



# University-industry cooperation in the Research Framework Programme

Joaquín M. Azagra-Caro, Gérard Carat, Dimitrios Pontikakis



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## Executive summary

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University-industry cooperation (UIC) in research is an important vector of innovation and growth, being one of the avenues to foster a dynamic research sector while strengthening the so-called third mission of universities. Based on budgetary data from the 6<sup>th</sup> EU R&D Framework Programme (FP6), this paper aims at identifying the main patterns derived from budget allocation to UIC projects versus other forms of collaboration (e.g. academic-only networks, intra-firms networks, etc). The main findings show that for the EU average, a UIC contract involves a funding four times bigger than other forms of collaboration. The results also show that countries getting the lion's share of FP6 UIC projects and value are usually Western, Northern and, to a minor extent, Southern member states, while Eastern and most Southern countries tend to rank low in both the number and value of projects. When correlating the average value of FP6 UIC projects with GDP, this pattern is even clearer. Considering that the FP allocates funds on the basis of the quality of the proposal, these findings could be attributed to the self-reinforcing nature of UIC, and open perspectives on possible ways of better involving the new member states in an increasingly important knowledge-oriented future for Europe.

## Introduction

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The ERA long-term vision based on the broad Lisbon goals promotes favourable conditions for all actors in research and the private sector to invest in research and exploit its results, as well as "sharing and using knowledge across sectors and borders"<sup>1</sup>. This vision to foster innovation and growth is the result of a long process trying to identify the hurdles to European competitiveness in research and innovation.

An often-mentioned weakness of the European research and innovation system is the sub-optimal research collaboration and knowledge transfer between public research organisations (PROs), particularly universities, and industry<sup>2</sup>. Although universities and PROs perform more than 35 percent of all research undertaken in Europe, their potential is not fully realised due to significant fragmentation of activities, and insufficient links with business and society<sup>3</sup>: "Changes can happen only if research institutions, notably universities, are given autonomy to position themselves, cooperate and compete at European and international levels, and better link their research activities to the needs of industry and society"<sup>4</sup>. Public-private partnerships should therefore be stimulated further, to improve research collaboration and knowledge transfer between PROs and industry

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<sup>1</sup> Council of the European Union Note 'Council conclusions on the launch of the "Ljubljana Process" - towards full realisation of ERA', 16 may 2008.

<sup>2</sup> For instance, Commission Communication 'More Research and Innovation – A Common Approach', COM(2005) 488; Commission Green Paper 'The European Research Area: New Perspectives', COM(2007) 161 final.

<sup>3</sup> Commission Green Paper 'The European Research Area: New Perspectives', COM(2007) 161 final.

<sup>4</sup> Op.cit., p. 14.

which member states and stakeholders, especially on a voluntary and flexible basis<sup>5</sup>. The importance of knowledge transfer and collaboration between industry and academia is now very well recognised, and many initiatives are underway to make it easier, from training schemes to IP guidelines<sup>6</sup>. The challenge in Europe is to establish conditions which lead to a virtuous cycle of productive collaboration and on a sufficient scale.

University-industry cooperation (hereunder referred to as "UIC") is one of the avenues to foster a dynamic research sector while strengthening the so-called third mission of universities. UIC has strategic importance as it brings opportunities for universities to improve the sharing of research results, intellectual property rights, patents and licences (for example through on-campus start-ups or the creation of science parks<sup>7</sup>). Universities can also increase the relevance of education and training programmes through placements of students and researchers in business, and can improve the career prospects of researchers at all stages of their career by adding entrepreneurial skills to scientific expertise. Links with business can bring additional funding, and enhance the impact of university-based research on SMEs and regional innovation.

Although the starting point to monitor UIC is within a region or a country, the increasing efforts to build a European Research Area (ERA) give a strong rationale to monitor UIC also on an international basis and see to which extent it fulfils the aforementioned objective of "sharing knowledge across sectors and borders".

Indicators on the 6<sup>th</sup> EU R&D Framework Programme (FP6)<sup>8</sup> provide an insight on this international collaboration pattern. However, it should be kept in mind that the FP6 budget only represents about 5% of public research funding in Europe, so the FP6 financial data used in this policy note will only provide one part of the picture on UIC patterns. Moreover, research *per se* forms only a part of the full range of UIC activities. Collaborative research projects may be seen as a proxy for a wider array of UIC instruments. The purpose of this article is to summarise geographical (national and international) patterns derived from the observation of FP6 projects linking firms and universities.

## Assessing UIC patterns in the EU: a financial perspective

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There are some studies trying to characterise science-technology and UIC, but they usually tend to measure non-monetary aspects of the UIC (e.g. co-publications, citations...), within a single country or in ad-hoc groups of countries.

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<sup>5</sup> Commission Communication 'Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation', COM(2007) 182 final.

<sup>6</sup> Commission Recommendation, 'Management of intellectual property and knowledge transfer by universities and other public research organisations', COM(2008) 1329.

<sup>7</sup> Commission communication 'Delivering on the modernisation agenda for universities: education, research and innovation', COM(2006) 208.

<sup>8</sup> The Sixth Framework Programme covers Community activities in the field of research, technological development and demonstration activities (RTD) for the period 2002 to 2006.

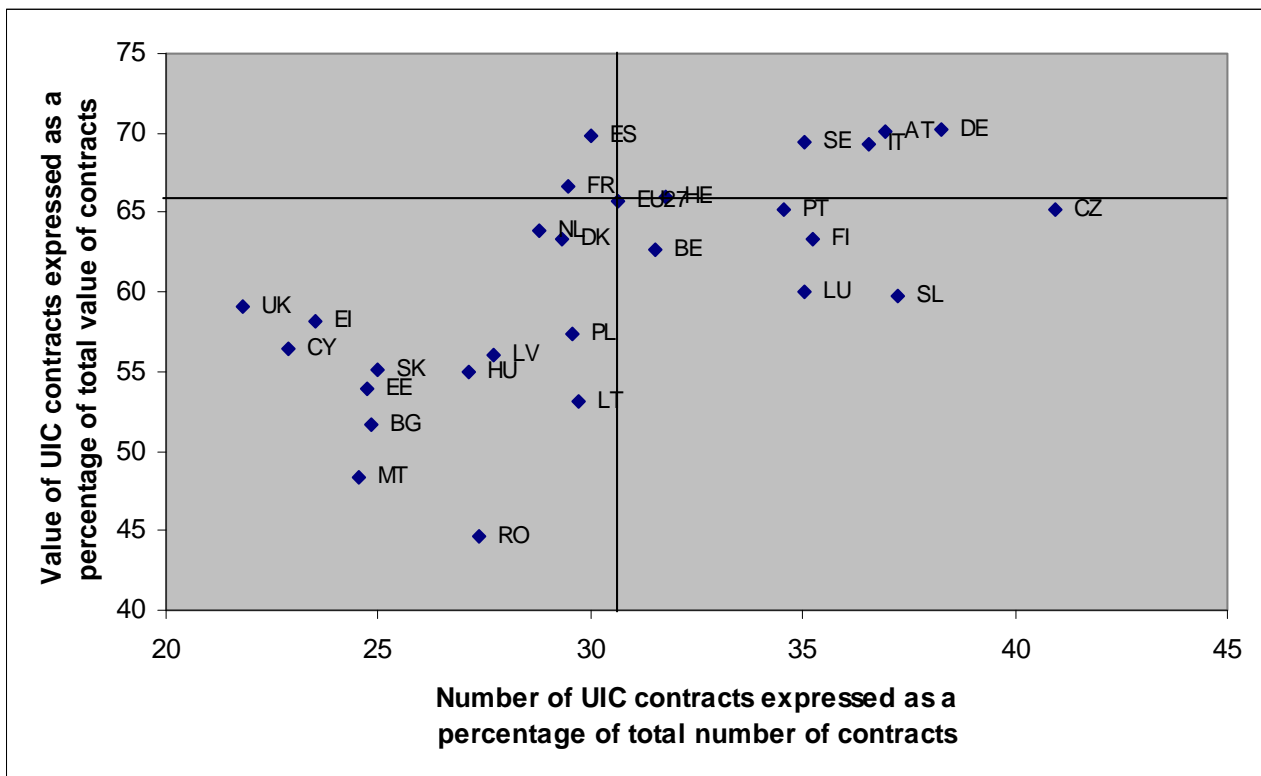
## University-industry cooperation budgets in the Framework Programme

Data on participation in the FP6 are a proxy for a financial perspective. By September 2007, the FP6 had granted 8 861 projects, for a total value of 15.8 billion Euros. Member states were involved in 88% of these projects (7 829 projects) representing 91% of the total value (14.5 billion Euros). For member states, one third of the total number of projects involved at least one university and one firm as participants (i.e. 2 400 projects). The value of projects involving UIC was 9.5 billion Euros. The average value per UIC project was nearly 4 million Euros in EU25, but with variations among countries ranging from 1.2 million for Romania to 4.76 million for Germany.

As can be seen in Figure 1, the percentage of UIC project value over the total value is high: two thirds of the FP6 funds in EU27 correspond to projects with UIC, even if UIC projects represent less than one third of the total number of projects.

It is possible to break this data down by country, because the database includes budgetary information per participant, and each participant is attributed to a country. For instance, if a project has a partner from France and another from Spain, we know exactly the money allocated for each partner.

Figure 1. Involvement of EU member states in UIC in the 6<sup>th</sup> EU R&D FP



Taking the EU27 average as a reference, Figure 1 also shows that countries getting the lion's share of UIC projects and value are Western, Northern and some Southern member states<sup>9</sup>. Eastern countries (Lithuania, Poland, Latvia, Romania, Hungary, Slovakia,

<sup>9</sup> Germany, Austria, Italy and Sweden present high percentages for both number and value of UIC; Finland, Luxembourg, Belgium, Spain and France stand out in at least one out of the two indicators.

## University-industry cooperation budgets in the Framework Programme

Bulgaria, Estonia) and some Southern countries (Malta and Cyprus) tend to rank low in both the proportion of number and value of university-industry FP projects.

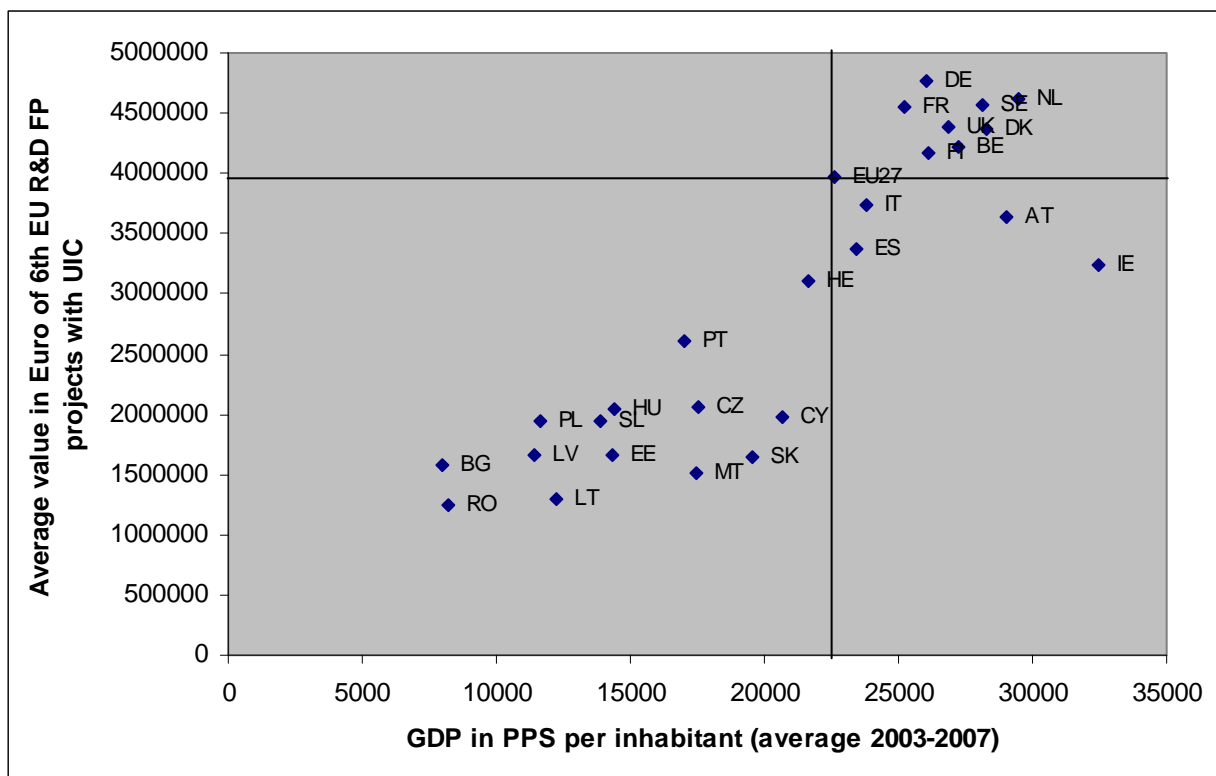
However, the pattern shows several exceptions: Northern and Western countries like Ireland and United Kingdom or, to a lesser extent, Denmark and the Netherlands, do not engage with UIC as often as their EU15 counterparts, while Eastern countries like Czech Republic or Slovenia and others like Portugal have a higher average number of UIC contracts than the other new member states. The average value of FP6 projects offers a partial explanation of the exceptions.

By dividing the value of FP6 projects by the number of FP6 projects, it is possible to build an indicator of the average value of FP6 projects. It appears in the Y-axis of Figure 2. In spite of a lower involvement in UIC, shown in Figure 1, projects involving participants from Denmark, the Netherlands, the United Kingdom and (to a lesser extent) Ireland have high average value.

On the contrary, despite being involved in high numbers of UIC projects, the Czech Republic, Slovenia or Portugal have low average value per project.

The X-axis of Figure 2 shows national per capita GDP. The correlation with the average value of FP6 projects is very high. This supports the idea that Northern and Western countries involved in FP projects with UIC get more funds than Eastern countries.

Figure 2. The relation between average value of EU R&D FP6 projects with UIC and per capita GDP in the EU



Note: Luxembourg excluded for being an outlier.

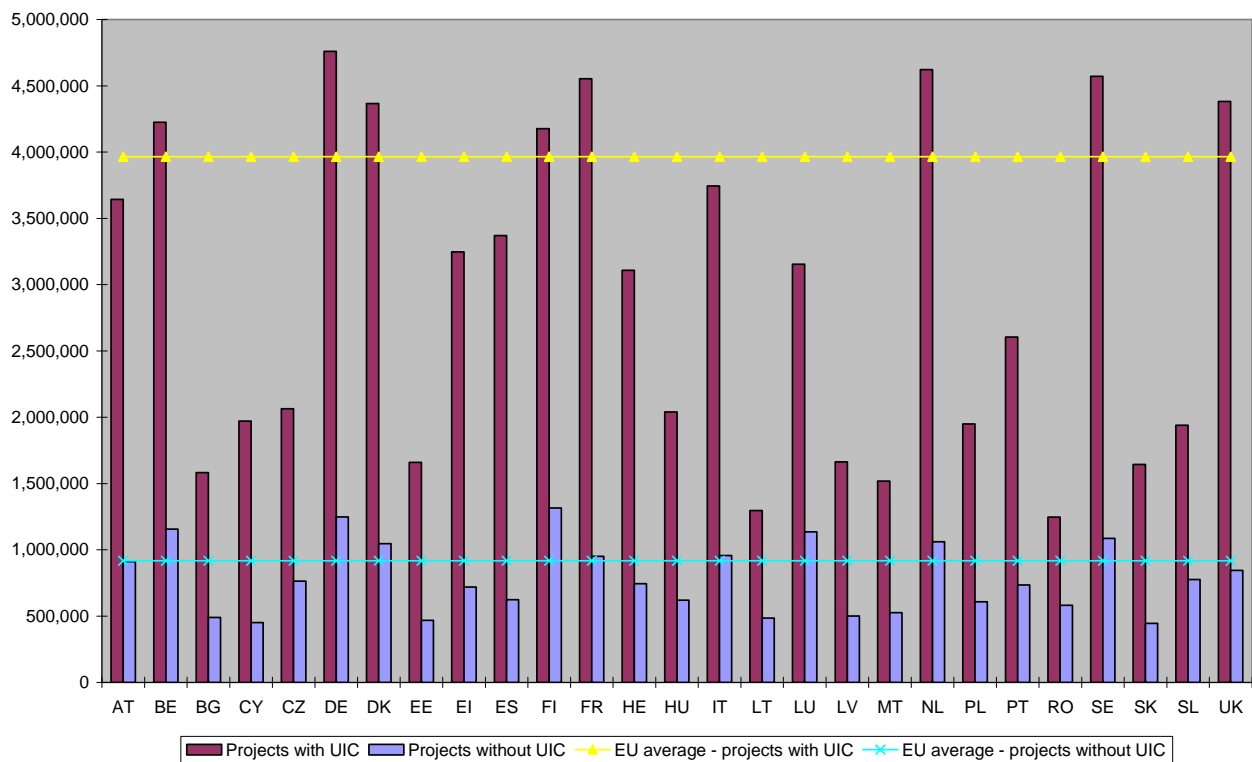
There is scant evidence to enable a comparison between UIC and other modalities of research, i.e. without UIC. Actually, results derived from the Fourth Community Innovation

## University-industry cooperation budgets in the Framework Programme

Survey (CIS4) show that, in EU27, universities are not an important cooperation partner for innovative companies, except for a few member states such as Finland, Slovenia and Sweden<sup>10</sup>. It is thus difficult to identify, for instance, whether UIC is more appealing in public calls for proposals than other modalities of research.

Figure 3 shows that, for the EU average, a UIC contract involves a funding four times bigger than other forms of collaboration (firm-firm, university-PRO, etc). This predominance of UIC is *a priori* reflecting the policy objective of fostering UIC, quoted in the introduction.

Figure 3. Average value of projects with UIC and non-UIC in the 6<sup>th</sup> EU R&D FP by EU member state

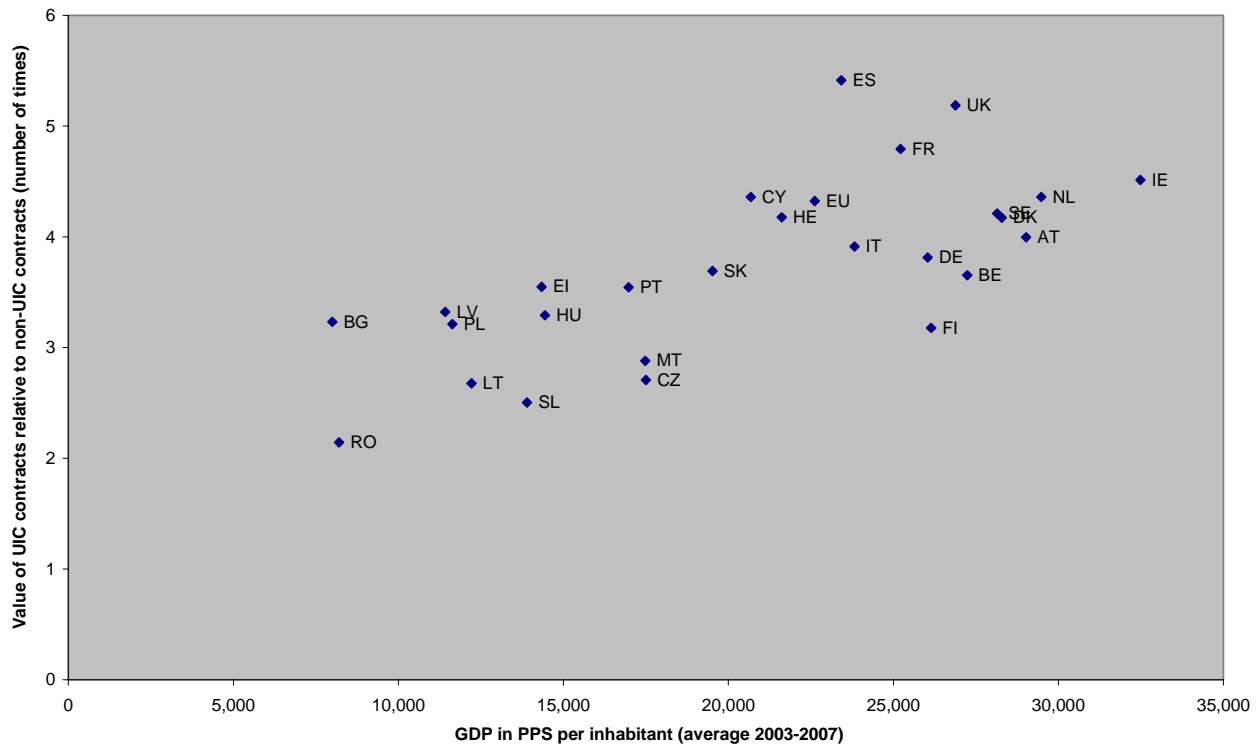


The higher average value of projects with UIC over projects without UIC is found in every member state. This raises the question of whether the relation of one to another is always the same. A good indicator is the ratio of the average value of projects with UIC over the average value of projects without UIC. Figure 4 shows the values for the EU and the member states and relates them to per capita GDP.

The results clearly show that the divergence in the value of UIC versus non-UIC is greater in Northern and Western countries than in Eastern and some Southern countries (Portugal, Malta).

<sup>10</sup> Statistics in focus 81/2007 "Weak link between innovative enterprises and public research institutes/universities". Eurostat

Figure 4. UIC vs. non-UIC projects in the 6<sup>th</sup> EU R&D FP in relation to GDP



Note: Luxembourg excluded for being an outlier.

## Conclusions and recommendations

The analysis presented above shows a gap in terms of funds received between Northern and Western countries on one hand and Eastern and some Southern countries on the other hand. Considering that the FP allocates funds on the basis of the quality of the proposal, the patterns observed may not apply exclusively to FP6, but to the wider context of measures promoting UIC. As other research activities, UIC tends to be a self-reinforcing phenomenon that favours already good performers. FP6 provides a good example of this asymmetric distribution. Northern and Western EU member states involved in FP projects engage more often in UIC and/or raise more funds out of each project with UIC. Other countries do not engage so often in projects with UIC or, if they do, they do not get so much average funding out of it. Therefore, at EU level, giving preference to UIC projects may have the unintended consequence of creating greater disparities between countries. In order to mitigate or reverse this consequence, accompanying measures would need to be put in place.

However, other studies show that Eastern and peripheral member states have the highest participation in the FP (in terms of relative number of participations<sup>11</sup>). Hence, in order to

<sup>11</sup> EC, 2008. A more research-intensive and integrated European Research Area: Science, Technology and Competitiveness key figures report 2008/2009. Belgium: European Commission, p. 106-107.

be cautious and more precise about such accompanying measures, additional analysis would be needed, such as:

- Breakdown by role of the partner (coordinator vs. participant): It would be possible to see if, from individual country data, some geographical patterns arise, not only in terms of "Northern and Western countries get more than Eastern countries", but also in terms of how member states are involved in UIC projects. For instance, in how many projects does country X appear as project coordinator and in how many just as a participant? Then, when presenting evidence that the difference between average value of UIC projects and non-UIC projects is bigger for Northern and Western countries, one could advance some hypothesis, e.g. these countries may generally be UIC project coordinators and participation from Eastern countries is in many cases only instrumental (e.g. to reinforce the multi-country nature of consortia) .
- Breakdown by FP thematic priority and/or instrument: the availability of indicators of the internationalisation of UIC in the ERA by thematic priorities would facilitate more fine-tuned policy making. Given that some FP thematic priorities coincide with emerging fields (e.g. nanotechnology), the analysis of UIC could help identify transnational complementarities and highlight the role of the FP in addressing sub-criticalities and fostering 'networked specialisation'. Similar insights could arise from the analysis of instruments, e.g. networks of excellence vs. integrated project, etc. Are the same geographical patterns of UIC observable for every thematic priority and/or instrument?
- Further analysis would be needed to suggest a causal relationship between geographical differences in UIC and per capita GDP. It could shed light on the variables that lay behind differences in GDP: a history of engagement with R&D (and perhaps the private and collaborative parts in particular), the number of years a country has been a member of the EU, the spatial concentration of industrial activity, institutional barriers to collaboration, the number of universities in each Member State, the size of the public sector research workforce, etc.
- Moreover, we must keep in mind that the exclusive use of FP6 collaborative projects statistics for this paper can only provide a limited perspective of the whole picture insofar as FP6 budget only represents about 5% of the whole public spending made by member states on R&D. One avenue of research would be to compare this analysis with data from other funding mechanisms such as nationally-funded collaborative research, funding coming from the Structural Funds, as well as non-FP6 international collaborative research. A wider consideration of the non-research aspects of UIC also needs to be examined.

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