



IMUS STRATEGIC PLAN 2016-2020

FEBRUARY 2016

Since its creation in 2007, the IMUS has progressively achieved its goal of structuring, coordinating and promoting research in mathematics at the University of Seville.

The IMUS implements programs supporting research activities, courses of doctoral training, grants for mobility of senior researchers and scholarships for young researchers; and provides administrative and logistic support to the management of research projects and activities. Also it runs the PhD Program “Mathematics”, the unified Doctorate Program in this scientific discipline of the University of Seville. Moreover, IMUS develops a multi-year program for training administration staff in order to permanently improve the services they provide.

Triggered by the development of IMUS, the international rankings of mathematics research at the University of Seville has dramatically improved. In particular, according to the Taiwan Ranking (that classifies worldwide universities by research results) the University of Seville jumps forward from the 161th place in 2010 to the 65th in 2015.

The IMUS, after consolidating its support to mathematical research at the University of Seville, addresses the challenge of consolidating itself as an international reference centre in mathematical research. This requires,

- . to support the internationalization of research in mathematics at the University of Seville through its extensive participation in the H2020 Programme of the European Union;

- . to regularly increase the volume and quality of mathematical research publications in prestigious journals;

- . to attract young qualified researchers that will strengthen our groups and provide energy and connections to new and relevant research topics;

- . to systematically develop links with multidisciplinary research at the University of Seville, the society and the productive sectors of Sevilla and Andalucía, by means of outreach and mathematical technology transfer activities.

The IMUS has developed a Strategic Plan for the period 2016-2020, specifically designed to achieve these objectives. This Plan consists of the following actions:

1. Attracting talent. The new structuring of University education in Spain, as well as the economic crisis have prevented the University’s recruiting young researchers for a long time,

close to one decade. It is extremely urgent to hire new qualified researchers, to ensure the perennity of research in mathematics at the University of Sevilla, and prevent the decline of this institution by lack of human resources. For that reason, we propose developing the following actions:

a. **Promoting the incorporation of researchers through the Ramón y Cajal and Juan de la Cierva Programs.** We propose to develop and implement a program that will attract young researchers of excellent quality, among those previously selected by these excellence national Spanish programs. We already hired Dr. Francisco Gancedo as a "Ramón y Cajal" researcher, who has subsequently achieved the first project (Starting Grant) of the European Research Council in mathematics of the University of Sevilla. This activity will be held annually starting from 2016.

b. **Participation to the call "María de Maeztu".** Obtaining the accreditation "María de Maeztu", seal of excellence of the Spanish Government as a research centre, would allow the incorporation of about 10 young researchers, in a period of 4 years. This would largely enhance the activity and international image of IMUS. The IMUS has taken part in the last two "María de Maeztu" calls of 2015 and 2016, achieving a high score (87 and 89.5 points). We plan to participate annually in the competition, taking into account the areas for improvement identified by the evaluation reports. In fact, this is the purpose for developing the present Strategic Plan.

c. **Participation in programs incorporating pre and post-doctoral researchers at the University of Sevilla.** For the past two years, the IMUS has successfully collaborated to the recruiting of 4 post-doctoral researchers in mathematics in several Department of the University of Sevilla. From now on, this action will take place each year.

d. **Participation in programs of early talent recruitment.** The IMUS is involved in organizing international youth camps, through a partnership with Russia and the Andalusian Society of Thales Mathematics Education, in view of attracting talents and encouraging early scientific vocations. The 2016 summer camp project is underway. From now on, we will promote permanently the realization of these activities.

e. **Organization of Doc Courses.** Doc-Courses are doctoral-level training activities for an intermediate term (1-3 months). Their purpose is to attract and make direct contact with high-quality worldwide young researchers, resulting in long-term collaborations and doctoral theses. IMUS has a wide and successful experience organizing this kind of courses. We aim to organize a Doc-Course every other year starting in 2016, in several scientific topics adapted to the specialties of IMUS researchers.

2. Promotion of participation in R&D national and autonomic programs.

The Research Groups in Mathematics very successfully participate in the funding calls of research projects of the R&D National Plan and of the Andalusian Government. We will promote these participations by two kinds of actions:

- a. Providing administrative support to the application and management of the projects, in order to minimize the researchers' administrative load. This action will be carried out permanently from 2016 onward.
- b. Completing and improving software applications and data bases of scientific production for a fast search of requested information in the projects applications. This action will be developed in 2016 and implemented from 2017 onward.

3. Promotion of participation in R&D International Programs. As in the case of national projects, our goal is to offer information and administrative support to Research Groups participating in these programs and running the projects, in order to minimize the administrative load of the researchers. The aim is not only to obtain funding for research, but also to enroll young qualified researchers in the projects, both at pre- and postdoctoral level. Starting in 2016, this action will be carried out permanently, thanks to the cooperation of national and international IMUS project managers. We mainly focus our activity on the European international programs, in particular:

- a. **Promotion of the application of high level projects of the European Research Council (ERC).** The ERC finances multi-annual projects to researchers of excellence. These are the scientific projects of greatest prestige. Currently Dr. Francisco Gancedo, researcher assigned to the IMUS, holds a "Starting Grant". We aim to achieve at least 3 ERC projects in the 2020 Horizon.
- b. **Promotion of the participation in ETN (European Training Networks) and RISE (Research and Innovation Staff Exchange) nets of H2020 Program.** The ETN and RISE networks provide funds for recruiting young researchers and for exchanging staff researchers. Its success rate is higher than that of the ERC projects. Our aim is to count on at least 3 networks in the 2020 Horizon.

4. Development of the PhD Program "Mathematics". The PhD Program "Mathematics" has reached a remarkable maturity, counting on an average of 40 students per year. A total of 44 Ph. D. theses have been defended since 2011. We aim to promote its development by funding young doctoral students and their international scientific connexions. The following actions will take place starting in 2016, in collaboration with the departments participating in the Program:

- a. **Organizing doctoral courses in specific and transversal skills.** We propose to continue the training actions that have been successfully organized within the Program since its starting in 2011. Its programming is annual, from 2016 onward.
- b. **Participating to funding actions of European PhD Programs (H2020).** This action will allow to obtain direct funding for the Program. We will address it annually from 2017 onward.
- c. **Participating to the “International Doctorates” within the H2020 ITN programme.** This action will provide funding for international and inter-sector mobility of our PhD students. We intend to present applications to the annual calls from 2016 onward.

5. Consolidation of the IMUS Activities Program. The IMUS Activities Program plays an important part in structuring and unifying research in mathematics at the University of Seville, providing a common framework for collaboration to all researchers in this discipline. We intend to continue its activity lines, promoting the organization of those that have been shown most effective:

- a. **Co-funding activities Program (Congress, workshops, visits, courses...)**
This is the program that has the greatest impact on the research community in mathematics. Starting in 2016, there will be at least two annual calls for financing activities to be held in the next 2 years to leave sufficient time for their organization.
- b. **Scholarship programs for research initiation.** This program is in place since 2010. From 2016 onward, we will make an annual call towards our brightest young people encouraging them to join research in mathematics.
- c. **Organization of Seminars.** The seminars organized by the IMUS allow on one hand to disseminate information on the latest research results, and on the other to link the mathematical community of the University of Seville with the IMUS. These will be maintained and we will promote the two current seminars, one aimed at senior researchers (Seminar IMUS), and the other at doctoral researchers (Ph D Seminar). They will be scheduled well in advance, from 2016 onward.
- d. **Colloquium “José Mendoza Rios”.** The Colloquium “José Mendoza Rios” is co-organized by the research institutes in mathematics from the Universities of Granada and Seville (IEMath-Gr & IMUS). Its purpose is to present in a basic way the results of mathematics research, understandably and thus transversal for the whole community involved. This colloquium provides a basis for

collaboration between the two universities, both with great research potential in mathematics. Starting in 2016, this action will be held by yearly programs.

- e. **Organization of large national conferences.** Through its experience, IMUS has acquired the ability for organizing large national conferences in mathematical research. We have recently submitted a candidacy for the organization of the **Multi-sector Workshop of Applied Mathematics in Industry 2016**, sponsored by the Math-in mathematical technology transfer network. We promote through the IMUS members, their engagement in the organization of large national conferences, which will be added to the IMUS Activities Program, starting in 2016.
- f. **Organization of large international conferences.** The IMUS promotes and actively takes part in the organization of two large mathematics congresses in the coming years, thanks to their members' commitment in the life of the Spanish mathematical societies, in particular the Royal Spanish Mathematical Society (RSME) and the Spanish Society of Applied Mathematics (SEMA):
 - i. The ICIAM2019-Valencia Congress of the International Council for Industrial and Applied Mathematics, one of whose sub-venues is Seville, and whose director is Prof. Thomas Chacon, director of IMUS. During the period 2016-2020 we will organize the IX ICIAM Congress and the Seville Sub-venue of ICIAM2019, in cooperation with SEMA.
 - ii. The VII ECM of the European Mathematical Society, whose candidacy has been recently submitted by the University of Seville, whose coordinator is Prof. Juan González-Meneses, IMUS member and Director of the Department of Algebra. During the period 2016-2020 we will submit the candidacy of the VIII ECM and its organization to 2020, if it is awarded, all of this in cooperation with the RSME.

In any case, the IMUS will maintain its commitment to the life of mathematics societies and organization of large conferences, eventually to be held in post-2020 dates.

- 6. **Development of the Mathematical Technology Transfer unit (TTM).** There is a significant number of research groups in mathematics at the University of Seville with mathematical technology transfer capacity, some of them with a long-term experience. Although there is a lack of recognition by the national industry, the mathematical technology allows solving or devising optimal solutions to problems in industry and public management. The IMUS proposes the development of the TTM Unit in order to structure and to advertise systematically its offer, in view of becoming the reference centre in this field for Andalusia and providing support to the management of transfer

projects from these groups. To this end, we will initially count on a technician of TTM who joined us on December 2015. The development of the TTM unit is articulated in the following actions, from 2016 onward:

- a. **Structuring and advertising the TTM bid of the IMUS.** Its purpose is to inform on the technological offer of the groups, to structure in industry sectors and to disseminate through several channels (written advertisement, web page,...).
- b. **TTM Meetings with companies.** We will arrange meetings with companies and Andalusian administration, with the cooperation of Technological Corporation of Andalusia and the Math-in net (national net of TTM), both sectoral and multi-sectoral. We will organize one or two yearly meetings.
- c. **TTM sectoral meetings inside of University of Seville.** Their objective is to favour the knowledge of the competences of the TTM by researchers in scientific and technical disciplines of the University of Seville. We shall organized a sectoral annual meeting with researchers of engineering (2016), health sciences (2017) and physics and chemistry (2018).
- d. **Project Management of TTM.** Administrative support for both the formalization of projects (legal framework) and for their management will be provided.

7. Development of Outreach and Scientific Culture Unit (DCC). Mathematics is one of the scientific disciplines with less social projection, despite being the basis of development of modern society. The IMUS intends to convey to the general public the relevance of research in mathematics and promote its own image. To this end, the Outreach and Scientific Culture Unit of IMUS, directed by Professor D. Antonio J. Durán was recently established. Its activities are articulated through the following actions:

- a. **Development of a DCC program in the scope of mathematics.** The DCC activity program will include: (a) Organizing and favouring cultural activities with mathematical connection (in particular to maintain and make visible in Seville the cycle "Mathematics in the city", and also to coordinate with the outreach lecture series developed by the Faculty of Mathematics and other institutions of university scope); (b) To seek direct contact with the media, in particular the own institutional ones of the University, to make visible the IMUS achievements in all aspects (mathematical research, transfer, cultural activities, etc.); (c) To emphasize, together with the Mathematical Technology Transfer unit of IMUS, this fundamental aspect of the Institute (looking for the appropriate reflection on the website of the

activities and achievements, in addition to moving it and making it visible through the media communication).

- b. **Development of a DCC Blog.** A blog that combines excellence with outreach and covering the multiple aspects of mathematics (research, applications, history, recreational problems, topical issues, etc.) will be launched. Launching such a comprehensive blog is an ambitious program. Above all, keeping it alive in time requires the collaboration, work and enthusiasm of a broad and generous team, well-structured and coordinated.
- c. **Collaboration with the DCC Unit of the University of Seville, and relevant sectors of the city of Seville.** To carry out its work of dissemination of mathematics, IMUS will collaborate with the DCC Unit of the University of Seville, either in organizing activities, joint participation in calls for funding or transfer of news and information in the media. It will also collaborate with any other institution in the city to promote and disseminate knowledge and culture, especially with the media, with the aim of achieving for Mathematics the space and attention it deserves.

8. Dissemination of the IMUS activity. The IMUS' ability to attract high quality researchers and its external visibility depend largely on the dissemination of its activities. To do this, we intend to develop the following actions permanently from now on:

- a. **Development and maintenance of the web page and database.** In addition to containing information about the IMUS activities, its database has a structured repository of research results of its members, which can be used by them as support to make CVs, to apply research projects, etc.
- b. **Annual report of activities.** An annual report of IMUS activities will be elaborated, which will be presented to its Council and to the Advisory Committee for its evaluation and suggestion of improvement strategies.
- c. **Multi-annual reports.** In 2017 the IMUS will celebrate the 10th anniversary of its foundation. We will prepare a detailed report to be published and disseminated broadly in the university and research community in mathematics. From then on, such reports will be presented every 3 years.
- d. **Development and dissemination of advertising material.** Specific advertising material for the relevant activities (brochures, posters, web pages, etc.) will be produced; they will be systematically distributed through the regular channels for these purposes (e-mail, post mail, mathematical societies, etc).

9. External evaluations. IMUS pursues the continuous improvement of its activities and services. To this end, starting in 2016, the Advisory Committee will be kept informed of our progress through our annual activity reports and will be asked for an annual evaluation. Moreover we will proceed to the renewal of the Advisory Committee every five years. On the other hand we will be available to the Andalusian Government to be evaluated every two years, as established in the statute of creation of IMUS (Official Journal of Andalucía –BOJA-- of June 13, 2006).

10. Development of foreign relations. Relations with similar centres and institutes promote the exchange of ideas as well as inter-mobility of researchers, especially post-doctoral, and increase the visibility of the IMUS. In this scope the IMUS started in 2015 a strategic collaboration with the Spanish Institute of Mathematics of Granada (IEMath-GR) with the launch of Joint Colloquium "Jose Mendoza Rios" which will continue with the organization of joint doc-courses and mathematical research activities in Andalusia. We intend to continue this collaboration and participation to the thematic network of university institutes of mathematics (RedIUM), as well as future strategic networks, favouring to be the managing institute when possible, from the present moment.

11. Consolidation of administrative services. The IMUS administrative services produce a high quality strategic work, which is vital to all its activities. Its administration staff is composed of two civil servants, three part-time senior research managers and one training research manager. The temporary staff is funded by aids for research management that the IMUS derives from diverse sources, essentially the Research Plan of the University of Seville. We intend the gradual stabilization of this staff by upgrading them to permanent positions, in order to consolidate this administrative work. Specifically,

- a. **Data and Supercomputing Manager.** This manager will assume the functions of the technician currently employed by the IMUS. In principle it will be included in the budget of the University of Seville for 2016, pending confirmation.
- b. **Projects and Activities Manager.** This position will perform the functions of administrative management of projects and activities currently performed by two temporary part-time employees. Their assistance is progressively strengthening the role of IMUS as a high quality research centre. We will ask the University of Seville to fund this position starting in 2017.
- c. **International Projects and Technology Transfer Manager.** This position will perform the functions of a current young training technician, whose contract ends on December 2017. Its assistance is essential for the gradual internationalization of IMUS and the development of the



Mathematical Technology Transfer Unit. We hope the University of Seville will fund this position starting in 2018.

12. Permanent training of administrative staff. We understand the formation of the administrative staff not only as a staple for the best performance of its functions, but as a means of promoting the participation of researchers in various calls, by simplifying the administrative burden involved. With these aims, we intend to train our technicians in the following areas, through annual courses (the first of which was delivered in November 2015):

- a. Training in projects management.
- b. Training in the administrative issues of H2020 Program
- c. Training in management information systems.
- d. Training in communication techniques in the professional working environment.

13. Development of the supercomputing service. The IMUS currently manages two computers for parallel computing (Azarquiel and Anonimus915) available to the research community in mathematics of the University of Seville, installed in the CICA (Center for Computer Science of Andalucía). Starting in 2017, we intend to facilitate and standardize their use, by temporarily hiring a parallel computing specialist technician.

14. Participation in the Mathematical Documentation Service. The IMUS actively participates in the Mathematical Documentation Service of the University of Seville, in collaboration with the Departments and the Faculty of Mathematics. We intend to continue this cooperation and participate in the development and structuring of the Service, permanently from 2016 onward.

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