

IMPLEMENTATION OF A PROSPECTIVE MODEL OF POPULATION, HOUSING AND JOB, FOR THE METROPOLITAN REGION OF BARCELONA

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1. Context of the model
2. Structure of the model
3. Assumptions
4. Results
5. Final remarks

THE RESEARCH PROBLEM

- In recent decades, Southwest Europe metropolises have undergone a process of **territorial dispersion**.
- Traditional **view of sustainability** in transport is strong focuses in **technological** factors
- **Transportation plans** (infrastructure) have been evaluated with the classic transport model (four stages). The **optimization** is mainly on private efficiency (of operators and users) of **generalized costs**, with an **assessment of environmental** indicators (GEI emissions, accidents, etc).
- The transport model considers as **exogenous** the structure of urban activities for the base situation, and for different periods of evaluation (scenarios).
- **Urban planning** applied mainly the strategic environmental assessment method, who is focuses in the incorporation of good environmental practices in the different planning stages, **without a quantity evaluation of impacts**.
- It is not usual the simulation of environmental relation of transport projects and land urban plan, in a systemic approach over a metropolitan scale.

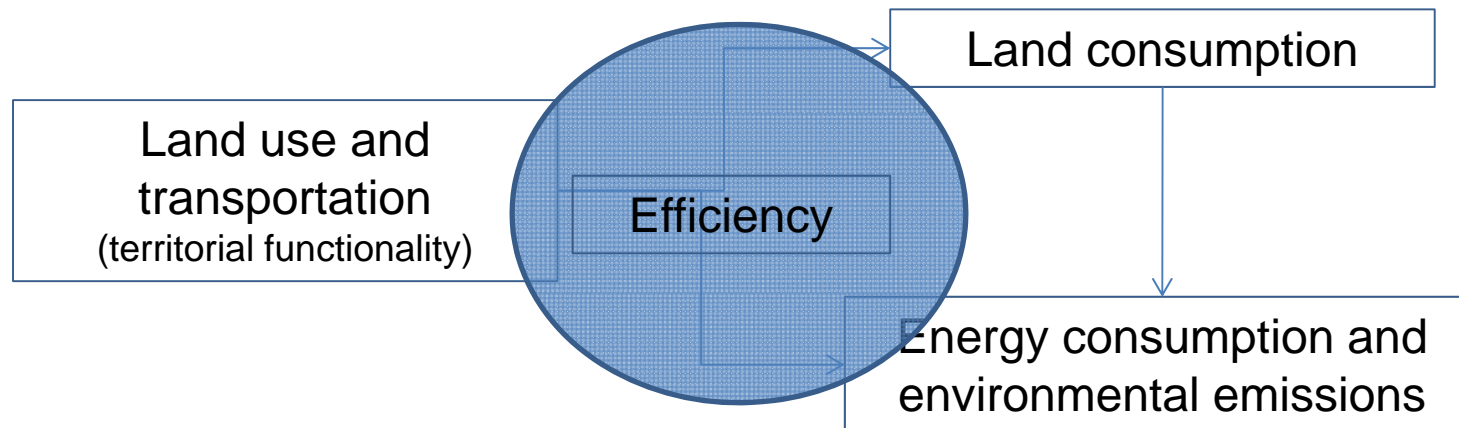
OBJECTIVES AND STRUCTURE

- Today the **decision makers** required the **assessment, monitoring, and prediction of the externalities generated by transport and urban plans, under a comprehensive approach to the phenomenon.**
- **Only with this approach can be identify the trade-off between the different elements of the territorial system.**
- The objective of the work is to build a mathematical model for the metropolitan area of Barcelona (164 municipalities), based on an integrated transport and land use model, to assess the social and environmental efficiency of urban functionality in relation to flows and activities in the territories

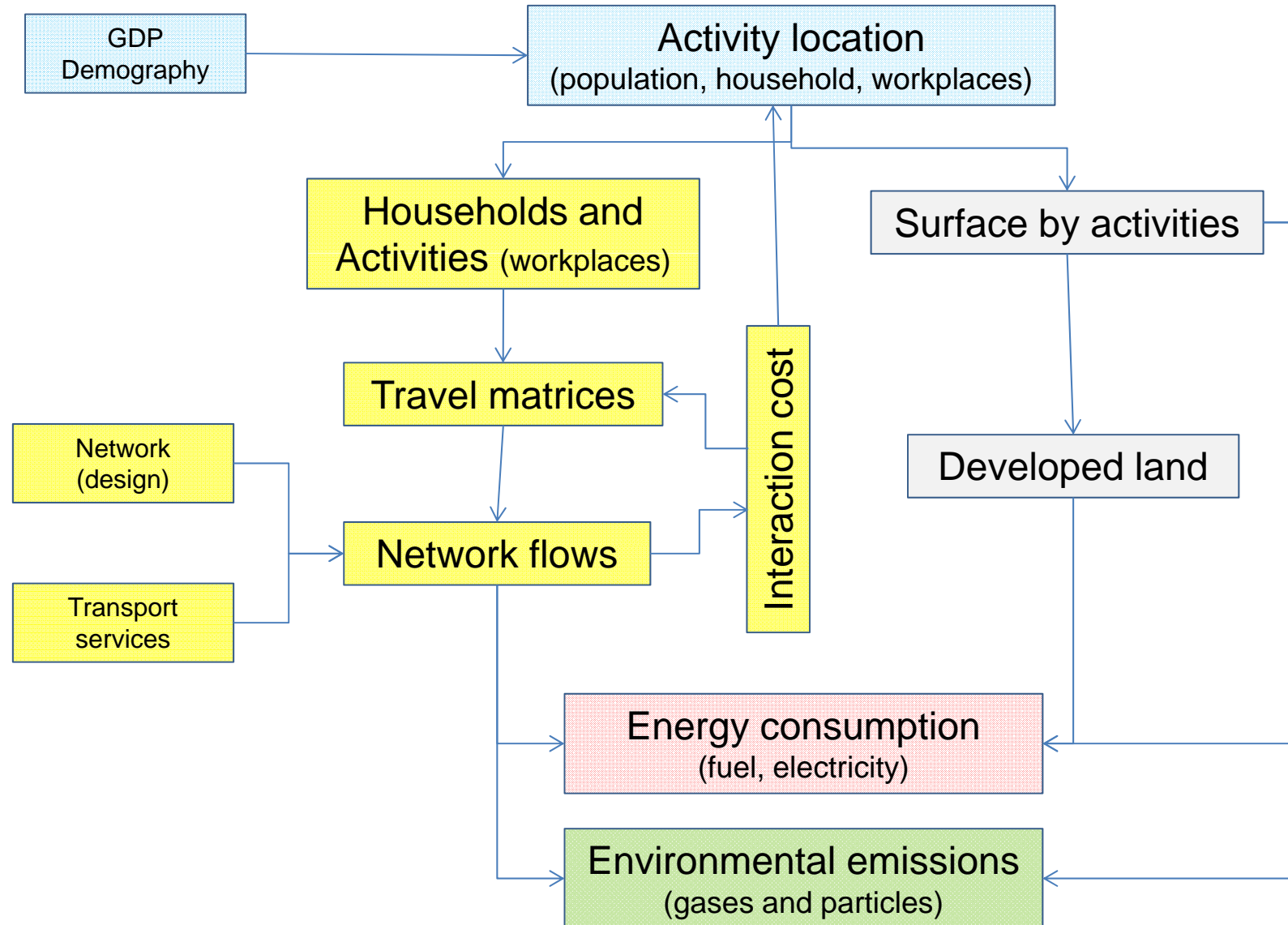
In particular there are four points that underpin the model:

OBJECTIVES AND STRUCTURE

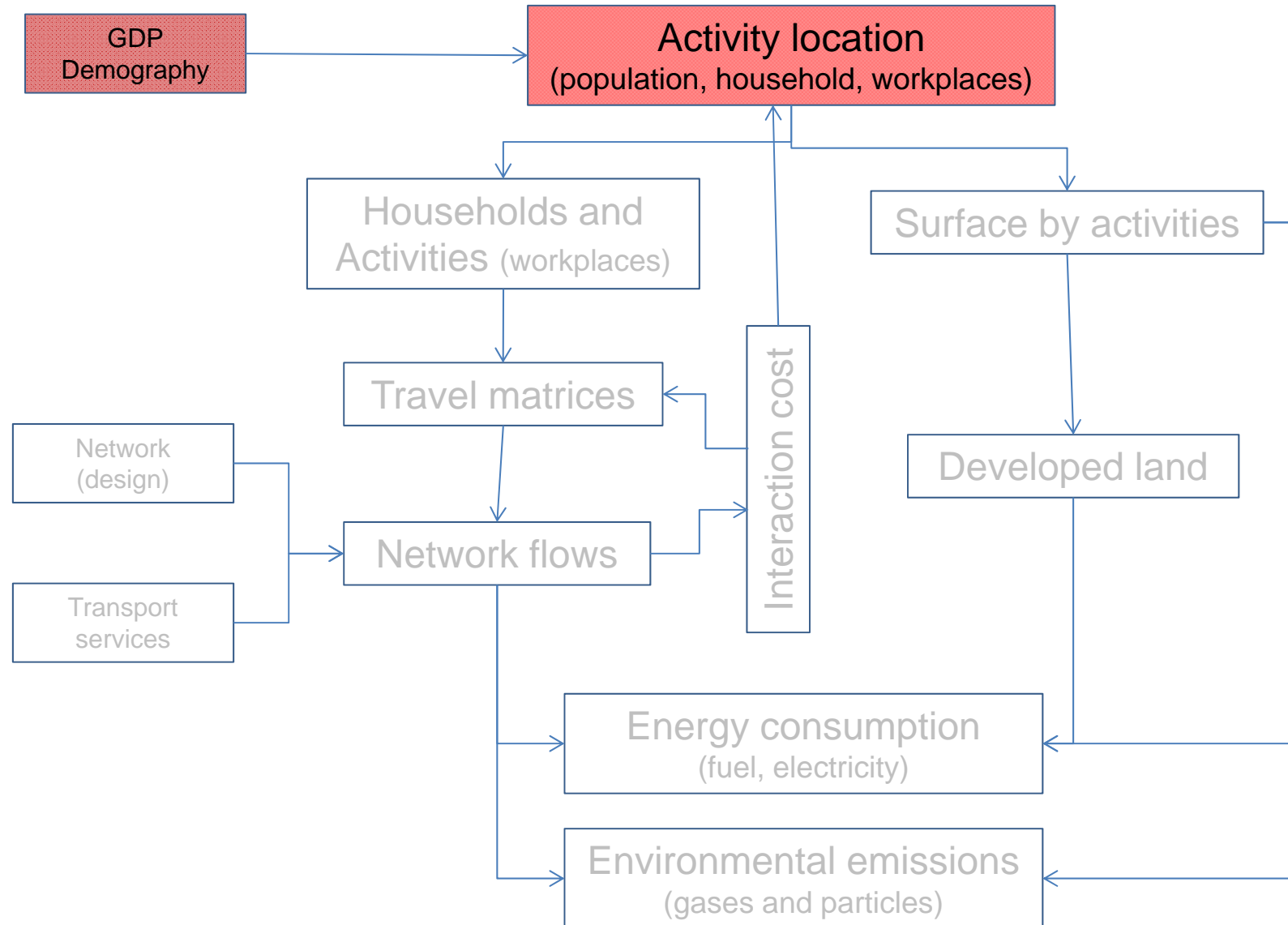
- a) A basic land use-transportation model (LUTM)
- b) An energy consumption and environmental emissions model (produced by the territorial functionality)
- c) A land consumption model (developed land produced by the territorial functionality), and
- d) The assessment of social equity (in access to urban activities, and in there exposure to environmental effects) as and indicator of efficiency of the system.



CONTEXT OF THE MODEL



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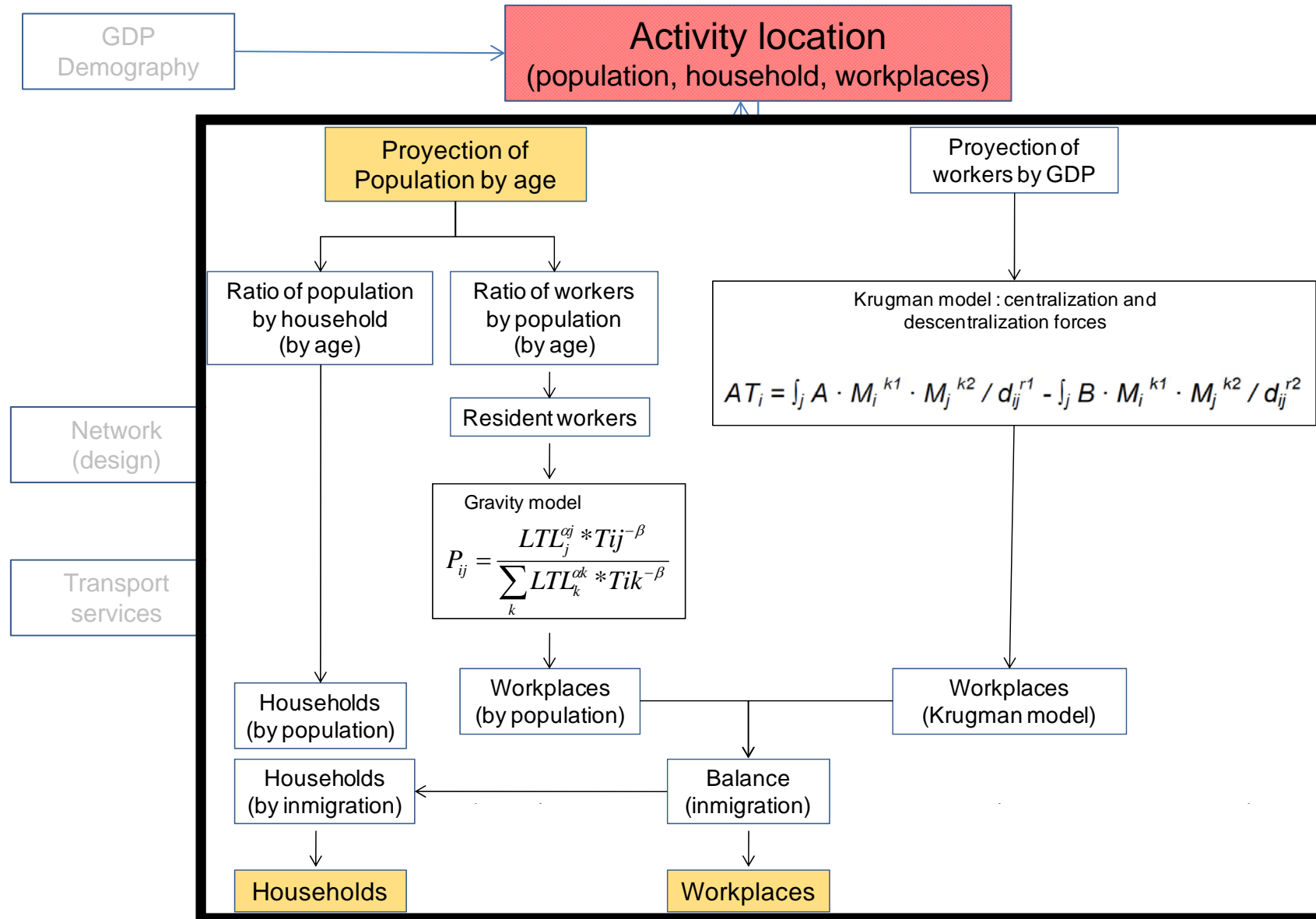
Objectives of the urban growth model:

Knowing... in a three future stages (2014-2019-2024)

- 1) The population and its spatial distribution
- 2) The employment (labour market) and its spatial distribution
- 3) The amount of principal housing

... within Catalonia

STRUCTURE OF THE MODEL



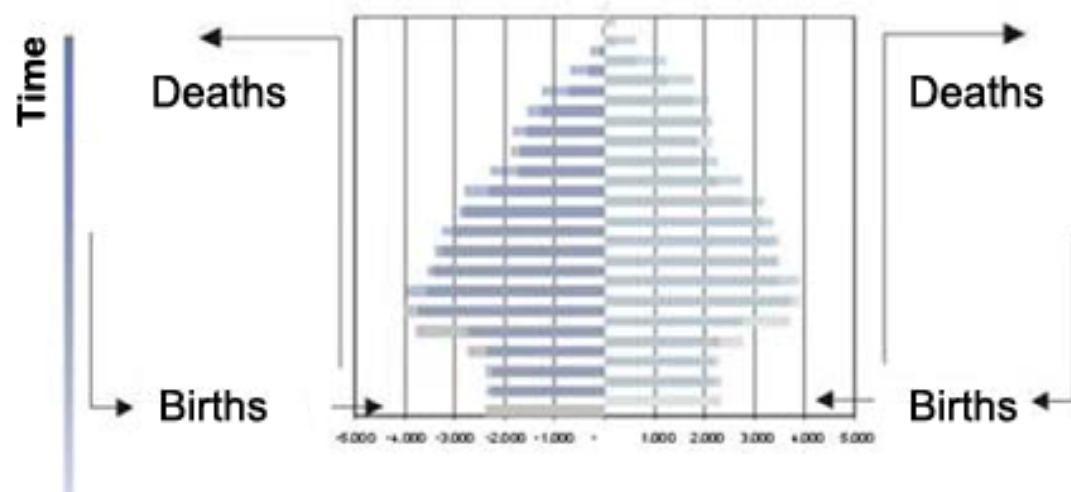
STRUCTURE OF THE MODEL

MODEL OF NATURAL MOVEMENT

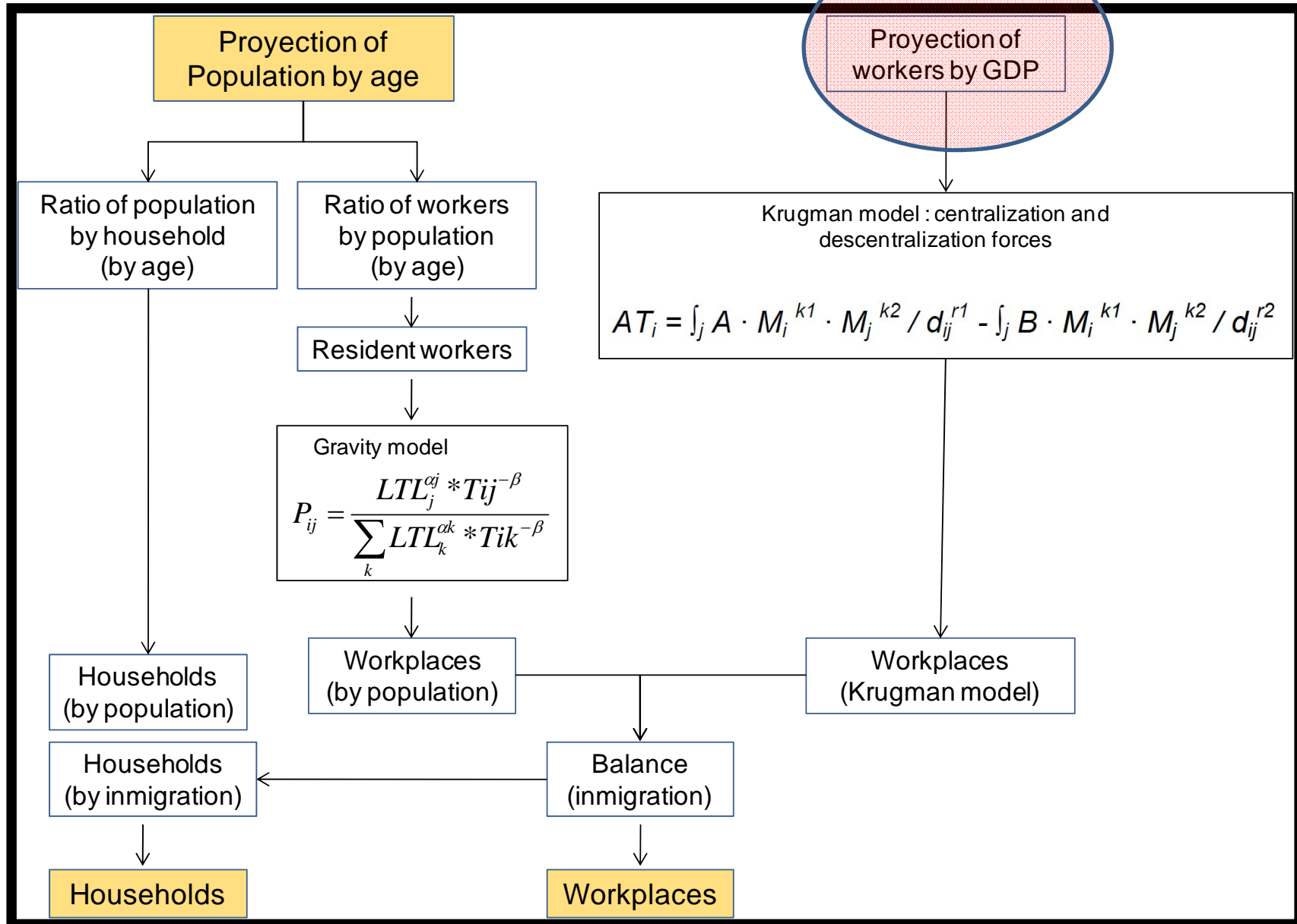
Natural movement
of the population

$$Fer_{19-24}_t = \frac{Births_{19-24}_t}{Women_{18-23}_{t-1}}$$

$$Mor_{19-24}_t = \frac{Deaths_{19-24}_t}{Population_{19-24}_t}$$



ASSUMPTIONS OF THE MODEL



ASSUMPTIONS OF THE MODEL

1) Labour market assumptions:

	Time	GVA	Productivity	LTL	LTL%
Historic	1996-2001	4,34%	0,01%	606.000	4,33%
	2001-2006	3,69%	0,33%	567.300	3,34%
	2006-2009	1,28%	2,76%	- 159.500	-1,44%
Projected	2009-2014	1,25%	1,00%	44.557	0,25%
	2014-2019	2,50%	1,50%	182.223	0,99%
	2019-2024	3,50%	2,00%	288.447	1,47%

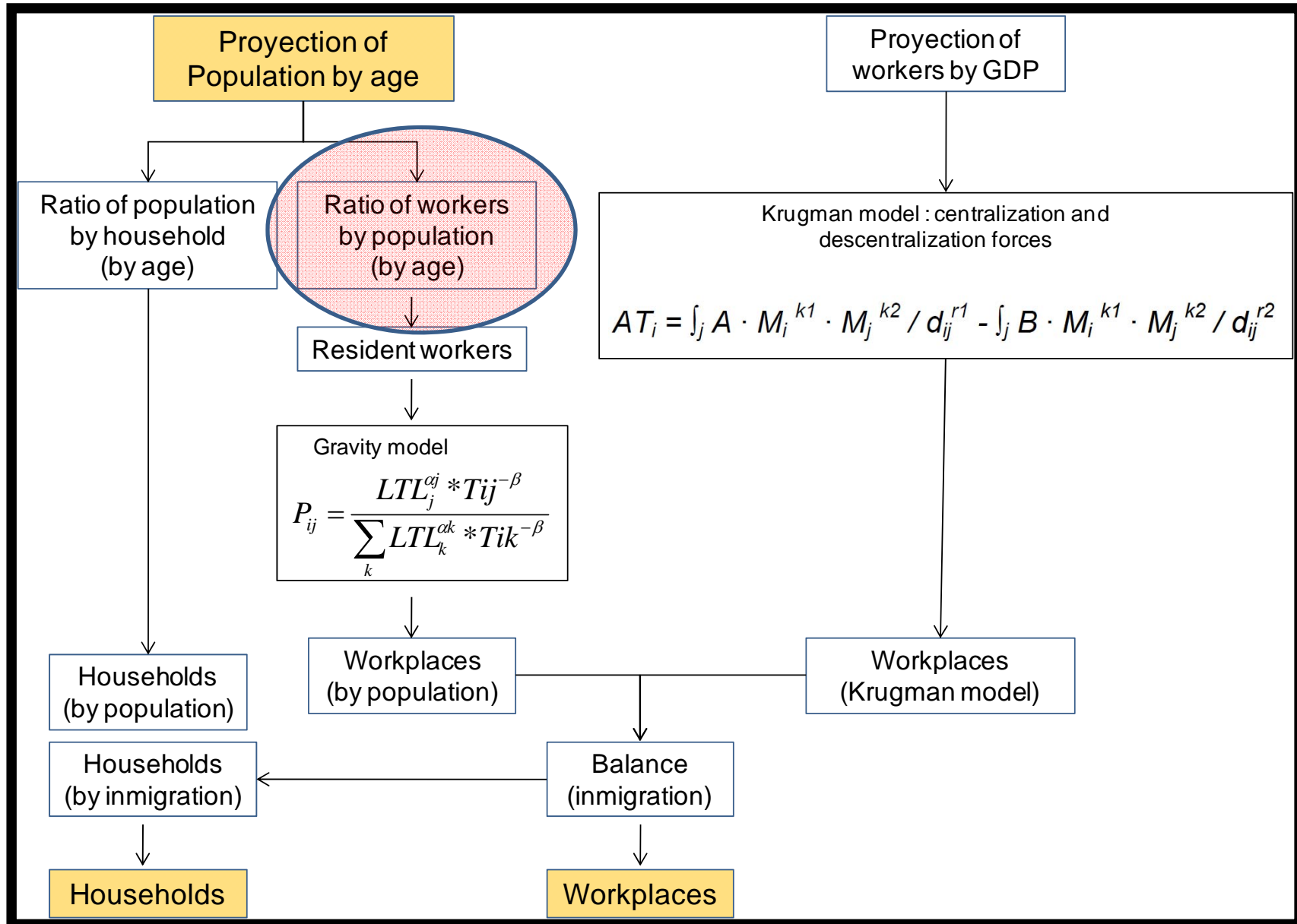
} 515.227 new LTL by 2024

Hypothetical scenario based on the evolution of the GVA and productivity:

- 1) **GVA is ascending** corresponding to an average annual growth of 1,25% - 2,50% and 3,50%
- 2) **Productivity is gradually increasing** due to the change of productive model, representing an annual growth of 1,00% - 1,50% and 2,00%

The combination of above scenario entails a LTL average annual growth of 0,25% - 0,99% and 1,47%.

ASSUMPTIONS OF THE MODEL



ASSUMPTIONS OF THE MODEL

2) Occupation rates assumptions:

Occupation Global Rate (Catalonia)

	Native Global Rate	Native + immigrant Global Rate
TOE 2001	63,66%	
TOE 2009	66,48%	
TOE 2014	67,58%	67,78%
TOE 2019	68,71%	68,89%
TOE 2024	69,15%	68,94%

The progressive...

- 1) **Incorporation of women** in the workplace
- 2) **Increment of the dependency rates**
- 3) **Reduction of the unemployment rate** to a lower technical rate, around 5%
- 4) **Process of convergence with Europe** - in 2010: Germany (71,10%), Sweden (72,70%), Denmark (73,40%) and Netherlands (74,70%)

Overall results...

1) In terms of **population evolution...**

	2001	2009	2014	2019	2024
Catalonia	6.344.191	7.475.420	7.581.452	7.781.333	8.145.566
Increment of the population (thousand of people)			2014-09	2019-14	2024-19
			106.032	199.881	364.233
Annual rate: Increment of the population			2024-2009	2024-2014	2024-2019
			0,57%	0,72%	0,92%

By 2024 there will be a increment of 670.146, representing a total population of 8 million people

Overall results...

2) In terms of **employment** (labour market) **evolution**...

	LTL 2009	LTL 2014	LTL 2019	LTL 2024
Catalonia	3.582.400	3.626.957	3.809.180	4.097.627
		2014-09	2019-2014	2024-2019
Increment (thousand of LTL)		44.557	182.223	288.447
Annual Increment (2024-2009)				515.227
(%)				0,9%

By 2024 there will be a increment of 515.227 LTL, representing a total of 4 million LTL (localised workers) in Catalonia

Overall results...

3) In terms of principal housing needs...

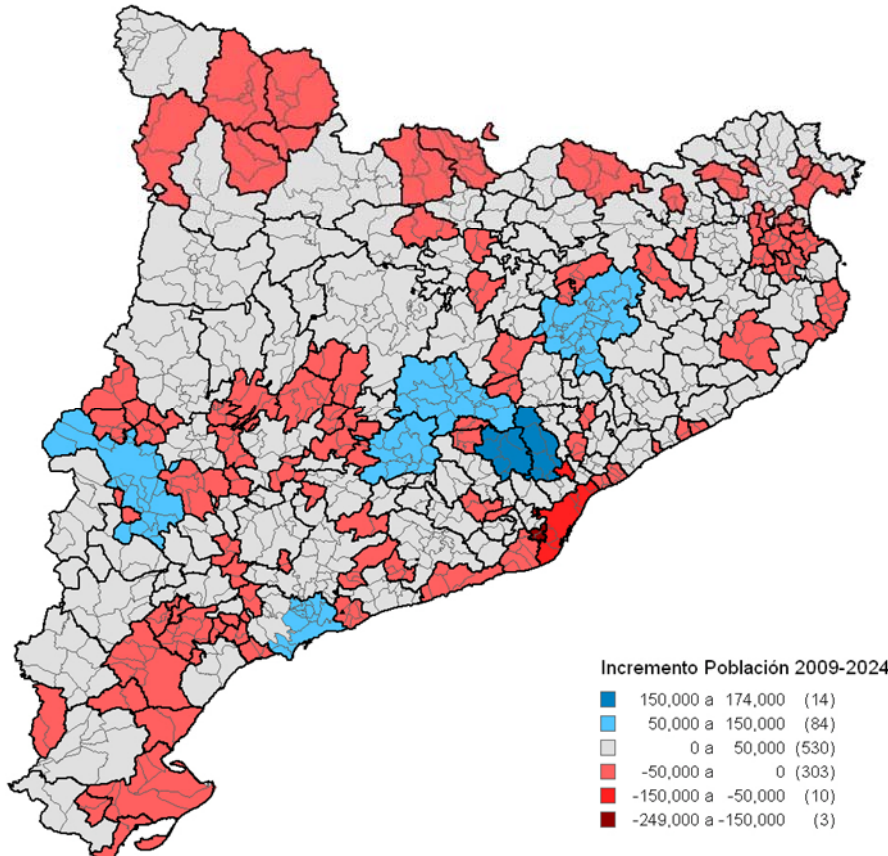
Principal Housing	2001	2009	2014	2019	2024
Catalonia	2.315.856	2.831.424	2.937.460	3.046.653	3.196.009
Principal Housings 2008 (Ministry of Housing)		2.830.754			
Increment of housings (accumulated)			2014-09	2019-14	2024-19
			106.036	109.193	149.356
Total of housings (2009-2024)				364.585	

If the prospects of growth maintains, by 2024 there will be a needs of principal housing of 363.585 in Catalonia

Results at territorial scale (functional systems)

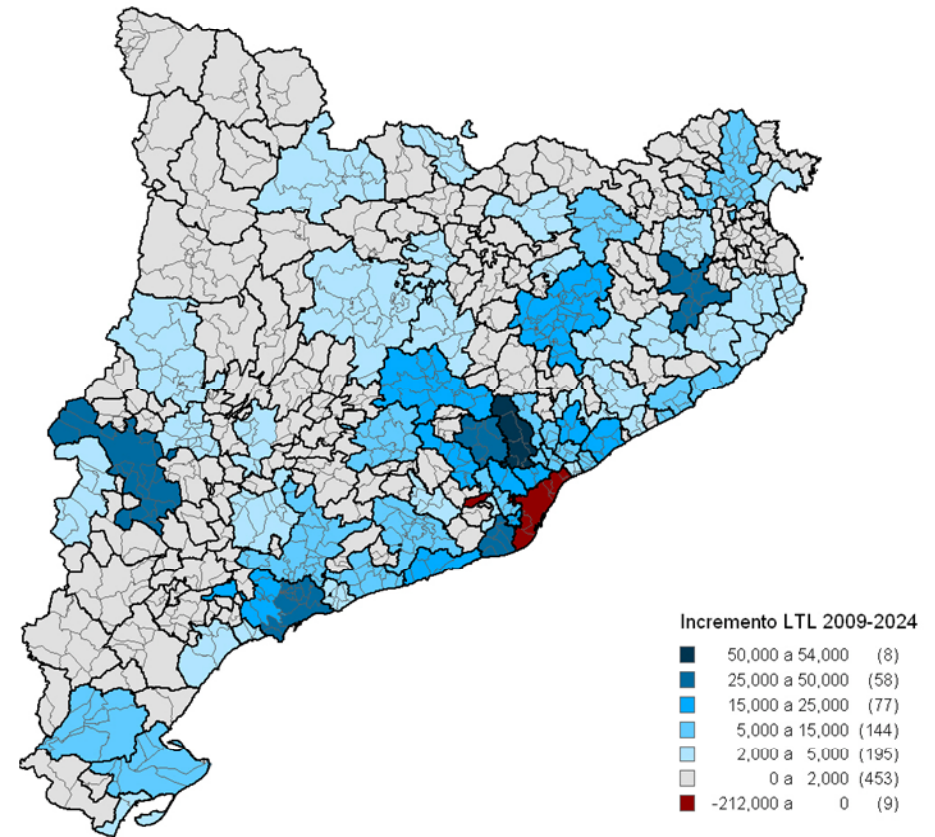
R1

POPULATION EVOLUTION (2024)



R2

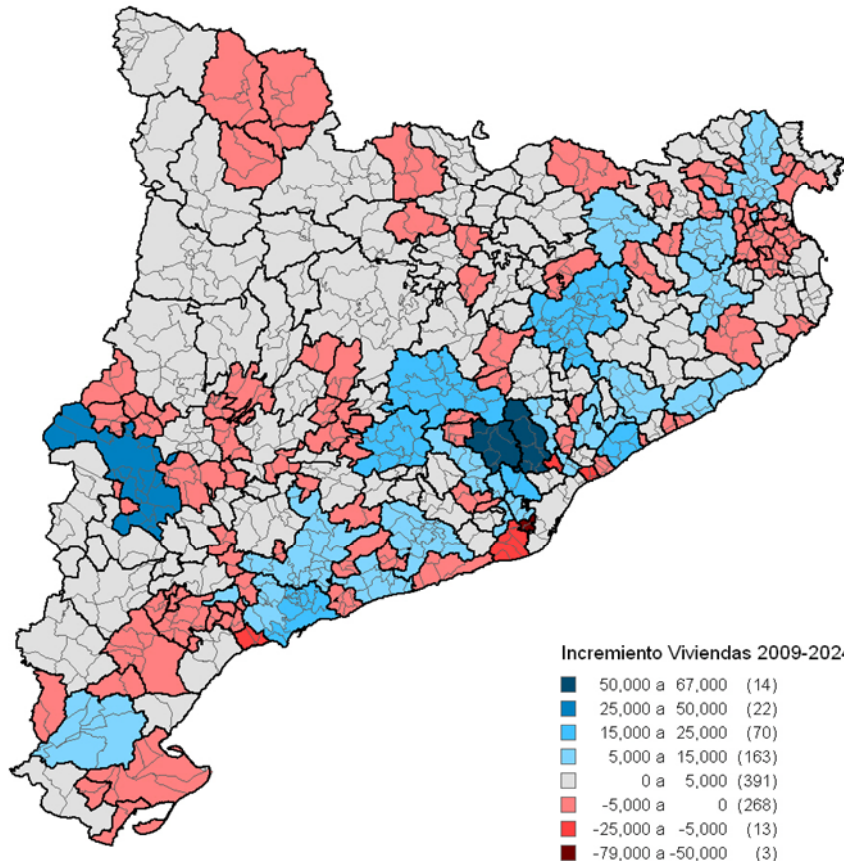
OCCUPATION EVOLUTION (2024)



Results at territorial scale (functional systems)

R3

EVOLUTION OF PRINCIPAL
HOUSEHOLD NEEDS (2024)



FINAL REMARKS

- The model is currently under construction.
- The calibration of the gravity models (transport and Krugman) shows good performance (adjust, significance, etc).
- The results show coherence, but the final conclusion will be made over the results of the main model.
- Other results of the main model will be presented today in the afternoon session

16:00		Coffee Break, Lobby of the Reitoria Building		
Auditório A		Auditório B		Sala do Senado
P Session 6.2 COST TU0602		P Session 2.6		P Session 1.6
16:30	Segado-Vazquez et al – “Estaciones del AVE: Murcia y Cartagena”	Beltrán et al – ““New Towns” para las vacaciones”		Gama et al – “Modelação SIG de redes multimodais: acessibilidade urbana”
16:45	González et al – “Regiones urbanas turísticas costeras”	Francia et al – “Escenografía urbana en el espacio turístico de Puerto Vallarta”		Bento et al – “Spatial multicriteria decision analysis tools applied to urban consolidation”
17:00	Miralles-Guasch et al – “Los ámbitos de influencia territorial de la universidad”	Cerda et al – “Eficiencia energético-ambiental usos y movilidad”		Freire et al – “Improving the planning of public facilities”
17:15	Ganau et al – “New practices and tools for land planning in Spain”	Peñalver et al – “El proyecto “Cartagena Puerto de Culturas”		Roca et al – “Valor de Interacción y Estructura Urbana”
17:30	Chair: Joan Ganau	Chair: Jorge Cerdá		Chair: Ricardo Bento

* Sala de Audiências (Room 007) is located in the first floor of the Faculdade de Direito (Faculty of Law) building, please refer to the car

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THANKS FOR YOUR ATTENTION