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Universitatea Politehnica Timişoara

Traditional Technical Teaching VS. Actual Industrial Needs – East European Perspective

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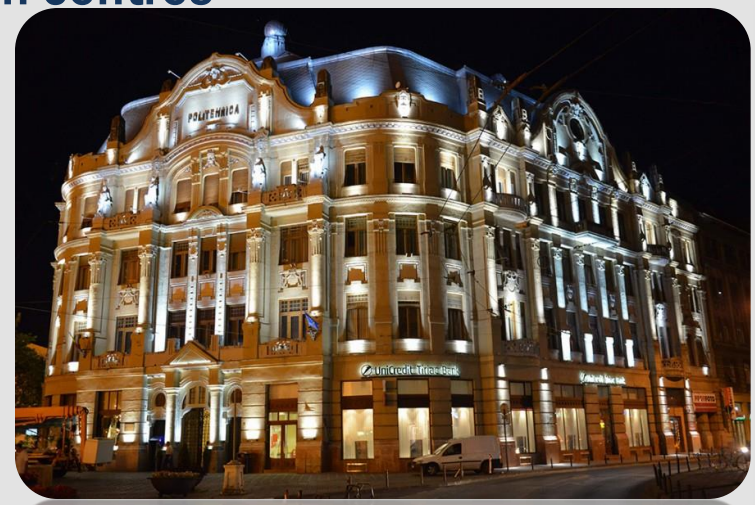
Politehnica University of Timisoara
- short presentation -

Universitatea Politehnica Timişoara

Politehnica University of Timisoara, Romania:

- One of the largest technical universities in Romania
- 94 years of history
- 10 faculties / 25 departments / 26 research centres
- 118000 graduates / 15000 students
- 57 study programs - bachelor level;
- 78 study programs - master level;
- PhD school;
- In 2011, Politehnica was classified



as an institution for **Higher Education and Advanced Scientific Research** by the Romanian Ministry of Education

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SIR Global 2013 – Higher Education – Ranking: Output 2007 - 2011

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SIR

SIR Global 2013 - Higher Education - Rank: Output
2007-2011

Powered by Scopus

WR	RR	CR	Organization	Sector	Country	Region	O	% IC	NI	% Q1	Spec	% Exc	% Lead	% EwL
1	1	1	Harvard University	HE	USA	NA	80467	37.54	2.4	77.14	0.53	28.69	45.5	11.99
2	1	1	University of Tokyo	HE	JPN	AS	51796	27.64	1.26	55.27	0.51	14.21	55.36	6.69
3	2	1	University of Toronto	HE	CAN	NA	48944	43.3	1.82	66.6	0.4	20.84	51.1	8.85
4	2	1	Tsinghua University	HE	CHN	AS	48396	19.91	0.96	31.54	0.66	11.65	73.6	7.75
5	1	1	Universidade de Sao Paulo	HE	BRA	LA	48156	25.52	0.86	39.11	0.52	8.12	60.86	3.84
6	3	2	University of Michigan, Ann Arbor	HE	USA	NA	46196	26.8	1.99	70.41	0.38	23.9	59.52	12.3
7	4	3	Johns Hopkins University	HE	USA	NA	45069	32.09	2.13	72.57	0.57	24.18	55.23	11.31
8	5	4	University of California, Los Angeles	HE	USA	NA	44207	31.23	2.11	71.45	0.44	24.89	55.4	11.83
9	3	2	Zhejiang University	HE	CHN	AS	42606	18.39	0.87	34.05	0.58	9.93	76.41	6.91
10	6	5	University of Washington	HE	USA	NA	42462	28.65	2.1	71.62	0.44	24.78	53.32	11.02
11	7	6	Stanford University	HE	USA	NA	41284	31.91	2.33	70.79	0.39	27.79	56.56	14.15
12	4	3	Graduate University of the Chinese Academy of Sciences	HE	CHN	AS	39990	12.85	0.9	38.15	0.68	10.74	8.29	0.93

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WR	RR	CR	Organization	Sector	Country	Region	O	% IC	NI	% Q1	Spec	% Exc	% Lead	% EwL
978	321	50	Universite d'Angers	HE	FRA	WE	2488	42.56	1.06	49.76	0.64	13.84	52.85	6.27
979	298	8	Khon Kaen University	HE	THA	AS	2484	38.97	0.95	39.45	0.68	9.67	63.85	5.09
979	298	68	Saitama University	HE	JPN	AS	2484	24.92	0.83	42.07	0.7	6.23	59.06	2.46
980	299	69	Kochi University	HE	JPN	AS	2483	28.39	1.04	50.7	0.7	9.54	57.87	3.39
981	322	35	Universitat Jaume I	HE	ESP	WE	2477	37.38	1.32	50.75	0.65	16.1	62.86	10.06
982	323	51	Montpellier SupAgro, Centre International d'Etudes Superieures en Sciences Agronomiques	HE	FRA	WE	2472	60.44	1.52	73.1	0.85	20.64	46.64	9.54
983	216	187	Brandeis University	HE	USA	NA	2466	32.08	1.77	77.29	0.74	22.63	55.84	10.38
983	50	4	Politehnica University of Timisoara	HE	ROU	EE	2466	23.52	0.72	7.95	0.84	6.13	78.43	4.14
984	324	54	Universitat Kassel	HE	DEU	WE	2464	37.99	1.02	37.7	0.63	10.09	61.16	5.44
985	300	70	Toyohashi University of Technology	HE	JPN	AS	2460	19.35	0.8	29.92	0.79	8.07	69.43	5.33
985	51	6	Institute of Chemical Technology in Prague	HE	CZE	EE	2460	28.01	0.89	38.21	0.8	9.69	59.51	4.1
986	301	71	Doshisha University	HE	JPN	AS	2457	13.19	0.77	32.93	0.62	6.2	61.05	2.48
987	217	188	Loma Linda University	HE	USA	NA	2455	26.19	1.37	65.46	0.74	15.32	60.33	7.6

Scopus ranking – focus on Romanian Universities (evaluation period 2007-2011)

Universitatea Politehnica Timişoara

WR	RR	CR	Organization	Sector	Country	Region	O	% IC	NI	% Q1	Spec	% Exc	% Lead	% EwL
465	8	1	Politehnica University of Bucharest	HE	ROU	EE	6582	23.56	0.54	9.98	0.82	4.23	68.44	2.23
715	23	2	Babes-Bolyai University	HE	ROU	EE	3910	41.99	0.86	27.8	0.73	9.18	63.5	4.74
844	37	3	University of Bucharest	HE	ROU	EE	3173	35.68	0.74	27.73	0.71	7.05	53.61	2.90
983	50	4	Politehnica University of Timisoara	HE	ROU	EE	2466	23.52	0.72	7.95	0.84	6.13	78.43	4.14
989	52	5	Gheorghe Asachi Technical University of Iasi	HE	ROU	EE	2446	25.31	0.74	14.10	0.88	6.83	71.05	3.94
1009	54	6	Technical University of Cluj-Napoca	HE	ROU	EE	2355	23.99	0.71	9.60	0.80	5.59	78.05	3.80
1015	55	7	Alexandru Ioan Cuza University	HE	ROU	EE	2333	33.95	0.76	26.92	0.77	7.41	65.80	4.53
1241	75	8	University of Craiova	HE	ROU	EE	1637	21.20	0.55	10.08	0.87	4.96	78.44	2.25
1290	82	9	Transilvania University of Brasov	HE	ROU	EE	1530	20.98	0.55	8.56	0.88	3.88	79.74	2.24
1330	86	10	Carol Davila University of Medicine and Pharmacy	HE	ROU	EE	1453	20.65	0.72	15.07	0.87	6.71	58.50	1.95
1353	90	11	Iuliu Hatieganu University of Medicine and Pharmacy Cluj Napoca	HE	ROU	EE	1400	18.64	0.58	14.53	0.87	5.45	62.79	2.34
1365	92	12	Bucharest Academy of Economic Studies	HE	ROU	EE	1381	7.89	0.30	4.78	0.95	2.57	84.58	2.24
1537	115	13	University of Medicine and Pharmacy Victor Babes	HE	ROU	EE	1042	23.90	0.46	12.38	0.86	4.02	66.89	2.06
1560	118	14	West University of Timisoara	HE	ROU	EE	1007	27.61	0.94	25.42	0.81	8.42	65.84	3.06
1603	125	15	University Dunarea de Jos of Galati	HE	ROU	EE	928	20.58	0.48	10.13	0.88	3.78	79.53	1.36
1639	128	16	University of Oradea	HE	ROU	EE	871	21.81	0.53	10.91	0.82	6.06	73.48	2.94
1753	142	17	Ovidius University	HE	ROU	EE	700	23.42	0.31	10.29	0.84	1.88	64.29	0.31
1822	151	18	Universitatea Lucian Blaga din Sibiu	HE	ROU	EE	594	11.45	0.21	3.70	0.90	0.60	82.15	0.00
1951	165	19	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca	HE	ROU	EE	390	26.15	0.53	13.59	0.89	4.15	50.51	1.31

Legenda:

WR - Clasificare mondială; **RR** - Clasificare regională (Europa de est); **CR** - Clasificare națională; **HE** - Învățământ superior

O - **Număr total de documente publicate** în reviste de specialitate indexate în Scopus.

% IC - **Colaborare Internațională** Proporția de publicații realizate în colaborare cu instituții din străinătate.

NI - **Impact Normalizat**. Normalizarea valorilor referitoare la citările articolelor individuale. Valorile (în %) indică relația între impactul științific mediu al publicațiilor instituției și impactul mediu mondial căruia i se atribuie valoarea 1. Un scor NI de 0,80 indică faptul că instituția este citată cu 20% sub media mondială.

% Q1 - **Publicații de calitate înaltă.** Proporția de articole publicate de instituție în cele mai reputate reviste de specialitate (cele aflate în primele 25% din categoria lor conform indicatorului SJRII, SCImago Journal Rank).

Spec - **Indice de specializare.** Indică gradul de concentrare/dispersie tematică a producției științifice a instituției. Valorile sunt cuprinse între 0 și 1 (0 instituții generaliste, 1 instituții specializate).

% Exc - **Rata de Excelență.** Indică procentul din producția științifică a instituției inclusă în setul de 10% din cele mai citate lucrări din domeniile respective de specialitate.

% Lead - **Leadership Științific.** Indică contribuția științifică majoră a instituției în cauză. Reprezintă numărul de publicații pentru care autori afiliați instituției au calitatea de autori principali/autori de corespondență.

% EwL - **Excelență prin/și Leadership.** Indică % de documente din Rata de excelență (%Exc) în care instituția are contribuția majoră sau principală.

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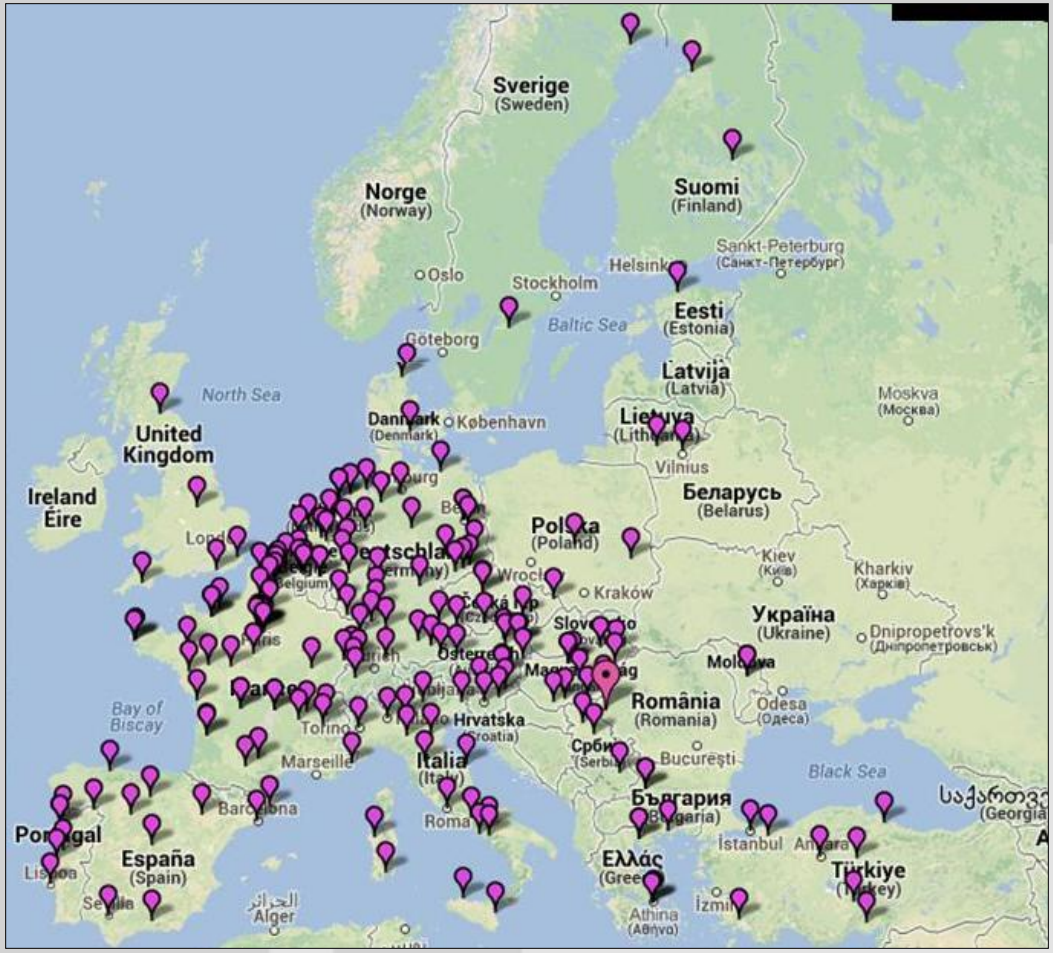
Bilateral agreements with more than 150 Universities



Austria	Japan
Belgium	Lithuania
Cyprus	Great Britain
Chile	Moldavia
Croatia	New Zeeland
Czech Republic Republic	The Netherlands Netherlands
Portugal	Switzerland
Finland	Russia
France Hungary	Serbian Republic Republic
Germany	Slovakia
Greece	Slovenia
Italy	USA

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Mission of the university

Universitatea Politehnica Timişoara

The university's function is threefold (in that order):

- *transmitting culture,*
- *providing professional education and*
- *advancing science (including training new scientists).*

*Universities must make a clear **distinction** between*

- ***teaching a profession** (which entails the application of the content of various sciences to solving a certain type of problem of value to others)*
- *and **training a scientist** (which entails the mastery of methods to incrementally push the limits of our knowledge in some discipline).*

Every student must learn a profession (to be a teacher, a nurse, an engineer, etc.) but not every student needs to become a scientist.

Ortega y Gasset, 1931

Mission of the university - review

Phase	Historical framework	Ideological framework	Mission
European medieval *Universitas* 1150-1500	revival of mercantilism, growth of cities and of the urban middle class, bureaucratization.	• human reason -subordinated to the Biblical truth. • the Renaissance: ideology, culture, art, science, literature.	**Teaching and learning professions (non-technical).**
Early modern University 1500-1800	global exploration, nationalism, humanistic emphasis on the individual, vernacular languages.	• rise of the independent nation-states. • use of the printing press. • religious reforms in the West.	**Socio-political service to the state (still non-technical).**
Democratic/Liberal University 1800-1920	High industrialisation. Need for technical-economical research.	• service to the individual of the nation-state. • liberalism in education. • research and academic freedom.	**Service to the public of the nation-state, civic or democratic Education.**
Modern University 1920-1970	Ideological interpretation of history. Research as part of the public service. Government supported research basis for defense, health, energy development, space program, economic growth.	• Initial phase - politically subordinated to governments. • Universities - directly involved in the work of the government and the industry.	**Promotion of national political directions (1920-1950).** **Promotion of an open society (1950-1970).**
Postmodern University 1970 - today	Mass higher education. Advanced industrial needs. Performance based management. Scientific research. Globalization.	• Internationalization as a vital Mission. • Knowledge - basic resource of society.	**Internationalization.** **Orientation towards the society.**

Adapted after "The mission of the university" – John C. Scott, 2006

What is the mission of the university today ?

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Universities have been and still are social organizations designed to provide higher educational services such as teaching, research, and hosts of other academic services to governments, to individuals, to the public, to the church and, in the future, perhaps, to the world.

Therefore, the university missions nowadays must be crafted and refined so as to meet these challenges:

- **Balance of the academic tradition with societal change**
- **Development of directions capable of solving problems in dynamically progressing and multidisciplinary professional fields**

Today's challenges:
high technology,
rapid globalisation,
environmental problems,
aggressive research,
time of nonstop change

Today's mission of the university is the education of specialists at the highest level of knowledge, the expansion of knowledge and the improvement of living conditions for people, here including the environment. *Andrei Marga, 2005*

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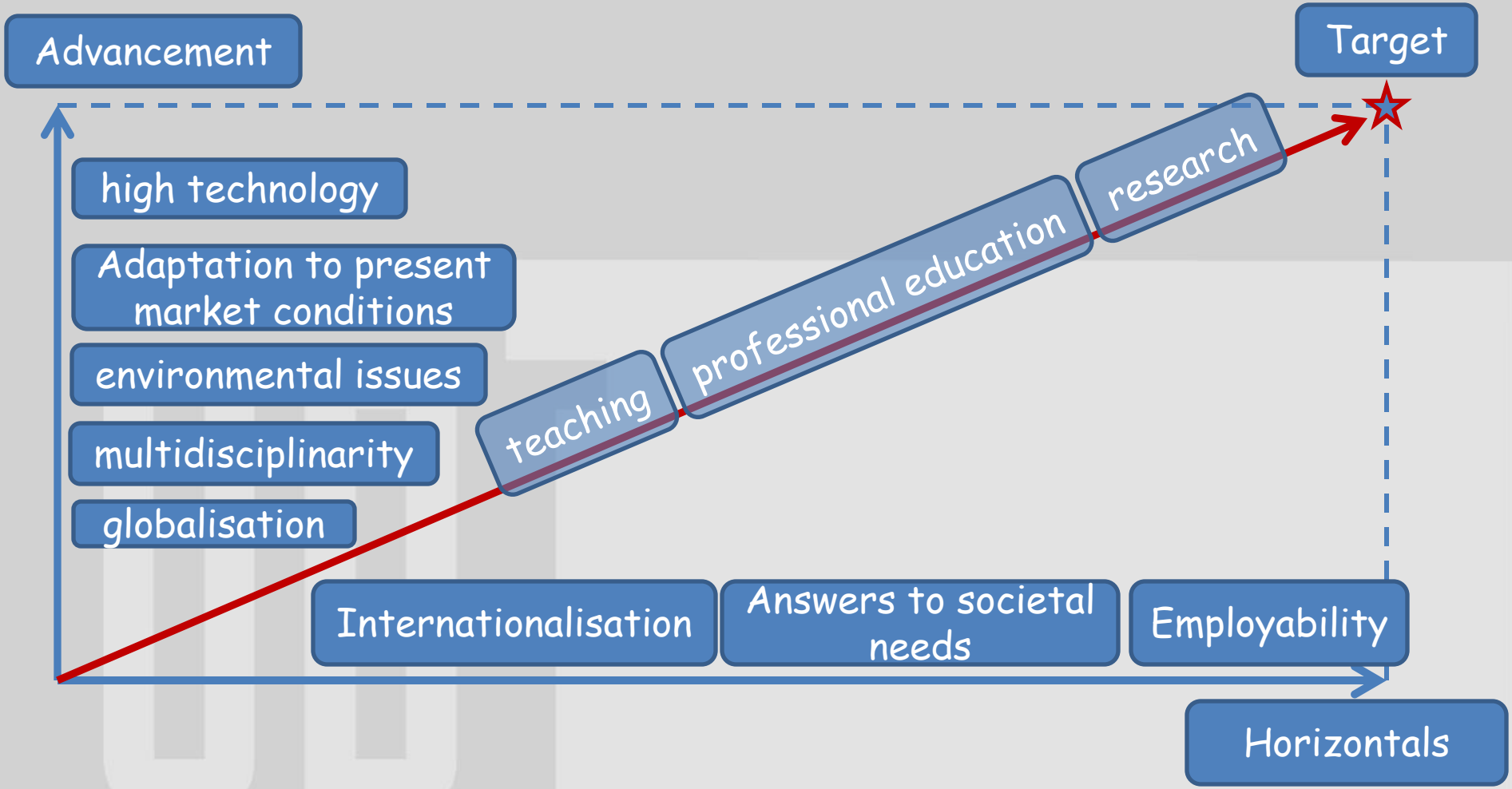
Matrix of the missions of the university today



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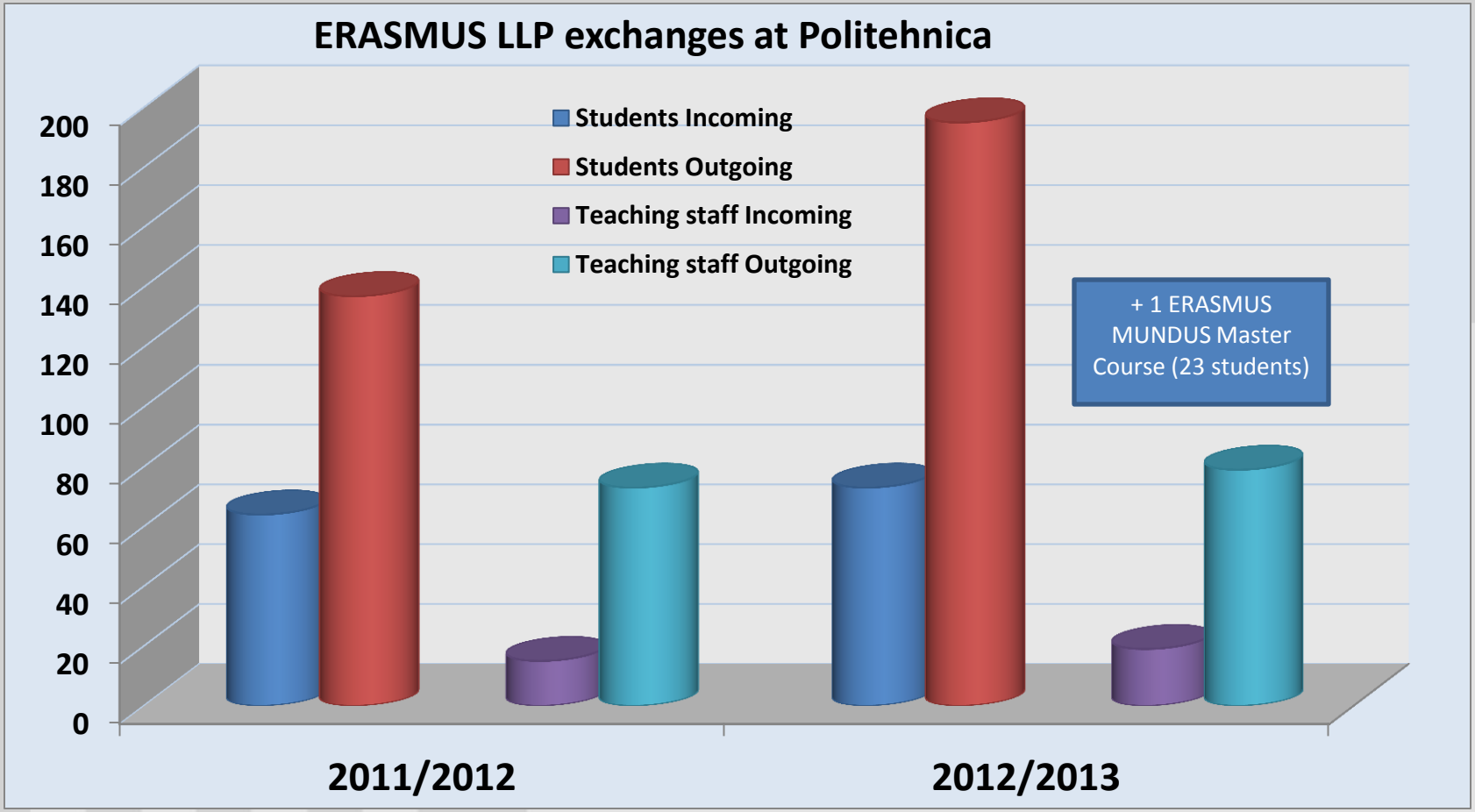
Contribution of ERASMUS



University - mass education system

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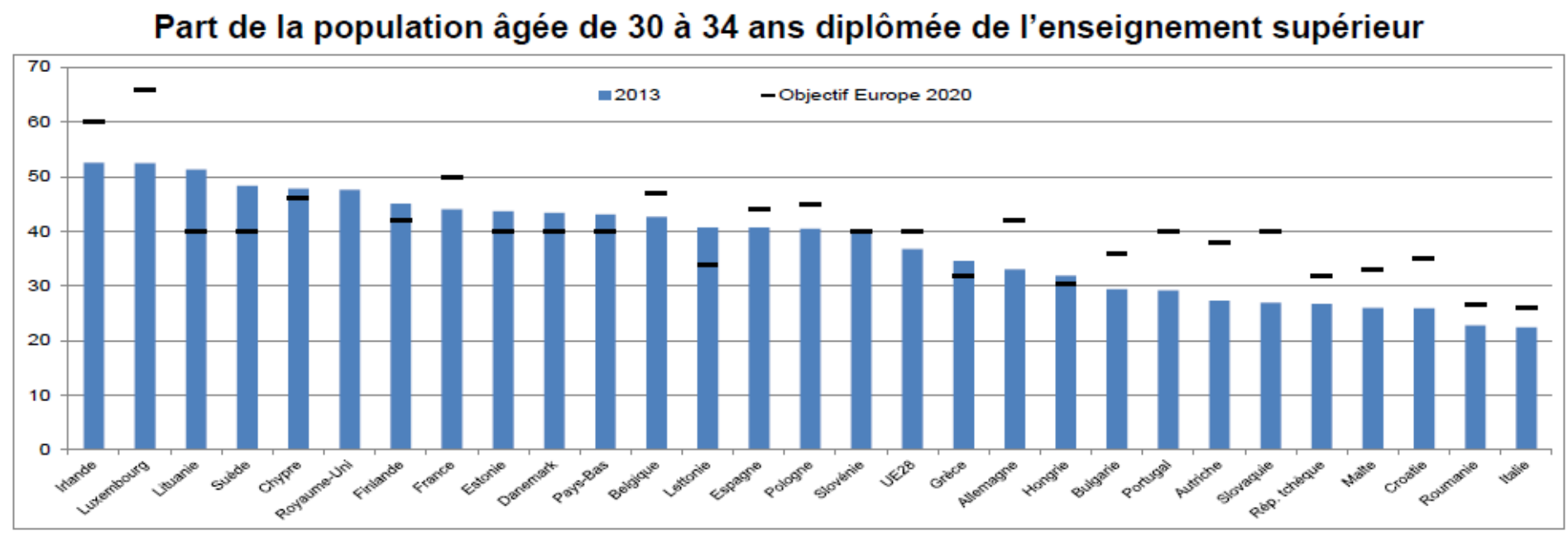
Part of the population with the age between 30 and 34 having a higher degree

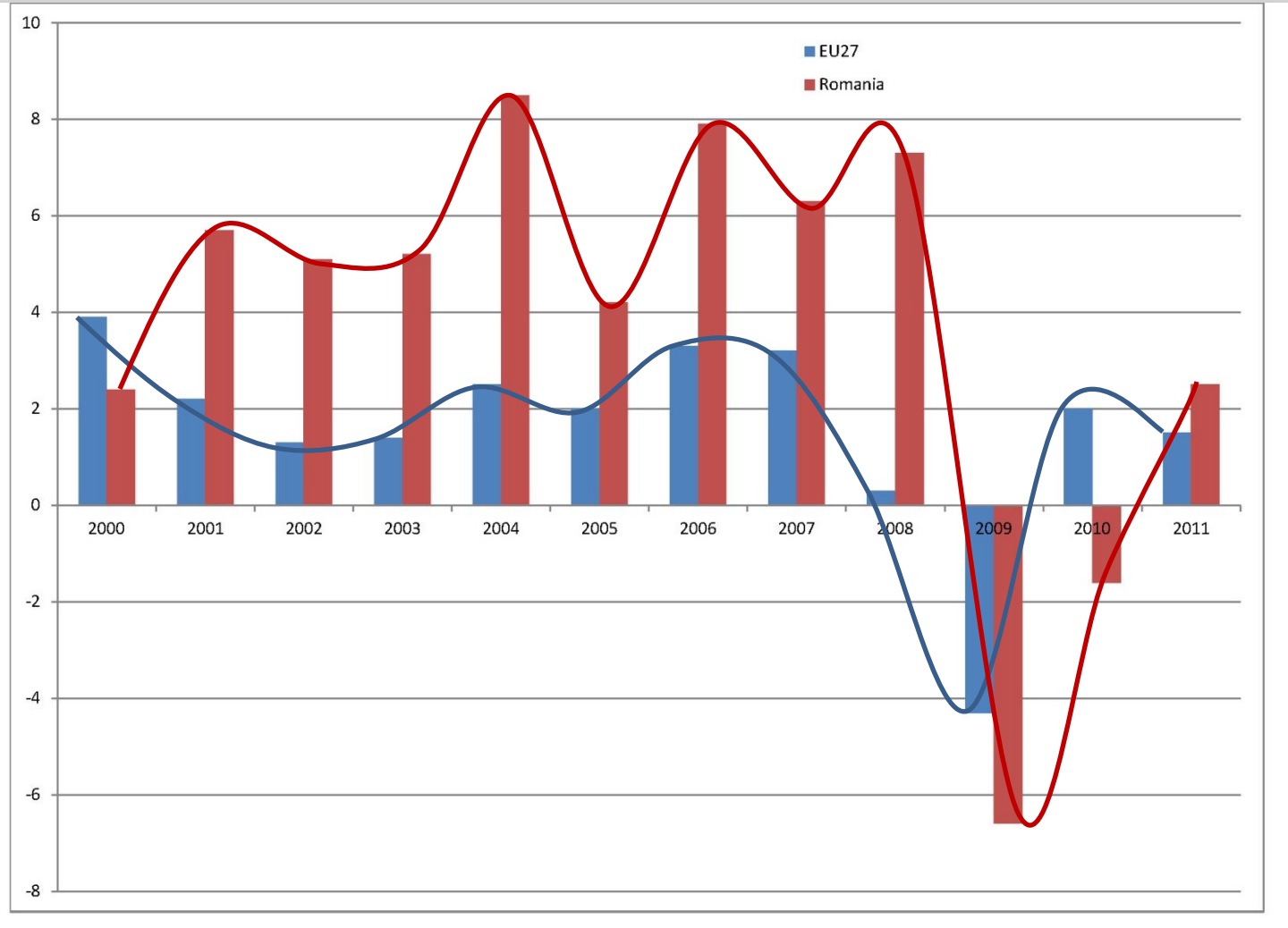


Source: Eurostat, 2013 – Europe 2020 – Indicateurs Clés sur L'éducation dans l'UE28 en 2013

- **within the current context, the university becomes a mass-education entity**
- **teaching for employability should be a necessity**

economic context today

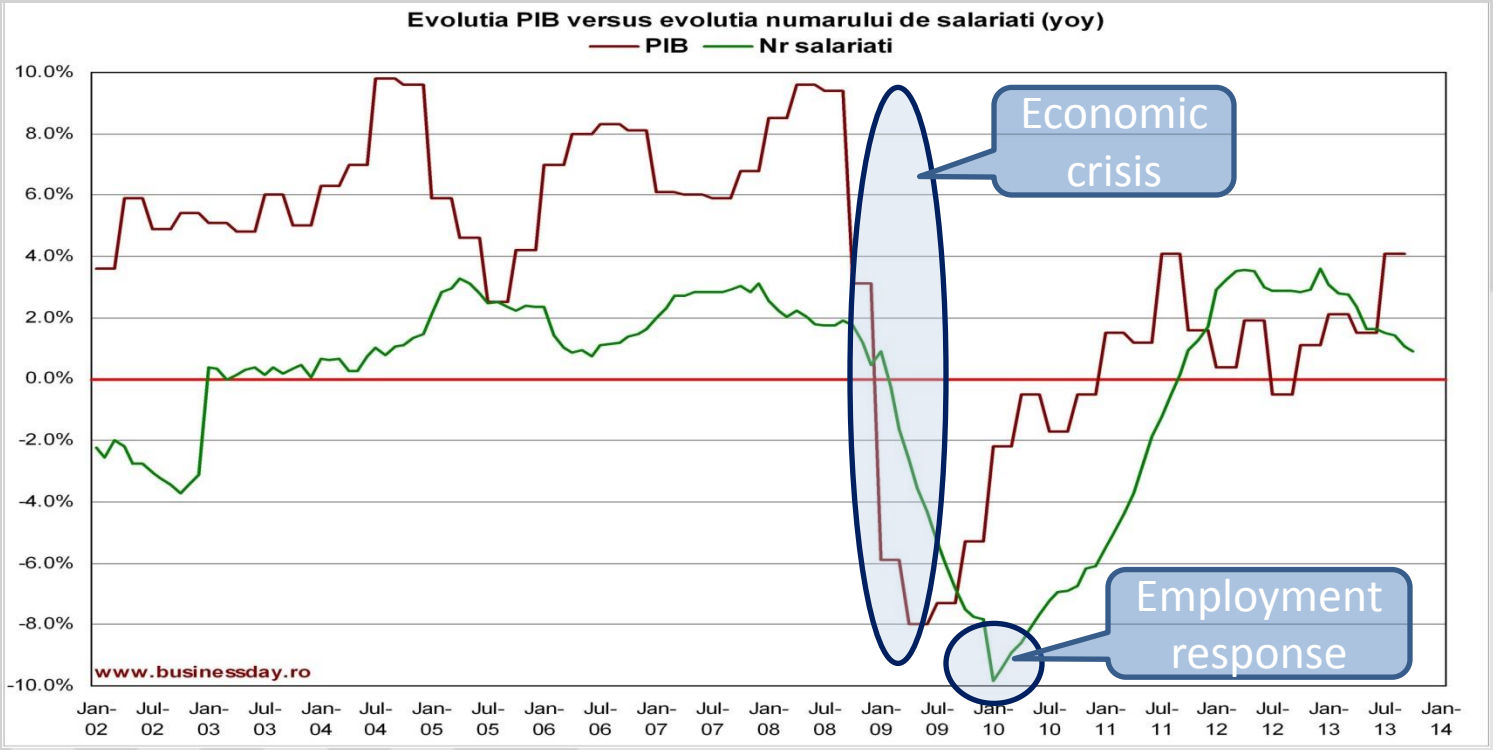
Economic growth in Europe (27) and Romania mean values (%)



Source: florincitu.worldpress.com

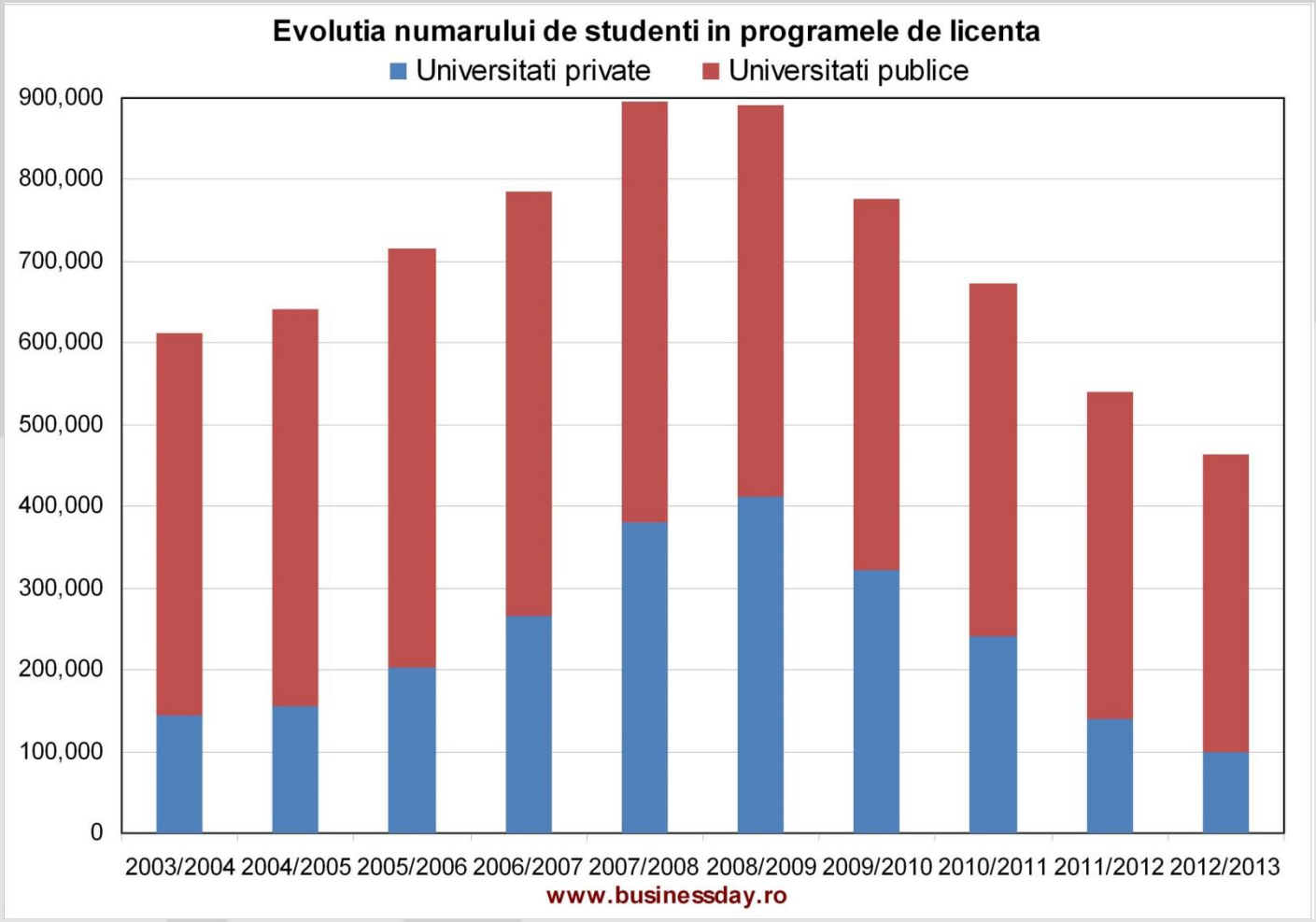
economic context today

Gross Domestic Product (GDP) vs. Number of employees in Romania



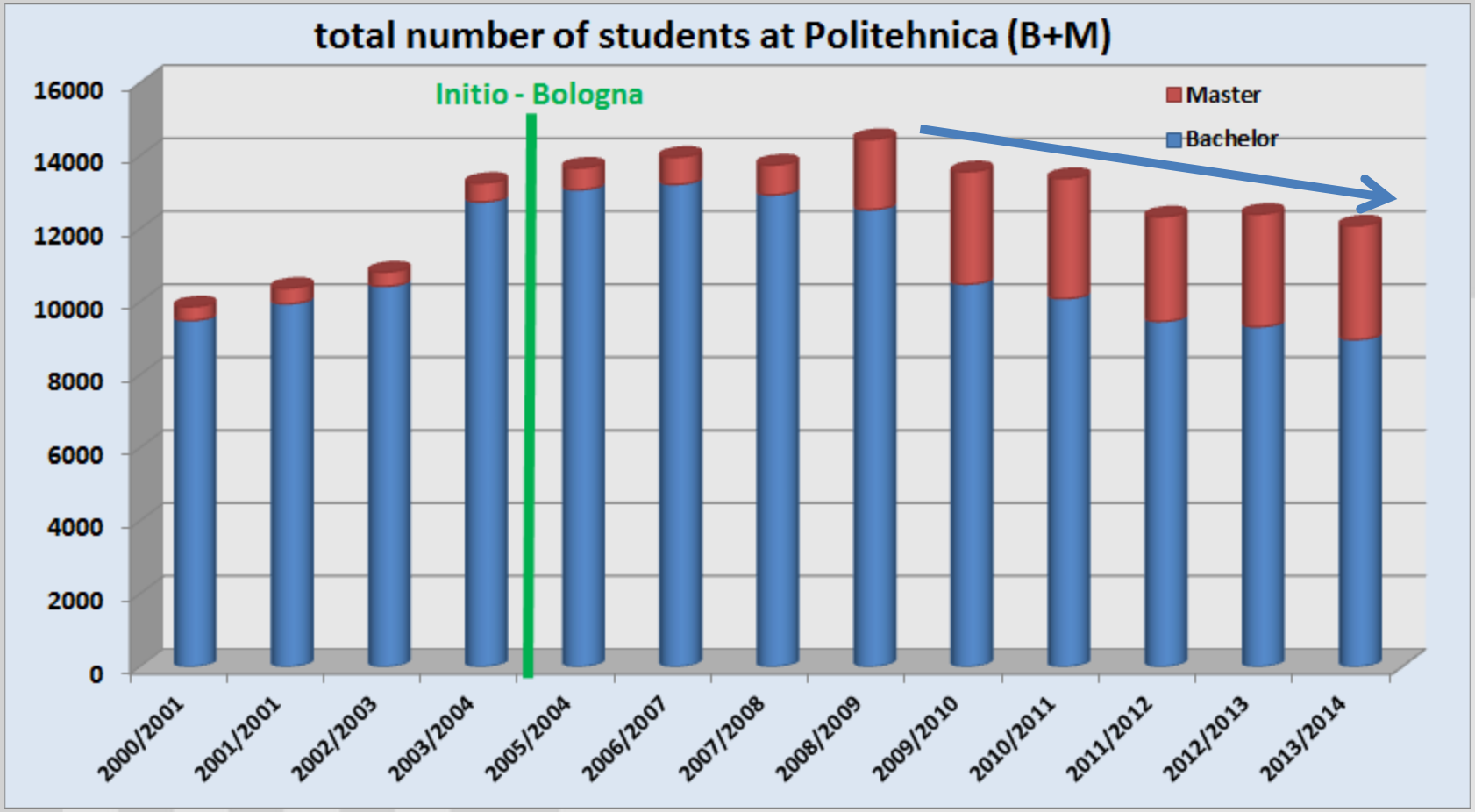
Source: www.businessday.ro

University – consequences of economic changes



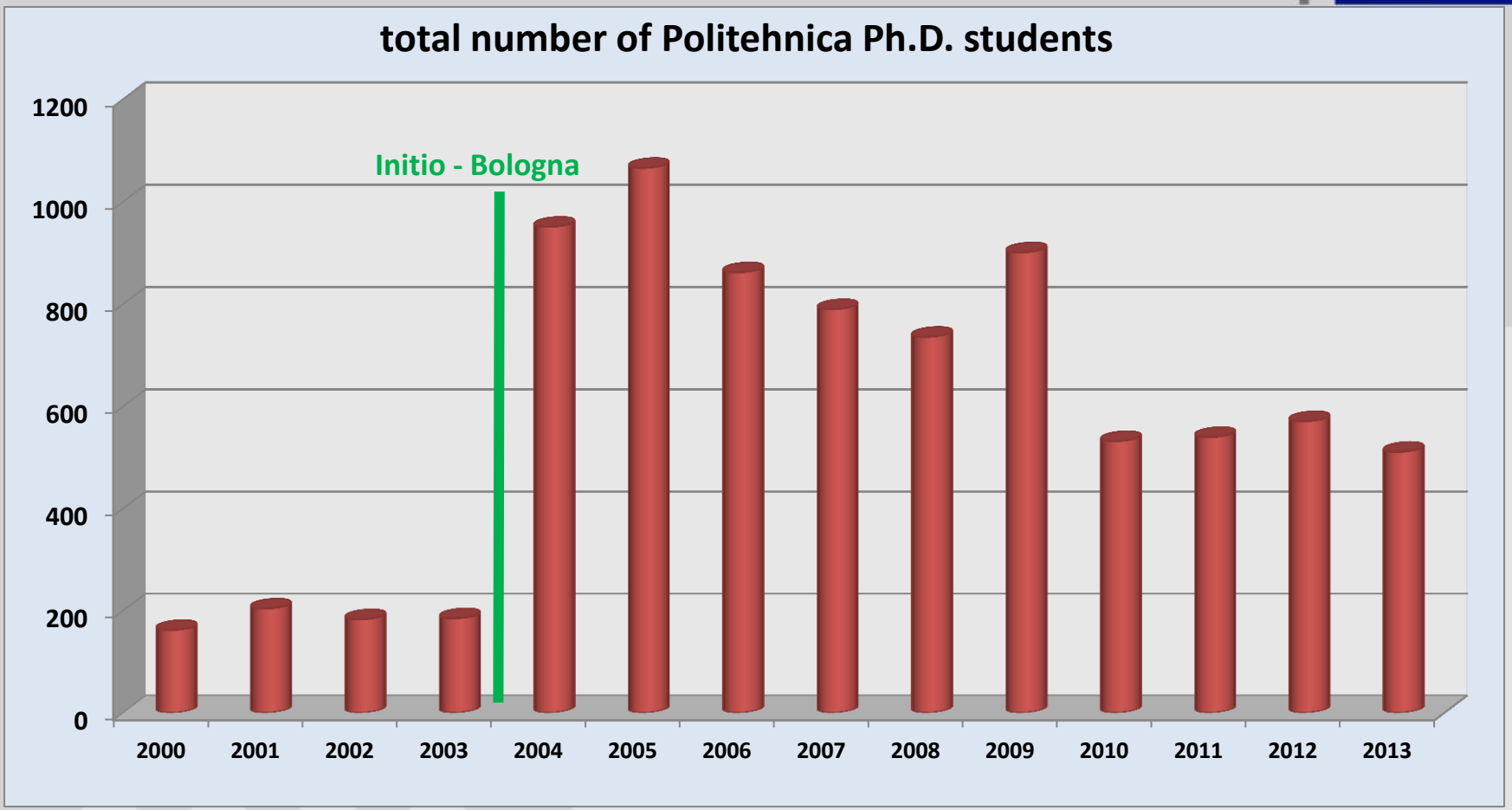
- **Evolution of the number of students in Romania (bachelor)**

University – consequences of economic changes



- the economic movements have shifted the responses of the university
- the university needs time in order to adapt to the new conditions

University – consequences of economic changes



- the economic movements have shifted responses on university
- the university needs time to adapt to new conditions

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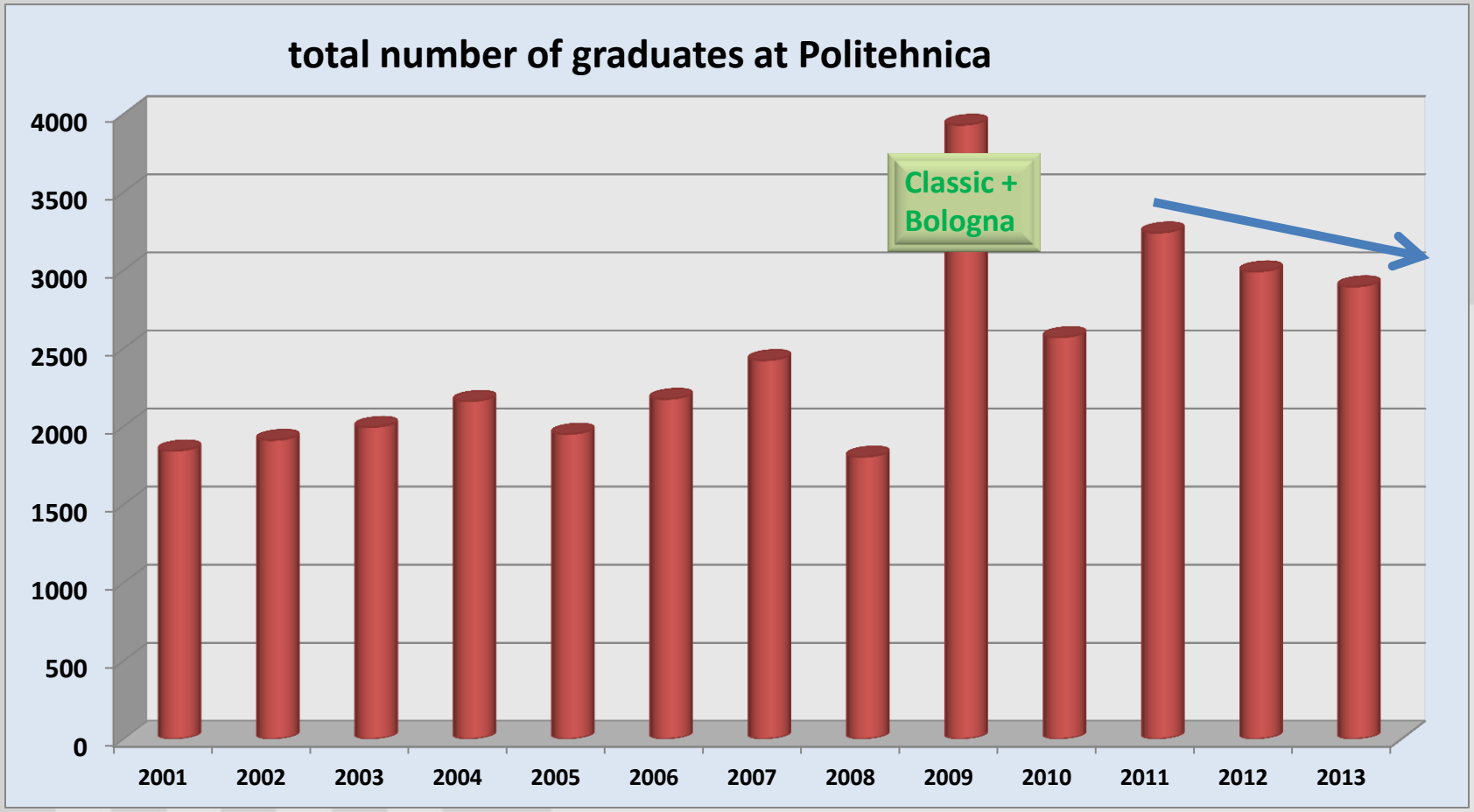
University – consequences of economic changes



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Employability - generalities

- The employability of graduates has become an aim that governments around the world have imposed on national higher education systems
- Employability – a set of achievements (skills, understandings and personal attributes) that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy

Mantz Yorke, 2004

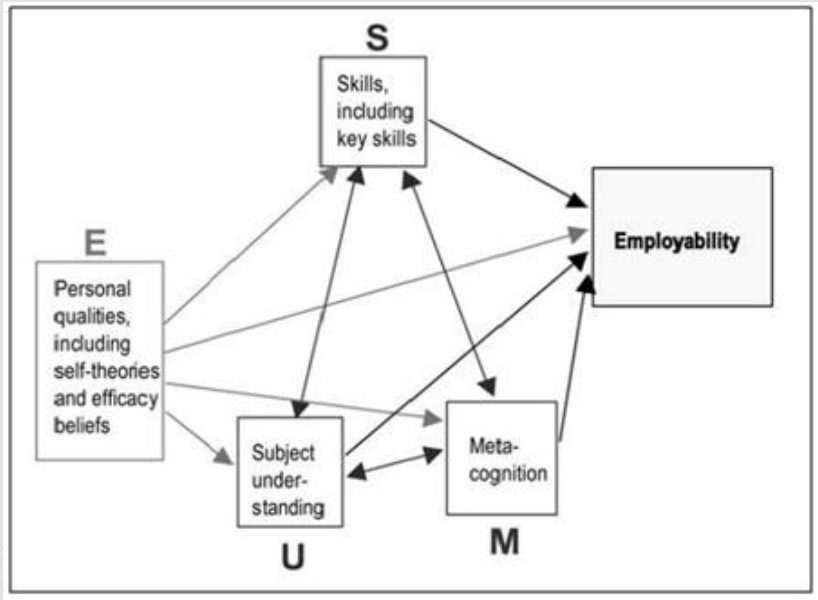
- The USEM model (*Knight and Yorke, 2004*) outlines employability as four broad and inter-related components:

☐ **U**nderstanding

☐ **S**killful practices (including deployment of skills)

☐ **E**fficacy beliefs (including students views of themselves)

☐ **M**eta-cognition (including self-awareness and a capacity to reflect on learning)



Employability - generalities

- **Employability is not the same as employment**
  - *employability implies the capacity of the graduate to function in a job, and is not to be confused with the acquisition of a job*

- **What does the University want?**
  - *produce graduates fully equipped so as to achieve the highest personal and professional standards*

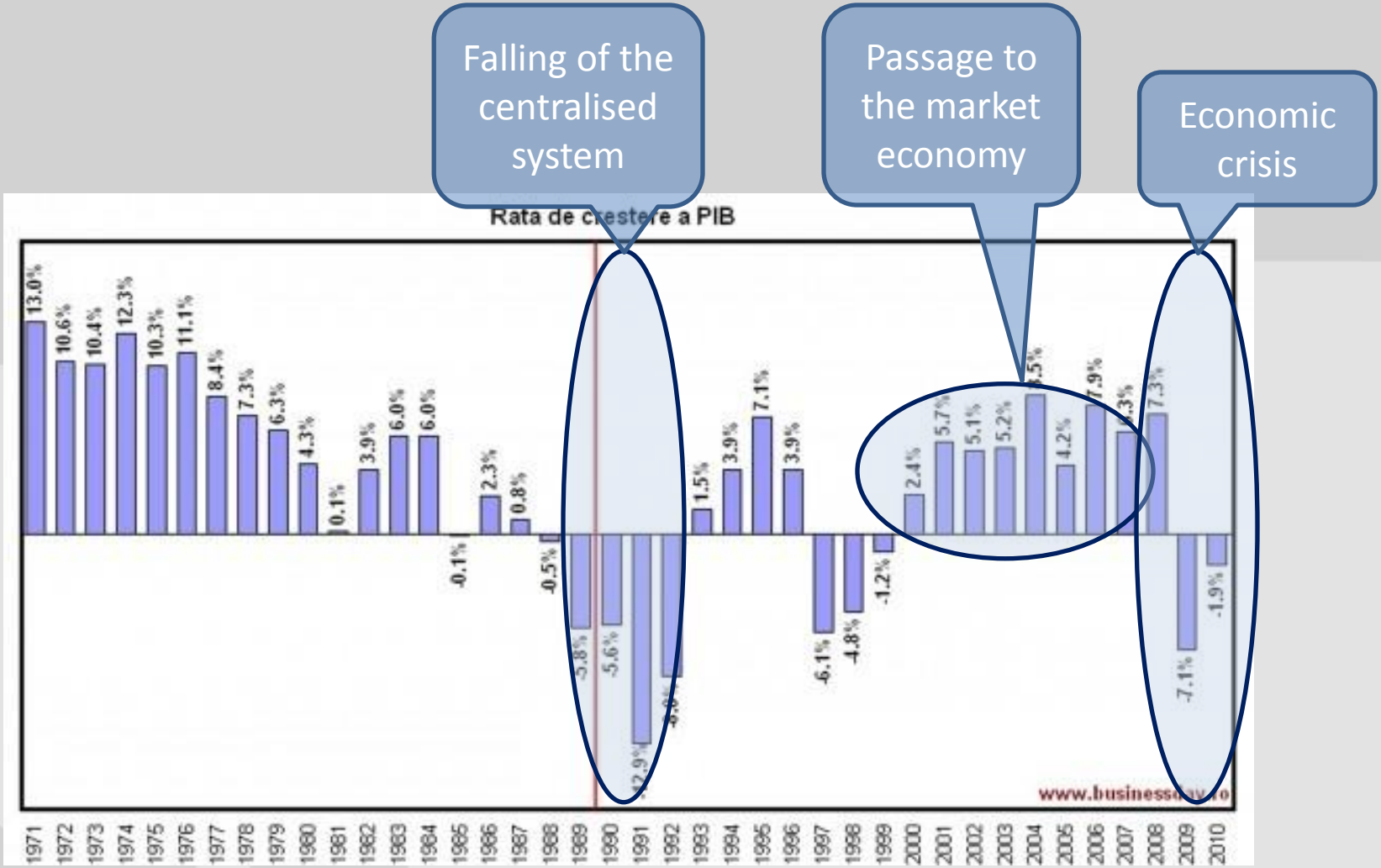
- **What do labour markets want from higher education?**
  - **employers tend to value generic skills** *(communication, team-working and time-management)* **more than disciplinary-based understanding and skills.**
  - **academic qualifications are the first tick in the box and then we move on. Today we simply take them for granted.** *(Brown et al. 2002)*.

- ***To be employed is to be at risk, to be employable is to be secure***

(Peter Hawkins, 1999)

University – economic context today

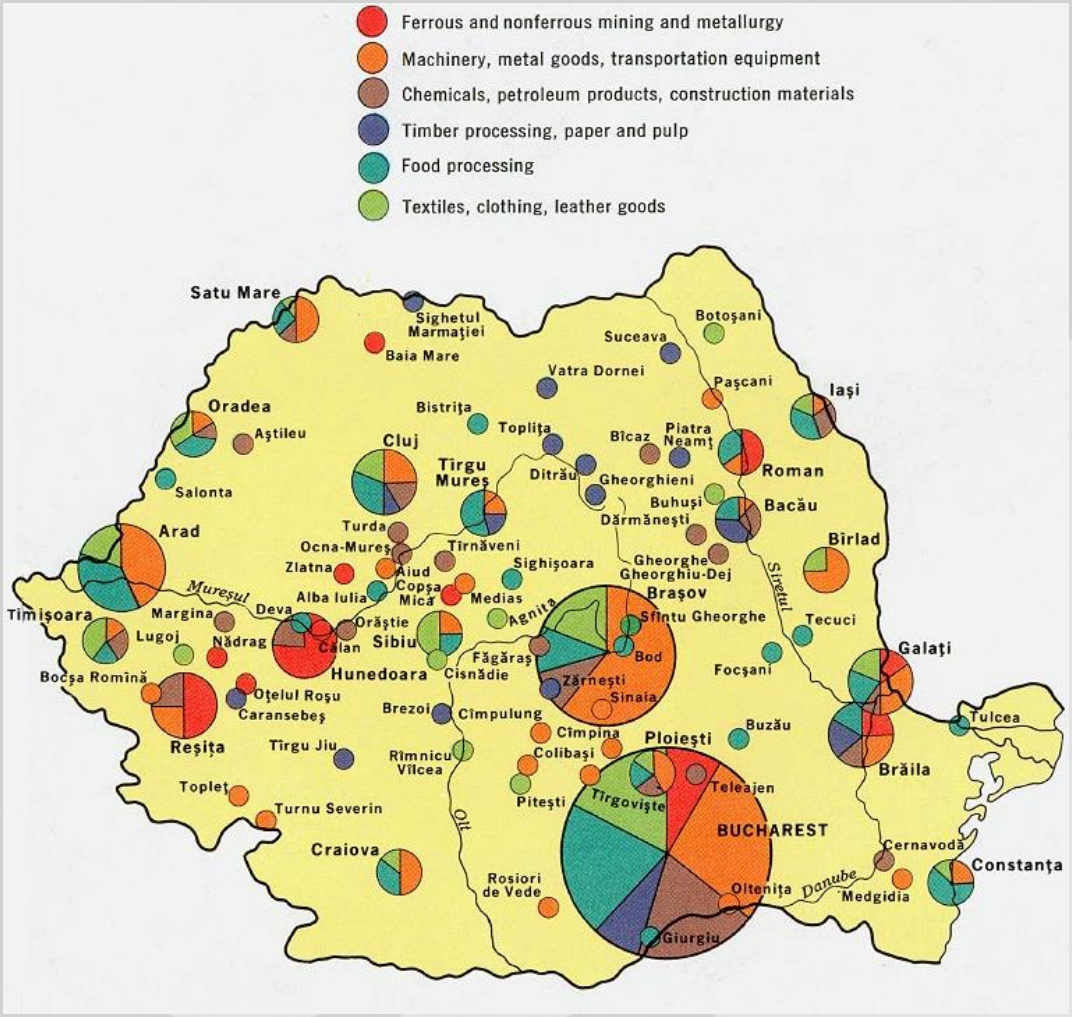
1971-2010 GDP growth in Romania



Source: www.businessday.ro

Industry in Romania

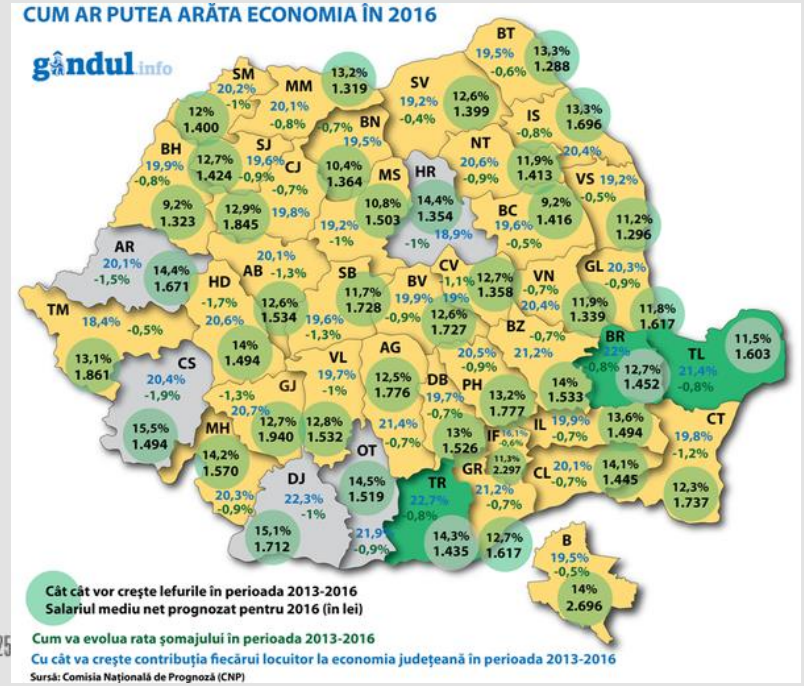
Romania - main economical centers in 1989



Source: www.businessday.ro

Romanian economy in 2014:

- dynamic changes in industry
- closing/openings overnight
- increase of services



Industry in Romania

facts

- 1998 Romania was the “sewing machine” of Europe
- Today: most of the textile companies left Romania

- 2008, Cluj-Napoca: Nokia opened one of the largest assembly line
- 2011, Nokia closed the line

- 2006 - 2008, Building sector: booming
- 2009, Building sector: loosing 50%
- 2014, Building sector: revitailising in shy steps

- 1998, Timisoara: Continental opened a large factory
- 1999, Pitesti: Renault bought Dacia

Source: www.businessday.ro

Are we teaching for employability under the current economic conditions ?

Universitatea Politehnica Timişoara

- Should universities adapt rapidly under the current economic conditions?

- Adaptations:
  - Based on trend lines
  - Creation of new bachelor and master programs
  - Change in the study curricula
  - Direct and continuous contact with the industry / economy
  - Internships / Industrial Placements / Practice / Partial employment
  - Continuous research on current issues

- Adaptations are possible but they require time
  - First graduates of new bachelor and master studies – at least 4 (2) years
  - Adaptation of curricula is usually based on a complex process

Are we teaching for employability in current economic conditions ?

Universitatea Politehnica Timişoara

- **Adaptations at Politehnica – contacts with the industrial sectors:**

1. S.C. Contitech Romania SRL	9. S.C. Kathrein Romania SRL	17. S.C. Swiss Solutions SRL
2. S.C. Valeo Lighting Injection	10. S.C. AEM SA	18. S.C. Continental Automotive Romania SRL
3. S. C. Ada Computers SRL	11. S.C. Leoni Wiring Systems Arad SRL	19. S.C. Aquatim
4. S. C. Nestle Romania SRL	12. S.C. FM Romania SRL	20. S.C. Alcatel-Lucent Romania
5. S. C. Yazaki Component Techno. SRL	13. S.C. Electrozep Exim SRL	21. S. C. Romker SRL
6. S. C. HUF Romania	14. S.C. Azur SA	22. S.C. Plexus Services Ro SRL
7. S. C. Elster Rometrics SRL	15. S..C. Ada Computers SRL	23. S.C. TRW SRL
8. S. C. Zoppas Industries Romania SRL	16. S.C. DPR DRAEXELMAIER Procese de Prod. Romania SRL	

Source: Report of the Rector, 2014

Are we teaching for employability under the current economic conditions ?

Universitatea Politehnica Timişoara

- **Adaptations at Politehnica – contacts with public institutions:**

Public institutions

- Romanian Academy- branch of Timişoara
- The Weather Centre – Region of Banat-Crişana
- The Museum of Dacian and Roman Civilisation
- The Institution of the Timis County Prefect
- The Intercultural Institute of Timişoara
- The Romanian Television Society- the Studio of Timişoara
- The Timis County Police Department

Research Centers

- The National Institute for Research and Development for Electrochemistry and Condensed Matter
- Leibniz Institute for Solid State and materials Research Dresden eV. Germania

Source: Report of the Rector, 2014

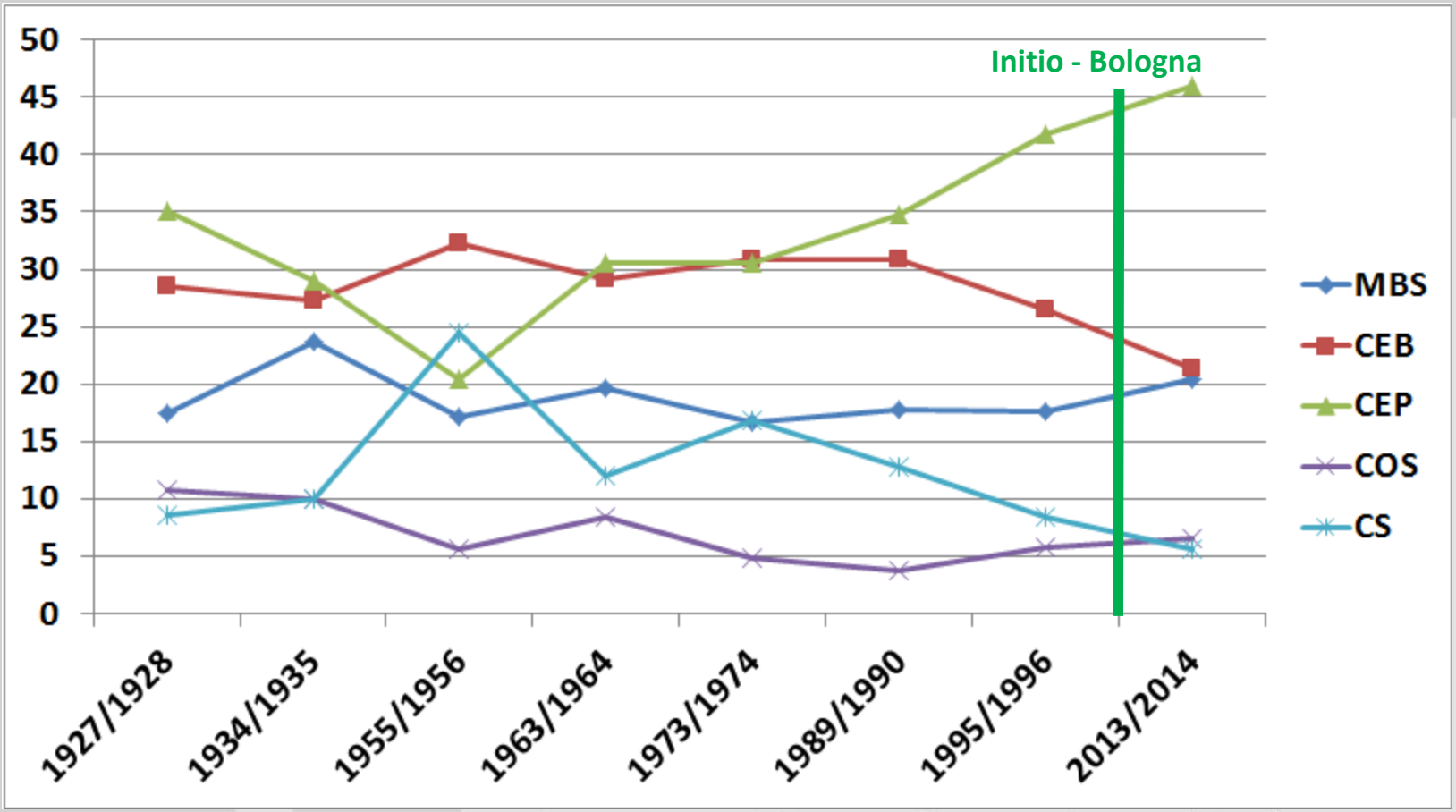
Are we teaching for employability under the current economic conditions ?

Universitatea Politehnica Timişoara

Evolution of components of curriculum content in Civil Engineering

MBS - Mathematics and Basic Sciences
CEB - Civil Engineering Background
CEP - Civil Engineering Profile

COS - Complementary Oriented Subjects
CS - Complementary Studies



Are we teaching for employability under the current economic conditions ?

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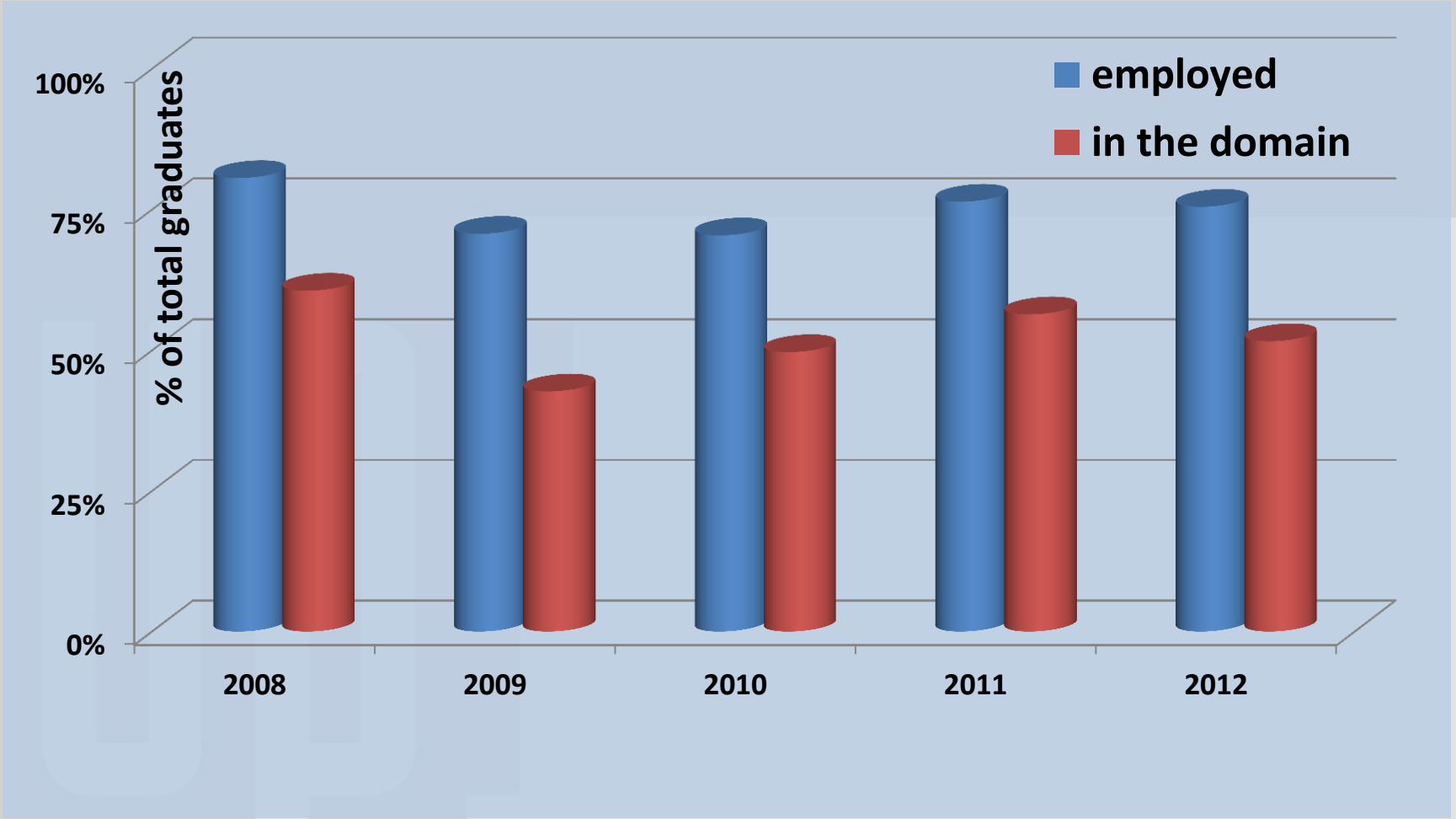
Employability at Politehnica (one year after graduation)



Source: Report of the Rector, 2014

Are we teaching for employability under the current economic conditions?

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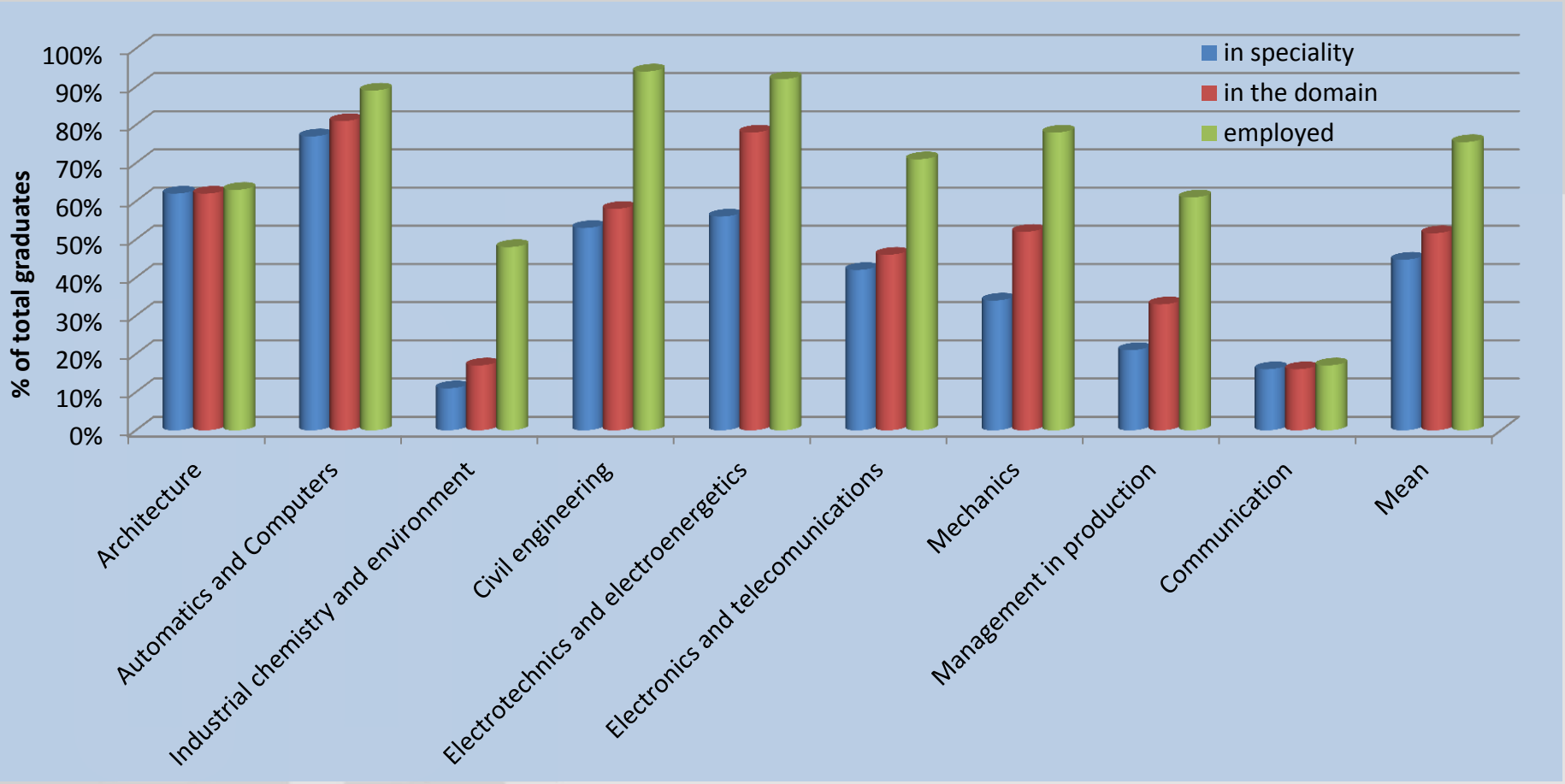
Employability at Politehnica (one year after graduation) 2012



Source: Report of the Rector, 2014

How can the university improve employability?

Universitatea Politehnica Timişoara

- Including employability as a mission of the university
- Encouraging Work Experience and Work-based Learning
- Completion of real internship stages
- Working on interpersonal competencies (communication skills, working within teams)
- Encouraging innovation (open-minded graduates)
- Improving the added-values of graduates (analytical skills, problem solving skills, analysing complex facts)

ERASMUS

Ideas adapted after J. Andrews and H. Higson, 2008

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Thank you for your attention.

Σας Ευχαριστώ Πάρα πολύ

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