Spanish Higher Education Enterprise Architecture Initiative and Capability Map

A Case Study by:

Sectorial TIC de la Conferencia de Rectores de las Universidades Españolas (CRUE-TIC)

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Executive Summary

This document presents the work carried out by the Enterprise Architecture subgroup of the Information and Communication Technology Directors working group (SIN group), framed within the Sectoral Committee on Information and Communication Technologies of the Conference of Rectors of Spanish Universities (CRUE-TIC). This paper presents a complete map of the capabilities defined for the whole of the Spanish University System and should be taken as a generic reference upon which each university should customize its own personalized framework, depending on its nature (public or private) or other unique characteristics.

We identify two main contributions for which the generic reference is key. First, to identify the practice of Business Architecture in the SUE itself, as one of the key elements for institutional development and the alignment of all activity with the institutional strategic objectives in an effective way. Second, to have a framework, a common language, at the university system level that also serves as a base reference to link with other works at the system level, such as the ICT services catalog of the SUE or the data model. In addition, it is a key reference for the work of definition and alignment with the equivalent work at the State level.

Work was first done to choose an Enterprise Architecture framework, a modeling language, and a set of tools to be able to co-create and share materials. Aligned to The Open Group vision for **Boundaryless Information Flow**, The Open Group TOGAF® framework, the ArchiMate® notation language, and the Archi® modeling toolkit were selected.

Introduction

In 2017, the Enterprise Architecture subgroup of the Information and Communication Technology Directors working group (SIN Group[1]), framed within the Sectoral Committee on Information and Communication Technologies (CRUE-TIC[2]) of the National Association of Rectors of Spanish Universities (CRUE[3]), started to work on the definition of the Enterprise Architecture practice initiative for the Spanish University System (SUE[4]).

The working group identifies Enterprise Architecture as one of the key elements for universities (in fact, for any organization), while also detecting a low adoption of this practice in the SUE. A clear first objective was then proposed, to promote and disseminate the concept of Business Architecture in the SUE.

Often, Enterprise Architecture practice is misunderstood, and even more so the role of Enterprise Architects. Let us dedicate this work to them:

[Enterprise Architects] "...are like sailors who have to rebuild their ship on the open sea, without ever being able to dismantle it in dry dock and reconstruct it from the best components." Otto Neurath

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[1] Refer to: https://tic.crue.org/grupos-de-trabajo/direccion-de-ti/.

[2] Refer to: https://tic.crue.org/.

[3] Refer to: https://www.crue.org/.

[4] SUE stands for Spanish University System (in Spanish – Sistema Universitario Español).

Problem Statement

When the CRUE-TIC Enterprise Architecture working group began in 2017, there was little knowledge of the practice of Enterprise Architecture in the whole SUE, or of its benefits for the whole institution. In addition, there was a lack of a common reference/language as a whole system. Far from understanding this as something negative, it was seen as an opportunity to unify and build.

Specific objectives were established: to define and disseminate what Enterprise Architecture is (and what it is not); to provide the first tool to the system that allows the connection of business and technology (the capability map); and to link this initiative with the results of other existing initiatives, such as the service catalog[5] of Spanish universities.

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[5]Refer to: https://tic.crue.org/catalogo-de-servicios-tic/.

Approaches Considered and Selected

The Enterprise Architecture working group adopted one main principle: "*do not reinvent the wheel*". So, we started by analyzing basic aspects, such as what frameworks of reference existed, at what stage was the question in the Higher Education (HE) sector, what modeling languages existed, what tools were available, etc. in order to identify those that would be taken as the basis for the initiative of Spanish universities.

About the Reference Model

The main architecture reference models (US Federal Enterprise Architecture (FEA), The Zachman Framework for Enterprise Architecture™, and the TOGAF® Standard) were analyzed. Their implementation/use in several countries (Australia, Austria, Belgium, Canada, Denmark, New Zealand, India) was also analyzed. As a result, the TOGAF Standard (see References) was chosen.

About Status on HE Initiatives

Different existing initiatives and references in the HE space were analyzed. Of these, two main initiatives and references were finally selected (see References):

- CAUDIT[6] v1.0.3

- UCISA[7] v1

An extensive analysis of both models was carried out, to include the philosophy and approaches of each one as well as a detailed comparative analysis of all capabilities.

Figure 1: Extract from the Comparative Work on the CAUDIT and UCISA Frameworks

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[6] Refer to https://www.caudit.edu.au, or see References.
[7] Refer to https://www.ucisa.ac.uk, or see References.

The CRUE Universidades Españolas' Approach to Capability Mapping

Context is an important aspect of Enterprise Architecture practice, which is why, after evaluating existing frameworks, it was decided that a new Enterprise Architecture, adapted to Spain and Spanish university environments, should be produced. Factors such as the legal nature of universities (publicly or privately funded) or cultural aspects (religious institutions, institutions with clear commercial orientation, etc.) were taken into consideration.

As a result, the first Spanish HE capability map was based on the CAUDIT model, incorporating the commercial capabilities of UCISA, and adapting some aspects of the SUE (such as basic terminology).

Preparation

The Spanish Enterprise Architecture Initiative Approach

One of the main goals of the Enterprise Architecture initiative was to prioritize a business approach, even above a technical approach.

The Spanish Enterprise Architecture Definition

"What is Enterprise Architecture?" Maybe this is the most recurrent question when someone starts to lead an Enterprise Architecture initiative.

We agreed to adopt a practical definition: "The purpose of Enterprise Architecture is to *WHY*, by *HOW*, using *WHAT*", to give us three main perspectives:

• WHY

  To enable an enterprise to realize its Vision through the execution of its Mission, while enabling it to respond to change and increase its effectiveness, profitability, customer satisfaction, competitive edge, growth, stability, value, durability, efficiency, and quality while reducing costs.

• HOW

  By strategic planning, architecture, and governance, supported by a decision support framework in the context of aligning all parts of the enterprise.

• WHAT

  Using models, guidance, processes, and tools.

Thus, we arrived at a more formal definition: "The purpose of Enterprise Architecture is to enable an enterprise to realize its Vision, by strategic planning, architecture, and governance, using models, guidance, processes, and tools."

It was also important to define what Enterprise Architecture is NOT. It is not:

• Lots of hardware, software, and white papers describing business IT

• A one-time project or effort

• IT governance and business strategy

• A set of artifacts, or architect-generated documents that describe the current state and future state architecture, or documents generated as part of an Enterprise Architecture framework

The Enterprise Architecture Initiative Framework

The TOGAF Standard, as explained above, was adopted as the best framework to fit our needs.

The Enterprise Architecture Initiative Modeling Language

The ArchiMate® Specification[8] (see References) was adopted as the modeling language for Enterprise Architecture.

The Enterprise Architecture Initiative Tool

The Archi® modeling toolkit[9] was adopted as the tool for modeling together with the GitHub™ collaboration plug-in[10], to enable the possibility for universities to work jointly.

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[8] Refer to: https://www.opengroup.org/archimate-home, or see References.

[9] Refer to: https://www.archimatetool.com.

[10] Refer to: https://github.com.

Enterprise Architecture Opportunities Identified

First things first: to properly sell the Enterprise Architecture initiative it is important to have a list of its benefits and opportunities. We adopted the following as the most important:

- Provides a full view of the university to all stakeholders through a comprehensive framework for business, performance, applications, data, integration, technology, security, and governance

- Enables the development of systems that are interoperable and scalable

- Provides a performance framework to measure drive performance based on indicators

- Ensures departmental and interdepartmental relationships are effectively identified

- Provides a structured way to categorize and prioritize university unit services for effective automation

- Provides a framework to develop and deploy applications from different units in a standardized way

- Facilitates the optimized use of Information and Communication Technologies by the university, reducing the cost of IT and business operations by identifying opportunities for reuse

The "Business First" Approach

As a first milestone, a dedicated strategy for communication is raised as a key element. Softly introducing the concept and its benefits was foreseen as a key goal. To do so, several materials/toolkits and dedicated meetings and speeches were planned for three main groups: decision-makers, business staff, and ICT staff (some examples are provided as separate downloads with this document – see also Additional Sources).

In addition, a collaborative workspace was deployed so that all universities are able to collaborate, find all produced materials, and share their own materials in a co-creation working model. The provision of real examples, those that anyone can associate with a nearby university for which they know the reality, allows the understanding of how a principle has been applied and what benefit has been obtained. It is one of the best ways to sell Enterprise Architecture; what it is for, its benefits, and how it can add value.

In this sense, learning lessons from mistakes is highly appreciated; to understand where and how a specific initiative or action can fail in a way that allows the rest to avoid making the same mistakes.

The Spanish HE Capability Map

As stated earlier, two main initiatives and references were selected: the CAUDIT initiative and the UCISA initiative. A dedicated working group started to analyze and compare both initiatives and references, to get the best of both for the Spanish HE system.

To accomplish this, capability maps from both initiatives were studied deeply and, as a first outcome, the need to create a new one that combined the best of both of them was suggested and adopted. As mentioned above, context is important, and the Spanish education system has some slight differences, and some major ones (public funding, governance model, etc.).

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

As a result, we have produced the "*Spanish HE Capability Map, Version 1.0*", which combines most of the CAUDIT capabilities, some UCISA capabilities, and some of our own.

The following Level 1 capability groupings were defined:

- Strategy and Governance: the processes and activities aimed at ensuring that the organization has a coherent, integrated, and sustainable vision, mission, and strategy

- Teaching and Learning: the processes and resources necessary for effective teaching and learning

- Research: the processes and resources necessary to manage the establishment of the research program

- Commercial Activity: the processes required to ensure that the organization is able to develop, deliver, support, and administer commercial activity

- Enabling Capabilities: the enabling core processes to support the business

A detailed explanation is provided in this document.

Solution Architecture and Implementation Plan

The following points were identified as aims to facilitate the concept and benefits of the practice of Enterprise Architecture in the SUE:

- The fit of Enterprise Architecture practice with the necessary Digital Transformation of universities:

  — Enterprise Architecture will allow HE institutions to describe all areas of the organization – the actors, the elements, and their relationships, with all their different perspectives (visions) – both for the current "as-is" situation and for the "to-be" objectives

  — With Enterprise Architecture, we will also be able to establish the gap between the "as-is" and the "to-be" scenarios and identify all elements of the organization that must evolve; to model "disruption" into "evolution"

- The elements that should be considered in an organization, and their fit with Enterprise Architecture, are conceptualized

- The concept and elements of the Enterprise Architecture are defined

- The framework proposed for the SUE is specified with a first modeling of the capacities of a typical university

- Examples for a better understanding of the potential and possibilities of Enterprise Architecture

Risks and Mitigation Strategies

Jisc[11] analyzed the possible causes of the lack of adoption of Enterprise Architecture in HE settings and explained the most likely reason for this: that the name itself is probably part of the problem.

"As the definitions suggest, it is a strategic technique, it is about people and processes as much as it is about technology, and it is a holistic approach. However, the word "enterprise" has corporate connotations that don't really resonate with the education sector and the word "architecture" makes it sound very technical. These are probably the important reasons why, despite the fact that Enterprise Architecture is a tried and tested technique that has been in use for around 20 years, Enterprise Architecture is little used, or even heard of, in the education sector."

Taking that into account, communication was identified again as one of the key priorities. Communication, however, must be appropriate to the audience and, therefore, one of the first actions undertaken was to prepare suitable material oriented to the university board and other suitable material oriented to technical profiles. In both cases, the objective/goal remained the same: to showcase how Business Architecture fits in and can add value to the interests of each target audience.

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[11] Refer to: https://www.jisc.ac.uk/guides/enterprise-architecture.

CRUE HE Capability Map for Spanish Universities (Spanish HE Capability Map v1.0)

The CRUE-TIC Enterprise Architecture working group elaborated the "Spanish HE Capability Map v1.0". In the following pages we will describe it in detail starting from Level 1 to Level 3.

The "*Spanish Higher Education Capability Map v1.0.archimate*" file, attached to this publication, contains all the levels as well as the related definitions for each capability or capability grouping.

To make the different layers readable, each layer will be presented in turn, with a figure for each level followed by a detailed list of its associated capabilities.

Spanish HE Capability Map, Level 1

Figure 2: Spanish HE Capability Map, Level 1

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Table 1: Set of Capabilities for Level 1

Level 1 Capability	Processes and/or Resources Necessary for/to:
Strategy and Governance	Effective strategic planning
Teaching and Learning	Effective teaching and learning
Research	Manage the establishment of the research program
Commercial Activity	Ensure that the organization is able to develop, deliver, support, and administer commercial activity
Enabling Capabilities	Enable core processes to support the business

Spanish HE Capability Map, Level 2

Strategy and Governance

- Strategic Governance
- Organization, Quality, Processes
- Risk & Compliance

Teaching and Learning

- Curriculum Management
- Attraction & Recruitment of Students
- Student Admission Management
- Student Enrollment
- Delivery of Teaching & Learning
- Student Assessment
- Student Completion & Graduation
- Alumni Loyalty
- Academic Administration
- Student Administration
- Student Support & Wellness Management

Research

- Research Planning & Opportunities
- Research Funding
- Research Delivery
- Research Publication
- Research Improvement
- Research Training
- Research Impact
- Research Support Management

Commercial Activity

- Commercial Offer
- Commercial Commitment
- Commercial Delivery
- Commercial Monitoring

Enabling Capabilities

- Government, Public, & Strategic Partner Relations
- Brand & Marketing Management
- Human Resource Management
- Finance Management
- Accommodation Management
- Library Administration
- Facilities & Property Management
- Supporting Services
- Information & Knowledge Management
- Information & Communications Technology Management
- Legal Services

Figure 3: Spanish HE Capability Map, Level 2

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Table 2: Set of Capabilities for Level 2

Level 1 Capability	Level 2 Capability	Processes and/or Resources Necessary for/to:
Strategy and Governance	Strategic Governance	Effective strategic planning
	Organization, Quality, Processes	Determine and report on organizational performance, and to develop, enhance, and manage improvements
	Risk & Compliance	Perform risk management and compliance activities
Teaching and Learning	Curriculum Management	Create and develop the curriculum
	Attraction & Recruitment of Students	Undertake activities to attract and recruit domestic and international students
	Student Admission Management	Admit students to the institution
	Student Enrollment	Enrol students at the institution
	Delivery of Teaching & Learning	Deliver teaching and learning
	Student Assessment	Manage student assessment
	Student Completion & Graduation	Perform student completion and graduation
	Alumni Loyalty	Engage with past students of the institution
	Academic Administration	Schedule curriculum courses
	Student Administration	Manage student administration
	Student Support & Wellness Management	Provide support to students during their studies
Research	Research Planning & Opportunities	Manage the establishment of research programs
	Research Funding	Identify sources and manage research funding
	Research Delivery	Manage the delivery of research
	Research Publication	Publish research findings and outcomes
	Research Improvement	Improve the research program
	Research Training	Prepare academics and students for research activities
	Research Impact	Promote research outcomes

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 1 Capability	Level 2 Capability	Processes and/or Resources Necessary for/to:
	Research Support Management	Acquire the resources, infrastructure, and equipment needed to support a research project
Commercial Activity	Commercial Offer	Identify potential new commercial opportunities across all sectors in which it is looking to operate
	Commercial Commitment	Manage organization relationships with commercial partners
	Commercial Delivery	Ensure the successful fulfillment of organization commercial activity commitments
	Commercial Monitoring	Scrutinize the effectiveness and performance of all commercial endeavors within the organization
Enabling Capabilities	Government, Public, & Strategic Partner Relations	Manage and maintain relationships with key stakeholders
	Brand & Marketing Management	Manage and market the institution brand
	Human Resource Management	Manage human resources
	Finance Management	Perform finance management activities
	Accommodation Management	Manage the provision of accommodation to students, and potentially to other people when not occupied by students
	Library Administration	Provide library services within the institution
	Facilities & Property Management	Manage and maintain institution property and facilities
	Supporting Services	Provide ancillary on-campus support services
	Information & Knowledge Management	Manage the institution's information assets
	Information & Communication Technology Management	Manage the institution's ICT
	Legal Services	Provide effective legal services

Spanish HE Capability Map, Level 3

Level 3 Capabilities for Strategy and Governance

Figure 4: Spanish HE Capability Map, Level 3 – Strategy and Governance

Table 3: Level 3 Capabilities – Strategy and Governance

Level 2 Capability for Strategy and Governance	Level 3 Capability	Processes and/or Resources Necessary for/to:
Strategic Governance	Strategic Vision & Development	Perform the vision and strategic development
	Development of the Strategic Plan	Perform the development of the strategic plan
	Management of the Strategic Plan	Perform the management of the strategic plan
	Strategic Reports	Assess and analyze Key Performance Indicators (KPIs)
	Corporate Performance Management	Perform the corporate management
	Commercial Prospect	Perform the commercial prospect
Organization, Quality, Processes	Benefits Management	Perform the benefits management
	Program & Project Management	Perform the program and project management
	Organizational Design	Perform the organizational design
	Portfolio Change Management	Perform the portfolio change management
	Quality Management	Assess service quality and determine and monitor quality improvement activities
	Enterprise Architecture	Perform Enterprise Architecture
Risk & Compliance	Risk Management	Assess corporate risk, and to identify and monitor risk mitigation activities

Level 2 Capability for Strategy and Governance	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Compliance Monitoring & Reporting	Monitor and report on compliance with institution policies and standards
	Management & Regulation of Standards	Perform the management and regulation of standards
	Internal Audit & Reports	Manage and undertake the internal audit and compliance program
	Business Continuity Management	Develop, test, and maintain the institution's business continuity plan(s)

Level 3 Capabilities for Teaching and Learning

Figure 5: Spanish HE Capability Map, Level 3 – Teaching and Learning

Table 4: Level 3 Capabilities – Teaching and Learning

Level 2 Capability for Teaching and Learning	Level 3 Capability	Processes and/or Resources Necessary for/to:
Curriculum Management	Curricular Design	Determine curriculum topics and design the academic curriculum
	Curriculum Performance Management	Assess curriculum performance and undertake performance improvement measures, including quality assessments

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Teaching and Learning	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Curriculum Development & Resources	Design and develop the learning and teaching resources that support the curriculum, including reusable digital assets
	Professional Accreditation	Gain accreditation for the academic curriculum by the relevant authority
	Professional Learning (Personal)	Prepare academic staff for designing and delivering HE
	Curriculum Management due to Obsolescence	Manage the academic curriculum due to obsolescence
	Curriculum Change Management	Manage changes in the academic curriculum
Attraction & Recruitment of Students	Prospective Recruitment of Students	Engage and promote the institution with prospective students from schools and other tertiary institutional settings
	Recruitment of Students from the Territory	Manage the recruitment of students from the territory
	Recruitment of International Students	Manage the recruitment of international students
	Management of Student Recruitment Agents	Manage student recruitment agents
Student Admission Management	Student Application Management	Process student applications
	Admission Evaluation	Assess and evaluate student applications
	Offer Management & Quota Management	Manage student placement offers and quotas
	Management of Prior Studies Recognition	Manage prior studies recognition
Student Enrollment	Pre-Registration Management	Manage pre-registration
	Enrollment in a Program	Ensure that students are fully enrolled on their chosen program of study, including provisional enrollment, confirmation, and capture of all necessary personal details
	Enrollment Management	Ensure that students are fully enrolled on the necessary modules for their program of study, including pre-enrollment where appropriate and provision of full information to enable informed module choice

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Teaching and Learning	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Scholarship Management	Manage scholarships
Delivery of Teaching & Learning	Face-to-Face Teaching	Provide face-to-face teaching activities that enable learning and associated resources to students physically located with the teaching content provider
	Non-Face-to-Face Teaching	Provide teaching activities via online and digital channels that enable learning for students not physically located with the teaching content provider
	Preparation of Teaching & Learning Content	Manage the preparation of teaching and learning content
	Student Internship Management	Source, allocate, and manage the placement of students in learning and professional practice environments external to the organization as part of the curriculum
	Management of Teaching & Learning Content	Provide resources in a wide range of formats to support teaching and learning in the organization; for example, physical and digital resources such as the VLE and lecture capture, access to specialized space, library, and other physical and digital services
Student Assessment	Assessment Delivery	Ensure that students are assessed against the learning outcomes of their curriculum proportionately, and using the most appropriate assessment method
	Student Results Management	Manage the gathering, aggregation, and assignment of a student's results from a variety of assessment methods (including coursework, examinations, and placements) as part of their curriculum and in accordance with academic regulations to provide assessment outcomes (e.g., progression and award)
	Administrative Evaluation	Administer the assessment of students, ensuring that regulations, policies, and processes are followed and that there is a clear communications strategy so students are aware of the assessment regime and their responsibilities
	Grade Evaluation & Surveys	Mark, benchmark, and moderate assessments, and provide feedback to students that facilitates their development as learners

Level 2 Capability for Teaching and Learning	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Management & Evaluation of the Relationship with the Industry for the Employability of Students	Engage with prospective employers and to ensure students are provided with direction and careers advice in order to help them develop and realize their career ambitions and to maximise their employment prospects
Student Completion and Graduation	Managing Eligibility for Graduation	Ensure that the administrative and financial (debt) affairs of students are in order, and those eligible to graduate can be determined (this does not include academic results or exam/review boards)
	Graduation Event Management	Stage the ceremony at which degrees are formally and publicly conferred by the organization to eligible graduates, including the ability to make the necessary arrangements for the event(s), and the carrying out of the graduation ceremony itself along with other associated events
	Records Management of Graduation Certificates	Ensure that accurate records, relating to the formal qualifications awarded to students, are produced and maintained, including degree award certificates, diploma supplements and other associated certificates and records, and the ability to provide records and certificates as required
	Non-Academic Achievement Management	Ensure the recognition and recording of achievements made by students at organization, other than formal academic awards, including abilities to produce achievement reports, recognise outstanding extra-curricular activities and voluntary work, and to bestow institution-specific prizes
Alumni Loyalty	Alumni Relationship Management	Ensure the effective communication and interaction with past students of the organization
	Alumni Campaign & Event Management	Ensure the development and management of alumni-related events and campaigns
	Benefactor Management	Ensure effective engagement with potential/actual benefactors; benefactors may provide financial donations or other help
Academic Administration	Academic Policy & Regulation Management	Create, review, administer, and revise academic policies and regulations
	Annual Program of the Academic Year	Schedule the curriculum across the academic year

Level 2 Capability for Teaching and Learning	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Management & Review of Teaching Resources Schedules	Manage the creation, revision, and communication of the timing and location of curriculum events, including lectures, seminars, examinations, and all similar/related activities
Student Administration	Student Mobility	Ensure that students can study and enrol at different universities either as part of their award at the originating organization or as a permanent transfer to the other organization, and *vice-versa*, the ability to accept students from other universities in the same fashion
	Student Financial Management	Ensure that all aspects of student finance are effectively managed, including fee setting and collection and debt management
	Enrollment Status Management	Ensure the change of official student status as members of the organization in response to requests or changes in situation, and in accordance with the relevant regulations, which includes the abilities to interrupt/suspend studies for a period, withdraw from units of study, programs of study and/or the organization, and to transfer between units/modules of study
	Transfer Management	Ensure a student's enrollment on one program can be ceased and enrollment onto an alternative program performed (within limitations that may be imposed in terms of time, academic requirements, fees, or other administrative reasons)
	Data Management & Student Records	Maintain accurate information about students, including contact, address and biographical details, and document management, including appropriate record retention and disposal management
	Management of Student Exceptionalities	Ensure student submissions relating to mitigating circumstances can be received and processed, to investigate and act in response to student misconduct, or allegations thereof, and handle subsequent formal challenges to those findings or actions, which includes ensuring the appropriate formal frameworks are in place for dealing with such situations – the term "misconduct" can relate to academic offences, administrative discrepancies, or behavioural conduct

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Teaching and Learning	Level 3 Capability	Processes and/or Resources Necessary for/to:
Student Support and Wellness Management	Development of Academic Competencies	Ensure students are assisted with their academic skills development, including development of skills in research, use of library resources, academic writing, work planning, and critical thinking
	Student Motivation and Retention	Ensure students are pro-actively engaged in the learning process and want to continue their studies at the organization
	Financial Advice to Students	Ensure students receive the help they need to manage their finances, including providing advice and guidance on financial matters and providing access to hardships funds if required
	Accommodation Advice	Ensure students have access to the support and advice required to enable them to secure accommodation that suits their needs and budget, whether that be organization halls or private accommodation
	Management of Personal Tutors	Ensure delivery of personal tutoring to students to help them make a successful transition into HE and aid their academic progression and achievement, including the provision of academic and personal support and guidance, and signposting to other support services
	Student Health and Wellness	Assist students with their health and wellbeing, including the provision of student wellbeing advice, mental health advice, and counselling
	Support for People with Disabilities	Ensure students who disclose a disability or require additional support for their academic studies receive the support and advice they need to achieve their full potential
	Personal Learning Management	Ensure students requiring additional support receive an individual personal learning plan to help them achieve their short and long-term goals
	Management of Academic Advice	Ensure academic advice is provided for students, including insight, direction, and planning of their academic career
	Management of the Professional & Occupational Relationship	Management of the professional and occupational relationship

Level 3 Capabilities for Research

Figure 6: Spanish HE Capability Map, Level 3 – Research

Table 5: Level 3 Capabilities – Research:

Level 2 Capability for Research	Level 3 Capability	Processes and/or Resources Necessary for/to:
Research Planning & Opportunities	Research Opportunities Analysis	Analyze and identify research fields that the institution may wish to promote or target
	Research Prioritization	Develop the research program goals and priorities and undertake research prioritization within the research program
	Collaboration Opportunity Management	Identify and manage collaborative research opportunities
	Research Program Development	Develop the institution research program
Research Funding	Raising Research Funding	Identify and secure research funding
	Management of Research Funds	Manage research funds
Research Delivery	Research Output Management	Manage the integrity of the outputs from research programs
	Research Production	Manage the production of research at the institution
	Research Dataset Management	Manage the storage, usage, and sharing of datasets created from research programs
Research Publication	Research Publications Reviewing	Manage participation and recognition of researchers in publication review activities for journals, conferences, and other publications

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Research	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Research Reporting	Develop and produce research reports on findings and outcomes, and to meet the reporting requirements of the research funding body
	Research Publications	Develop and achieve publication of research findings and outcomes
Research Improvement	Research Quality Management	Assess research program quality and undertake quality improvement activities
	Researcher Performance Management	Assess researcher performance and undertake performance improvement activities
	Research Program Performance Management	Assess research program performance and undertake performance improvement activities
Research Training	Training and Development of Researchers	Provide training and development for researchers
	PostDoc Supervisor Accreditation	Manage the accreditation of PostDoc student supervisors
	PostDoc Skills Development	Assist PostDoc students with their skills development
Research Impact	Manage Research Relationships	Engage and promote the institution's research with commercial organizations
	Impact Management in Non-Commercial Research	Plan and realize the non-commercial potential of its research outcomes, including for social good
	Commercialize Research Results	Manage the realization of the commercialization of research outcomes
Research Support Management	Research Compliance Management	Provide compliance support to research projects
	Ethical Clearance Management	Ensure a robust ethical clearance process for research projects
	Research Infrastructure Management	Manage and support specialized research infrastructure
	Attraction & Retention of Researchers	Recruit and retain specialized research staff
	Research Application Development	Develop and support specialized research applications
	Research Data Management Planning	Support researchers to develop data management plans for managing their research datasets

Level 3 Capabilities for Commercial Activity

Figure 7: Spanish HE Capability Map, Level 3: Commercial Activity

Table 6: Level 3 Capabilities – Commercial Activity

Level 2 Capability for Commercial Activity	Level 3 Capability	Processes and/or Resources Necessary for/to:
Commercial Offer	Identification of Business Opportunities	Ensure that potential new commercial opportunities can be identified across all sectors in which it is looking to operate
	Market Business Analysis	Ensure that effective processes are in place for the gathering of information about past, current, and future states of the commercial marketplace in which it is looking to operate
	Market Opportunity Assessment	Ensure that it has the relevant measures in place to compare and evaluate commercial opportunities
Commercial Commitment	Partner Commercial Commitment	Initially identify, engage with, contract, administer, and maintain commercial partners
	Integration & Transition of Commercial Partners	Manage assimilation and change in the relationship with commercial partners
Commercial Delivery	Management of the Production of the Commercial Activity	Ensure the relevant processes are in place to deliver and communicate related time, quality, resources, and risks associated to commercial outputs
	Business Activity Problem Management	Ensure that all issues affecting commercial activity are handled speedily and effectively, within legal parameters, with the specific aim of minimizing business damage and adverse brand reputation
	Management of Abandonment of Commercial Activity	Ensure all relevant processes are in place to allow the organization to cease specific commercial activities with the least harmful effect

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Commercial Activity	Level 3 Capability	Processes and/or Resources Necessary for/to:
Commercial Monitoring	Performance Management of the Commercial Contract	Ensure the process of systematically and efficiently managing contract execution and analysis for the purpose of maximizing financial and operational performance and minimizing risk
	Business Activity Reports	Ensure the effective reporting of commercial activity performance, good or bad, within the organization activity reports
	Business Contingency Planning	Ensure commercial activities can continue in the event of unplanned activities, such as supplier failure, emergency, or disaster

Level 3 Capabilities for Enabling Capabilities

Enabling Capabilities

Government, Public, & Strategic Partner Relations
- Government Relations Management
- Industry Relationship Management
- Internal Stakeholder Relationship Mgmt
- Media Relations
- Other Tertiary Institution Relationship Mgmt
- Public Relationship Management

Brand & Marketing Management
- Advertising Management
- Campaign Management
- Event Management
- Market Research
- Marketing Management
- Merchandising

Human Resource Management
- Workforce Planning
- Organizational Design & Change Mgmt
- Remuneration & Entitlements Management
- Workforce Relations Management
- Staff Recruitment
- Organizational Health & Safety
- Staff Engagement
- Employee Performance Management
- Training & Development
- Workforce Reporting
- Human Resource Support
- Workforce Management
- Talent Management
- Staff Record & Details Management
- Staff Absence Management

Finance Management
- Procurement & Purchasing
- Expenditure Management
- Treasury Management
- Income Management
- Insurance Management
- Asset Management
- Financial Reporting
- Tax Liability Management
- Investment Management
- Financial Analysis
- Supplier Management

Accommodation Management
- Accommodation Allocation
- Accommodation Facilities Management
- Accommodation Incident & Emergency Response
- Accommodation Departure & Turnaround Mgmt
- Private Sector Housing Management

Library Administration
- Art / Museum Collection Management
- Library Collection Resource Management
- Collection Access Management
- Membership Management

Facilities & Property Management
- Campus Security
- Commercial Tenancy
- Space Utilization
- Buildings & Facilities Management
- Environmental Management Services
- Campus Parking
- Health & Safety
- Mail Management
- Estate Development & Management
- Commercial Non-Compliance Mgmt
- Vehicle Management
- Property Management
- Grounds Maintenance

Supporting Services
- Food & Retail Outlet Management
- Religious Support
- Sport & Recreation Services Mgmt
- Event & Venue Management
- Childcare Service Management
- Health Care Service Management
- Printing Service Management
- Internal Communications
- Complaint & Compliment Management
- Fleet Management

Information & Knowledge Management
- Advanced Analytics
- Collection Management
- Copyright Management
- Data Management
- Enterprise Content Management
- Information Policy Management
- Information Search & Discovery
- Information Security Management
- Knowledge Management
- Records Management

Information & Communication Technology Management
- Infrastructure Lifecycle Management
- Application Lifecycle Management
- ICT Service Support
- Digital Communication Management
- High Performance Computing
- End-User Computing
- Alignment, Planning, & Organization
- Monitoring, Assessment, & Evaluation
- Identity & Access Management
- Build, Acquisition, & Implementation
- Delivery, Service, & Support

Legal Services
- Contract Management
- Dispute Resolution
- Legal & Legislative Compliance
- Legal Advisory

Figure 8: Spanish HE Capability Map, Level 3: Enabling Capabilities

Spanish Higher Education Enterprise Architecture Initiative and Capability Map
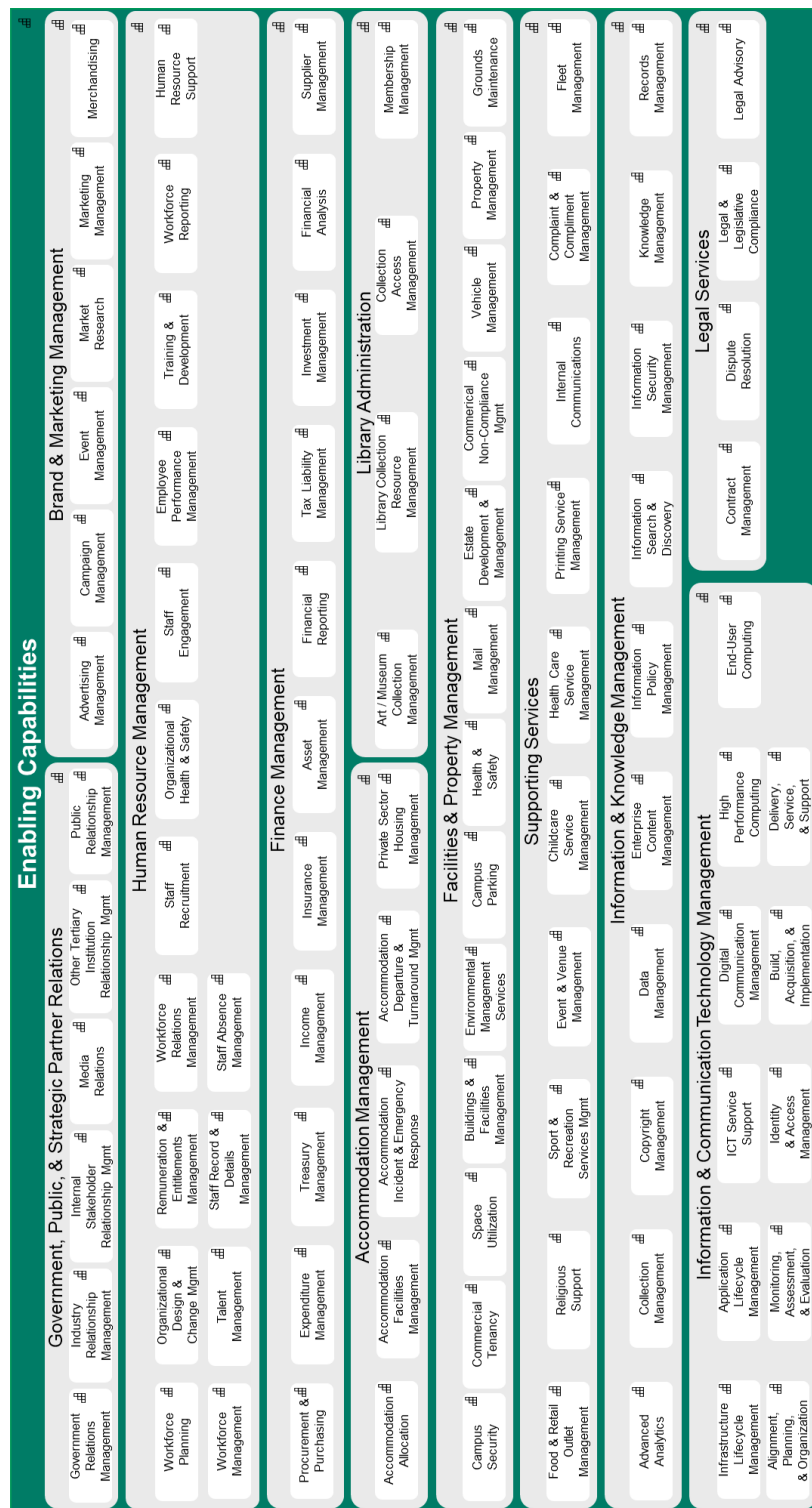
Table 7: Level 3 Capabilities – Enabling Capabilities

Level 2 Capability for Enabling Capabilities	Level 3 Capability	Processes and/or Resources Necessary for/to:
Government, Public, & Strategic Partner Relations	Government Relations Management	Identify key government stakeholders, and manage and maintain these relationships
	Industry Relationship Management	Identify key industry stakeholders and partners, and manage and maintain these relationships
	Internal Stakeholder Relationship Management	Identify key internal stakeholders, and manage and maintain these relationships
	Media Relations	Manage media communications, and the media profile of the institution
	Other Tertiary Institution Relationship Management	Identify key peer tertiary institutions, and manage and maintain these relationships
	Public Relationship Management	Manage public relations, as well as identify key community stakeholders and partners, and manage and maintain these relationships
Brand & Marketing Management	Advertising Management	Develop and manage institution advertising
	Campaign Management	Develop and manage campaigns
	Event Management	Develop and manage events
	Market Research	Undertake market research
	Marketing Management	Market the institution brand to potential customers
	Merchandising	Develop, manage, and sell institution merchandise
Human Resource Management	Workforce Planning	Forecast anticipated workforce requirements, report workforce performance, and make recommendations regarding workforce structuring and recruitment strategies
	Organizational Design & Change Management	Perform organizational design and change management
	Remuneration & Entitlements Management	Determine and manage employee remuneration and entitlements
	Workforce Relations Management	Manage workforce relations
	Staff Recruitment	Recruit institution professional staff
	Organizational Health & Safety	Provide learning and organizational development services

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Enabling Capabilities	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Staff Engagement	Assess and manage staff performance
	Employee Performance Management	Provide organizational health and safety services
	Training & Development	Determine requirements for professional development and training, as well as record the qualifications, certifications, and competencies of institution staff
	Workforce Reporting	Provide workforce reporting
	Human Resource Support	Provide support to institution staff
	Workforce Management	Manage the institution workforce
	Talent Management	Ensure staff are rewarded appropriately in terms of pay, pension, and other benefits
	Staff Record & Details Management	Maintain accurate information about employees, including contact, address and biographical details, contract management, and document management, including appropriate record retention and disposal management
	Staff Absence Management	Ensure the absence of employees is managed, recorded, authorized, and followed up appropriately, along with ensuring work is adequately covered by other staff. This includes annual, sick, and other authorized leave, and unauthorized absence
Finance Management	Procurement & Purchasing	Manage institution purchases
	Expenditure Management	Ensure the effective payment of creditors, suppliers, and customers
	Treasury Management	Ensure ongoing liquidity and mitigation of operational, financial, and reputational risk through sound financial planning
	Income Management	Ensure the effective invoicing, collection, and allocation of monies into the organization, including debt management
	Insurance Management	Ensure the relevant provisions are in place to provide a means of protection from financial loss
	Asset Management	Track and manage institution assets
	Financial Reporting	Manage financial reporting
	Tax Liability Management	Manage the institution's tax liability

Level 2 Capability for Enabling Capabilities	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Investment Management	Manage the institution's investments
	Financial Analysis	Undertake financial analysis
	Supplier Management	Plan and manage the relationships with third-party suppliers of goods and services to maximise benefits
Accommodation Management	Accommodation Allocation	Manage the allocation of accommodation to students who have requested it, or to other people staying there when not occupied by students, and enable an orderly occupation of accommodation upon arrival, and the management of room transfers and student withdrawals
	Accommodation Facilities Management	Ensure accommodation is appropriately furnished and equipped, including repair and replacement of furnishings and equipment as needed.
	Accommodation Incident & Emergency Response	Ensure appropriate reactions and responses to emergencies and other serious incidents that occur in or affect student accommodation, including the ability to keep residents safely housed even during occurrences that mean standard accommodation is temporarily vacated
	Accommodation Departure & Turnaround Management	Enable an orderly departure of residents at the end of their tenancy and ensure the accommodation is properly prepared for its next resident
	Private Sector Housing Management	Provide tools and services to help students find private accommodation to rent whilst they are at the organization
Library Administration	Art/Museum Collection Management	Manage and maintain the institution's art collection
	Library Collection Resource Management	Manage library collections and resources, including acquisitions, invoices, and catalogs, covering both physical and electronic assets
	Collection Access Management	Manage library borrowings
	Membership Management	Manage library membership
Facilities & Property Management	Campus Security	Manage and maintain institution security services
	Commercial Tenancy	Manage commercial tenants

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Enabling Capabilities	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Space Utilization	Maximise the utilization of available space
	Building & Facilities Management	Manage and maintain institution buildings and facilities
	Environmental Management Services	Manage and maintain environmental services
	Campus Parking	Manage institution parking facilities
	Health & Safety	Ensure the environment is conducive to the health and safety of the entire onsite community
	Mail Management	Ensure the distribution of mail both internally and externally
	Estate Development & Management	Ensure that the estate is effectively developed and managed to meet both current and future requirements
	Vehicle Management	Manage the internal vehicle fleet
	Trade Default Management	Manage trade defaults
	Property Management	Manage and maintain institution property such as land
	Grounds Maintenance	Manage and maintain the institution grounds
Supporting Services	Food & Retail Outlet Management	Manage the food and retail stores and outlets on the institution campus
	Religious Support	Support the religious and spiritual needs of staff and students, including the provision of care services, events, and facilities
	Sport & Recreation Services Management	Provide on-campus sport and recreational facilities to students and staff
	Event & Venue Management	Provide venue management services for on-campus facilities
	Childcare Service Management	Provide on-campus childcare services for students and staff
	Health Care Service Management	Provide on-campus health care services to students and staff
	Printing Service Management	Provide on-campus printing and binding services for students and staff

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Enabling Capabilities	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Internal Communications	Ensure that all constituent parts can communicate effectively using appropriate means across all aspects of the business
	Complaint & Compliment Management	Receive, manage, and respond to any complaints or compliments related to any aspect of its business
	Fleet Management	Manage a fleet of vehicles for institution use
Information & Knowledge Management	Advanced Analytics	Support advanced analytics techniques on big data sets
	Collection Management	Manage the institution's library collections
	Copyright Management	Manage the copyrighting of institutional intellectual property, and to ensure that copyright requirements for copyrighted material are observed by the insitution
	Data Management	Manage institution data, including planning for sourcing and storage, and to ensure data is fit for purpose, including the sourcing and maintaining of data necessary to support the institution business (geospatial, social, economic, demographic data)
	Enterprise Content Management	Manage content across both digital and physical platforms
	Information Policy Management	Develop, communicate, and manage institution information management policies
	Information Search & Discovery	Support search and discovery of library resources
	Information Security Management	Protect information and information infrastructure assets against the risks of loss, misuse, disclosure, or damage
	Knowledge Management	Harness people's tacit knowledge and enable it to be preserved and shared
	Records Management	Manage the institution's records
Information & Communication Technology Management	Infrastructure Lifecycle Management	Create and manage infrastructure in support of organizational requirements
	Application Lifecycle Management	Create and manage applications in support of organizational requirements
	ICT Service Support	Ensure the delivery of customer-focused ICT service support

Spanish Higher Education Enterprise Architecture Initiative and Capability Map

Level 2 Capability for Enabling Capabilities	Level 3 Capability	Processes and/or Resources Necessary for/to:
	Digital Communication Management	Facilitate communications between stakeholders over digital channels and ensure that new channels are identified and adopted as required
	High Performance Computing (HPC)	Provide HPC
	End-User Computing	Ensure the availability of end-user devices and/or access by end-user devices
	Alignment, Planning, & Organization	Manage and maintain alignment between IT services and business priorities
	Monitoring, Assessment, & Evaluation	Assess the performance of technology services
	Identity & Access Management	Manage data on IT systems and applications about users – managed data includes user objects, identity attributes, security entitlements, and authentication factors
	Build, Acquisition, & Implementation	Acquire new technology solutions and services
	Delivery, Service, & Support	Provide IT support services
Legal Services	Contract Management	Manage institution contracts
	Dispute Resolution	Undertake dispute resolution activities
	Legal & Legislative Compliance	Provide advice on legal compliance
	Legal Advisory	Provide timely and accurate legal advice to support institution operations and decision-making

Applicability

The Spanish HE Enterprise Architecture capability map is a:

- Reference model for state relations: this is relevant because CRUE has competencies in the Sectoral Committee of Electronic Administration of Spain for the HE sector – thus, the capacity map and the data model are the reference and basis for relations with other educational and/or productive sectors

- Reference model for stakeholders: the capability map serves to provide a common language with key stakeholders and suppliers

- Reference model for other working groups: the capability map also serves as a common reference with other CRUE working groups, such as the service catalog, or the teaching, etc. – in this sense, it is also a common basis for all the different profiles of the different groups

- Universal template for every university: the capability map is generic but serves as a basis for any university, being adaptable to its own reality

- Glue for business engagement: one of the most appreciated values of the capability map is the ability to place different university actors in the same context, with a common language

Additional Sources

In addition to this document two more companion files are available:

- ArchiMate file "Spanish Higher Education Capability Map v1.0.archimate" containing:

  — 01 CRUE v1.0 Capability map (English and Spanish)

  The CRUE Spanish Higher Education Reference Models provided here are offered free-of-charge under the Creative Commons 4.0 Attribution-NonCommercial-ShareAlike license (i.e., CC BY-NC-SA, https://creativecommons.org/licenses/by-nc-sa/4.0/).

  — 02 CRUE CAUDIT UCISA Comparison

  — 03 CAUDIT v1.0.1 Capability map

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  — 04 UCISA v1 Capability map

- Excel file "*Spanish Higher Education Capability Map V1.0 – Opengroup.xlsx*" containing all the capacity definitions included in the .archimate file

References

(Please note that the links below are good at the time of writing but cannot be guaranteed for the future.)

The definition of the capability map of the Spanish university system has been based on the analysis of four main references:

- ArchiMate® 3.0.1 Specification, a standard of The Open Group (C179), August 2017, published by The Open Group; refer to: www.opengroup.org/library/c179

- CAUDIT Higher Education Business Reference Models; refer to: https://www.caudit.edu.au/EA-Framework

- The TOGAF® Standard, Version 9.2, a standard of The Open Group (C182), April 2018, published by The Open Group; refer to: www.opengroup.org/library/c182

- UCISA UK HE Capability Model, Version 1; refer to: https://www.ucisa.ac.uk/Groups/Enterprise-Architecture-Group/UK-HE-Capability-Model

- University Enterprise Architecture Framework (UEAF), February 2018, published by National Informatics Centre (NIC); refer to: https://nicea.nic.in/sites/default/files/Draft_UEAF_Report_v7.5_0.pdf

About the Authors

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Lluís is a computer engineer with more than 26 years of experience in IT, specializing in the higher education sector. Linked to the Rovira i Virgili University, he promotes a holistic view of business, setting himself the goal of adding value and increasing business results by aligning IT with the university's global strategy. With a number of recognized acknowledgements throughout his professional career, Lluís likes to highlight the "IT Professional Trajectory Award", granted by the ICT sector commission of the Conference of Rectors of Spanish Universities (CRUE-TIC) and recognized across all Spanish universities. In relation to the Enterprise Architecture field, Lluís collaborates with the working group of IT directors of Spanish universities, which supports the Enterprise Architecture working group from which the Spanish capabilities framework has been defined and promoted.

José Carlos González

José Carlos is a computer engineer expert in managing IT services for universities. He has 24 years of experience as the Head of IT services at the University of La Laguna, responsible for many different areas, including systems, communications, user support, and university management. He currently holds the position of Vice Manager for Strategic Planning at the University of La Laguna and is part of the university's Board of Directors. From this position, José Carlos coordinates and plans the Digital Transformation of the university, the improvement of its processes, the structuring of resources and, above all, the monitoring of the services provided to the university community. José Carlos collaborates in the CRUE-TIC Enterprise Architecture group made up of Spanish universities. Within the group, he has focused especially on the analysis and adaptation of the Spanish capabilities map and has carried out practical examples to verify how it can be applied to public universities, identifying aspects that take on greater relevance and management areas that are initially more mature.

Acknowledgements

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