3 YEARS OF FUNDING INITIATIVE FOR COMPUTATIONAL MATHEMATICS IN AUSTRIA

P. Kerschl[(a)], A. Pogány[(b)]

[(a)] Austrian Research Promotion Agency (FFG) Departments Thematic Programmes, Sensengasse 1, 1090 Vienna, Austria, www.ffg.at/tp
[(b)] Federal Ministry of Transport, Innovation and Technology (bmvit) Department III/I 5 Department for IT, nanotechnology, industrial technologies and space flight, Renngasse 5, 1010 Vienna, Austria, www.bmvit.gv.at

[(a)]peter.kerschl@ffg.at, [(b)]alexander.pogany@bmvit.gv.at

ABSTRACT

The funding initiative ModSim Computational Mathematics started in 2008. In 2010 there was the third call for project-proposals. This paper describes the results from the three calls and the comparison with respect to the temporal and financial outcome from the three calls. Also, the topics and contribution of different proposers are shown. Each year the number of proposals increased. The requested funding has increased with the announced available money for funding. At the same time, the size of the funded projects has decreased. Also the request for funding of big companies has increased from 37% to 76%, but their success-rate is lower than for the smaller companies. The sum of the funding asked for was around 19 Mio €. In total around 9 Mio € have been announced for the projects and 6.4 Mio € were decided for funding.

Keywords: computational mathematics, funding, Austria, economy

1. INTRODUCTION

In Austria, the quality of scientific research in mathematics is high (FWF 2007). On the other hand, the use of applied mathematics in companies was low (Ohler and Tiefenthaler 2007). Therefore the federal ministry for transport, innovation and technology (bmvit) decided to stimulate the challenging use of applied mathematics for commercial use. The funding initiative called "ModSim Computational Mathematics" (ModSim) was established by the bmvit. It provided 6 Mio € funding money for research projects. ModSim is owned by the bmvit and run by the Austrian Research Promotion Agency (FFG). The FFG performs awareness measures, contacts researchers and companies working in the field of or possibly benefit from ModSim. It also organises the evaluation process and monitors the funded projects. The funded research projects are between basic research and product development.

2. THE FUNDING INITATIVE MODSIM COMPUTATIONAL MATHEMATICS

The goals of ModSim are:
- Intensify the challenging use of computational mathematics in the Austrian business and research setup
- Development of structures for research and development with the purpose of long-term transfer of knowledge between science and economy in the area of Computational Mathematics

These goals should be reached by funding research projects. The projects are preferably run by consortia consisting of researchers from research institutions and companies. But also projects of individual organisations are possible.

The European legal framework for the funding is the European-Union law "Community Framework for State Aid for Research and Development and Innovation" (Framework, 2006). Below that also Austrian law and the funding initiative FIT-IT (Research, Innovation and Technology for ICT) define the details of the funding scheme.

The projects fund research of the type 'industrial research' as defined in the Community Framework. The outcome of a ModSim-project must not exceed a research prototype. Such a research prototype only shows the functionality, but is not yet suitable for mass production. So the projects deal with issues which might come to the market within 3-8 years. The runtime of a project has a maximum limit of 3 years and a minimum time of 6 month.

The FFG organizes the evaluation process, signs funding-contracts and deals with the financial issues of the funded projects. Since 2008 three calls for proposals for research projects have been made.

2.1. Types of funded projects

There were two types of projects:
- Cooperative RTD: Research project in cooperation. It is fund between 54% and 76% of the total costs. The funding rate depends on the degree of contribution of the research

partner and the size of the involved companies. For Cooperative RTD – projects, the unfunded part of the research partners have to be paid by the companies. The funding scheme for Cooperative RTD was taken from the Austrian ICT-funding-initiative FIT-IT.

- Stimulation projects: may be run by a research group or by a company individually or in cooperation with partners. A stimulation project is fund with 50% of the total project costs. Financing of the unfunded costs is up to the consortium without rules from ModSim.

Stimulation projects provide more freedom with respect to the number of partners and the way of financing the unfunded part. Nevertheless, the funding rate for Stimulation-projects is smaller than for Cooperative-RTD-projects.

In the first two calls, also projects for the development of Human Resources were available. They were not used so often and have not been successfully at all. Therefore they were not available in the third call.

All proposals were evaluated by an international jury. The jury process is described in Kerschl and Pogany (2009).

2.1.1. Applications and funding in ModSim

Table 1: Number of Applications in ModSim

	Coop. RTD	Stim.	Dvlp of HR	sum
2008 (1st Call)	8	4	1	13
2009 (2nd Call)	8	8	2	18
2010 (3rd Call)	9	10	-	19
sum	25	22	3	50

It can be seen that during time, the number of applications has increased. The number of Stimulation proposals has more than doubled between the first and the 3rd call. In total the Cooperation RTD - project is the most wanted type of projects. On the other hand, Stimulation projects have gained more interest each year.

Table 2: Financial aspects of the applications and funded projects

	Available Money [Mio €]	Re-quested funding [Mio €]	Average costs of funded projects [1000 €]	Nr of partners of each Coop. RTD
2008	3	5.8	643	3.3
2009	4	7	576	3.6
2010	2	6.6	391	2.8
sum	9	19.4	-	-
average	3	6.5	537	3.2

Contrary as stated before, 9 Mio € were announced for funding instead of 6 Mio €. Both sums are true as not all available money was used for funding in the first

two calls. In Table 2 it is clearly visible that the amount of requested funding and the amount of partners in Cooperative RTD-projects have a similar relation to the available money. The relatively high amount of requested money in the 3rd call might be due to the higher number of Stimulation projects and due to the fact, that the initiative ModSim was better known in the Austrian research community.

Considering the number of proposals and the demand for funding, it can be said, that despite the increasing number of applications of Stimulation projects, the total sum of requested funding did not increase. This shows, that the project volume decreased during time.

Table 3: Requested Funding of different organisations [Mio €]

	Enter-prises	Research organisations	Uni-versities	Other
2008	2.5	1.5	1.8	0.01
2009	3.2	2.3	1.3	0.02
2010	3.1	1.4	1.7	0.03
sum	8.8	5.2	4.8	0.6

Table 3 shows clearly the high demand for funding coming from enterprises and research organisations. This shows that the funding scheme attracts the contribution of enterprises.

Looking at the contribution of small and medium-sized enterprises (SME) compared to all companies involved, table 4 shows their participation.

Table 4: Part of SME of total involvement of companies [Mio €]

	Requested funding by SME	Requested funding by big companies	Funding for SME	Funding for big companies
2008	1.6	0.9	0.8	0.2
2009	1.3	1.8	0.3	0.2
2010	1	2.1	0.3	0.6
average	1.3	1.6	0.5	0.3

Although the requested money of SMEs in the proposals has decreased during the calls, their acceptance rate with respect to money is always higher than for big sized companies.

The higher contribution of big-sized companies in the calls with time might be due to the long decision ways (and times) in big-sized companies (see table 4). Also successful SME from the first call(s) might not have submitted in the 2nd or 3rd call.

Table 5: Funding of different organisations [Mio €]

	Enter-prises	Research organisations	Uni-versities	Others
2008	1.1	0.6	0.5	0.09
2009	0.5	0.6	0.3	0.1
2010	0.9	0.5	0.5	0
sum	2.5	1.8	1.3	0.1

In 2009 the enterprises requested most of the funding, but received the smallest amount compared to the other years (compare tables 4 and 5). This might be due to the high competition in the year 2009. Also in 2009 the non-academic research organisations had the highest demand, but received more funding than the enterprises.

Looking at all years and the funding money with respect to the demand, the funding success of the companies was 28%, of the non-academic research organisations 35%, of the universities 27% and of the others 17%. So the monetary most successful type of organisations were the non-academic research organisations, followed by companies and universities.

In addition to the total public funding of 5.7 Mio € another 4.4 Mio € have been invested mainly by companies but also by non-academic research institutes and universities in the field of research in computational mathematics.

3. RESULTS FROM THE FUNDED PROJECTS

3.1. Topics of the funded projects
The funded projects work in the fields of (alphabetic order):
- Automotive
- Building industry: 2 times
- Economy
- Energy production
- Hydraulic Equipment
- Logistic
- Logistic for public health
- Manufacturing technology: 3 times
- Material science
- Mechatronics
- Medicine
- Meteorology
- Optics
- Surface technology
- Timberwork
- Water supply

It is clearly visible that many different topics are addressed in the funded projects. Most successful were topics of manufacturing technologies (3 times). The kind of computational mathematics is as versatile as the topics: it ranges from numerical simulation, computational fluid dynamics, ab-initio calculations up to machine learning.

3.2. Institutions running the funded projects
The motivation of companies acting as project leaders are twofold:
1. Use of the achievements in modelling and simulation in house or
2. Use of the methods as a service for other companies as users.

From the funded projects led by companies, 6 from 8 projects are designated to be used for in-house use. This shows a high demand for innovation. 50% of the leading companies using modelling in-house are big companies and 50% are SMEs. The two companies, which deliver the results of the projects as part of their own product/service are both SME.

For Stimulation projects, universities were most successful, whereas for Cooperative RTD - projects, the most successful leader were the research institutions. If a company was involved as a project partner, it was very successful with a success rate of 48%. This shows, that the cooperation of a company was very welcome in ModSim.

3.3. Outcome of the funded projects
Up to now the first two projects have successfully finished their work. Within the finished projects several papers have been written, further collaboration could be established and the visibility of Computational Mathematics in Austria was increased by the work. As the finished projects cover just 4% of the total funding money, it is too early to conclude from the results from these projects to the effect of the funding.

4. COMPARISON WITH OTHER FUNDING INITIATIVES

In Finland there was a similar initiative between 2005 and 2009: The MASI Programme run by Tekes, the Finnish Funding Agency for Technology and Innovation. MASI aimed at:
- The widespread implementation in industry of modelling and simulation
- Innovation of modelling and simulation processes
- The creation of new commercial opportunities

The MASI programme had a total budget of 92 Mio €. (Holviala, 2009)

In comparison to ModSim, MASI was 15 times bigger and ran about twice as long. MASI also organised seminars, workshops, manager days and fair presentations. Whereas in ModSim, the public events were restricted to the publication of funding opportunities.

Another funding programme is located in Baden-Württemberg in Germany, called "High Performance Computing", which concentrates on the topics life science, energy & environment and automotive. The runtime of the 7 funded projects is from 2009 until 2012 and 4 Mio € are available (HPC, 2011).

5. CONCLUSION AND OUTLOOK FOR MODSIM

5.1. Conclusion

Looking at the interim results of the running projects, it can be seen that new impact is given to the use of Computational Mathematics in some Austrian companies. Especially small and medium-sized companies have won capabilities, which were not so easy to access without funding. For some academic institutions, new fields of applications were found.

SMEs have been attracted by ModSim initially. To keep the contribution of SMEs high during time, additional special effort has to be made.

In the year 2009 the requested funding by enterprises and research organisation has increased, but their success rate was lower than in the year before and after.

5.2. Outlook

ModSim always was intended as an initiative with a definite end, the 3rd call was the last one. The already running projects run until their planned end.

The topic of simulation for industrial needs will now be taken up by a bigger initiative "Intelligente Produktion" (smart production: internet: http://www.ffg.at/intelligente-produktion, in german). This initiative aims at keeping the production site Austria competitive. Within this context, modelling and simulation is a proper tool to enhance the development time for example. Concerning funding, the already known companies and research institutions of ModSim will be able also to submit their proposals in the field of smart production.

ACKNOWLEDGMENTS

REFERENCES

Framework, 2006: Official Journal of the European Union, 30.12.2006; 2006/C 323/01, "Community Framework for State Aid for Research and Development and Innovation"; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2006:323:0001:0026:en:PDF; 2011/06/17

FWF 2007: FWF - Der Wettbewerb der Nationen – oder wie weit die österreichische Forschung von der Weltspitze entfernt ist. Eine Analyse der internationalen Wettbewerbsfähigkeit wissenschaftlicher Forschung Österreichs in den Natur- und Sozialwissenschaften, Wien, 2007 (in german)

Holviala, 2009: „MASI Programme 2005-2009" in „Tekes Programme Report 3/2010 – Final Report" edited by Niina Holviala, VTT Technical Research Centre of Finland, Libris Oy, Helsinki 2010, ISBN 978-952-457-498-3

HPC, 2011:http://www.bwstiftung.de/forschung/laufende-programme-und-projekte/information-kommunikation/high-performance-computing.html; 2011/06/17, (in german)

Kerschl P, Pogany A 2009: Public Funding of Modelling and Simulation in Austria, in: International Workshop on Modelling & Applied Simulation (MAS) at the conference "International Mediterranean and Latin American Modeling Multiconference" (I3M), September 23-25 2009, Puerto de la Cruz, Tenerife, Spain, Editors: O. Balci, I. Castilla, F. Longo, M. Massei; p 15-17

Ohler F, Tiefenthaler B 2007: DI Fritz Ohler, DI Brigitte Tiefenthaler, Technopolis Forschungs- und Beratungs- GmbH, 2007, „Modellierung und Simulation – Analyse und Förderung eines emergierenden Forschungsgebietes" (in german)

AUTHORS BIOGRAPHY

Peter Kerschl is working at the Thematic Programmes of the Austrian Research Promotion Agency (FFG) since 2006. He is involved in the funding schemes for ICT, Computational Mathematics and smart production. Before joining the FFG he worked at the Institute for Solid State Physics and Materials Science Dresden (IFW Dresden), where he finished his PhD-thesis in the area of experimental solid state physics.

Alexander Pogány is working as policy expert for the Federal Ministry for Transport, Innovation and Technology within the area of nano- and industrial technologies. Before that he worked as validation expert in quality control for Baxter Bioscience. He holds a Master in Microbiolgy.