

INTELLECTUAL CAPITAL MANAGEMENT AND REPORTING IN UNIVERSITIES.

USEFULNESS, COMPARABILITY AND DIFFUSION.
BEST PRACTICES IN DATA GATHERING AND ANALYSIS FROM THE AUTONOMOUS UNIVERSITY OF MADRID'S EXPERIENCE

M. Paloma Sánchez

Professor of Applied Economics
Autonomous University of Madrid
Ctra. de Colmenar, Km.15
28049, Madrid (Spain)
Phone: +34 913882180
E-mail: mpaloma.sanchez@uam.es

Rocío Castrillo

Research Assistant
Autonomous University of Madrid
Ctra. de Colmenar, Km.15
28049, Madrid (Spain)
Phone: +34 914975241
E-mail: rocio.castrillo@uam.es

Susana Elena

Assistant Professor of Business Management
Pablo de Olavide University
Ctra. Utrera, km. 1
41013, Sevilla (Spain)
Phone: +34 954 348986
E-mail: seleper@upo.es

Paper presented at the International Conference on Science, Technology and Innovation Indicators. History and New Perspectives. Lugano 15-17 November 2006.

INDEX

1. Introduction.	2
2. Why Intellectual Capital approaches in Universities?	3
2.1. Intellectual Capital. Conceptual framework.	3
2.2. The role of universities in the knowledge-based society.	4
2.3. Intellectual Capital in Universities: the State of the Art.	5
3. The ICU framework.	7
3.1. The ICU measurement framework. Methodological and practical considerations stemming from the Strategic Matrix.	8
3.2. The ICU Report.	13
4. The UAM case study.	13
4.1. Assessment of the ICU Report: usefulness for management and willingness to disclose.	14
4.2. Characterisation of the Research Management and Governance of the UAM.	15
5. Conclusions and ways forward.	24
6. References.	28
ANNEX 1. Frascati fields of Science and Technology.	32
ANNEX 2. The ICU Report.	33
ANNEX 3. List of interviewees' positions.	35

KEY WORDS

Management, Reporting, Intellectual Capital, Intangibles, Universities, Research Centres, Observatory of European Universities.

ABSTRACT

The first aim of this study has been to discuss the need for new models of management in universities and reflect on why Intellectual Capital approaches are so highly recommended to cover this requisite. The second aim has been to provide an initial framework for the management, measurement and disclosure of Intellectual Capital within universities and research centres: the ICU framework. Two specific tools have been designed to cope with two challenging necessities in the new paradigm of universities: the ICU measurement framework to improve internal management (through an initial improvement in measuring); and the ICU Report to improve transparency. Finally, the third main aim of this work has been to assess the usefulness and suitability of this ICU framework in the specific case of the Autonomous University of Madrid (UAM), in order to address the traditional complexity of these institutions and to present proposals for Intellectual Capital measurement. We have dealt in particular with Governance issues at the UAM.

1. INTRODUCTION.

There is general consensus on the idea that, under the new paradigm of the knowledge-based economy, wealth and economic growth are “*driven primarily by intangible (intellectual) assets*” (Lev, 2000; p.1). According to this, intangibles and Intellectual Capital have become a major issue not only for academics but also for governments, regulators, companies, public organisations, investors and other stakeholders.

During the last few decades we have witnessed an unprecedented increase in the use of the terms intangibles and intellectual capital in reference to a set of factors that represent sources of corporate earnings (MERITUM, 2002). In a very recent document, the OECD states that the contribution of unmeasured Intellectual Capital to economic growth was 10%-11% of gross domestic product (GDP) in the United States over the period 1995-2003, rivalling the contribution of tangible capital, and both types of capital contributed equally to labour productivity growth in those years (OECD, 2006, p. 11). Accordingly, the OECD affirms that an improved measurement of their contribution is very much needed (ibid., 2006).

Despite the fact that most knowledge management and Intellectual Capital analysis developed during the last decades refers to private companies, there is a growing interest in public organisations, such as universities and research centres. This latest concern is due to the fact that universities’ main goals are the production and diffusion of knowledge and their most important investments are in research and human resources (Cañibano and Sánchez, 2005).

The current role of universities in the knowledge-based economy is analysed from the perspective of new theories in evolutionary economics, mainly the Triple Helix Model, where University-Industry-Government relations are analysed “*in terms of three interlocking dynamics: institutional transformations, evolutionary mechanisms and the new position of the university*” (Etzkowitz & Leydesdorff, 2001; p.6), and it is suggested that not only these relationships are changing, but also that there are internal transformations in each institution. According to this, “*the increase of interactions among the institutions has had the effect of generating new structures within each of them, such as centres in universities or strategic alliances among companies*” (Etzkowitz & Leydesdorff, 1996; p.280). Traditionally, universities were acting in isolation, separated from the real world and working under regulations that prevented them following their own path.

Within this new paradigm, European higher education and research systems are immersed in a far-reaching transformation process, which aim to make our universities and research institutes more comparable, flexible, transparent and competitive, in both teaching and research. As Goldsmith and Berndtson (2002) state, “*higher education is affected today by a number of new challenges, which have already changed our way of teaching and research*”. If a knowledge-based economy is characterised by the production, transmission and dissemination of knowledge and Intellectual Capital, universities are unique in all these processes (European Commission, 2003). Subsequently, the European Commission has been fostering universities as pivotal elements for augmenting economic growth.

As we have stated, the first aim of this study has been to discuss the need for new models of management in universities and reflect on why Intellectual Capital approaches are so highly recommended to cover this requisite. The second aim has been, once the need has been identified, to provide an initial framework for the management, measurement and disclosure of Intellectual Capital within universities and research centres. Finally, the third main aim of this work has been to assess the usefulness and suitability of this ICU framework in the specific case of the Autonomous University of Madrid (UAM). Within the UAM we have tackled the Governance issues in particular. Each one of these three aims is developed in the three following sections and after this, there is a

conclusion, summarising its key points and main contributions. In addition to this, we throw up new and interesting questions for discussion and propose some ways forward which are now open to further research.

2. WHY INTELLECTUAL CAPITAL APPROACHES IN UNIVERSITIES?

2.1. INTELLECTUAL CAPITAL. CONCEPTUAL FRAMEWORK.

We are moving towards a knowledge-based economy where intangible assets and investments are seen as essential elements to value creation in companies and, hence, to economic wealth (Cañibano, García-Ayuso and Sánchez, 2000). To this effect, since the second half of the twentieth century main economic theories have recognised, to a greater or lesser degree, the existence of intangible elements that explain part of the economic growth (Solow, 1957; Deninson, 1962; Arrow, 1962; Schultz, 1969; Kendrick, 1974; Becker, 1975; Freeman, 1982; Nonaka and Takeuchi, 1995; Gorey and Dobat, 1996; OECD, 1996; European Commission, 2000).

From a conceptual point of view, in line with Lev (2000), we can consider that the terms intangibles, knowledge assets and intellectual capital are interchangeable. Intellectual Capital (IC) has been defined as the combination of intangible resources and activities that “allows an organisation to transform a bundle of material, financial and human resources in a system capable of creating stakeholder value” (European Commission, 2006, p. 4).

In this sense, Marr and Roos (2005), when referring to firms, highlight the dynamic interaction between Intellectual Capital and other resources. Such interaction is essential to deliver organisational performance. In fact it is the interaction among the different types of capital that creates wealth within an organisation (Marr and Roos, 2005, p. 32).

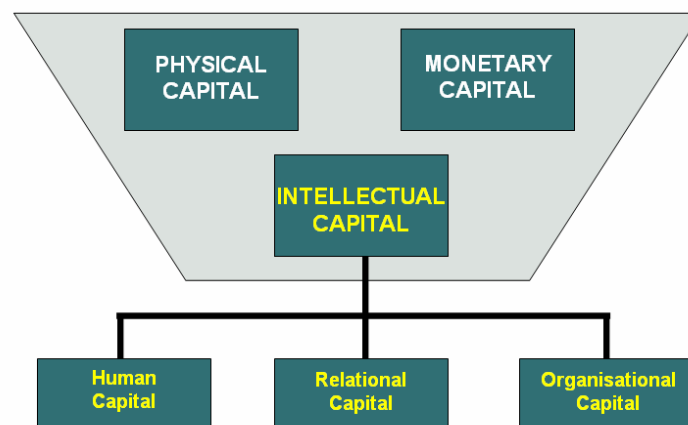


Figure I. Taxonomy of Organisational Assets.
Source: Marr and Roos (2005), p. 32.

The IC components recognised in most literature (Edvinsson y Malone, 1997; Sveiby, K.E., 1997; MERITUM, 2002) are Human Capital, Structural Capital and Relational Capital. The definitions,

although initially established for companies¹, can be easily adapted for Universities and Research institutions:

- **Human Capital** is defined as the knowledge that the human resources (teachers, researches, PhD students and administrative staff in this case) would take with them if they left the institution.
- **Organisational Capital** is defined as the knowledge that stays within the institution at the end of the working day. It comprises the governance principles, the organisational routines, procedures, systems, cultures, databases, intellectual property, etc.
- **Relational Capital** is defined as all resources linked to the external relationships of the institution such as “customers”, “suppliers”, R&D partners, Government, etc.

Within each category we distinguish between resources and activities (European Commission, 2006). Each group focuses on different issues and gives different types of information. MERITUM (2002) defines these two categories as follows:

- **Intangible resources (static notion)** is the stock or current value of a given intangible at a given moment in time. They may or may not be expressed in financial terms. The resources can be both inputs (researchers, for instance) or outputs (publications).
- **Intangible activities (dynamic notion)** imply an allocation of resources aimed at:
 - a) developing internally or acquiring new intangible resources,
 - b) increasing the value of existing ones, or
 - c) evaluating and monitoring the results of the two former activities.

Intuitively, we can say that resources show what an institution is like (a static vision at a given moment; as a ‘stock’ of the organisation) while activities may show how an institution is going to be (a dynamic vision, as a ‘flow’). The activities give revealing insights into the expected evolution of the Intellectual Capital linked with the strategic objectives.

....In the case of universities, for example, patents, publications or spin-offs are the results of previous activities. At a given moment, they are the resources (the assets) of the institution. However, the institution may undertake activities to encourage researchers to patent, publish or create spin-offs which would improve such resources. The amount that an institution invests in these activities reveals its strategy and provides some hints about its future prospects (MERITUM, 2002). In order to understand knowledge-based value creation, we have to look both at the resources and the activities for using them, although the latter are apparently much more difficult to measure and quantify (Pöyhönen, 2005, p.3).

2.2. THE ROLE OF UNIVERSITIES IN THE KNOWLEDGE-BASED SOCIETY.

In this new context where knowledge and Intellectual Capital play a central role in the innovation process, the Lisbon Agenda (European Council, 2000) aims to make Europe “*the world’s leading knowledge-based economy by 2010*”. Barcelona European Council in March 2002 and European Council of March 2005 re-launched the Lisbon strategy and are fostering universities as pivotal elements for reaching this objective.

If a knowledge-based economy is characterised by the production, transmission and dissemination of knowledge, universities are unique in all these processes. For that reason, the UE considers that “*investing more and better in the modernisation and quality of universities is a direct investment in the future of Europe and Europeans*” (European Commission, 2005; p.2).

¹ The definitions the European Commission is using are taken from the MERITUM project (MERITUM, 2002).

Although there is general consensus about the necessity for new measurement techniques, there are important obstacles when measuring knowledge for many different reasons (Foray, 2004): an important part of knowledge is implicit; the different elements of knowledge are heterogeneous; knowledge is not observable, etc. Furthermore, it is more complicated to obtain comparable indicators for intangibles than for tangibles (OECD, 1999). Even though it is generally accepted that intangibles create added value, this cause-effect chain has not yet been quantified (Lev, 2000).

Notwithstanding the above-mentioned difficulties, a wide range of methods and initiatives for measuring and reporting intellectual capital at firm level has been developed since the last decade in order to identify, measure, manage and report intangibles within companies. The most relevant and widespread are: Balanced Score Card (Kaplan & Norton, 1992); Navigator of Skandia (Edvinsson & Malone, 1997); Technology Broker (Brooking, 1996); West Ontario University (Bontis, 1996); Canadian Imperial Bank (Saint-Onge, 1996); Intellectual Asset Monitor (Sveiby, 1997); Intellectual capital (Dragonetti & Ross, 1998); The Value Explorer (Andriessen, 2001); MERITUM Project (2002)². Even though all these initiatives follow different schemas, they share a common feature: the voluntary character of those firms that decide to implement them. From the public sector perspective, intellectual capital and knowledge management is an important challenge for public organisations and is *"in many ways a crucial public good, affecting a country's overall competitiveness"* (OECD, 2001; p.6).

During the last decade some public organisations have been making great efforts to identify measure, manage and disclose Intellectual Capital. However, even assuming that firm-level experiences could be useful in formulating public management models, a new design addressing the specific needs of these kinds of organisations is needed.

Focusing on public universities and research centres, Intellectual Capital and knowledge management approaches become crucial in order to reinforce their role in national innovation systems within the new economy for different reasons. On the one hand, because universities' main inputs and outputs are basically intangibles and only a small part of these are identified and very limited instruments exist to measure and manage them (Cañibano y Sánchez, 2004). On the other hand, because public institutions, universities and research centres are forced to be more transparent and disseminate more information to stakeholders. As asserted by the European Commission (2003; p.13) *"universities have a duty to their stakeholders (students, public authorities funding universities, labour market, society as a whole) to maximise the social return of the investment"*. However, despite the increase in external demands for greater information and transparency on the use of public funds (Warden, 2003), most universities in developed countries inside and outside Europe have not yet assumed generalised practices on the preparation of external information reports (Campos, Noerto and Villanueva, 2003).

2.3. INTELLECTUAL CAPITAL IN UNIVERSITIES: THE STATE OF THE ART.

Supporting the use of Intellectual Capital approaches in universities, the European Commission is encouraging Intellectual Capital reporting in Universities through a recent move. In December 2004 the D.G. Research set up a High-Level Expert Group to recommend a set of measures to stimulate SMEs to report on their intangibles. By doing so, the Expert Group has also taken into consideration their relationship with Universities and the need for the latter to report on their Intellectual Capital. The main assumption which supports the recommendations for reporting is that Intellectual Capital is the hidden driver of the knowledge-based economy and that diffusing information on IC may

² The MERITUM Project developed 77 case studies in six European countries (Spain, France, Finland, Sweden, Denmark and Norway).

stimulate and make the organizations' R&D efforts more visible. The document produced by the Group (European Commission ,2006) includes, among the policy recommendations, the need for both the Commission and the member states to promote the spread of the IC framework in universities and research and technology organizations.

In relation to universities, the report argues that they have been confronted with new kinds of challenges in recent years, having to compete increasingly for research funds and to cope with new research modes. In this new context, *"IC Reporting could improve both the transparency in governance and in their resource management. This could make a valuable contribution to their competitiveness and attractiveness to the most 'forward looking' students and academics of the European Higher Education System"* (ibid, p. 102).

As a consequence the RICARDIS report is very clear. It suggests that:

- 1) Universities and like institutions should be encouraged to see the advantages, both for their internal management and for their relations with society, of managing and reporting IC.
- 2) Under-graduate and postgraduate education and training in the identification, management and communication of intangible assets should be provided to students, and
- 3) Funding agencies should fulfil IC reporting requirements, but do so only in an environment of increased support and funding and not as tool for *cutting back* or *budget restriction*.

In the light of these recommendations, some public organisations have been making great efforts to identify measure, manage and disclose Intellectual Capital information during the last decade. In this respect, some interesting experience has been acquired, specifically in universities (ARC, 2000 and 2005; INGENIO, 2002; Leitner and Warden, 2004; Comunidad de Madrid, 2002; Araujo, 2000; Norwegian Ministry of Education and Research, 2003; Nyen et al., 2004; CMM Centre for Molecular Medicine, 2005).

Among these examples, the most important one is probably the case of ARC in Austria. The ARC (Austrian Research Centres) has been publishing an IC Report for the last 7 years. The Intellectual Capital Report is conceived by the organisation as a new instrument to measure intangibles not shown in its annual report, and a crucial component in corporate strategy. This model is not only conceived as an instrument to diffuse information to the community, but also, and even more importantly, to improve strategic management and to learn about the internal process of value creation. Accordingly, the main reasons to develop an Intellectual Capital Report (Austrian Research Center, 2000) are:

- ❑ Transparency in the use of public funds.
- ❑ Understanding that *"research is not self-explanatory: its benefits must be interpreted and communicated in a comprehensible way"* (Austrian Research Center, 2000; p.3), and following its internal policy of communication and openness, the IC Report provides interesting information about all research activity.
- ❑ Illustrating the development of the intangible assets.

Taking advantage of such experience the Austrian Government decided in 2002 that IC Reporting would be mandatory for all universities by 2007 (Leitner, 2005). The Universities Act 2002 (Section 13, subsection 6) defines that "each university shall submit an intellectual capital report [...]. which would present the university's activities, social goals and self-imposed objectives and strategies; and its intellectual capital, broken down into human, structural and relational capital (European Commission, 2006; Appendix C).

Anticipating its obligations to the above-mentioned Austrian Act, the University of Vienna is currently developing a trial of the Intellectual Capital Report in two departments in order to analyse both the opportunities and the potential problems when applying the law (Altenburger & Novotny-Farkas, 2005).

Analysing all these initiatives and endeavours, we believe that the European Union will follow a similar path to the one opened by Austria, as is suggested by the RICARDIS document (European Commission, 2006). In this changing context, the need for measuring and managing Intellectual Capital in universities becomes crucial.

In line with this, there has been research specifically devoted to this need. In order to understand the European university system and to improve university management processes in this changing context, one of the most ambitious initiatives is the Observatory of European Universities, being developed within the PRIME (Policies for Research and Innovation in the Move towards the European Research Area) Network of Excellence, and supported by the VI Framework Programme.

Fifteen universities and research institutes from eight different European countries³ are working together to develop a common framework of analysis and to build a battery of indicators to measure and compare the intangible elements related to research activities. Among them, is the Autonomous University of Madrid that has actively participated throughout this whole project. Indeed, OEU has been the basis of the above-presented ICU framework in terms of indicators design and data gathering.

3. THE ICU FRAMEWORK.

The previous section demonstrates that **new methods of measurement and management are necessary within universities and research centres, and that Intellectual Capital approaches seem to be a potential answer for universities to cope with the new requirements in this changing paradigm.** Higher education institutions are going through a period of important transformations ('Bologna Process' -Bologna Declaration, 1999- and the proposed 'European Higher Education Area' -Prague Declaration, 2001-), and in this new context, IC Reporting could improve both their transparency in governance and their resources management. Having identified this latent need, two proposals for measuring, managing and reporting Intellectual Capital at universities have been developed within this work: the ICU measurement framework for management and the ICU Report for disclosure. Each proposal endeavours to give a solution to two of the main university concerns: improving transparency and improving management.

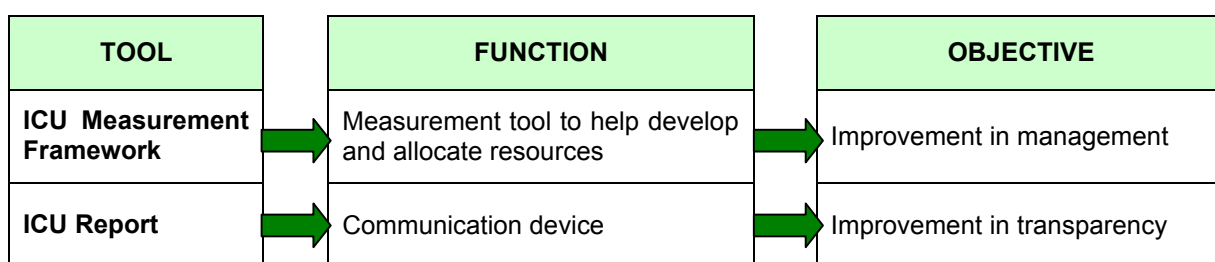


Figure II. The ICU Framework. Functions and objectives.

With our understanding of the different objectives set by universities, our aim is to present suggestions and recommendations to cater for each one. Therefore, the proposals in this study are:

1. **The ICU measurement tool.** It is specifically designed to help internal management within a university through an improved measurement system of IC information. Its general aim is to tackle one of the main concerns in universities: achieving an efficient management model.

³ Germany, Spain, France, The Netherlands, Hungary, Italy, Portugal and Switzerland.

2. **The ICU Report.** It is a tool to disclose IC information to the community (students, public authorities funding universities, the labour market and society as a whole) in order to cope with other important concerns in universities: improving transparency and reducing isolation from the external world.

We consider this framework narrow enough to assure a certain degree of comparison (when showing some of the indicators included in the ICU Report for disclosure), and open enough to allow institutions to include their individual concerns.

3.1. THE ICU MEASUREMENT FRAMEWORK. METHODOLOGICAL AND PRACTICAL CONSIDERATIONS STEMMING FROM THE OEU STRATEGIC MATRIX.

The ICU measurement framework has its basis in the Strategic Matrix created by the OEU Project⁴. From this Strategic Matrix, the 141 indicators have been reclassified into the categories of Intellectual Capital: Human, Organisational and Relational Capital⁵. The Strategic Matrix developed by the OEU project is easily presented in an IC framework, with little adaptation, due to the similarities with the IC Report recommended at RICARDIS (European Commission, 2006). This adaptation has had its practical effect on the terminology used. We consider that the approach taken in OEU was totally valid from the analytical point of view, but a higher impact and usefulness can be achieved by using IC terminology (Sanchez et al., 2005).

In short, the ICU measurement framework is simply a translation of the Strategic Matrix into IC language. The rationale of this translation is that, regarding the international visibility of the IC approaches and perspectives, it would be more consistent to report the information that universities will publish in terms of IC.

The ICU measurement framework has been a first approach in the design of a tool for the measurement of research activities. We consider that measurement is the first and unavoidable step towards efficient management. Nevertheless, it is important to keep in mind that universities will have to adapt this framework to their specific characteristics individually: we maintain that no homogenisation is possible at an individual level.

Next, we will raise some methodological and practical considerations that, in our view, could improve the ICU measurement framework. Some of them are structural limitations without a perceived solution, but they must be taken into account. Others can be undertaken in future works. These considerations were highlighted when undertaking the experience of fulfilling the Strategic Matrix at the Autonomous University of Madrid (UAM)⁶.

⁴ The Observatory of European Universities project has been developed within the PRIME Network of Excellence, and supported by the VI Framework Programme. The Strategic Matrix is the analytical framework created in order to provide universities and research centres with the necessary tools and instruments for the governance of research activities.

⁵ Detailed information about such translation is available at Castrillo, R. (2006) "Intellectual Capital Management and Reporting in Universities. The Autonomous University of Madrid case study". Minor thesis.

⁶ UAM is a Spanish public university founded in 1968 where teaching and research activities are considered of equal importance. UAM is shaped by 8 Faculties made up of 60 Departments, 8 Research Institutes and 20 additional centres, where 34 undergraduate programmes, 75 Master programmes and 89 PhD programmes are taught. Within the OEU Project, UAM is the only institution that has been working in all the five thematic dimensions of the Strategic Matrix⁶. Therefore, the UAM research group has acquired a great deal of experience on the problems of measurement faced by universities.

Methodological and practical considerations stemming from the Strategic Matrix.

❑ *Structural differences that hinder comparison.*

The **national system** in which a university is embedded obviously plays a very important role and hinders comparison between universities. While assuming that it is impossible to isolate all the effects of the national systems in a university, some indicators could be adapted. For example, in order to allow comparisons of wages, it is necessary to analyse them using a deflator based on salaries in real terms (Sanchez and Elena, 2006).

At the same time, the **region of a university** should be studied, in terms of, for example, the density of innovative companies in the area of influence, or population size in the closest city. These factors may affect the 'Third Mission' of a university.

Other structural differences that should be taken into account are the size of the university and the degree of specialisation. The differences in the **size of universities** can be only partially overcome by using percentages (for example the budget of such a unit in relation to the total budget of the university), although this does not exclude the effect of the economies of scale.

Regarding the **degree of specialisation in a university**, it has been a very complicated issue for the OEU Project. The great differences among scientific fields concerning expected outputs (mainly patents and publications) make it crucial to avoid aggregated comparisons regarding productivity. For example, there is no sense in comparing a university engaged in the Arts with another with a scientific profile in terms of the number of patents.

Although there is a clear need for providing disintegrated data for certain indicators, there is no consensus about the number of scientific fields that the OEU group should use for breaking down indicators. Each university groups internal information according to individual considerations; nevertheless, a consensus on the number of scientific fields to be considered is crucial, if comparison is to be valid.

With this aim, we undertook a comparison of nine European universities, members of the OEU project, in order to unravel the heterogeneity in scientific fields and the availability of disaggregated information. By doing this, we had to assume the number of faculties as the minimum unit of analysis possible. In principle, the breaking down of information by department, lab or research group would be highly costly (if possible). For example, this information is not available in the UAM. However, we consider that a more thorough disintegration of information would be very interesting for managing Intellectual Capital internally, and this could be thought about in the future.

In this comparison, we acknowledge that the number of universities considered is not large enough to allow generalizations, but it may be interesting as an initial approach. The goal here was to group the areas in which a university is involved, considering the faculties (the minimum statistical feasible unit of study) as a proxy to the areas in which research takes place. The breakdown by fields follows the Frascati rules (see Annex 1) (OECD, 2002).

	UMLV Université de Marne- la-Vallée	UNIL Université de Lausanne	Universidad Autónoma de Madrid	Universi- dade de Aveiro	Universi- té Paris- Sud	University of Maastricht	University of Bologna	EPFL Ecole Polytechni- que Fédérale de Lausanne	University of Venice Ca' Foscari
1. Natural Sciences	X	X	X	X	X	X	X	X	X
2. Engineering and technology	X		X	X			X	X	
3. Medical sciences		X	X	X	X	X	X		
4. Agricultural sciences							X		
5. Social sciences		X	X	X	X	X	X		X
6. Humanities		X	X	X		X	X		X

Table III. Scientific fields disclosure.

Another issue to be addressed in relation to scientific fields is the **labelling of a university as generalised or specialised**. We define a university as specialised when a large proportion of its fields is concentrated in one area or a few related areas. We define it as generalist if there is a broader spread covering a number of different areas of knowledge.

At a first glance, only two of the nine universities in the table seem to be clearly specialised: UMLV Université de Marne-la-Vallée and EPFL Ecole Polytechnique Fédérale de Lausanne. Both are engaged only in Natural Sciences and Engineering and Technology. At the other extreme, we could identify three generalised universities: University of Bologna, Autonomous University of Madrid and University of Aveiro. However, even in this small sample, there are three universities that are between being specialised or generalised. In order to classify them, a clear definition of limits should be set down.

It has been difficult to set the limit between a generalist university and a specialised one. The OEU project undertook this goal but no one solution has been found. In order to show the complexity of this issue, we have identified some ways to make this separation with its corresponding problems and limitations:

1. Breaking down by the number of areas of knowledge.
We could consider specialised universities as those that are present in, for example, three or fewer scientific fields. This is, in our view, a naive approach, since being present in a specific area does not mean being active from a research point of view: some areas can remain only as historical objective and be of no interest for developing. For example, a university could have lost all its good researchers in a field and still maintain the same research institute, even if it is not productive.
2. Breaking down by the resources dedicated to some areas.
We can also consider the specialisation of a university according to the resources dedicated to each area. This approach could result in misleading conclusions for several reasons: university authorities might not have the power of reallocating resources in a given period of time⁷; some scientific fields usually need more fixed investment (such as labs or equipment), etc.

⁷ For example, in Spain, personnel cannot be easily reallocated, and this is the most important research-related expense that universities have.

3. Breaking down by the outputs of areas.

Another option may be to discriminate the most important fields by concentrating on those that produce more outputs. One of the problems with this approach is that not enough is known about the outputs of a university (excluding publications and Intellectual property, which, as seen before, benefit the Scientific fields). Another problem is related to new areas of knowledge, which may not give results in the short-term, but could be a source of excellence in the future.

4. Breaking down by the priority lines of a university.

This is, in our opinion, the most coherent way of breaking down specializations. As the university decides how many areas it invests in, its strategy is indirectly stated: whether it is looking for specific areas of excellence or a broader spread over a number of different areas of knowledge. Despite its theoretical rationale, there are universities that do not have priority lines (like the UAM). It would also be necessary to go much deeper to find out which area each specific priority is in and this would require information on a greater disintegrated level.

❑ ***Different stages of development.***

The starting point to implement a research measurement system, is the discussion and definition of the institution goals and strategies, because *“the process of acquiring, applying and exploiting knowledge starts with the definition of specific goals”* (Leitner and Warden, 2004; p.8). The culture of quality and transparency in the higher education system started some years ago has pressured universities around the world to define a Mission Statement or a Strategic Plan. Even so, not all universities are at the same stage of development. Most European universities follow a functional and disciplinary internal structure, which make it difficult to manage university research activity as a whole. Indeed, most managers of individual faculties have little knowledge about research activity in other disciplines. Moreover, this organisational structure is not flexible enough to assess and measure multidisciplinary actions and joint research (Sanchez and Elena, 2006).

❑ ***Too many indicators.***

University managers point out that the Strategic Matrix includes too large a battery of indicators (Sanchez and Elena, 2006). The process of gathering information and producing indicators is costly and may turn out to be useless for management purposes.

Although the battery of indicators may be too large at a first glance, we consider that this has some benefits. Since each specific university should make the effort of selecting indicators according to its strategic considerations, this list is a good starting point that provides a broad framework for universities. From this, each university should adapt the IC information to its own idiosyncrasies.

❑ ***Over ambitious indicators.***

Following the Strategic Matrix, the UAM was able to give information on only some indicators. For example, in the case of Third Mission-related indicators, most of those associated with policy making and society in general were not available.

In order to obtain some information for comparison, the UAM proposed using less ambitious indicators, focused on compiling qualitative and narrative information together with checklists YES/NO. For example, in order to evaluate a Transfer of Technology Office, we consider it useful to present a list of activities (which may be) performed by these institutions. From this list, each university would tick those appropriate and add some comments in order to complement the numeric indicator.

❑ ***Further definition of indicators required.***

When the UAM undertook the task of assessing usefulness of decision-makers in the university, some indicators appeared to be confusing and could lead to different interpretations. This is obviously a drawback, and shows the need for a clearer definition for them.

❑ ***Lack of information on efficiency.***

Efficiency in the use of resources in order to achieve the maximum possible outputs should be an important issue if the goal is to compare universities. However, measuring efficiency has not been undertaken within the OEU Project. The reason of this may be the fact that there is another project (AQUAMETH⁸) fully engaged with this measurement in universities and research centres within the PRIME Network of Excellence.

❑ ***Lack of indicators on activities.***

As we defined above, activities are actions to (somehow) improve the situation of the Intellectual Capital in an institution. They reflect how an institution is going to be rather than how it is now. They show what the main strategic goals of the institution are in reality. The RICARDIS document also emphasises the importance of distinguishing between resources and activities.

The OEU project has been working mainly on resources, and has not proposed indicators on activities. This limitation has been mainly set for one reason: within the project, indicators were selected in accordance with the ease of data collection. Indeed, the feasibility of obtaining information in universities was the main criterion when selecting indicators. As Pöyhönen states, activities are apparently much more difficult to measure and quantify (Pöyhönen, 2005, p.3). Subsequently, this work should be considered an initial attempt that will be developed in the future.

This limitation has also remained in our proposal for disclosure mainly because of the goal set in this work: creating a list of indicators that identify comparability among institutions. If we consider comparability as the first aim, it may be advisable to use indicators of resources. Moreover, we selected these latter indicators bearing in mind the potential reluctance to publish strategic activities. In our view, how a university is planning to improve a certain situation throws invaluable light on the strategic decisions that have been made internally. On the one hand, this will be of great value to attract, for example, the best researchers or students, but, on the other, may give away sensitive information. A careful selection of the indicators on activities to be diffused is therefore needed.

Nonetheless, we are sure that the scanning of indicators that provide information on activities will be paramount in future steps of IC Report development.

❑ ***Weakness of some indicators.***

There are specific limitations affecting some indicators. In these cases, alternative sources of information would be highly very much needed in order to complement them.

1. Regarding Codification of Knowledge (Academic Outcomes).

Although the usual way to measure Academic Outcomes is by the number of articles published in the ISI-Thompson database (as is the OEU project), it raises several important problems.

- Advantages for English speaking countries. Most articles that are included in the ISI-Thompson database are written in English, which supposes a disadvantage and greater effort on behalf of non-English speaking researchers.

⁸ "Advanced Quantitative methods for the analysis of performance of public sector research".

- Great differences among scientific groups. As stated above, this limitation can be overcome by comparing only the same scientific groups: an aggregated comparison would not have any sense.
- Disadvantages for applied discoveries. As the scope of this database is worldwide, publications of applied discoveries seem to have less value than general discoveries. This obviously benefits the Hard Sciences, since any discovery made in these areas may be more easily proven and used everywhere. On the other hand, very important discoveries in other areas, such as Social Sciences, may only be used in the research centre.

2. Regarding patents.

The drawbacks of patents as comparable indicators are well known. Many innovations are not patented, others are covered by multiple patents, and while many patents have no technological or economic value, others are extremely valuable⁹.

3.2. THE ICU REPORT.

The ICU Report is a proposal for the next logical step after managing Intellectual Capital: its disclosure. This tool deals with a first attempt to create a homogenised IC Report specifically designed for universities and research centres. To this purpose, we have designed the ICU Report with three main sections, in order to address the close relationship of management with the selection of information for disclosure. In this regard, a pile of indicators were selected from the ICU measurement framework. We consider that the list of indicators is not self-explanatory since each indicator can denote or imply different things depending on the person who receives the information. Consequently, it is crucial to add the literature required to understand each indicator in order to avoid a set of meaningless indicators.

According to RICARDIS, standardization on the measurement of intangibles is at the same time an important and delicate issue. On the one hand standardization is paramount to provide comparability, interpretability and credibility of information. On the other, such standardization is difficult since IC Reports are designed around the specific characteristics of each organization.

Regarding the RICARDIS proposal for standardization, we should consider the basic or general set of indicators as those that should be useful for all organisations and institutions. Using the same thinking, there would be a set of sector-specific indicators (only useful for those in a specific sector, universities and research institutions in this case). Institution-specific indicators can be chosen by each university allowing for individual considerations.

Apart from the effort that the European Union is making for the standardization at the first level (the basic set of indicators), we have attempted to set standards for clearly identifying, defining and describing indicators at the second level (sector-specific indicators for universities). The third level indicators should be developed by each institution individually. Assuming that every organisation is idiosyncratic in nature, the creation of an opener framework (with some homogenized categories to ensure consistency and comparison) can allow new and attractive possibilities. The model that RICARDIS proposes is narrow enough to assure a certain degree of comparison, and open enough to allow institutions to include their main concerns.

The ICU Report is not extensively explained in this paper. Full information about this tool can be found in the closing chapter of the OEU methodological guide¹⁰.

⁹ For a detailed explanation, the reader may see the *Patent Manual* (OECD, 1994).

¹⁰ Sanchez, M.P., Castrillo, R. and Elena, S. (2006) "The Intellectual Capital Report for Universities. Guidelines for Reporting". The reader can find the ICU Report template in Annex 2.

4. THE UAM CASE STUDY.

A survey was carried out at the Autonomous University of Madrid. The fourteen respondents were¹¹ among the main decision-makers at the UAM at different levels and in other positions considered strategically important due to the amount of information they handled and their decision capacity.

The interview had two objectives. First, to evaluate the usefulness for management of the selected indicators. For that, the interviewees had to evaluate each indicator according to a Likert scale (from 1 to 3) and to assess possible barriers for the disclosure of indicators, and second, to gather information about research management and governance at the UAM.

It is important to mention that this interview does not have any statistical validity: the selection was not random; therefore, these interviews should be regarded as providing opinions rather than statistics. In this context, the interview has provided some very stimulating ideas to the topic. We also consider that qualitative information is much more useful in this area of knowledge, that is, Intellectual Capital approaches in universities, because of the novelty of the issue and the relative lack of previous experience. Besides, the heterogeneity of the topics for measurement would make quantitative information meaningless.

4.1. ASSESSMENT OF THE ICU REPORT: USEFULNESS FOR MANAGEMENT AND WILLINGNESS TO DISCLOSE¹².

A. ANALYSIS OF THE USEFULNESS FOR MANAGEMENT.

It is interesting to note that, despite the fact that interviewees were asked to reply to the questionnaire in general terms, it was clear that they usually **focused on the UAM case**. For instance, the indicator *Weight of private donors in the total budget* is insignificant in Spain, and this indicator was perceived as not very useful. This seems quite natural, but it further limits the possibility of general conclusions and international comparisons. Therefore, the perceived usefulness of the indicators is very closely related to the specifics of the UAM.

Some of the indicators suggested were not considered clear enough. In order to make them comparable among institutions, **a very precise and clear definition would be essential**. For example, the indicator number 9 (*Amount of research budget managed at the central level / Research Budget*) seems easy to calculate in theory, but is extremely difficult in practice, for these reasons:

- a) The classification of items in the budget does not meet the criterion of autonomy in the use of funds, so it would be impossible for someone external to the university to calculate this indicator and subsequently it would not fulfil the requirement of verifiability.
- b) There are items that have a part that is managed at the central level and another that is not. It is paramount to know the proportion of each. This is the case, for example, of funds coming from regional governments.
- c) The situation could change over time, so the criteria used in one given period might not be useful in another..

¹¹ A list of interviewees and their position is included in Annex 3.

¹² Besides the exercise within the UAM, we launched the same survey among the fifteen OEU European universities in the attempt to assess the ICU Report. Unfortunately, we obtained only one answer, which was not enough to undertake a comparison at a European level.

- d) Even if we can solve all the problems mentioned above, some limitations concerning definitions may still remain. For example, are the expenses in libraries part of the budget managed at central level? In whole or in part? There are a number of library acquisitions that are financed by research projects and in consequence cannot be used freely by the university authorities. The same would apply to new infrastructures.
- e) Overheads incurred on research projects and contracts (15-20%) are considered part of the external funding. This amount is not identified, separately in the budget but it is in fact part of the budget managed at central level since it may be freely used by the university authorities.

For these reasons, only a member of the university with access to internal accounting could calculate this indicator. In general, the top authorities should be aware of the importance of these indicators and dedicate enough resources to calculate them accurately. Each indicator would have specific problems and we may only be able to identify part of them. In some cases, we could observe that the data was available, but manual procedures would be required to gather information useful for management.

Notwithstanding these methodological considerations, in summary, the indicators have been perceived as so useful that none has been rejected at this stage. Most of the respondents considered all the indicators useful or very useful. This exercise has been very positive in general since it clearly shows the perceived importance of this kind of information: interviewees appear to be **aware that IC information is becoming ever more necessary**.

B. ANALYSIS OF THE WILLINGNESS TO DISCLOSE IC INFORMATION.

On the other hand, concerning perceived barriers on the diffusion of the list of indicators, no respondents identified any as confidential. In other words, the whole sample considered that no indicators posed any confidentiality problems, since the pre-selection was done based partially on the previous experience in the OEU data gathering process at the UAM. By this process, we had the opportunity of identifying some of the issues that imply problems of confidentiality. Therefore, we consciously tried to avoid some issues, such as wages or internal organisational issues.

The total acceptance of all the indicators for disclosure leads us to an interesting and very positive conclusion. The general willingness to disclose IC information shows that the interviewees are **aware of the need for the transparency required** by the European Union, and they no longer support the traditional opacity of universities regarding funding distribution. Moreover, they are showing interest in the university's engaging in measurable objectives and subsequently supporting a commitment to society. Objective indicators can be compared with other institutions and with the institution itself over time. This second comparison allows an institution to follow-up its objectives and to evaluate its initiatives. Agreeing on the disclosure of a list of indicators means that the university is willing to accept a commitment to transparency and accountability, which is a very positive sign. In the next section, we will see the main barriers that have been identified that hinder the implementation of new management models at the UAM.

4.2. CHARACTERISATION OF RESEARCH MANAGEMENT AND GOVERNANCE IN THE UAM. POTENTIAL SUITABILITY OF THE ICU FRAMEWORK.

The successful embodiment of new management systems in universities can be neither understood nor implemented without an in-depth analysis of the current governance of the university, specifically their qualities, potential, barriers and limitations. This case study was undertaken to

complement and give sense to the proposed framework of Intellectual Capital approaches in universities presented above. We argue that the idiosyncrasy of a university affects the successful implementation of an Intellectual Capital model. Therefore, it is paramount to carry out an in-depth study of each university that decides to implement these systems.

As we will see in this section, the UAM has shown several shortcomings that may be solved by implementing an Intellectual Capital system. Besides this, we have also identified some barriers that could hinder or even make this implementation impossible if they are not taken into account and appropriately managed.

It is worth mentioning that the survey template for Governance has been based on the work done within the Governance group of the OEU project. Therefore, its scope is quite generalist, aiming at capturing the reality of diverse European universities and research centres. Although this approach can obviously offer a global idea of the university situation, we consider that a more specific interview template could have better reflected the uniqueness of the institution. Obviously, this specific design implies a previous knowledge of the situation in each university. If the exercise were to be repeated in some months, a better and more specific interview template could be created.

Therefore, the present section has a two-fold objective: to describe the process of research management in the UAM and to analyse its idiosyncratic style of governance. Each objective corresponds to the two differentiated parts of this section: the research management at the UAM and the governance at the UAM.

4.2.1. RESEARCH MANAGEMENT AT THE UAM.

A. THE IMPORTANCE OF RESEARCH AT THE UAM.

The UAM is defined as a generalist university that offers studies and programs in all the six Frascati scientific fields. As stated in the statutes and the UAM Strategic Plan (2003-2006), teaching and research are given the same weight. Regarding the assessment of research activity at the UAM, the analysis of the interviews reveals very different positions. On the one hand, some members of the community think that great importance is given to research and that research quality is also very good, both at institutional and at a personal level. On the other hand, others consider that personnel dedicate less time to research than they should.

These contrary opinions are unproductive and shed little light on the real situation regarding research at the UAM. If we consider objective data, such as international rankings, the number of 'six year periods'¹³ granted or the tenure positions obtained by applicants at national level, the UAM ranks top nationally. Therefore, this negative vision of research activity at the UAM appears to reflect a certain lack of knowledge about the real situation. It also gives us a positive insight: a degree of non-conformism is perceived that stems from a strong desire for self-improvement and pursuit of excellence. The main conclusion is that more clearly defined indicators that measure and assess research activity by scientific fields are needed.

B. THE STRATEGIC RESEARCH PLAN: PREPARATION, IMPLEMENTATION, EVALUATION AND FOLLOW-UP.

As we mentioned in previous sections, there has been a tendency to use management tools (mainly developed in the private sector) in universities and research centres in order to improve their

¹³ A positive 'six year period' is granted to those who show adequate productivity in research in terms of publications.

internal management and transparency. As in private companies, the definition of the priorities and strategic objectives is paramount in order to design where an institution is going. Increasingly forced by the competitive environment, universities have started to produce their Strategic Plan. In the case of the UAM, the first Strategic Plan has been developed for the period 2003-2006.

In our survey, we wanted to analyse the three main stages of the Strategic Plan: the preparatory process, the implementation process and the design of evaluation and follow-up mechanisms. It is the first time that the UAM has developed a Strategic Plan and thus has only limited experience in these processes. Therefore, the comparison of the Research Strategic Plan with those of other universities with greater experience may not be of much use.

Stage A. Design and preparation of the Strategic Plan.

The Plan was firstly fostered by the government team, which created a Committee formed by the Rector, the Management Director, the Vice-Rector of Planification and Quality and the Vice-Rector of institutional coordination, communication and information. In the process of Design, different working groups were created, and one of them was specifically engaged in research activity. The members of each working group were selected by the Rectoral team according to their experience, prestige and knowledge of the topic. The result was a brief document produced by each working group that would form the basis for the final design of the Plan.

Stage 2. The implementation.

It was led by the Rectoral team, who tried to involve all the groups concerned in the academic community and facilitate a transparent process that could be followed by the whole community (Strategic Plan, 2003, p.73).

Stage 3. Evaluation and Follow-up.

This is being handled basically by the Rectoral team through the above mentioned Committee. There have been a few meetings open to the whole academic community and, although not particularly active, an Office for the Strategic Plan has been created in order to deal with all the issues related to the Plan: design, implementation, evaluation and follow-up. Also, a web page specifically devoted to the Strategic Plan has been created for use as a tool for communication and debate.

Due to the importance of the Strategic Plan in defining the priority lines and the specialisation of the university, a part of our survey was devoted to analysing the degree of knowledge, participation and perception that interviewees have of the Plan. Next, we are going to analyse these opinions and perceptions about each of the described stages.

Stage A. Design of the Strategic Plan.

Level of participation and degree of involvement in the design process

Although the design of the strategic research Plan was led by the Rectoral team, it has endeavoured to achieve the highest possible participation and involvement of all the groups in the academic community (UAM, 2003, p.73). The interviewees have perceived the participation in the preparatory process in many different and sometimes contradictory ways.

In general terms, both the **Rectoral team** and individual researchers are perceived as the most important groups in the process of design of the Strategic Plan. Directors of Research Institutes, Heads of Departments, Deans and Administrative staff have apparently played a much lesser role.

This was interpreted as a high degree of participation by some and low degree by others. It would appear that the concepts 'high' and 'low' are relative and dependent on individual expectations.

The establishment of priority lines.

There is general consensus on the idea that the Strategic Research Plan does not establish research priority lines, but general objectives such as: strengthening the recognised excellence in UAM research, improving the management of the Research Service, or fostering the Scientific Park. These objectives are somehow applied through projects and actions. However, the layout of the Plan is considered generic, mainly based on principles.

The suitability of defining priority lines is at the same time an important and controversial issue. On the one hand, there are opinions defending the need for priority lines, since resources are scarce. They believe that a effective Strategic Research Plan should focus on identifying both areas of current excellence and new and promising areas. On the other hand, there are those who consider that the Plan should not define priority lines, but support the excellence in researchers and research groups. According to this group, the existing priority lines are indirectly defined by the national and international research plans, which are funding most research. Therefore, the researchers and the research groups are the ones actually responsible for the university specialisation and the university itself does not influence the definition of priority lines (except the institutional participation in producing national and international plans through the Rectors Commission -CRUE-).

Although there are no explicit priority lines in the Strategic Plan, it has been recognised that there are implicit ones, which result in concrete actions, such as better infrastructure, the creation of research institutes, etc.

Establishment of specific and measurable objectives.

Although the Strategic Plan counts on strategic areas and their corresponding objectives, it is agreed that most of the objectives are not measurable. In general terms, the Plan is considered to be a declaration of intentions and qualitative in nature. It has been admitted that the identification of **very** precise objectives would help management, but it would also involve a strong political commitment.

It has been agreed that a system of indicators would be very useful to describe the real situation regarding research in the university and subsequently to design the most appropriate internal policies. For example, it was suggested that publishing the research budget of every department would be useful in order to analyse their comparative position.

Suggestions about the design process

Regarding the degree of participation of the different groups, most of the interviewees state that the number of participants should not be too many. The selection of an Experts Committee in each faculty was suggested and that these should be constituted by accredited researchers (by the number of 'six year periods' granted and their excellence in research).

It is very interesting to observe that these suggestions do not deviate much from the way in which the Plan was produced. The lack of an effective communication channel appeared to be a crucial problem. This subjectivity might be controlled by better communication of the process. In this respect, the web page, used as a participation-enhanced tool seems not to have had the expected impact, even though there were over 7.000 visits to the site from April to November 2003 (UAM, 2003, p.74).

Before calling in the experts, some interviewees think that the Rectoral team should set the basis for discussion by, for example, designing initial priority lines. A previous study was also recommended: excellence mapping, the analysis of other external experiences and/or a SWOT analysis.

Stage B. Implementation of the Plan.

Level of participation and involvement in the implementation process

The Rectoral team seems to have played a most important role at this stage. Some initiatives that were not included in the Plan are being implemented to enable the UAM to adapt to the European control mechanisms.

Resistance to change.

Some pockets of resistance to change have been identified. In any organisational environment there are routines, work cultures and traditions that need addressing prior to a change of management or practice. As Tidd, Bessant and Pavitt (2001) indicate, human beings naturally resist change or at least are cautious about it, and early involvement may ease such tensions. This early user involvement in implementing change has positive effects during the course of the project. Literature on the change in management practice points out that the 'buy in' of the initial concept by users ensures 'ownership' of the project. The converse of the above is also true; lack of early user involvement may have an adverse effect during the final stages of implementation (Castrillo et al., 2005).

Suggestions for the implementation process.

Many interviewees suggest that there should be more participation in the implementation process in order to get general agreement on the objectives. This is no trivial matter since more involvement can lead to greater participant commitment and this, especially at the intermediate management levels, is considered very important.

Stage C. Systems of Evaluation and Follow-Up.

Some evaluation meetings have taken place, organised by the Rectoral team. In these meetings, the members of the government team explained the advances so far, what was left to be done and to what extent the expected objectives were being fulfilled. As some objectives are not measurable, evaluation appears to be complicated and the need for objective indicators was highlighted.

The regional Government is going to implement a mechanism by which part of the public funding (around 25%) will be linked to measurable research results. This necessarily implies the preparation of homogeneous, comparable and externally verifiable indicators. As the lump sum of funds is set in advance, the increase in the share of one university unavoidably means a decrease in another. This was perceived, in general terms, as a very positive initiative to foster change in universities.

C. HUMAN RESOURCES POLICY.

The Human Resources policy at the UAM should be understood in the light of the general national context of the Organic Law for Universities, LOU (Ley Orgánica de Universidades, 2001). This law – likely to be modified again shortly- has meant a radical change in the concept of teaching and research personnel (PDI hereafter) in the university, directly affecting new contracts from 2003. The most important changes can be summed up as:

- Teaching and research personnel can now be taken on as labour personnel and, if this is the case, they would be answerable to private company law.
- Teaching career development establishes a number of stages, and the teachers have to go through a process of national or regional accreditation to get access to the next stage.

Although, the PDI is defined as teaching and research personnel, the interviewees highlight that the posts allocation is usually based on teaching considerations alone. Moreover, Human Resources

policy is sometimes applied according to the proportional distribution of existing posts. This means that when a teacher retires, the general practice is to create a new post in the same area which makes it difficult to improve certain new areas. Also identified were the differing teaching loads from one faculty to another. Because of this policy of post allocation, the problem is structural and has yet to be corrected.

The Human Resources policy is perceived as crucial within the research policy in a university, since Human Capital is one of the inputs of research activity, together with funding, and is the financial item which allocates universities the greatest amount of resources. Apart from this, Human Capital is also able to attract additional funding, both public and private.

Regarding the definition of Human Resources policy, many respondents stress the urgent need to design systems of incentives and sanctions, in order to recognise the excellence in research. While it was not really possible to implement these kinds of mechanisms in the university a decade ago, the current legal framework allows greater autonomy in designing initiatives to foster research. We will come back to the barriers on implementing such changes later.

Finally, it is worth mentioning that the UAM, and other Spanish Universities, will experience a massive number of retirements in the near future. This situation presents the opportunity to establish a Human Resources policy that responds to new criteria. However, this change is very difficult to undertake in practice. It is generally assumed that a post cannot be changed without previous negotiation, since this would create a conflict of interests.

4.2.2. THE GOVERNANCE IN THE UAM.

Defining the governance of a university is not an easy task since these institutions are complex and possess a number of specific characteristics that make them unique (Sporn, 1999). However, pressure from the social environment is forcing an analysis of their governance styles in order to better understand their functioning and to suggest recommendations that allow them to adapt to the new social demands.

Next, we are going to present the most relevant characteristics regarding the governance style of the UAM, focusing on the organisational structure, the levels of centralisation/decentralisation in research management, the mechanisms for solving conflicts, the internal and external perception, the capacity to adapt, the degree of autonomy and the relationship with society.

A. ORGANISATIONAL STRUCTURE: THE DEMOCRATIC UNIVERSITY.

The Spanish university is characterised by collective styles of governance. These styles are based on the existence of plural decision-making committees that act as organs of government. The main organ is the University Government Board but besides this, Spanish universities also have a Social Council in which society is represented. This is formed by the Rector (president), the General Secretary, the Management Director and another 50 members of the academic community. The Social Council supervises the strategic lines of teaching, research, human resources, and financial resources and budget approval.

This organisational structure aims to assure the representation of all the groups in the institution and avoid the concentration of power. One of the characteristics of the collective model in Spanish universities is that the Rector and other heads of units (such as the Dean or the Department Director) are democratically elected by the academic community every four years.

In line with this, all the interviewees consider that the UAM has a democratic style of governance, which is explained historically by Spain's dictatorial past. As with every organisational model, the selection of a democratic style has direct consequences on the management of a university. It is for

this reason that some interviewees consider that, nowadays, this system is not the most appropriate way to select and nominate university authorities, despite its being crucial in the past. The model does not always assure criteria of efficiency and rationale in decision-making, since the top authorities are not selected for their management skills, but because of their academic prestige. Besides this, the process generates a number of micro-political pressures that directly affect the autonomy and margin of manoeuvre of those in charge.

According to some opinions, this model also negatively affects the articulation of a suitable hierarchical structure in research activities. It would be much better to recognise the existence of different roles, categories and functions within the academic community. However, this idea clashes with the widespread egalitarianism in the academic community and further reinforced by trade unions. For example, in many cases assistant teachers and professors take on the same tasks in spite of their different categories and experience, and are also requested to do administrative duties that should be done by administrative personnel.

B. DECENTRALISATION AND FRAGMENTATION.

At a centralised level, the university is responsible for managing the administrative and bureaucratic processes derived from the research projects. This activity is developed through both the Administrative Research Office, which assists in the administration of regional, national or European competitive projects, and the Technology Transfer Office, which assists in the management of non-competitive projects and contracts. The Scientific Park can also attend to the administration of research activities funded by external agents.

Management is, therefore, decentralised since the decision-making (regarding the presentation of projects, the members of research teams, topics of interest, work methodology, etc.) is delegated to the research team and, at the end, to the individual researcher.

On the other hand, a high degree of fragmentation has been observed in the university, since many researchers feel a much stronger affinity with their knowledge area (frequently their faculty) than with the university. Moreover, it seems more common to perceive competitiveness among faculties rather than unity of the university as a whole. The organisational structure that splits the university into faculties and departments contributes to this fragmentation and also hinders potential multidisciplinary and inter-faculty work.

C. STYLE OF CONFLICTS SOLUTION: THE MEDIATOR UNIVERSITY.

The interviews reveal that the university is generally oriented towards negotiation, the stabilisation and conciliation of interests. In this sense, it has been stressed that the Rectoral team tries to maintain a balanced position, so final decision making is generally affected by the social and political risks that each option poses.

The University Personnel Claims Office was created as a mechanism for solving conflicts. This office acts as a mediator between the parts involved, analysing the problem and making recommendations. However, these are not binding and the final decision is taken by the Rectoral team.

In summary, this stabilising behaviour is perceived by some to hinder the undertaking of new approaches in management, since the university tries to reach a compromise position in order to avoid negative responses from the different groups. We will discuss this situation in depth in the paragraph F of this section, dealing with the autonomy of the university.

D. ATTRACTIVENESS OF THE UNIVERSITY: INTERNAL AND EXTERNAL PERCEPTION.

As mentioned before the external perception of the UAM is quite positive. Despite the characteristics that situate the UAM well above the average, no institutional document reflects the qualities that differentiate and distinguish the UAM from other Higher Education Institutions. In fact there is not one public document highlighting the strong points of the UAM¹⁴, and all the opinions are based on subjective perceptions. It would be necessary to define objective and verifiable indicators that can be shown externally and be used as an internal management tool. In this regard, as recommended in the previous section, they would be useful for excellence mapping or a SWOT analysis.

E. TRADITIONAL UNIVERSITY VS. THE NEED TO ADAPT.

Some interviewees argue that the university's reputation is mainly maintained by the efforts of individual researchers and research groups, who get research projects, attract funding and develop innovations. In contrast, the research governance of the university still sticks to traditional ways. Therefore, if the university wants to maintain or increase its excellence, prestige and quality, it is essential to progress and adapt its management system to the present situation. One of the new internal procedures leading this adaptation is the evaluation of some of the services the institution provides to the research community.

F. AUTONOMY IN MANAGEMENT.

When referring to the governance of an institution, the issue of the degree of autonomy is unavoidable. The autonomy of the university and its top authorities directly affects the way in which management acts. In this sense, we raised two important questions: what is the margin of manoeuvre that the university has?, and even more importantly, to what extent can the top authorities exercise this autonomy? With regard to this, limits to this margin of manoeuvre in Spanish universities have been identified, and come mainly from the election system mentioned above. This kind of organisation is not unique to the UAM or just to Spanish universities. The fact is that the Portuguese, Italian, Greek and Austrian Higher Education systems appear to be experiencing the same problems. It is worth noting that, in Spain and some of these other countries, the principle of university autonomy is written into their Constitutions¹⁵.

The election procedure in universities implies that the top authorities are part of the academic community, and this situation leads to the following consequences. On the one hand, it is assumed that a prestigious academic in any area of knowledge has the required skills for organisation management. On the other hand, those elected have somehow to respond to the groups that have supported them. In short, this governance model, while assuring democracy, somewhat jeopardizes the autonomy of the government team.

Moreover, it is important to highlight that, once the governing period is over, the academics in charge generally go back to their old teaching and research positions. This encourages us think that the top authorities are still 'academics' during their governing period and, therefore, maintain their personal and disciplinary affiliations. This point is particularly relevant, since efficient management should imply a global vision of the university, avoiding bias.

Since the mid eighties, there has been a tendency in specialised literature to support the inclusion of professionals of management in universities; in order to ensure that those in charge possess the

¹⁴ Some months ago, the Rectoral team launched, , a call to identify the Research groups present in the UAM (these groups have been limited by a very specific definition). The result of this call has not been published yet. We consider that the diffusion of these Research groups could be an interesting tool to show the singularity of the UAM and its activity in new and innovative areas, which is not captured by traditional indicators.

¹⁵ In these cases, the university models were developed under difficult political circumstances during the transition from dictatorship to democracy. For this reason, the 'democratic' decision making is a fundamental characteristic of these styles of governance.

skills and knowledge required (Amaral et al., 2003). In the UAM, the professionalization of the university top authorities appears to be a controversial issue. There is general consensus on the idea that some changes in the management system is required, although there are opposing views on the potential advantages and risks that this professionalization would bring to academic life and the production of knowledge.

Regarding the university's actual capacity to mobilise and allocate resources for research activity, most interviewees consider there is no real autonomy over resources since most funding is channelled through research projects and the main researcher is consequently the one who decides how to use it, regarding project objectives and the financial backers' restrictions. Besides, university autonomy is also affected by regional government regulations which control some actions and consequently limit the independence of these institutions. Together with the regional government, other agents such as the European Commission, and the Science and Education Ministry (MEC), as the main financial backers, turn out to be (albeit indirectly) crucial in the definition of priority lines. Other entities, like business associations, individual companies or city councils influence the university to a lesser degree.

Finally, trade unions are perceived as a limiting factor for the university in its development of real autonomy and decision-making capacity. Their egalitarian principles make the creation of incentive schemes impossible¹⁶. In this respect, interviewees state that, when the objective is the search of excellence, trade unions are the stumbling block.

G. INVOLVEMENT WITH SOCIETY: THE THIRD MISSION.

The university has traditionally had two main missions: the diffusion of knowledge (through teaching) and the production of new knowledge (through research). During the last twenty years, we have witnessed a great increase in university-society relations, and very noticeably the business sector. Because of these interactions, universities have now become a very important part of their local and regional development and this new role as a development enhancing force has been called the Third Mission.

Spanish universities involve society in their organisational structure through the previously mentioned Social Council. The president of the UAM Social Council is nominated by the Madrid regional Government. Regardless of the importance of this organ in university planning and its supervision of tasks, the Council does not play the relevant role that could be expected. The interviewees point out that giving impetus to the role of the Social Council would be necessary in order to better integrate the university in society, taking into account its regional and local needs.

The UAM has two other institutions that deal with its relationship with the outside world: the Technology Transfer Office (OTRI) and the Scientific Park of Madrid, which is located in the UAM campus. The UAM Technology Transfer Office is the institutional channel giving support to researchers and forming links with firms in order to strengthen the university-environment relations. The Scientific Park of Madrid was born as an initiative of the UAM and the Complutense University of Madrid (UCM), and was joined later on by the Spanish Research Council (CSIC) and other private institutions. It was created to encourage quality research in areas that require the interaction of different disciplines and institutions and to propitiate the collaboration of public institutions with the business sector. It is felt that these institutions should play a more important role promoting the UAM in its environment.

The UAM also interacts with the vicinity through collaboration agreements with different councils in the Community of Madrid (Madrid, Alcobendas, San Sebastian de los Reyes, Tres Cantos and

¹⁶ These policies of incentives and punishments would imply a differentiation in wages (through bonuses) or even in the steering of research careers. These initiatives could foster research by creating the means to award excellence.

Colmenar Viejo, among others). Besides these, there are several agreements with firms in the north of Madrid, where the UAM is.

Apart from the commercialisation of research, the Third Mission includes other concepts, such as the participation of the university community in policy making, involvement in social and cultural life and furthering public understanding of science¹⁷.

In this respect, it was emphasised that, although the influence of individual researchers is strong (through policy studies, participation in committees, etc.), the influence of the university as an institution is very weak. Moreover, researcher participation in policy making generally takes place away from university life, mainly for of two reasons. On the one hand, researchers that participate in policy making have no incentive to make this involvement known. On the other hand, respondents consider that researchers hide their participation in other activities to avoid the rejection or jealousy of their colleagues. These negative feelings stem from the idea that academics involved in other tasks may not be dedicating enough time to teaching and research. Several respondents highlight the importance of shifting this thinking through active policies taken by top management.

Concerning the influence of the university in the cultural and social life around it, it is considered that the university should take a more active role in shaping public opinion.

In summary, although there seems to be significant interaction between the UAM and its social environment, there is a great diversity of opinion. This fact appears to reflect an ignorance of the cooperative activities undertaken with other institutions and entities, although it could also be explained by the little impact these activities have, or both. Generally, it should be stressed that there is a lack of knowledge of these issues that, in the university world, are becoming more and more important everyday.

5. CONCLUSIONS AND WAYS FORWARD.

This work was organised to reflect the suitability of Intellectual Capital approaches within universities and research centres, with its corresponding arguments, moving logically from the formulation of an ICU Report to respond to this new challenging paradigm to the assessment of the usefulness and suitability in the Autonomous University of Madrid case study.

The ICU measurement framework has been a first approach in the design of a tool for the management of research activities, assuming that measurement is a first and necessary step before management. It has been, in our view, a valuable attempt to create a framework in order to make universities aware of the importance of managing Intellectual Capital. Nevertheless, as mentioned above, it is important to keep in mind that universities will have to make an individual effort in adapting this framework to their specific characteristics.

Consequently, the ICU Report is a proposal to the next logical step after managing Intellectual Capital: its disclosure. This tool deals with a first attempt to create a homogenised IC Report specifically designed for universities and research centres. To this purpose, we have designed the ICU Report with three main sections, in order to address the close relationship of management with the selection of information for disclosure. In this regard, a pile of indicators was selected from the ICU measurement framework. We consider that the list of indicators is not self-explanatory since each indicator can denote or imply different things depending on the person who receives the

¹⁷ These concepts are relatively new in universities. A proposal for their measurement has been included in the ICU framework.

information. Consequently, it is crucial to add the literature required to understand each indicator in order to avoid a set of meaningless ones.

The lack of activities-related indicators is one perceived limitation of the ICU measurement framework for management and, subsequently, of the ICU Report for disclosure. Accordingly, this work should be considered an initial attempt that will be developed in the future: we feel that the scanning of indicators that provide activities' information will be paramount in future steps of ICU Report development. Moreover, when conducting the survey, it was perceived that some indicators would need a further definition, and even with this, there could be misleading indicators depending on who or which institution was gathering them. This limitation should be understood as a structural characteristic of a novel science, which will become more precise over time by the process of standards setting. Because of the mentioned limitations, this study should be regarded as being essentially exploratory in nature.

Although no quantitative data has been collected (regarding the nature of the study), we can conclude that the UAM top management is very much **aware of the necessity for this kind of management tools** for both internal and external uses. They have been very proactive with the research group and shown a great interest in the work. The general willingness to disclose IC information shows that the interviewees are **aware of the need for transparency** required by the European Union and society at large.

In order to address the characteristic complexity of universities to these proposals, we also undertook the study of research management and governance in the Autonomous University of Madrid. From this study, it was clearly perceived that a transition is taking place in the UAM, and, in general, in all European universities. Governments *"have promoted university autonomy, believing this to be the best way of improving the service. In exchange, they have demanded a greater accountability, established stricter systems of finance to performance and, above all, encouraged the use of market mechanisms in higher education"* (Mora, 2002, p.108). Most interviewees are aware of the new and challenging paradigm, although there is still great diversity in the perceptions of the current situation. Besides this issue, the survey in the UAM has also thrown light on others that are very interesting.

The UAM has recently developed its first Strategic Research Plan that covers the period 2003-2006. Although the preparation was itself an important step forward, it did not contain enough measurable and concrete objectives. This was generally perceived as a weakness in the Plan, since the development of measurable objectives would help management, in terms of decision-making and in evaluation and follow-up.

In this regard, the participants state that indicators would be very useful to identify strategic objectives and priority lines. The fact that the UAM authorities perceived most of the indicators as very useful and that none was considered confidential, highlights a **willingness to acquire a commitment with the community** (students, public authorities funding universities, labour market and society as a whole).

Notwithstanding this willingness, there are a number of barriers that could hinder the implementation of new management models if they are not appropriately dealt with. They are related to the current power structure in the university and the resistance to change perceived in some people and services. However, if there is good communication and detailed information provided, these groups would appreciate the situation better and feel more motivated. Moreover, some groups, such as researchers, who get their own funding and act as virtual labs, have been identified as potential motors of change if they are involved enough,

Coming back to the power structure identified, the UAM has been characterised as being 'democratic' in its style of decision-making. This collective model is based on the existence of **plural** decision-making committees that act as government bodies and endeavour to assure the participation of all the groups in the academic community and avoid any concentration of power.

However, some interviewees consider that, nowadays, this is not the most appropriate way to select and nominate university authorities, despite its being so crucial in the past. This model does not assure criteria of efficiency and rationale in decision-making, since the top authorities are not selected for their management skills, but their academic prestige. Besides, the current process generates a number of micro-political pressures that directly affect the autonomy and margin of manoeuvre of those in charge.

These pressures might also explain why the university is perceived to act as mediator or stabiliser in the resolution of conflicts. This stabilising behaviour is perceived to block new approaches in management, since the university endeavours to reach a compromise in order to avoid negative responses from the different groups.

In line with the presented results, our recommendations for the UAM are focused on three main aspects. Firstly, an improvement in the information and communication systems would favour the commitment and involvement of the academic community as well as internal transparency. In the second place, the definition of measurable, comparable and verifiable objectives would improve strategic management and set a starting point for the evaluation and follow-up of research activities. This is especially relevant if we are taking into account the new methods of funding distribution (depending on the results of research activities) of the external agents (the Madrid Regional Government in the UAM case), which make the construction of indicators essential. Thirdly, the implementation of internal management mechanisms and instruments would allow the university authorities to achieve an objective and verifiable management of research activities. Using this argument, Intellectual Capital and knowledge management models have been used by some pioneer European universities and research centres as a useful tool to enhance internal management and transparency.

Therefore, our final recommendation is **the implementation of an Intellectual Capital model in the UAM**, in order maintain the levels of excellence in research and efficiently manage the opportunities and challenges arising at this important juncture.

There are several benefits to have come out of this study. In a first place, we consider that the ICU framework is an easy instrument to use to characterise research activities in universities. It facilitates a learning process about what are, and will be, the key issues for universities and pressures university authorities to define strategic guidelines. Although many indicators in this system have been traditionally used in universities, the contribution of this work has been to create a common working framework in an initial attempt to homogenise and harmonise Intellectual Capital information. In addition, the ICU framework highlights the importance of people, knowledge and innovation in achieving strategic goals, since it recognises that universities are key producers of knowledge and innovation and that Human Capital is one of the main factors in this process.

In summary, we believe that this experience, though somewhat limited (mainly due to the novelty of the issue and the relative lack of previous experience), has created a tentative framework to develop an IC model in universities, and has given us a broader understanding of the unique university features specific to the UAM. This case study has allowed us some insight into university routines and to adapt the ICU framework to a specific university. We consider that preparing other case studies would be a logical way forward to facilitate the generalisation of results.

There are many other possible ways forward for this study. The first logical one could be the inclusion of activity-related indicators in both the ICU measurement framework and the ICU Report. Other additional developments of this work could be the extension of the ICU model to teaching, since the work has only looked into research so far. Moreover, after this first experience, we consider that the survey dealing with the governance in the UAM could be improved in order to take on board all the new concerns identified.

Therefore, the way is open for further research. What is well known is that Intellectual Capital Reporting is gaining importance day by day, and it is now clear that measuring, managing and reporting Intellectual Capital in universities and research centres is becoming crucial.

6. REFERENCES

- Altenburger, O.A. and Novotny-Farkas Z. (2005). "Intellectual Capital Reports for Universities – A Trial Intellectual Capital Report at the University of Viena". Paper presented at the EIASM Workshop on Visualising, Measuring, and Managing Intangibles and Intellectual Capital. Ferrara, October 18-20.
- Amaral, A., Meek, V.L. and Larse, I.M. (Eds.) (2003), *The Higher Education Managerial Revolution*. Kluwer Academic Publishers, The Netherlands.
- Andriessen, D. (2001). "Weightless Wealth. Four Modifications to Standard Intellectual Capital Theory". Paper presented at the 4th World Congress on the Management of Intellectual Capital. Hamilton, Ontario, Canada.
- Araujo, A. (2000). "Gestión del Conocimiento, Universidad y Empresa". Paper presented at Jornadas Universitarias sobre la gestión del conocimiento en empresas y organizaciones, Centre for University Knowledge Management. Bilbao, Spain.
- Arrow, K.J. (1962). "The Economic Implication of Learning by Doing", *Review of Economic Studies*, Vol. 29, June, pp. 155-173.
- Austrian Research Centers (2000) *Intellectual Capital Report 1999*. Austrian Research Centers, Seibersdorf. Internet device: www.arc.ac.at.
- Austrian Research Centers (2005) *Intellectual Capital Report 2004*. Austrian Research Centers, Seibersdorf. Internet device: www.arc.ac.at.
- Becker, G.S. (1975). Human Capital, 2nd Edition, Chicago University Press, Chicago
- Berndtson (2003) "The European Higher Education Area: to Change or not to Change?" Paper presented at The EpsNet General Conference. Paris, June 13-14.
- Bologna Declaration (1999), "The European Higher Education Area", Joint Declaration of the European Ministers of Education, Bologna, 19 June 1999. Internet device: http://www.bologna-berlin2003.de/pdf/bologna_declaration.pdf
- Bontis, N. (1996). "There's a price on your head: Managing intellectual capital strategically", *Business Quarterly*, Summer.
- Brooking, A. (1996). *Intellectual Capital: Core Asset for Third Millennium Enterprise*. International Thomson Business Press, London.
- Bueno, E. (1997), *Organización de Empresas. Estructura, Procesos y Modelos*. Ed. Pirámide, Madrid.
- Campos, M.; Novertó, M.C. and Villanueva, E. (2003). "Reporting de las Instituciones Universitaria". *Revista AECA*, No. 62, January-April.
- Cañibano, L., García-Ayuso, M. and Sánchez, M.P. (2000) "Accounting for Intangibles: A Literature Review" in *Journal of Accounting Literature*, vol. 19, 2000, pp. 102-130.
- Cañibano, L., Sánchez, M.P. (2004). "Measurement, management and reporting on intangibles. State of the art". In Cañibano, L. and Sánchez, M.P. (Eds.) *Readings on Intangibles and Intellectual Capital*. Publicaciones AECA, Spain. Pp. 81-113.
- Castrillo, R. (2006). "Intellectual Capital Management and Reporting in Universities. The Autonomous University of Madrid case study". Minor thesis.
- Castrillo, R., Hwang, S., Jangra, P., Lewin, D., Makgonatsotlhe, A., Wojtanowska, B. and Zotidou, M. (2005). "Implementation of SalesLogix at GMAC Commercial Finance". Consultancy work. Confidential report.
- CMM Center for Molecular Medicine (2005). *Intellectual Capital Report 2004*. Stockholms Offset, Sweden.
- Comunidad de Madrid (2002). *Capital Intelectual y Producción Científica*. Dirección general de Investigación, Consejería de Educación, Comunidad de Madrid. Madrid, Spain.
- Communiqué of the Conference of European Ministers Responsible for Higher Education (2003) "Realising the European Higher Education Area", Berlin, 19 September 2003.

- Communiqué of the Conference of European Ministers Responsible for Higher Education (2005) "The European Higher Education Area. Achieving the Goals", 19-20 May, Bergen
- Deninson, E. F. (1962). *The Sources of Economic Growth in the United States and the Alternatives Before Us*. Committee for Economic Development, New York.
- Dragonetti, N.C. and Ross, G. (1998). "Efficiency and Effectiveness in Government Programmes: An Intellectual Capital Perspective". Paper presented at the 2nd World Congress on Intellectual Capital, McMaster University. Hamilton, Ontario, Canada.
- Edvisson, L.; Malone, M.S. (1997). *Intellectual Capital. Realizing your company's true value by finding its hidden brainpower*. Harper Collins Publishers, Inc.
- Etzkowitz, H. and Leydesdorff, L. (1996). "Emergence of a Triple Helix of University Industry Government Relations". *Science and Public Policy*, Vol. 23, pp. 279-286.
- Etzkowitz, H. and Leydesdorff, L. (2001). "The dynamics of innovation: from national systems and 'Mode 2' to a triple helix of university-industry-government relations", *Research Policy*, Vol. 29, No. 2, pp. 109-123.
- European Commission (2000). *Towards a European Research Area*. Brussels, 18/01/2000, COM (2000) 6.
- European Commission (2003). *The role of the Universities in the Europe of Knowledge*. Brussels 05/02/2003, COM (2003) 58 Final.
- European Commission (2005). *Mobilising the brainpower of Europe: enabling universities to make their full contribution to the Lisbon Strategy*. Brussels, 20/04/2005, COM (2005) 152 Final. Internet device: http://ec.europa.eu/education/policies/2010/doc/comuniv2005_en.pdf
- European Commission (2006). *RICARDIS: Reporting Intellectual Capital to Augment Research, Development and Innovation in SMEs*. Internet device: http://ec.europa.eu/invest-in-research/pdf/download_en/2006-2977_web1.pdf
- European Council (2000). Presidency Conclusions. Lisbon, March 23-24. Internet device: http://www.bologna-berlin2003.de/pdf/PRESIDENCY_CONCLUSIONS_Lissabon.pdf
- European Network for Quality Assurance in Higher Education (2003). *Quality Procedures in European Higher Education*. ENQA Occasional Papers 5, Multiprint, Helsinki, Finland. Internet device: <http://www.engq.eu/files/procedures.pdf>
- Federal Ministry of Education, Science and Culture of Austria (2002), "University Organisation and Studies Act – University Act 2002 -" N° 120/2002. Available: <http://www.bmbwk.gv.at>.
- Foray, D. (2004). *The Economics of Knowledge*. MIT. Cambridge, Massachusetts.
- Freeman, C. (1982). *The Economics of Industrial Innovation*. Pinter Publishers, London.
- Gibbons, M. Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Two, M. (1994). *The New production of Knowledge: the Dynamics of Science and Research in Contemporary Societies*. Sage Publications, London.
- Goldsmith and Berndtson (2002). "Teaching Challenges for Political Science in Europe" *European Political Science*, Vol. 1, No. 3. Cited in Berndtson (2003).
- Gorey R.M. y Dovat D.R. (1996). "Managing on the Knowledge Era". New York.
- INGENIO (Instituto de la Gestión de la Innovación y del Conocimiento) (2002). "Portal de Conocimiento del II Plan de la Calidad de las Universidades". Internet device: <http://www.ingenio.upv.es>.
- Instituto Universitario Euroforum El Escorial (1998). "Medición del Capital Intelectual". Madrid, Spain.
- Kaplan, R., y Norton, D. (1992). "The Balanced Scorecard - Measures That Drive Performance". *Harvard Business Review*, Vol. 70, No. 1, pp.71-79.
- Kendrick, J.W. (1974). "The Accounting of Human Investment and Capital", *Review of Income and Wealth*, 20, December.
- Leitner, K-H (2005). "Managing and Reporting Intellectual Capital in Public Research Organisations and Universities: Background, Development and Experiences of Austrian Organisations". Paper presented at the 1st Workshop on "Visualising, Measuring, and Managing Intangibles and Intellectual Capital". Ferrara 18-20 October 2005.
- Leitner, K-H. and Warden, C. (2004). "Managing and Reporting Knowledge-based Resources and Processes in Research Organisations: Specifics, Lessons Learned and Perspectives". *Journal of Management Accounting Research*, Vol. 15, No. 1, pp.33-51.

- Lev, B. (2000). "Intangibles: Management, Measurement and Reporting". Internet device: <http://www.baruch-lev.com>.
- Lev, B. (2001). *Intangibles: Management, Measurement and Reporting*. The Brookings Institution. Washington D.C.
- Ley Orgánica de Universidades, 6/2001, de 21 de diciembre. Boletín Oficial del Estado num. 307, Madrid.
- Marr, B. (Ed.) (2005). *Perspectives on Intellectual Capital. Multidisciplinary insights into Management, Measurement and Reporting*. Elsevier Inc., Amsterdam.
- Marr, B. and G. Roos (2005). "A strategy perspective on Intellectual Capital". In Marr, B. (Ed.) (2005). *Perspectives on Intellectual Capital. Multidisciplinary insights into Management, Measurement and Reporting*. Elsevier Inc., Amsterdam. Pp. 28-41.
- MERITUM (2002). Cañibano, L.; Sánchez, P.; García-Ayuso, M.; Chaminade, C. (Eds.) "Guidelines for Managing and Reporting on Intangibles (Intellectual Capital Statements)". Vodafone Foundation. Madrid.
- Mora, J.G. (2001). "Governance and management in the new university". *Tertiary Education and Management*, Vol.7, No.2, pp. 95-110.
- National Council of the Republic of Austria (2002) *University Organisation and Studies Act (Universities Act 2002)*. No. 120/2002. Internet device: http://www.bmbwk.gv.at/medienpool/8019/8019_u02_engl.pdf
- Nonaka, I., Takeuchi, H (1995). *The Knowledge-Creating Company*. Oxford University Press. Boston, Massachussets.
- Norwegian Ministry of Education and Research (2004). *The Norwegian Competence Report 2003*. Norwegian Ministry of Education and Research, Norway.
- Nyen, T., Hagen, A. and Skule, S. (2004) *Lifelong learning in Norwegian working life. Results from The Learning Conditions Monitor 2003*. Fafo Institute for Labour and Social Research, Oslo.
- Observatory of European Universities (2005) "The Strategic Matrix". Internal document.
- OECD (1996). *The Knowledge-Based Economy*. Paris. OCDE/GD(96)102.
- OECD (1999). "The Knowledge-Based Economy: A Set of Facts and Figures". Meeting of the Committee for Scientific and Technological Policy at Ministerial Level, 22-23 June, 1999, Paris.
- OECD (2001). "Knowledge Management: Learning Experiences from Private Firms and Public Organisations". Centre for Educational Research and Innovation Governing Board. OECD, 12 June, 2001. CERI/CD(2001)2.
- OECD (2002). *Frascati manual. Proposed Standard Practice for Surveys on Research and Experimental Development*. Paris. Internet device: <http://www1.oecd.org/publications/e-book/9202081E.PDF>
- OECD (2006). Meeting of the OECD Council at Ministerial Level 2006. Key Information. Internet device: www.oecd.org/dataoecd/42/9/36686180.pdf.
- Pöyhönen, A. (2005). "Exploring the Dynamic Dimension of Intellectual Capital: Renewal Capability, Knowledge Assets and Production of Sustained Competitive Advantage". Paper presented at the 2005 PMA IC Symposium: Management and Measurement of Intangible Assets and Intellectual Capital: Multidisciplinary Insights. New York, 15-16 December.
- Prague Declaration (2001). "Towards the European Higher Education Area. Policy and Reform of Higher Education, Inter-University Cooperation, Academic Recognition and Mobility". Prague, May 19th, 2001.
- Saint-Onge, H. (1996). "Tapping into the Tacit Knowledge of the Organisation": Paper presented at the Knowledge Challenge Conference, MCE. Brussels, 30-31, May.
- Sánchez, M.P., Elena, S. (2006) "Intellectual Capital in Universities. Improving transparency and internal management". *Journal of Intellectual Capital*. Forthcoming.
- Sánchez, M.P., Castrillo, R. and Elena, S. (2005) "Intellectual Capital within Universities. Challenges for the OEU Project: Some proposals". Paper presented at the Observatory of European Universities (OEU) meeting. Budapest, December 1-2.
- Schultz, T.W. (1969). "Investment in Human Capital", in Phelps, E.S. (Ed.), *The Goal of Economic Growth*, Norton, New York.
- Solow, R. (1957). "Technical change and the Aggregate Production Function". *Review of Economics and Statistics*, Vol. 39, pp. 312-20.

- Sorbonne Joint Declaration (1998). "Joint Declaration on Harmonisation of the Architecture of the European Higher Education System". Paris, May 25, 1998.
- Sveiby, K.E. (1997). "Measuring Intangibles Assets". Internet device: <http://sveiby.com/Portals/0/articles/MeasureIntangibleAssets.html>
- Tidd, J., Bessant, J. and Pavitt, K. (2001). *Managing Innovation: Integrating Technological, Market and Organisational Change*. John Wiley & Sons, Ltd. Chichester.
- Universidad Autónoma de Madrid (2003). *Plan Estratégico 2003-2006*. Madrid.
- Warden, C (2003) "Managing and Reporting Intellectual Capital: New Strategic Challenges for HEROs" in *IP Helpdesk Bulletin*, No. 8, April-May 2003. Internet device: www.ipr-helpdesk.org/newsletter/8/pdf/EN/N08_EN.pdf

ANNEX 1. FRASCATI FIELDS OF SCIENCE AND TECHNOLOGY.

1. NATURAL SCIENCES

- 1.1. Mathematics and computer sciences [mathematics and other allied fields: computer sciences and other allied subjects (software development only; hardware development should be classified in the engineering fields)]
- 1.2. Physical sciences (astronomy and space sciences, physics, other allied subjects)
- 1.3. Chemical sciences (chemistry, other allied subjects)
- 1.4. Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)
- 1.5. Biological sciences (biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences)

2. ENGINEERING AND TECHNOLOGY

- 2.1. Civil engineering (architecture engineering, building science and engineering, construction engineering, municipal and structural engineering and other allied subjects)
- 2.1. Electrical engineering, electronics [electrical engineering, electronics, communication engineering and systems, computer engineering (hardware only) and other allied subjects]
- 2.3. Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products; applied sciences such as geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other allied subjects)

3. MEDICAL SCIENCES

- 3.1. Basic medicine (anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)
- 3.2. Clinical medicine (anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, dentistry, neurology, psychiatry, radiology, therapeutics, otorhinolaryngology, ophthalmology)
- 3.3. Health sciences (public health services, social medicine, hygiene, nursing, epidemiology)

4. AGRICULTURAL SCIENCES

- 4.1. Agriculture, forestry, fisheries and allied sciences (agronomy, animal husbandry, fisheries, forestry, horticulture, other allied subjects)
- 4.2. Veterinary medicine

5. SOCIAL SCIENCES

- 5.1. Psychology
- 5.2. Economics
- 5.3. Educational sciences (education and training and other allied subjects)
- 5.4. Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary, methodological and historical S&T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences]

6. HUMANITIES

- 6.1. History (history, prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeography, genealogy, etc.)
- 6.2. Languages and literature (ancient and modern)
- 6.3. Other humanities [philosophy (including the history of science and technology), arts, history of art, art criticism, painting, sculpture, musicology, dramatic art excluding artistic "research" of any kind, religion, theology, other fields and subjects pertaining to the humanities, methodological, historical and other S&T activities relating to the subjects in this group]

Source: OECD, in Frascati 2002, p. 67.

ANNEX 2. THE ICU REPORT

Section 1. Vision of the institution.

- ✓ What main services does the organisation provide?
- ✓ What are the main objectives of the institution?
- ✓ What makes a difference with respect to other institutions?
- ✓ What resources (human, organisational and relational) are needed to reach the objectives and provide the target services while ensuring quality?
- ✓ How are those intangible resources related to the *value* of the institution?
- ✓ What is the combination of tangibles and intangible resources that creates *value*?

Section 2. Summary of intangible resources and activities.

- ✓ Which existing intangible resources should be strengthened?
- ✓ What new intangible resources are needed?
- ✓ What activities can be launched?
- ✓ What activities should be prioritised?

Section 3. A system of indicators for IC resources.

HUMAN CAPITAL		
		EFFICIENCY
1	F	Total funds for R&D / Number of researchers
2	NF	Number of PhD students / Number of Researchers
3	NF	Number of Researchers / Number of Administrative Personnel
		OPENNESS
4	NF	Number of visiting fellows from other universities/Number of Researchers (per field) (A. National, B. International)
5	NF	Number of PhD students coming from other universities/Total number PhD students (per field) (A. Nat., B. Internat.)

ORGANISATIONAL CAPITAL		
		AUTONOMY
6	F	Amount of resources devoted to R&D / Total Budget (personnel cost is not included)
7	F	Structure of the Research Budget by scientific fields (by disciplines)
8	F	Amount of budget constraints (personnel cost + equipment cost) / Research Budget
9	F	Amount of research budget managed at the central level / Research Budget
10	F	Lump-sum for Research (A. Governmental funding, B. Non-governmental funding) / Total Funding for Research
11	F	Share of staff appointed through autonomous formal procedure (at the University level + by type, by field and by units) (consider procedures dealing with positions and academics)
12	F	Non-core funding / A. Total budget, B. Budget for Research
13	NF	Thresholds imposed to fund-raising (including weight of tuition fees on total budget and incentives given to private donors to support research activities)
14	NF	Structure of non-core funding
		CODIFICATION OF KNOWLEDGE THROUGH PUBLICATIONS
15	NF	Number of publications by disciplines / Total publications of the university
16	NF	Number of co-publications per field (6 Frascati levels) (A. National, B. International)
17	NF	Number of citations of publications by discipline / Total publications of the university
18	NF	Share of specialisation publication in a discipline compared to the total publications of the university.

19	NF	Indicators of Production for books, chapters, e-journals, etc.
20	NF	Indicators of Visibility for books, chapters, e-journals, etc.
CODIFICATION OF KNOWLEDGE THROUGH INTELLECTUAL PROPERTY		
21	NF	Number of active patents owned by the university (by field)
22	NF	Number of active patents produced by the university (by field)
23	F	Returns for the university; licences from patents, copyright, (sum & % to non public resources)
24	F	Joint IPRs by university professors and firm employees
STRATEGIC DECISIONS		
25	NF	Existence of a Strategic Plan for Research
26	NF	Existence of mechanisms to evaluate the Strategic Research Plan
	NF	- Frequency
	NF	- Brief Description of the process

RELATIONAL CAPITAL		
SPIN OFFS		
27	NF	Number of Spin-offs supported by the university
28	NF	Number of Spin-offs funded by the university and % above the total number of Spin-offs (funded + supported)
CONTRACTS AND R&D PROJECTS		
29	NF	Number of contracts with Industry (by field and by a competitive/non competitive classification)
30	NF	Number of contracts with Public Organisations (by field and by a competitive/non competitive classification)
31	F	Funds from Industry / Total budget for Research
32	F	Funds from Public Organisations / Total budget for Research
KNOWLEDGE TRANSFER THROUGH TECHNOLOGY TRANSFER INSTITUTIONS		
33	NF	Existence of a Technology Transfer Institution
34	NF	Checklist of activities of the TTI
		- Intellectual Property Management
		- Research contract activities
		- Spin-offs
		- Others
35	F	Budget of TTI / Total university budget
KNOWLEDGE TRANSFER THROUGH HUMAN RESOURCES		
36	NF	Number of PhD students with private support / Total PhD students
37	NF	Number of PhD students with public support / Total PhD students
PARTICIPATION INTO POLICY MAKING		
38	NF	Existence of activities related to policy making
39	NF	Checklist of activities related to policy making
		- Involvement into national and international standards setting committees
		- Participation in the formulation of long-term programmes
		- Policy studies
INVOLVEMENT IN SOCIAL AND CULTURAL LIFE		
40	NF	Existence of special events serving social and cultural life
41	NF	Checklist of special events serving social and cultural life
		- Cultural activities
		- Social activities
		- Sports activities
		- Others
PUBLIC UNDERSTANDING OF SCIENCE		
42	NF	Existence of specific events to promote science

43	NF	Checklist of specific events to promote science, to classical involvement of researchers into dissemination and other forms of public understanding of science
		- Researchers in Media
		- Researchers in Forums
		- Others

F = Financial indicator - NF = Non-financial indicator

ANNEX 3. LIST OF INTERVIEWEES' POSITIONS

The people who have participated in the survey for this study are:

- Rector (UAM).
- Vice-Rector for Research (UAM).
- Vice-Rector for Libraries and Scientific Promotion (UAM).
- Director of Research Institute (UAM).
- Director of Research Institute (UAM).
- Dean of Economics and Business Faculty (UAM).
- Social Council President (UAM).
- Professor of Archaeology (UAM).
- Professor of Accounting and Finance (UAM).
- Management Director (UAM).
- Head of the Research Administrative office (UAM).
- Head of the Personnel Services (UAM).
- University Personnel Claiming Office (UAM).
- Deputy Director of Research in Universities (Madrid Regional Government).