MONDRAGON UNIBERTSITATEA

GOI ESKOLA POLITEKNIKOA

ESCUELA POLITÉCNICA SUPERIOR

2015 / 2016
REPORT

www.mondragon.edu/memoriaMGEP


MONDRAGON
UNIBERTSITATEA

INDEX

A BRIEF HISTORY

The Mondragon Higher Polytechnic School was created in 1943 on the initiative of Father José María Arizmendiarrieta, Founder of the Mondragon Cooperative Experience. It has not stopped growing since the outset, also giving rise to the creation of many innovative business experiences.

A major landmark in the history of the School was the founding by five of its technical engineers in 1956 of the Mondragon cooperative movement's first industrial cooperative society: ULGOR, S. Coop.

Another milestone was the creation of the industrial cooperative society ALECOP in 1966, which enabled students to combine their studies with work at a company.

Later on, in 1972, internationalisation took place when the first university exchange programmes were organised with centres abroad. The School has also been actively involved in numerous international Training and Research & Development projects since 1986.

The year 1974 marked the creation of the IKERLAN Research Centre, which is now one of Spain's most cutting-edge technology centres, employing over 200 researchers.

In 1983, the Gizabidea Private Educational Foundation was recognised, posthumous work of Fr. José Maria Arizmendiarrieta, and it took over the running of the School's buildings.

The School has also played an active role in other socio-corporate initiatives over the last three decades, such as DIARA, a pioneering Industrial Design company founded in 1985, and various education centres. More recently, in 1996, the company CEI SAIOLAN was created as a business incubator for new enterprises in advanced sectors, although this activity had already been delivering benefits since 1984.


MONDRAGON
GOI ESKOLA
POLITEKNIKOA
RIA ARIZMENDIARRIETA

In 1995, the Higher Polytechnic School became the first university centre in Spain and one of the first in Europe to obtain the ISO ER353/1/95 Quality Certificate.

MONDRAGON UNIBERTSITATEA (Mondragon University) was created in 1997, together with two more university centres in the Alto Deba area: ETEO S. Coop. in Oñati and Irakasle Eskola S. Coop. in Eskoriatza, now respectively known as ENPRESAGINTZA and HUHEZI.

In 2002, in collaboration with the Goierri Foundation, the HPS campus was started in Ordizia.

The Silver Q Award was received in 2003-2004, with a score of over 400 points in an external evaluation conducted by EUSKALIT.

In 2008, the School was the first Basque University to adapt its engineering studies to the new European Higher Education Area.

September 2010 saw the official opening of the Centre for Technological Research and Innovation in Electronics and Embedded Systems, located at the Garaia Innovation Park and which combines research and training in the fields of electronics, computer science and telecommunications.

In September 2013, the HPS, in alliance with Orona Ideo, opened the new campus in Donostialdea in the Orona Foundation building.

In July 2014, the AUDIT Certification was awarded after the assessment by UNIBASQ and ANECA.

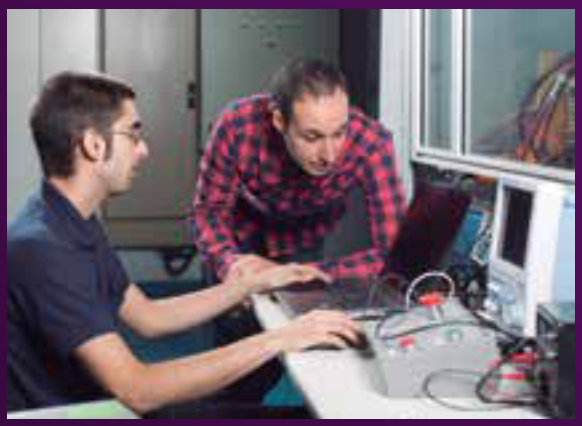
In 2014-2015, we celebrated the 100th anniversary of the birth of Jose Maria Arizmendiarrieta.

COMPOSITION OF THE HIGHER POLYTECHNIC SCHOOL

The legal name of Mondragón University's Higher Polytechnic School (HPS) is Mondragon Goi Eskola Politeknikoa (MGEP). It is a mixed cooperative with three types of members in equal numbers:

- Working partners.
- User partners (students).
- Collaborating partners (Companies and Government bodies).

The Assembly, which is its ultimate decision-making body, and the Governing Board, which establishes its lines of action, are both made



up of equal numbers of these three types of Partners. This structure enables the students and companies to become directly involved in running the centre.

Bearing in mind that the main mission of the HPS is to train students for a professional career in an industrial environment, the legal formula of the mixed cooperative, which has been integrated into the business world and, in our case, mainly into the cooperatives, has been an essential factor in its constant evolution and adaptation to external demand.

Equally, the real opportunity for our students to take sandwich courses (work-study model) is a key added value throughout our development. As is the performance of the degree and master's final projects/thesis in companies or in the HPS itself under contract R&LD projects with companies.

The employment status of the HPS' teaching staff is equivalent to that of professionals belonging to an industrial cooperative. Specifically, aspects such as the working calendar, timetables, wages and the staff promotion system are all equal.

ANNUAL REPORT

We this annual report, we intend to transmit to Society the main lines of action in on which we have focused our activity in the academic year 2015-2016 and attach figures and qualitative assessments to this data report. For us, it is also the time to communicate our strategic bets for the future, reflected in the Strategic Plan, which we have projected to 2020.

We have oriented our activities and business to the development of our Mission, the transformation of society through comprehensive training and, the generation and socialisation of knowledge in the scientific and technical fields. We aspire to excellence in our daily activities, aiming to improve the satisfaction of our students, of companies, and institutions.

The overall dimension of the Polytechnic School of MONDRAGON UNIBERTSITATEA (EPS) has been 3.5% higher in the academic year 2015-2016. With regard to the previous course, we have trained more engineers and engineers, researched more, and transferred more knowledge to the industry. We have also maintained our commitment to Professional Training (Higher Degree) – an activity that we manage from the Polytechnic Institute.

With regard to the formal training activities (the clients of which are Degree, Master's and Doctorate Engineering students and those of Higher Technical Certification Courses), we have maintained the offer of 9 degrees and 5 Master's degrees, expanding the offer of distance learning formats in the Master's Degree in Business Innovation and Project Management These degrees are taught in the campuses of Arrasate, Goierri and Orona-Ideo. This course should highlight the implementation of a complete term in English for all students in the 3rd year in 7 degrees, as well as the implementation of the Master 's Degree in Industrial Engineering at Orona-Ideo. We have begun deploy-

ing the Ethazi Model of active methodologies in the Training Courses. In addition, we continue with the second promotion of the Higher Degree Training Course in Industrial Mechatronics in a partial offer format to meet the needs of retraining professionals, in particular cooperative partners in relocation processes.

With regard to research and transfer activities and non-regulated (or continuous) training, whose main clients are companies and institutions, roughly 2,324 professionals have attended over 296 continued training courses in this academic year 2015-2016, with a growing number of companies demanding tailored training, including a professional development plan and coaching in the use of methods and tools.

The value we add to the company is reflected in the fact that 57% of the research financed by companies, mainly from the industrial sector, is related to the existence of a long-term collaboration research programme. We work with this model with leading companies in their sectors such as Orona, Fagor Arrasate, ITP, ULMA, Ampo, Fagor Ederlan, Batz, Matrici, CAF, the Automotive and Component Divisions of the MONDRAGON, Ingeteam, Ormazabal, MSI, etc., as well as SMEs, with fewer resources and which demand customised care.

We must not forget the support of the Institutions in this journey, and their trust in our project, which has even more value in these times of budgetary adjustments. For that reason, we would like to thank Basque Government for its support, despite the difficulties, especially via the University Plan managed by the Department of Education, Language Policy and Culture and the support from those of Economic Development and Competitiveness and Employment and Social Policies. The support of the Innovation, Rural Development and Tourism department from the District Council of Guipuzkoa has also been significant. And, lastly, that of the Ministry of Economy and Competitiveness of the Central Government. The programs to support the knowledge agents and the competitive calls promote by these institutions make it possible to develop and transfer knowledge and technologies to our industrial and service fabric and thus contribute to improving the competitiveness of our companies at the global level. Secondly, it helps us to contribute, through lifelong learning, to the development of continuous training and to the renewal of the knowledge and skills of professionals with a technical profile. Finally, it contributes to improving the training of students in technical and engineering studies, so that young people can develop the competences that make them the engine of change in the companies in which they are integrated when they finish their studies, and orient them towards activities with an increasing added value.

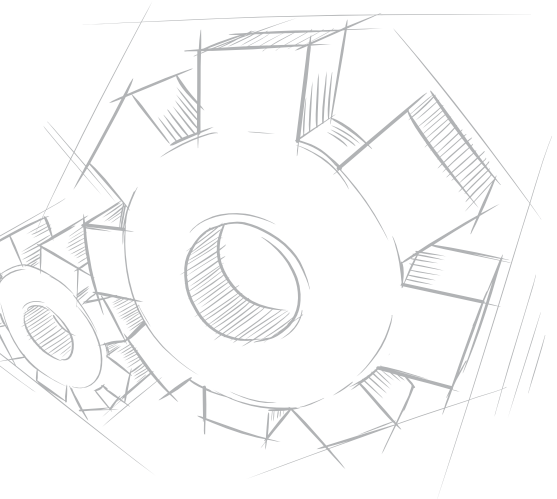
Against popular belief, an approach geared towards business interests is compatible with scientific excellence. 27 theses were produced during 2015-2016 and 106 theses are currently being prepared, 60% of which are entirely funded by companies. With regard to scientific production, we have published 42 articles during 2015-2016 in publications included in the Journal Citation Report (JCR), 60% of which were publications in the first quartile and another 20%, publications in the second quartile, which gives an idea of their quality. Furthermore, we have been awarded 3 patents, one of which is European. This course has been especially positive in the European competitions, where we have achieved nearly 9.5% of the annual financing of the research and transfer activity, with a total of 20 active projects, four of which are new concessions for this course.

The groups of both workers and students have had the opportunity to participate in the process of strategic reflection, either directly through the work tables, in which over 120 workers have participated, or indirectly, through on-site and remote group activities. As a result, we have established the 4 Strategic Challenges, which are summarised as follows:

- To train students with an integral profile for work in cooperation.
- To be the University of reference in its relationship with the company.
- To count on the cohesive and enthusiastic people necessary for the development of the project.
- To do that in a sustainable way over time and maintaining our social commitment.

The actions we think will enable us to achieve these challenges are prioritised in the following five strategic actions:

- Fostering capacity building and internal training.
- Boosting specialisation in advanced manufacturing, energy and health.
- Promotion of the geographical expansion of our activities.
- Development of a more comprehensive offer to companies and workers.
- Establishment of stable alliances with the company.



None of these activities would have been possible without the participation and commitment of the 455 people who have led the Mondragón Higher Polytechnic School project with enthusiasm, respect and responsibility. This is an educational project geared to the development of a free society, committed to its future.

Finally, we share quantitative data to measure the activity:

The turnover for the financial year 2015-2016 amounted to €28,690,000 euro, representing a 3.5% growth over the previous financial year.

Legal surplus amounted to €261,000 before provision for the COFIP (Mandatory Contribution for Purposes of Public Interest) and after payment of interest on the contributions.

Ordinary investment made and committed during the year amounted to €1,391,000, 7.9% higher than the figure for the previous financial year and financed mainly by subsidies from the MONDRAGON Corporation's Inter-Cooperative Education and Promotion Fund (FEPI) and the Basque Government.

With regard to the Balance Sheet, as of 31/08/2016, it reached a figure of €58,661,000, in which we can highlight the solvency and independence ratios.

ACADEMIC REPORT

POLYTECHNIC INSTITUTE

DEVELOPMENT OF THE ACADEMIC ACTIVITY

Professional Training continues to play a key role in the academic activity of the MGEP. Six Upper-Level Vocational Training Courses have been taught, relating to the four professional fields most directly connected with the local industrial sector: Mechanical Manufacturing, Electricity and Electronics, IT and Communication and Installation and Maintenance.

- Advanced Technician in Industrial Mechatronics.
- Advanced Technician in Mechanical Manufacturing Design.
- Advanced Technician in Mechanical Manufacturing Production Programming.
- Advanced Technician in Network Computer Systems Administration.
- Advanced Technician in Industrial Robotics and Automation.
- Advanced Technician in Electrotechnical and Automated Systems.

234 students have been trained in the 14 Upper-Level Vocational Training groups. During this academic year, all the qualifications offered are courses contemplated in the new Organic Education Law (LOE), having removed the LOGSE (previous educational law) courses entirely.

On the other hand, In collaboration with the MONDRAGON Corporation and the Deputy Council for Professional Training and Permanent Learning of the Basque Government, we have implemented a second promotion in the Industrial Mechantronics qualification in partial format (combining the studies with the work) in order to meet

the educational requirements of the partners of the MONDRAGON Corporation cooperatives. In total, sixty-four (64) workers are being trained by us.

A fundamental element of the courses is Workplace Training (WT), which enables both students and work experience tutors to work directly with companies. A total of 68 students undertook Workplace Training at 49 different companies. Also, in collaboration with HETEL (the Association of Vocational Training Centres created by Social Initiative), two students trained at companies abroad as part of the ERASMUS+ programme in the Netherlands and Ireland.

As part of the training, our students have entered two competitions:

- FTC robotics competition organised by FIRST: a group of students and teachers from different branches have taken part in the European competition held in Eindhoven (Holland), where the help of Danobat Group, Talleres Erle, Fagor Automation and Mondragón S.Coop was vital.
- The contest SCE – Industry Automation 2016, organised by Siemens throughout Spain, ranking third.

Additionally, 14 students obtained their degrees this year through the work-study courses (DUAL sandwich courses run by the Basque Government) with a further 35 embarking on the programme upon completing their first year of study.

The general level of satisfaction of our students is high, both with the academic studies carried out at MGEP, particularly the practical sessions and group projects, and the Workplace Training, and these are key indicators for our activity.

INNOVATION IN THE TEACHING-LEARNING PROCESS

During the academic year 2015-2016, we continued to redesign the learning processes based on the achievement of learning results. This knowledge will be the professional competences which the students must achieve in order to participate in the work environments.

This redesigning and adaptation of the objectives for each qualification have set the foundations in the development of the educational model, progressing in the active methodologies and taking continuous assessment a step further. The introduction of practice-based learning, i.e., know-how, has meant the transformation of the elements

of the learning-teaching process. Practical learning and learning by doing put the focus on the student. Therefore, the teacher's and student's roles change in the new model.

The student adopts the role of technician who performs projects in which he/she experiments and builds situations that will arise in the near future in the labour market. For this purpose, the student must suggest what must be done and how to do it to resolve a problem or respond to a need.

TECHNOLOGY INNOVATION AND INVESTMENTS

The major technology evolution, particularly in technology connected with university-level courses in Vocational Schools, has led us to an important investment effort in order to renew and adapt our laboratories and facilities. This was financed by the Inter-Cooperative Education and Promotion Fund (FEPI) resources received from MONDRAGON and equipment subsidies from the Basque Government's Department of Education, Language Policy and Culture and, more specifically, the Professional Training Directorate. The investment was mainly made in the fields of Mechanics, Electronics, IT and Manufacturing.

To make efficient use of these resources, technology projects such as prototypes, scale models and manuals are also being developed, to aid both students and teaching staff in their academic tasks with workshop and laboratory practical sessions and innovation projects. These innovation projects for this year are:

- Micromanufacturing, in collaboration with HETEL as a BETEKU project.
- Electric innovation and mechatronics in the new hybrid and electric motors in the automotive sector.
- Reverse engineering technologies. Design, testing and verification of individual industrial parts.
- Design of tools for handling ultra-resistant steel sheets for the automotive and aviation industry.

The latter three projects were piloted by the TKNIKA (Professional Training Research and Innovation Centre of the Basque Country), in collaboration with other Professional Training centres.

ENTREPRENEURSHIP

This academic year we continued our activity with the entrepreneur-

ship working party, geared to motivating the entrepreneurial culture. In addition, our participation in TKNIKA's Urratsbat scheme enabled us to enhance this area through exchanges of experiences.

The following activities were developed:

- Entrepreneurship awareness-raising lectures.
- Procurement of complementary training for the students' professional development.
- Finding employment opportunities in today's complex market.
- Empowerment for creation and launch of the students' own business ideas.

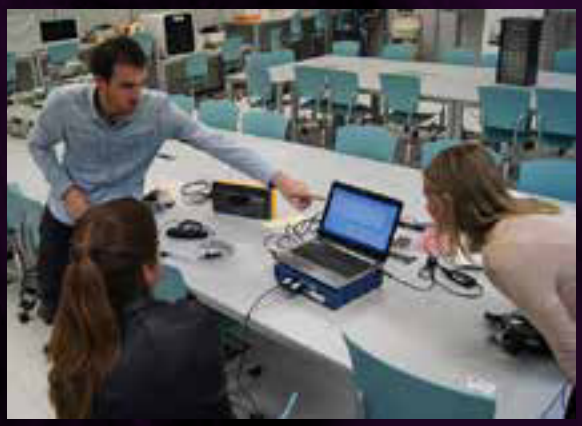
In the academic year 2015-2016, all the Upper-Level Vocational Training Courses have taken part in the "IKASEMPRESA" project, an educational tool based on practical experience (development of a business project) and on interaction with external agents. The project includes an "ENTREPRENEUR FAIR" which was held in February and involved all the centres participating in the scheme. The aims of this project were to:

- Foster development of entrepreneurial skills.
- Give students the chance of finding out about local institutions, entities and companies and contacting them.
- Help clarify misconceptions regarding entrepreneurship.

RELATIONSHIPS

As an associated centre, in addition to our working relationship with the Basque Government's Vice Ministry for Vocational Training and Lifelong Learning, we also participate in different schemes set up by the Guipuzcoa Regional Government and Lanbide.

We liaise with educational centres and associations in our region and in other areas. This includes membership of HETEL, the Association of Vocational Training Centres created by Social Initiative, which is present in numerous regions of the Basque Country.



ENGINEERING

In the academic year 2015-2016, we offered 9 Degree courses and 5 Master's Degrees and one Doctorate degree adapted to the European Higher Education Area (EHEA). These were as follows:

- Degree in Mechanical Engineering
- Degree in Engineering in Industrial Design and Product Development
- Degree in Engineering in Industrial Organisation
- Degree in Engineering in Industrial Electronics
- Degree in Computer Engineering
- Degree in Engineering in Telecommunications Systems
- Degree in Energy Engineering
- Degree in Engineering in Eco-technology in Industrial Processes
- Degree in Biomedical Engineering

- Master's Degree in Business Innovation and Project Management
- Master's Degree in Strategic Product Design and Associated Services
- Master's Degree in Industrial Engineering
- Master's Degree in Energy and Power Electronics
- Master's Degree in Embedded Systems

- PhD in Mechanical Engineering and Electric Power

Students have been trained at the following levels:

- Bachelor's Degree in Engineering: 1,243
- Master´s Degree 245
- PhD: 106

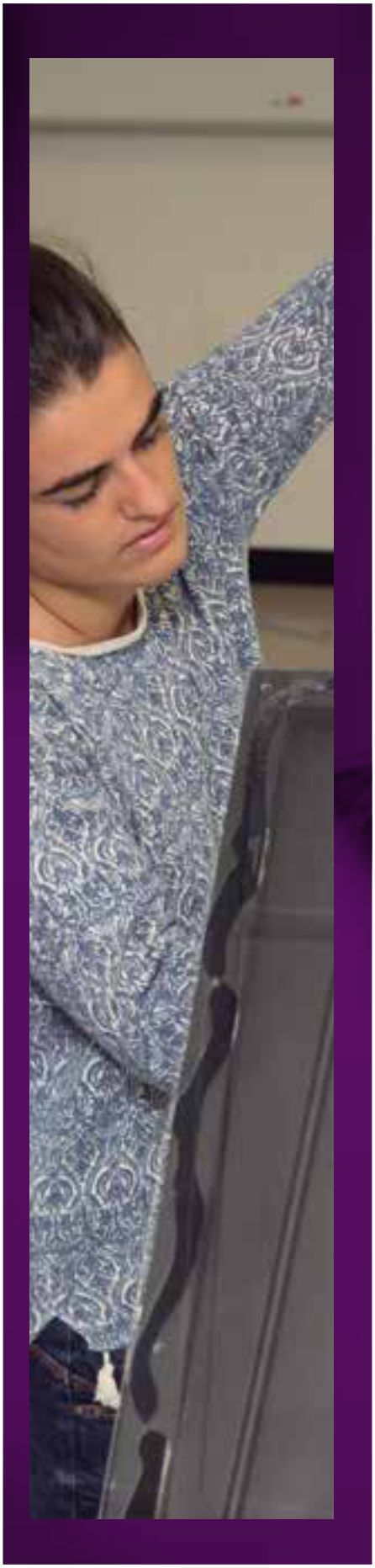
In collaboration with ANECA (National Agency for Quality Assessment and Accreditation) and UNIBASQ (Agency for Quality Assessment and Accreditation of the Basque Country University System), the Master's Degree in Industrial Engineering, Master's Degree in Strategic Design of Products and Services , Computer Engineering , Engineering in Industrial Organisation and Engineering in Industrial Design and Product Development received a positive evaluation in the ACREDITA programme.

ACADEMIC ACTIVITY

All the academic activities planned for 2015-2016 were carried out in full compliance with the Management Plan.

In our effort to educate competent young adults, 1594 students have developed their academic activity in Engineering in the Higher Polytechnic School.

From a quality viewpoint, the good academic results obtained in general on both the degree and master's courses are noteworthy, as is the students' satisfaction with PBL methodology and project development. These active methods enable the students to develop key professional skills through individual and team-based learning.



EDUCATIONAL MODEL

Our School is characterised by providing practical, business-oriented training within an increasingly international framework. To advance in this challenge, we continue to develop and implement our own distinctive educational model, which has the following cornerstones:

- Intensive use of active methods in the teaching/learning process.
- A model based on developing and acquiring skills and learning outcomes, rather than a subject-based model.
- Continuous overall assessment of students as a key tool for skills evaluation.
- Work-study alternation with in-company work experience.
- Studies and end-of-degree projects abroad.
- Teaching in three languages.
- A change in role of the teaching staff and students.

Learning Methodologies

The EHEA wishes students' learning to focus on acquiring skills (technical and cross-cutting), rather than on the acquisition of knowledge.

This new paradigm requires a profound change in the planning of the teaching and learning process, which now focuses on the skills to be acquired by the students, while the subject matter is a vehicle for developing and acquiring these skills.

For students to discover the usefulness of theoretical principles and to develop technical skills, we use the following teaching methods for all the subjects on our courses:

- Theory classes and lectures in the classroom.
- Classroom exercises. Problem-solving individually or in small teams (cooperative learning).
- Practical sessions in the computer room. Scheduled practical activities using a software application as a working tool.
- Practical work in laboratories. When necessary, use of equipment or machinery for testing, measuring, etc.
- Case work and/or studies. Students draw up a report and present it in class.
- Project Based Learning (PBL) works. Teams of students carry out a project each semester, concentrating on knowledge development and the practical application of technical and transferable skills.
- POPBL (Problem Oriented Project Based Learning) in Degree courses. Students are posed with a problem, which they must solve through a project.

Skills Development and Assessment

Focusing learning on acquiring skills has required the evaluation system to necessarily adapt, contemplating:

- Continuous assessment: Written/oral exams, tests, assignments, projects, etc. are carried out and assessed throughout the semester, taking into account all the teaching activities that have taken place during this time, as opposed to a single assessment milestone such as an end-of-semester exam.
- Feedback: This is a key component of the learning process. The students receive assessment and individual guidance from their teachers throughout the semester at different times.
- Retaking: A second chance to pass any activities the students may have failed is scheduled within the actual semester, eliminating the September retakes.
- Global assessment: Assessment based on the student's general performance and skills acquisition throughout the semester or year, based on a joint assessment by the teaching staff.

Multilingualism

Technical English is included during the first years as a subject of study; verbal and written communication in English is included as a cross curricular subject in both the writing of the technical report in the presentation and when arguing the thesis; and technical subjects taught in English are also offered throughout the different years of the degree.

In 2014-2015, the proposal for an integral semester in English began, namely in the first semester of the 3rd year. We can thus facilitate the integration of students from other universities and countries in each of the degrees offer our students the possibility of having the internalisation experience at home. In 2015-2016, a total of 7 qualifications of the 9 offered were given in English, and work is being carried out so that this can be done in all degrees in the next academic years.

With the aim of ensuring that our students can reach the level equivalent to C1 in the Basque Country, two subjects of technical Basque have been offered for the first time, helping to ensure that the requirements for such equivalence are met.

Study-Work Alternation

A large number of students at the School combine their studies with work placements, either working in the facilities of the School as assistants in the research departments and laboratories or at other companies.

A total of 247 engineering students combined work and study in the academic year 2015-2016.

END-OF-DEGREE PROJECTS

The main aim in the end-of-course project area was to obtain quality applications from companies that were suited to the students' professional profile, with well-defined objectives, an adequate dimension according to the length of the projects and with the highest possible technology level, meeting their needs.

Significant data include the fact that a total of 322 students completed their end-of-course projects in the academic year 2015-2016, with 414 project applications being received. Forty-one (41) undergraduate and Master's Degree theses have been developed, mainly in European countries such as the Czech Republic and Slovakia, but also in extra-community countries such as Mexico, through the ERASMUS+ mobility programme, bilateral mobility agreements or company-unversity agreements.

DOCTORATE

In the academic year 2015-2016, the School also offered numerous post-graduate courses. As a result, the course had 106 doctoral students enrolled and 27 theses defended, 12 of which obtained the European Doctorate Mention and 16 obtained the CUM LAUDE mention.

The doctoral theses read during the academic year were as follows:

Engineering Doctorate Programme

- Álvarez Ruiz, Jorge: Application of variable speed techniques for optimisation of the grinding process
- Aracama Camino, Jon Ander: Development of models and simulation tools for FMLs with morphing capability
- Barrenetxea Iñarra, Manex: Energy conversion scheme for offshore DC wind turbines
- Barreno Fernandez, Igor: Development of a calculation methodology for the design of an oscillating Stirling heat pump
- De Carlos Garcia, Xabier: Query Tranformation Framework – MQT: from EMF-Based Model Query Languages to Persistence-Specific Query Languages
- Echaniz Hernandez, Erik: Development of hybrid structures by semi-solid forming of aluminium on steel
- Elguezabal Lazcano, Jon: Influence of brake rotor, caliper and anchor bracket stiffness on low frequency brake squeal
- Esnaola Arruti, Aritz: Development of impact structures in composite materials for light vehicles
- Ezpeleta Gallastegi, Enaitz: New approaches for content-based analysis towards Online Social Network spam detection
- Golvano Escobal, Ione: Corrosion and tribocorrosion characterisation of Ti13Nb13Zr alloy in oral environment for dental implants
- Gomez Herrera, Damian Jose: Advanced design methodology for permanent magnet synchronous machines in power applications
- Iriarte Azpiazu, Ion: The contribution of service design for the servicing of the manufacturing industry
- Iriondo Gabilondo, Jaione: Numerical-experimental study of the dynamic behaviour of a self-reinforced thermoplastic MLF
- Lazcano De Anta, Urtzi: On-line stator winding temperature estimation for thermal protection of induction machines in railway traction applications
- Legarda Cristobal, Aritz: Calibration of laser triangulation systems based on Scheimpflug cameras
- Leon Garcia, Omar Alexander: Impact of information and communication technologies on business diversification
- Mugica Abarquero, Joseba Iñaki: Mechanical behaviour of fibre metal laminates based on self-reinforced composites for impact applications
- Olave Irizar, Mireia: Quasi-Static and Fatigue Delamination Characterisation for Carbon Fibre Reinforced Woven Laminates: Investigation into the Nesting Effect between Layers
- Perez Riaño, Alain: Semantic Web and Semantic Technologies to enhance Innovation and Technology Watch processes
- Perez Rodriguez, Gustavo Antonio: Advanced closed loop algorithms for state of charge and state of health estimation in li-ion

batteries at wide operating conditions

- Retegi Uria, Aiur: Design Methodology for an experience based on people's skills
- Rodriguez Torija, Pedro Manuel: Spectrum Handoff Strategy for Cognitive Radio-Based MAC in Industrial Wireless Sensor and Actuator Networks
- Roldan Nariño, Raul Fabian: Inventory routing problem with stochastic demand and lead time
- Sacristan Perez, Irantzu: Rough turning of Ti-6Al-4V and Ti-10V-2Fe-3Al: understanding machinability by looking at the link between machining parameters and material properties
- Silvestre Soriano, Elena: Sheet metal roll levelling optimization by means of advanced numerical models and development of new concepts for last generation materials
- Tena Merino, Iosu: Pultrusion of 3D profiles based on ultraviolet (UV) curing outside the mould and robot-boring systems
- Zabala Eguren, Alaitz: The use of 3D surface topography analysis techniques to analyse and predict the alteration of endosseous titanium dental implants generated during the surgical insertion.

INTERNATIONAL RELATIONS

During the academic year 2015-2016, the International Relations continued the actions initiated during the previous courses, but placing special emphasis not only on those related to foreign mobility but also those regarding internationalisation of the students do not have this experience. This is the concept of "Internationalisation at home". These were, specifically:

- To ensure that a third of the students from Degree and Master's courses have an international experience of at least one semester during their period of study.
- To boost "Internationalisation at home" by integrating the inclusion of contents in study plans, inclusion of Incoming students in the university life and activity, and establishing a semester entirely in English for each Degree course, which was implemented in the last academic year for the first time.
- To reach a number of national and international exchange students in accordance with the size of the HPS, so as to contribute to the Internationalisation of the

Campus and its sustainability.

- To renew and activate collaboration agreements with foreign universities within the new European strategy, "Horizon 2020". In particular, to work on sharing networks and strategic alliances with other institutions which, in some cases, may lead to joint qualifications.
- To boost the participation of the HPS in the internationalisation process of local companies, both via its assistance in training a qualified workforce and by taking part in joint initiatives with foreign companies and/or institutions.
- To continue to coordinate and take part in European Projects such as the current Erasmus Mundus LAMENITEC (with Latin America, completed in 2016) and INTERWEAVE (with Asia). The participation in programmes within the "Horizon 2020" framework programme is vital in order to increase the visibility of the HPS.

Below is a quantitative description of how some of these actions have materialised during the academic year 2015-2016.

a. Actions aimed at promoting the mobility of students from the HPS.

- Monitoring and strengthening of the current double qualifications:
  - INSA Toulouse (France): Master in Industrial Engineering and Master in Embedded Systems.
  - ENSEEIHT Toulouse (France): Master in Energy and Power Electronics and Master in Embedded Systems.
  - ECN Nantes (France): Master in Industrial Engineering.
  - University of Skövde (Sweden): Master in Embedded Systems / Web Computing.
  - New Dual Degree programme: ESTIA (France): Master's Degree in Business Administration and Project Management
- Academic travel management (4th year of Degree, 2nd year of Masters and Doctorate Programme).

  Out of the 181 people who have requested to leave in the academic year 2015-2016, in accordance with their academic record and their level in a foreign language, 143 have embarked on a mobility experience under the following programmes:
  - Studies Mobility: 80
  - Projects Mobility: 56
  - Doctorate Mobility: 7

  The countries and/or cities in which our students have been able to perform a study stay are Belgium, Switzerland, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France, India, Italy, Japan, Mexico, Netherlands , Poland, Sweden, Slovakia, Turkey, and the United Kingdom.

b. Actions aimed at improving Internationalisation at home.

- Seventy-nine foreign students, and from the rest of the country, are pursuing studies in the HPS within the ERASMUS+, ERASMUS MUNDUS and SICUE programmes, as well as INTER-UNIVERSITY AGREEMENTS. The visiting students came from the following counties: Argentina, Czech Republic, Turkey, France, Guatemala, India, Mexico, Colombia, Guatemala, Honduras, Nicaragua, Brazil, Japan, Hungary, Spain, Italy, Sweden, and Poland.
- Organising welcome and integration activities through the Buddies system, for the third consecutive year. We see that this activity is gaining strength year after year.

c. Actions aimed at assisting the internationalisation of companies and society.

- As part of the backing we provide for the international expansion process of Basque companies, 6 students carried out their end-of-course and end-of-degree projects at Basque companies abroad: Czech Republic (4), Slovakia (1), Mexico (1).

PROFESSIONAL LEARNING SPACE

2,324 professionals have taken part in 295 training programmes during the academic year 2015-2016, totalling 10,939 training hours. More and more companies are coming to us to obtain tailored training combined with a professional development plan and support in the use of methods and tools. 310 companies have trusted us throughout this academic year. 115 teachers have assisted these professionals in their learning process and the average satisfaction mark was 8.54.

Two courses related to professional certifications were run in the academic year 2015-2016 as part of the scheme organised by Lanbide, the Basque employment service. A total of 770 training hours in the courses on Injection Mould Design and Manufacture of moulds of polymer and light alloy parts. A total of 38 professionals have taken part in these two professional training programmes for employment.

January 2016 marks the beginning of a new edition of the Master's Degree in Industrial Operations Management, in collaboration with the Chamber of Commerce of Bilbao and Asenta and the 24th edition of the Professional Master's Degree in Production Management in Mondragón. A total of 20 companies participate and train their professionals in these training programs. Over 40 professionals participated in the edition.

In January 2016, the first edition of the Expert Course on Logistics and Purchasing began. Considering the success of this training, an Executive Master's Degree in Integral Logistics and Purchasing, to be taught as from March 2017, was designed during this period.

During this course, the 14th edition of the Advanced Course in Maintenance Management was given. In this course, 27 professionals attended the complete course or the different modules that are designed.

During the academic year 2015-2016, a number of seminars or forums were organised in which experts presented different tools and methodologies, sharing good practices of the industrial organisation with the participating companies.

More and more companies are demanding practical training and support in order to better acquire the knowledge. During this course, more than 20 training courses were held in companies.

At the Polytechnic School, we believe that project management is a key competence for enterprise development, as it forms an essential part of companies' projects for change and innovation. During the academic year 2015-2016, two editions of the PMP Certification Program were held. Currently over 160 professionals have been certified and 85.3% of those certified in PMP in the Basque Country have trained with us. During this academic year, a new edition of the advanced course in project management was held, as well as five conferences on specific topics.

With this clear commitment to Project Management, in collaboration with InnoBasque, its partner companies and professionals from the country's leading companies which have already firmly committed to Project Management, it has been decided to create a Project Management Professional Community (Basque Project Management). A space to access and share information and knowledge concerning Project Management and Project Managers with a global and international focus, centred on people and professionals thirsty for knowledge with experience in the field of Project Management.

This Community is expected to be a meeting point for Basque professionals in the field of Project Management for sharing news, opinions, reflections and activities

related to the field. Furthermore, the two founders of this initiative wish to stimulate another series of dissemination activities, such as forums and encounters which enable the participants' professional development.

In the field of Mechanical Engineering, more than 30 open courses have been taught in subjects including Industrial Design and Product Development, Materials, Manufacturing Processes and Maintenance. An increasing number of companies are turning to us for needs analysis and tailored course design, and we provide practical, applied guidance to offer solutions to their problems. In the academic year 2015-2016, 20 in-company courses have been run with this approach.

In March 2016, the 2nd edition of the Master's Degree in Casting Technology Innovation (iCasT) was started, aiming to train professionals in this sector so that they are able to recognise new technological opportunities and evaluate their impact.

This academic year marked the 6th edition of the "Design Konferentziak", in which participants got together with the aim of creating a space for reflection on the design and healthcare to view different pathways available for improving health through design.

Furthermore, during this academic year, the 5th edition of the Expert Course on Patents in the business field was held in collaboration with Galbaian, at the Bilbao Chamber of Commerce.

As in previous years, the ICT team of the Polythetic School organised and hosted more than 120 conferences in the field of Digital Marketing, as part of the Enpresa Digitala initiative. It has participated in the Rioja Alavesa Wine Tourism Forum, in the Tourism conferences of Urdaibai, Gipuzkoa Encounter, Araba Encounter, Euskal Encounter, Digital Transformation for the Mondragón ICT Committee, CRO at Bilbao Tech Week, and the ICT Week of Hernani, Bergara, and Tolosaldea. The congresses Indusmedia, Interdigitala, KaixoWorld and WP Euskadi, as well as 22 Technological Barnetegis, were organised in areas of Industry 4.0, Tourism and ICT. As a complement to the training, the team of ICT professors has provided support to a number of companies in the application of these Digital

Marketing tools, methodologies and strategies in their companies.

An increasing number of professionals, with the aim of training, are choosing new training formats that allow them to combine their training and their careers. With the aim of responding to this need during the academic year 2015-2016, several online courses were given, including the Master's Degree in Computer Security, the Expert Course on Computer Security, the first edition of the MOOC in Ethical Hacking, the Lean Manufacturing course, and the Integral Logistics course. During the academic year 2015-2016, the online Master's Degree in Business Innovation and Project Management was designed.

To cater to the demand for our new degree courses, we launched a new series of adaptation courses for the on-line Degrees in Mechanical Engineering and Industrial Electronics Engineering.

We have been designing new training courses throughout the academic year 2015-2016 for the academic year 2016-2017. All this information is available on the new web platform www.mondragon.edu/profesionales

RESEARCH AND TRANSFER

Despite the tough conditions of the environment, EPS-MU has managed to continue strengthening its knowledge transfer and research activity during the academic year 2015-2016. This was, on the one hand, thanks to the support of the companies that have relied on us to conduct research with them, and on the other hand, thanks to our success in the various calls for research projects, especially in Europe. Thus, in this activity, we have grown by more than 9%, reaching €11.6 million for research and transfer. It should be noted that 51% of this amount comes from private investments, which have grown by 4%, and the remaining portion is due to a 15% growth in revenues obtained from competitive R&D calls, which thanks to our transfer model, also aims at the application of the knowledge acquired in our collaborating companies.

These numbers make us the university with the greatest relationship with companies (% of company-funded research) and several studies attest to us being the most highly valued in terms of Innovation and Technology Transfer. For example, U-Multirank (2016) gave us an "excellent" rating

in parameters such as co-authoring with industry partners, income from private research, or external funding for research.

One of the keys has, once again, been the wise decision of the Polytechnic School researchers to align their technological capabilities with the needs of the companies. The value added to the company by the Polytechnic School is reflected in the fact that 57% of this research funded by companies, mainly in the industrial sector, is related to the existence of a long-term collaboration research programme. The projects undertaken within the framework of these collaborative research and transfer programmes range from oriented basic research to industrial research and experimental development projects, which eventually lead to innovative products, processes and services. In addition, a long-term relationship allows us to align our basic research with the company strategy and train the talent they require. All this results in a model with proven efficiency in the provision of a comprehensive and multidisciplinary solution to business requirements by effectively coordinating between the generation and the transfer of knowledge.

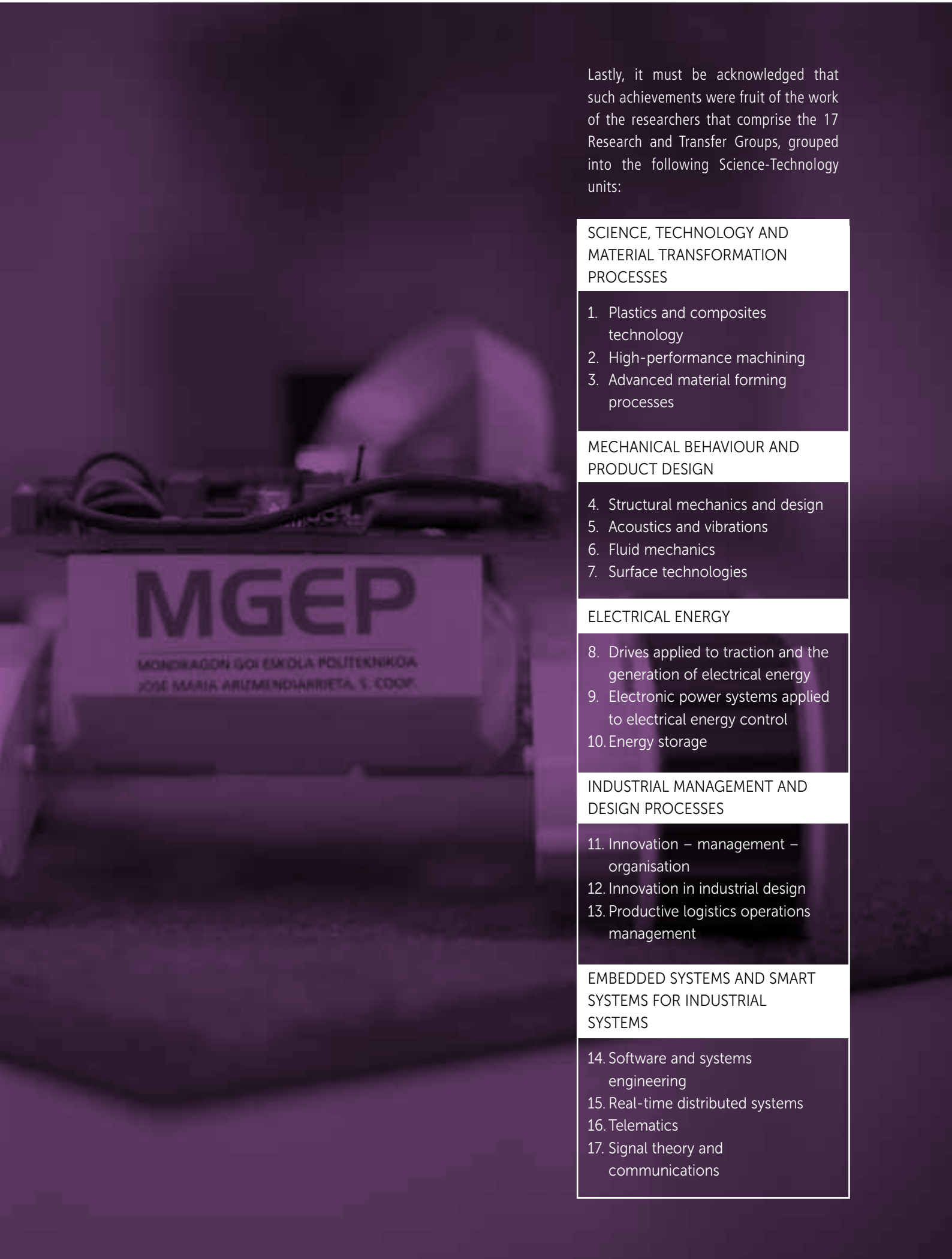
We work with this model with leading companies in their sectors such as Orona, Fagor Arrasate, ITP, ULMA, Ampo, Fagor Ederlan, Batz, Matrici, CAF, the Automotive and Component Divisions of the MONDRAGON, Ingeteam, Ormazabal, MSI, etc., as well as SMEs, with fewer resources and which demand customised care.

With regard to scientific production, we have published 42 articles during 2015-2016 in publications included in the Journal Citation Report (JCR), 60% of which were publications in the first quartile and another 20%, publications in the second quartile, which gives an idea of their quality. In addition, we have been awarded 3 patents, one of which is European. Our publications stand out (U-Multirank, 2016) thanks to their impact index, number of joint publications with foreign universities, and co-authorisations with industrial partners.

The majority of these results are related to the theses under way and are an indicator of the excellent work performed by the researchers of the Higher Polytechnic School. Also noteworthy are 27 doctoral theses read and 106 in progress, over 60% of which are funded by private entities.

An essential instrument which allows our Research and Transfer Groups to remain at the forefront of knowledge is the Specialisation Plan, funded by the Department of Education, Language Policy and Culture of the Basque Government, which we have managed to maintain during the last academic year.

As for research financing in competitive tenders, according to the KT&R report by the CRUE (Board of Governors of Spanish Universities), the Higher Polytechnic School triples the average financing by university TRS. In this sense, the academic year 2015-2016 has been especially positive in the European competitions, where we have achieved nearly 9.5% of the annual financing of the research and transfer activity, with a total of 20 active projects, four of which are new concessions for this course. Also worth noting is the financing obtained in competitions by the Provincial Council of Gipuzkoa, amounting to 8% of the research and transfer budget, with 17 active projects from their various competitions. As for the calls of the Basque Government, four projects have been obtained from the Department of Education, Language Policy and Culture, one from Employment and Social Policies and one from Environment and Territorial Policy of the Basque Government. In addition, we are present in a total of 32 Hazitek projects and 15 Elkartek projects of the Department of Economic Development and Competitiveness. Other projects granted during the academic year 2015-2016 include: Three Collaboration Challenges projects, one CIEN and three Research Challenges (excellence) of MINECO (Ministry of Economy and Competitiveness).



Lastly, it must be acknowledged that such achievements were fruit of the work of the researchers that comprise the 17 Research and Transfer Groups, grouped into the following Science-Technology units:

SCIENCE, TECHNOLOGY AND MATERIAL TRANSFORMATION PROCESSES

1. Plastics and composites technology
2. High-performance machining
3. Advanced material forming processes

MECHANICAL BEHAVIOUR AND PRODUCT DESIGN

4. Structural mechanics and design
5. Acoustics and vibrations
6. Fluid mechanics
7. Surface technologies

ELECTRICAL ENERGY

8. Drives applied to traction and the generation of electrical energy
9. Electronic power systems applied to electrical energy control
10. Energy storage

INDUSTRIAL MANAGEMENT AND DESIGN PROCESSES

11. Innovation – management – organisation
12. Innovation in industrial design
13. Productive logistics operations management

EMBEDDED SYSTEMS AND SMART SYSTEMS FOR INDUSTRIAL SYSTEMS

14. Software and systems engineering
15. Real-time distributed systems
16. Telematics
17. Signal theory and communications

SCIENCE, TECHNOLOGY AND MATERIAL TRANSFORMATION PROCESSES

Plastics and composites technology

The main objective is to create and transfer knowledge about composite structural manufacturing processes and applications that meet lightening/weight, cost and productivity criteria. The focus is on targeted research projects that develop plant-pilot level demonstrators or processes. The activity is organised into three areas:

- Advanced resin transfer processes (RTM); thermoplastic RTM (TP-RTM), compression RTM (CRTM), hybrid material RTM (FML-RTM).
- Ultraviolet curing technology applied to: Pultrusion (3D Pultrusion), automatic fibre placement (AFP), filament winding.
- Rapid prototyping based on advanced 3D printing technologies: Manufacture of moulds, structural elements, complex cores, and local reinforcements.

In addition, aspects such as deformation and fracture of polymers and composites, stamping/thermoforming, impact/damage simulation and morphing are addressed.

Industrial partners include companies from the machine tool sector (Fagor Arrasate), railway (CAF), civil engineering (Acciona Infraestructuras, Irurena), and sport (Orbea).

High-performance machining

The main goals of the High Performance Machining research group are to improve the machining production processes employed in different industrial sectors (automotive, aeronautics, health, machine-tool, moulds and dyes, health...) and to generate new ideas for manufacturing innovative products or entering new businesses or markets. The general strategy pursued is to create, together with other research groups at the Higher Polytechnic School, multidisciplinary teams including personnel from companies, research centres and universities, with a view to providing an advanced scientific response to industrial problems, to later transfer the knowledge directly or via highly qualified young adults.

Such is the case with (I) the definition of machining processes including the optimum selection of working conditions, tools and fastening equipment, (II) the approval of machining processes based on customer requirements and (III) the pre-industrial development and evaluation of new machining technologies and products.

The group has broad experience in the analytical and numerical simulation of machines and processes, as well as state-of-the-art machining equipment for milling, lathing, broaching, grinding, etc. and advanced experimental machining analysis techniques: high speed filming, thermography-based temperature measurement, scanning electron microscopy, etc.

The main work areas are machinability of materials, study of the cutting and modelling process, design of machining processes, high-speed machining, micro-machining, grinding, intelligent machining and bio-machining.

Advanced material forming processes

The general aim of the "Advanced Material Forming Processes" group is the experimental characterisation, development and optimisation of materials, processes and tool which make it possible to produce parts adapted to the purpose for which they were designed, at the lowest possible cost. Experimental characterisation includes, whenever possible, the production of prototypes in the University laboratories and the monitoring of processes in an industrial context.

Similarly, the group is working on the optimisation of forming processes via the use of monitoring and control systems specially adapted to each process, This is intended to reduce the impact of the involuntary variations of the process parameters or external agents on the final result.

It works on the development, application and experimental validation of advanced behaviour models of materials adapted to the various

processes (deformation, fusion, solidification, etc.) as a tool to optimise the variables of the process and the design of tools. This includes, among others, multi-scale models which integrate mechanical, rheology, thermodynamic and microstructural evolution. The group has the necessary experience and know-how to implement these models in numerical simulation programmes as a base for process optimisation and development.

MECHANICAL BEHAVIOUR AND PRODUCT DESIGN

Structural mechanics and design

Growing competitiveness means that not only is it necessary to create technical solutions to respond to market requirements, but to ensure that these solutions have as much added value as possible. On the one hand, structures are exposed to increasingly tough conditions; on the other hand, they need to fulfil an increasing number of functions.

The objective of this group is to contribute to the launch of robust products while providing material behaviour models and techniques/tools for numerical simulation, which allow the evaluation and optimisation of their behaviour before their production begins.

To this end , the group addresses the following lines of research:

- THERMOMECHANICAL AND RESIDUAL FATIGUE STRESS MANAGEMENT: improvement of the mechanical behaviour of the product under cyclical loads and control of residual stresses through the modification of design variables and process variables or application of thermal treatments.
- DEVELOPMENT AND OPTIMISATION OF MECHANICAL PROTOTYPES, ASSEMBLIES AND COMPONENTS: optimisation of transmission elements (gears, ball screws, universal joints), characterisation of systems and mechanical assemblies (braking systems, clutches brakes, suspension
- ADVANCED MULTI-PHYSICAL MODELLING: coupled analysis of the different physical phenomena affecting products, machines and processes (mechanical, fluidic, thermal, electromagnetic, chemical, etc.). The analysis of each phenomenon in isolation does not guarantee an in-depth study due to the interaction between them. The group has worked in sectors as diverse as mining (sludge transport), energy (Stirling engine, thermal management of batteries, heat pump), and glass (generation of residual stress in glass blowing).
- FAST PRODUCT DEVELOPMENT (CAx automation): automation of tools for the transfer and implementation of knowledge developed in a productive way in the company. The group has experience in both the development of customised tools and automation of commercial CAD/CAE/CAM software programs (SolidWorks, Unigraphics, ABAQUS, ANSYS, etc.)

Acoustics and vibrations

The Acoustics and Vibrations group of EPS-MU works on the characterisation and analysis of vibration and acoustic emissions, with the aim of proposing practical solutions that optimise the vibratory and acoustic behaviour of industrial products and processes. Research activity is focused mainly on the following areas:

- Squeaky noise from brakes and clutches.
- Electrical machinery design and optimisation.
- Design and optimisation of silencers.
- Passive control of vibrations and noise using viscoelastic materials in free or forced layer.
- Vibration control using magnetorheological elastomers.
- Characterisation of multi-material and multi-layer structures: Simulation of structural noise and airborne noise isolation.
- Monitoring of mechatronic actuators.

In addition to the research, transfer projects are also carried out for:

- Identification of noise and vibration sources.
- Optimisation of behaviour through vibration and acoustic simulation and experimental contrast.
- Sound quality.

Fluid mechanics

The Fluid Mechanics Group was created in 2004. This group is currently involved in three lines of research:

Thermal fluidics, Complex Fluids and Magnetorheological Materials, being classified as a type-A excellence group by the Department of Education, Language Policy and Culture of the Basque Government.
The group's objective is to generate new knowledge in basic research as well as in development and to carry out their technological transfer in the midterm, within the collaborative research framework.

The activities developed by the three lines of research combine models and methods, both analytical and numerical, with experimental techniques to respond to problems of Fluid dynamics, Aerodynamics, Thermodynamics, and Heat Transfer, Microfluidics, Biotechnology, Transport Phenomena and Magnetorheological Material. The results of these activities have created new work synergies that materialise in collaboration with internationally renowned institutions, such as the European Space Agency (ESA), among others.

Surface technologies

The research and transfer projects of this research group focus on the study of the surfaces of components to optimise their functionality. By means of advanced characterisation methods, the mechanisms and causes of friction failure, corrosion and mechanical degradation of the surface are diagnosed, as well as the impact of microgeometry on the correct operation of the system. It is thus possible to propose surface designs that are tailored to each application.

The main areas of research are as follows:

- Advanced 3D topographic characterisation: When the surface dominates product functionality, microgeometry is crucial. Microgeometric analysis of profiles and surfaces both for measurements associated with ripple, roughness and micro-roughness are carried out, as well as measurements of islands volumes, cavities, etc. and protocols adapted to specific products.
- Friction and wear: the tribological behaviour is analysed based on the friction generated in the friction systems and the study of the wear mechanisms present. The in-depth study of the type of contact allows us to propose solutions from the design phase. We work both from a theoretical and experimental point of view, as well as using numerical simulation techniques using finite elements.
- Corrosion and tribocorrosion: Corrosion is analysed in different atmospheres and potentiometric techniques. The tribocorrosion analysis identifies undetectable

problems through an independent study of each mechanism of degradation.

- Customised development of experimental devices: the group has experience in the design of test benches for the study of wear in the service of components (cables, wheels, guides, slides, etc.).

ELECTRICAL ENERGY

The future points towards a continuous increase of our society's energy consumption. With sights set on 2050, governments are promoting policies to improve energy efficiency, diversify energy sources and reduce the gas emissions into the environment. One of the key vectors for achieving these goals is Electric Energy.

The research group addresses the knowledge and the improvement of the use and transformation of Electric energy for applications related to transport networks and electricity distribution (distributed generation, integration of renewable generation systems, intelligent networks, active energy management, electric energy quality, etc.), traction (railway, marine and electric vehicle) or industrial goods (industrial process control, tool machine, elevation).

The specialisation lines are related to the area of power electronics, storage systems and electrical machines. The design area, linked to a detailed analysis of the final application, enables electrical-electronic equipment to be optimally designed and specified from the start of its development.

Drives applied to traction and the generation of electrical energy

The aim of this research group is to develop the knowledge required for designing, modelling, simulating and controlling devices that use the principle of electromagnetism to function.

For the specific case of electrical machines, actuators and sensors, the aim is to master the process that includes the design, construction and production of the most suitable control system. The specifications for the design of these devices and their control system are specific for each application, and are taken into account from the first stages of development.

Thereby, the main issues to be tackled are:

- Modelling, simulation and control of electrical machines: design of vectoral, direct torque and specific power controls for each type of machine, as well as status observers, sensorless system design, adaptation of on-line and off-line parameters and automatic tuning of inverters.
- Design of Electrical Machines: design tools for electrical machines and actuators and analysis of their behaviour via advanced analytical models and finite-element techniques.
- Protection and Diagnosis in Electric Drives: Implementation of off-line and on-line algorithms for protecting the drive and early detection of failures in the drive or the application.
- Application analysis: The need to specify the electrical machine and the control system makes it necessary to master the final application. Therefore, particular emphasis is placed on knowledge acquisition in the fields of wind energy generation, vertical transport and electrical traction.

Electronic power systems applied to the control of electrical energy

This research group develops scientific-technological knowledge about systems based on Power Electronics applied to the control of electrical energy. The progress made in the manufacture of high-powered semiconductors and the development of new conversion topologies now allows the tackling of applications for the integration of Distributed Energy Resources in the electrical distribution network: electricity generating microsystems, electrical energy storage technologies, devices based on power electronics to improve the supply quality as well as resources that control the electricity consumption or demand.

The integration of power electronics in the electrical system enables the study of its transformation with a view to making the system more reliable, flexible and intelligent, and the development of the concepts of distributed generation and active distribution.

The research group develops research activities in:

- Integration of new power electronic parts such as semiconductors based on silicon carbide or gallium nitride.
- Development of electronic power converters for different applications:
  - Electro-thermal and mechanical design, together with its refrigeration systems.
  - Modelling, simulation and control based on the application requirements.
  - Development of new converter topologies: multi-level, matrix, multi-pulse, etc.
- Devices connected to the transport and distribution network to improve supply quality: FACTS, Custom Power, Medium Voltage Switches, new protection systems for electricity distribution networks.
- Energy management and coordination of the electrical-electronic parts as part of intelligent networks for the integration of distributed generation systems based mainly on renewable energies.

Energy storage

The research carried out by the group focuses on the development of scientific-technological knowledge of electrical energy storage systems. Mainly the electrochemical systems based on technologies such as batteries and supercapacitors, covering from cell level to modules and large storage systems.

The group plays an active role in joint projects with Universities, Technological Centres and local Companies, developing its activities in two Campus of the Higher Polytechnic School, located in Arrasate and Galarreta.

The Energy Storage Systems research group develops research activities in:

- Complete electrical, thermal and mechanical design of storage systems based on electrochemical cells.
- Electrochemical and thermal modelling of cells and battery modules and super capacitors.
- Algorithms and electronics for management and protection of storage systems.
- Sizing of storage systems focused on the application as electric traction, integration of renewable energies and autonomous systems.
- Electrochemical storage system feature analysis and experimentation.

INDUSTRIAL MANAGEMENT AND DESIGN PROCESSES

Innovation – management – organisation

The main mission of the research group is to generate new knowledge to improve the implementation of innovation and entrepreneurial processes in companies and the strategic management of organisations. This knowledge is generated in two ways: (i) development and implementation of techniques and tools for managing innovation and entrepreneurship, encompassing the entire innovation life-cycle process (from ideas to their evaluation as a new business activity) and (ii) analysis and modelling of management systems and complex strategic processes. The implementation of this research is carried out: (i) by developing new frameworks, models and tools or (ii) by applying scientific criteria to increase the efficiency of innovation processes and other management processes. This process aims to foster a management that favours the sustainability/competitiveness of companies in our environment (mainly SMEs and micro-SMEs).

The Entrepreneurship and Innovation research group develops research activities in:

- Innovation and Technology Management: it focuses Research in innovation processes and projects, portfolios, research in innovation management techniques and tools (IMTs), and research in business models and innovation networks. This research aims to enable SMEs to develop more efficient innovation processes and to convert their business models into proposals of greater added value (individually or in networks). This is achieved through the systematisation of innovation activities, portfolio management, development of new business models, configuration of value constellations and collaborative models, as well as the use of techniques and tools adapted to the characteristics, sectors and specific innovation objectives of organisations.
- Industrial Organisation: The objective of this area is to respond to the challenge of "liberating" and aligning the potential of people for the benefit of a common project (ensuring the well-being of individuals and the values of cooperation) with the aim of contributing to sustainability/competitiveness of organisations. The research is based on an internationally proven model and has a database of 65,000 surveys of 465 organisations from different sectors (industry, education, services, etc.) that allows us to understand, among other things:

(i) how to create work/organisational contexts that favour the alignment of people with the organisation's challenges, and (ii) the extent to which people influence organisational performance. The generation of this knowledge helps companies ensure a better alignment of people's potential with the strategic needs of the organisation in a win-win relationship.

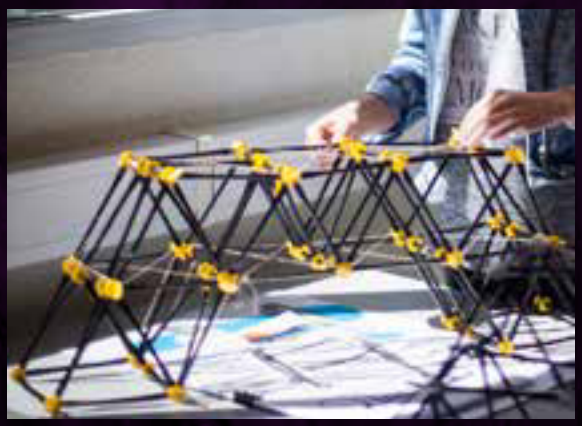
- Entrepreneurship: based on the phenomenon of the Entrepreneurial University, this area focuses its research on the entrepreneurial processes in organisations (their models, objectives and processes to be implemented), as well as on the university-company collaboration, which helps companies, universities and other agents in the development of entrepreneurial activities within an ecosystem of innovation (Triple Helix).
- Modelling of complex management systems: this research area seeks the modelling of complex management processes from a systemic perspective. To do this, different simulation techniques are used (discrete event simulation, system dynamics-based simulation and agent-based models). The current areas of application focus on the management of people in organisations, business models, innovation networks, socio-technical systems, and corporate entrepreneurship systems.

Innovation in industrial design

The main aim of this research group is to use innovation in industrial design to provide added value for products and services, to develop innovative products and services of value for a constantly changing market and to redesign or adapt companies' current products or production resources to different customers/users. All of this is with a people-centred design focus, where the users' needs, aspirations and abilities are the starting point.

For this purpose, the following activities are carried out:

- Redefinition, strengthening or implementation of product/service development processes based on the person/customer-centred design method.
- Identification of user/customer and their needs.
- Product/service conceptualisation using cutting-edge creativity techniques, and all aspects of Industrial Design.
- Complete, detailed product/service specification
- Product or productive resource design and/or redesign in accordance with different criteria such as user experience, human-machine interaction, ease of use, inclusive-



ness, ecodesign, assemblability, fabricability, etc. throughout its life cycle
- Development of prototypes and models.

Productive logistics operations management

The increasing competitiveness forces companies to search for distinctive elements which give them competitive advantages at product service level and from a management perspective. As part of the business Strategy, Logistics is key in this context in meeting customer needs. Defined as the company function which plans, manages and controls the organisation's resources n order to ensure its correct working order in accordance with the Service Strategy, it implies the coherent integration of the information and material flows through the entire productive and distribution system.

- Project Management: the study and improvement of project management in different contexts are tackled through the main existing approaches, mainly PMBOK®, Critical Chain, and Agile Project Management.
- Manufacturing Engineering: focused on industrial processes, through the study of the in-factory distributions design centred on Lean Production via related techniques such as VSM, OEE, cell design, SMED, 5S, Smart Manufacturing, etc.
- Industrial Asset Management: based on the assumption that the state and conservation of the industrial facilities and resources form a strategic activity to support a competitive productive system, the main areas of action are the design and optimisation of operational techniques (Corrective, Preventive, Autonomous Maintenance, etc.), the organisational aspects in Maintenance Management, TPM and RCM.
- Robust Industrialisation: the Industrialisation of processes in the life cycle is addressed, from the conception of the product until the end of its useful life. The key aspects which are most frequently addressed are the product reliability, the reduction of variability through the 6-sigma method, modelling and optimisation and data processing. Occupational health and safety improvement and assessment and the analysis of the environmental impact as part of the life cycle are other complementary aspects of special interest included in this area.
- Supply Chain Management: this area covers the different areas which take part in the management of the supply chain. The main objective is to identify, visualise and study the key agents of the supply chain to improve the flow. The topics addressed in this area are as follows: Lean Logistics, process simulation, distribution network design, Demand Driven MRP, and TOC-DBR.

EMBEDDED SYSTEMS AND SMART SYSTEMS FOR INDUSTRIAL SYSTEMS

Software engineering and web engineering

Information technologies and the actual software applications are becoming increasingly important in business management and product development, and today they are no longer auxiliary or peripheral aspects but key factors in companies' competitiveness and the success of their products. The Software Engineering and Web Engineering research group focuses its research activity on two areas:

- Industrialisation of the software development process to reduce costs and improve the quality of software products. For this purpose, it focuses on software product lines and model-driven software development as development paradigms that provide numerous benefits regarding the development of traditional software, such as reduced development times, increased quality, validation from the initial stages of the development, etc.
- Web engineering: In this area, the group researches Semantic Web technologies and Linked data structures from the perspective of open systems (open source and open data) and the design and development of interoperable platforms based on web ser-

vices and standards compliance, and the construction of Service-oriented architectures (SOA) to enable multi-platform and multi-device integration.

Real-time distributed systems

The EPS-MU Real-Time Distributed Systems team focuses its research activity on two areas:

- Sensorisation, Learning and Reasoning: "Development of Systems which by using sensors (artificial vision, temperature, pressure, presence...) learn and adapt their behaviour to act autonomously".
- Real-time Embedded Systems: "Optimisation of the development process of real-time embedded systems by introducing techniques that improve productivity and reliability".

In order to tackle these two lines, the following knowledge areas have been defined:

- Learning, Deduction and Reasoning Models: Automatic Learning and Artificial Intelligence techniques (Data Mining, Case Based Reasoning, Fuzzy Logic, Neuronal Networks, Bayesian Networks, etc.).
- Distributed Systems, Communications, Middlewares: standards such as CORBA, ICE, ZeroMQ and RMI to create distributed applications in different environments.
- Concurrent Computing, Real-Time Panning: Real Time Operating Systems for Built-in Systems with the aim of developing applications that control different critical processes.
- Certifiable Embedded SW development and design: Development and design costs reduction and increase in the reliability of critical embedded systems when using methodologies based on the reusability of the critical SW components and technologies which enable testing and adapting of SW components in Runtime.

Telematics

The Telematics research group is a group of multidisciplinary scientists that works in various areas. It is an eminently cross-sector area that contributes to most of the research themes and actions envisaged by European and national strategies in the fields of Energy, Transport, Climate Change, Smart Cities, Healthcare and Information Society (the cloud, mobility, social media, data mining, etc.). It works on the following lines of research

and knowledge areas:

- Information Security: The aim of this line of research is to tackle the new challenges that have arisen from the most recent developments and uses of information technologies, providing solutions to improve citizens' confidence in the new CIT landscape through research in secure and reliable technologies. Our research group is contributing in areas such as the following: Security of social networks, security of embedded systems, SCADA security, security of critical infrastructures, security of industrial control systems, or security of mobile devices and networks.
- Data Mining: This line of research focuses on applying the most advanced data-mining algorithms to various problems that we face in society and industry. More specifically, projects are developed for areas such as health, computer security, industrial processes, tourism, big data, linked data, etc. The knowledge areas covered by this line are as follows: Data mining applications (classification, grouping, optimisation), opinion mining, content curation, emotion and sentiment mining.

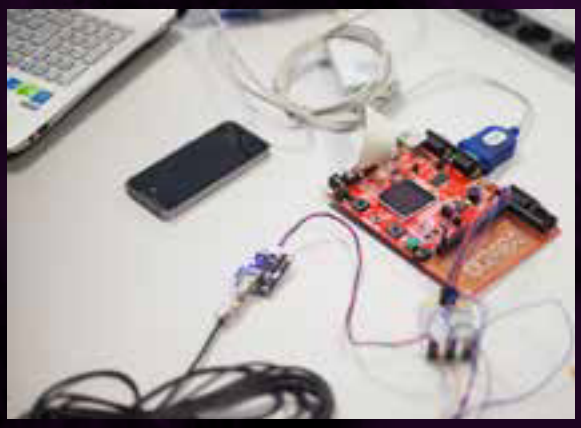
Signal theory and communications

This research group's research and transfer projects focus on the design and implementation of signal processing systems applied to fields of wireless and wired communications, image processing, systems monitoring, and inspection in industrial processes.

- Communications: The key technologies that are being investigated in wireless communications are mostly robust MAC layers and modulations for use in industrial contexts. The use of Cognitive Radio and multi-antennae or MIMO systems are important examples of these technologies. The group's results stand out due to their practical approach and especially to their ability to implement these structures in FPGA-SOC and DSP. As a practical application of wireless communications to industrial environments, work has been carried out on the design and implementation of monitoring systems based on passive wireless sensors.
- Artificial vision: The key technologies being researched in the image processing area are those geared to precision quality control, stereo vision and lasers in conjunction with other types of sensors (force,

acoustic emissions), enabling overall control of the production systems.

- Monitoring and inspection: The group also applies the signal processing techniques in the field of process and component system identification, monitoring and inspection. The advanced inspection systems developed are applied in both the industrial and biomedical field. In this respect, it is worth highlighting the developments in in-factory inspection methods and the integration of sensors in components, working generally in hostile environments.
- Real-time implementation of signal processing systems: Due to the group's vast experience in implementing algorithms and complex systems in microprocessors and FPGAs, it has specialised in the design and implementation of real-time systems for the fields of communications, energy, sensor systems or process control. These implementations are tackled from low level up to high-level tools based on graphic tools.



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MANAGEMENT AND SERVICES REPORT

RELEVANT INFORMATION

	Academic Year 2015-2016
Students of Training Courses in Upper Education	234
Undergraduate Students	1,243
Master's Degree Students	245
Doctorate students	106
Students in International Mobility	143
Hours of Continuing Training	10,939
R&TD Budget (1)	11,600
Support Budget (1)	28,690
Ordinary Investment (1)	1,391
Staff	455

(1) Thousand Euros

GENERAL AND MULTI-DISCIPLINARY SERVICES

All services offered by the Mondragon Goi Eskola Politeknikoa have the mission of supporting teaching, learning ad research and contributing to the achievement of our Institution's goals.

One of our current challenges is the planning and sustainable and efficient management of the services we offer the community, mostly related to teaching, research and continuous training throughout people's lives. In order to achieve sustainable services which satisfy our various clients' needs and expectations, we implemented several strategies and proposals in the academic year 2015-2016 through the following projects.

In order to facilitate and simplify the users' experience of searching for information, the Library has worked on the implementation of a discovery tool, the EDS, which enable the integration and retrieval of information from all resources from a single search interface.

The library has collaborated in the diffusion and raising fo awareness on subjects related to intellectual property. This academic year has focused the effort on the development of material oriented to teachers, on basic aspects of intellectual property. It has also actively supported Open Access by proposing institutional policies for the academic and scientific production of the School.

Project IKT2020: within the strategic reflection of MU, a strategic line related to the digitalisation has been identified, with three strategic objectives:

- To develop a common digital infrastructure and tools for the management of the university activity and development of an integrated information system
- To develop a common digital infrastructure and tools for learning
- To develop the Campus M Digital Ecosystem

Project IKT2020 consists of analysing, designing and planning the actions necessary to achieve these strategic objectives for 2020 in collaboration with the four schools and MU.

In Information Systems, the migration to DROPBOX has been addressed. In order to provide the MGEP group with collaborative, centralised work, in addition to adding security and facilitating its use from any place, a decision was made to migrate the information and documentation to Dropbox. Dropbox is a tool for storing information in

the cloud. By means of Dropbox, users are able to access their information from any place, in addition to retrieving deleted files and having the versions of the documents available.

Wi-Fi antennas have been changed in order to support higher bandwidths and a greater number of devices to cover the new needs, as the use of the Wi-Fi network is increasing, with each user usually having more than one connected device such as mobile phones and laptops, or any other device with Wi-Fi connection.

On the other hand, as a response to two of the challenges of the strategic plan in the cycle 2013-2016, comprising the implementation of MGEP in the Donostialdea Technological Campus and the development of 3 new fields (healthcare, energy and sustainability), the following have been implemented, the spaces of the second floor of the Fundazioa building at Orona IDeO have been opened. An extension of more than 2,100 m² intended for classrooms, laboratories (microscopy, chemistry, thermal energy, etc.) and common spaces. With this expansion and redistribution of the basement plant, we completed the necessary spaces for the implementation of the energy and sustainability courses on the Donostialdea Technological Campus.

We are also working in the development of the IT programme of the management system. In collaboration with all the faculties and MU, during the academic year 2015-2016, work has continued on the design and development of the KUDE computer application, which was created to give the Management System a manageable, efficient IT resource. Work has been carried out above all, with the option to group and select by rule or program all aspects related to each of them: ISO 9001, ACREDITA, etc.

In terms of quality programs, we have worked on the design and implementation of the ISO 17025 standard for accreditation of tests at the materials laboratory.

BITERI HIGHER COLLEGE (CMB)

The Biteri High School welcomes students not only from the Polytechnic School, but also from other MONDRAGON UNIBERTSITATEA schools on the Arrasate, Eskoriatza, Aretxabaleta and Oñati campuses. In the academic year 2015-2016, a total of 101 students enrolled in this institution. Specifically, we recorded 76 students enrolled for the first time, 14 renewals, and 11 short-term foreign students.

The experience gained through the relationship with the students and, by extension, their families teaches us that the three agents directly influencing the training process share two basic objectives:

- The student should graduate satisfactorily.
- The student should enjoy a rewarding university experience.

To do this, the house is organised into work groups, and responsibilities are shared among the students. These duties are monitored by the staff of the centre through group and individual tutor meetings.

Also noteworthy is the increasingly implied academic relationship that the Biteri High School is gaining in the university community, as verified below.

ACTIVITIES RELATED TO FORMAL EDUCATION

A 12-hour module on teamwork has been designed at Biteri and is taught in the degree course on mechanics through the subject "Methodological Foundations", both on the Arrasate and Goierri campuses. The evaluation of the students, those responsible for the degree, and the dynamisers of the module is very positive.

In the organisation degree, a part of this module is conducted, with the aim of accelerating the training process of the group as such. Once again, the parties involved were highly satisfied by the work, and the possibility of designing a more comprehensive model is being considered.

ACTIVITIES RELATED TO NON-FORMAL EDUCATION

The extra academic activities space is progressively gaining strength as a valid, fun and efficient training environment. 83% of the total credits requested by the students have been accredited by Biteri (67 of 80). In this sense, it should be noted that 7 non-collegiate students have applied for and obtained their respective credits.

The list of activities drawn from the extra-academic activities space was as follows:

Charity Area

- Charity football in the Ibaiondo educational centre.
- Volunteer work in the Harrera Gela of the Arrasate Public School.
- Haima: direct solidarity action in the Urgatzi centre for minors.
- Haima txiki: school reinforcement for children from migrant families.
- Three blood donation sessions.
- Volunteer work in the Ibaiondo educational centre
- Volunteer work in Elkarhezitzen
- Volunteer work in shelters in Urgatzi.

Sociocultural Area

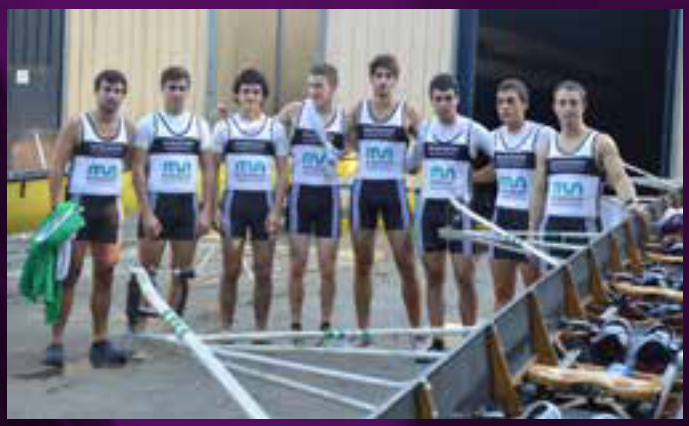
- Leisure and sport outings: skiing, paintball.
- Organisation of fancy dress competition and outing to the Tolosa carnivals.
- Cultural visit at Astarbe Sagardotegi.
- Bertso Afaria and chocolate party.
- Talks:
  - "Mexico, from a socio-economic perspective", foreign student.
  - "Relationship marketing", Jorge Andueza
  - "What your mobile hides", Sabino San Vicente.
  - "The surfing culture", Karmele del Teso.
  - "Day of the Dead in Mexico", foreign student.
  - "The banana guy", foreign student.
- Internal and external communication of the Biteri activities
- To learn how to knit to make winter clothes.
- Organisation of an event to put acquired skills into practice.
- Multidisciplinary development of technology project
- Design and manufacture of drift trikes.

Student representation area

- Coordination of the working order and in-house activities.
- Representatives of the various commissions take part in the decision-making along with the High School headmaster.
- Organisation of the Academic Year Opening Ceremony.
- Participation in sessions on cooperativist values, energised by the Arizmendiarrieta Friends Association.

Sport and Healthcare Area:

- Training and participation in skating races.
- Monthly outings to see the Basque mountains.
- Training and participation in popular races.
- Integral personal care and health.
- Internal sport championships.
- Mus championship between CCMM of Euskadi.
- Coordination with those responsible for the restoration service in order to improve the students' diet and the service.
- Internal organisation of the emergencies team.



ACTIVITIES RELATED TO INFORMAL EDUCATION

To grow, taking responsibility, is what makes a person feel an active part of and owner of their personal development. But there is another equally important component, which has to do with the bonds established by people. In this sense, Biteri aspires to build a university community in which students feel welcome first and then an active part. The aim is to ensure that each member of the university, working as a team and assuming cooperative values, becomes a player in said community.

EXTRACURRICULAR ACTIVITIES

The aim of the sport service is to promote an active lifestyle among students and the staff, providing facilities and offering the possibility of performing various physical and sport activities. In addition to the activities themselves, the sport department works on various projects to provide a better product and communication with the entire group of students and staff via a computer system that facilitates their enrolment in activities. It sets up collaboration agreements with the various sport organisations in the area to provide access for the students and staff to their facilities and programmes.

During the academic year 2015-2016, 670 students participated in the following activities (without taking into account the 300 participants in the health week activities for which registrations were not made):

COMPETITIONS

In the various championships organised: within the school and between schools from the Basque Country and the state, the participation included 347 students. Furthermore, a total of 29 students competed in the various championships of the university, such as: Go-karting, surfing and zabalki (international Basque pelota meeting).

PROMOTION OF SPORT ACTIVITIES AND HEALTH

200 people participated in:

A) Courses and outings

Various courses and outings were arranged in which students had the opportunity to learn about new types of sports or to practice familiar ones. Courses such as surfing, climbing, canoeing and go-karting and skiing outings were organised involving a total of 175 students.

B) Improving physical fitness

This section includes the students who enrolled in both public and private gyms to practise physical activity, taking advantage of our agreements with such centres, with there being a total of 25 students enrolled and registered.

RENTING FACILITIES AND BORROWING EQUIPMENT

This service, which allows students and staff to practise their favourite activity on their own, was a great success with 93 people making reservations or renting equipment.

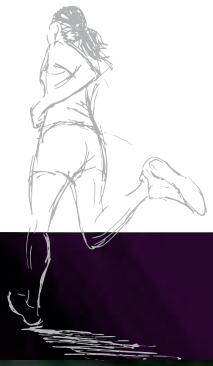
ADDITIONAL ACTIVITIES

This section covers all the activities related to physical activities that do not involve their actual practise, such as attending Laboral Kutxa Baskonia and SD Eibar matches, photography and kit design contests, etc. featuring the participation of 422 students.

It should be noted that more than 300 students participated in the activities that were organised for health week, an amount that has not been added to the overall indicators for the service due to the fact that registration in the sport department for these activities was not necessary, thus making it impossible to tell if these people participated in other activities or not.

WORKER PARTICIPATION

The sport service has encouraged workers in the School to practice sport, adapting activities to the available time in their timetables. Thus, during the academic year 2015-2016, 61 workers participated in the activities organised (45 participated as workers and 16 as MUkide, i.e. alumni).



GOVERNING AND SOCIAL BODIES

GENERAL ASSEMBLY

The General Assembly is held for the members to discuss and reach agreements on matters within their powers and it is chaired by the President of the Governing Board. It is made up of 226 Working partners, 226 User partners (students) and 226 Collaborating partners (companies).

GOVERNING BOARD

The Governing Board is the collegiate body responsible for managing and representing the Cooperative.

- President: Juan Mª Palencia
- Vice-President: Javier Oyarzun
- Secretary: Idoia Irazabal
- Spokespersons:
  - Carmelo Cortabarria
  - Josetxo De Frutos
  - Xabier Arrasate
  - Naroa Iturrioz
  - Mikel Mendikute
  - Mikel Muxika
  - Jon Pedrazo
  - Javier Picavea

GENERAL COORDINATION

This is the body responsible for coordinating the school's activities and businesses, taking on leadership and responsibility for the MGEP project, and advising the Governing Board.

- General Coordinator: Carlos García
- Academic Coordinator: Nekane Errasti
- Polytechnic Institute Coordinator: Gorka Aretxaga
- Research Coordinator: Roberto Uribeetxeberia
- Continuous Training Coordinator: Gentzane Aldekoa
- Electronics and IT Coordinator: Xabier Sagarna
- Mechanics and Industrial Production Coordinator: Angel Oruna
- Systems and Multi-disciplinary Services Coordinator: José Luis Larrabe
- Finance Coordinator: Milagros Arregui

SUPERVISORY COMMISSION

The Supervisory Commission is the body responsible for the duties of review and control of the cooperative.

- Belén Cortabarria
- Fernando Murgiondo
- Aitzol Pico

SOCIAL COUNCIL

The Social Council is the body that represents the partners and working partners and has information, advice and consultancy as its basic functions.

- Miren Illarramendi
- Iñigo Zendegi
- Gonzalo Abad
- Aitor Orue
- Haritz Barrutia
- Obdulia Vélez
- Javier Arkauz
- Nagore Elexpuru
- Andrea Aginagalde
- Mikel García
- Elisabeth Urrutia
- Ander Goikoetxea

COLLABORATING COMPANIES AND INSTITUTIONS

COLLABORATING PARTNERS

- ABEKI COMPOSITES, S. L.
- ALECOP, S. COOP
- ALEJANDRO ALTUNA, S. A.
- AUSOLAN, S. COOP.
- ASMOBI, S. L.
- COPRECI, S. COOP.
- EKIDE, S. L.
- ENERGÍA PORTÁTIL, S.A.
- FAGOR AOTEK, S.COOP.
- FAGOR ARRASATE, S. COOP.
- FAGOR, S.COOP
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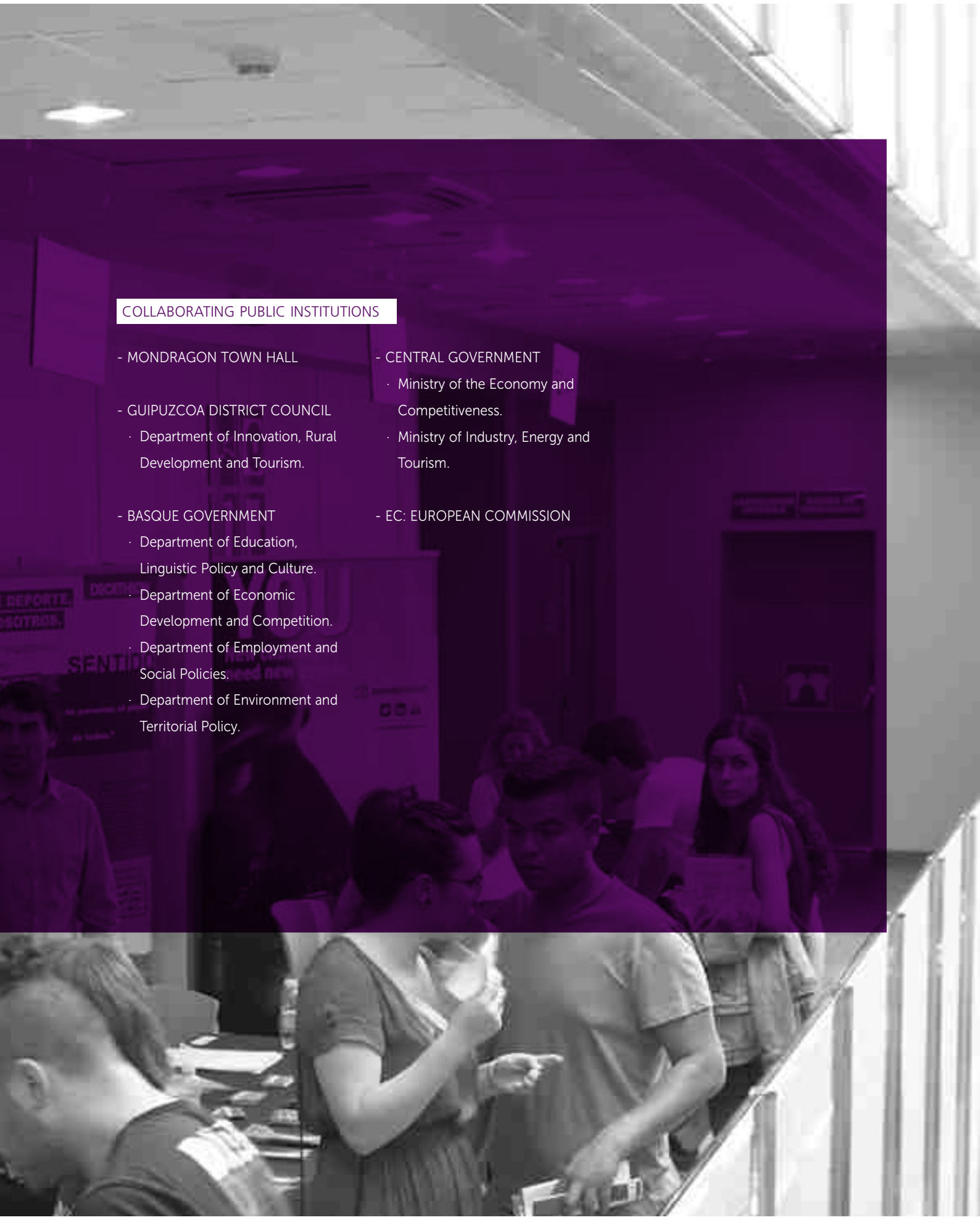
- ULMA SERVICIOS DE MANUTENCIÓN, S.COOP.
- GRUPO ULMA



COLLABORATING PUBLIC INSTITUTIONS

- MONDRAGON TOWN HALL

- GUIPUZCOA DISTRICT COUNCIL
  - Department of Innovation, Rural Development and Tourism.

- BASQUE GOVERNMENT
  - Department of Education, Linguistic Policy and Culture.
  - Department of Economic Development and Competition.
  - Department of Employment and Social Policies.
  - Department of Environment and Territorial Policy.

- CENTRAL GOVERNMENT
  - Ministry of the Economy and Competitiveness.
  - Ministry of Industry, Energy and Tourism.

- EC: EUROPEAN COMMISSION

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