

Europe needs a Maastricht treaty for research & innovation or it will decline into a museum (competitive only in soccer tournaments)

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What happened to Lisbon's objective to make Europe by 2010 "*the most competitive and dynamic knowledge-based economy in the world*", spending approximately 3% of GDP on investment in research, development, and innovation? Average spending for the EU-19 has remained low if not lower (1.3% of GDP, according to OECD2007 data), the gap with leading countries, especially in some sectors, as IT and pharmaceutical, has been enlarging, in academic rankings, still only few EU universities score in the top 50 or 100 (France and Italy do *not* appear at all in the first fifty). It is not just the question of money: EU has mostly concentrated efforts to increase the *number* of students, neglecting often meritocratic patterns for excellence. Reactions to the economic crisis in the last 2 years have probably enlarged further the gap with the US, since Obama included research in the "Stimulus" packages, with an extra 21 billion dollars injected in the system, whereas most EU countries continue to threaten large budget reduction, which require large reactions from the media to be reduced or sometimes withdrawn. Even leading EU countries (Germany, France) have only long term plans to invest (Excellence initiative, and Grand Emprunt ¹, respectively). EU coordination has been active for Universities in terms of the Bologna process which however was seen by many as a further quality loss for many systems. Integration towards the lower end seems obviously easier to achieve than synergetic improvements, despite the redundancy of the planned objectives.

In Italy, for example, the situation seems to be deteriorating, and mistakes from the past seem to be all too evident: public universities serve the vast majority (about 95%) of the 1.8 millions students, with relatively inexpensive fees which some Universities near bankruptcy are finding very hard to increase. "Quantity" of students, of "exams" and possible "dates" and appeals for every single exam, have generally multiplied, resulting often in chaotic functioning, excessive length of the studies, generating probably the persistent illusion that a University degree would open the world of stable and satisfactorily professions, as it was the case perhaps in the booming economy after WWII with a tenth of the present students' population. This may explain resistance to change. I created with a few friends a web site, www.sciencedebate.it, following the example of the US ScienceDebate, originally mainly to inform about the US initiatives (the stimulus plan, for example) and perhaps discuss possible implementations in Italy. The interest arose, few hundreds scientists have registered to the site, few thousand visited the site, support from politicians to the initiative exists, but there is very little reaction from the political scene at the moment, scientists and professors are struggling against continuous attacks, attempt by Minister Gelmini to introduce some reforms (which may be in the correct direction, but unlikely to address core problems) is finding very strong opposition ², especially as it comes together with the first serious downsizing of the University budget from the already tight €7.49 billion (US\$9.27 billion) of about 20% between 2009 and 2012. Additionally, Minister Tremonti's plan to save about €24 billion in public spending by 2012 includes new rules for the Universities almost wiping out recruitment. The two processes combine to seriously undermine even the level and the certainty of the salaries of the present staff. Within this scenario, it is perhaps too early for a Science Debate in Italy, which would not want to be yet another trade union, or petition on line.

Just imagine what recently happened for the elimination of Italy from the World Cup: emotional headlines running in all newspapers, TV news, as a large national disaster, with requests for immediate dismissal of the trainer and of the entire team, endless discussions between experts analyzing every

¹ Declan Butler, French research wins huge cash boost: President Sarkozy uses 'big loan' to push his reform agenda. Nature 462, 838 (2009) doi:10.1038/462838a

² Alison Abbott, (2010) Strikes could 'break' Italy's universities, Nature 466, 16-17

single aspect of the failure. If only something of the like were remotely possible in the discussion about University and Research world competition, the Lisbon strategy would have been taken much more seriously, perhaps introducing strict rules, similar to a “Maastricht treaty”, to reach the objective. Here, the role of the press, the media, and perhaps Web2.0 as a ScienceDebate, may be strongly beneficial.

A possibility that I am starting to consider seriously is that perhaps the only serious alternative is to move towards a European level of Science Debates. The appeal could be *Is Europe declining slowly and inevitably into a museum?*

The EU Commission has for long time failed to recognize the fading role of EU research. A “European Paradox” was even postulated of EU excellence in research, simply not followed by Technology Transfer³, which is contested by leading academics⁴: “*some descriptive evidence shows that, contrary to the ‘paradox’ conjecture, Europe’s weaknesses reside both in its system of scientific research and in a relatively weak industry. The final part of the paper identifies a few normative implications: much less emphasis should be put on various types of ‘networking’, and much more on policy measures aimed at strengthening both frontier research and European corporate actors.*” It is easy to get stuck into academic discussions about the best possible funding “mechanisms”. Using again the parallel with soccer, it is clear that, in the lack of top “players” in research, the difference between an “ambitious task”, and a “white elephant” infrastructure of bureaucrats is subtle, and the risk of implementing the latter is high. How many have heard of the €14billion ESFRI initiative at <http://cordis.europa.eu/esfri/> or of the European Institute of Technology <http://ec.europa.eu/eit/>, particularly in the general public? The general perception is that some European funding schemes seem to incentive characters like “Lanterne” of the late French Nobel prize winner Pierre de Gennes’ book “Petit Point: A Candid Portrait On The Aberrations Of Science” where he explains in few lines the abilities of those people whose primary job is to “milk the cows” in Bruxelles. The risk of precipitating the reputation of EU funding should be considered seriously.

Some action has been taken for improvement, and the European Research Area (ERA) was created to address some of these issues⁵, to go much beyond the bureaucratic limitations of the Framework Programmes and the politicians’ worry for every country “budget share”, to measure instead than real benefit from that money. Framework programs incidentally account for only about 5% of total public-research money in Europe, and therefore cooperation between national governments is still very marginal, and could be increased substantially. And there is enormous margin also to shift to research also money still allocated in too traditional ways. The best initiative so far seems to be the European Research Council (ERC), which has funded young researchers based on a good peer review system, and has received enthusiastic feedback from an entire generation of wanna-be researchers, particularly in Italy, who struggle to survive or find a position in a system which protects excessively the established academics.

It is imperative to make Science and Technology attractive to young and energetic people, in terms of salaries and social status, as suggested by Sir Alec Broers' BBC Reith Lectures 2005 -The Triumph of Technology. Also, Europe should just turn back to the best examples of his past, and ambitious tasks. In 1900, the German David Hilbert posed 23 “mathematical puzzles” which kept busy mathematicians

³ European Commission (2007), "Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation --Implementing the Lisbon Agenda", Communication to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions.

⁴ Dosi G., Llerena P, and Labini M.S. (2006): "The relationships between science, technologies and their industrial exploitation: an illustration through the myths and realities of the so-called 'European Paradox'", Research Policy 35.

⁵ Luke Georghiou, (2008) Europe’s research system must change, Nature Vol 452, 935-936

busy for a century. More recently, initiatives as Science Debates, or National Academy of Engineering “Grand Challenges” have been quite successful in the US. A Maastricht treaty with strict rules is probably the only way forward to collate European countries towards a new renaissance, together with a new set of ambitious goals to seriously attack, within reach of European countries. An example could be President Kennedy 1961’s announcement of the “moon shot”, or the US initiatives to sequence an entire human genome in the 1980’s, which have transformed the engineering industry or the biomedical research, respectively.

The parallel with soccer may seem unorthodox, but it is work to change attitude towards investments in Research and Innovation. Europe does a much better job at attracting the best football (soccer) players in the world, than the best scientists (brain drain). Although money spent in putting together the team is not the only ingredient to win the tournaments, the top European soccer teams have undoubtedly typically the largest budgets. There may be a case when a team with large budget doesn’t win the national tournaments for a few years, and indeed this can happen also with Research and Innovation --- actually, this possibility has already been noticed in the past for research, and often is called a “Paradox”. According to Shelton for example, the loss in *share* of world investments, rather than the absolute investments, can be measured in terms of scientific publications output, and there is now an “American paradox”⁶, due to Asian countries now investing aggressively.

In soccer, there is a rigid and well identified hierarchy of tournaments (first division, second, etc.), and a number of competitions at European level, which would be nice to see at scientific level too. There certainly is a much larger circulation of football players in Europe, than in the average professions. Just consider for example that in Italy only 1.3% of immigrants has a university degree, while in US, the figure is about 42%⁷. The extent of brain drain to the US (and soon to other emerging countries), is very large not just from Italy or France, but even from UK: in recent years, it has been measured that 56 per cent of UK-born elite scientists (i.e. those included in the top 250 of each field in the ISI database including about 5000 total scientists www.isihighlycited.com) have left the United Kingdom and currently live abroad. The situation in Italy is certainly worse, if only less than 100 highly cited scientists live in Italy (most of them, are in the “Gruppo2003” association, which publishes the journal www.lascienzainrete.it), i.e. less than many US Ivy League Universities (Caltech, Harvard, Yale all have each more than 100). The USA is per capita the largest net-importers of elite (highly-cited) scientists as argued by Prof. Andrew J Oswald, who says: “*Creative scientists are worth far more than their salary and lab expenses, because they set a quality standard that lifts the aspirations of dozens or even hundreds of other researchers around them*”. This seems to agree with Nobel Laureate Julius Axelrod who apparently declared that “*Ninety-nine percent of the discoveries are made by one percent of the scientists*” . Oswald suggests American dominance in recent Nobel prizes may even limit mankind’s creativity in general in the long term, since biographies of leading scientists suggest great discoveries usually came from unconventional ways of thinking. Increasing R&D investments by Asian countries particularly aimed at attracting “extremely talented” people and give them sufficient budget (A*STAR program, etc.) seem to indicate these countries are moving in the right direction. World-Class Universities are a dream for a generation of Chinese people, and Europe has only historical examples which resist to change sometimes with increasing difficulties.

So perhaps the real “European paradox” is that the most prestigious scientific prize remains European, but it is hardly ever given to European scientists!

⁶ RD. Shelton, Relations between national research investment and publication output: Application to an American Paradox , *Scientometrics*, Vol. 74, No. 2 (2008) 191–205

⁷Lorenzo Beltrame. Realtà e Retorica del Brain Drain in Italia. <http://www4.soc.unitn.it:8080/dsrs/content/e242/e245/e2209/quad35.pdf>