D) **SCIENTIFIC REPORT ON THE LAST FIVE YEARS. JUSTIFICATION FOR AND APPROPRIATENESS OF THE PROPOSAL**

The Autonomous Community of Madrid has among its major assets its great potential for investigation (I+D+i) due to its human resources as well as its infrastructure. Concretely, within this community, there are six public universities: UAH (University of Alcalá de Henares), UAM (Autonomous University of Madrid), UC3M (University Carlos III of Madrid), UCM (Complutense University of Madrid), UPM (Polytechnic University of Madrid) and URJC (University Rey Juan Carlos) [henceforth, abbreviations are for the institutional names in Spanish]. As well, it hosts the central unit of the UNED (Distance University) and the CSIC (Spanish National Research Council). The latter institution has created, together with the UAM, UC3M and UCM an Institute for Mathematical Sciences (ICMAT), which will clearly play an important part in the research carried our in this community. In order to give a complete account of the opportunities, it should be noted that the Government of the Autonomous Community has created institutes for advanced studies in Madrid (IMEDEA), one of which is concerned with Mathematics. A posterior section offers a brief description of each of these institutions, concerning their relationship to Mathematics.

All of the institutions previously mentioned, and for which a brief description of the various relations with Mathematics will be offered in the following text, represent a very influential activity within Mathematics. For example, the joint research projects for this region add up to 22.66% of the research carried out in Mathematics in Spain (ISI, see the Table included below). As well, two of the universities aforementioned (UCM and UAM) offer degrees in Mathematics, with more than 270 new students enrolling each year. The UNED also offers a degree in Mathematics within distance learning. Furthermore, within this autonomous community, there are five post-grad programmes, which include Master's and Doctorate Degrees in Mathematics, as well as a Doctorate in Mathematics in three different universities, which have more than 75 new students each year and three new doctorate programmes. Among the graduate programmes, 4 already have obtained the distinction of "Excellence" at the Doctoral level, as there have been more than 120 doctoral theses passed in these five years.

The major objective of this project is to bring together, coordinate and offer potential avenues for investigation for the most relevant mathematical research carried out within the Community of Madrid, with a view to include the most relevant human resources possible

and to create a synergy among the various institutions, thereby creating a research platform for Mathematics for the Autonomous Community of Madrid. For the achievement of this objective, each of the institutions involved will provide human resources, materials and infrastructure for this project.

Consejo Superior de Investigaciones Científicas (CSIC**,** Spanish National Research Council**) and Instituto de Ciencias Matemáticas** (ICMAT, The Institute for Mathematical Sciences)

The CSIC is the most important institution of public research within Spain and thus has an important role to play within the scientific policies of all the autonomous communities, through their individual planning schemes. Due to their multidisciplinary character, these projects are related to many fields of knowledge, from quite basic investigations to those of the most advanced technological character. The organization is divided into eight scientific-technological fields, Mathematics being included in the Field of the Sciences and Technologies of Physics. The CSIC has 119 centres of investigation (43 of which are of mixed character), 8 belonging to services, 1 centre for technical service, and 147 units which are associated with universities and other institutions, all of which have some 14,000 assistants who are responsible for almost 20% of the Spanish scientific output. All of this adds up to a gross output from this community to some: €800 million for 2008.

The CSIC is a major participant in the development of the Spanish system of scientific and technological advances and therefore, is the natural interlocutor with the European community as well as with broader international sectors. The CSIC, in collaboration with universities and other institutions, seeks to play an important role which will lead mathematics in Spain to the highest international standards. For this objective it has initiated various programmes, one of which is the ICMAT. These initiatives can be found in its Programme Planning (http://www.csic.es/documentos/Plan_de_Actuacion_2006-2009.pdf).

The CSIC actively participates with other institutions and mathematic societies in diverse programmes for the Spanish mathematic community, programmes which have received important funding, such as the ESTALMAT (50,000€), DIVULGAMAT (38,000€), Science in Action (60,000€) (148,000€ annually).

The Institute for Mathematic Sciences (ICMAT), the Combined Institute of the CSIC and three universities of Madrid (UAM, UC3M y UCM), was created as a

result of an international evaluation of the Strategic Programme of the CSIC, and has as its objectives:

a.Stimulate mathematic investigation of high quality

b.Explore diverse initiatives and facilitate high impact interdisciplinary research in basic sciences for industry and for the information society at large.

c.Facilitate doctoral and post-doctoral competence in an international context through specific programmes

d. Serve as an interlocutor between technological, productive and financial sectors who work towards the following ends:

1. High quality research
2. Leading investigation
3. Emphasis on young researchers
4. Establishment of international links
5. Collaboration with universities and other research centres
6. Providing high-quality service to the Spanish mathematic community

The present personnel of the ICMAT are divided into the following sectors:

- Researchers: From the CSIC, UAM, UC3M y UCM (22 PhD researchers of the CSIC, 14 PhD professors from the UAM, 2 PhD professors from the UC3M, and 8 PhD professors from the UCM). The CSIC, when using its full resources, has some 200 researchers (including doctoral students).
- Administrative personnel of the ICMAT
  1. General services
  2. Services for the libraries and scientific documentation
  3. General administrative services
  4. Personnel for the computational laboratory
  5. Other general personnel

The following is a summary of the formative activities carried out during the last 5 years and a view to future perspectives:

- Students initiating research: 18
- PhD theses: 5 (another 9 in progress)
- Contracts from Juan de la Cierva Institute: 4
- Postdoctoral contracts (SIMUMAT): 3
- Other contracts: 2

The CSIC actively collaborates with other institutions and societies for mathematic research in diverse programmes which are of interest to the entire community. It has important financial sources, such as ESTALMAT (50,000€), DIVULGAMAT (38,000€), Science in Action (60,000€) (148,000€ annually).

The research output of the CSIC is now 3% of the total national output (154 articles in the period 2003-2007); its mean impact is far above that of the national mean and is equal to that of centres of excellence abroad. Also notable is the success in obtaining contracts from the Ramón y Cajal Institute (the third of the total for Spanish research from the initiation of the ICMAT, a fifth of the CSIC).

Recently two CSIC researchers have obtained the prestigious Starting Research Grants from the European Research Council 2007 (the only two in mathematics in Spain), in addition to the areas of administration and services offered in recent years, which are numerous and highly relevant (RSME, ICM2006 Madrid, CEMAT, IMU, ESF, ANEP).

The ICMAT takes part directly during various parts of the year concerning diverse topics in collaboration with i-Math, with an emphasis on the training of young researchers:

- **i-Math programme q-C&I (Quantum control and Quantum Information Theory),** which seeks to stimulate the mathematic activity in our country in the areas of information and quantum control.
- **The programme on Moduli Spaces,** with special emphasis on the interaction between this field and other areas of mathematics and theoretical physics, such as algebraic geometry, differential geometry, simplectic geometry, gauge theories, topological invariants, quantum theory of fields and string theory.
- **Intensive research programme in Geometric mechanic and Control theory.**

It is also developing important documentation and archive services through its project, **Integrated Services for Libraries, Archives and Documentation** (in its new library of 1100 square metres in a new building, designed following modern guidelines), as well as making public mathematic investigation, through the DIVULGA programme. Finally, in two years the ICMAT will have its own installations at the UAM campus, with an investment of 18 million € (details can be found at the following web site

http://www.csic.es/Licitaciones/licitacion.do?ID=10456).

IMDEA Mathematics

Background. The Instituto Madrileño de Estudios Avanzados en Matemáticas (Madrid Institute for Advanced Studies in Mathematics, IMDEA Mathematics) is a research center established by the Comunidad de Madrid (CM, Madrid Regional Government) in 2006 with very demanding criteria of scientific excellence. Its origin is the research project SIMUMAT, the only such project in Mathematics awarded in 2005 to groups of Autónoma, Complutense and Carlos III Universities and CSIC (the Spanish Research Institution), within the first call for activities between groups of the Madrid Region. Relevant data about the activity of SIMUMAT in the period January 2006 – June 2007 are the publication of 111 papers in SCI journals, the recruitment of 8 postdoctoral researchers in international calls, or the 380.000 € awarded by external sources (CSIC, Ministry of Education, i-math Consolider project, etc.) compared to 300.000 € allocated to SIMUMAT by the CM.

Start up. IMDEA Mathematics is one of the ten Research Institutes included in the IV Regional Plan for Scientific and Technological Research of the CM. It was established on November 23, 2006 with the structure of a Foundation based on the aforementioned project SIMUMAT, its first director being Professor Enrique Zuazua. Its Board of Trustees includes representatives from public and private Institutions, such as the CM, AIRBUS or the bank Santander. Its mission is to contribute to the leadership of Mathematics in the regional, national, european and world playgrounds, thus helping the development of the society at large.

Activities. On the one hand, IMDEA Mathematics has designed its Scientific and Strategic Plan for 2008-2011, which has been approved by its Scientific Council, a body of highly prestigious, world class researchers. On the other hand, the activities of the Institute have been started. The Scientific Plan for 2008-2011 focuses the effort of the Institute on the following research lines: Non linear partial differential equations; Tropical geometry; Mathematics applied to aeronautics; Mathematics and cryptography; Mathematics for finance; Network modelling and monitoring; Multiphysics problems and applications; Complex systems. In addition, next June Prof. Carlos Nobre, chairman of the International Geosphere Biosphere Programme (IGBP) will deliver a mini-course at IMDEA Mathematics which will be the basis to consider starting a new line on Mathematics of Climate Change.

Following the approval of the Scientific Plan, the main activities of IMDEA Mathematics have been:

- **Recruitment of researchers** through international calls. 20 people have been selected, and will join the institute along the year.
- **Grants:** Over 10 grants requested to the third i-math call, including research, thematic periods, etc. A european grant of the 7 Framework Programme has recently been awarded, and we are waiting to hear from an additional one.
- **Colaboration with enterprises and technology trasnfer:** AIRBUS will support a research project in IMDEA Mathematics for 1.5 million € in 2008 – 2011, devoted to optimal design in aeronautics.
- **Conferences of top-class researchers.**
- **Affiliation with international organizations:** IMDEA Mathematics is a full member of ECMI (European Consortium for Mathematics in Industry) and of the IMSI consortium (International Mathematical Sciences Institutes).

UNIVERSITY OF ALCALÁ DE HENARES (UAH)

University of Alcalá de Henares has two departments (Mathematics and Statistics, Structure and Economic Organization) in which 24 researchers take part in three different groups of investigation (Computational Algebraic Geometry, Applied Mathematics and Statistics.)

Although UAH is one of the small partners within the present proposal for the site of the IEMath-Madrid, the UAH mathematicians have demonstrated in recent years great activity in carrying out more than twenty projects, some 100 publications, 12 PhDs, and a great capacity in organizing 5 national and international congresses as well as taking part in the organization of many other activities. It should be noted that the UAH research has a strong practical component as shown in the fact that in recent years almost 15 Article-83 projects have been obtained. Therefore, the UAH can propose useful research for industries at the national level as well as in Madrid. This is most probably one of the most significant contributions of the UAH for the IEMath-Madrid.

The existence of a Scientific and Technological Site at the UAH greatly contributes to these objectives. This site is responsible for hosting innovative enterprises in sectors with a high Investigation and Development

component and was created in order to facilitate innovation in said enterprises and the transfer of technology from the universities. Thus, this site constitutes a fundamental component which allows for the strengthening of the relations between academic, scientific and industrial sectors, as well as the joint collaboration and the strengthening of scientific activity which could be guided towards the needs of enterprises. The site is located on the external campus of UAH, with 375000m2, of which a total of 187,000m2 can be used for construction.

In spite of its brief existence (the UAH is only 30 years old as a legal entity), the city of Alcalá can boast of a long university tradition of more than 700 years. We believe that the UAH can also collaborate with the IEMath as a partner which can attract students and researchers from abroad to pool scientific resources.

AUTONOMOUS UNIVERSITY OF MADRID (UAM)

The Department of Mathematics at the UAM has developed an intense search programme in mathematics which has attracted international attention. It has 66 researchers, who have a total of 127 research merit periods recognized by the Ministry of Education. Two of the researchers have received the National Prize for Investigation.

Established in 1968, the UAM increased in size and productivity throughout the 1980s and in more recent years has decidedly sought after excellence in investigation in order to become a leader in mathematic research in Spain. The UAM maintains a high level of research in mathematics at all age-levels; it has been particularly active in obtaining postdoctoral contracts from the Ramón y Cajal Institute (6) and from the Juan de la Cierva Institute (5), as well as hosting research fellows and doctoral students from abroad.

The approximate number of research projects supervised by UAH researchers for the period 2003-2007 is 100, of which 10 are regional projects, 50 are national projects, 3 are European, and 37 are Article-83 contracts, thus summing up some 7.5 million € in funding. During this same period, some 380 publications have been included in international data bases, 70% in high impact ISI journals (the FI mean for the last three years is 0.8).

The UAM offers an undergraduate degree in Mathematics and a double degree in Computer Science-Mathematics, with 90 new enrolments each year. In recent years, admission to the double degree has required the

highest secondary school grades in the Community of Madrid (8.72). The double degree programme also has an agreement with the Paris-Dauphine University. In addition, this department gives courses in the Faculty of Science and in the University Polytechnic School of the UAM, with a total of 60,000 credits in courses taught by members of the department. Regarding graduate studies, up to 2005 the department had a doctoral programme only but during the last two academic years has offered Master's and Doctoral programmes adapted to the EEES. The Doctoral Programme in Mathematics at the UAM has received the distinction of "Programme of Academic Merit" from the Ministry of Education. Sixteen doctoral theses have been presented, many of which have given rise to international publications.

As this department has continuously organized many conferences, workshops and scientific activities, some of which have turned into international collaborative projects, it plays an important role within the Community of Madrid. The UAM campus is the site of the ICMAT Institute of the CSIC (Combined Institute for the CSIC-UAM/UC3M/UCM). The IMDEA-Mathematics of the Community will continue to be located there until it is able to relocate to its own site. The UAM publishes *the Ibero-American Journal of Mathematics*, one of the two Spanish journals indexed at 0.0672. The Mathematics Department collaborates in scientific activities with enterprises, such as the Risk-Lab. Finally, this department organizes and collaborates with other scientific institutions in order to make public mathematic findings, especially for students at secondary level, such as ESTALMAT which seeks to foment mathematic talent, offers prizes (during the last two years) and hosts mathematic workshops for students at secondary level.

CARLOS III UNIVERSITY OF MADRID (UCIIIM)

This university has developed a high level of research activity in mathematics through its department of Mathematics, Statistics and Econometrics. Its 32 researchers and research groups located in this young department have already attracted the attention of the national and international community.

This international recognition has arisen from the surprisingly prolific scientific activity during the period 2003-2007, with the supervision of 44 scientific projects, 425 publications and a total of 40 PhD theses within the Mathematic Engineering Programme. The department has also hosted important national and international conferences, as well as its participation

in mathematic activities in Spain, such as its collaboration in the Combined Institute for Mathematics CSIC/UAM/UCIIIM/UCM, its participation in the network for the SIMUMAT Project of the community of Madrid, cooperating with the UCM in the doctoral Programme in Complex Systems. It should also be noted that this university is currently developing a scientific technology park which will doubtless offer a stimulus and source for the IEMath Madrid to develop research related to business and industry, thus generating spin-offs and technologically based enterprises.

COMPLUTENSE UNIVERSITY OF MADRID (UCM)

The Mathematics Faculty is comprised of 120 researchers distributed in 5 departments and two department sections. In addition, departments and mathematicians very active in research can also be found in other Faculties such as physics, Biology, Medicine or Economy. The Faculty of Mathematics offers a degree in Mathematics together with a special two year degree in Science and Statistical Techniques with around 200 new enrolments each year. It offers two Official Post-grad Programmes (in Mathematic Research and Mathematic engineering), together with an additional Post-grad Programme and two Doctoral Programmes in cooperation with other institutions (Computer Engineering, Statistic/Mathematic and Computations Methods for the management of information and science and technology of Geodesic and Cartographic engineering).

The Doctorate programmes have obtained the designation Programme of Academic Merit. The average number of students in the postgraduate courses in the last five years is 78. In this period 57 theses have been completed. Master's original initiatives, such as the "Workshop for young researchers" part of the programme in Mathematic Research and the "Modelling week" of the Master in Mathematic engineering will be strengthen by the Scientific site of the IEMath.

An approximate number of 80 research projects were directed by researchers of UCM between 2003 and 2007. Of those projects, 21 are part of the National Plan for Mathematics, which implies the highest concentration of projects was in the Madrid area, ten projects under Art. 83 have to be added. In the same period, around 750 publications have been produced. UCM researchers are frequent organizers of congresses, workshops and events.

Furthermore, the Mathematics Faculty publishes the *Complutense Mathematics Journal* which has been accepted within the "Indexed

Reference Reviews" by the editorial Committee of *Mathematical Review*, and Thomson Scientific has indexed it beginning with volume 20, 2007, as well as including it in the data base "Science Citation Index Expanded" (SCIE).

It must be pointed out that, in both their teaching (the Mathematics degree has six specialities) and research endeavours (postgraduate and projects), in the Faculty of Mathematics all the different areas in Mathematics are developed with an open and interdisciplinary approach.

The Faculty is the site for the Astronomy and Geodesic Institute (IAG), an organization that with the CSIC is taking part in the Combined Institute CSIC-UAM/UCIIIM/UCM), and has a research agreement with the CIEMAT. It houses the offices of RSME, of SEIO and SEMA, and it has been the site for numerous meetings and forum for the Spanish Mathematics Community, as for example, "The World Mathematic Year, 2000", the ICM 2006, the International Mathematics Olympics, and other various events which make it a national and international reference centre.

Recently, UCM has created the **Institute for interdisciplinary mathematics (IM),** with more than 60 researchers and which in a second phase will host researchers from other centres and universities. IMI general objectives are to promote the interdisciplinary Mathematics research linked to other sciences (information technologies, biomedical sciences, nanotechnology, industrial applications, finance, etc.), and stimulate cooperation with different areas in Mathematics, contributing to the development of technological knowledge, and with a clear social impact and develop the upsurge in research areas, all this in cooperation with other national and international research centres of similar characteristics.

UCM's activity comprises five scientific programmes: Mathematics Biology, Cryptography and Quantic Information, Modelling and Simulation in science and technology problems, Interdisciplinary Theoretical Mathematics, information and decision technologies, together with general and specific interdisciplinary activities.
In its one year of existence the IMI has activated and increased the scientific activity in the Faculty (We should note the cooperation with the two Master Official programmes) as well as help in the organizing of projects and the designing of new initiatives. IMI has attracted the attention of the members of the Faculty of Mathematics implies the need and opportunity for the UCM participation in IEMath Madrid. More information can be found in http://www.mat.ucm.es/imi/

We consider it very important to highlight the intensive teacher training activity (course in Mathematic Education and Methodology) and the promotion of Mathematics that is carried out by the Faculty: The ESTALMAT Project (In collaboration with RACC and Vodafone), EFyN, The Spring Competition, The Inter-centre Competition, The qualifying stages of the National Mathematics Olympics, The Mathematics School Day, The Seminar on the History of Mathematics, etc. Most of these events and activities will be held, undoubtedly, by the IEMATH-Madrid in a near future.

Moreover, the Miguel de Guzmán Chair has just been created and that will allow the Faculty to keep on stimulating and promoting mathematics among students and teachers in secondary education.

Finally, the Faculty of Mathematic Sciences can boast of excellent infrastructure that facilitates the work of researchers and students (offices for guest teachers, videoconference, seminars and meeting rooms, laboratories and computer rooms etc). However, especially relevant is the most comprehensive library as well as the best newspaper and periodicals library on Mathematics in Spain. The proximity of this library to the Head Office of the IEMath Madrid, will be an important added value to attract numerous researchers.

OPEN NATIONAL UNIVERSITY (UNED)

The UNED is the biggest institution for university education in the Spanish language with associated Centres throughout the entire Spanish territory, as well as in South America and Equatorial Guinea. In the Head office, in Madrid, there are some 40 mathematic researchers distributed in different faculties: Sciences Faculty, Industrial Engineering College and Computer Engineering College. This University offers a Master's Programme in Advanced Mathematics and two Doctorate Programmes. From 2003 to 2007, the UNED has developed more than twenty projects on mathematics and it has produced some 190 publications.

The UNED has 1100 students of mathematics distributed around the world. It also has adequate infrastructure and technical means adapted in order to collaborate with the students disseminated around the world (it has experience in the creation of virtual communities and in virtual technologies applied to courses. Also, it has experience in broadcasting lectures and reference materials).

These human and technical resources will be available at the IEMath's Head Office. This guarantees a wider scope for the activities that will be carried out, and will allow for the recruiting of students and researchers from less developed areas.

UNIVERSIDAD REY JUAN CARLOS (URJC)

The URJC is the youngest public University in the Autonomous Community of Madrid; it was opened just 10 years ago. In that short period of time, it has created several research groups within the Department of Applied Mathematics in the School of Experimental Sciences and Technology and the Department of Statistics and Operational Research. The main lines of research conducted in the URJC comprise different aspects of communication theory (Networks, Signals and Cryptography, Electronic Democracy, Neuronal and Evolutive Computation), Statistics (Bayesian Inference, Biostatistics, Imprecise Probabilities), Fundamental Mathematics (non-associational Algebras, Functional Analysis and Algebraic Geometry) and Applied Mathematics (differential Equations and numerical Analysis). With regard to official courses, departments participate in several official postgraduate Master's courses in the fields of Computer Science and Information Technologies, in addition to an Official Decision Engineering Masters programme.

There are currently 39 researchers and during the 2003-2007 period 60 research project and 26 Art. 83 projects were begun which have produced some 258 publications. 8 doctoral theses have been defended in this period. Furthermore, the URJC has successfully organized 9 international conventions and several summer courses with the collaboration of the URJC Foundation. Added-value elements of the URJC are the facilities and laboratories located in the Centre for Technological Support, which provide great support to the aforementioned lines of research; among these the Computation and Advanced Display Laboratory is noteworthy. In short, the URJC's lines of research, combined with the current rate of growth, augur a bright future for the URJC; this young university is undoubtedly destined to play a major role in the short term in R&D+ I in Mathematics in the Autonomous Community of Madrid.

UNIVERSIDAD POLITÉCNICA DE MADRID (UPM)

The UPM is the Autonomous Community of Madrid's technology university; it houses *18 Schools* (10 higher and 8 technical) of all branches of Engineering and Architecture,

2 Faculties, *5 University Research Institutes*, *7 Research Centres* in which major studies in R+D are conducted. Furthermore, three of the *Institutos Madrileños de Estudios Avanzados* (IMDEA) (Madrid Institutes for Advanced Studies) are headed by UPM professors.

The UPM has a *Science and Technology Park* in which, with the participation of other public and private institutions, 18 spin-off companies and a considerable number of Technology or Research Centres are in operation or are about to be launched, many of them devoted to activities with a significant Mathematics component, traditionally acknowledged (e.g., the Aeronautic and Industrial Technology Centres, the Aerospace Research Centre, the Robotics and Acoustics Research Institutes, the Silicon Institute, Technofusion, and the Software IMDEA) or emerging (e.g., the Biomedical Technology Centre, the Biotechnology and Plant Genome Research Centre, the Spanish Node Blue-Brain), in addition to the *Great Science Facilities*, recognized as such by the MEC, the *Institute of Optroelectronic and Microtechnology Systems* and the CESVIMA *Magerit Supercomputer* (a supercomputer with 22.5 Tflops, 2569 processors, 720GB of RAM and 10 TB of storage, which makes it the second supercomputer in Spain, after the Mare Nostrum in Barcelona, and the tenth in Europe).

The R&D+I fabric of the UPM has evolved naturally as a result of specific technology needs which necessarily involve mathematics. For example, in the Nuclear Energy Institute, which predates the Park, work is being conducted on mathematical problems associated with Plasma Dynamics the resolution of which requires the massive use of numerical and analytical tools and is essential to control the process of Inertial Confinement Fusion. This whole experience has also proved useful, more recently, in manufacturing pure silicon using Nuclear Energy techniques. Consequently, in the UPM Park, the recently created Silicon Institute has been complemented by the facility called Technofusion.

The UPM Mathematics departments have assembled some 100 researchers who, by way of example, have headed 13 international, 80 domestic and 32 regional projects over the last five years, with public funding of 672 KEuros, 7,615 KEuros and 1,058 KEuros, respectively, and have set up another 28 collaboration projects with companies, with 1,780 KEuros in funding. It is noteworthy that a large portion of this latter funding has been earmarked for predoctoral grants and for improving university facilities, thus complementing the public funding received.

Owing to its characteristics, the UPM envisages the role of mathematical activity as one which is closely linked to the R&D+I and technological transfer sector. On the one hand, many researchers belonging to departments or institutes which are not strictly mathematical conduct R&D activities with a very high mathematical content. On the other, teachers in the UPM Mathematics departments do a large part of their work in direct connection with non-mathematical departments, on problems which, frequently, have a dual scientific interest (mathematical, very frequently) and technological. That is why a lot of its work is directly funded by companies.

And this has been so in the UPM for decades. One of the major weaknesses of our *Science-Technology system i*s precisely the lack of a robust connection between the academic world and Industry. The UPM can contribute this dual interdisciplinary and industrial aspect as a distinctive value to the IEMath project: fostering coordinated, *interdisciplinary* work of mathematicians and engineers is also a priority objective which the UPM is in an ideal situation to head.

Table summarizing the most important data on participating institutions. Financial amounts are given in thousands of euros.

GENERAL DATA 2003-2007 PERIOD								
	CSIC	**UAH**	**UAM**	**UCIIIM**	**UCM**	**UNED**	**UPM**	**URJC**
Researchers	**22**	**24**	**66**	**32**	**120**	**40**	**96**	**39**
Doctoral grants	**8**		**37**	**56**	**35**	**10**	**47**	**5**
Theses Read	**5**	**12**	**16**	**40**	**57**	**12**	**26**	**8**
Regional projects	**5**	**7**	**10**	**14**	**37**	**5**	**32**	**28**
National projects	**5**	**4**	**53**	**40**	**39**	**17**	**80**	**18**
European projects	**8**		**4**	**3**	**4**	**2**	**13**	**14**
Art. 83 LOU		**13**	**38**	**23**	**8**		**28**	**26**
Projects €	**1500**	**312.6**	**2,803.3**		**4,026.6**		**9,345**	**2,300**
Article 83 LOU €		**408**	**5,557**		**488.8**		**1,780**	**1,170**

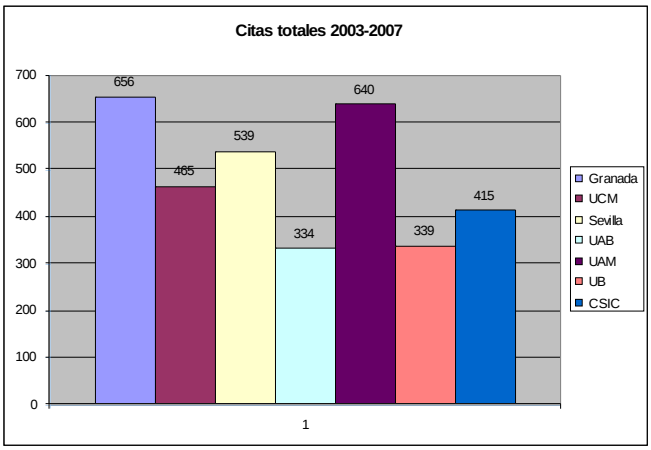
DATA PUPILS 2006-2007 COURSE								
Alumn totales en Licenciatura			**467**		**1100**	**1113**		
Alumn nuevo ingreso en Licen.			**90**		**182**	**204**		

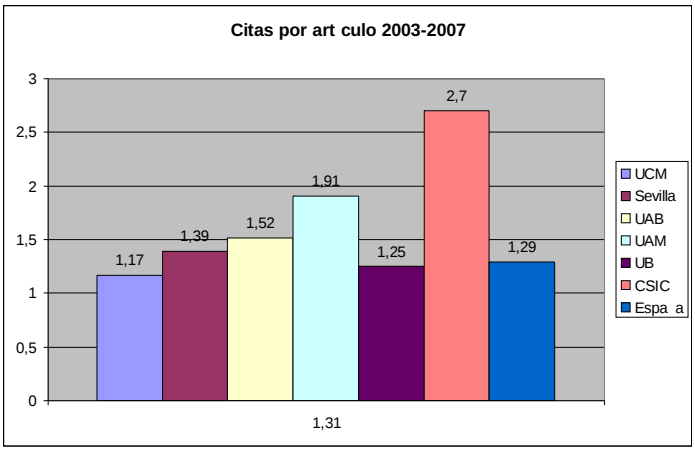
Alumn en posgrados Oficial.			**30**	**65**	**67**	**15**		**100**

In absolute terms the following table summaries scientific production in mathematics in the Community of Madrid in the ISI quoted topics. Statistics is not included:

ISI SCI-expanded Mathematics; Mathematics, Applied; Mathematics, Interdisciplinary Applications; Computer Sc., Theory & Methods; Physics, Mathematical; Computer Sc., Artificial Intellig.; Operational Research & Manag. Sci.;							
	2003	**2004**	**2005**	**2006**	**2007**		**2003-2007**
CSIC	56	52	79	51	54		292
UAH	18	15	25	22	30		110
UAM	78	95	98	90	75		436
UC3M	108	103	115	142	77		545
UCM	146	150	140	160	108		704
UNED	52	24	55	37	30		198
UPM	106	126	146	133	73		484
URJC	37	43	51	60	35		226
Total Spain	2593	2565	2840	2995	2015		13008
Total Madrid	583	596	660	644	465		2948
Madrid/Tot %	22,48	23,23	23,23	21,5	23,07		22,66

Apart from this global data, in recent years an effort is being made to improve the quality of these publications, as a token of the quality commitment on which this plan wishes to place its distinctive stamp. Thus, with the data available, we may indicate that of the UAM publications over the last three years, 32 are in the upper ten percent of the impact index and 99 of the CSIC publications in the last five years are in the first third. The following tables display the data contained in the WoK regarding papers cited in six Spanish institutions; they show that Madrid institutions come higher than other Spanish regions.





JUSTIFICATION FOR AND APPROPRIATENESS OF THE PROPOSAL

All of the above is evidence of a very significant wealth of human resources, which is concentrated in the Madrid region, for the development of mathematical research. By virtue of which, Madrid is proposed as the venue for the IEMath encompassing all the abovementioned institutions and promotes the collaboration of all of the former in a bid to attract sufficient human capital so as to ensure the maintenance of and improvement in research activities in Mathematics in the Autonomous Community of Madrid and, by extension, in all of Spain, and to prepare the takeover by the next generation which will be needed by the universities in the region over the coming years.

Governing principles of the proposal:

- •Strong institutional support component, setting up a mathematician's promotion group comprising members of each of the different institutions involved.
- •Consideration of Madrid as a single mathematical research area, so that activities are conducted where most appropriate depending on

availability and the best way to meet the objectives proposed.

- Consideration of all areas of mathematics with special attention to interdisciplinary and cutting-edge subjects.
- Firm commitment to maximum scientific quality in endeavours proposed, constantly seeking the added value of searching for and providing what institutions cannot currently achieve by their own means.
- Emphasis on recruiting human resources and the articulation of a comprehensive development of a research career in Mathematics.

E) ACTION PLAN AND SCIENTIFIC PROJECT OF THE CENTRE AS HEADQUARTERS

The scientific project presented is based on the aims defined in the call for centres and start up documents issued by the MEC. The basic aspects are:

Aims:

- To attract human resources for research in Mathematics and provide the conditions for an integrated development of the research career by contracting pre-docs or post-docs, within maximum quality and internal competence parameters until such time as they are definitively settled within the university or research framework.
- To encourage and support high quality research in the Madrid institutions providing support and infrastructures for sabbatical leave, visits, etc., and to encourage researcher mobility, promoting the visible presence of Spanish Mathematics on an international level.
- To promote inter-group collaboration and facilitate the creation of new groups, with special emphasis on emerging topics in Science, Technology and Social Sciences.
- To set up a Madrid Community-wide researcher training area, supporting the already existing postgraduate programmes and facilitating and coordinating collaboration between them, to provide a stimulating environment which will attract the best early researchers and students to the region.
- To contribute to stimulating young mathematical talent and to improving training.
- To promote multidisciplinary and industrial facets of R&D activity. To carry out promotional activities for multidisciplinary projects which bring together mathematicians and other related scientists (physicists, biologists, engineers, etc.). To promote activities and projects with business enterprises.

- To seek out uniqueness and distinction wherever it is to be found, with a special commitment to those innovative and daring ideas which, precisely because they are original or interdisciplinary, often fall outside standard research patterns.

Actions: To realize the above aims the project will focus on the following actions:

- Organizing theme-based periods of concentrated scientific activity focusing on research areas or topics.
- Temporary contracting (as visiting members) of prestigious researchers to collaborate with already established groups, or in areas with development potential. No permanent contracts or appointments are envisaged.
- Creating a sabbatical programme linked to long-term activities to enable Spanish researchers to organize and take part in these.
- Setting up a stable programme of post-doctoral mobility to facilitate incoming young Spanish and international researchers.
- Consolidating Postgraduate Programmes in each of the associated institutions and cooperation between them.
- Funding through Master and Doctoral studentships.
- Setting up a Seminar for Applied and Industrial Mathematics.
- Encouraging the pooling of the outstanding mathematics library and periodical resources of the member institutions, with the help of the *Consorcio Madroño*.

A detailed description follows of the specific actions grouped into three main areas:

1.Human resources and research career development.

- Participation in the cooperative programme for IEMath doctoral studentships. The studentship holders in this programme will be assigned a tutor from the region and a thesis director who may also be an IEMath visitor from within or outside Madrid. Within this programme actions will be put in place to attract foreign students, including the search for external studentships (AECI, Fundación Carolina, etc).
- As part of the creation of a Madrid training area the doctoral students holding studentships from other funding sources will be included in the IEMath Madrid activities. A register of all studentships holders will be

drawn up and introduction to research courses programmed.

- A specific programme will be set up for tutors and follow-up of undergraduate students awarded Madrid Autonomous Community Excellence scholarships. This Programme attracts excellent students countrywide to Madrid and is a potential goldmine for mathematical talent.
- Participation in the competitive programme of postdoctoral contracts in IEMath Stages 1 and 2, in collaboration with the Juan de la Cierva and Ramón y Cajal Programmes in the terms decided by the MEC. This involves creating a system of two-year studentships available to researchers returning to the region after a post-doctoral stay either abroad or in centres elsewhere in Spain.
- A visitor programme will be set up in which high quality scientists are invited to participate in the activities of IEMath Madrid, theme-based periods, advanced schools, prospective research activities, student guidance, etc. Where these are researchers from the region taking part in the theme-based periods, substitution contracts may be on offer at their universities so that they can participate on a full time basis in the activities.

In 2008 the studentship and IEMath programmes will be started in coordination with the other sites. A Human Resources committee will be created to complete the design plan for human resources and research career development. The plan to coordinate all pre-doctoral studentships will be put into practice.

In 2009 the visitors plan will be put into practice and also the fellowships and contracts in the plan itself.

2.Actions for researcher training.

The training actions envisaged will be coordinated with the regional postgraduate programmes and are intended to complement these. They include different types of activities:

- Coordinating existing postgraduate programmes, while respecting the individual institutions, programming intensive courses of mutual interest, credit recognition and support for student mobility.
- Participating in the activities of the IEMath official Doctoral School, by the coordinated organization of advanced courses using the start-up document format or its final version.
- Programming advanced courses in innovative topics of special

relevance, given by top level international experts (1 or 2 per year envisaged). Some of these courses will be programmed within the activities of the theme-based periods. It is envisaged that some of these courses will lead to a series of teaching publications with a view to converting them into key introductory texts to their thematic material.

- 'Taster' courses on topics of special interest designed for young researchers to be given by international experts which may open up new approaches to research areas of special attraction where the Autonomous Community of Madrid is under-represented. The aim here will be to encourage interactions which may lead to the completion of doctoral theses, either through distance-based thesis direction or by the student transfer to their Director's work place with a IEMath studentship. What is sought here is the participation of mathematicians in the Madrid area in priority topics where our scientific community is under-represented.

For 2008, successful initiatives already underway in the Madrid mathematical environment will be supported, including the International School for Geometry and Physics which this year will take part in the moduli spaces semester, the Geometry, Mechanics and Control Summer School and the School for Mathematical Analysis in Fluids and its Simulation . Other planned activities include:

- Organizing a fortnightly seminar on number theory in 2008-09 (UAM) with the TENU2 project of the Madrid A. Community.
- SIMUMAT Summer School
- Colloquium UAM 2008 (as part of the commemoration celebrations of the 40th anniversary of the UAM).
- 8th International Conference on Harmonic Analysis and Partial Differential Equations, to be held in El Escorial from 16 -20 June 2008.
- III Euro-Japanese Workshop on Blow-up Problems, to be held in Japan in September 2008 (UAM-UC3M)
- International conference on Harmonic Analysis, on the occasion of the 60th birthday of José García-Cuerva and 25 years of his book with José Luis Rubio de Francia (June 2009).

For 2009, a selection period will open shortly for advanced courses and others already programmed will be included, such as School for Advanced Mathematical Cryptography of the *Red Española de Matemáticas de la Sociedad de la Información* and IMDEA.

3.Programme of in-house activities.

This programme of activities will be developed in coordination with the research institutes in the region and the other IEMath sites and the *Consolider Mathematica* Project. It includes:

- Holding concentrated theme-based periods for scientific activity. These will last from 3 to 6 months depending on whether the specific level of each topic. These will include a specific number of visits, an advanced school and at least one workshop. During the longer thematic periods more workshops may be organized. Particular emphasis will be placed on holding encounters for young researchers. Past experience shows that these encounters are an especially enriching experience for them, since are available to travel but on the other hand have few opportunities to speak at regular scientific congresses.
- Financial and logistic support for holding workshops of high scientific quality.
- Setting up a committee to design and carry out prospecting activities designed to identify and support priority topics in emerging areas and areas of mathematical technology transfer to the industrial sector.
- Organizing meetings to identify topics of interest in the strategic areas of the new National Plan (Climate Change, nanotechnology, Information Society, etc...). Organizing University - business enterprise meetings.
- Promoting projects in areas of interest and funding for start-up activities aimed at obtaining competitive or interested business enterprise funding. In particular what will be sought in collaboration with Madrid institutions is the way to support the presentation of European projects in successive EU frameworks, by facilitating the heavy administrative load these imply.

In 2008 the Committee for strategic design will be set up. Activities already underway in the participating Institutions will be supported. Future prospects meetings will be held and the priorities and strategic plan for the following years defined.

F) ECONOMIC VIABILITY PLAN OF THE PROPOSAL AND ITS DESCRIPTION

Presentation of the proposal. Characteristic Elements

The participating institutions, through this proposal, strengthen their collaboration with regard to mathematical research in the environment of

the Autonomous Community of Madrid so that the present proposal is planned with the following characteristic elements.

- The creation of a new Centre, called IEMATH's Madrid Headquarters or IEMAth Madrid in the form of a Consortium between participating institutions that will be formally set up in the event that this proposal is successful.
- IEMath Madrid will have full scientific autonomy and management for the development of its activities and the fulfilment of its objectives so that it has its own regulation and management bodies that are described below.
- The funds obtained for the IEMath Madrid activities will have a definitive character. They cannot be diverted to other uses with the decisions for their use corresponding to the IEMath Madrid's Management bodies.
- In order to visualize and re-enforce this autonomy, IEMath Madrid's management and coordination headquarters will be at the USC for which a use agreement will be formally signed and the corresponding premises will be transferred to the IMDEA for IEMATH's headquarters.
- Regardless of the location of IEMAth Madrid's Management Headquarters, the activities, which correspond, can be performed at different Community institutions, which participate in the consortium, bearing in mind their best scientific development. Eventually and as long as the IEMAth Consortium agrees, at a national level, associated headquarters may be considered.
- The participating institutions include their commitment to the establishment of the Consortium pursuant to the terms of this proposal.

Legal Personality. IEMath Madrid's legal personality will be that of the Consortium among the participating Institutions in the proposal.

Scientific Coordination

Governing Bodies. IEMath Madrid will have a Director, Sub-director, Board of Directors and Scientific Council

Scientific Council

Despite the existence of IEMath's general Scientific Council for the annual drafting of scientific proposals, which must be taken up with the council from the local headquarters. The establishment of a Scientific Council advisor may be useful. Nevertheless this will depend, as indicated on the operating dynamics of IEMath consortium on a state level, which is still to be defined. Therefore, we hereby indicate the possibility of a Scientific Council

for the Headquarters, the composition of which is subsequently to be determined by the Management Council with the following duties.

a) Produce an annual scientific policy proposal
b) Advise the Management Council on the activities to be performed
c) Propose the performance of new activities
d) Issue reports on contacting or any other question the Management Council wishes to submit for consideration
e) .Value the actions of the Management Board and report on the scientific activities to be developed.

Management Council. It will be comprised of the Director who will act as its President, the Subdirector and members of the different participating institutions (Universities + CSIC+IMDEA) nominated from among mathematicians of renown research. The Management Council will be responsible for

- Budget approval and approval of the annual accounts
- The approval of the activities to be performed and their location
- The adoption of the necessary means for the execution of activities.
- The agreements will be passed by qualified majority and on the advice of the Scientific Committee.

During the starting phase, it will be composed of

Director: Carlos Andradas Heranz, Catedrático de Álgebra, UCM.
Sub-director: Alberto Ruiz González, Catedrático Matemática Aplicada, UAM.
UAH: Juan Llovet Verdugo, Catedrático de Matemática Aplicada.
UAM: Juan Luis Vázquez Suárez, Catedrático Matemática Aplicada.
UC3M: Guillermo López Lagomasino, Catedrático Matemática Aplicada.
UCM: Ignacio Luengo Velasco, Catedrático de Álgebra.
UPM: Jose Manuel Vega de Prada, Catedrático Matemática Aplicada.
URJC: Maria Isabel González Vasco
UNED: Antonio Costa González, Catedrático de Geometría.
CSIC: Juan José López Velásquez, Profesor de Investigación.
IMDEA: Enrique Zuazua Iriondo, Catedrático Matemática Aplicada.

Director: Must be a mathematician with renown research experience, also preferably with experience in research management. They will be chosen by the Management Committee and approved by the Delegate Council of the IMDEA Mathematics Foundation. The Director will be responsible for:

e.The execution of the resolutions of the Management Council
f.The coordination of all IEMath Madrid’s activities

g. The adoption of measures regarding IEMath Madrid's ordinary operations and the achievement of established objectives.
h. The preparation of reports, budgets and action proposals for submission to the Management Council
i. The preparation of as many documents as are necessary for the headquarter's participation at IEMath's meetings and activities
j. The preparation of the visiting professor programme each year.

During the starting phase, Professor Carlos Andradas Heranz, Catedrático in the Algebra Department at UCM and proposal coordinator will act as the director

Subdirector: They will be appointed by the Director and will assist them in the performance of their duties. If the director belongs to one of the promoting institutions the sub-director may not belong to the same one. During the starting phase, Alberto Ruiz of the UAM will serve as sub-director.

Executive Manager: IEMAth Madrid will have its own management, performed by a director hired ex-novo for said function and transferred by any of the institutions, which are members of the consortium, with previous agreement.

Physical Spaces: Fortunately, the Community already has and will have in the future infrastructures and physical spaces for the development of the mathematical research that will strengthen this proposal.

And so for example, in addition to all installations and means of the mathematics departments of the participating institutions we must point out ICMAT's future installations, the building of which will begin to be constructed immediately at the UAM campus, and all the spaces of the IMDEA Mathematics headquarters on the boundary with UAM. At the same time, the Universidad Complutense has recovered Vasco de Quiroga Residence Hall for its utilization, a space that it wants to dedicated entirely to research and among others, in particular Mathematics research.

It is proposed that the Management and coordination of IEMATH Madrid be housed at the Universidad Complutense, which would act as headquarters for these purposes. In so doing, a strategic effect is pursued, the configuration and visualization together with the currently existing zone in Cantoblanco, a second pole for Mathematics activity in the Moncloa Zone, in which the UCM, UPM UNED and other OPIS such as CIEMAT are physically located, thereby taking advantage of their proximity. All of this is without

detriment, as already indicated, to one of the defining elements of this proposal, the consideration of the Community of Madrid as a unique space for mathematics research, in which activities can be performed where it is more appropriate from a scientific point of view, with even being able to consider an agreement with the IEMath Consortium on associated headquarters.

In the transition phase, until the conclusion of the remodelling of the Vasco de Quiroga Residence Hall, foreseen for 2010 the Headquarters of the IEMath Madrid's Management will be housed in the School of Mathematics of the UCM that will make available to IEMATH immediately a group of up to 20 offices for dual use, fourteen of them grouped together on the first floor of the East Wing of the School as well as management and administrative offices. Likewise, the UCM will make available to IEMath Madrid the remaining facilities for its utilization, coordinated with the School. In particular, the Meeting Hall, the Main Lecture Hall for Seminars, Miguel de Guzman Classroom and the Rey Pastor Meeting Room and particularly the library of the School of Mathematics of the UCM.

From 2010, in the event of this project's success the UCM will make available to IEMATH Madrid one thousand square meters of space at the Vasco de Quiroga Residence, which may be increased to 200 square meters, thereby taking up the entirety of one of its towers in the event that IEMath Madrid is designated as IEMATH's central headquarters. The UCM and the IEMath Madrid shall sign a collaboration agreement in which said spaces are assigned to IEMath Madrid for its Management Headquarters in the event it is selected at this call for proposals. The Vasco de Quiroga Residence hall is located a few meters away from the School of Mathematical Science and the rest of the Science Schools of the UCM together with the Meteorological Institute and also near to many of the UPM and UNED schools. In particular, the proximity of the library of UCM's School of Mathematics, the most important in the Country, in terms of is endowment of funds, we believe constitutes important added value to be contributed to this service at zero cost.

After two years, when the previously mentioned spaces are completely in operation the transfer of the Headquarters to another institution can be considered as along as IEMath Madrid's Management Council agree and the consortium's competent body approves it.

THE PROPOSAL'S MOST PROMINENT POINTS:

Scientific Excellence

Without wanting to be exhaustive and for example purposes the participating institutions in this proposal have numerous points of scientific excellence that are proposed as one of the guiding principals of the proposal. For example

- The ICMAT has received one third of all the Ramón y Cajal prizes in mathematics up to this time. Adding to those received by the Universities of Madrid and other institutions of the Community, this figure is almost near 50%.
- The only two “starting grants” to Spanish mathematicians awarded at the last meeting have gone to ICMAT researchers.
- The UAM has among its professors two winners of the “Rey Pastor” National Research prizes
- Two of the invited speakers at the past ICM belonged to Madrid institutions.
- The only Spanish key note speakers at the past ICM belongs to a Madrid University.
- The Community of Madrid has leading work research groups in Harmonic Analysis, Partial Derivative Equations, Complex Algebraic Geometry, Quantum Computation and Cryptology. Numbers Theory and Singularities, Varieties of Low Dimension and Knot Theory, Rieman and Klien Surfaces among others.
- The Community of Madrid certainly boasts the greatest volume of bibliographical and hermeroteca resources and hemeroteca in the country.
- The participating institutions edit two Mathematics research journals La Revista Iberoamericana de Matematicas, the RSME journal which already appears in the ISA in a relevant position and the Revista Complutense Matemática, recently selected for its inclusion.
- Madrid is the Spanish community with the most relations with the rest of the Spanish communities as shown in the study *La investigación matemática española de difusión internacional,* Bordons, M. *et al,* available on the web page *http://www.ce-mat.org/documentos/informe_csic.pdf*
- Madrid is host of one of the units of the project Consolider Ingenio Mathematica (i-math), but moreover has played a key role in its start-up. This i-math unit would coordinate its activities with the IEMath Madrid’s headquarters, following the directives of the report that it contributed to IEMath’s creation.

Information Capacity

As indicated, the entirety of institutions in the Community of Madrid, who are participating in the proposal, offer two degree programmes in Mathematics as well as post-graduate and doctoral degrees. In the last five year, over 120 doctoral theses have been read. Nevertheless, this education is clearly below the training capacity of the Madrid Region and precisely one of the objectives of this proposal is: attract more young people to do their doctorates and provide them with the means so that they can pursue them.
On the other hand, the diversity of the areas covered by the research groups of the Community of Madrid permit that these training possibilities cover any topic in mathematics.

Complementarities of the resources:
The rich resources of the Autonomous Community of Madrid, described in the initial summary of the participating institutions, make this an ideal place to establish the headquarters of IEMAth and offer a guarantee toward the successful performance of its activities. Furthermore, by pooling these resources in their undertakings, each institution can provide their specific strengths and thus make a contribution to the added value obtained from a united effort involving, for example, the bibliographic resources of the UCM, the audiovisual and information dissemination media of the UNED, and the supercomputing resources and applied science profile of the UPM, etc. As is apparent, the institutional profiles of the participants complement each other in such a way that joint activity will enhance the overall Madrid research system. In particular:

a.This complementary character is found also in the area of experience in research projects. For example, the UPM offers long experience in projects with businesses and contracts which meshes well with the capabilities of other institutions experienced in competitions of calls for proposals organized by government bodies.
b.The advantages offered will allow the coordination of teams that work on similar subjects in different institutions. This will produce synergies that doubtlessly will lead to new projects and scientific initiatives. At the present time there exist some joint activities that show that good results can be obtained by proceeding in this way, such as for example the Seminar on Complex Geometry in which researchers from the CSIC, UAM, UC3M and UCM have participated since 2003 and whose sessions take place on different campus each week
c.Coordination of the work will be encouraged by the establishment of a service to distribute information and carry out scientific oversight over

the Web. In this area, new technologies dealing with syndication and interaction of content will be used. Hence, the experience of the UNED will be of undoubted value in work with digital platforms.

d.The physical spaces and logistical aides will also complement one another. In addition to the space available in the headquarters at the UCM, there will be among others the new building of ICMAT, the meeting halls and conference spaces of the UAM and the UPM and the videoconferencing infrastructure of the UNED.

Financial budget and plan of viability

The intense participation of the institutions in the proposal offers maximum guarantees of the viability and financial solvency of the proposal. In particular, the Autonomous Community of Madrid and other institutions have expressed their commitment of financial support of the activities to be undertaken at each site, in terms of financial, human and material resources. Specifically, the universities have committed themselves to offer the maximum availability of their professors to participate in research activities, themed semesters, and training courses to be developed IEMAth.With respect to administrative support, the Complutense University have made a pledge to provide administrative, logistical and executive support to the IEMAth headquarters if the proposal meets with success.

CONCLUSIONS. This is an open proposal, focused on human capital, using resources that are either existing or are under construction. The proposal's objective is to assist the work of researchers (fellows, postdocs in the first or second stages, visiting researchers, etc.) and their placement in the posts judged best for them to perform their work. This will be made possible by treating the Autonomous Community of Madrid as an integrated research area. The proposal focuses on enhancing the integrated development of researchers' career by means of coordination between IEMath head offices. Thus, the scientific programme of the headquarters will not be in competition with other Research Institutes in the region, but rather will be complement and take advantage of their experience and activities as a way of strengthening the capability of the IEMAth Madrid headquarters to attract human and educational resources. The centre will be launched with a mission of service that will be directed towards the rest of the universities in the country as well, with calls for proposals for the organization of events for researchers and personnel in training that will be open to proposals from national ands international sources. Supplementary information is available on the CD that accompanies this application and also can be found on the website http://www.mat.ucm.es/vdrmat/IEMath-Madrid.htm.