UNIVERSIDAD POLITÉCNICA DE MADRID

HR EXCELLENCE IN RESEARCH

Universidad Politécnica de Madrid

Research, Innovation and Doctoral Studies at UPM

Doctoral Studies @ UPM

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1. *Universidad Politécnica de Madrid* (UPM)

Why UPM?

Main Technological University in Spain

Specialized in engineering and architecture

nº 75 Ranking QS (2021)
nº 79 employability in QS ranking (2020)

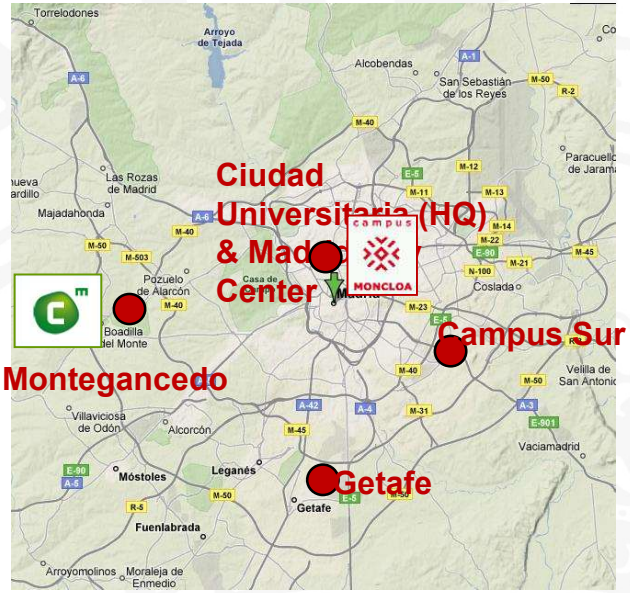
Source of high impact knowledge in Spain

nº 1 in university patent applications
nº 1 university in attracting R&D European funds (+110 M€ in H2020)
nº 1 in attracting R&D contracts with industry
nº 1 in new technology ventures creation

International Excellence Campus

CEI Moncloa (UPM-UCM)
Information Technology Campus-I2Tech (UPM)

UPM on the Map



Rectorate in Madrid

5 Campuses in Madrid area

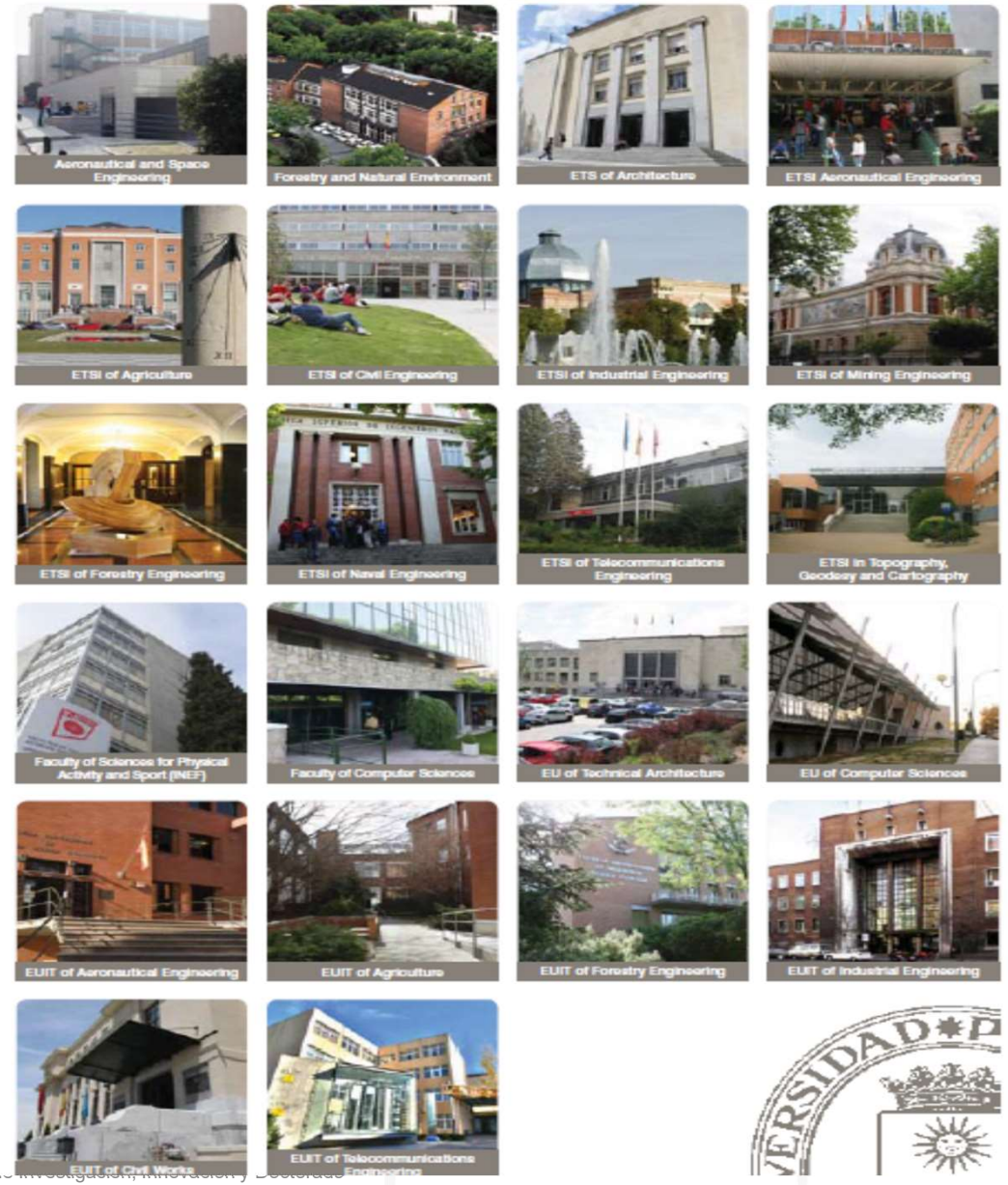
2 International Excellence Campus awarded by the Ministry of Education (MEC-MINECO)

UPM Structure

- 16 Schools
- 1 Faculty (Sports)
- 1 Fashion Design Center
- 5 R&D&I Institutes
- 14 R&D&I Centers
- 201 Research Groups
- 61 Departments

Budget (2021)

359.7 M€ Total funds



UPM: Some figures

Research in 2020 – *ca.* 63M€

- 55,44 M€ in financed projects
  - ✓ 3.82 M€ National & Regional projects
  - ✓ 33.21 M€ International projects
  - ✓ 18.42 M€ Private projects (companies and foundations)
- 7,55 M€ in HR competitive contracts
- +2,300 indexed publications

Technological Innovation

- 567 patents in force to date
- 34 priority patents filed in 2020
- 75 University-business chairs in 2020
- + 280 spin-offs created and coached from 1998 to date
- 10 exploitation contacts in 2020
- >67% spin-off Survival rate (3rd year)
- + 114 M€ from investors (2010-2020)

Fields of teaching and programmes

Higher education, research and innovation in all Engineering fields:

- Aeronautics
- Agronomy
- Architecture
- Biomedicine
- Civil Engineering
- Energy
- Forestry
- Industrial
- Mining
- Naval
- Informatics
- Telecommunication
- Topography

+ Sports and Fashion Design

- ✓ 52 Bachelor Degrees
- ✓ 67 Master Degrees
- ✓ 44 Doctoral Programmes
- ✓ 94 Double degree agreements with foreign universities
- ✓ 18 Undergraduate + Master Joint Programmes
- ✓ 123 University-Specific Programmes (Expert, Life-long learning…)

High potential for increasing participation in multidisciplinary engineering areas

21 R&D&I Centers

DIGITAL

1. **Information Processing and Telecommunications** Center (IPTC)
2. Center for **Supercomputation & Simulation** (CCS)
3. Integral **Domotics** Center (CeDInt)
4. Centre on **Software** Technologies **and Multimedia** Systems for Sustainability (CITSEM)
5. ***AI.nnovation*** *Space*

MOBILITY

6. **Transport** Research Center (TRANSyT)
7. Institute for **Automobile Research** (INSIA)

MATERIALS

8. Institute for **Optoelectronic Systems and Microtechnology** (ISOM) (*Micronanofabs, ICTS)*
9. **Structural Material** Research Center (CIME)
10. Center for **Advanced Materials and Devices for ICT** (CEMDATIC)

ENERGY

11. Institute for **Solar** Energy (IES)
12. Institute for **Nuclear Fusion** (IFN)

BIOTECHNOLOGY and HEALTH

13. Research Center **for Biotechnology and Plant Genomics** (CBGP-INIA) (*Severo Ochoa* award)
14. **Biomedical Technology** Center (CTB)
15. Research Center for the **Management of Agricultural and Environmental Risks** (CEIGRAM)

INDUSTRIAL ENGINEERING

16. Center for **Automation and Robotics** (CAR, UPM-CSIC)
17. **Laser** Center
18. Center of **Electronics for the Industry** (CEI)
19. Institute for **Microgravity** "Ignacio da Riva" (IDR)

INNOVATION

20. **Innovation and Technology for Development** Centre (itdUPM)
21. Centre for Support for **Technological Innovation** (CAIT)

Human Resources & Students

Human Resources

- 2,928 Faculty academics
  - +380 Full professors
- 1,785 Administration and Service Staff
- 508 competitive contracts in 2020
  - 311 predoctoral researchers
  - 127 postdoctoral researchers
  - 70 technicians and managers

Students

- 29,300 Undergraduate students
- 6,180 Master degree students
- 2,000 PhD students
- + 1,300 International mobility (incoming)
- + 1,800 International mobility (outgoing)
- + 6,300 Internships
- + 45 Associations
- + 125 Medals obtained in official competitions

Connected to Research & Innovation networks

UNIVERSIDAD POLITÉCNICA DE MADRID

Human Brain Project

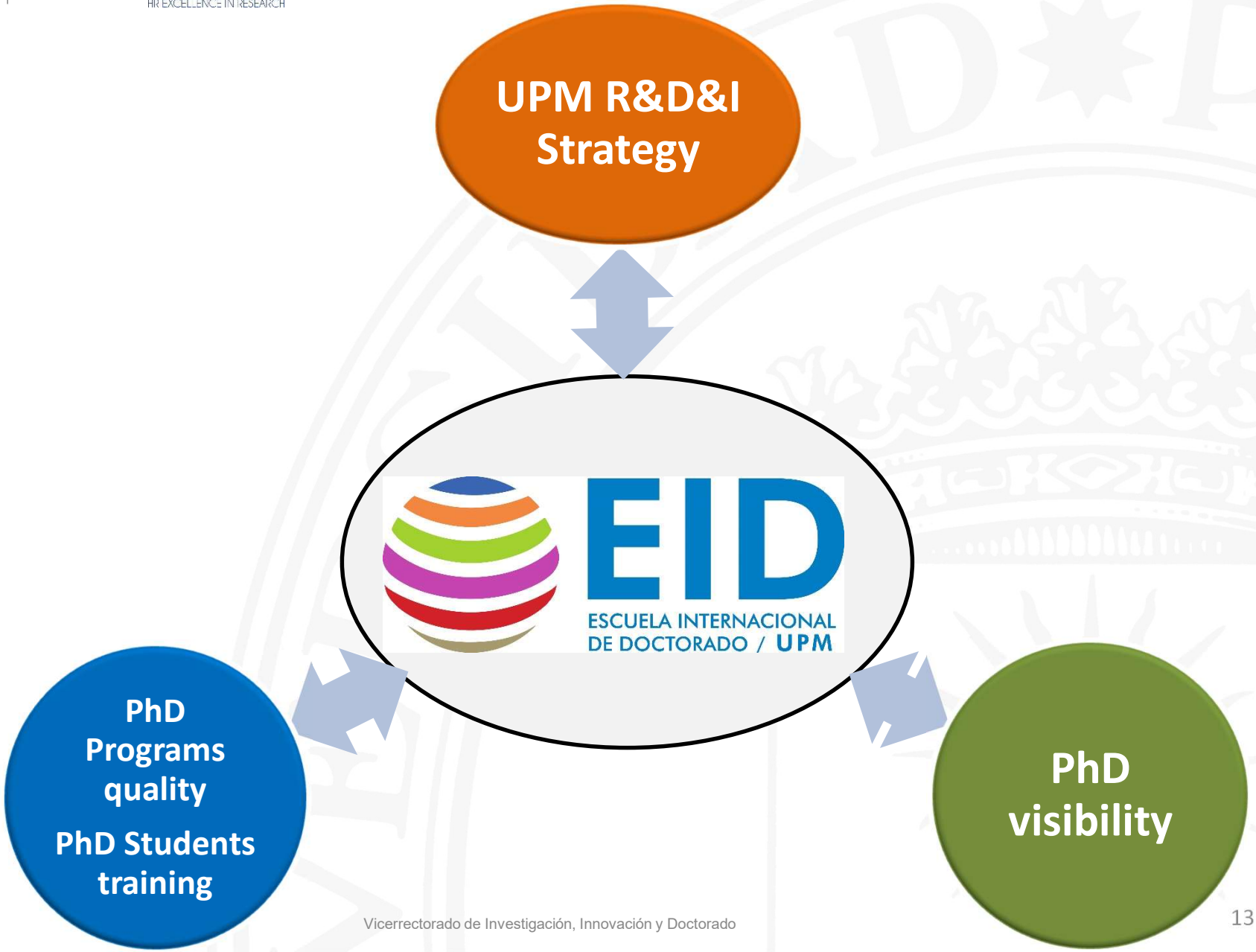
Unifying our understanding of the human brain.

AIOTI

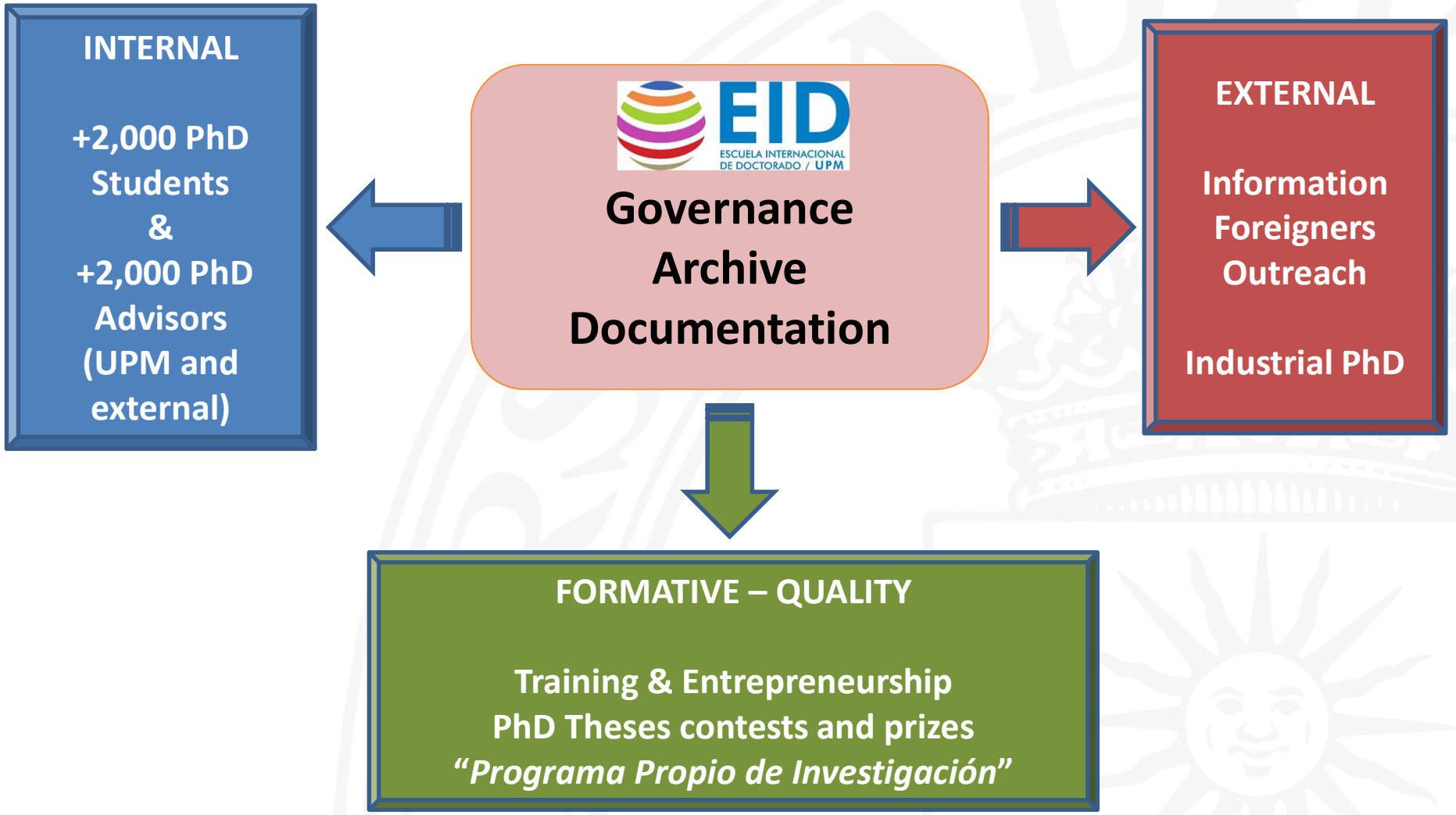
ALLIANCE FOR INTERNET OF THINGS INNOVATION

2. UPM International Doctorate School

International Doctorate School



International Doctoral School: Visibility and "School" model



3. Doctoral Areas and Doctoral Programs

Doctoral Areas & Doctoral Programs

MANUFACTURING & INDUSTRY

1. Aerospace Engineering
2. Automation and Robotics
3. Economy and Innovation Management
4. Engineering in Industrial Organization
5. Environmental, Chemical and Material Engineering
6. Electrical and Electronic Engineering
7. European Doctorate in Industrial Management
8. Fluid Mechanics
9. Mechanical Engineering
10. Production Engineering and Industrial Design
11. Research, Modeling and Risk Analysis in Environment
12. Sustainable, Nuclear and Renewable Energy

ICTs

1. Artificial Intelligence
2. Biomedical Engineering
3. Communication Systems and Technologies
4. Computation Science and Technology for Smart Cities
5. Electronic Systems Engineering
6. Mathematical Eng., Statistics and Operations Research
7. Photovoltaic Solar Energy
8. Systems and Services Engineering for the Information Society
9. Software, Systems and Computation
10. Telematic System Engineering

AGRONOMICS, FORESTRY & ENVIRONMENT

1. Advanced Forest Research
2. Agricultural Engineering
3. Biotechnology and Genetic Resources of Plants and Assoc. Microorganisms
4. Complex Systems
5. Engineering and Management of Environment
6. Environmental Technology for Sustainable Agriculture
7. Project Planning for Rural Development and Sustainable Management

CIVIL ENGINEERING

1. Earth Informatics Engineering
2. Civil Engineering Systems
3. Structural, Geotechnical and Material Engineering
4. Naval Architect, Marine and Ocean Engineering
5. Technological Innovation in Building Construction

ARCHITECTURE

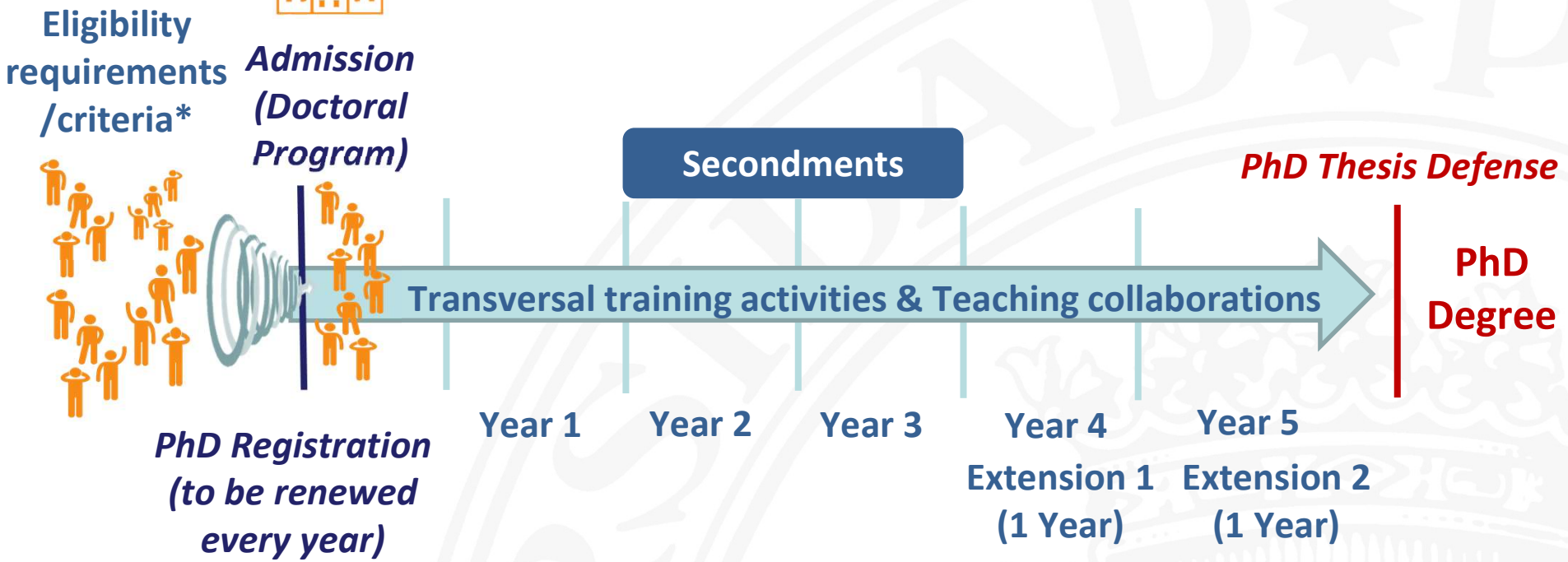
1. Advanced Architectural Design
2. Architecture and Urban Planning
3. Architecture Heritage
4. Building and Architecture Technology
5. Edification Structures
6. Sustainability and Urban Regeneration

ARTS & SOCIAL SCI.

1. Architecture Communication
2. Architecture, Design, Fashion and Society
3. Music and its Sciences and Technologies
4. Physical Activity and Sport Sciences

4. Doctorate at UPM

Doctorate at UPM (RD 99/2011)



**Candidates must have completed the studies that lead to an official Spanish (or from another country of the EHEA) university degree awarding 300 ECTS credits, of which at least 60 ECTS credits must correspond to master level. Or they must have completed a degree in a University not adapted to the EHEA that gives access to doctoral studies*

Doctorate at UPM: Modalities

International Doctorate

- ✓ Three months international secondment
- ✓ PhD thesis reviewed by international experts
- ✓ PhD thesis committee with international members
- ✓ PhD thesis and dissertation: Spanish and other language

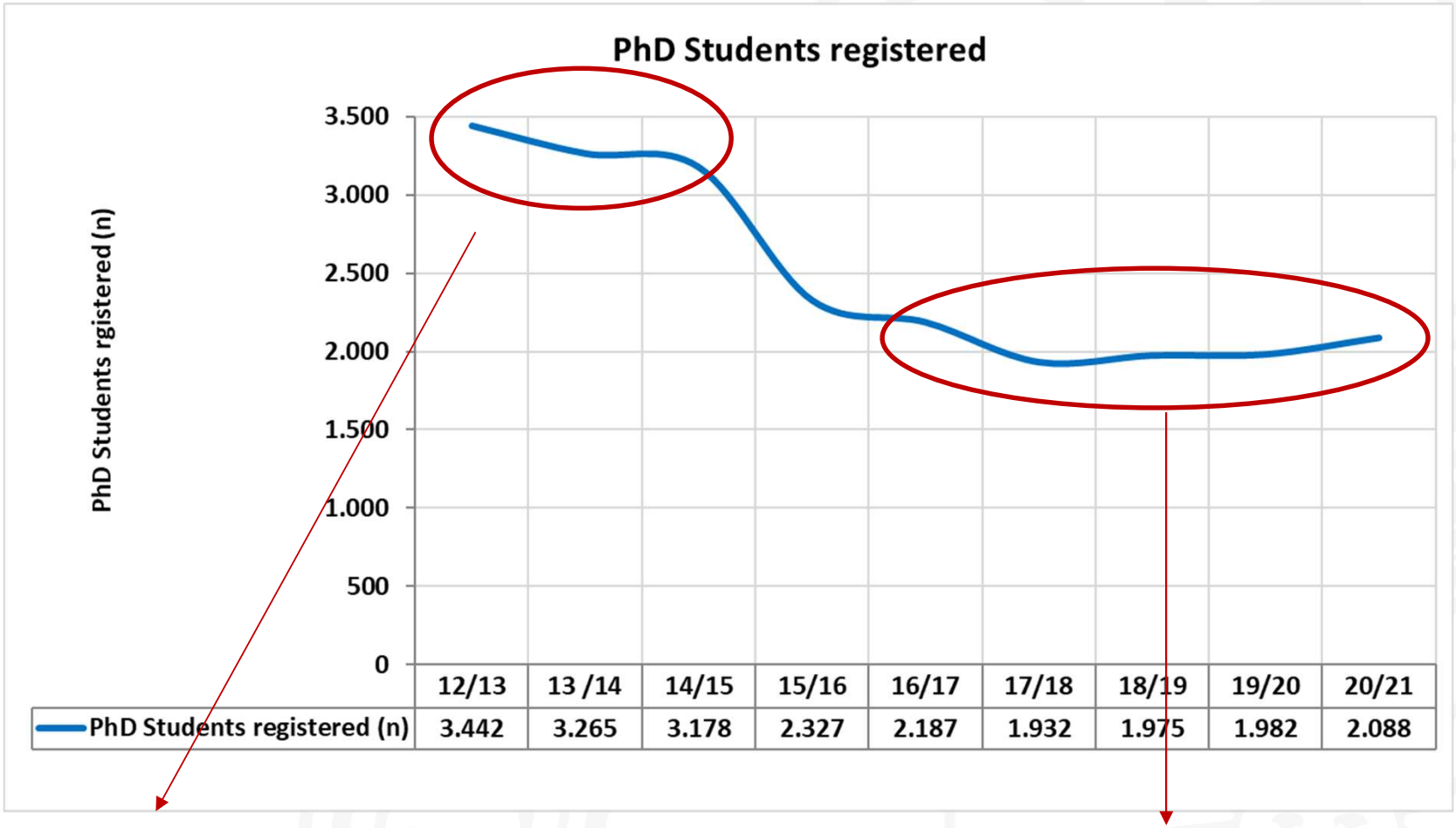
Industrial Doctorate

- ✓ UPM-Industry collaboration agreement
- ✓ Industrial research project
- ✓ Industrial secondment

Co-tutelle

- ✓ Individual agreement for every PhD candidate.
- ✓ Two PhD certificates, one from each university
- ✓ At least 2 PhD advisors, one from each university
- ✓ Spend part of the PhD at each university (agreed by both universities)

PhD Students registration

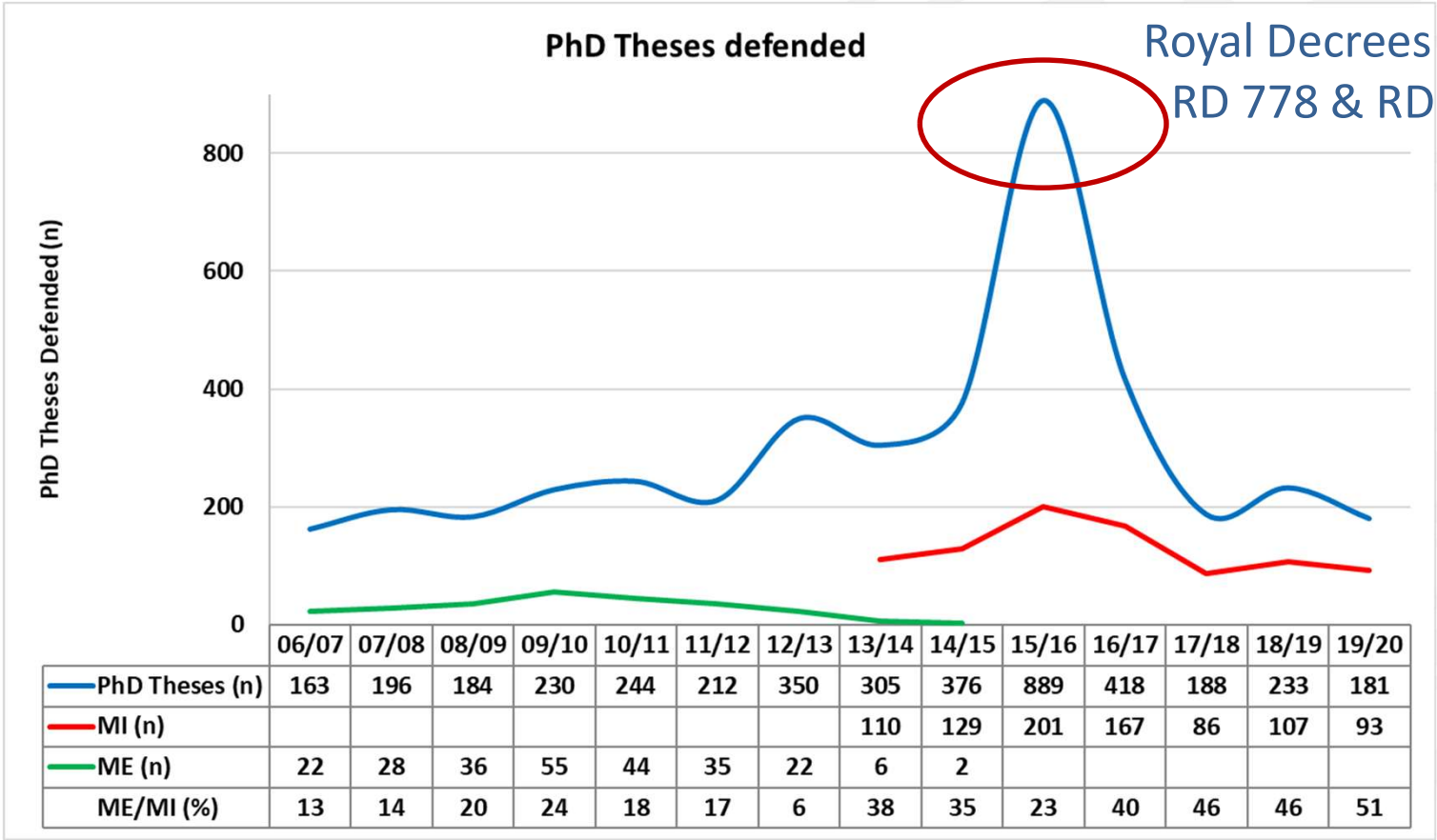


Extinction of former Royal Decrees (RD 56, RD 778 & RD 1393)

ca. 2,000 PhD students per year on average

PhD Theses defended

Extinction of former Royal Decrees (RD 56, RD 778 & RD 1393)



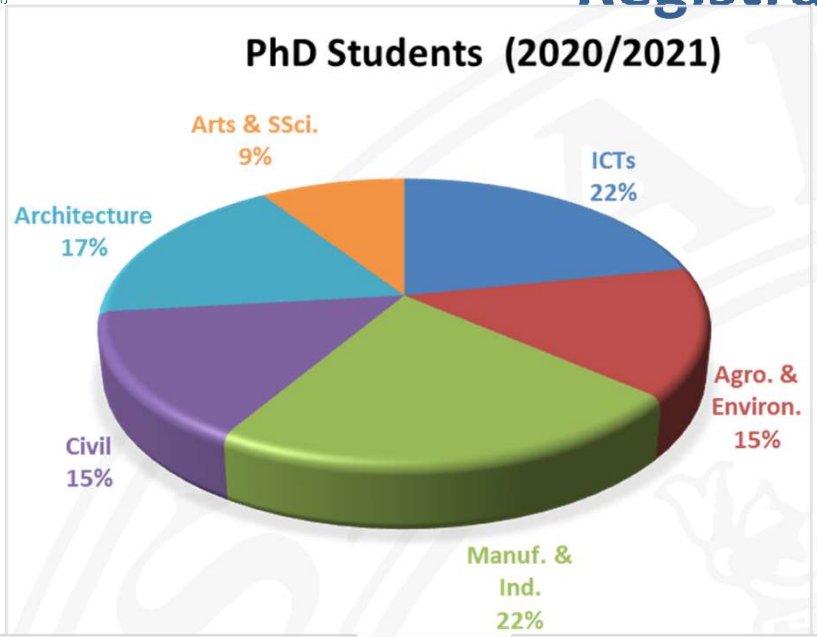
	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20
PhD Theses (n)	163	196	184	230	244	212	350	305	376	889	418	188	233	181
MI (n)								110	129	201	167	86	107	93
ME (n)	22	28	36	55	44	35	22	6	2					
ME/MI (%)	13	14	20	24	18	17	6	38	35	23	40	46	46	51

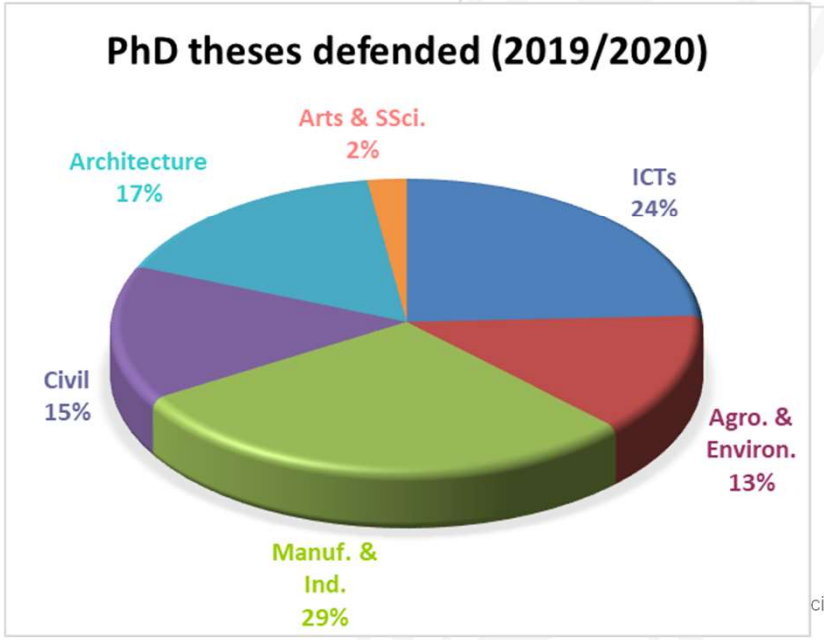
MI: International Doctorate
ME: European Doctorate

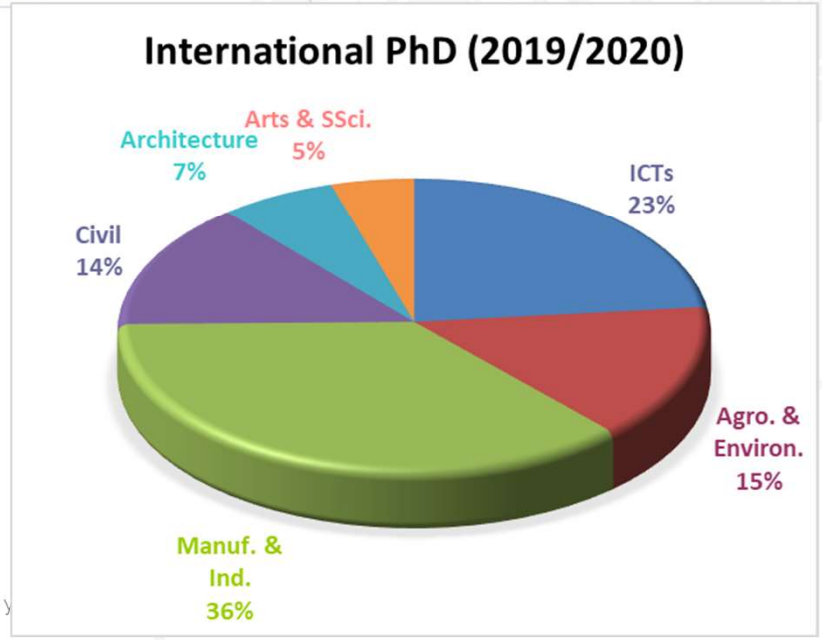
ca. 225 PhD theses defended per year on average (excl. 2014/2015-2016/2017)

ca. 48% International Doctorates on average from 2017/2018 onwards

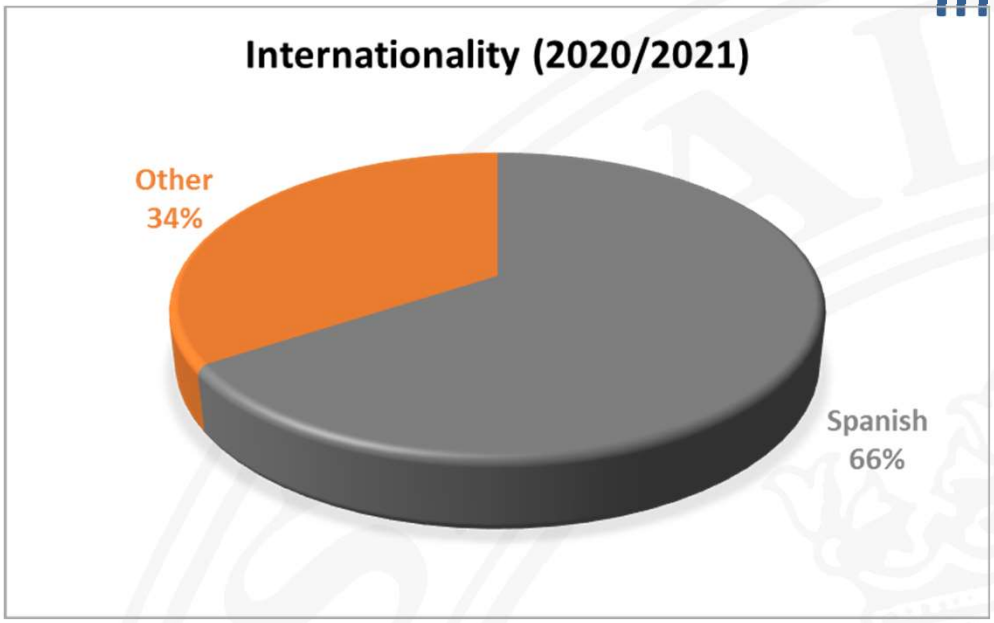
Doctoral Areas: Registration and defence

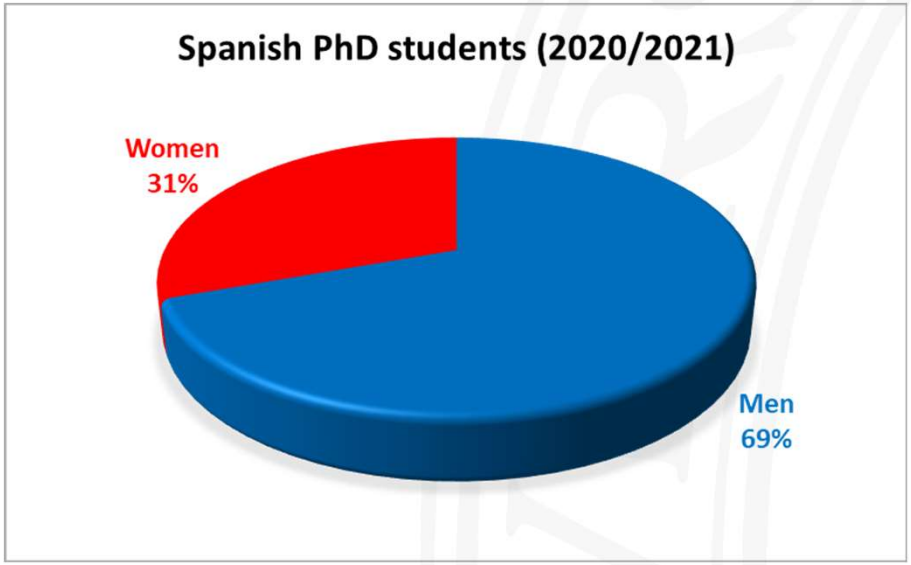


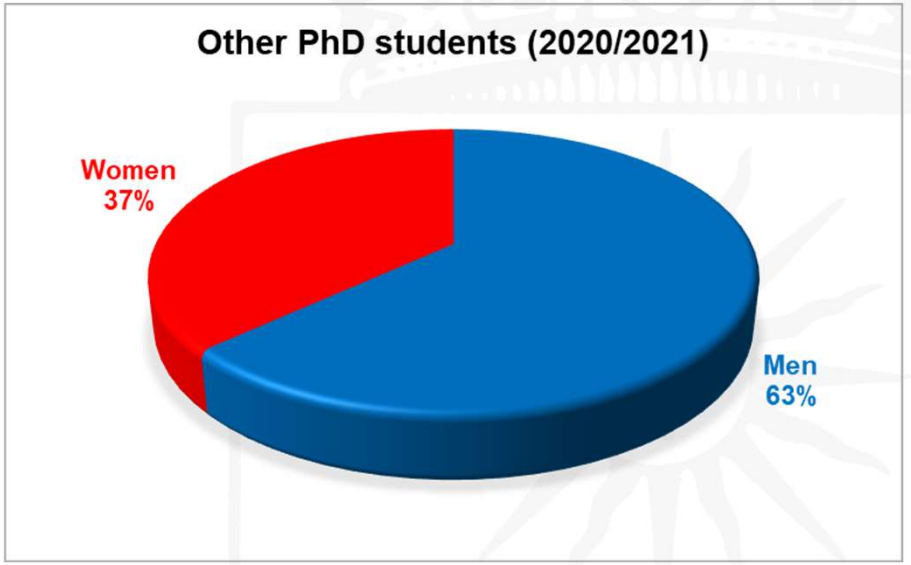




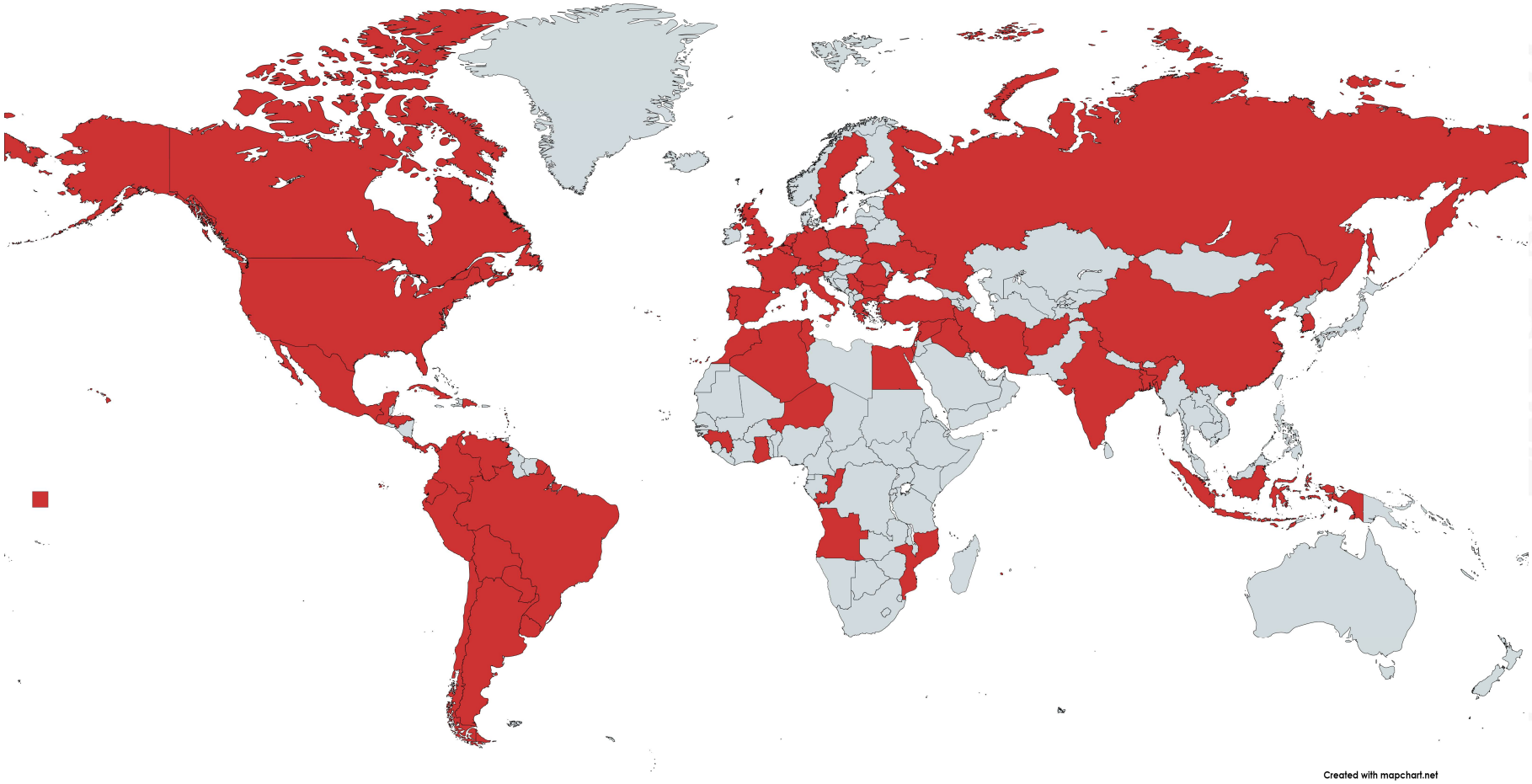
PhD Students registration: Internationality







PhD Students nationalities (2020/2021)



Industrial Doctorate (from 2017 onwards)

- ✓ **Industrial Doctorate contracts** granted by the Government of Madrid
- ✓ **Framework agreements** (UPM-company) to carry out Industrial Doctorates

PLANTRESPONSE STRONGER BY NATURE

AIRBUS

ALTER TECHNOLOGYGROUP

LEANCALE

THE LAB

CEDRION

CENER | CENTRO NACIONAL DE ENERGÍAS RENOVABLES | NATIONAL RENEWABLE ENERGY CENTRE

biod Bio Optical Detection

étulos servicio integral de asesoría eólica

Silk BIOMED

BIOTERRA, S.L.

GEOLYDER Logística y Desarrollo para la Reducción de GeoRiesgos

Aura innovative robotics

QPV QualifyingPhotoVoltaics

nutega Expertos en Nutrición

Solar Technology Advisors

Co-tutelle (from 2017 onwards)

UNIVERSIDAD POLITÉCNICA DE MADRID

HR EXCELLENCE IN RESEARCH

EID ESCUELA INTERNACIONAL DE DOCTORADO / UPM

UNIVERSITÉ TOULOUSE III PAUL SABATIER

Université de Toulouse

UNIVERSITÀ DEGLI STUDI FIRENZE

UFCG SUPRA OMNES LUX LUCIS

U LISBOA | UNIVERSIDADE DE LISBOA

Universidade Federal de Campina Grande

Villard de Honnecourt framework agreement (Architecture)

IUAV Università Iuav di Venezia

paris-belleville école nationale supérieure d'architecture

TU Delft BK Bouwkunde Delft University of Technology Faculty of Architecture and the Built Environment

5. Transversal training activities for PhD candidates

Transversal training activities for PhD candidates (tentative)

January-February

- ✓ *Innovation and entrepreneurship*
- ✓ *Introduction to business*

March-April

- ✓ *Patents and copyrights*
- ✓ *Science communication and dissemination*
- ✓ *Technology commercialization*
- ✓ *Methodology to support research I*
- ✓ *ERC Writing Days*

May-June

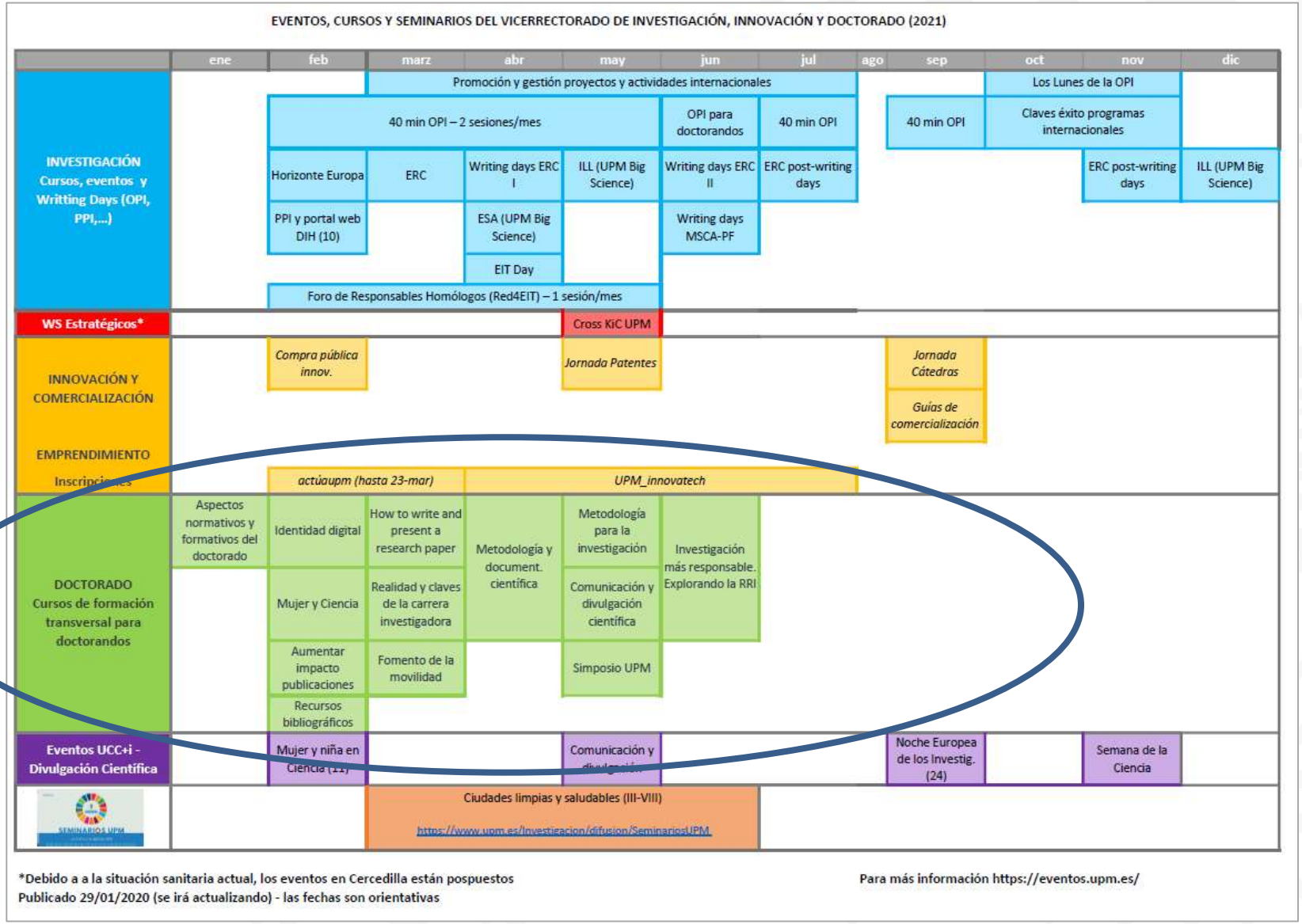
- ✓ *Postdoctoral career projection*
- ✓ *Symposium "Your thesis in a nutshell"*
- ✓ *Methodology to support research II*
- ✓ *Bibliographic resources*
- ✓ *MSCA-IF Writing Days*

October-November

- ✓ *Researchers' digital identity*
- ✓ *Normative aspects of the doctorate*
- ✓ *Making my research more responsible: Exploring RRI*
- ✓ *International R&D&I projects*
- ✓ *Writing in Engineering*

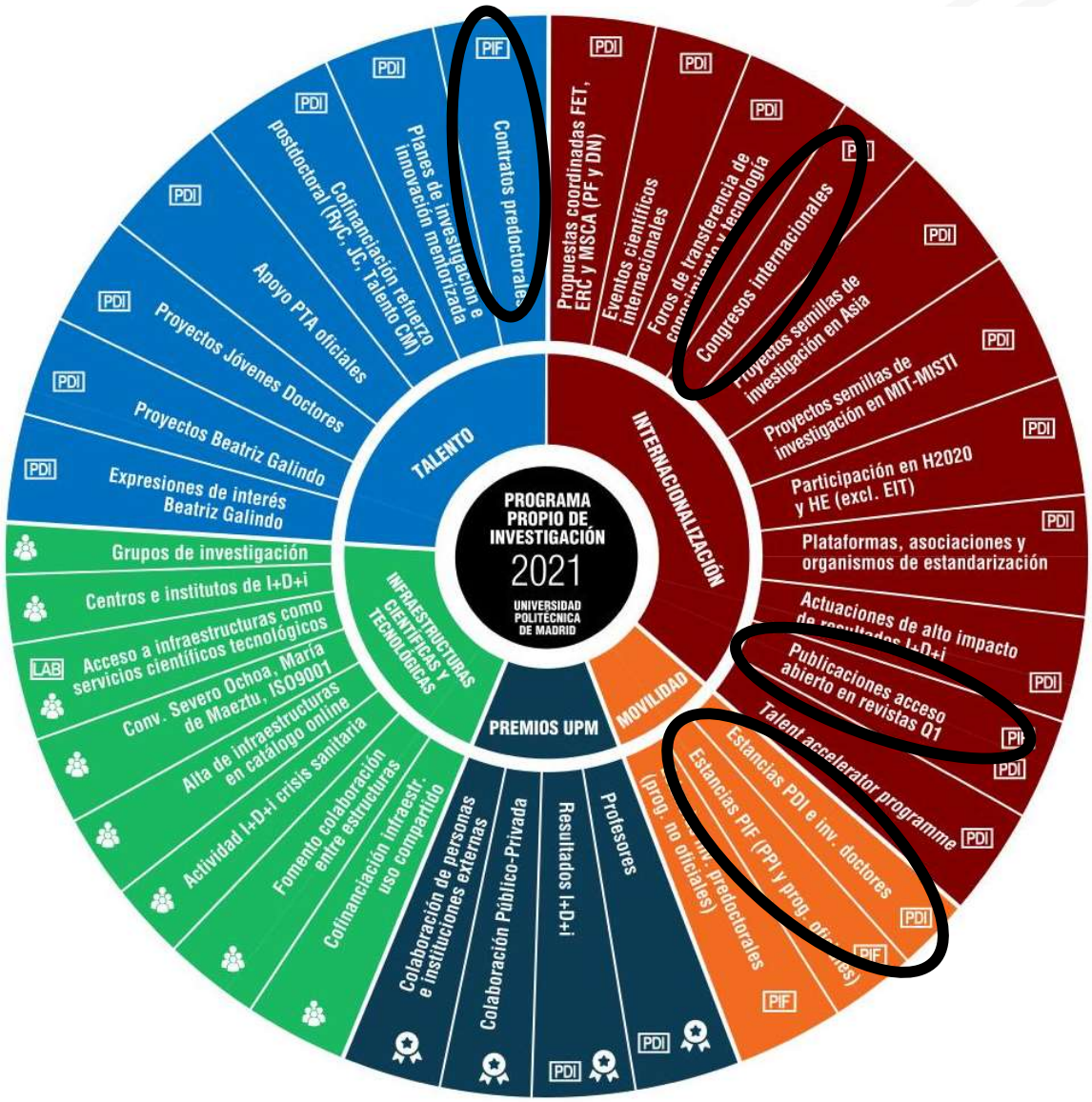
Teaching collaboration (up to 60h/year - max. 180h/PhD candidate)

Transversal training activities for PhD candidates II



6. *Programa Propio de Investigación*

Programa Propio de Investigación (Vice-Rectorate for Research, Innovation and Doctoral Studies funds)



Specific calls for PhD candidates
(total budget: +1,70 M€)

- ✓ **Pre-doctoral contracts**
- ✓ **International conferences**
- ✓ **Secondments** (3-month international secondment to obtain the International Doctorate)
- ✓ **Open access** publications (Q1)

Thank you for your attention!