

Modularization as a path to Efficiency

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1. The need to change

SIUE is Universidade de Évora's Management Integrated Information System, in use since 1999 when it started as a semi-academic project. Today, SIUE has grown to be the main institutional management tool reaching such distinct areas as Academic management, Social support, Research, Institutional management, Teacher evaluation, Technical management, International students, Alumni or News management.

In 15 years of existence SIUE has had many twists and changes. Development architecture and procedures are well defined and known by everyone, yet pressure, timing and fast decisions often speak louder. The need to keep up with all the requests and to achieve quick results frequently leads to unstructured development.

In a different layer, government policies for the Universities in Portugal are also changing and the future clearly shows a more integrated network of knowledge and services. Universidade de Évora must be prepared for this potential inter-institutional integration. SIUE can make the difference in this future network and so it must evolve in quality and flexibility.

Obtaining the rector recognition and support assures us full conditions for the project sustainability and success.

With all these variables in hand, the need (and opportunity) to have an IS development methodology that guarantees higher sustainability and reduces the cost of changes became very clear.

2. Modularization: a means to an end

The goal we aim to achieve is to turn SIUE into a modular set of reusable building blocks, instead of the monolithic structure it has now. Using this approach will allow us to deliver customizable implementations of the system in other institutions, as we have already been requested to do so but unable to, due to the current system architecture, as well as, more importantly, streamline out internal development.

Modules will be loosely coupled although they may have inter-dependencies. Each module may span across all system tiers, from presentation down to the data layer or be limited to only some of them, depending on its function.

We have two types of modules (Figure 1): Core level modules and Information System (IS) level modules. Core modules provide basic, system-wide, low-level features such as caching, logging, session management and i18n/l10n as well as the core data structures and business logic, required by all other higher level modules, such as user management, institutional data or administrative tools. IS level modules contain the higher level business logic and processes that manage the institution's normal activity and fulfill all requests the system is expected to fulfill, spanning from academic to financial management.

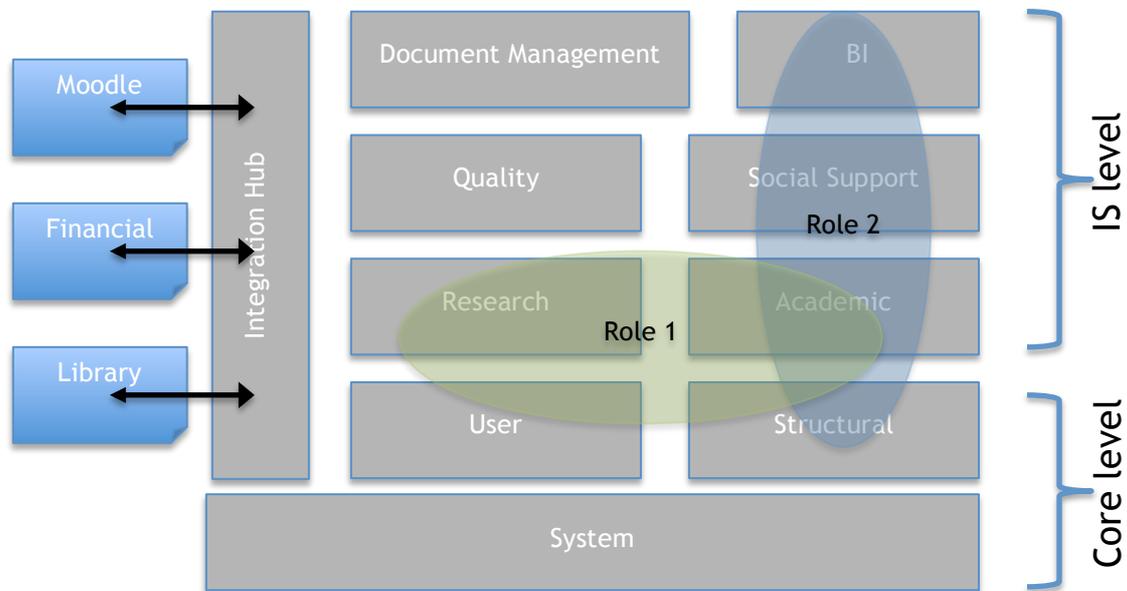


Figure 1 SIIUE module architecture / transversal roles

Using these building blocks we can create access roles, which aggregate features from one or (usually) several modules. With this approach we can easily reuse modules to provide access to the same information and features, to different parts of the institution, while still providing a differentiated experience according to the access scope, each with its own set of rules and behaviors. With this approach we can easily deliver fine-grained feature access, with tight access control, on demand.

A reference to the special “Integration hub” module which encapsulates all the API implementation, needed to transparently integrate with external developed/explored systems such as Moodle, Library or Financial Management.

SIIUE’s technological architecture is a standard 3-tier web-based application, based on Open Source technologies, using MVC design pattern.

For the system core business logic we use PHP, on top of an Apache web server. We chose PHP due to its solid use base and wide knowledge and resource availability as well as the development team’s solid PHP experience.

For the data layer we rely on PostgreSQL RDBMS. It was chosen for its set of features and reliability as well as its solid performance. It can, however, be easily replaced by another RDBMS such as MySQL/MariaDB or even commercial alternatives.

The presentation layer is built upon standard web technologies, HTML/CSS/Javascript, as well as REST web services using JSON/XML for systems integration/interoperability.

This structure provides us with a flexible architecture we can easily scale horizontally if resource demand increases.

3. Next steps

Forthcoming milestones include: (1) a 2nd follow-up report in the 2nd trimester of 2015, which should include detailed reference of the proposed architecture and development calendar and (2) a stage development presentation in the last trimester of 2015.

4. References

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