

EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)

A way to make Europe

HERCULES PROJECT

A System for Universities with Research Data Semantically Enriched



euroCRIS May 2022



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José Tomás Palma Méndez

UM Research Coordinator

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Background and objectives

02

Results and Project Plan

03

**Semantic Architecture and Research
Domain Ontology**

04

Research Management System

EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)

A way to make Europe

01

Hercules is an initiative promoted by the Conference of Rectors of Spanish Universities (CRUE) and led by the University of Murcia. It has a total budget of Five million four hundred and sixty two thousand six hundred euros (5.462.600 €). The European Regional Development Fund (ERDF) is financing 80%, therefore the ERDF makes a contribution of Four million three hundred seventy thousand eighty euros (4.370.080 €). This contribution is made through the Ministry of Economy, Industry and Competitiveness (currently the Ministry of Science, Innovation and Universities) as Intermediate Body of the Smart Growth Operational Programme (POCint), which now is known as the Plurirregional Operational Programme of Spain (POPE).

It started in 2017 and it is foreseen to end in 2022.



Background

- 84 Universities having different Research Management Systems
- Each university has its own procedures and the systems are based on different data models and schemata
- Poor standardization
- Transfer of research results to the society is done in a disaggregated way
- Inefficiencies in knowledge management and dissemination
- Additional costs to use combined research information
- Difficulties to access European Funds
- Data representation is done with different granularity



Needs

- Integration of normalized CV
- Transparency
- Collaborations between universities and research groups
- Unify the criteria used to extract the information
- Open Access of research results to the society
- Availability of combined information from different universities/sources
- Improvement of the technological transfer and collaboration University-Company

Hercule's Universities

Convenant with Hercules

- **Universidad de León**
- Universidad Pontificia de Salamanca
- Universidad de Salamanca

- **Universidad de Cantabria**

- **Universidad del País Vasco**
- Universidad de Deusto

- **Universidad Internacional de La Rioja**

- **UNED**
- **Universidad Complutense de Madrid**
- **Universidad Rey Juan Carlos**
- **Universidad Camilo José Cela**

- **Universidad de Extremadura**

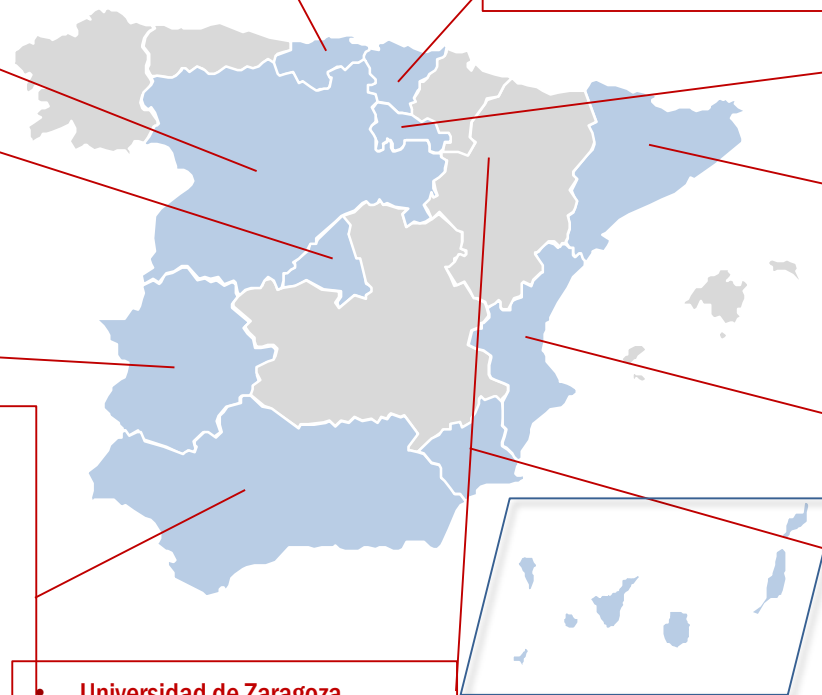
- **Universidad de Córdoba**
- **Universidad de Granada**
- **Universidad Pablo de Olavide**
- **Universidad de Huelva**
- **Universidad de Cádiz**
- **Universidad de Málaga**
- **Universidad de Jaén**
- **Universidad de Almería**
- **Universidad de Sevilla**

- **Universidad de Zaragoza**

- **Universidad Autónoma de Barcelona**
- **Universidad de Barcelona**
- **Universidad de Lleida**
- **Universidad Rovira i Virgili**
- **Universidad Oberta de Catalunya**

- **Universidad de Valencia**
- **Universidad Politécnica de Valencia**
- **Universidad Católica de Valencia**

- **Universidad de Murcia**
- **Universidad Católica de Murcia**
- **Universidad Politécnica de Cartagena**



Intellectual Property Rights

GPLv3

General Public Licence

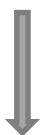
It is free to facilitate the deployment in all universities

02

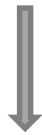
Results of the Hercules project

05

Advanced National Research Portal for Spanish Universities
By using Semantic and Artificial Intelligence Technologies



Advanced Search



Dashboard
Research Indicators



Collaboration Clusters

04

Innovative
Prototype of
the Research
Information
System

06

Tool for the Management and Enrichment of researcher's CV
By using Data Enrichment and Artificial Intelligence Technologies

03

Semantic Arquitectura and Research Ontology

Current status

Projects	Scope	Due Date
Semantic Architecture 03	Research Domain Ontology + Semantic Architecture.	Closed
Innovative prototype of the Research Management System 04	Research Ethics Management Module Calls management Module Request Management module Projects, Grants and Contracts Management Module Intellectual and Industrial Property Rights/Patents Management Module	September 2022
Tool for the Enrichment and Management of Researcher's CV 06	Curriculum Management Tools (Spanish Standard CVN) External Internet Sources Integration Semantic Similarity. Topics Extraction.	September 2022
National Research Portal for Spanish Universities 05	Projects, Researchers, Research Groups, Papers, Patents and other Research Objects portal.	September 2022

Ontological Infrastructure and Semantic Architecture

The products that have been provided are:

- **Ontological Infrastructure:** creation of an **Ontology Network** that can be used to describe the data of the research domain with fidelity and high granularity.
 - Using already existing ontologies
 - Aligned with FAIR principles.
- **Semantic Data Architecture:** developing an efficient platform to store, manage and publish research information. It is based on the Ontological Infrastructure, with the ability to synchronize instances installed in different universities.

ROH. Domains

- The ROH has been designed using different files or “ontologies” for different domains.
- In the scope of the Hercules’ Project 3 ontologies have been created:
 - ROH – General research information
 - ROHES – Spanish specialised information
 - `rohes:Account` – Account System
 - **Derived of** `roh:AcademicAccreditation` y `rohes:Sexenio`
 - **Derived of** `vivo:FacultyPosition`
 - `rohes:Tax`
 - ROHUM – University of Murcia specialised information
 - `rohum:GastosCorrientesYServicios`
 - `rohum:InversionesReales`



Innovative Prototype of a Research Management System

The development of an **innovative prototype** of the **Research Management System** for UNIVERSITIES



Acquisition of equipment or infrastructure is not included in the scope.

Modules

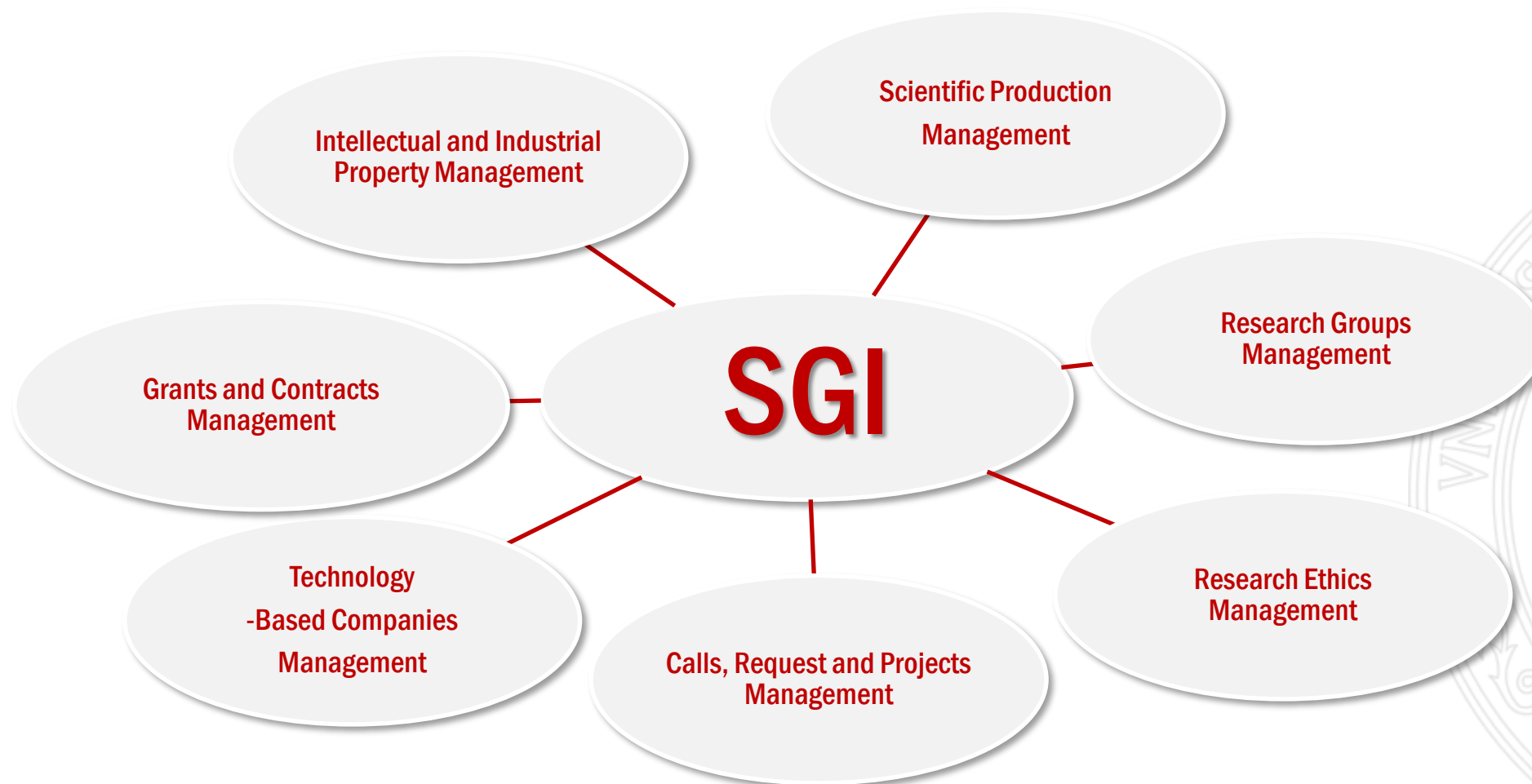


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05

National Research Portal

06

CV Management and Enrichement Tool

07

Conclusions



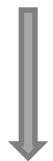
José Tomás Palma Méndez
UM Research Coordinator



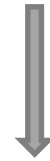
Objective

Advanced National Research Portal for Spanish Universities

By using Semantic and Artificial Intelligence Technologies



Advanced Search
Enriched Information
Semantic Similarity



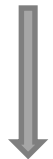
Dashboard.
Research Indicators.



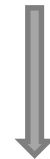
Tools for the creation of
collaborative clusters.

Objective

Advanced Research Portal Semantic and Artificial Intelligence Technologies



Advanced Search
Enriched Information
Semantic Similarity



Dashboard
Research Indicators



Tools for the creation of
collaborative clusters.

05

EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF) *A way to make Europe*

Metasearch

- Single query point
- Information dynamically and automatically retrieve from Knowledge graph

HERCULE
05

Explora

Inicio | Crear cluster | Indicadores | Iniciar sesión

Publicaciones
Investigadores
Centros de investigación
Proyectos
RÖs

FILTRAR POR

CENTRO
Cic bioGUNE (56)
Universidad de La Rioja (40)
Universidad de Murcia (32)
Ver más

ÁREA
Química biológica (56)
Nanotecnología (40)
Ingeniería molecular (32)
Ver más

TIPO DE INVESTIGADOR
Docente (56)
Personal investigador (40)
En formación (32)
Ver todas

ROL

NÚMERO PUBLICACIONES

NOTICIAS

ÍNDICE H

GRUPO DE INVESTIGACIÓN

LÍNEAS DE INVESTIGACIÓN

Publicaciones 2400

Eduardo Enrique Veas

The Sequence Alignment/Map format and SAMtools
2009 Bioinformatics
Heng Li, Bob Handsaker, Alec Wysoker, Tim Fennell, Jue Ruan

The Sequence Alignment/Map (SAM) format is a generic alignment format for storing read alignments against reference sequences, supporting short and long reads (up to 128 Mbp) produced by different

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Exportar
Ordenar
Visualizar

Computer science
Tema de investigación

Computer Science is the study of computers and computational systems. Unlike electrical and computer engineers, computer scientists deal mostly with software and software systems; this includes their theory, design, development, and application.

Temas de investigación
240

Computer Science
Human-computer interaction
Augmented reality
Visualization
Multimedia
Mobile device

Ver todas

Red de colaboradores
60

Universidad de La Rioja
Francisco Corzana López
Publicaciones: 778 H-index: 69

Universidad de La Rioja
Francisco Corzana López
Publicaciones: 778 H-index: 69

Universidad de La Rioja
Francisco Corzana López
Publicaciones: 778 H-index: 69

Universidad de La Rioja
Francisco Corzana López
Publicaciones: 778 H-index: 69

Specific facet-search system

- Publications
- Researchers
- Research Groups
- Projects
- Research lines
- News
- Entities (departaments, research groups, ..)
- Other research results (software, bioprotocols, ...)

Infoboxes (enriched information in search process)

Entity navigation / enriched web pages

- Researchers
 - Publications
 - Research topics
 - Collaborations
 - Projects
 - Research objects
- Research Groups
 - Same structure as Researchers page.

HERCULES Explora

Inicio | Crear cluster | Indicadores

Home > Investigador > Tim Berners-Lee

Información general

Eduardo Enrique Veas
Univ.-Prof. Dr.techn., MSc

Publicaciones 2400

Temas de investigación 240

Red Colaboradores 60

Proyectos 20

ROs 320

Grafo de relaciones con otros investigadores

Listado de Investigadores relacionados

FILTRAR POR

ÁREA DE CONOCIMIENTO

Computer science (56)

Software (40)

Data mining (32)

Artificial Intelligence (28)

Bioinformatics (24)

Data science (19)

Source code (14)

Ver más >

CENTRO

Cic bioGUNE (56)

Universidad de La Rioja (40)

Universidad de Murcia (32)

Ver más >

TIPO DE INVESTIGADOR

Docente (56)

Investigadores 90

Exportar Ordenar Visualizar

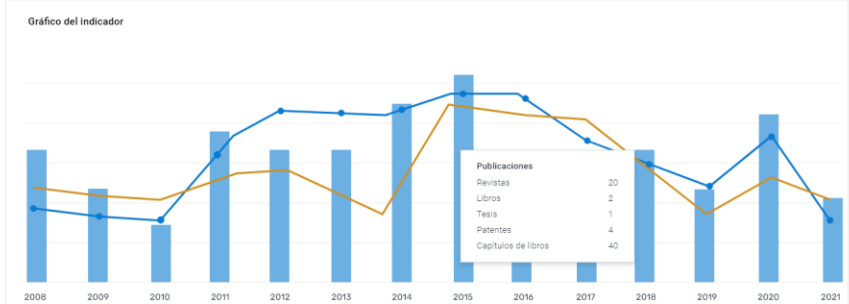
Nombre Apellido Investigador	Publicaciones	H-index
Organización	778	69
Organización	778	69
Organización	778	69
Organización	778	69
Organización	778	69
Organización	778	69
Organización	778	69
Organización	778	69
Organización	778	69
Organización	778	69
Organización	778	69

INVESTIGADOR
Jens Grubert
Professor of Human-Computer Interaction
in the Internet of Things at Coburg
University

EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)

A way to make Europe

Financiación
Indicador financiación



Definiciones Fuentes Datos

Financiación

Descripción

Nullam in rutrum orci. Curabitur sollicitudin neque sollicitudin feugiat imperdiet. Vestibulum at mattis enim. Donec nulla risus, tincidunt nec risus nec, sagittis tristique elit. Aliquam feugiat eu augue sed placerat. Proin consectetur faucibus mi, ac aliquam massa. Nam dapibus dictum eros quis porttitor. In in pulvinar neque. Morbi quis risus mattis, vestibulum erat sed, vulputate lectus. Cras venenatis ex ligula, nec vestibulum arcu pharetra at. Quisque dictum sodales massa, eu facilisis urna semper ac. Pellentesque imperdiet ac lacus hendrerit laoreet. Nulla at malesuada mi, placerat imperdiet ipsum. Donec id lorem porta, maximus orci et, aliquet velit. Praesent condimentum quam lorem, ac imperdiet sem porttitor malesuada.

Cálculo

Nullam in rutrum orci. Curabitur sollicitudin neque sollicitudin feugiat imperdiet. Vestibulum at mattis enim. Donec nulla risus, tincidunt nec risus nec, sagittis tristique elit. Aliquam feugiat eu augue sed placerat. Proin consectetur faucibus mi, ac aliquam massa. Nam dapibus dictum eros quis porttitor. In in pulvinar neque. Morbi quis risus mattis, vestibulum erat sed, vulputate lectus.

Recursos Humanos

Descripción

Nullam in rutrum orci. Curabitur sollicitudin neque sollicitudin feugiat imperdiet. Vestibulum at mattis enim. Donec nulla risus, tincidunt nec risus nec, sagittis tristique elit. Aliquam feugiat eu augue sed placerat. Proin consectetur faucibus mi, ac aliquam massa. Nam dapibus dictum eros quis porttitor. In in pulvinar neque. Morbi quis risus mattis, vestibulum erat sed, vulputate lectus. Cras venenatis ex ligula, nec vestibulum arcu pharetra at. Quisque dictum sodales massa, eu facilisis urna semper ac. Pellentesque imperdiet ac lacus hendrerit laoreet. Nulla at malesuada mi, placerat imperdiet ipsum. Donec id lorem porta, maximus orci et, aliquet velit. Praesent condimentum quam lorem, ac imperdiet sem porttitor malesuada.

Cálculo

Nullam in rutrum orci. Curabitur sollicitudin neque sollicitudin feugiat imperdiet. Vestibulum at mattis enim. Donec nulla risus, tincidunt nec risus nec, sagittis tristique elit. Aliquam feugiat eu augue sed placerat. Proin consectetur faucibus mi, ac aliquam massa. Nam dapibus dictum eros quis porttitor. In in pulvinar neque. Morbi quis risus mattis, vestibulum erat sed, vulputate lectus.

Dashboard
Main indicators

	Research	Enterprise activities	Post-graduate
Input	Applications, awards, success rate	Academic-industry, business consultancy	Research student funding
Process	Income, market share	Contracts, project financial data	Student & academic staff
Output and Outcome	Publications & citations, collaboration, societal impact	Intellectual Property, Spin-Offs, Technological offer	Time to doctoral degree, destination of research student leavers

Research Dashboard

- Facet based navigation according to a predefined hierarchy
- Aggregation of Indicators over a period of time.
- Visualization of the evolution of the indicators according to the timeline.
- Prediction of the evolution of the indicators.
- Detection of trends in different Research Areas



Nombre / Título cluster

The term "Linked Data" refers to a set of best practices for publishing and connecting structured data on the Web. These best practices have been adopted by an increasing number of data providers over the last three years, leading to the creation of a global data space containing billions of assertions—the Web of Data. In this article, the authors present the concept and technical principles of Linked Data

Áreas de investigación

Computer Science Artificial Intelligence

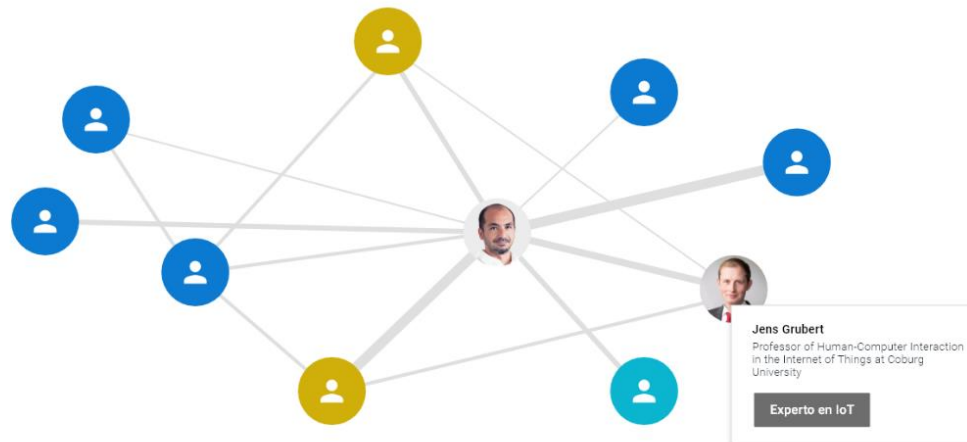
Temas de investigación

Linked Data Platform Linked Data Data Web

Participantes
24

Temas de investigación
240

Grafo de relaciones con otros investigadores



Listado de Investigadores relacionados

FILTRAR POR

ÁREA DE CONOCIMIENTO

Computer science (56)

Software (40)

Investigadores 90

Categoría

Categoría



Nombre Apellido Investigador

Organización

Publicaciones
778

H-index
69

Project Team Recommender / Cluster builder

- Different research topics taxonomies
- Different roles and their associated research topics
- Visualization
- Facet-based refinement
- Complete access to Researchers CV

Benefits

Creation of a research portal with semantic capabilities and infrastructures.

Joint exploitation of university research information

Enabling greater scientific dissemination of research results

Facilitate the detection of R&D synergies between universities and/or research groups.

Strengthen the transfer of R&D results to the private sector and university-industry collaboration.

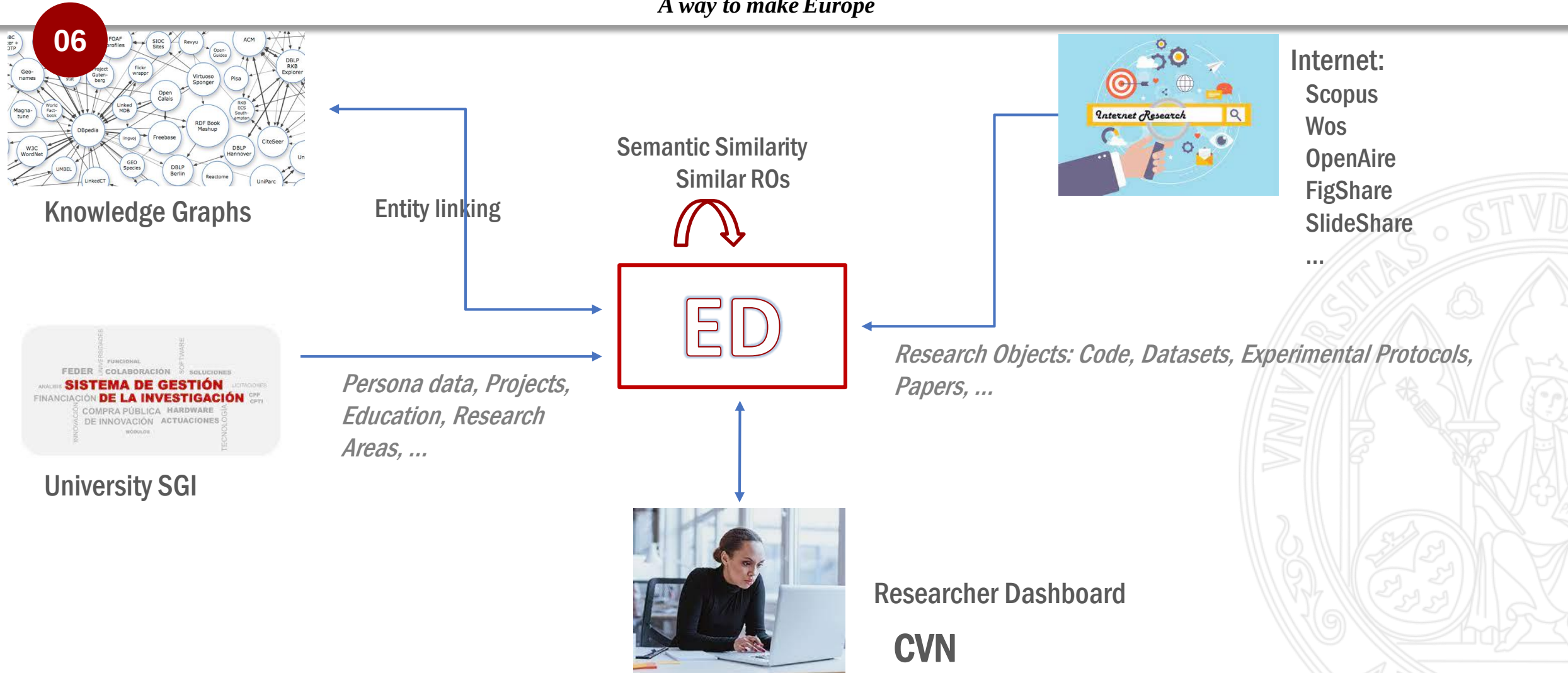
Unify the criteria for information gathering, offering greater guarantees of an adequate interpretation and, therefore, the accuracy of the obtained indicators.

Objective

Management and Enrichment of Researcher's CV Using Data Enrichment and Artificial Intelligence Technologies



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EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)

A way to make Europe

06

Scientific Publications.
References and Citations

WoS, Scopus, OpenAire

CrossRef , OpenCitations, SemanticScholar

Protocols

Code

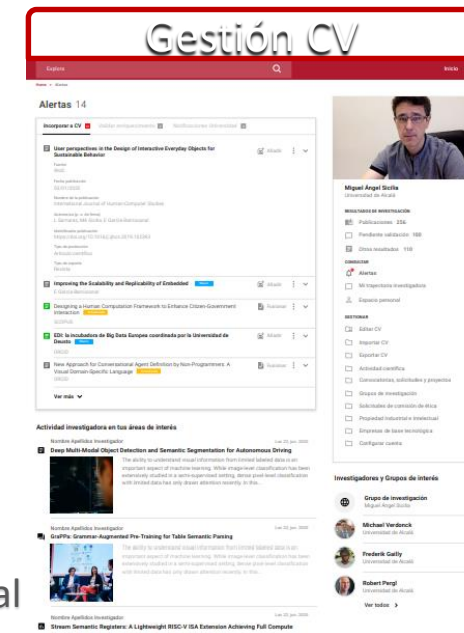
Other research objects
(Dataset, Presentation, Graphics,
Docs, Links, Video, Poster, Lesson)

Zenodo, FigShare, SlideShare, OpenAire

Anotaciones

University
Management
Systems

Academic Information, Formal and non-formal training, Personal
data, Innovation, etc.





Editar CV

Cambiar de sección ▾

Exportar ▾

Idioma ES ▾

Secciones ▾

Plegar todas ▾

Datos de identificación

Situación profesional

Formación recibida

Experiencia científica y tecnológica

Actividad científica y tecnológica

Resumen de texto libre

5 - Actividad científica y tecnológica

Publicaciones, documentos científicos y técnicos (169)

Añadir

Ordenar por fecha más reciente ▾

Escribe algo...



The Challenges of Software Cybersecurity Certification

01/01/2021 Jose Luis Hernandez Ramos, Sara Nieves Matheu Garcia, Antonio Fernando Skarmeta Gomez

[An Artificial Intelligence-Based Collaboration Approach in Industrial IoT Manufacturing: Key Concepts, Architectural Extensions and Potential Applications](#)

01/01/2020 Alfonso Pablo Ramallo Gonzalez, Antonio Fernando Skarmeta Gomez

An Interledger Blockchain Platform for cross-border management of Cybersecurity Certifications

01/01/2020 Jose Luis Hernandez Ramos, Sara Nieves Matheu Garcia, Antonio Fernando Skarmeta Gomez

ARIES: Evaluation of a reliable and privacy-preserving European identity management framework

01/01/2020 Jorge Bernal Bernabe, Antonio Fernando Skarmeta Gomez

Conceptualisation of an IoT Framework for Multi-Person Interaction with Conditioning Systems

01/01/2020 Alfonso Pablo Ramallo Gonzalez, Pedro Javier Fernandez Ruiz, Miguel Angel Zamora Izquierdo, Antonio Fernando Skarmeta Gomez

Ver 5 items ▾

1

2

3

4

5

...

32

33

34

<

>

Trabajos presentados en congresos nacionales o internacionales (0)

Añadir

Ordenar por fecha más reciente ▾

Escribe algo...



 Editar 

PUBLICACIÓN ▼

Plegar todas ▼

Título

User perspectives in the Design of Interactive Everyday Objects for Sustainable Behavior

Descripción

Addressing efficient management of energy has become a central objective due to the scarcity of traditional energy sources and global warming. To cope with this overarching issue, some technological solutions such as Smart Grids, Internet of Things or Demand response are proposed. However, the majority of them overlooks the role of human beings in the equation. Moreover, the very nascent body of research combining human and machine intelligence proposes methods, frameworks, and guidelines which vary depending on the application scenario complicating the selection of gold-standards to ensure seamless cooperation between smart devices and people. Hence, the purpose of this paper is to provide a set of design-hypotheses to devise augmented objects that ally with their users to reduce energy consumption. We expect designers, engineers, makers or even hobbyists in the intersection between technology-enablers (through IoT) and behavioural scientists to benefit from them...

Áreas de conocimiento

Detección facial

Procesamiento lenguaje natural

Grafo de conocimiento

Asistentes virtuales ✕

Web semántica ✕

Linked Data ✕

Tópicos específicos

Computer science

Ontology

Knowledge management

Metadata ✕

Learning object ✕

Semantic Web ✕

Educational technology ✕

Human-computer interaction ✕

Nombre de la publicación

International Journal of Human-Computer Studies

Editorial

Introduce la editorial

Benefits

Researcher CV management

Enhance efficiency
in CV management
for Spanish
researchers

Increasing the
quality and
completeness of
university research
data

Value and raise
awareness of all
research objects
that are part of
the research
process.

Facilitate the
integration of the
CVN. Greater
mobility for
teaching and
research staff
between Spanish
universities.

EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)

A way to make Europe

02

Implementacion Process

Projects	Scope
Pilot Project	University of Murcia
National Research Portal	Universities in Hercules Consortium
National Research Portal	Univiersities outside Hercules Consortitum Conection via API

Conclusions

- HÉRCULES will entail the incorporation into the Spanish University System of a **highly innovative** product that incorporates **semantic web** technologies that will allow us to obtain new information by integrating existing information from multiple nodes with heterogeneous ontologies and vocabularies, enabling greater inductive knowledge from apparently unconnected data.
- As **open-source software**, these techniques will be applicable to a wide range of geographical and knowledge environments.

Conclusions

- As a public service, the implementation of **HÉRCULES** will be a great step forward as it will allow the different University Information and Research Nodes to interoperate in a semantic way, resulting in:
- Improvement in the *efficiency of research management* in terms of licensing and software maintenance costs.
 - Greater *efficiency in public investment* by decreasing duplication of R&D&I investment.
 - Enhancement in the *efficiency of research* in universities

Conclusions

- Improve the ***scientific dissemination*** of research results.
- Create systems to support the ***detection of R&D&I synergies*** between universities.
- Possess ***semantic capabilities*** to strengthen the transfer of R&D&I results to companies.
- Create a system for university research ***data analysis***.
- ***Improve interoperability*** with the corresponding European, national and regional governmental bodies.

EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)

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HERCULES WEBSITE

<http://hercules.um.es>

Thank you for your attention

hercules@um.es

