



Chapter 4

Library Research Support Services: The Universitat Politècnica de Catalunya – BarcelonaTech Case


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EXECUTIVE SUMMARY

This chapter addresses library research services at the Universitat Politècnica de Catalunya · BarcelonaTech (UPC), an institution engaged with science and technology that clearly emerges as a research university. Due to the attributes of the UPC, its library, publications, and archives services differ from traditional libraries and have been transformed over its lifetime to offer services to researchers that fit their current and future needs. Librarians are actively seeking personalized solutions to meet researchers' needs. The Research Service Charter of the UPC libraries includes a range of assets related to UPC researchers as producers of new scientific output and as primary agents of its dissemination.

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INTRODUCTION

The goals of this chapter are both to exhaustively list and briefly describe the library research service of the Universitat Politècnica de Catalunya · BarcelonaTech (UPC), and to highlight how it contributes to achieving the UPC's research challenges and objectives. In order to explain these services to the reader, they are illustrated by contextualizing them in the following aspects:

1. **Research-oriented university:** UPC's will to be a research institution makes it unique in the Catalan university system.
2. **Strategic planning:** using strategic planning as a management tool for the UPC Library, Publications and Archives Service (UPCLPAS).
3. **Organization chart:** UPCLPAS is organized based on units, created from the basic segmentation of university library users, and is refined with distinctive structures such as thematic rings.
4. **Technological evolution:** UPCLPAS's services have evolved in accordance with the dramatic changes in the computerization of research, including the information and communication revolution associated with this environment.
5. **Innovative services:** the flagship products of the UPC libraries available to researchers.
6. **Library users:** the heightened segmentation of users to whom library research services are devoted and the correlation of these users with all of these services.

Due to the attributes of the UPC, its library service clearly differs from traditional ones. End-users have historically been positioned at the center of the organization, which is being transformed throughout its lifetime to offer researchers services to meet their current and future needs. The assimilation of the University's archives and the integration of its publishing services have significantly helped make this vision a reality. In this field, the UPCLPAS has been very active from the beginning in promoting and facilitating the deposit and publication of UPC's scientific production in open access, through books and scientific journals, and particularly with UPCommons, the institutional repository, that has traditionally achieved a leading position in the international rankings that evaluate these repositories.

Thereby, the provision of the library research services is not understood as a static proposal that is passively delivered to centers, departments, and groups of researchers. On the contrary, UPC librarians actively seek personalized solutions to meet the informational needs of particular researchers. The Research Service Charter of the UPC libraries aims to easily pinpoint specific answers the UPCLPAS gives to the research activity of the University staff. This is particularly noteworthy because this research activity is considered strategic from a Return on Investment (ROI) perspective and from the point of view of the social and economic future of Catalonia.

This chapter presents an overview of the UPCLPAS organizational structure, which is characteristic of UPC libraries and determines how all available research services are conceived and delivered. These services are described here in depth, and some brand new and innovative ones are explained in detail, focusing on their current and near-future impact on the university's overall research goals.

UPC: A BRIEF HISTORY AND OVERVIEW OF A RESEARCH UNIVERSITY

The origins of UPC date back to 1971 with the foundation of the Universitat Politècnica de Barcelona (UPB). The University developed from several existing schools: Barcelona School of Industrial Engineering, Terrassa School of Industrial Engineering, Barcelona School of Architecture, and some other research institutes. Although it is a relatively young University, due to the greatly impoverished university situation inherited from Francoism (Pedrals, 1986), UPC is one of the oldest universities within the Catalan university system.

The UPB changed its name in 1984 to the Universitat Politècnica de Catalunya (UPC), which remained the valid name of the university until 2012 when the official name became the Universitat Politècnica de Catalunya · BarcelonaTech (UPC). During these years, the University has been managed by a total of eight rectors who have dealt with the integration of new centers and the split-off of some others to finally reach the current composition of UPC, which includes 18 schools (and two additional affiliated business schools) spread across six different cities in Catalonia. In addition to these centers, UPC is composed of 30 academic departments, 21 of its own research centers, and 19 linked research entities.

On its webpage, UPC defines itself as a “public institution of research and higher education in the fields of engineering, architecture, sciences and technology” (“The institution”, n.d.). The UPC specializes in science and technology, and it offers a wide range of programs and degrees devoted to a broad spectrum of engineering and architectural fields. In fact, the total offering for the 2019-2020 academic year is up to 65 bachelor degrees, 79 master degrees and 48 doctoral programs. The amount of research activities conducted by professors and researchers boosts the institution to be a very prestigious university, reaching top-tier positions in the most renowned international rankings. Some basic figures in the research area for the 2019-2020 academic year can help understand the notable strength of UPC and its excellent position at national and international levels: 1,713 active agreements and projects (of which 654 are brand new ones), 2,058 articles in scientific publications, 292 doctoral thesis presented, and up to 157 scientific and technical distinctions earned.

It is also worth noting that the university’s description (quoted above) prioritizes research. It is true that, from the outset, there is an individual motivation factor caused by the fact that the Spanish evaluation system clearly values research over teaching activities when assessing university professors’ career and tenure. UPC reinforces this tendency with a strong commitment to generate both basic and applied high-quality research. To effectively develop this intended vocation, the institution has endowed itself with an organizational structure, the so-called Research and Transfer Area/CTT (ART/CTT), to support the research activities from a broad perspective; it also helps overcome challenges related to research, technology, and knowledge transfer within the Action Plan UPC 2018-2021 (Pla d’actuacions UPC, 2018).

This Action Plan functions as UPC’s strategic plan and is based on seven commitments that generate a total of 12 challenges with additional strategic goals for each of them. Challenge five is titled “To consolidate UPC’s position as a leading university in its own research fields” and holds the following strategic action lines: attract research talent to work in UPC research groups, promote faculty staff participation in excellence programmes, promote international mobility for doctoral students and faculty staff, stimulate research lines with the greatest social, economic and technological impact, adapt scientific and technical infrastructures and maximize scientific production visibility, both internally and at a national and international level.

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To unfold these strategic goals, ART/CTT is divided into four services: Research and Innovation Support Service, Innovation Management Service, Knowledge Management of Research and Innovation Service, and Economic Management of Research and Innovation Service (this area is especially active considering the number of resources obtained by the UPC, as shown in Figure 1). The system is completed by local structures geared toward research assistance on all campuses.

Figure 1. Some data about the funding of UPC research (Source: *Participación española en Horizonte 2020: resultados provisionales (2014-2018), 2019*)

Some data about the funding of UPC research

Regarding research funding issues, the university's inward investment is complemented by external financial resources and UPC researchers are very active in raising funds through:



- **Project calls:** Participation in international project calls within the EU Research and Innovation program Horizon 2020, and its Catalan counterpart crystallized in the strategic frame RIS3CAT (RIS3CAT, 2018).
- **Plan Estatal de Investigación:** Plan Estatal de Investigación Científica y Técnica y de Innovación 2017-2020 of the Spanish Ministry of Economy, Industry, and Competitiveness (Plan estatal de investigación, 2017).

Other resources from individuals and organizations complement these main additional funding lines. The total amount of money obtained from all these resources during 2018 (58 M€) is up to 20.5% of UPC total budget (282,7 M), a similar figure to the revenues from student fees (21% of the 2018 UPC total budget). Another sign of the dynamism in this field is that UPC, not one of the largest universities, is leading fundraising in Spain in the total count of Horizon 2020 program (2014-2018), with 125 participating projects – of which 39 are coordinated by UPC researchers- (Participación Española, 2019).

ORGANIZATIONAL STRUCTURE OF THE UPC LIBRARY SYSTEM

Libraries have been a part of UPC since its origins. As an essential service for faculty and students, each and every one of the schools, which would later become part of the UPC, had their own library. For some years, these libraries were a mere group of centers with poor relationships between them. However, this situation drastically changed in 1989 when the currently named UPC Library Publications and Archives Service (UPCLPAS) was redesigned to become an organized structure, changing a group of almost unconnected libraries into a real library system, with shared services, procedures, and

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policies for all UPC libraries. It is worth noting that a key element in making this change possible is that UPCLPAS is managed by library professionals but, before this transition, it was managed by faculty and staff. This professionalization trend was reinforced by a movement with the same characteristics at an institutional level; the UPC began to reorganize the entire management, administrative apparatus, and university services from the same criterion of professional expertise.

Strategic planning became the tool to draw together and boost the reorganization and improvement of the UPC libraries. In 1991, with the Leibniz Plan approval, which was a plan for the improvement of the library services at UPC and the first ground-breaking strategic plan in any organizational area within the university (as well as in any university library in Spain), UPC libraries started a new way to manage and develop resources and services. It has been successful to date and has led to the present Enginy20 program with which UPC libraries are in their 6th strategic plan. The complete list of these plans encompasses almost 30 years of library service to the UPC community:

- Leibniz 1991-1993
- Escher 1995-1999
- Paideia 2000-2005
- Aprèn 2007-2010
- Digital! 2012-2014
- Enginy20 2015-2020

Notable events during the development of these strategic plans were that, at the request of the University's governing bodies, the Library Service integrated the archiving service, which was incorporated as the Office of Documentation and Archives (2007), and the publishing services, which were rebranded as the Digital Polytechnic Initiative (2011). Also during this period, the UPCLPAS began to participate in national (CSUC), state (REBIUN), and international (IATUL and LIBER) librarian networks and associations. Of these partnerships, the most decisive for the UPC libraries has been, by far, the one established with CSUC, since it has meant sharing library acquisitions, interlibrary loans, professional training courses, an integrated library system, shared storage facilities, and many other critical aspects and services with other Catalan universities.

Organizationally, the UPCLPAS is placed under the Office of the Vice-Rector for Digital Transformation and the Academic Area of the UPC. Moreover, the research services of UPCLPAS support other Vice-Rector offices: Office of the Vice-Rector for Science Policy, Office of the Vice-Rector for Assessment and Quality, the Office of the Vice-Rector for International Policy, and ART/CTT services.

From an internal structuring perspective, UPC strives to be user-centered. UPC library services are addressed toward a diverse audience, including students (27,951 in 2019-20 academic year), professors and researchers (3,147 in 2019-20 academic year), and administration and services staff (2,006 in 2019-20 academic year). Conscious of the different needs of these groups of users, in 2002, the UPCLPAS switched from a traditional organizational structure to an organizational chart based on the different needs of users. Considering that UPCLPAS is made out of 12 Campus or School libraries distributed across the Catalan territory, each of them with different staff compositions, the organizational system must be well designed to handle the complexity generated by this multiplicity of actors while guaranteeing a system-wide standard of service. The chosen organizational solution meant a complete reorganization of staff and services to obtain a scheme based on three sections:

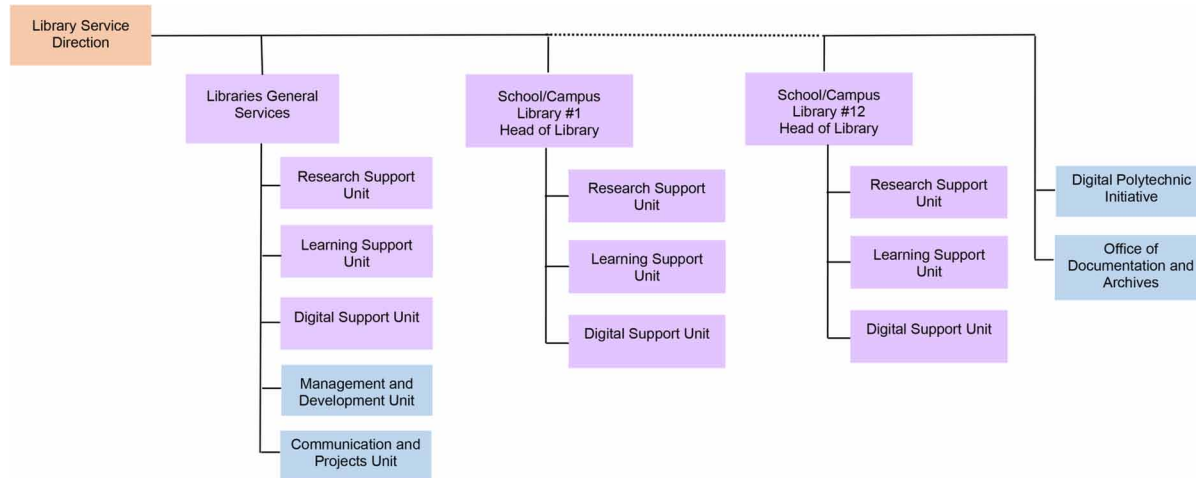
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1. UPCLPAS Direction
2. **Libraries General Services:** manages all centralized services and coordinates the activities of all 12 existing libraries. The team of people integrating Libraries General Services includes some highly qualified ICT technicians who have helped this coordination and have allowed for a high level of innovation and online service delivery. Eventually, Libraries General Services organizational chart was crystallized in a structure made up of five units:
 - a. **Research Support Unit:** it deals with services directly linked to faculty and researchers. Nowadays, the Unit is staffed by one head of area and 3 librarians. It supports the Library Service Director in defining the lines of each UPCLPAS strategic plan, setting its goals and overall actions that libraries have to perform to provide services to support research at UPC. It is also responsible for the management or supervision of the budget for the subscription of journals and databases, whether subscribed at the institution level, within the framework of the University Services Consortium of Catalonia (CSUC) or with national agreements. Expenditure on these concepts is 80% of the total budget of the UPCLPAS.
 - b. **Learning Support Unit:** it deals with services directly linked to students.
 - c. **Digital Support Unit:** it deals with the crosswise services to cope with the switch from the traditional to the digital library.
 - d. **Management and Development Unit:** it deals with the resource allocation needed to provide services to the library users.
 - e. **Communication and Projects Unit:** it deals with the organizational support to new projects and the face-to-face and virtual dissemination of the UPCLPAS offer.
3. **Campus libraries and School libraries:** for each campus or school library, the general model is based on having a research support service head. This person leads a small or rather big team, depending on the size of the library, and also plays the role of cross-talk with other colleagues and members of the Libraries General Services through regular meetings and mailing lists, especially the “Knowledge Dissemination” list. In conjunction with the Research Support Unit, each library has two other teams, the Learning Support Unit, and the Digital Support Unit, which are all led by the Head of the library.

The whole organization chart was refocused in 2017 to simplify it and make it more flexible (which was needed after the constraints caused by the economic crisis). Moreover, the organizational chart needed to be adapted to fit the evolution of research services, which have become increasingly oriented toward the dissemination of research results. Figure 2 shows UPCLPAS’s organizational chart with the mentioned features.

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Figure 2. UPCLPAS simplified organizational chart (Source: Universitat Politècnica de Catalunya, Library Publications and Archives Service)



To complete the organizational structure of library research services, the “thematic rings”, made up of subject librarians from all UPC libraries dealing with the same topics, collectively cover documentary needs of research users related to such topics (Figure 3).

EVOLUTION OF THE RESEARCH SUPPORT SERVICES AT UPC LIBRARIES


The UPC Libraries have always maintained a constant choice for change and adaptation to academic, technological, and social transformations, in consonance with the goals of the University, government, and supranational strategic lines regarding scientific policy and technological innovation support. Until the end of the 1990s, the UPC library’s research support action lines were oriented almost exclusively to collection expansion and the growth of the scientific and technical resources. This was the main goal for that period, and it alleviated the effects of underfunding (structural and services) that characterized the Catalan university system for much of the 20th century. Substantial improvement in access to research collections was achieved by increasing budgets and through the consortial purchase of electronic packages for journals and databases thanks to the big deal model. The Library shaped its research support services as a necessary link between collection and researchers, with traditional intermediary services such as specialized reference, document delivery service, or selective dissemination of information.

The emergence of online electronic information since the mid-1990s was one of the main causes of the transformation of research support services in university libraries. The widespread access to online collections and resources (Tenopir, King, Edwards, & Wu, 2009), the growing use of Internet search engines (Rowlands et al., 2008), and the technological expertise of most UPC researchers led to a gradual decrease in in-person visits and in library services based on primary document access. At the same time, the inquiries received became more complex with regard to their resolution. Mediation, therefore, had to involve more expertise and add more value to the offered services. For this reason, UPCLPAS chose to focus on the professional competence of librarians and on the dissemination of information tools and resources to the research community.

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Figure 3. Thematic rings at UPCLPAS (Source: Universitat Politècnica de Catalunya, Library Publications and Archives Service)

Thematic rings at UPCLPAS



UPC is a university which teaches and conducts research on the same topic on more than one University campus. The organization of library services conforms to this peculiarity with the “thematic rings”, or groups made up of subject librarians from different libraries who, despite not having an academic degree in the University disciplines, have specialized in the information sources of the subject they provide support to. The “thematic rings” were launched in 2001 as an organizational and collaborative way across all UPC libraries to improve the provision and dissemination of the available research information resources. These “thematic rings” were made up of subject librarians who perform the following tasks:

- **Task 1:** Be acquainted with the bibliographic novelties and solve, analyze and interpret the demands and needs of scientific and technical information of library users.
- **Task 2:** Provide information and training in the use of information resources and library support services for research.
- **Task 3:** Search and disseminate quality scientific and technical information to meet the needs of research and continuous training of users.
- **Task 4:** Normalize the curriculum vitae of researchers in the Current Research Information System (CRIS) and archive the publications in the institutional repository of the University.
- **Task 5:** Develop projects related to information and documentation.
- **Task 6:** Set annual goals and plans for improvement of the library research services.

Up to 27 rings cover all UPC thematic areas. These thematic rings have a numerical composition that varies according to the number of schools in which teaching and research are carried out dealing with such 27 subjects. Thus, there are one-person rings, as in the case of Nautics (the subject of a single UPC center) and up to rings with 12 members (this is the case of Teaching and Learning, with a presence on all UPC campuses). One of the integrating subject librarians is responsible for the activity of each of the rings and leads the evolution of that specific ring under the guidelines provided by the Research Support Unit of the UPCLPAS.

Furthermore, the thematic indexing is done using standard tools like the Library of Congress Subject Headings and with a thesaurus created by UPC librarians that contain more specific terms at a second or third level within each of the 27 UPC thematic areas.

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Although these actions were convenient, it was certain that the technological changes already had a profound impact and would soon have a more global impact on the dynamics of the processes linked to research and, in particular, on the role that libraries had in the academic system (Guédon, 2001). In front of this challenge, the UPC Libraries aimed to be part of the transformation process between information and knowledge to boost the quality of UPC research, technological innovation, and its scientific production.

The Open Access movement, which was joined by UPC in 2006 with the creation of the UPCommons institutional repository (Figure 4), and the endorsement of the Berlin Declaration (“Berlin-Declaration”, 2003) in 2007 became a key impetus to take on new roles and acquire new capabilities.

Figure 4. UPCommons: The institutional repository of the UPC (Source: Universitat Politècnica de Catalunya, Library Publications and Archives Service)

UPCommons: The institutional repository of the UPC

UPCommons was created in 2006 as one of the first open-access institutional repositories in Europe, and it responded to UPC’s willingness to be a driving force for open access. It was designed to facilitate a single access point to the digital archives run by UPCLPAS, and its main goal was to organize, preserve, and increase the visibility of the intellectual heritage of the UPC (Gómez, 2004). It was also part of a strategy to combat the rise of scientific journal prices that between 2000 and 2010 increased as much as 15% per year.



UPCommons offers UPC authors a technological tool to publish full-text documents and uses the interoperability protocol Open Archives Initiative (OAI-PMH) to increase the visibility of the archived documents. Records are labeled using DCMI (Dublin Core Metadata Initiative) and Creative Commons licenses are recommended.

Among the 16 repositories included in UPCommons, six of them are dedicated to research documents: E-prints (45,957 journal articles, conference papers, and research reports), doctoral theses (4,232 documents), research data (8 datasets), UPC journals (12,300 articles), UPC conferences (5,340 papers), and Bachelor/Master theses (43,475 documents). This wide offering is intensively used by UPC researchers, so the green road is the preferred open-access solution (37% of all UPC open-access documents) at UPC (Rovira & Labastida, 2019). Further, UPCommons has become a very well-positioned repository in the main world ranking, achieving a rank of 19th place in the last edition of Webometrics ("Ranking web of repositories", 2020).

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With the launching of the European Research Area (ERA), UPC desired to increase the quantity and quality of its scientific production. The professional skills of UPCLPAS staff were gradually diversified as a mid-term strategy action, to take a position within the research process in new roles that go beyond information dissemination and conservation. These include intellectual property advice, edition and publication facilities, bibliometry and scientiometry analysis, etc. Further, new competencies to respond to the priority needs of researchers-authors were needed (Rovira, 2007). The UPC included this objective on the 2006-2010 Government Plan: To integrate libraries into the UPC's learning and research activities to contribute to achieving the new challenges of the European Knowledge Area (EEES and EER).

However, with the beginning of the economic crisis in 2008 and the subsequent budgetary constraints, a paradigm shift for the UPCLPAS research support services occurred. Collaborations with other units or services of the University in key processes of the research operations began being established. During this period, just like in all universities (Hernández Armenteros & Pérez García, 2016), libraries had to make a painful effort of budget containment that, among other measures, led to a drastic reduction in their workforce and to the cancellation of 51% of subscriptions to journals and other specialized information resources between 2010 and 2015, including those acquired through consortial acquisitions. This adverse situation also arose in the context of growing competitiveness. The demand for funding and resources forced the university to use its assets and to be particularly rigorous in terms of accountability.

The UPC libraries, due to their versatility, decentralized structure, and their links with schools and departments, have been seen as agents with a remarkable ability to actively participate in management processes through alliances with other units of the University. In 2009, UPC approved its institutional open-access policy (*Institutional open-access policy*, 2009) and expanded it in 2014 (*Approval for awarding*, 2014), which led to the institutional mandate to publish in open access the journal articles signed by UPC authors, in accordance with European Union directives. The UPCCommons repository's interoperability with the UPC's Current Research Information System (CRIS) set up a gateway interface through which researchers archive their publications. In 2015, with the creation of FUTUR¹, the UPC's Research Production portal, data from other University information systems were also connected (Doctoral School, Personnel Service, Project Office, etc.). These successful collaborations opened the door to further alliances with UPC units on research project management, patentability, and training of research staff.

The evolution of research support services is aligned with and consistently supported by the UPC's 2018-2021 Action Plan and also by the RIS3CAT plan of the Catalan Government, which aims to consolidate Catalonia as a European hub of knowledge through the internationalization and valorization of research, social impact, transparency, and the assumption of responsibilities.

RESEARCH SUPPORT SERVICES AND STRATEGIC PLANNING IN UPC LIBRARIES

The UPC Libraries have a global mindset for understanding research support services, which aligns with UPC's statutes where research is identified as one of its fundamental activities. In total, the UPCLPAS is currently made up of a team of 120 people distributed between the 12 libraries and the Libraries General Services. Of these, 81 are qualified librarians, 30 of which support researchers. These librarians are called research librarians, many of whom are subject librarians specialized in information resources for a particular topic and liaise with the University's researchers and research units.

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The desire to provide the UPC Libraries with research support services is stated for the first time in its 1995 strategic plan (Programa Escher, 1995). But from 2000 onward, strategic plans of the UPC Libraries are structured in different cornerstones where one or more are directly related to Research Support Services.

In other words, the UPC libraries management mechanics are based on strategic planning (Martínez, López-Vivancos, Sunyer-Lázaro, & Vives-Gràcia, 2007), and consists of the following items: (1) statement of mission and vision of UPCLPAS, (2) establishment of master lines to accomplish the stated mission and vision, (3) annual goals setting according to master lines already established for the whole UPCLPAS and for each library, and (4) evaluation of the annual goals achievement and overall strategic plan achievement. The most significant achievements are published in an annual report.

Enginy20, the current strategic plan (*Enginy20*, 2015), has a duration of five years (2015-2020), (similar to prior UPC strategic plans), and it states the mission and vision of the UPC libraries, emphasizing their role as a key agent for the development of the learning, research, and documentary development at the University. It also acts as an effective way to face the ongoing economic crisis (Figure 5). Those concepts are underpinned by some values that can be synthesized in this list: self-commitment, great flexibility, quality, innovation, open-access, responsibility, professionalism, collaboration, and transparency. In any case, the content changes over strategic plans, but the Leibniz Plan (*Programa Leibniz*, 1991) already established two conceptual bases and have become necessary for creating services and values: (1) the alignment of interests and needs with the institution and (2) the orientation of services toward end-users. Both concepts are essential for defining future action plans because they help determine the design of the UPC libraries' organizational chart.

Similar to the UPC's Action Plan (*Pla d'actuacions UPC*, 2018) that devotes a section to research development, Enginy20 second core idea is "Network research" and defines the following general libraries goals for the period 2015-2020: support processes related to the scientific publication of research results, promoting open access to scientific communication, be publishers, consultants, and disseminators in the new scientific publication in open access to the net, ease and guarantee both access and use of scientific and technical collections and resources, analyze and respond to the needs arising from the management and data plan of UPC research projects and enhance the management of journal collections and electronic resources of information in order to address the real needs of information and documentation in research.

RESEARCH SERVICES PROVIDED BY UPC LIBRARIES

Issues

This section presents the current services that are offered to researchers. All of them aim to contribute to the quality of UPC research results, although evidence remains scarce in terms of quantifying this contribution. Some figures show that the influence is considerable and that library research support services are highly rated. For instance, in 2019, of the 204 doctoral students who were taught by librarians in training sessions on information management tools, 80 participants in a survey rated their overall satisfaction as 5 out of 6. – What is more, regarding personalized services, attention from library staff was awarded the highest score, 5.3 out of 6. The year 2019 also saw 3,413,386 visits to the research repositories in the UPCcommons, in addition to a total amount of 9,944,818 downloads. Whether in person or online, UPC libraries assist both groups and individual researchers not only in querying and gathering

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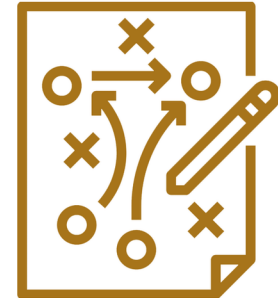
the information they need to conduct their research, but also in publishing their results, managing their data, and increasing the visibility of their results and digital identity.

Figure 5. Strategic planning to cope with the impact of the economic crisis (Source: Universitat Politècnica de Catalunya, Library Publications and Archives Service)

Strategic planning to cope with the impact of the economic crisis

The preface of the strategic plan Enginy20 (2015) begins with a statement that frames the background for its development:

“In recent years, UPC libraries have suffered significant cuts in the provision of resources as the result of the economic crisis affecting all universities. If we add the frequent changes produced by ICT in information and scientific publishing, learning, and research, we are in a new scenario full of challenges that need to be managed with more imagination, more work, and more effort, if needed.” (p. 2)



The recipes to tackle this challenging context are related to efficient management, optimization of resources, and establishment of alliances and collaborations with other services and units. To do this, the following goals were established:

- **Goal 1:** Improve organizational communication, participation, and partnerships with other services and associations.
- **Goal 2:** Increase the quality of information and communication technology processes and services.
- **Goal 3:** Improve the availability of managed resources.
- **Goal 4:** Train staff in cross-disciplinary and new digital skills.
- **Goal 5:** Create new, innovative projects that provide added value to users and the organization.

These goals are intended to be applied in management working areas such as developing key procedures, working collaboratively, communicating internally and externally, customizing service charters, defining and updating tasks, analyzing and reviewing existing regulations, building cooperative relationships, managing annual budget effectiveness, sponsorship, and return on investment, among others.

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Table 1. Types of users of UPC library research services (Source: Universitat Politècnica de Catalunya, Library Publications and Archives Service)

	Users	Virtual / Face-to-face
Information Search & Management		
Support for database searching		Virtual
Advice on patent searching		Virtual + F2F
Access to scientific and technical documents		Virtual + F2F
Bibliographic reference management		Virtual + F2F
Training courses		F2F
Support for doctoral candidates		Virtual + F2F
Research heritage conservation		Virtual + F2F
Research Projects		
Compliance with open access requirements		Virtual + F2F
Library collaboration with the UPC RISS		F2F
Facilities & Meeting Places		
Study areas for doctoral candidates		F2F
Research Café		F2F
Visibility, Impact & Assessment		
Revision of the quality of publication in CRIS		Virtual
Visibility and impact of research		Virtual
Accreditation and assessment of research		Virtual + F2F
Research profiles		Virtual + F2F
Bibliometric studies		Virtual
Quality indicators monitoring in rankings		Virtual
Improvement of research assessment		Virtual + F2F
Publishing		
Advice on writing articles, theses		Virtual + F2F
Open access publication		Virtual + F2F
Institutional signature and affiliation		Virtual + F2F
Intellectual property		Virtual + F2F

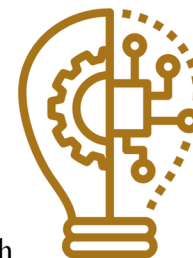
Undergraduate students Graduate students
 Faculty researchers Researchers from industry / Professionals

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Figure 6. New patent search assessment service (Source: Universitat Politècnica de Catalunya, Library Publications and Archives Service)

New patent search assessment service

Patent search assessment is the latest service that UPCLPAS has made available to UPC researchers. Clearly aligned with the UPC goals to stimulate a generation of new patents, the service is provided by research librarians, specialized on documentary sources related to patents, who search patent databases subscribed by the UPCLPAS (such as the Derwent Innovation Index) and prepare a first report to detect and contextualize precedents related to the potential patent. After that, the researcher can decide whether to go to the Patent Office of the Innovation Management Service of the UPC to begin the process of creating a new patent.



First feedbacks regarding this service fulfill by far the established goals. This is the opinion of one of its users:

- The service is very responsiveness regarding the support provided by the library staff according to their experience in searching topics in this specialised environment that is not common for the researchers.
- Through this service, the access to unusual databases is facilitated.
- By means of joint collaboration between the authors and the library staff, the results from the database can be effectively filtered.
- From the results, a preliminary view is provided, in order to decide about the feasibility of the patent to be submitted.

Dr. Xavier Hesselbach-Serra
Associate Professor
IEEE Senior Member
UPC. Dept. Network Engineering

Faculty, graduate students and other users conducting research are personally assisted throughout the process of their investigations and enjoy a wide range of services, which are summarized in Table 1

At the institutional level, research is evaluated by librarians, who authenticate and standardize meta-data of articles, preprints, and books. In addition, they provide support for UPC researchers who are participating in congresses while also increasing their visibility through the institutional repository and the university's scientific production portal. Finally, in monitoring the UPC's position among international rankings, the UPCLPAS provides knowledge on the bibliometric tools used by the publishers of

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these rankings (Web of Science and Scopus). Furthermore, it participates in developing the university's strategies and initiatives for maintaining and improving the position in these rankings.

Beginning with a general perspective of the library research services, the UPC libraries Research Service Charter (2019) is the first item mentioned because it compiles the current range of research services intended for individual researchers, groups (departments and research groups), or for the University as an institution. This Charter is publicly available through *Bibliotècnica*², the webpage of the UPC libraries and is displayed in customized versions for each library.

The research services range from the acquisition of new knowledge (stemming from the information resources search) to the research production dissemination and publication, research evaluation support, and positioning of UPC in international rankings. In recent years, traditional services like advice on seeking information have been integrated with new ones, such as support in publishing, digital visibility and preparing bibliometric studies.

The complete list of offered research services grouped by area is detailed below:

1. **Information search and management:** Support related to specialized information is provided. Along with traditional services, such as UPC documents delivery and interlibrary loans, advice is given on the use of the metasearch engine *DiscoveryUPC* and subscribed databases. Information search and management also includes the following services:
 - a. Access to scientific and technical documents: through the *DiscoveryUPC* metasearcher, a single search box provides access to a vast breadth of resources from the classic library catalog, the digital library, and the institutional repository *UPCommons*.
 - b. Research heritage conservation: services related to antique collections, architectural heritage collections and *UPC Digital Archive*.
 - c. Support for database searching and advice on patent search: this traditional service has been recently completed with the patent search assessment service. The *UPC digital library* offers specific information resources on patents (*Derwent Innovation Index*, *DEPATISnet*, *Espacenet*, etc.) and a librarian's subject team helps researchers register new inventions (Figure 6).
 - d. Bibliographic reference management: all *UPC* members have *Mendeley Institutional Edition* access, and this product is recommended to *UPC* researchers for managing their references.
 - e. Training courses to faculty, staff, postdoc staff, and doctoral degree students: a wide range of training courses is offered within the training program of the *UPC Institute of Education Sciences*. The *Doctoral School* helps to disseminate and manage open enrollments to the *UPCLPAS* training sessions among the students. There is also an extensive training program for undergraduate students.
 - f. Support for doctoral candidates: with the approval of thesis directors and doctoral program coordinators, doctoral degree students are trained in a personalized manner on issues related to information search and management.
2. **Publishing:** Publishing support is also provided, ranging from guidelines on how to write a journal article to intellectual property issues and open access assistance. Some services are directly provided by the *Digital Polytechnic Initiative* within *UPCLPAS*, which include the following:
 - a. Advice on writing articles, theses, contributions to conferences: librarians assist researchers with selecting journals or conferences to present a paper and also provide guidelines on how to write a doctoral dissertation.

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- b. **Open access publication:** assistance on the different routes to open access publishing (institutional open access repository, open access journals with or without Article Processing Charges, discounted article processing charges for UPC authors, etc.). Moreover, the institution is committed to open access and holds a mandate that requires all UPC authors to submit the last full-text version before publishing (i.e., the author's final draft). This version of the document is published in the institutional repository in an open way, with an embargo period or closed, always complying with journal and conference policies.
 - c. **Institutional signature and affiliation:** for both the researchers and the university,, it is very important that research staff use the same signature and correctly mention UPC in their articles and academic works. This helps appropriately retrieve results when searching databases, particularly bibliometric ones, and also helps the institution maintain relevant positions in scientific production rankings. Some guidelines are developed on how to sign publications and are recommended to all researchers within the university community.
 - d. **Intellectual property: author's rights, and ethical use of information:** training to young researchers on how to prevent plagiarism and the ethical use of information in their papers is provided. Some guides are available on the use of Urkund, the anti-plagiarism software used by UPC.
 - e. **Publication of books and journals:** the Digital Polytechnic Initiative provides access to open-access academic books and to journals published by UPC research units.
3. **Research projects:** Assistance is provided to help comply with open access requirements. The main focus of this group of services is on research data, Data Management Plans (DMP), conditions and possible embargoes of open access journals, and the dissemination of research results. A great majority of university researchers take part in research projects funded by organizations for which open access is required, for both articles and research data. Following the guidelines of the Office of the Vice-Rector for Science Policy, and in collaboration with the Research and Innovation Support Service, libraries provide open access to publications and research data in accordance with the institutional policies approved by the governing bodies of the University, on the initiative of the Vice-Rector. For instance, the Library collaboration with the Research and Innovation Support Service results in a service where research librarians take part in kick-off meetings to give advice to the research team on informational issues. The aid provided in these initial meetings includes:
- a. **Basic information:** about the publication of papers and data for each project.
 - b. **List of journals:** An arranged list of acknowledged journals and conferences on the topic of the project, their conditions for publication, open access publishing (green and gold routes), article processing charges, embargoes enforced by publishers, and Creative Commons licenses.
 - c. **Research data information:** Information about managing and publishing research data in UPCommons or other data repositories. Help is provided to create a DMP, elaborate on research data, revise citations, and disseminate results for facilitating the publication of documents and data in UPCommons.
 - d. **Diffusion information:** Information about dissemination on social networks run by libraries of papers published in the framework of research projects.
 - e. **Other information:** Aid in the production of educational videos, article publication in social media sites, and availability of library spaces for meetings or exhibitions showcasing the results of their research.

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4. **Facilities and meeting spaces:** The emergence of electronic publications has brought new possibilities for the transformation of the academic library spaces. Almost all UPC paper collections have been substituted by facilities focused on converting the library-as-a-place into a meeting place where, aside from more traditional features, participation, co-creation, and collaboration are not only possible but are also promoted. Despite the fact that too few investments have been made so far in redesigning library spaces due to economic constraints, the UPC libraries have already created brand new self-use relaxation areas and bookable meeting rooms. These new areas end up being used mostly by undergraduate students, so the libraries have complemented these spaces with work areas geared toward researchers by adding study areas for doctoral candidates and a Research Café.

The most notable study areas for doctoral candidates are located in the biggest UPC library, the Rector Gabriel Ferraté Library of the UPC North Campus in Barcelona, where UPC Ph.D. candidates can take advantage of some exclusive rooms well equipped with technological outfits and bookable lockers. On those premises, they also have access to a meeting room with multimedia equipment where they can work together on their projects. The attendance at these open doctoral rooms has not been massive, and currently, some of the rooms are exclusively dedicated to the students of a particular doctoral degree program. Thus, several research groups of the University have a private space where their doctoral students benefit from their own locked office inside the library. Additionally, those spaces have been opened to UPC students enrolled in Erasmus Mundus master's degrees, who can now enjoy valuable resources that were initially intended only for doctoral students.

Besides a good wealth of various sizes bookable meeting and study rooms to accommodate individual or group work, UPC libraries carry out activities to help make research visible. For instance, Research Café sessions, in which young researchers are invited to the library to present their work, are regularly offered. The libraries undertake the organization and full logistics of the event but widely recognized experts always conduct the sessions. The main goal of the Research Café is to increase the visibility of new projects and to promote the interdisciplinary exchange of ideas and collaboration across research areas. The assistants are doctoral students, academic staff, and other researchers that exchange their points of view, research, knowledge, opinions, doubts, etc. within an informal environment. To finish the cycle, the library publishes the presentations in the institutional repository.

5. **Visibility, impact and assessment:** To enhance the visibility of research, libraries provide support in taking advantage of FUTUR, UPCommons, and Geocommons and also in other relevant services dealing with accreditation of research and metrics support. Bibliometric studies are also carried out for a variety of academic fields.

The University requires all faculty, staff, and doctoral degree students to submit their activities into UPC's CRIS. When activities are publications (journal articles, congresses contributions, research reports, etc.) the already mentioned open access mandate requires them to submit the author's final draft version. Following the guidelines of the Office of the Vice-Rector for Science Policy set as far as 1999, all publication references submitted to the CRIS (5,612 in 2018) are normalized by UPC librarians who load the open-access full-text version in UPCommons in compliance with publisher's policies.

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Figure 7. *recerTIC UPC* (Source: Universitat Politècnica de Catalunya, Library Publications and Archives Service)

recerTIC UPC

recerTIC UPC consists of a set of ten bibliometric studies, on the same number of subjects, intended to provide a representative vision of UPC's scientific publications on emerging fields in information and communication technologies.



Both from a conceptual and a formal point of view, *recerTIC UPC* constitutes a step forward in the bibliometric analyses conducted so far by the UPLPAS. Some of the features that define this new generation of reports are the use of advanced technologies (the most interesting of them was developed specifically for these surveys), a highly user-friendly presentation of the results, and the option to interact with data. The combination of these elements makes a difference in how bibliometric studies are shared with the UPC academic community. Furthermore, the reports were designed to improve the user's experience when consulting the provided information (Pocull et al., 2019).

In terms of content, *recerTIC UPC* aims to provide a wide view of the publications authored by UPC researchers, with an emphasis on co-authorship, internal and external collaborations, their impact, and topics. The results presented at *recerTIC UPC* are based on journal articles and conference publications published by UPC professors from 2007 to 2017 and are indexed in the Web of Science Core Collection database.

In 2006, with the launch of UPCommons, the UPCLPAS started to disseminate UPC research on the Internet. Now, the institutional repository contains more than 159,000 academic items, and most of them are open access. The UPCLPAS also developed two other information systems to increase the visibility of UPC production worldwide:

- a. FUTUR: FUTUR website displays all active research staff's CVs and includes activities of emeritus, retired faculty and staff, and overall scientific and technical production from research units and groups.
- b. Geocommons: Geocommons³ platform provides a geolocalized view of the academic production of the University.

Librarians provide guidance to researchers undergoing an accreditation process to national or state agencies such as Agència per a la Qualitat del Sistema Universitari de Catalunya (AQU Catalunya), or Agencia Nacional de Evaluación de la Calidad y Acreditación (ANECA), and to researchers participating in competitive calls that require recording bibliometric data from their scientific productions. In these

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cases, librarians give advice and seek information to obtain the impact factor of a journal, received citations, normalized impact, and other bibliometric indicators.

Additionally, it is increasingly necessary to have researcher identifiers to ensure the correct identification on the network. UPC libraries promote the use of all main identifiers such as ORCID, ResearcherID, Scopus Author ID, and Google Scholar profiles.

Libraries conduct bibliometric studies to meet the needs of schools, departments, research groups, and the university as a whole. From queries to bibliometric databases and corporate information systems such as the FUTUR portal, bibliometric reports are produced to visualize scientific output and to support decision-making by these units. Some relevant examples are the Observatori de Recerca de la Catalunya Central⁴ and the recerTIC UPC studies (recerTIC UPC, 2019), which are devoted to making UPC scientific production visible in emergent information and communication technologies topics (Figure 7).

Additionally, quality indicators are used to monitor, maintain, and reach high-ranking positions in international rankings. UPCLPAS provides services to the University and participates in a transversal cross-working group created by the Office of the Vice-Rector for Assessment and Quality to monitor the UPC's position in the different national and international rankings. In addition to providing guidelines for researchers to correctly indicate their affiliation and organizing open symposiums to instruct researchers on the different ways to guarantee a good position in the University's rankings, the UPCLPAS works with the Planning, Assessment, and Quality Office to effectively monitor all the university units to make sure that different variants of the UPC name are correctly displayed in the Web of Science and Scopus so that editors of the rankings who use these sources can comprehensively retrieve all of UPC's scientific output.

Improving research assessment is another important goal. UPCLPAS currently supports the Office of the Vice-Rector for Science Policy in promoting Open Science, responsible research, and innovation. They work with the Planning, Assessment, and Quality Office to define the criteria to move toward a multi-indicator-based institutional research assessment within the frame of international initiatives such as the Leiden Manifesto and the San Francisco Declaration (DORA). Thus, it is also remarkable that the Office of the Vice-Rector for International Policy has encouraged the UPC libraries to actively participate in European networks such as LIBER (Ligue Européenne de Bibliothèques de Recherche) and CESAER (Conference of European Schools for Advanced Engineering Education and Research). As a member of the CESAER Open Science Task Force, specifically in the open-access subgroup, work is being done with 11 other technological universities to advance these initiatives in different fields (such as providing access to full texts presented at conferences or open publication monitoring). For that matter, the Open Access Observatory⁵ is a new tool created by UPC's library services and the University of Barcelona (UB) that allows ongoing monitoring of the open access movement among Catalan universities (Rovira & Labastida, 2019).

The set of specific services that support UPC researchers has been shaped by the opinion or by the direct demand of the users and by the gradually positioning strategy of the UPC libraries at different stages of the research cycle, while assisting researchers and anticipating their needs. It is remarkable that direct interaction with researchers or with research support units has been of particular interest in the design and creation of new services and in the improvement of existing ones. Although a formal process of gathering information on users' satisfaction on library research services is pending (expected by 2020), previous processes of this kind, based on internal surveys and external evaluations, have provided very valuable information that has been taken into account for the evolution of existing services and the creation of new offerings. It is also common to include the end-users in the design and launching of new

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library features, starting from planned interviews and meetings depending on the goals to achieve with their participation. The diversity of the University's specialties, coupled with the decentralized structure of both the libraries and UPC itself, means that the generation of new services based on detected needs is carried out by any of the 12 libraries and not by direct indication of the strategic plan.

SOME POSSIBILITIES FOR FUTURE LIBRARY RESEARCH SERVICES AT UPC

Academic libraries will be operating within multiple scenarios in developing library research services in the near future. At UPC, those services are anticipated to be determined mainly by the information provided by assessment tools that the UPCLPAS will implement very soon: on the one hand, UPC libraries are going to conduct structured surveys among doctoral degree students and open interviews with UPC researchers; while on the other hand UPC libraries are devising a dashboard for collecting statistics and indicators to help monitor the services offered by each UPC library and the UPCLPAS as a whole. At the same time, the UPCLPAS is aware of international trends and is taking into consideration some emerging issues that are summarized below:

- **From Open Access to Open Science:** UPCommons has consolidated itself, and researchers count on the benefits of publishing in the institutional repository. Now is definitely the time to move forward and transform the existing dynamics and infrastructures in accordance with the Open Science movement. In this sense, it is planned to promote open research data and open source software repositories. Moreover, it would be useful to promote preprint archiving for open-peer review and to implement the benefits of Webs 2.0 and 3.0 (evaluating contents and notifying authors when their contents are used, among others). In addition, UPCLPAS may soon implement some functionalities related to citizen science and generating collaborative networks based on its repositories.
- **More personalized services:** The UPCLPAS plans to delve deeper into personalizing research services. The library goes far beyond being a mere service provider and seeks to become the very collaborator in the research process by participating in every stage, from designing the study to publishing the results. For instance, it is planned to consolidate the figure of the embedded librarian who already works on H2020 projects from the very beginning, and extend their presence to national projects while they will also give direct advice to doctoral students and academics. In short, UPC libraries will ideally provide researchers with a "personal librarian" service, whenever requested.
- **Bibliometrics and altmetrics services:** Greater demand is predicted for this field taking into account the acceptance of the surveys that have been already published to analyse the research on specific areas and, what is more, to help researchers with their CVs, increase the impact of UPC research, and help research units obtain quality accreditations. These surveys are forecasted to be extended to databases and platforms, such as altmetrics, which have not been used so far. Furthermore, these will provide more complete and sophisticated ways of visualization for facilitating the discovery of new possibilities in cross-disciplinary research while also focusing on improving the university's position in international rankings.

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Figure 8. *Bibliometric Indicators for Architecture Journals (IBRA): Assessing researchers output on architecture* (Source: Universitat Politècnica de Catalunya, Library Publications and Archives Service)

Bibliometric Indicators for Architecture Journals (IBRA): Assessing researchers output on architecture

In the particular case of architecture, there has been a historic need for consistent tools to clearly report on the quality of journals within the field as few architectural journals are indexed in Journal Citation Reports (JCR), which is the primary tool for assessing journal articles published within Spanish universities.



In 2012, UPC librarians and faculty staff devised a system that reports on indicators for journals in the field of architecture and urban planning. The system considers other quality indexes apart from JCR, including Arts & Humanities Citation Index, Avery Index to Architectural Periodicals, Carhus +, ERIH PLUS, and other databases. As this tool was considered useful by several universities, the Standing Committee of the Conference of Directors of the Architecture Schools of Spain agreed on the established criteria and methodology for classifying architectural journals, which led to brand it as Bibliometric Indicators for Architecture Journals (IBRA). It was agreed that IBRA responded to the requirements for organized information on high-quality journals that publish and disseminate knowledge for the international community. Librarians from the two architectural schools supported the establishment of this self-assessment system, and they currently keep it updated.

Regarding UPC assessing to journal articles and as a result of this new tool, the University raised awareness on the special needs of the architectural field and some other areas such as Business Administration, close to the social sciences, and adapted IBRA to design a new assessing grid particularly deserved to these fields.

- **Socializing research, spaces to share experiences:** UPC libraries already promote social work activities for young UPC researchers, mainly through the abovementioned Research Café. In this line, significant effort must be made in upcoming years not only toward adapting the physical space to new ways of sharing interdisciplinary research and novel workflow dynamics, but also toward redesigning and creating virtual services tailored to wherever researchers are located.
- **New disruptive technologies:** Big data, artificial intelligence, machine learning and blockchain are technologies that are rapidly gaining momentum in most sectors. Their eruption in research pathways and the associated information management will have a dramatic impact on the processes and tools used in library research services. Collaboration between researchers will be highly incentivated by platforms, like ResearchGate or Academia.edu, that are using these technologies.

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Institutional repositories will be able to provide semantic information to their users. University libraries have already begun to move in these new directions, especially in regard to the use of AI for better discovery tools, but library research services need to be vigilant to the emergence and impact of these technologies if they do not want to fall behind. Moreover, due to the technological nature of the UPC, UPCLPAS anticipates this impact to occur sooner at this university than in most of its surrounding environment.

USERS OF THE UPC LIBRARIES' RESEARCH SUPPORT SERVICES

As research is of foremost importance at UPC, research users are a focus of library services. All research activities related to the library or devised by the library are user-centered and UPC libraries are already used to adapting and managing changes of all kinds: technological, organizational and related to management (Codina-Vila & Íñigo, 2015). Furthermore, the vision of the UPCLPAS included in the same strategic document states that UPC libraries need to become an indispensable service for the study and research of their users.

There is a wide range of research activities conducted by the UPC researchers, and it is remarkable how much the kinds of research conducted vary. This is because there are very scientific and technological profiles performing basic and applied research and other profiles, for instance in the architectural domain, whose research is close to the social and human sciences. This means that there is a variety of research output conducted by students and academic staff. For this chapter, the classification of users of research services is going to be as follows:

Undergraduate students: bachelor's degree students usually focus their research on a final project and, in consequence, their research needs significantly differ from the other user categories dealt with in this chapter. At this stage, the majority of undergraduate students (from 65 bachelor's degrees run by UPC) need to know and access a small group of information sources and, in most cases, bibliographic management software. Therefore, they are included among the potential recipients of the library's research services.

Graduate students: master's degree students and doctoral degree students are included in this category. They are graduates that conduct research guided by a faculty researcher. As for master's students, they usually conduct research within their established syllabus or their technical specializations with the end goal of writing their master final project. With regard to doctoral students, as they don't take lectures and have almost no classes, they are a rather scattered target. They often live abroad and regularly meet their tutor through virtual or face-to-face appointments. They are, indeed, full research services users and they are in an explicit need to access and take advantage of sources and information tools. UPC has 79 master's degrees and 48 doctoral programs with more than 7,400 enrolled students. Each year, more services are delivered to graduate students and the delivery tends to be more personalized.

Faculty researchers: postdoctoral staff performing teaching and research activities and staff fully dedicated to research and pursuing an academic career are included in this category. They direct doctoral dissertations, publish papers in top academic journals, win prizes in architectural competitions, register patents, innovate in laboratory experiments, and take part in technology-based companies and European or national projects. Along with doctoral students, they become the main focus of the library research service. UPCLPAS has highlighted that professors are the main recipients of the library research services, who meet their needs and even develop tools such as the Bibliometric Indicators for Architecture

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Journals (IBRA) (Figure 8), which deal with areas of research activity that have not traditionally been well explored.

Researchers from industry/professionals: they are individuals or corporations not directly linked to the university community and are occasional users of research services that have UPC libraries as their reference point for very specialized information needs such as technical standards searches, patent searches, training on information sources management, or bibliographic software use. The UPCLPAS meets these information needs through payment services open to these users.

Almost all library services are available to all the university community. Because of its nature, some of them are particularly targeted to a group of patrons. For instance, the advisory service on patents is mainly delivered to doctoral students, faculty, and staff. In some cases, such as the devising of new bibliometric studies, the service is delivered to a research group or academic department. Table 1 provides a list of research services related to the type of user of such services.

CONCLUSION

UPC defines itself as a research university, so its libraries provide a variety of research services. The UPC Library Publications and Archives Service (UPCLPAS) organizational units shape and use strategic planning as a management tool to meet the researchers' current needs and to adapt to new research demands, and they have been doing this for the past three decades.

The economic crisis that still permeates Catalan universities has had a significant impact on the UPC libraries. For this reason, UPC libraries have sought to position themselves and engage in the UPC's research processes through internal and external collaborations at the national and international level (CSUC, Rebiun, CESAER, LIBER, and others) while continuing the lines of work begun prior to the crisis (UPCommons, CRIS administration, FUTUR, and others). Likewise, the university's commitment to improving the efficiency of its management processes has fostered this engagement and definitely helped in consolidating its services.

Besides, UPC's library research services have reached an important level of maturity in terms of personalized assistance for researchers, in products related to the publication, in the visibility of UPC research and its researchers, and in the analysis of research output through bibliometric studies or research assessment tools in the field of architecture (a subject area that was particularly deficient in regard to such evaluation tools). As for open access publishing, it has been able to achieve successful results in terms of open publication rates. UPC reaches other leading European universities' open access rates and has also promoted initiatives for monitoring open access at the universities of Catalonia, such as the Open Access Observatory, developed by UPC and UB.

Consequently, libraries now play a remarkable role in the university's research ecosystem and can be considered a major player in supporting research activities and a visible contributor to new research services, as demonstrated by the assessment of the new patent search service, one of the latest library services launched at the UPC.

Despite the complexity of a system consisting of 12 libraries spread all over Catalonia, both users and governing bodies highly value the library research services. However, a more formal evaluation is needed to show the real state of the opinion of the recipients of the services, and evidence of real impact in research output. New guides can be drawn to enhance the evolution of services according to the criteria of their users. This evaluation is planned for 2020, through a collaboration between UPCLPAS

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and UPC Planning, Assessment, and Quality Office that is going to launch a massive survey to UPC researchers. In the same way, a dashboard for quantitative analysis of research services offered by UPC libraries is planned to be operational in the near future.

Furthermore, the UPC's library services will need to be proactive to keep giving satisfactory answers to face big future challenges, such as internationalization and collaboration between researchers to move forward in increasingly multidisciplinary fields, the evolution and revolution of technologies in the generation-processing-distribution of research information, and in library systems in general. One of the strengths of the UPCLPAS staff structure has been the availability of an information and communication technologies team in-service, which has enabled a high level of innovation and provision of online services. With the forthcoming dramatic technological changes that are about to occur in the coming years, staff should be guaranteed to ensure the continuity and improvement of strategic projects.

The best way to tackle these great challenges is to advance the integration of library staff and services into the University research workflows by embedding librarians in research networks (as has already been done with the new research projects) and by maintaining the two cornerstones that have inspired the UPCLPAS activity so far: the user-orientated approach to services and the alignment with the policies and goals of the UPC.

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Library Research Support Services

KEY TERMS AND DEFINITIONS

Bibliometrics: Statistical methods applied to published research output.

Bibliotècnica: The digital library of the UPC, which provides access to all collections and to information regarding the resources and services offered by UPC libraries.

Current Research Information System (CRIS): Database for storing and managing information and metadata related to an institution's research activity.

Data Management Plan (DMP): Document that describes in detail all aspects related to collecting and managing research data.

FUTUR: The portal that displays the lines of research conducted by the various UPC departments and the documentary production of their researchers.

Thematic Rings: Groups made up of subject librarians in different UPC libraries, all of whom are specialized in the information sources for the subject they support.

UPCommons: The institutional repository of the UPC. It gathers the teaching and research output of all university community members and provides them in open access.

ENDNOTES

- ¹ FUTUR can be accessed in <http://futur.upc.edu>
- ² Bibliotècnica, the webpage of the UPC libraries can be accessed in <https://bibliotecnica.upc.edu/en>
- ³ Geocommons platform can be accessed in <https://geocommons.upc.edu>
- ⁴ Observatori de Recerca de la Catalunya Central <https://orcc.upc.edu>
- ⁵ Open Access Observatory is part of Bibliotècnica <https://bibliotecnica.upc.edu/en/observatory>