

*“Políticas públicas para la competitividad regional.  
La región metropolitana como ejemplo”*

## **La universidad y la empresa: Investigación, innovación y transferencia**

# **Universities as key nodes in the creative imperative: La política universitaria dirigida a la empresa A national perspective**

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**Universitat Autònoma de Barcelona**

Martes, 17 de julio, 09:30-10:30 h

**Aula 2 Centre de Cultura Contemporània de Barcelona (CCCB)  
c/ Montalegre, 5. Barcelona**

**Institut d'Estudis Regionals i Metropolitans de Barcelona (IERMB)  
Cursos Verano 2007 Consorci Universitat Internacional Menéndez Pelayo de  
Barcelona (CUIMPB)**

## . Introducción

**La universidad y la empresa: Investigación, innovación y transferencia**

## **QÜESTIONES ESTRUCTURALES**

**. Qué son las universidades hoy en día?**

**. Qué son las empresas hoy en día?**

**. La transferencia de conocimiento**

**. Las políticas de universidad y empresa**

## . Introducción

# **La universidad y la empresa: Investigación, innovación y transferencia OBJETIVOS GENERALES**

- . Describir como y donde se genera el conocimiento**
- . Analizar como este conocimiento se transfiere a las empresas**
- . Discutir si hay política de universidad dirigida a la empresa**
- . Comparar entre diferentes países las relaciones entre universidad y empresa**

## . Introducción

# **La universidad y la empresa: Investigación, innovación y transferencia**

## **PALABRAS CLAVE**

**. Universidad**

**. Empresa**

**. Transferencia de conocimiento**

**. Relaciones universidad y empresa (política universitaria)**

## . Introducción

**La universidad y la empresa: Investigación, innovación y transferencia**

**PALABRAS CLAVE, otra vez**

**. Universidad: Institución cambiante**

**. Empresa: De la manufactura a la nueva economía**

**. Transferencia de conocimiento: Investigación y otros?...**

**. Relaciones universidad y empresa (política universitaria): como se definiría?**

## . Outline

# **La universidad y la empresa: Investigación, innovación y transferencia**

## **EL RESTO DE ESTA CONFERENCIA**

**. La universidad, ¿una institución cambiante?**

**. ¿A qué empresa nos referimos?**

**. Transferencia, ¿el concepto clave?**

**. ¿Hay política universitaria hacia la empresa; hay política de empresa hacia la universidad?**

# ~~. La universidad, ¿una institución cambiante?~~



## **La universidad un nodo en la cadena de valor añadido**

- . Motores de la economía del conocimiento**
- . Para los políticos representan los avances en innovación e investigación que tiene un país**
- . Son la base del paradigma “creatividad y prosperidad nacional” (Wince-Smith 2006)**
- . ACUERDO:**
- . Universidades punteras en investigación son vitales para el desarrollo de un país**
- . PREGUNTA ESTRUCTURAL:**
- . Como construir una universidad puntera?**
- . La investigación de calidad**



# . La universidad, ¿una institución cambiante?



## Como conseguir “la cúspide de excelencia” en una universidad?

### . Puntos débiles que afrontan las universidades:

1. Construyendo el “know-how” en investigación
2. Financiamiento
3. Mentalidad abierta de los investigadores
4. Mentalidad abierta de los agentes gubernamentales y de los políticos

# ~~. La universidad, ¿una institución cambiante?~~



Objetivos INGENIO 2010

	2005	2006	2007	2008	2009	2010
Inversión en I+D con respecto al PIB	1,13	1,3	1,5	1,6		2,0
Contribución privada en inversión en I+D	46,3		50,0	52,5		55,0
Contribución pública en inversión en I+D sobre el PIB	0,2		0,7			0,9
Incorporación de doctores y tecnólogos al sector privado	780	850	900	1000	1150	1300
Incremento de nuevas empresas de base tecnológica creadas a partir de iniciativas del sector público	60	80	100	110	120	130
Porcentaje del PIB destinado a TIC	5,5		6,0	6,4		7,0
	Datos reales		Previsiones			

Fuente. Ministerio de Educación y Ciencia. FECYT, 2006.

## ~~. La universidad, ¿una institución cambiante?~~



### **“Offshoring” de productos de alto valor añadido en investigación**

**. Identificar el conjunto de acciones**

**. Añadir “Creatividad” al polinomio R+D+I+C**

**. CÓMO:**

- 1. Colaboración**
- 2. Interdisciplinariedad: artes, humanidades, ciencias sociales y ciencias**
- 3. Abrir fronteras entre disciplinas, organizaciones y empresas entre regiones y naciones**

# . La universidad, ¿una institución cambiante?

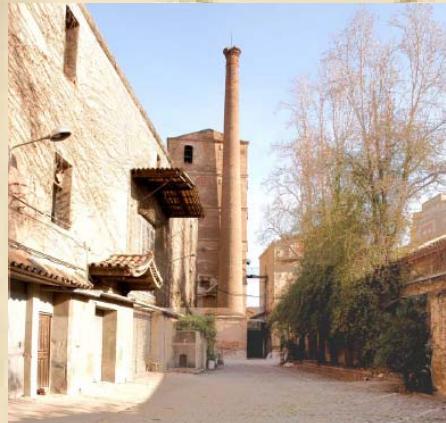


## Factores de localización empresarial y universidad

. De la universidad próxima

. A la universidad proactiva

Figura 1. Inversiones privadas en viejas fábricas, *Palo Alto*, 1990



Pallares-Barbera et al. 2007.

# ~~. La universidad, ¿una institución cambiante?~~



## **La empresa y la universidad, un binomio discontinuo**

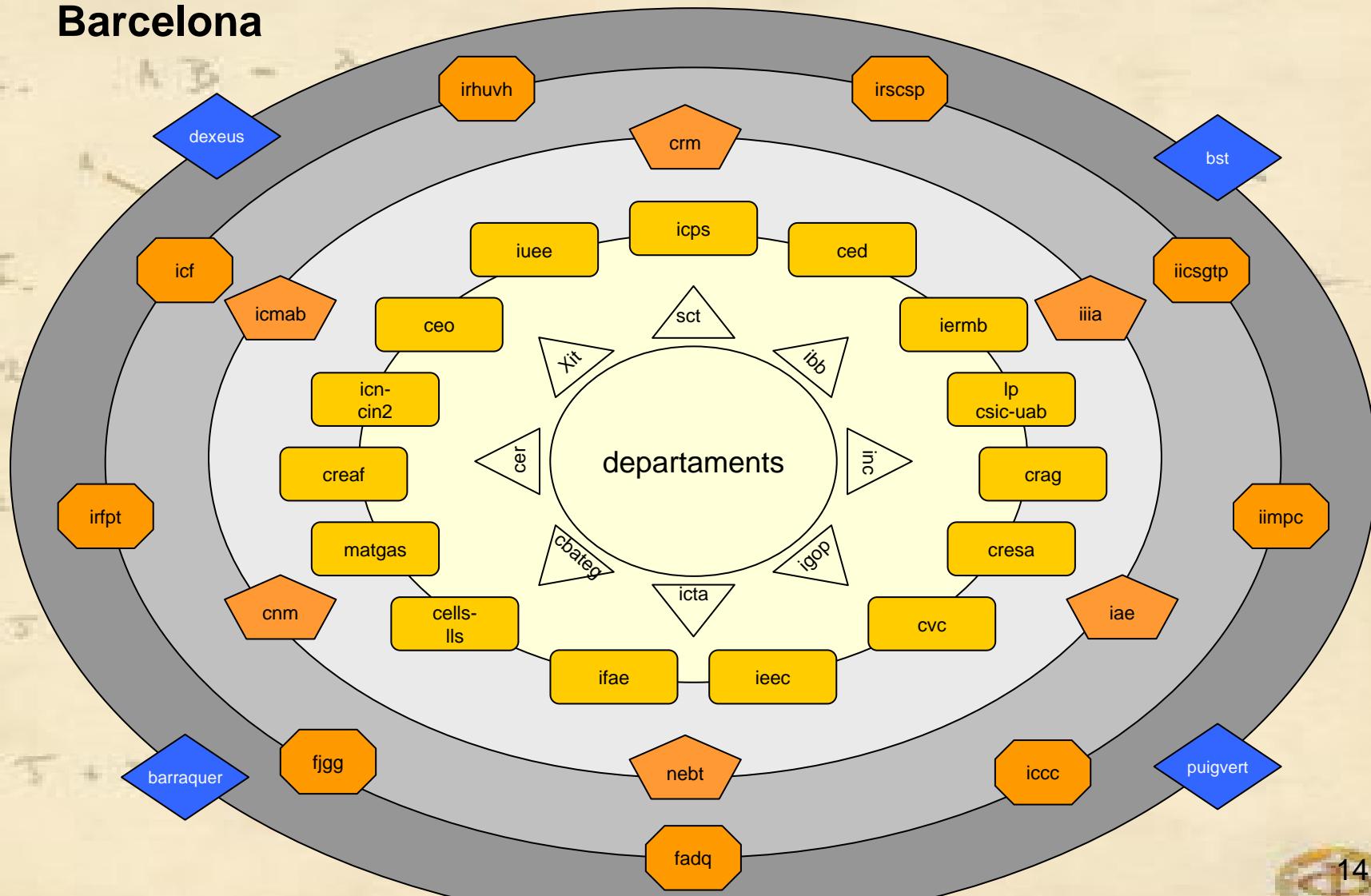
- . Investigadores en el sector privado
- . DIFERENCIAS ENTRE UNIVERSIDAD Y EMPRESA
- . La relación docencia e investigación solo se da en la universidad
- . La producción de doctores es función de la universidad

### **EN CAMBIO**

- . Las empresas retienen los beneficios de la investigación
- . Las empresas quieren un beneficio rápido de la investigación
- . Las empresas, en general, no invierten en investigación básica

# . La universidad, ¿una institución cambiante?

Figura 2. Aspecto microfuncional de la Universitat Autònoma de Barcelona



## . Outline

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## ~~- ¿A qué empresa nos referimos?~~



**La corporación, las pequeñas y medianas empresas, las spin-offs...**

### **LA NUEVA ECONOMÍA, EL NUEVO ENFOQUE EMPRESARIAL**

- . Sector servicios de alto valor añadido
- . Sector de comunicación y de creación
- . Sector de creación y desarrollo de innovación

### **PREGUNTA ESTRUCTURAL**

1. Quien hace investigación en el sector privado?
2. Qué tipo de investigación no hacen y necesitan las empresas?
3. Qué capital humano necesitan las empresas?

## . Outline

# La universidad y la empresa: Investigación, innovación y transferencia

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## ~~. Transferencia, ¿el concepto clave?~~



### **El role de la universidad dirigido a la empresa**

- . Programas de post-grado de especialización
    - . Programas de master de especialización
    - . Programas de doctorado
  - . Política de fortalecimiento y soporte a la investigación:
    - Básica,
    - Tecnológica, y
    - Aplicada.
1. Patentes
  2. Servicios de “puesta en valor” de los avances científicos
  3. Servicio “puente” entre universidad y empresa

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. ¿Hay política universitaria hacia la empresa; hay política de empresa hacia la universidad?

## Acciones de universidad dirigidas a empresas

- . La universidad tiene muy claro que su papel en la sociedad pasa por la empresa
- . La universidad se implica a ofrecer sus servicios a la empresa. Cómo?

1. Creación de “parques científicos”, institutos de investigación
2. Colaboración con las empresas a través de “grupos de fusión”
3. Gestión y asesoramiento de grandes proyectos conjuntos: cooperación universidad-empresa

## ~~. Case Study: La Universitat Autònoma de Barcelona~~

### **STRUCTURAL QUESTIONS**

- . The big debate across research, universities, firms and society compress four key issues:**
  - (a) How the universities cope with changing economic landscape**
  - (b) How new mindsets, changing attitudes, and firm's new demands are embodied in demands for new education in universities**
  - (c) How universities are responding to new jobs implying new forms of educational skills**
  - (d) How local-global struggle conform the new arena for competitiveness and society for firms and universities?**

## ~~. Case Study: La Universitat Autònoma de Barcelona~~

The Universitat Autònoma de Barcelona (UAB) has a total of 52.350 students...

(Please see the attached form with the formulation of the Study problem)

## **. Definiciones útiles**

### **. Definition of knowledge (Frascati 2002):**

“Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications”.

### **. Learning (OECD 2001):**

Ability to innovate-to create knowledge needs for interaction between individuals and organizations. Then, regions with high physical densities of skills and specialized firms

## . Definiciones útiles

The term R&D covers three activities: basic research, applied research and experimental development

- a. *Basic research* is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view
- b. *Applied research* is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective
- c. *Experimental development* is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed

## . Definiciones útiles

### **. The boundaries of R&D**

***Criteria for distinguishing R&D from related activities:***

the basic criterion for distinguishing R&D from related activities is the presence in R&D of an appreciable element of novelty and the resolution of scientific and/or technological uncertainty, *i.e.* when the solution to a problem is not readily apparent to someone familiar with the basic stock of common knowledge and techniques for the area concerned

### **. Novelty versus routine**

***For instance:*** The investigation of new methods of measuring temperature is R&D, as are the study and development of new systems and techniques for interpreting the data.

The preparation, execution and maintenance of production standardization or the promotion of sale of products should be excluded from R&D

## . Definiciones útiles

- . Explicit knowledge is formalized and codable**
- . Tacit knowledge is highly contextual and not easily codified**
- . Tacit or experimental knowledge tend to require specific organizational environments, face-to-face contacts to ensure successful development and transmission (Polanyi 1966; Amin and Wilkinson 1999)**
  - core areas of large cities and metropolitan areas
- . Core areas are successful in knowledge clusters and networks based in:**
  - personal relations,
  - economic, social and cultural components (Gillespie, Richardson, Cornford 2001; Millard 2002b)

## . Definiciones útiles



**. Dissemination of knowledge** → training, creation of routines, manuals, licenses. **Geographical decentralization**

**. Creation of knowledge** → universities, cluster of firms, collaboration networks. **Geographical concentration**

## . Definiciones útiles

**. Two main effects of knowledge and innovation in location  
(Castro, Jensen-Butler 1991):**

- a. knowledge and innovation which is embodied in the technology itself (hardware and software) tend to be explicit and codable, and thus, easily to move around between regions
  - Geographic decentralization Low value added

- b. knowledge and innovation which is embodied in people as individuals and their organizations and networks tend to be tacit and non-codable. It can be moved around only if people and organizations move; so it is less easily to move than technology one. Great deal of value added
  - Geographic concentration

## ~~. Case Study: La Universitat Autònoma de Barcelona~~

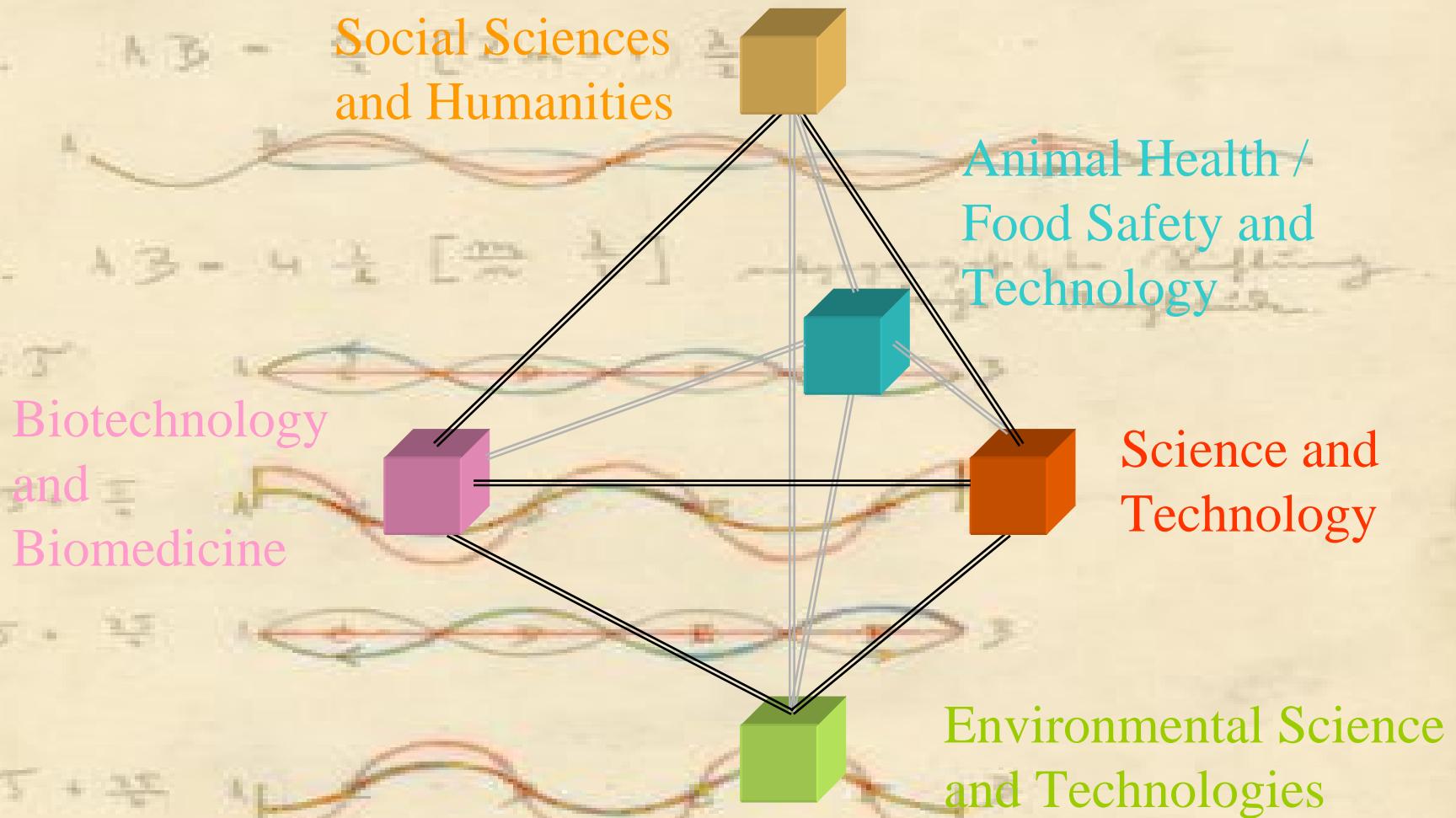
**DATA ABOUT THE UAB CASE STUDY**

**(PLEASE SEE FOLLOWING SLIDES)**

# The Universitat Autònoma de Barcelona: University's Research and Innovation

- . Graduate courses
- . UAB Position in Catalonian University network
- . UAB Position in Spanish University network
- . UAB Human Capital and Potential
- . A vision of the knowledge society from the UAB
- . University's role and its changing structure: Diversity divide
- . UAB links and Basic Research
- . International competitiveness of UAB's research
- . The Diamond of R+D+I in the UAB

## **. The Diamond of R+D+I+C in the UAB**





## **. International competitiveness of UAB's research**

- Changes to Bolonia Declaration Framework (1999)
- Selection of prestigious European universities as partners:  
ECIU, VIU, EUA etc.
- Encouragement of student mobility through international  
programmes
- Promoting collaboration with prestigious foreign universities,  
by setting up research networks

## International competitiveness of UAB's research

### Research and Knowledge Transfer Activities

(2004)

1554

Publications in ISI journals

42 M Euros

in competitive research

16,6 M Euros

in 563 research contracts

202

Doctoral theses

(2005)

1996

Publications in ISI journals

33 M Euros

in competitive research

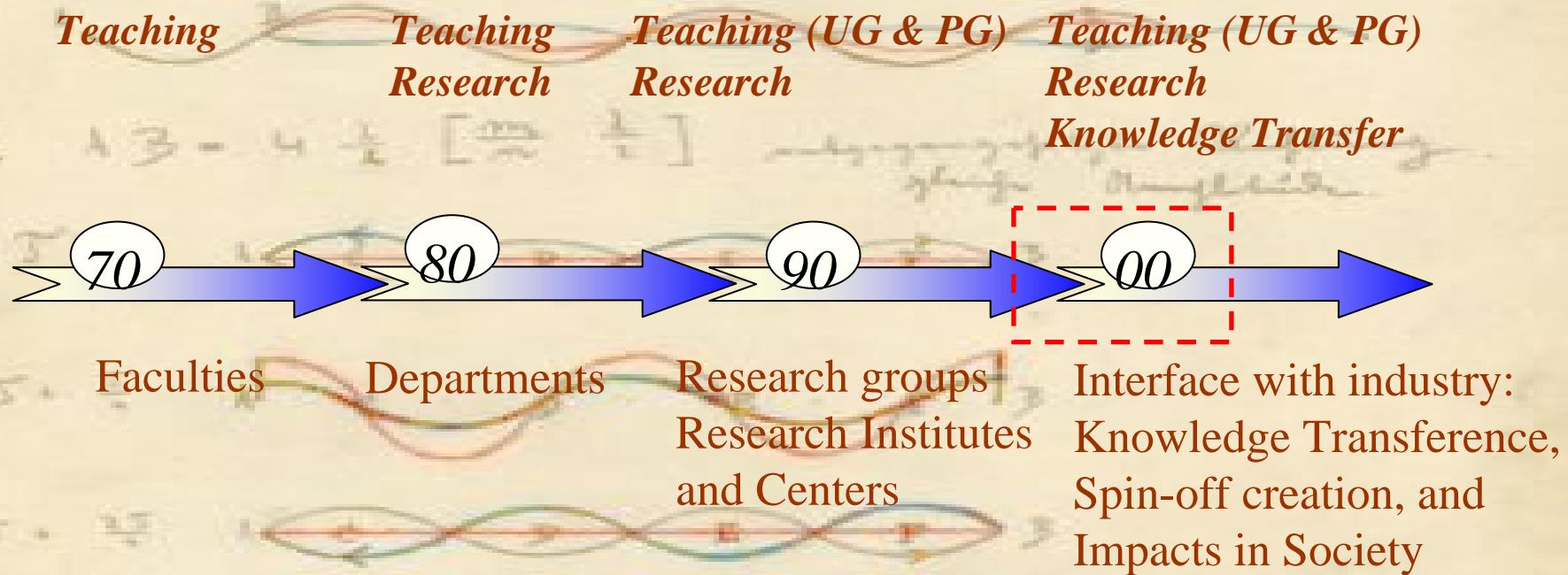
13 M Euros

in 563 research contracts

269

Doctoral theses

## Structural path and principal agents of R+D+I at the UAB



## **Research Centres, Institutes and Consortia**

- . These elements constitute the **UAB Research Park**, which seeks both to generate and to transfer new knowledge and technology
- . They are closely integrated with the rest of the university (Faculties, Departments, Services)

**This relationship, constitutes one of the unique and most interesting elements of the UAB, bringing together a critical mass of researchers in these five transversal axis:**

- . Social Sciences and Humanities,
- . Animal Health / Food Safety and Technology,
- . Science and Technology,
- . Environmental Science and Technologies,
- . Biotechnology and Biomedicine

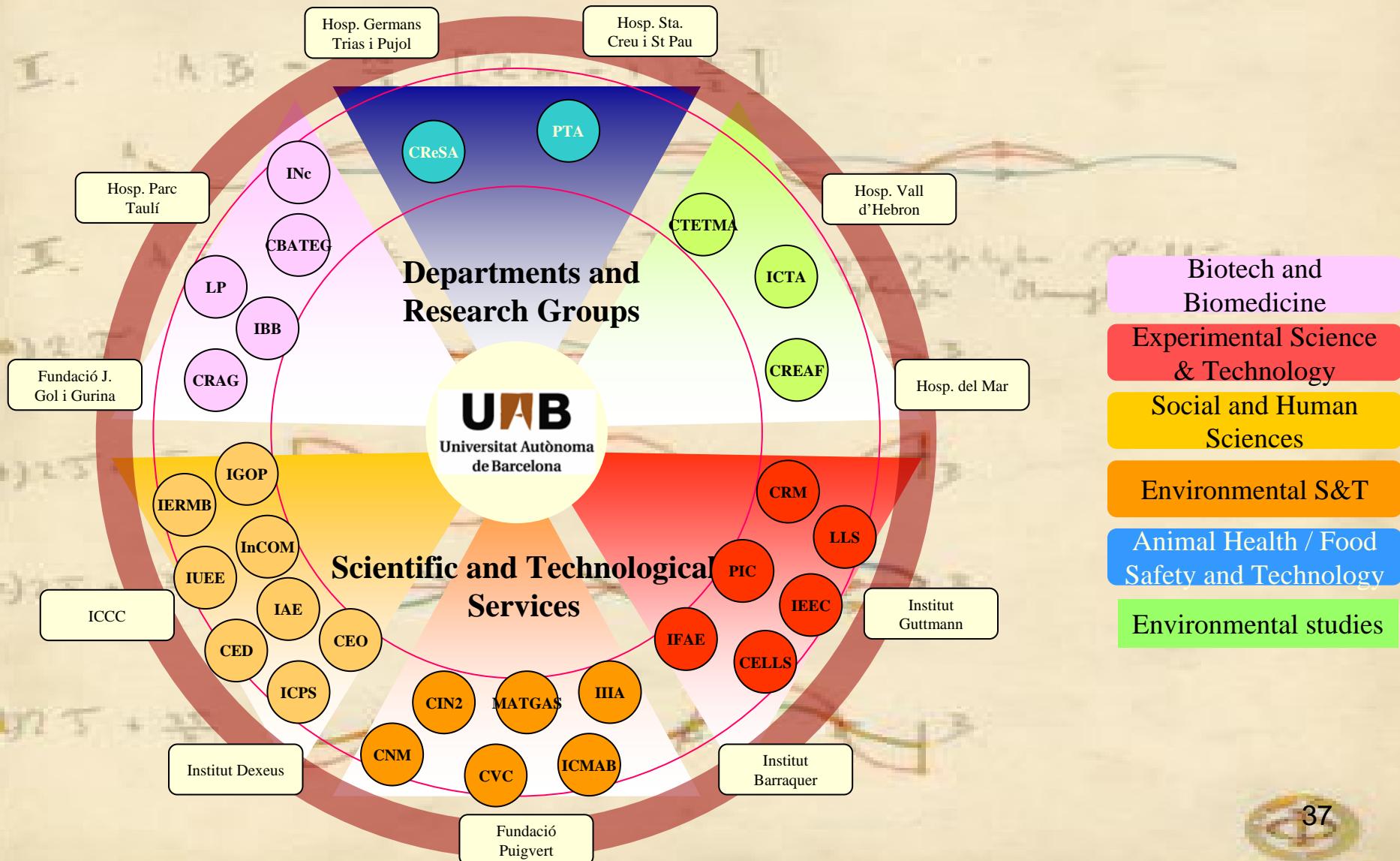
## Research Centres, Institutes and Consortia: The “Esfera UAB”

. This research capacity of the University, the institutes and centers of the **Research Park** is further enriched by the research activities of the UAB hospitals and Medical Research Institutes

.All these come together in what we call: the **Esfera UAB**



# The “Esfera UAB”





## To Summarize: UAB's Pathways and Goals

A university with a clear research vocation and international outlook

Clear links and pathways across teaching and research

A concentration of people, research facilities and infrastructures

A strong and growing orientation towards industry, end-users and society



## Overarching questions on university policy research, development, innovation and creativity

- How the universities are coping with changing economic landscape?
  - +
  - How the mindsets and changing attitudes are embodied in demands for new education in universities?
  - +
  - How universities are responding to new jobs implying new forms of educational skills?
  - +
  - How the universities respond to global-local struggle of competitiveness and society?

In the process...

$$I_1 = AB - \frac{\lambda}{2} [2m + 1] \frac{h}{a}$$



$$I_1 = AB - h \frac{1}{2} [2m + 1] \text{ angular lift lifting angle}$$

(i)  $2\pi$



(ii)  $2\pi + \frac{\pi}{2}$



(iii)  $2\pi + \frac{3\pi}{2}$



(iv)  $2\pi + 2\pi$





## UAB: Facts and Figures (2004-2005)

- 37.975 Undergraduates students (78% Approx.)
  - 11.335 Postgraduate students (22% Approx.)
  - 2.149 Foreign students
  - 54 Departments
  - 30 Research institutes
  - 7 Science and technology support services for research
- 90 Doctoral programs
- 106 Masters
- 136 Postgraduate programs
- 146 Specialization courses
- 153 Consolidated research groups
- 351 University research groups



## • UAB in Catalonia and Spain (2004-2005)

- Total university students in Catalonia: 217.965
  - 16,81% are enrolled in the UAB
  - Total university students in Spain: 1.447.209
  - 2,53% are enrolled in the UAB
- 
- Total graduate students in Catalonia: ...
  - .... % are enrolled in the UAB
  - Total graduate students in Spain: ...
  - .... % are enrolled in the UAB



## . Researchers in the UAB

- 1.859 men (64%)
- 1.049 women (36%)
- 2.908 in total

Women are only the 30% of the full professor category and in this context our Rector and the council of the university have taken the political decision to create the **Observatory for Equality** in order to implement measures aimed to eliminate sexism in our university

**The End**

**Thank you for coming and listening.**

I.  $A_3 = \frac{2}{3} \pi [2m + \frac{1}{2}]$  *geg. Ringe*



I.  $A_3 = \frac{\pi}{3} [2m + 1 + \frac{1}{2}]$



I.  $A_3 = 4 \frac{1}{3} [\frac{m}{2} + \frac{1}{4}]$  *anfangsgleiche Ringe  
geg. Anreize*

a)  $\omega_3^*$



b)  $\omega_3^* + \frac{\pi}{2}$



c)  $\omega_3^* + \frac{3\pi}{2}$



d)  $\omega_3^* + \frac{5\pi}{2}$



- UAB: Facts and Figures (p. 4)
- UAB in Catalonia and Spain (p. 5)
  - . The internationalization of the UAB (p. 6)
  - . Researchers in the UAB (p. 7)
  - . The Diamond of R+D+I in the UAB (p.8)
- Structural path and principal agents of R+D+I at the UAB (p. 9)
  - . Research Centres, Institutes and Consortia (p. 10)
  - . Research Centres, Institutes and Consortia:  
The “Esfera UAB” (p. 11)
  - . The “Esfera UAB” (p. 12)
- International competitiveness of UAB’s research (p. 13)
- International competitiveness of UAB’s research (p. 14)
- To Summarize (p. 15)

I.  $A_3 = \frac{2}{3} \pi [2m + \frac{1}{2}]$  *geg. Ringe*



I.  $A_3 = \frac{\pi}{3} [2m + 1 + \frac{1}{2}]$



I.  $A_3 = 4 \frac{1}{3} [\frac{m}{m} + \frac{1}{2}]$  *ausgesetzte Ringe  
geg. Aneller*



•) 23°



•) 23° + 1/2



•) 23° + 3/2



•) 23° + 5/2

## **. Case Study: La Universitat Autònoma de Barcelona**

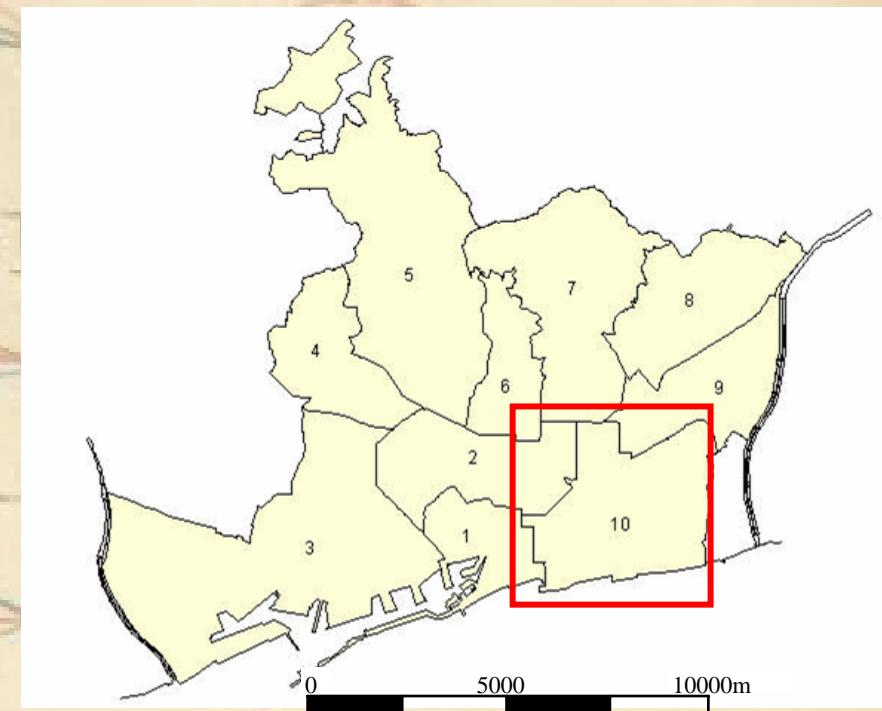
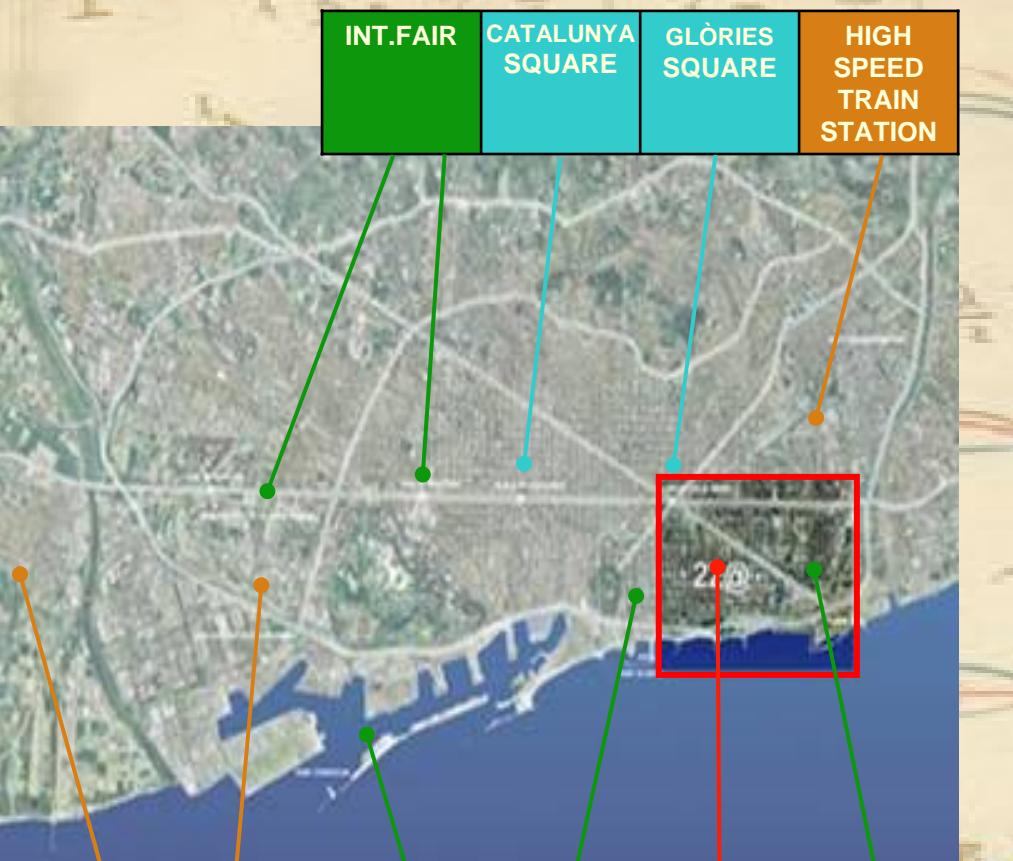
**DATA ABOUT THE URBAN ENVIRONMENT FOR THE UAB CASE STUDY**

**EXAMPLES OF NEW FIRMS IN A TECHNOLOGICAL DISTRICT:  
THE 22@BCN**

**WHY THESE FIRMS ARE LOCATED TO THE NEW ECONOMIC SPACE  
OF THE 22@BCN. UNIVERSITY MATTERS?**

**(PLEASE SEE FOLLOWING SLIDES)**

# Figure 18. The 22@bcn Project, 2000



PRAT BCN  
INT.  
AIRPORT

RONDES,  
MEDIUM  
SPEED  
ROADS

COMERCIAL  
PORT

OLYMPIC  
PORT

22@BCN  
DISTRICT

FORUM  
2004 AREA



Pallares-Barbera et al. 2007.

Figure 19. 22@bcn Project. Public intervention and private results. Can Jaumeandreu, 2000-2007

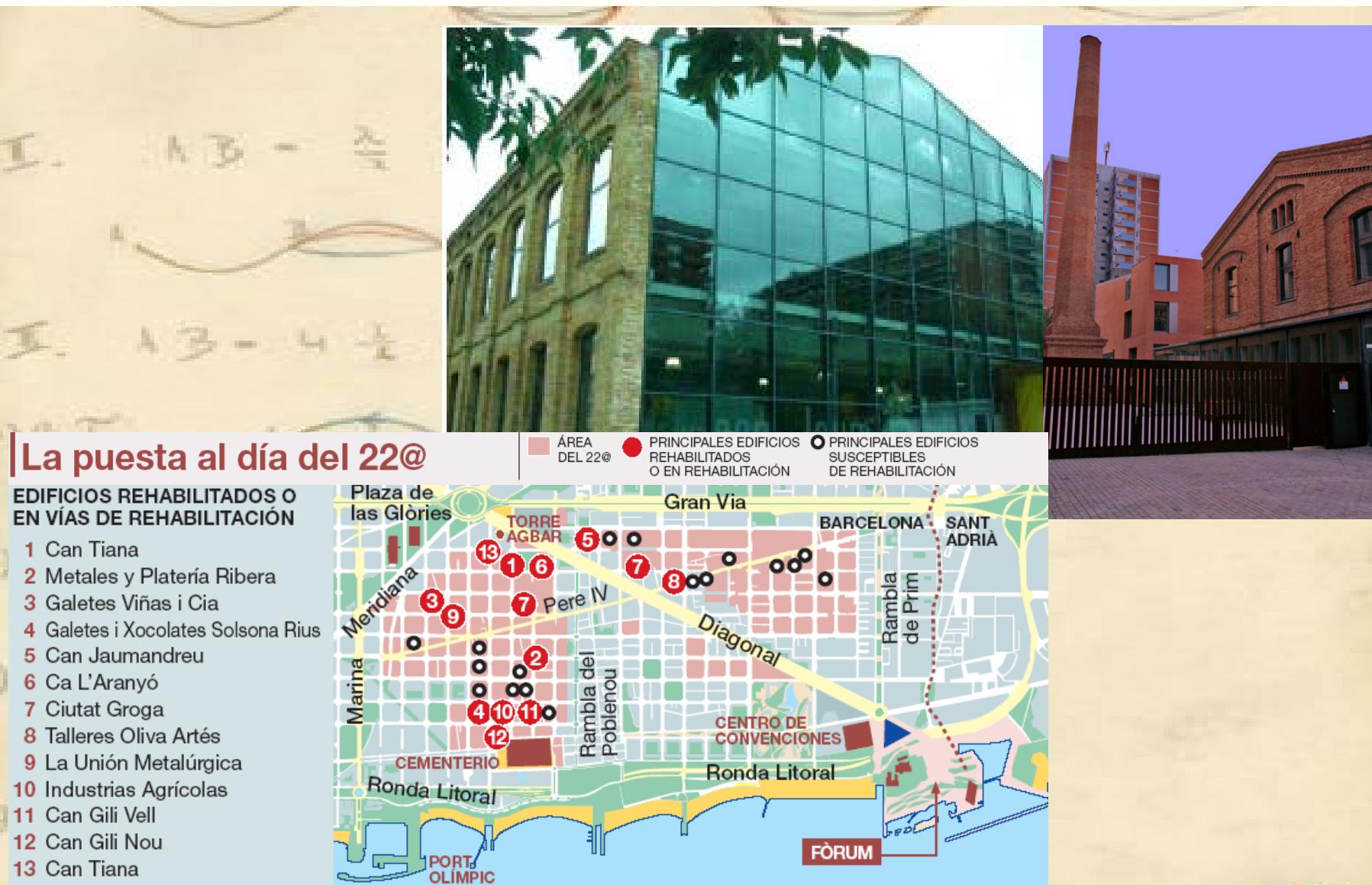


Figure 22. Urban planning. The construction of a new urban economic space. Ca l'Aranyó, seven engines of knowledge activities: the Media Park



EL PARC BARCELONA MEDIA SE PROMOCIONA EN EL MEETING POINT



1. Sede de Indra 2. Edificio Mediàtic 3. Edificio Interface 4. Centro de posgrados de la Universitat de Barcelona (UB)  
5. Sede corporativa de T-Systems 6. BTV 7. Vivienda protegida 8. Vivienda protegida 9. Equipamiento social aún por determinar  
10. Zonas verdes junto 11. Centro de Innovación Barcelona Media, donde está previsto que se sitúe Yahoo  
12. Universitat Pompeu Fabra 13. Edificio de oficinas de Mediapro 14. Edificios de oficinas en la Diagonal

Figure 24. New firms (ICT, design...), new activities. 22@bcn



Pallares-Barbera et al. 2007.

Figure 25. New functions and special buildings for a global city. Forum Barcelona 2004



Forum Barcelona 2004.

Figure 26. Building a 'new culture' for the 21th Century. 2005



**The End**

**Thank you for coming and listening.**

## . Definiciones útiles

### **. New economic geography and the death of distance**

- “the use of Internet within the economy has resulted in distance transformation of economic space. Regional development of peripheral regions due to the ‘break free’ of the constraints imposed by the ‘friction of distance’” →  
Geographic diffusion
- “large companies in new economy search for low cost locations within their production and distribution structures and strategies → Production divide resulting in decentralization”
- “improving means of communication there are forces to relocate industries (Marshall 1923)”

## . Definiciones útiles

- . “to avoid transportation, mankind invented the city”  
(Schaeffer, Sclar 1975)

- . Upper-tier knowledge based activities are spatially concentrated in the ‘global cities’. Electronic communications appear to be complementing, rather than replacing, face-to-face communication

- . ‘the compulsion of proximity’  
→ Modernity implies that interaction is preferred face-to-face (Boden, Molotch 1994)

- . In lower-tier activities knowledge is routinized and embodied in technology, and contributes to geographical dispersal

## . Definiciones útiles

- . Manufacturing economy: developed market economies transfer manufacturing to low-cost production locations  
→ New International Division of Labor

- . New economy: ICT has led to relocation of services to low cost labor locations

. “ ‘second global shift’ or a ‘new international division of ‘service’ labor or the potential to transfer service work from developed countries to low cost locations (China and India) (Bryson 2006)”

- . Shift of manufacturing and service work to offshore locations

## . Definiciones útiles

- . Complex situations in the NIDL: firms blend onshore, offshore and nearshore delivery systems to maximize benefits
- . Retaining activities onshore may become a market advantage associated with quality rather than cost of service provision
- . Large producer services: process of outsourcing and offshoring functions
- . Continued development, adoption and integration of technologies will lead to an increase in offshoring as more information becomes automated and digitized (Rusten 2006)

## . Definiciones útiles

### **. Offshore activities:**

language and cultural differences may add additional cost to offshoring processes. Consultancy companies lead their clients to choose offshore

### **. Offshore projects:**

How are they integrated into the organizations of core business activities?

### **. Revised terminology:**

- . outsourcing, offshoring, global sourcing**
- . onsite, onshore. Home nation**
- . nearshore. Near nation**
- . offshore. Far nation**

## . Definiciones útiles



. Onshore activities are of higher value added?

. Offshore activities are market oriented?

. Knowledge hubs and knowledge districts

. Creative clusters

## . Definiciones útiles



### **. Social capital (OECD 2001; Casellas, Pallarès 2006):**

The quality of social capital is defined by the degree in which associations, institutions, relationships, and social norms in a society determine the quality and quantity of social interactions within a society

**. Social capital moulds the type of learning, the use of knowledge and the ability to innovate, also to in social inclusion**

## - Webs de interés



. <http://www.uab.es/forumdelarecerca/FORUMes/index.htm>

**The End**

**Thank you for coming and listening.**