generated in the ITSUR.

The lessons learned as part of the continuous improvement have contributed to the maturity of the SICE platform, however, it is necessary to apply all of these since the procedure for supporting the platform can be optimized.

It is also necessary to implement tools to improve customer service and relationship.

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