Scholarship Management at the University of Trás-os-Montes and Alto Douro: An Update to the Current Ecosystem

Jorge Borges[1(✉)], Elsa Justino[1], Pedro Gonçalves[1], João Barroso[1,2], and Arsénio Reis[1,2]

[1] Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal
`{jborges,ejustino,pgoncalves,jbarroso,ars}@utad.pt`
[2] INESC TEC, Porto, Portugal

Abstract. The research activities in a Higher Education Institution (HEI) is highly dependent of the development of research projects. Most times, these projects have, at the core of their workforce, scholarship fellows financed by the project budget and responsible for the execution of very specific research tasks. The procurement process, leading to the contracting of these fellows, evolves several internal bureaus, from several organic units of the HEI, in a complex and long process. This work reports on the development of system to support this process. The solution was integrated in the HEI ecosystem in a harmonious manner, by implementing the necessary features and using the other HEI systems features when possible. After a year, the scholarship management system has proved a success, providing the user features to conduct the process as well as the management analytics to proper support the governance of the research area.

Keywords: Information Systems · High education institutions · Scholarship management · Information systems ecosystems

1 Introduction

The University of Trás-os-Montes e Alto Douro is organized in five schools and several departments, with some degree autonomy regarding the procurement processes, and governed by a central rectorate and central administration services. Most procurement processes, related to teaching and research, are initiated and concluded in the schools and departments scope, and are subject to several authorizations from the rectorate and the administration, mainly related with human resources management and budget management.

An essential aspect of research management includes the processes of hiring fellows to work on research projects, which provide scholarships vacancies. A typical research project includes a set of scholarships vacancies that will have to be fulfilled by executing a process that includes the selection of the most suitable candidate with whom it will be signed a scholarship working contract. This process is initiated by the researcher and the staff at their school of origin and later sent to the rectorate and central services for

analysis and proper authorizations. The detailed process is illustrated in Fig. 1, and can be resumed in six phases, comprising the steps from the scholarship approval up to the moment in which the selected candidate signs the work contract.
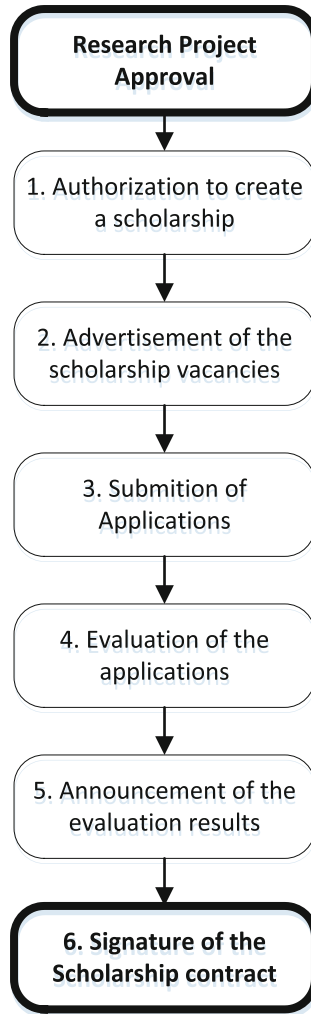
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┌─────────────────────────┐
│   Research Project       │
│   Approval               │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ 1. Authorization to create│
│    a scholarship          │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ 2. Advertisement of the   │
│   scholarship vacancies   │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ 3. Submition of           │
│    Applications           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ 4. Evaluation of the      │
│    applications           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ 5. Announcement of the    │
│    evaluation results     │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ 6. Signature of the       │
│   Scholarship contract    │
└─────────────────────────┘
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Fig. 1. Scholarship management process main workflow

The process concludes with the successful fulfilment of the scholarship vacancy by a well suited fellow. All the phases of the process are supported by paper documents and manual (autographed) signatures by the several process actors.

This process was hard to proper execute without errors and delays. There are several reasons for this problem [1], including:

- The geography and physical space of the university campus, which is composed by several buildings, located in an area of several acres and distancing from each other's up to a kilometre. Paper documents have to be collected, transported and delivered by an internal paper mail service.
- The processes of preparing, printing and physically move the supporting papers is executed by persons, so the increase in the number of scholarship processes must be accompanied by a corresponding increase in the staff number, in order to keep the same level of service. As the staff number increases several issues may arise regarding the necessary changes in organization, resources and staff management.
- The scholarship management processes are executed involving several bureaus inside the institution, so any change in the process must be accompanied by the proper retraining of the staff in each bureau. Such a task is hard to execute, so changes are highly dependent of human factors and staff voluntarism, and may introduce misunderstands leading to errors and delays in the process.
- The research activities are an important aspect of the university overall performance, e.g., influencing the indicators used by most ranking systems. Therefore, excellent scholarships management is paramount to the performance of the research activities and should be closely monitored by the several levels of the university management and governance. With simple paper support it is not simple to have an up-to-date status and performance report.

In the last years, the University has greatly increased the research activities and consequently the number of available scholarships vacancies. These increase has brought some stress to the bureaus involved in the processes related to the scholarships management. The need to have a support infra structure, that could scale as the volume increases, became obvious and the development of such infrastructure would be now well justified in cost-benefit terms [2, 3].

The usage of Information Systems (IS) solutions to support governance and administrative processes has long been introduced and the institution has at its core several systems, including:

- Central user management, which is mostly an infrastructure system featuring a technology that allows the users to have a single identification and access token in all the other electronic services provided by the university [4].
- The Intranet system, that provides a web portal interface for several services related to internal documents publication and sharing, as well as to act as a web access to other backend systems [5].
- The documents workflow system, identified as GesDoc, that provides the features related to documents and forms workflow among users and bureaus of the university [6].
- The Enterprise Resource Planning (ERP) system, that provides several ERP classic features, including the most relevant, related to human resources management and financial management [7].

This systems are components of a global institution IS Ecosystem (ISE) in which they cooperate and compete to support the institution business processes [8].

2   Solution Design

The process of scholarship management is broader than the perimeter comprised by each one of the previous described systems. As a result of this assessment, it was planed the introduction of a new component that would address two issues:

1. To be able to include support for all the actors and tasks part of the scholarship management process.
2. To orchestrate and induce the participation of the several ISE elements in the specific parts of the process.

The solution was designed as a web application portal responsible for the initiation and conclusion of the scholarship management process. In Table 1, are represented the several components and their participation in each phase of the process.

Table 1. Scholarship management procedures

Procedure	System	Intervinent
Definition of skills and rating criteria of scholarship candidates	Scholarship management	Head of research project
Solicitation of authorization for opening a scholarship	Gesdoc/ERP	Head of research project
Elaboration of public notice for scholarship	Scholarship management	Head of research project
Announcement of public notice for a scholarship	Scholarship management	Vice-rector
Application for scholarship	Scholarship management	Applicants
Application acceptance	Scholarship management	Head of research project
Evaluation of applications	Scholarship management	Jury
Public notice of decision about applications	Scholarship management	Jury
Notification of candidates	Scholarship management	Head of research project
Acceptance of the scholarship supervisor	Scholarship management	Scholarship supervisor
Acceptance of exclusivity by the selected fellow	Scholarship management	Fellow
Solicitation of authorization for contracting a fellow	Gesdoc/ERP	Head of research project
Signature of contract	Gesdoc/HR	Fellow/Rector

According to Table 1, the process is now fully supported by electronic systems and the documents are digitally signed using the Portuguese Citizen Electronic Card (Cartão de Cidadão) [9]. In this table are also displayed the several intervenient on each phase of the process. To enforce the design of the process workflow it was created an internal procedure rule, which was later implemented in the system [10].

3   Implementation

The specific component of scholarship management was implemented using the .NET framework [11]. The integration with the other ecosystem components was implements using webservices and REST/JSON, accordingly to the model of ISE in which is essential that the several components of the ecosystem are able to proceed with their IS life-cycle without compromising the other IS or the overall solution of which they are part [12].

In Fig. 2 are represented the interoperability connexions between the scholarship management and the other components.
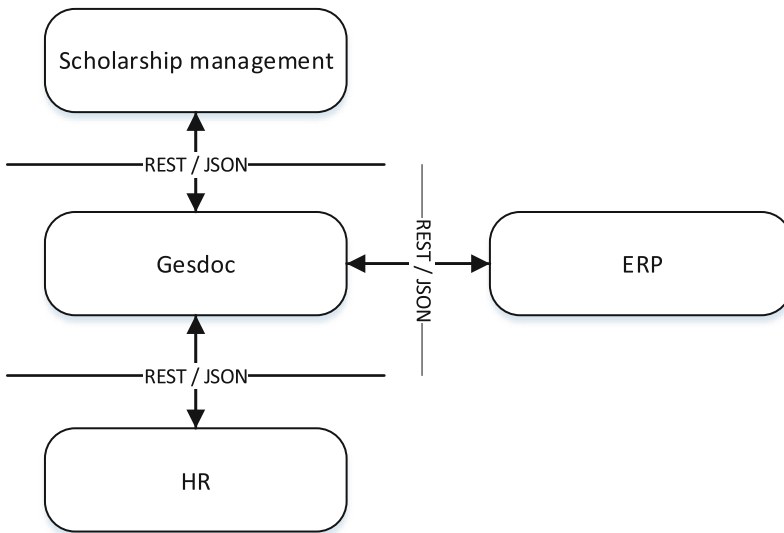
Fig. 2. Interoperability between systems

A special care was taken in the implementation of the user interface in order assure proper accessibility features [7, 13].

4   Conclusion

The scholarship management module was successfully develop and introduced in the university's ISE and is, since the beginning of 2016, the mandatory instrument to execute the process. In this period, several direct benefits have been observed, from which the most relevant are:

  (i)   A much more lean process execution, without delays and misunderstandings.
 (ii)   The constant updated information about each individual process as well as about all the processes and their current status.
(iii)   The ability to perform analytics reporting on the data related to scholarships.

(iv) Preservation of document in a long term way with digital signatures, andproper classification according to our classification plan.

There are also several other indirect benefits, from which the two most relevant are:

 (i) The containment of the human factor interference in the overall quality of the process execution, which is a complex, but straight forward process that has well defined moments of human subjective analysis. Beyond this moments, subjectivity is not required and will not benefit the process.
(ii) The introduction of a new systems with new user oriented features and using features of other components of the ecosystem, although respecting their independency and without introducing constrains and dependencies for their life cycle.

In future work, a special care should be taken in order to further integrate and reuse the system's information in other processes related to research activities management. In particular, this system is currently a side partner of the UTAD Current Research Information System (CRIS), providing complementary features, which, in a future version of CRIS may integrated in the CRIS core services.

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