# SIGMA CRIS: SCIENTIFIC OUTPUTS, INTEGRATION AND INTEROPERABILITY

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## Abstract

Society increasingly demands quickly, easily and a homogeneous access to the information. Access to Internet, mobile devices, social networks as Facebook or ResearchGate, which create links between people to share data reaching anywhere in the world within seconds or the increase commitment for the cloud, where access from any device and place allowing the access to the own documents, videos, photos, music, etc. keeping the own customized environment or applications to share documents as Google Drive or Dropbox, which allows to agile data access are examples of agility in the flow of information and is something that nowadays is needed and is no longer questioned.

This paradigm transferred in the scope of research, knowing that universities, their affiliated research centers and researchers have the aim on spending time doing research, getting funds for their research or teaching and the moment to feel the need to transfer or enter the results into an information system that do not report short-term progress or improvement in their day to day of research never arrives. Faced with this situation takes more relevance offer systems that provide the flexibility and immediacy of access to scientific publications generated. In this regard already exists commercial databases as Web Of Science, PubMed, Dialnet, Scopus, Google Scholar, etc. that provides it.

On the other hand, SIGMA Gestión Universitaria, which is a not-for-profit consortium established in 1996 by a group of 8 top level Spanish Public Universities to provide technological solutions to their needs for managing academic, learning, research and organization processes aligning its SIGMA CRIS Solution with the ERA requirements.

SIGMA and their universities have made great efforts to promote competitiveness, mobility, create synergies and improve the research quality in-house, regionally, nationally and internationally. This has allowed great progress in all areas, researcher's mobility, creating synergies with shared resource centers between different institutions and improving the research visibility generated.

In line of what has been said, SIGMA is making a major effort to focus its research solution in the current demands of the research community. These efforts have focused on three main areas of development: improving the usability of the solution that the researcher uses to update their scientific production, automatic interoperability with commercial scientific databases and the image adaptation to standards quality that currently defines the market for web applications.

**Keywords:** Sigma, CRIS, scientific production, interoperability.

## 1    SIGMA GESTIÓN UNIVERSITARIA CONSORTIUM

SIGMA Gestión Universitaria [1] is a nonprofit consortium established in 1996 by a group of 8 top level Spanish Public Universities to provide technological solutions to their needs for managing academics, learning, research and organization processes. SIGMA represents 20% of the students in the Spanish university system. The consortium's objective has evolved towards the continuous technological modernization of university management through the development of IT solutions aimed at automating the administrative processes and, as a result, guaranteeing their effectiveness.

Technology and innovation are the backbone of the services and solutions provided, based on a highly open source development and deployment platform for J2EE certified application servers compliant on a multi-tier and high performance proven open architecture. Internationalization is also one of SIGMA's top priorities. For years, SIGMA has established relationships with other European universitity consortiums. Lately, SIGMA has open new strategic areas of interest such as SaaS, BI, eLearning and Mobile. SIGMA focuses the development and support of two main suites of solutions:

## 1.1 SIGMA Student Information System

The European Higher Education Area (EHEA) was created to construct the Europe of Knowledge and place it at the international forefront, in order to benefit mobility and employment opportunities, and also to unify higher education studies in the EU. Since then, one of the main priorities of SIGMA [1] has been the adaptation of its products and services to the requirements of the EHEA, thus assisting the universities in the group as they go through this important transformation process.
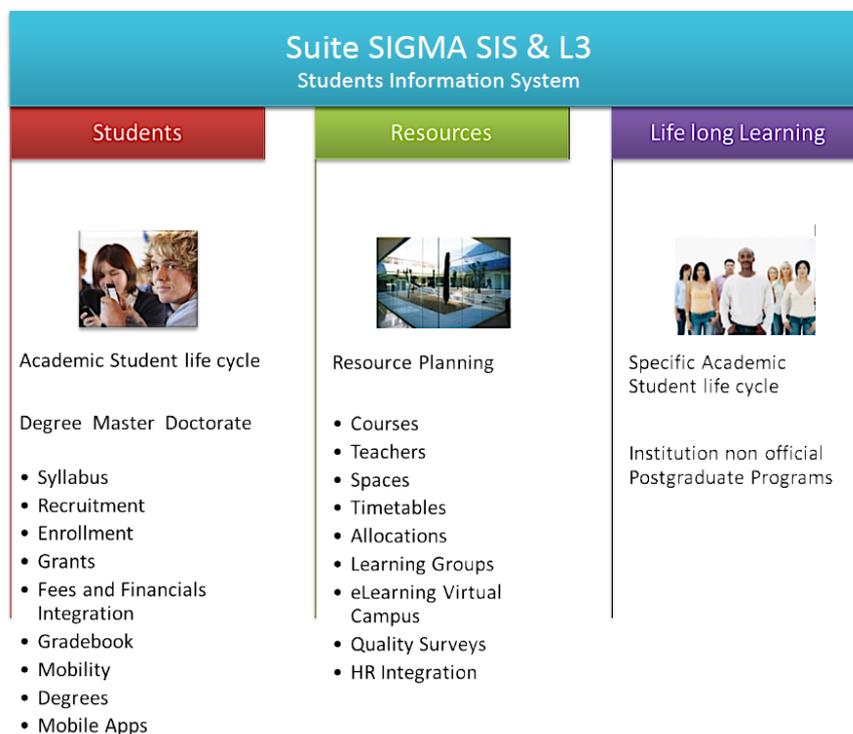


**Fig. 1. Suite SIGMA Students Information System**

## 1.2 SIGMA Current Research Information System

The European Research Area (ERA) [2] was created to facilitate the mobility of researchers, attract the best world researchers and coordinate the national and regional programs. Since then, SIGMA [1] has incorporated in its products - adaptations and new functionalities to support the scientific activity as well as its promotion, and has aligned its SIGMA CRIS Research Project with the ERA requirements.

Sigma is also aware of the new research trends (mobile devices, EuroCRIS Common European Research Information Format – CERIF [3] initiative, unique author identifier studies (i.eiraLIS [4]), altmetrics [5], …) through continuous studies and the experience provided by the joint collaboration with the universities that compose the consortium.
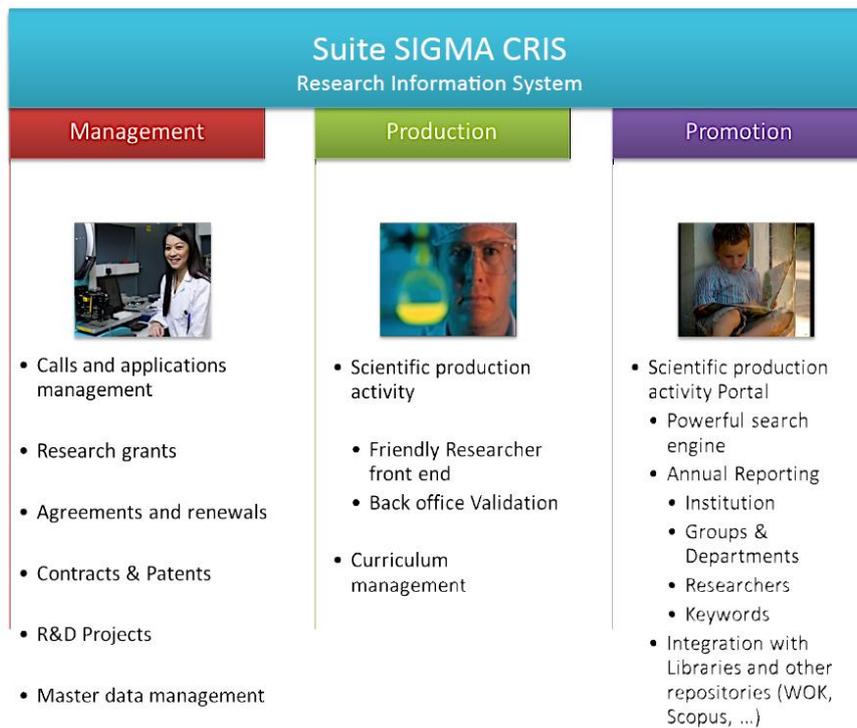
**Fig. 2. Suite SIGMA Current Research Information System**

## 2 SCIENTIFIC OUTPUTS, INTEGRATION AND INTEROPERABILITY

Promotion and dissemination among research community and society are as important as research. Any researcher wants their work to be recognized and make it known, so publication of a scientific output increases the opportunities of being cited and thus its impact.

The universities have made great efforts to promote competitiveness, mobility, create synergies and improve the research quality in-house, regionally, nationally and internationally during the past few years. This has allowed great progress in all areas, researcher's mobility, creating synergies with shared resource centers between different institutions and improving the research visibility generated, but there is still a long way to go.

How scientific outputs are promoted and disseminated?

- **Institutional Web Sites**: Universities and research centers have they own portals and CRIS systems. SIGMA provides CRIS to Spanish Universities.

- **Research Results Transfer Offices (*OTRI*)**: There is an OTRI in almost all the universities and national public research centers, as well as in the university-business foundations and in many technological centers. The OTRI has played a major role as part of the efforts made by the Spanish universities to bring their activities into line with society's needs.

- **Databases of indexed journals**: WoS, Scopus, Dialnet, PubMed are examples of database of indexed journals, where all contributions (articles, editorials, letters, reviews, discussions, etc...)

that may publish on journals are collected. Those databases may be general in scope or cover a specific academic discipline and a significant number of them are still proprietary, available by licensing agreement from vendors.

- **Open Access Repositories**: the open access movement was formalized in the Budapest Declaration, in February 2002, which established that the results of scientific work should be free access, free of charge and without most copyright and licensing restrictions. Recolecta (*www.recolecta.net)*, Recercat (*www.recercat.cat*), Raco (*www.raco.cat*) or TDR (*www.tdx.cat)* are examples of research open access repositories.

The main advantages for researchers and institutions for the promotion and dissemination of scientific outputs are:

- Acquire global visibility.
- Raises the prestige of the authors and institutions.
- Encourages contact between researchers working on the same research scope from any part of the world.
- Facilitate the transference of these results to the companies.
- Promote the participation of the university community in R&D projects.

In this scenario, SIGMA decided to invest actively and improving its product of research management specifically in the module of scientific production. It was decided to give a strong impetus to the solution of scientific production in the sections: usability, interoperability and image. In the area of usability has been done a thorough review of the tool used by researchers to introduce, completing and reviewing scientific production. Specifically improvements were:

- Show initially only required fields and hide the optional fields under "Additional Information".

- Reordering fields to give more importance to the text fields than the codes.

- Add autocompletions for title fields.

- Facilitate the massive influx of publications.

About interoperability we can comment that the adaptations have been made using webservices that allow you to connect to international repositories such as WoS, Scopus and Dialnet.
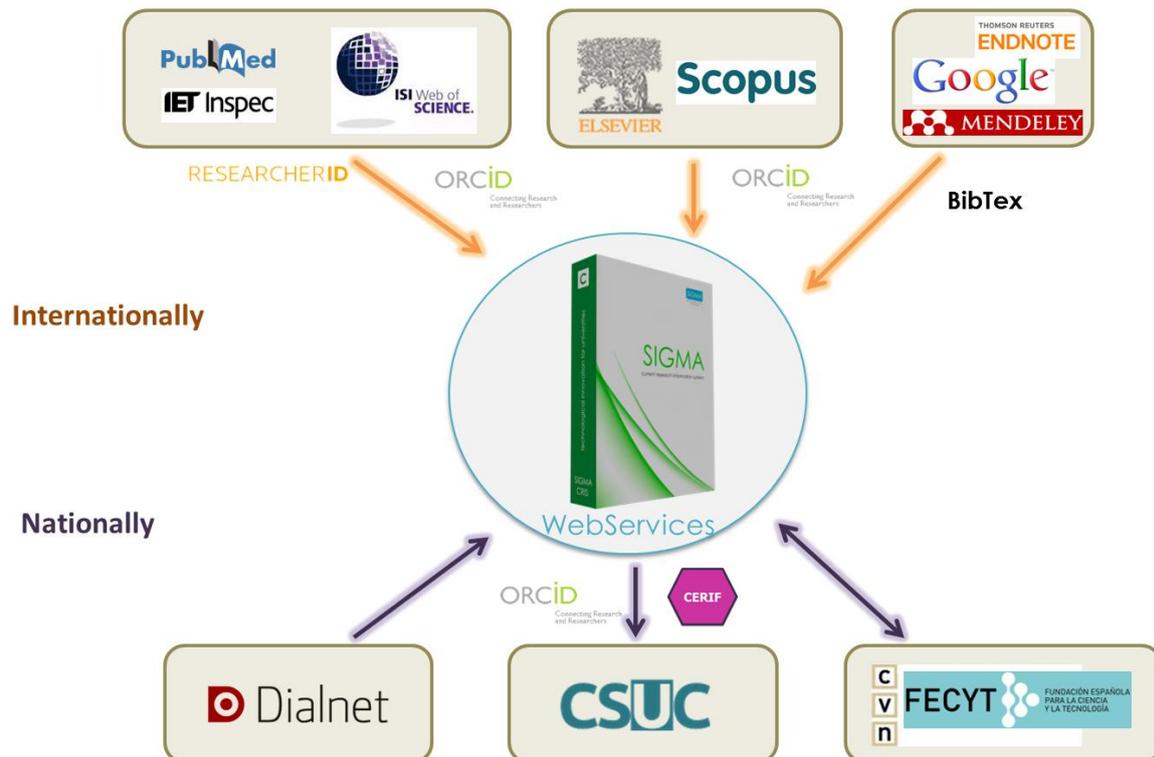


One of the first steps to solve is the author name disambiguation. A right researcher identification is important in order to improve the scientific discovery processes, make the collaboration easier among the research community and guarantee a right interaction among the existing research information systems, such as bibliographic database, this is the challenge of ORCID. SIGMA CRIS manage ORCID which links research activities of the same author indexed to different information systems, and this is adopted as standard researcher identifier among all universities of the consortium (Haak, 2013)[5] which will allow the aggregate query to the research which is produced at these universities and recollected from different systems. Since the launch of ORCID, there was a very strong campaign to encourage the creation of this identifier, placing Spain within the top five countries in the ranking use.

In order to unify data from IR and CRIS, DOI (Digital Object Identifier) is the alternative to locate and identifier scientific outputs (articles, chapters, etc…) as ORCID identifier is for researchers. Both identifiers are managed on SIGMA CRIS. Having analyzed several alternatives for standard exchanging data from CRIS Universities to the central repository, XML-CERIF is the alternative adopted by the consortium. This interoperability will be reach by calling Web Services using OAI-PMH protocol.

Finally, about the improvements in image, it has been redesigned the Scientific Production Portal giving it a more modern view and according to the profile view of a researcher and his entire scientific production, in addition to consulting catalog online of the university.

In this process of improvement, has been tapped to include an expert guide that allows society and the media in particular, to consult a list of expert researchers in several fields.

## REFERENCES

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[4]  IraLIS – International Registry for Authors http://www.iralis.org/

[5]  Altmetrics – A manifesto: http://altmetrics.org/manifesto/