

UPM addressing grand challenges

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A fast and changing world

- Disruption of the university model (stable for 1000 years)
- Universities cannot keep with “knowledge access control”
- Internet is changing (lately) the learning schemes
 - Individual experience to learning
 - Virtual teaching – Remote students (e.g. MOOCs)
- New requests:
 - Learning associated to labour market access
 - Group-ware skills
 - Innovation (In addition to R&D) activity
 - Entrepreneurship awareness
- Analog (professors) versus Digital (students)?

IT'S OVER, BOOK...
YOU'RE AN INFERIOR
TECHNOLOGY.



YOUR BIG, CLUNKY
FORMAT IS IRRELEVANT.



JUST A NIP OF THIS
FLAME AND YOU'D BE
GONE FOREVER!

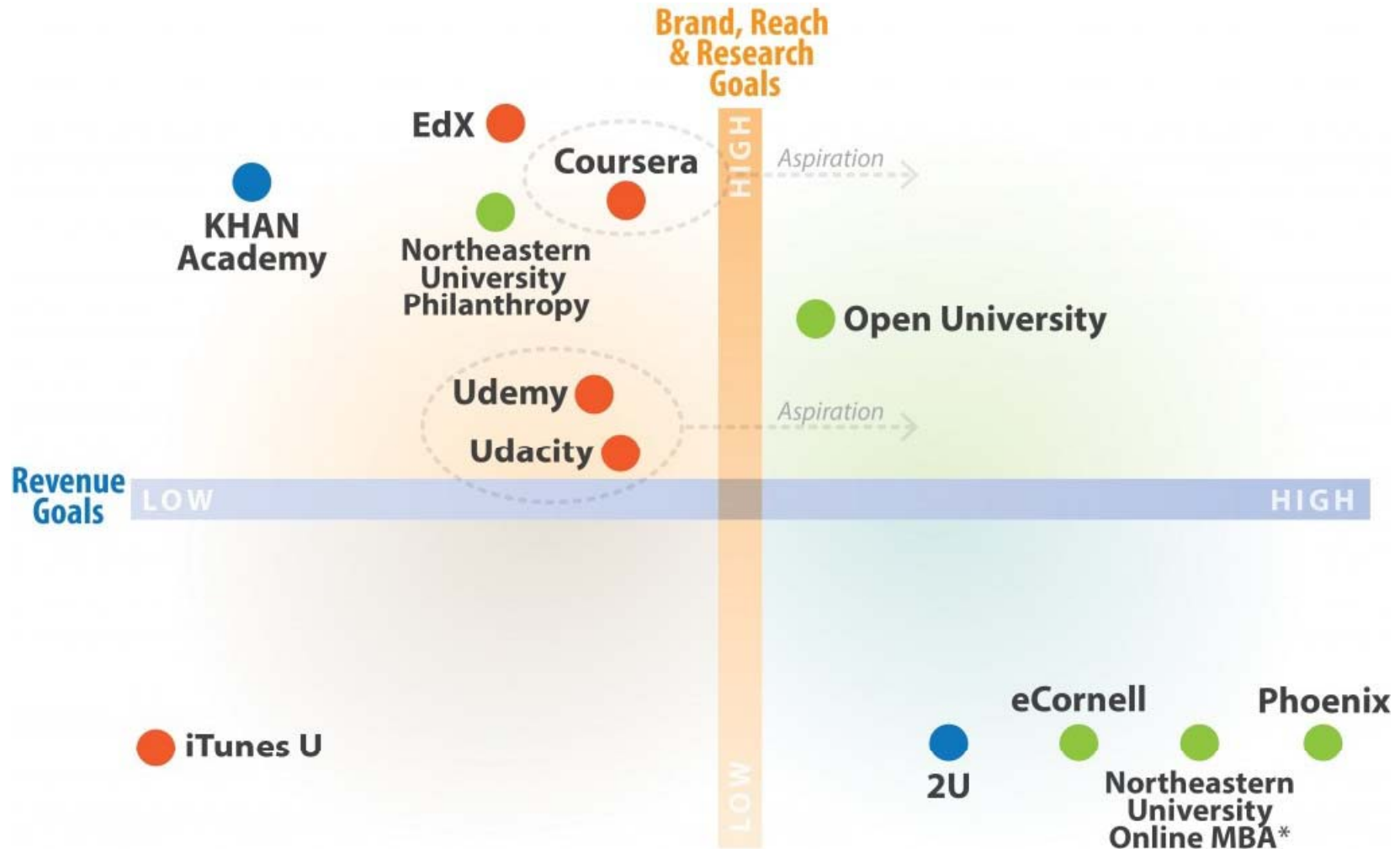


Speed of change (society and university)

- Faster than the usual reaction processes
- Some topics and (possible) solutions:
 - Complex technology - - - Open work collaboration
 - Fast change - - - Lean development
 - Global world - - - Global networks + Language/Cultural skills
- Education transfers knowledge,
- ... but values and culture should be taught

- Change in access to knowledge
 - ... facilitate learning versus information control
 - ... individual experience to learning
- Different university models

MOOCs Interests



● Course aggregator
 ● Universities doing it themselves
 ● 3rd party vendor platform/services

** Example for many online programs offered by existing universities*

UPM choices in education

- Spain is changing from an integrated model (five years for BS+MS) to a Bologna one (independent BS and MS)
- Program to encourage engineering career among secondary school students, jointly with Sp. Acad. Engineering and UPV
- UPM requires all students to prove at least a B2 English level before the Bachelor degree is granted
- UPM strongly recommends international exchanges for bachelor and master students
 - Go out, see, and learn

Learning of foreign languages at UPM

Área de Español		Área de Lenguas Extranjeras			
Programas de movilidad <i>(ERASMUS, Etc.)</i>	Programas especiales <i>(a la carta)</i>	Programas de movilidad <i>(ERASMUS, Etc.)</i>	Programa de chino	Mesa de Formación	Inglés para la CAM <i>(Prof. secundaria)</i>
Cursos Intensivos <i>(Lengua y cultura)</i> 1º y 2º semestres	Curso General <i>(Lengua y cultura)</i> 1º y 2º semestres	Programas On line <i>(auto-estudio)</i> <i>Alemán, Francés, Inglés, Italiano.</i>	Cursos Intensivos <i>(Lengua y cultura)</i> 1º y 2º semestres	Cursos presenciales Alemán, Francés, Inglés	Preparación para prueba de habilitación: Nivel C1
Curso General <i>(Lengua)</i> 1º y 2º semestres	Intensivos verano <i>(Lengua y cultura)</i> Universidades chinas y otros	Intensivos de verano <i>(lengua)</i> Alemán, Danés, Francés, Italiano, Portugués, Sueco, etc	Cursos Generales <i>(lengua)</i> 1º y 2º semestres	Cursos semipresenciales Alemán, Francés, Inglés	Cursos generales de primavera y otoño Niveles: A2 a B2
Preparación al DELE Curso intensivo por convocatoria	Preuniversitarios chinos (700h) Lengua, cultura y materias técnicas	Preparación al TOEIC Curso intensivo por convocatoria	Preparación al HSK Curso intensivo por convocatoria Taller de Caligrafía	Plataforma Online de Autoaprendizaje: Alemán, Francés, Inglés, Italiano.	Intensivo de Verano <i>(Julio)</i> Niveles: A2 a B2
Exámenes		Exámenes			
Acreditación Externa DELE <i>(Diploma de Español como Lengua Extranjera)</i>		Acreditación Interna UPM <i>(Prueba de Nivelación para futuros estudiantes de intercambio)</i>		Acreditación Externa TOEIC (Inglés) y TFI (Francés)	
Convocatorias de Mayo y Noviembre Niveles (A1, A2, B1, B2, C1, C2)		Alemán, Francés, Inglés, Italiano		2 convocatorias curso para Estudiantes, PAS, PDI (Puesta a punto + Prolinter)	

UPM strategic decisions

- Definition as a postgraduate university (emphasis on master and doctorate programs)
- Keep with the involvement in the EU Framework Programme
- Spin-off incubator
- Programs for technology transfer for company innovation
- Strong internationalization and fostering of alliances
- Search for (new) sponsorships
- Simplification of structure (merge of departments and schools)
- Clarification of Bachelor degrees (Spanish specific problem)

UPM - Research structures

+ 200 R&D groups in the areas of major interest

- ✘ Artificial Intelligence
- ✘ Food quality
- ✘ Next generation Internet
- ✘ Solar Cells
- ✘ Nanomaterials
- ✘ Aerospace operations
- ✘ Agri-Food
- ✘ Next Generation Networks
- ✘ Wind power
- ✘ Biometrics
- ✘ Acoustics
- ✘ Agro-Energy
- ✘ Water management
- ✘ Visual telecommunications
- ✘ Quantum computation
- ✘ Materials engineering
- ✘ Management of sustainable resources
- ✘ Bioclimatic architecture
- ✘ Life Supporting Technologies
- ✘ Reliable and high quality software
- ✘ Geoinformation

...

17 R&D&I centres and institutes

Life Sciences

biomedicine
green biotechnology
agroenvironmental

Energy

solar energy
digital home
nuclear fusion

Industry

laser technologies
nanoelectronics
materials
industrial electronics
robotics

ICT

multimedia
materials for ICT
open source software

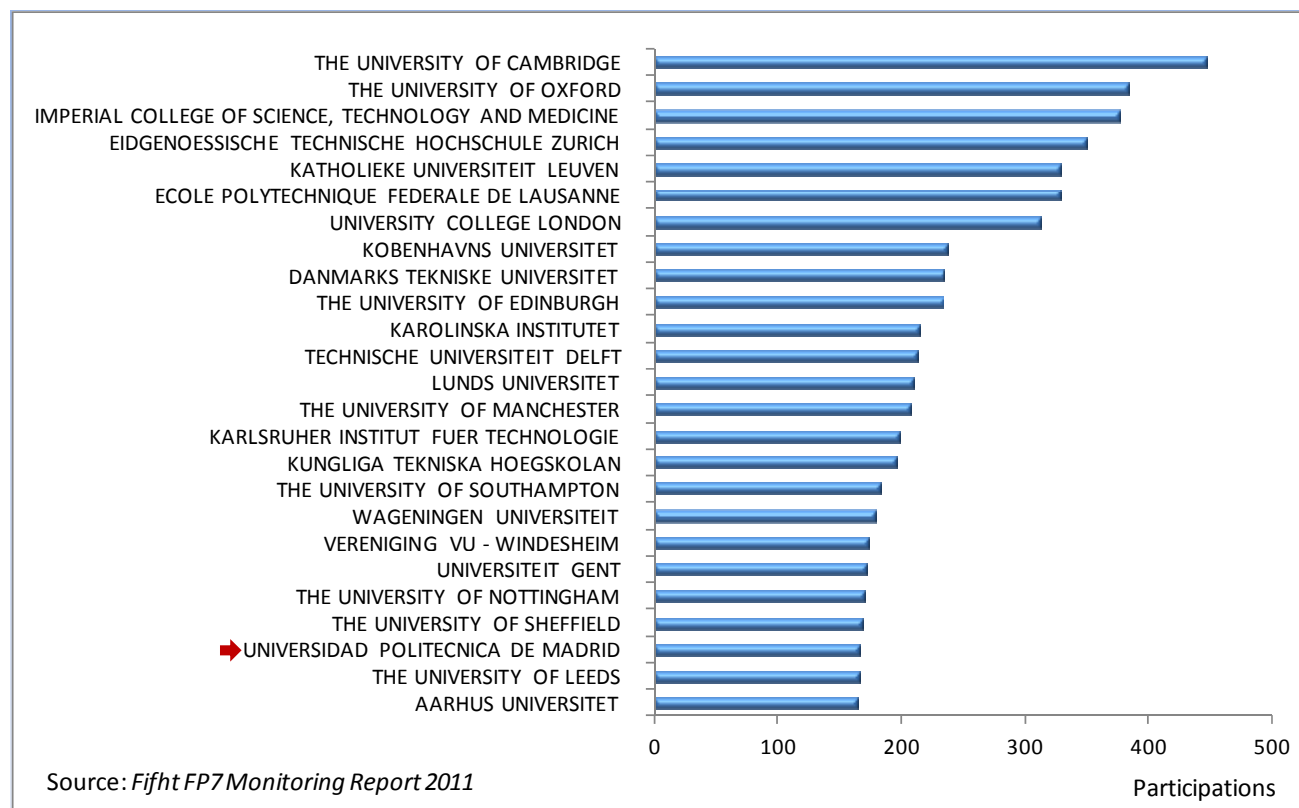
Transport

intelligent transport
rail technology
microgravity

UPM - data of the research activity

+ M€ 65 of funding received from the 7th Framework Programme

1st Spanish University in projects and funding participation

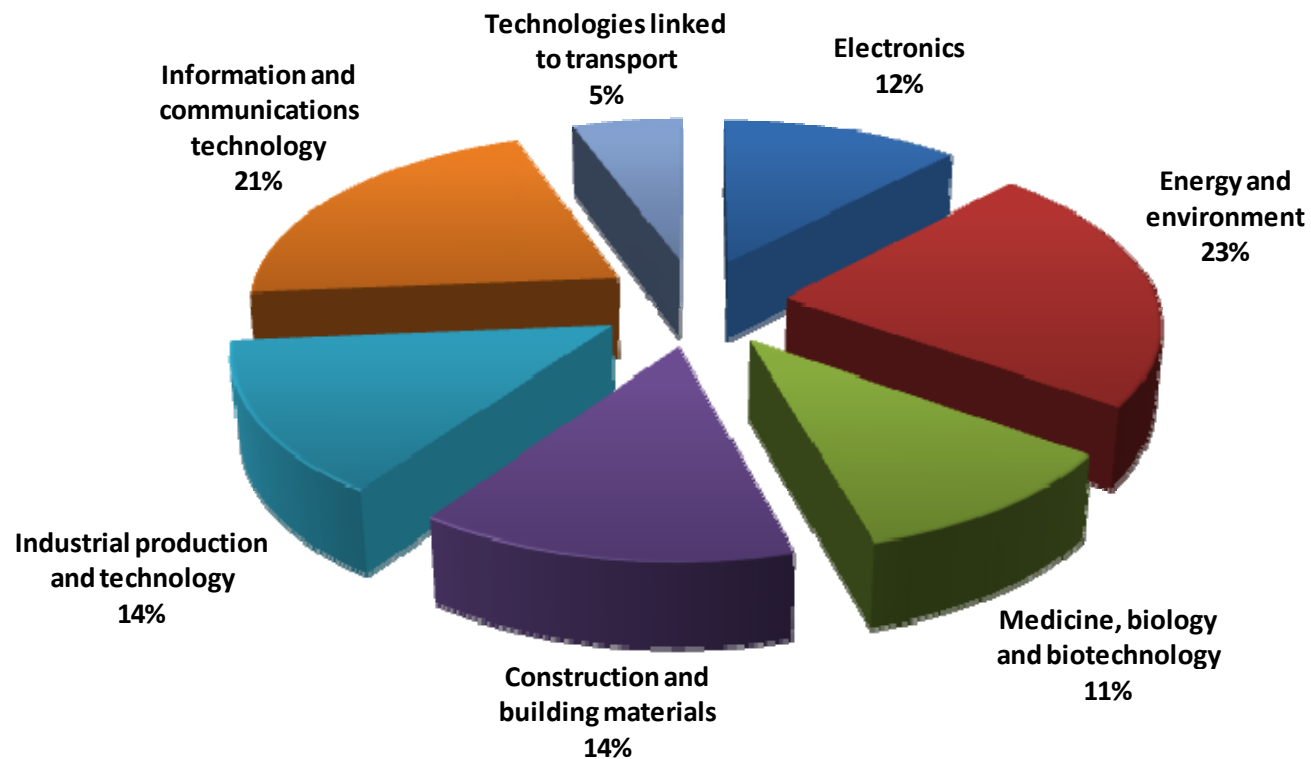


The UPM is at **No. 23** in the ranking of top participant HES organisations in FP7 signed grant agreements in terms of counts of participations for the period 2007-2011

UPM - data of technology transfer

+ 300 active patents + 90 international patent applications

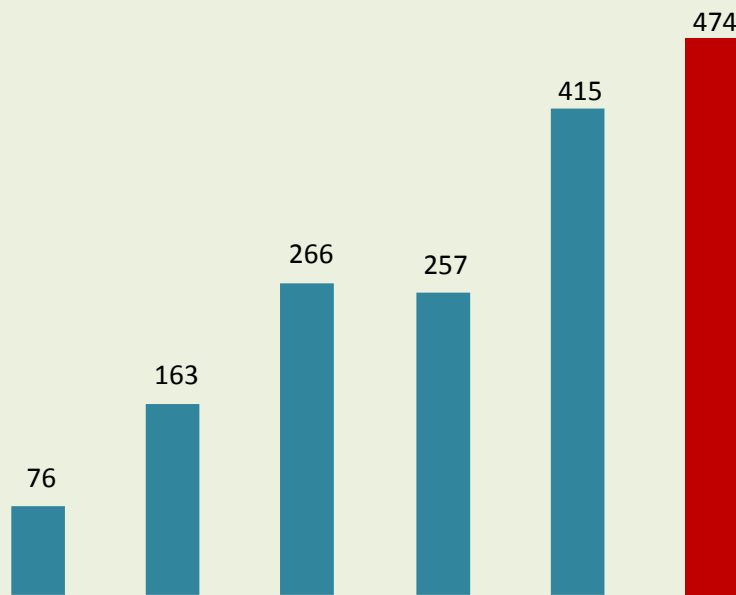
1st Spanish University generating patents



UPM - data of technology transfer

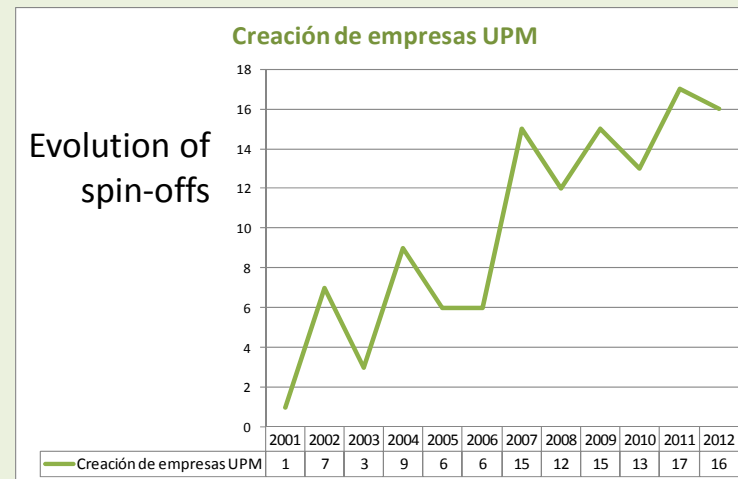
+ 125 technology companies

1st Spanish University creating spin-off companies



I	II	III	IV	V	VI
2007	2008	2009	2010	2011	2012

Business ideas (annual contest)



UPM – research structures

+ 80 Industry-University Chairs



UPM – research structures

+ 80 Industry-University Chairs



Research strategy towards innovation

- Long tradition of company sponsored contract-based research
- Ability to cope with company evolution
- New paradigm on innovation based evolution versus former R&D based evolution (i.e. Apple)
- Need to foster university-company relations oriented towards innovation → New scheme of industry driven activities
- Industry/Company not only as a “source of funding”, but also as a “source of inspiration”

UPM "Solutions Programme"

- Customer driven innovation (Company sponsored)
 - ... forerunner Repsol, ... Mapfre, ... Inditex, ...
 - Challenges set by the company
 - Call for proposals among UPM researchers
 - Selection of ideas by the company
-
- International extension
(RedEmprendia-Solutions)



UPM in International Academic Programs

Academic EU-funded competitive programs

Erasmus, Erasmus Mundus (Actions 1,2 & 3), Tempus, Youth in Action, Leonardo, Alfa, Atlantis, Lingua, ...



UPM is very active & successful obtaining European funds for academic purposes

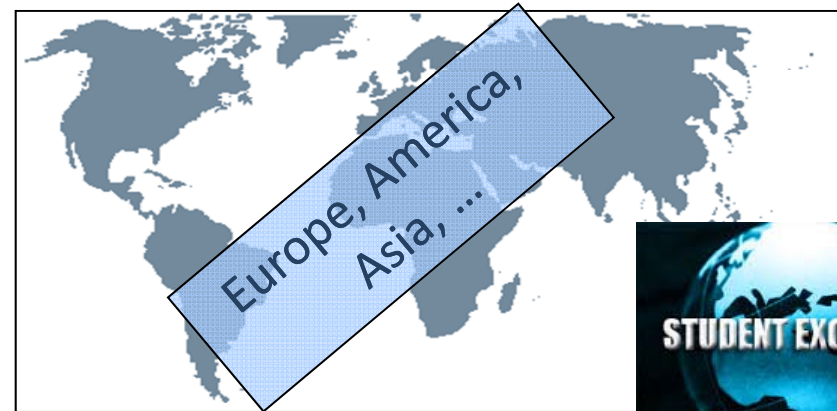
Networks & Associations

EUA, EAIE, TIME, SEFI, Cesær, GE3, Athens, Columbus, Magalhães, ASIBEI, AUIP, LACCEI, *Grupo Tordesillas*, ...

UPM has been co-founder of some of the most important networks of Technical Universities in Europe & Latin America

Mobility: Student Exchanges

- Short Stays
- Diploma Project
- One Academic Semester
- One Academic Year
- Double Degree



3300+ Exchange Students per year (*incoming + outgoing*)

90+ Double Degree Agreements (*80 in Europe*)



MAGALHÃES Programme → **SMILE Project**



UPM has been the promoter of this multilateral student mobility programme between Technical European and Latin American Universities (33 Universities)

UPM-China Student Exchanges



300+ Chinese student exchanges (some post-doc and staff) during the course of the past 7 years

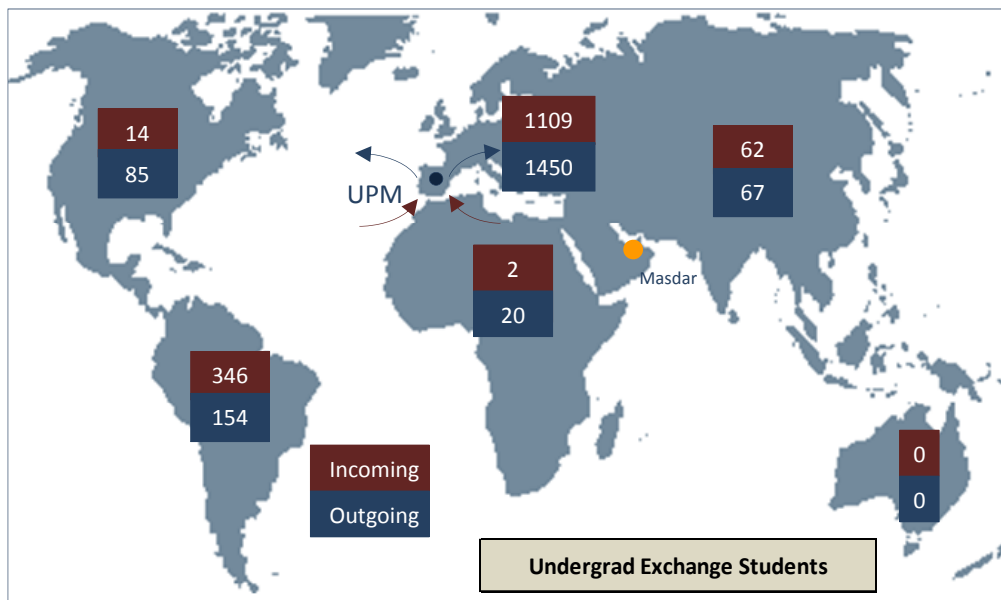
150+ Spanish student exchanges in the same period (Diploma Project Work)

As a consequence, 40+ UPM faculty members has visited their Chinese counterparts for 1 to 2 weeks to foresee the launching of new R&D projects

Approximate total funds of these programs for UPM and Sponsors around 2 M€

Around 20 Chinese students/year join UPM for PhD with grants from China Scholarship Council

International mobility for UPM (2012-13)



Undergrad Exchange Students						2012-13	
Outgoing							
		Africa	Asia	LatAm	USA-CAN	Europe	Total OUT
OB	Cooperation	20	4	51			75
COF	Erasmus					1166	1166
OB	Athens					250	250
COF	Magalhaes & others			103			103
OB	USA-CAN				53		53
COF	China & others		63				63
OB	Double Degree				32	81	113
		20	67	154	85	1497	1823
Incoming							
		Africa	Asia	LatAm	USA-CAN	Europe	Total IN
	Visiting & Bi. Agree	2	1	49	9	8	69
	Erasmus					655	655
	Athens					451	451
	Magalhaes & others			296			296
	USA				5		5
	China & others		61				61
	Double Degree			1		30	31
		2	62	346	14	1144	1568
TOTAL						3391	

OB: Own Budget
COF: Cofunded UPM & others

Graduate Degree Seeking Foreign Students: Master & PhD (China)

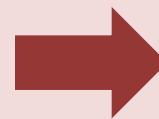
Foreign Master Students				Cumulative CSC PhD Students				
Africa	Asia	LatAm	Europe	2009-10	2010-11	2011-12	2012-13	2013-14
3	3	37	147	1	9	30	52	65

Moving towards an external and permanent representation

Europe is considered domestic from the internationalization point of view

The rest of the world and its associated UPM's figures, *e.g. Student Mobility*

UPM mobility activities					
Africa	Asia	LatAm	USA-CAN	Europe	World
1%	4%	15%	3%	78%	100%



To balance **Int'l UPM activity**

Emerging regions & key UPM bases

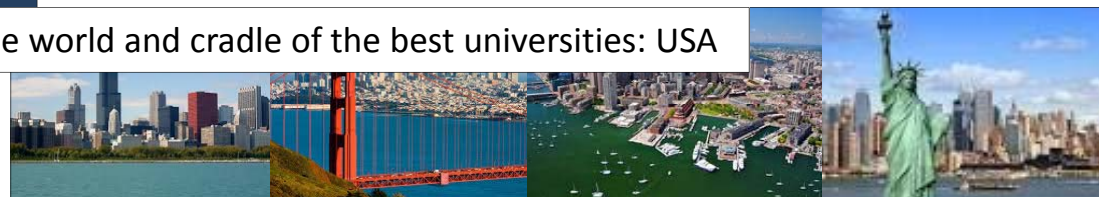
Asia, specially China (Big unknown) and Latin America, specially Brazil (Big forgotten)



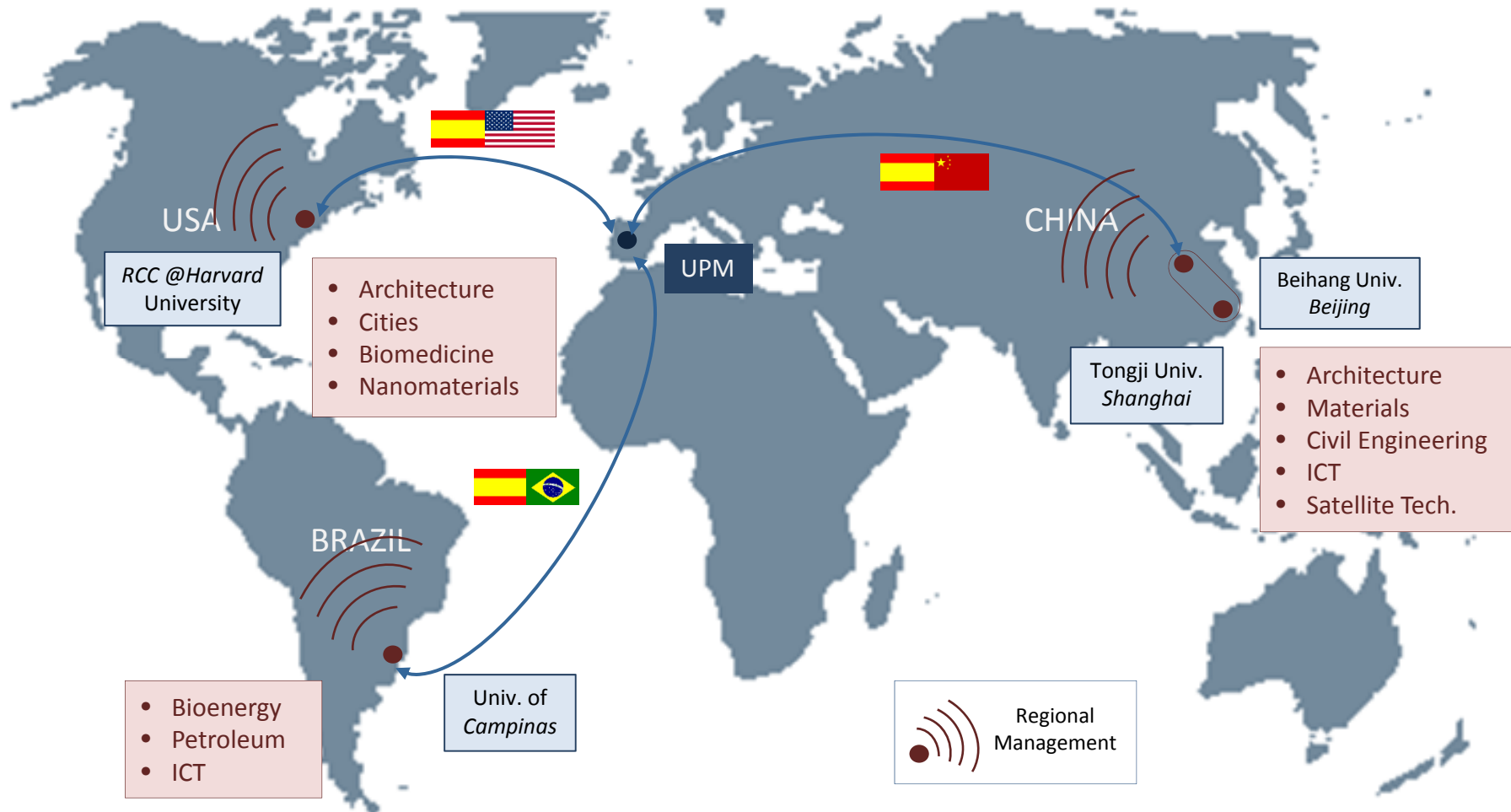
Fast developing economies (*to know & to be known*)
Need of technical advise
Big opportunities for our professionals & companies
Good and stable foundations
To increase quantity & quality relations regionally

Need to learn and to be known

... in the largest economy of the world and cradle of the best universities: USA



International & permanent delegations of UPM



Sino-Spanish Campus @ Tongji Univ. (Shanghai)

Technical Universities of Madrid and Catalonia (Spain) & Tongji Univ (China) opened a Campus in 2012

Developing undergrad & grad student exchanges

6 Areas of interest: Architecture, Civil Eng, Computer Science, Telecom Eng, Material Sciences & Energy

BRAZIL

Exchanging lecturers for modular courses (1-2 months) & launching joint research

Open since 2012

UPM delegation @ RCC-Harvard: Affinities



Developing, jointly with UCM and Harvard, the 6 thematic research clusters



Short term: Calls for Grants

- RCC Grants for recent PhD Candidates (1y+1y)
- RCC Research Scholarships Grants
- Harvard Graduate Programs Grants

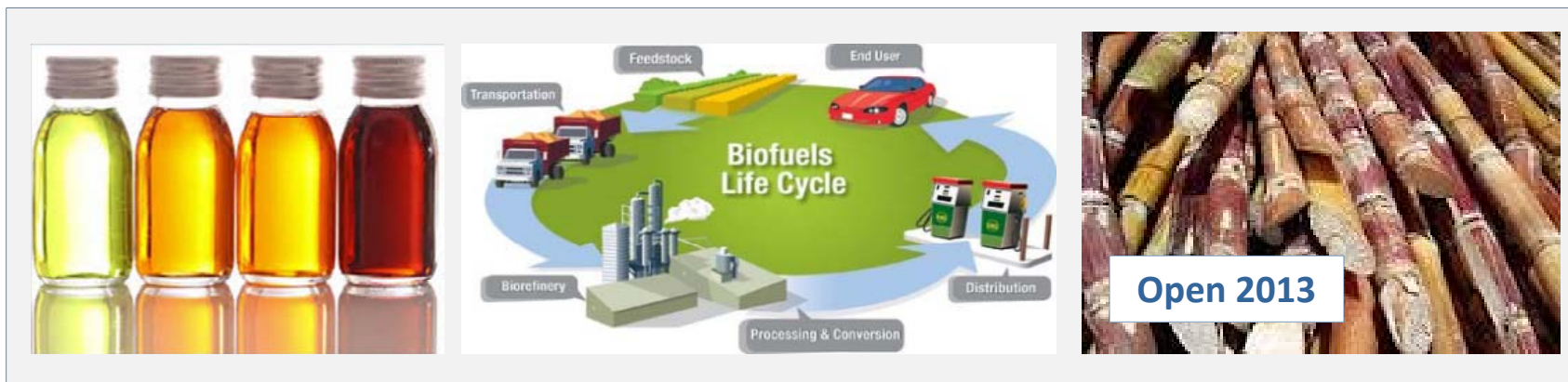
Opening a joint Lab in Brazil (Campinas)

Technical University of Madrid & Unicamp (Brazil)
opened a Joint Lab in **Bio-energy**



With sponsorship from **REPSOL-SINOPEC** (Sino-Spanish Company located in Brazil)

Areas of interest: **Sugarcane** genomics, Biomass, bio-fuels efficiency, other plant oil, ...



200 m² common new space for Joint Research & UPM Office

International strategy

- Stage based approach
 - Student exchange
 - Faculty and Staff exchange
 - Double/Joint degrees
 - Joint research
- Alliance oriented (*Global university*)
 - Networks of common interests (*done*)
 - Complementary portfolio (*a.k.a. airline operative alliances*)
 - Supra-organization agreements
- Areas of focus: *Europe*, China, North America, Latin America

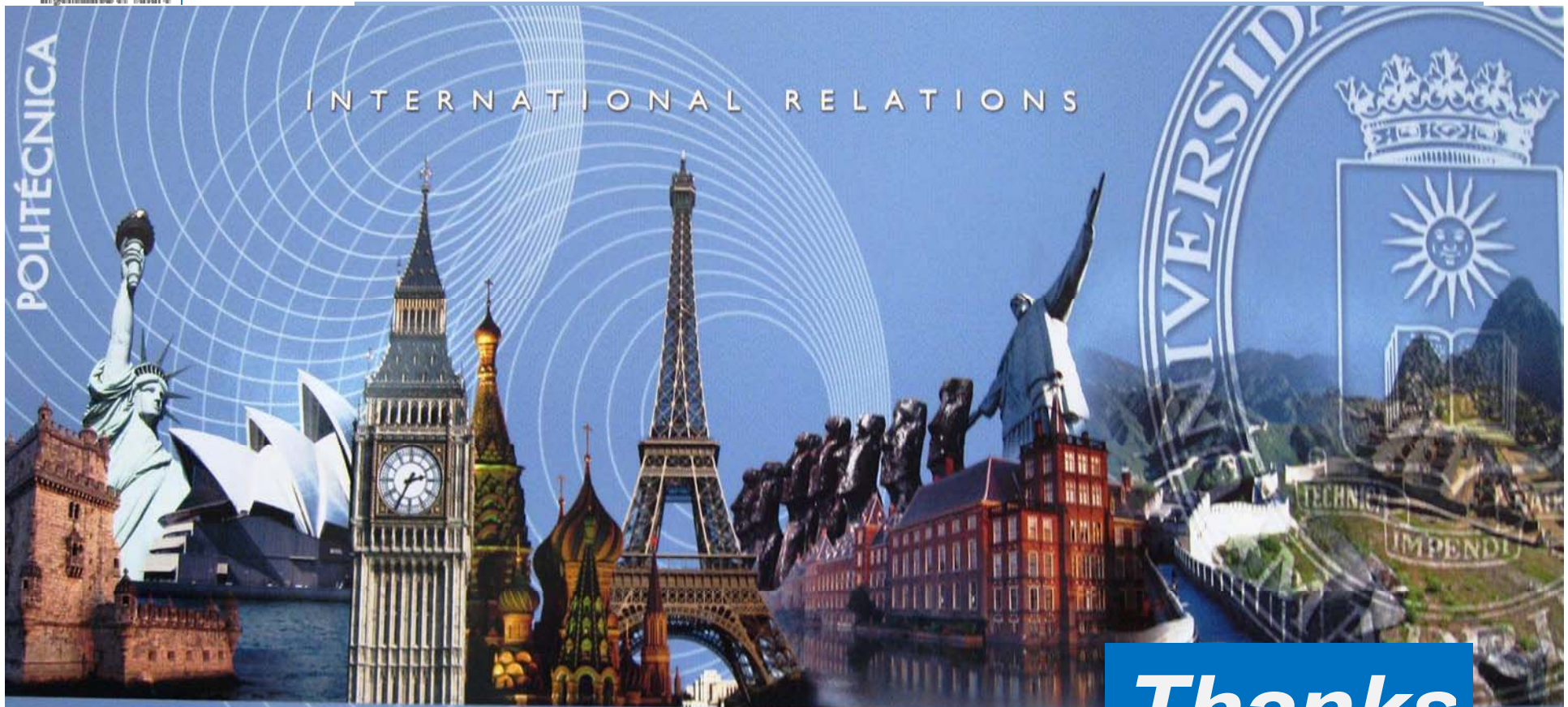


POLITÉCNICA

"Ingeniamos el futuro"

CAMPUS
DE EXCELENCIA
INTERNACIONAL

POLITÉCNICA



Thanks

“Ingeniamos el futuro”