Mathematics in Southeast Asia:
Challenges and Opportunities

Summary

Commission for Developing Countries,
International Mathematical Union

Mathematics in Southeast Asia: Challenges and Opportunities
A Brief Summary and Recommendations

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Contents

§1. Introduction

This report is a brief study on the challenges and opportunities of Mathematics in Southeast Asian countries. Countries included in this study are Brunei, Cambodia, Laos, Indonesia, Malaysia, Myanmar, Singapore, Thailand, the Philippines, and Vietnam.

This study is based on the brief assessments and perspectives provided by some current and past presidents of the various mathematical societies in the SEA region and influential individuals who were invited to write on those questions contained in §6. Appendix: Background Information.

This report provides a series of snapshots of the mathematics situation across the region, the current challenges each country faced, and the areas where significant progress could be leveraged with some increased attention and/or infusion of resources.

More specifically, each country report dwells on one or more of the topics listed below:
(1) A brief account of the current situation of mathematical development;
(2) An analysis of strengths and/or weaknesses in mathematics and/or mathematics education;
(3) Educational policy;
(4) Opportunities for talented/gifted/achieving students in mathematics;
(5) Highlight a selection of opportunities for highly leveraged investment in its mathematical future;
(6) Provide a vision for cohesive, sustainable development through networking and building on existing nodes of quality;
(7) Provide a vision of the mechanics of investment in its country as well as the Southeast Asia's mathematical development. In particular, the current initiatives to encourage the development of mathematics and mathematics education in its country.
(8) Expectation from International Mathematical Union (IMU).

§2. The Current State of Higher Mathematics in Southeast Asia

§2.1 Abstracts of Country Reports

The country reports contain a wealth of information. The abstracts serve as an executive summary of these reports. We attempt to describe in the abstracts the content, some highlights in the reports, and also the comments which may lead to recommendations. The items reported include: the role of professional societies, journal publication, research groups and their research interest, nurturing talented students, building up capacity of teachers and lecturers, benchmarking, regional and international networks.

Country report 1: Brunei

Education system in Brunei Darussalam follows a 7:3:2:2 system: one year of preschool plus 6 years of primary, 3 years of lower secondary, 2 years of upper secondary, and 2 years of post-secondary education. In 2009, the National Education System for the 21st Century or "Sistem Pendidikan Negara Abad Ke-21" (SPN21) was launched to equip students with 21st century skills.

The year 1990 was declared the Year of Mathematics by Sultan of Brunei. The journal "Science and Mathematics Education" (SME) was also launched to publish mathematics articles and, renamed "Science, Mathematics & Technical Education" (SMTE) in 1998.

The fifth SEACME (Southeast Asian Conference on Mathematics Education) was held in Brunei Darussalam in 1990. The International Conference on Science, Mathematics and Technical Education was held in 1996 to celebrate the 10^{th} anniversary of University Brunei Darussalam (UBD), and this series of conferences has continued for many years.

The Sultan Hassanal Bolkiah Institute of Education (SHBIE) of UBD, which began as the Brunei Teachers Training Centre in 1956, evolved to become the Graduate School of Education (GSE) in 2009. GSE offers only teacher education at the Masters levels, in particular the MTeach programme.

Country report 2: Cambodia

The report describes the role of Cambodia Mathematical Society in the development of mathematics in the country. The country is faced with insufficient number of teachers, a class size of over 60 students, and low interest in studying mathematics. The key issue is the capacity building for teachers and lecturers among many other issues. A meeting on science and mathematics education held every year since 2005 has produced encouraging results.
It is expected that some talented students have the opportunity to go for further study, and there could be 20 more PhD's by 2020.

Country report 3: Cambodia and Laos

The report is submitted by a French mathematician. The leading university in Cambodia is the Royal University of Phnom Penh (RUPP). The problems in the country are mainly social rather than academic. Almost every year a conference is organized among Cambodia, Laos, and Myanmar. The education systems in the three countries are similar. An area most needed is the master programme in mathematics, in particular at RUPP. The author ends by saying that "the local partnership is essential for a success".

Country report 4: Indonesia (1)

The report gives the ranking of research papers cited and the performance of IMO in 2010. In both cases, Indonesia ranks above the median among the 10 ASEAN countries. The strength of research is in statistics and applied mathematics. Indonesian Mathematical Society publishes the Journal of the Indonesian Mathematical Society, the latest volume is Volume 17, and Indonesian Mathematical Society Journal on Mathematics Education, first published in 2010. Both are international journals. There are also Indonesian Combinatorial Society and Indonesian Algebra Society. All societies are constantly engaged in organizing national activities.

Talented students, who won awards in competitions, have been given direct entry to the universities, some with scholarship. Teaching is not a priority, partly due to the low salary.

There is an Asean University Network based in Thailand. Not many universities in Southeast Asia are members of this network. There could be more regional activities, including conferences on some special topics, for the improvement of the quality of teachers, lecturers, and research. Also, there could be more funding for the participation in the IMU programmes.

Country report 5: Indonesia (2)

The report describes the role of Indonesian Mathematical Society (Indo MS), Association of Indonesian Mathematics Teachers (AGMI), and Realistic Mathematics for Indonesia (PMRI) in the development of mathematical sciences and mathematics education in Indonesia.

IndoMS was established on 5 July 1976 in Bandung, and it has 1,283 members in 2011. It has 9 provincial branches. It has organized 16 national conferences in mathematics, 4 national conferences on mathematics education, and the International Conference on Mathematics and its Applications in 2009. It publishes Journal of IndoMS, IndoMS Journal on Mathematics Education, IndoMS Journal on Statistics, and IndoMS on Industrial and Applied Mathematics.

There were two surveys on the areas of expertise in Indonesia in 2004 and 2009 respectively. In 2004, the areas included the following 5 groups: applied mathematics, statistics, computer science, analysis, and algebra. In 2009, 3 more groups were added: mathematics education, mathematical finance, and system and control theory. During the period of 2007 and 2008, there was a surge of research proposals accepted by the Indonesian Ministry of Research and Technology. Five universities in Indonesia have a good ranking regionally. Recently, Indonesia invested extensively in the teacher certification, the infrastructure of educational institutions, and has provided greater opportunity for talented students. The report ends with a proposal of funding a programme on mathematics education to develop the curriculum, to train teachers, and to strengthen the network between the teachers in schools and the lecturers at the universities.

Country report 6: Malaysia

The report gives a description of the current education system in Malaysia from elementary schools to higher institutions. Students take part in national and international mathematics competitions. A list of 9 research groups with websites is given. A list of 28 journals where papers are published is also given. A special programme under the Prime Minister Department was formed in 2012 to cater for the talented and high achieving students. The report ends with a list 13 items where IMU could help. The items include academic exchanges, research support, special programme for talented students, and benchmarking.

Country report 7: Myanmar

The paper gives a comprehensive survey of the educational system in Myanmar and some latest initiatives from the government. Myanmar follows a system of 5 years primary, 4 years middle school, and 2 years high school. Since 1991, English textbooks are used for mathematics and science at Grade 10 and Grade 11 (high school level). Though exam papers are conducted in English, the instruction is normally given in Burmese. There is an extensive GTHS system to cater for the training of technicians for the industry. GTHS stands for Government Technical High Schools.

Concerning higher education and research, it is under the care of MOE (Ministry of Education) and MOST (Ministry of Science and Technology). Master degrees and PhD degrees are available at the universities, including mathematics education at the Yangon Institute of Education since 2000. There is also a one-year research programme for master degree holders leading to MRes (Master of Research). A graduate of MRes may enter PhD programme directly without further requirement. One initiative among others is a system of distance education through e-learning. So far, the system has reached 50 colleges and 400 schools. The challenge for Myanmar is still capacity building for the future. *(Due to copyright issues this report is not included in this document.)*

Country report 8: the Philippines (1)

The report provides information on the journals published and active research groups in the following 6 countries: Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. The author quoted the data given in Country Report 3 and observed that the region "moved forward in terms of PhD's graduate programmes, research, and publications". So far, no research area countries can claim to be their own, except in the case of Vietnam.

Cooperation among Southeast Asian countries and with other countries was reported. In particular, the helpful partnership with Western Europe was mentioned.

Several opportunities are highlighted: Identify high-achieving students and nurture them; Seek help in producing more high-level statisticians; Hold a meeting of science high schools in Southeast Asia for benchmarking.

Country report 9: the Philippines (2)

This is a detailed report of the state of higher education and research in mathematics in the Philippines. Data are taken from the government sources. A major change is to implement a K+12 basic education programme from the former 10-year basic education system. The first batch of students will graduate in 2015-2016.

There is a proliferation of higher education institutions in the country. A Commission on Higher Education was created in 1994. The commission identified 5 universities as Centers of Excellence in mathematics and 4 others as Centers of Development in mathematics. This is to recognize the high quality of these centres. The author describes the role played by the professional organizations in the country, and the major research groups in the past five years.

Both weaknesses and successful programmes are mentioned. Collaboration with France is a good model. Joint master with foreign universities is a successful programme. Challenges and opportunities cover the possible improvement the country can make in the area of higher education and research. The country must find its own way to move forward. A list of 117 published papers since 2006 is appended.

Country report 10: Singapore

Singapore has a population of slightly above 5 million. Singapore has four universities with two to be added in the near future. Two out of the four existing universities offer mathematics and related programmes. Currently there are about 150 PhD students in mathematics, statistics and mathematics education in the two universities. Mathematicians and those in the related areas published more than 200 research papers yearly in peer-reviewed journals and conferences (conferences especially for computer science related fields). There is a research institute at the

National University of Singapore. The institute fosters mathematics research in most of the known areas and involves actively in the exchange of mathematicians internationally and regionally. A challenge for the region is leveling up of the vastly differing stages of development both economically and mathematically. Many detailed information in research areas, journals where papers are published, mathematics education and gifted education are also included in the report.

Country report 11: Thailand

Thailand has established two national centres for mathematics research and mathematics education. A list of research interests with the names of mathematicians involved is given in the report. Strong professional societies help regulate the progress in the area of mathematics and mathematics education in the country. A wish list includes: more exchange programmes for the postgraduates, more attention to talented students, and more government support in terms of budget commitment.

Country report 12: Vietnam

The country is stronger in pure mathematics. Research interests are: optimization, commutative algebra, PDE, and singularity theory. The country has benefited greatly from the regional and international collaborations including Southeast Asian countries, Russia, France, and Germany. In the past 5 years, there are 250 publications in mathematics every year. One difficulty is the financial support for travelling to conferences. The achievement of Ngo Bao Chau as a Fields Medallist generated supports from the government. An institute, called Vietnam Institute for Advanced Study in Mathematics, was established in 2012 in Hanoi. It serves to drive the development of mathematics research in Vietnam. The author states that ASEAN could follow the model of the European Union in promoting regional cooperation.

§ 2.2. A Summary of Recent Successful Mathematics Projects/Activities in the Region

Various data on academic activities and research projects were collected among six of the ten ASEAN countries; namely, Cambodia, Indonesia, the Philippines, Singapore, Thailand and Brunei. It consists of seminars, workshops, national conferences held regularly, internationally funded events (workshops, conferences, training programs), and publicly sponsored research projects. All these help promote networking, training, research and, in general, capacity building nationally and regionally. The information provides a comprehensive picture of academic and research activities in the region.

BRUNEI

In 2009, University Brunei Darussalam organized the 2nd Mathematical Modelling and Computation Conference and the 5th EASIAM Conference. There were two keynote talks from the Society for Industrial and applied mathematics (SIAM), 11 invited talks, and about 70 contributed talks. This activity was supported by UBD and SIAM. Several mathematics education conferences were organized in Brunei in the last 5 years.

CAMBODIA

Five international conferences were organized every year from 2008 to 2012. The total cost is US$41,000. The attendance increases yearly from 80 in 2008 to 300 in 2012. The conferences lead to sharing, connecting network, and capacity building.
Five master programmes were implemented since 2004. Twenty students graduated each time. The cost is between US$40,000 to US$60,000 for each batch over two years. This is an area that needs the support most.

INDONESIA

Indonesian Mathematical Society organizes National Conference on Mathematics (KNM) and National Conference on Mathematics Education (KNPM) once every two years in alternative years. The next KNM will be held in 2014 and KNPM in 2015. Regional workshops with international support and sponsorship were conducted since 2008. Other sponsored projects include a survey of the research areas of mathematicians in Indonesia and accreditation of the Journal of Indonesian Mathematical Society (raising the quality and getting international recognition).

THE PHILIPPINES

Various projects including conferences, workshops, and training programmes were conducted regularly since 2005. For example, a research school supported by CIMPA (International Centre for Pure and Applied Mathematics) was held almost every two years since 2005. The latest research school in 2013 had 51 participants and 10 lecturers costing around EUR17,000. Other activities often involved in latest research topics and young researchers. Further, it linked up with oversea institutes and it helped promote the development locally including IMO and mathematics education research.

SINGAPORE

There are two groups of activities, one in Nanyang Technological University and another in National University of Singapore (NUS).

Nanyang Technological University. There are 8 research projects since 2008 with total funding of S$23.6 millions, and only projects costing over one million are listed. They are mostly long-term research projects of about five years. The major outputs are research publications, PhD students and post-graduate scholars. The projects are funded publicly, for example, by National Research Foundation and Ministry of Education.

National University of Singapore. Eleven workshops and conferences were organized by the Institute of Mathematical Sciences, National University of Singapore, in the years 2012 and 2013. Over half of the workshops are those lasting two months. For example, a workshop may have 126 participants costing US$83,000. There are also conferences of one day or one week. The research topics cover a wide range including, for example, mathematics for defense.

THAILAND

It is a record of seminars, workshops, national, regional and international conferences taken place in the following universities: Chulalongkorn, Mahidol, Ramkhamheang, Naresuan, Chiangmai, Srinakhorinwirot, and Sipakorn. The activities concentrated mainly in the three universities: Chulalongkorn, Mahidol, and Sipakorn. There is an annual national conference since 2008 with 250 to 300 participants. There are international conferences every year on a wide range of topics. CIMPA (International Centre for Pure and Applied Mathematics) research schools also took place in Thailand. Individual university organized regular seminars and workshops.

§2.3. Rationale behind Our Recommendations

The report covers ten ASEAN countries. In comparison, some countries are more populated, for example Indonesia and the Philippines, and some less, for example Singapore and Brunei. They face problems of different kinds. Recently, *as a whole they all spend more money on education*. One example is Indonesia which invested heavily on graduate studies in the past few years by sending many students overseas. Another example is the Philippines which recently implemented the K to 12 basic education programme (one year of kindergarten plus 6 years of primary, and 6 years of secondary schooling). Its first batch of students will graduate in 2015-2016. Formerly, the Philippines adopted the 10-year basic education system.

As far as research is concerned, *Singapore ranks number one* as reported in the country report of Indonesia and also confirms by country report of Singapore. As reported, the five countries, namely Indonesia, Malaysia, Thailand, the Philippines, and Vietnam, all publish their own journals of mathematics. Although Singapore does not publish its own journal, but there is an international publisher based in Singapore (World Scientific Publishing) which publishes books and proceedings of conferences, workshops and lecture notes. There is an Institute of Mathematical Sciences attached to the National University of Singapore. The Institute organizes conferences, stand-alone workshops, colloquium lectures and ad-hoc seminars, and produces a Lecture Notes Series. Since 2001, it organizes activities throughout the years. In 2013, it organizes 8 activities. So far it has published 24 volumes of Lecture Notes. (See http://www2.ims.nus.edu.sg/)

In terms of social and educational development, the countries in the greater Mekong sub-region (including Laos, Cambodia, and Myanmar) are less advantaged. For example, they are short of highly qualified personnel in schools and universities.

It has been a tradition in the Southeast Asian region that some countries would work together for the betterment of both parties. An example was the linkage between the Philippines and Singapore. They worked together in the 70s and 80s for training PhD students in the Philippines, and recently for the Philippines benchmarking the teaching approach in Singapore. The Philippines also has the experience of working together with one country in the greater Mekong sub-region.

It is important to establish a common base for all the countries in the region. This is essential in order to move forward as a region. Hence collectively the region should work together with countries in the greater Mekong sub-region. International bodies have already done that. Our contribution should be in the area of mathematics, mathematics education, and capacity building. In particular, a proposal to support the master degree programme in the Mekong sub-region is essential. Hence please refer to ***Recommendation 3 on providing special assistance to countries in the greater Mekong sub-region*.**

There are many conferences held and to be held in the region. It is interesting to note that SEAMS (Southeast Asian Mathematical Society) organized regional conferences in the early days since 1972, before national conferences were held. Then national conferences and international conferences followed. There are several series of conferences, for example, AMC (Asian Mathematical Conference) and EARCOME (East Asia Regional Conference on Mathematics Education). AMC 2013 was held in Korea in July 2013. EARCOME 6 (2013) was held in Thailand. EARCOME started as SEACME (Southeast Asian Conference on Mathematics Education). The motto of the SEACME series is that it is a national conference with regional participation. The formula worked very well. It was the best attended conference in the region. Then it moved on, as ASEAN did, to EARCOME involving countries in the East Asia. The series stretched for 35 years from 1978 to 2013. Now we can say it is a successful series. So is AMC.

Now each country also organizes their own national, regional, and international conferences (Please see the country reports). Furthermore, they organize special conferences, for example, applied mathematics in Indonesia. Also, there is the annual conference for Laos, Cambodia, and Myanmar. It is time to go into holding special conferences. This is where the impact will be greater. Hence please refer to ***Recommendation 2 on a symposium in an area that needs to be attended to, for example, benchmarking science high schools in the region*.** Professor Bienvenido F. Nebres proposed this a few years ago and more than once. We have also consulted Dr Hang Kim Hoo, principal of the NUS science school in Singapore. He supported the proposal. The executive committee members of ICMI (International Commission on Mathematical Instruction), who attended EARCOME 6, have also been consulted. They are favourable to the proposal. So this is not a proposal from us alone.

The fifth SEACME held in Brunei in 1990, as reported in the country report of Brunei and the Philippines, was a memorable event. The Sultan of Brunei declared the year 1990 as the Year of Mathematics. The theme then was on a national issue, namely Secondary School Mathematics. The conference was open for regional participation. Briefly, we name three recent changes in Brunei. There are now more local teachers in schools. This is indeed a great achievement for Brunei. The University of Brunei Darussalam increases its contact internationally through more conferences. (See http://**www**.ubd.edu.bn) Also, the country has received more foreign students.

§3.Recommendations to IMU-CDC

Our recommendations to be proposed are based on the following three criteria.

(1) We look into the area where funding is not easily available.

There are such projects which may have the short term and sometimes the long term benefit for the development of mathematics and mathematics education in the Southeast Asian region. We do not compete with the agencies which provide the funding for the standard projects.

(2) We consider the projects especially for the younger mathematicians. We should support the initiative which will open up further opportunities for the advancement of mathematics and mathematics education.

(3) We pay special attention to events which will lead to deeper understanding and closer collaboration among the countries in the Southeast Asian region.

Based on the above criteria, we make the following four recommendations.

RECOMMENDATION 1. *Sponsor young mathematicians and graduate students to attend the conferences in the Southeast Asian region.*

Each country in Southeast Asia has its own centres of excellence in mathematics and mathematics education, and research groups. It has strong national mathematics associations (professional societies) to regulate its progress in mathematical sciences except for Laos, Cambodia, and Myanmar. Therefore what is lacking is regional cooperation among them.

Many regional and national conferences in mathematics are held in the region every year. Although each conference has invited prominent/famous mathematicians to give lectures, however these conferences do not normally attract enough participants from various countries in the region, except the Asian Mathematical Conference (AMC) and International Congress of Mathematicians (ICM). This is due to the limited funding that the regional conferences could obtain from various funding agencies.

A possible annual budget for this recommendation is estimated at USD10,000. The amount is enough to sponsor 20 participants at USD500 (five hundred US Dollars) per participant for travel expenses to attend a conference in the region.

RECOMMENDATION 2. *Take initiative to invite a centre in the region to host a symposium in an area that needs to be attended to.*

For instance, a centre in a country can be invited to host a symposium on learning for gifted students.

Normally, funding is there for others to apply. The suggestion is that the initiative comes from the donor. We must also take initiative to invite applicants. The budget could be from USD10,000 (ten thousand US dollars) to USD20,000 (twenty thousand US dollars) for one such symposium. There could be one symposium a year, or twice a year, or once every two years. The sponsorship could be full for a small symposium or partial for a larger size.

Another possible symposium is as follows:

(1) A theme is the science high schools in the region.

(2) Host institution could be (Regional Centre for Quality Improvement of Teachers and Education Personnel (CITEQ) of Yogyakarta, Indonesia or Regional Centre for Science and Mathematics (RECSAM) of Penang, Malaysia. Both are part of Southeast Asian Ministers of Education Organization (SEAMEO). We name CITEQ because RECSAM is already doing it. To expand the involvement, we may wish to invite CITEQ. However we should keep it open.

(3) Form a Regional Programme Committee of five persons. Suggested members of the committee: the director of the regional centre (or host institution), a member of CDC (ex-officio), Principal of NUS High School of Math and Science, a representative from a Philippine science high school, and a representative from the host country.

RECOMMENDATION 3. *Provide special assistance to countries in the greater Mekong sub-region.*

One possible model is to enter into a bilateral agreement between two countries in the region so that one can help the other. The traffic of collaboration does not need to be one way. We recommend that we do not try to do it at the regional level, only at the bilateral level. It has been tested and it worked at the bilateral level. The quantum of the budget will be higher and the implementation period will be longer, depending entirely on the plan and the size of the plan. However it could also be a project of mini size.

For instance, a project may be proposed to assist Myanmar, Laos, or Cambodia in its capacity building. However, the project's key to success is to find the right partner and the right local contact.

One concrete project proposal is:

(1) one of Laos, Cambodia and Myanmar or all three.

(2) one country from the region. Other countries should also be acceptable. It depends on the personnel and the contact. Experience shows that the bilateral model works.

(3) sufficient funding for at least three years.

(4) a specific programme. Currently, there is a master programme supported by CIMPA.

If there is a choice, we prefer more funding on fewer projects than spreading the money very thin over too many projects.

RECOMMENDATION 4. *Support exchange programmes among the ASEAN countries*.

In the next five years, there will be a great increase in the number of graduate students in each of the ASEAN countries due to the scholarships/incentives provided by their government agencies. The growth rate will be higher compared with all the years in the past. These are mostly local graduates without or with minimal exposure outside their countries.

In the early days (70s and 80s), all Filipino PhD students were sent to the National University of Singapore or Nanyang University (now Nanyang Technological University) for immersion. This is a necessary component of the graduate study and yet not easily available. We should always think of the future, the young people, and the long term development of talents. In addition, we make friends with our neighbouring countries. All these will lead to potential collaboration among the countries in the region. What we should do is to create an environment that will lead to the destination (ie, collaboration). The whole idea is for the graduate students or postgraduates to get out of their own country and to gain experience outside. Therefore we should not put in too many conditions on the funding. We are not asking them to go around and contribute. Of course, they will do this in the process.

The ASEAN countries have been trying very hard to come together to upgrade the level of mathematics in the region. There are short term programmes and there are also long term programmes.

ASEAN plus one, two, three or four (China, Japan, South Korea, or India), all plus-four countries are welcome. For the current report, it serves a special purpose. The plus-four countries are more than welcome to come in and help ASEAN. In the words of one report, Recommendation 3 and Recommendation 4 are capacity building. If any of the plus-four countries is willing to contribute, we are sure that they can contribute academically and also financially. There is nothing to stop them from doing it. Of course, this could not be forever. Ultimately, each ASEAN country has to rely on itself or among the ASEAN countries. Since the funding is limited and regional cooperation is long term, ASEAN must come first. We wish to set priority and expand the source of assistance since IMU funding is not for everything.

§4. Conclusion

Recommendation 1 should not be an issue. Recommendation 2 is to introduce new element into the development of the region. Recommendation 3 is to bind the countries in the region closer together. Recommendation 4 is to add on so that we may create a larger base in the region for future development.

The above recommendations represent the type of projects which are feasible. Also, they are affordable, sustainable, and finally scalable. The order above indicates the order of priority of our recommendations. Ideally, we should support all. Alternatively, we could support the first two recommendations. At least, we should support the first one.

If the funding is abundant, we can always multiply the above recommendations in many different ways and exchange programmes could also be accommodated.

Concerning implementation, funding for Recommendation 1 and Recommendation 4 can be open for applications or given to the organizers concerned to administer. This has been done in the past. ICMI can help to implement Recommendation 2. For Recommendation 3, we may need to form a subcommittee to handle the matter.

Due to time factor, it may not be advisable to wait for the missing activity reports to complete the document. We have reasons to believe that the missing activity reports do not affect the deliberation of our report.

Finally, seven project proposals for possible funding are collected among six of the ten ASEAN countries; namely Cambodia, Indonesia, Malaysia, the Philippines, Singapore, and Thailand. These project proposals can be found in attachments §7.4.

§5. Acknowledgment

We would like to express our sincerest thanks to all of the contributors of this report. Our thanks also go to the staff of IMU CDC for assisting us in the process of conducting the survey. We are most grateful to Prof Herb Clemens for his encouraging words and valuable comments in the finalization of this report.

§6. Appendix: Background Information

The Commission on Developing Countries (CDC) of the International Mathematical Union (IMU) is conducting a survey on **Mathematics in Southeast Asia: Challenges and Opportunities**.

The survey should provide the following information:

(1) A brief account of the current situation of mathematical development in Southeast Asia
   (i) By country
   (ii) By mathematical specialty
   (iii) By educational infrastructure

   Basic Questions:

   1. Which countries in Southeast Asia have a strong university education in mathematics? In which mathematical areas are their strengths?
   2. Which countries have viable centres for research in mathematics? What mathematical areas are represented?
   3. Which countries have a strong development in secondary mathematics education?
   4. Which countries have a strong development in elementary mathematics education?
   5. What is the balance between urban centres and schools in the countryside?
   6. What is the existing national, regional or international network of relationships as regards mathematics teaching and research?
   7. What is the role of ethno-mathematics?

(2) An analysis of strengths and weaknesses in mathematics

   (i) By country in Southeast Asia
   (ii) By mathematical specialty
   (iii) By educational infrastructure

   Basic Questions:

   1. Which areas of mathematics are strongest in your country? How do these map to Southeast Asian (or Asian) needs? In which international mathematics research journals have mathematicians in your country published in the last 5 years? If possible, indicate the rough number of publications in each of these journals authored by mathematicians in your country.
   2. What are the advantages and disadvantages for mathematical development of linkages with neighbouring countries in Southeast Asia and East Asia?
   3. What are the appropriate roles of countries such as China, Japan, and South Korea in mathematical development of Southeast Asia?
   4. What is the role of the countries in Western Europe and other parts of the world, in enhancing your mathematical development?

(3) School mathematics in Southeast Asia:
   (i) By country in Southeast Asia
   (ii) By educational policy

   Basic Questions:

   1. On a per-country basis, what is the teacher-student ratio in each level of elementary and secondary math education?
   2. What is the normal education level of primary and secondary school math teachers in each country? Do they need bachelor's degrees?

3. What are the math teacher organizations within the country and in the region? Provide the relevance and role of each organization, contact person and email address.

(4) What are the opportunities for talented/high achieving students?

(i) By country
(ii) By educational policy

Basic Questions:

1. Are there screening systems in the Southeast Asian/Eastern Asian countries to identify exceptionally gifted math students?
2. If such screening tools exist, are they effective? Do such screening procedures lead to placing these highly-gifted students in special accelerated schools or courses?
3. Is there a system of educational tracking of highly talented math students to assure their entry into top flight universities with strong mathematics departments?
4. What are the educational career opportunities for highly-talented math students in your country? How does this vary with that of the countries within Southeast Asia and Eastern Asia?
5. What are the commercial or specialized career opportunities, such as research, engineering, etc., for talented and well-trained math students in your country?

(5) Highlight a selection of opportunities for highly leveraged investment in Southeast Asian's mathematical future.

Basic Question: Which are the greatest opportunities for improvement in mathematical development and training?

(6)Provide a vision for cohesive, sustainable development through networking and building on existing nodes of quality. Consider the single nation strategies vs. regional or international approach.

(7) Provide a vision of the mechanics of investment in Southeast Asia's mathematical development.

Basic questions:

1. What are the current initiatives to encourage the development of mathematics and mathematics education in your country? In Southeast Asia?
2. To what extent is cooperation with these initiatives, as opposed to initiating new ones, the more effective and highly leveraged strategy?

(8) Expectation from IMU

Basic question: What can IMU do to support the mathematics development in the region?

§7. Reports on the Recent Mathematics Projects and Programs in the Region

Activity Report 1: Recent Mathematics Projects and Programs in Brunei by Prof Victor Didenko

(Due to copyright issues this report is not included in this document.)

Activity Report 2: Recent Mathematics Projects and Programs in Cambodia by Dr Chan Roath

I. Programs

1.

Country	Cambodia
Name of Project/Program/activity:	Master of Mathematics International Program
Program/Project/activity proponent:	Training Students on Mathematics
Year started and Year ended	2004-2006
Description of the Program/Project/activity:	Professor of Mathematics from a different countries : France, Japan, United Stat (USA), Come to Cambodia to teach mathematics in different subject to students at Royal Academy of Cambodia and Institute Technology of Cambodia
Significant outputs:	Students of Mathematics finish Master Course with quality. Some of them have a chance to continue they study at PhD degree in France, China.
Program/project cost:	the cost between: 40,000.00USD to 60,000.00USD
Funding agency (if any):	CIMPA, IMU, ISP, UNESCO, Toyota Foundation,
Number of beneficiaries :	20 Students finished with quality.
Remarks:	All students get a Job as a teacher and researchers

2.

Country	Cambodia
Name of Project/Program/activity:	Master of Mathematics International Program
Program/Project/activity proponent:	Training Students on Mathematics at Master Degree on International program

Year started and Year ended	2007-2009,
Description of the Program/Project/activity:	Professor of Mathematics from a different countries : France, Japan, United Stat (USA), Sweden, Spain, Philippines, … Come to Cambodia to teach mathematics in different subject to students at Royal University of Phnom Penh
Significant outputs:	Students of Mathematics finish Master Course with quality. Some of them One, Two or three have a chance to continue they study at PhD degree in abroad: France, United Stat, European Countries, Germany …
Program/project cost:	the cost between: 40,000.00USD to 60,000.00USD
Funding agency (if any):	CIMPA, IMU, ISP, UNESCO, Toyota Foundation, and University that provide lecturer.
Number of beneficiaries :	20 Students finished with quality
Remarks:	All students get a job as Teacher and researcher

3.

Country	Cambodia
Name of Project/Program/activity:	Master of Mathematics International Program
Program/Project/activity proponent:	Training Students on Mathematics
Year started and Year ended	2008-2010,
Description of the Program/Project/activity:	Professor of Mathematics from a different countries : France, Japan, United Stat (USA), Sweden, Spain, Philippines, … Come to Cambodia to teach mathematics in different subject to students at Royal University of Phnom Penh.
Significant outputs:	Students of Mathematics finish Master Course with quality. Some of them One, Two or three have a chance to continue they study at PhD degree in abroad: France, United Stat, European Countries, Korea, Germany …
Program/project cost:	In each generation the cost between:

	40,000.00USD to 60,000.00USD
Funding agency (if any):	CIMPA, IMU, ISP, UNESCO, Toyota Foundation, …
Number of beneficiaries :	20 Students finished
Remarks:	All get a job

4.

Country	Cambodia
Name of Project/Program/activity:	Master of Mathematics International Program
Program/Project/activity proponent:	Training Students on Mathematics
Year started and Year ended	2009-2011,
Description of the Program/Project/activity:	Professor of Mathematics from a different countries : France, Japan, United Stat (USA), Sweden, Spain, Philippines, … Come to Cambodia to teach mathematics in different subject to students at Royal University of Phnom Penh .
Significant outputs:	Students of Mathematics finish Master Course with quality. Some of them One or Two have a chance to continue they study at PhD degree in abroad: France,United Stat, European Countries, Korea,…
Program/project cost:	the cost between: 40,000.00USD to 60,000.00USD
Funding agency (if any):	CIMPA, IMU, ISP, UNESCO, Toyota Foundation, …
Number of beneficiaries :	20 Students finished
Remarks:	All get a job

5.

Country	Cambodia
Name of Project/Program/activity:	Master of Mathematics International Program
Program/Project/activity proponent:	Training Students on Mathematics

Year started and Year ended	20011-2013
Description of the Program/Project/activity:	Professor of Mathematics from a different countries : France, Japan, United Stat (USA), Sweden, Spain, Philippines, … Come to Cambodia to teach mathematics in different subject to students at Royal University of Phnom Penh .
Significant outputs:	Students of Mathematics finish Master Course with quality. Some of them One or Two have a chance to continue they study at PhD degree in abroad: France, European Countries, …
Program/project cost:	the cost between: 40,000.00USD to 60,000.00USD
Funding agency (if any):	CIMPA, IMU, ISP, UNESCO, Toyota Foundation, …
Number of beneficiaries :	20 Students finished
Remarks:	All get a job

II. Conferences and Teacher-Training

1. Conference

Country	Cambodia
Name of Project/Program/activity:	International Conference
Program/Project/activity proponent:	First International Conference on Science and Mathematics Education in Developing Countries.
Year started and Year ended	January 2008
Description of the Program/Project/activity:	Three day conference. Plenary session, Parallel Session and round table discussion
Significant outputs:	Share experience, Connecting Network, Get knowledge from expertise from abroad

Program/project cost:	7,000.00USD
Funding agency (if any):	UNESCO, Toyota Foundation, MOEYS
Number of beneficiaries :	65 Local participants and 15 participants from abroad.
Remarks:	Place in Seam Reap Province

2. Conference

Country	Cambodia
Name of Project/Program/activity:	International Conference
Program/Project/activity proponent:	Second International Conference on Science and Mathematics Education in Developing Countries.
Year started and Year ended	January 2009
Description of the Program/Project/activity:	Three day conference. Plenary session, Parallel Session and round table discussion
Significant outputs:	Share experience, Connecting Network, Get knowledge from expertise from abroad
Program/project cost:	5,000.00USD
Funding agency (if any):	UNESCO, Toyota Foundation, MOEYS
Number of beneficiaries :	80 Local participants and 10 participants from abroad.
Remarks:	Place in Phnom Penh

3. Conference

Country	Cambodia
Name of Project/Program/activity:	International Conference
Program/Project/activity proponent:	Third International Conference on Science and Mathematics Education in Developing Countries.
Year started and Year ended	March 2010
Description of the Program/Project/activity:	Three day conference. Plenary session, Parallel Session and round table discussion
Significant outputs:	Share experience, Connecting Network, Get knowledge from expertise from abroad

Program/project cost:	7,000.00USD
Funding agency (if any):	UNESCO, CASIO, MOEYS
Number of beneficiaries :	150 Local participants and 15 participants from abroad.
Remarks:	Established network, place in Phnom Penh

4. Conference

Country	Cambodia
Name of Project/Program/activity:	International Conference
Program/Project/activity proponent:	Fourth International Conference on Science and Mathematics Education in Developing Countries.
Year started and Year ended	February 2011
Description of the Program/Project/activity:	Three day conference. Plenary session, Parallel Session and round table discussion
Significant outputs:	Share experience, Connecting Network, Get knowledge from expertise from abroad
Program/project cost:	10,000.00USD
Funding agency (if any):	ICTP, ICME, CASIO, MOEYS, Zaman University
Number of beneficiaries :	250 Local participants and 25 participants from abroad.
Remarks:	Established network, Zaman University, Phnom Penh

5. Conference

Country	Cambodia
Name of Project/Program/activity:	International Conference
Program/Project/activity proponent:	Fifth International Conference on Science and Mathematics Education in Developing Countries.
Year started and Year ended	March 2012
Description of the Program/Project/activity:	Three day conference. Plenary session, Parallel Session and round table discussion
Significant outputs:	Share experience, Connecting Network,

	Get knowledge from expertise from abroad
Program/project cost:	120,000.00USD
Funding agency (if any):	ICTP, ISP, CASIO, MOEYS, Zaman University
Number of beneficiaries :	250 Local participants and 46 participants from 26 Countries.
Remarks:	Established network, Zaman University

6. Teachers Training

Country	Cambodia
Name of Project/Program/activity:	Training's Math Teacher on Using Scientific Calculator
Program/Project/activity proponent:	Using Scientific Calculator in Math Class-Room for Upper Secondary School
Year started and Year ended	2008-2013
Description of the Program/Project/activity:	Train math teacher in upper secondary school in provinces to use scientific calculator Pilot project in 4 schools to test the significant of using scientific calculator in math class-room Prepare supplementary text book to read for grade 11 and grade 12 Distribution supplementary text book to six high schools in Phnom Penh Mathematics Competition by using scientific calculators
Significant outputs:	Mathematics Teachers know how to use scientific calculators. Students enjoy learning mathematics with technology.
Program/project cost:	240,000.00USD
Funding agency (if any):	CASIO Computer Co. Ltd, Japan
Number of beneficiaries :	2,500 math teachers had trained 30,000 students get supplementary text book
Remarks:	Will improve the curriculum

Activity Report 3: Recent Mathematics Projects and Programs in Indonesia by IndoMS

The Indonesian Mathematical Society (IndoMS) has arranged some projects in last 5 year (2008-2013)

Please follow the format below per project/activity:

Country	Indonesia
Name of Project/Program/activity:	Survey of development of field in Mathematics based on member of IndoMS
Program/Project/activity proponent:	Field of Mathematics
Year started and Year ended	2008-2010
Description of the Program/Project/activity:	To know how many percent of member IndoMS give supporting in development study of field of applied mathematics, statistics, analysis, algebra, operational research and mathematics education
Significant outputs:	Contribution of member of IndoMS can be drwan in graphics, hom many people to contribute in each field
Program/project cost:	At Cost
Funding agency (if any):	Higher Education, Ministry of National Education-Indonesia
Number of beneficiaries :	Member of IndoMS and Higher Education
Remarks:	The result is good and we still try to do survey again at 2014

Country	Indonesia
Name of Project/Program/activity:	IndoMS International Conference on Mathematics and Its Applications
Program/Project/activity proponent:	International Publication of IndoMS member
Year started and Year ended	2009
Description of the Program/Project/activity:	To get some benefit on dissemination of the result of research in theory and applications of mathematics To get linkages with expert people on field of mathematics in aorund the world
Significant outputs:	16 papers for international journal 16 papers for national journal Proceedings of IICMA 2013
Program/project cost:	Rp 400.000.000
Funding agency (if any):	Higher Education, Ministry of National Education-Indonesia
Number of beneficiaries :	Member of IndoMS and Higher Education

Remarks:	The result is good and we have a program again on November 2013

Country	Indonesia
Name of Project/Program/activity:	Increasing of manajement journal of the Indonesian Mathematical Society (JIMS) to get an international reputation
Program/Project/activity proponent:	Publications on Mathematics
Year started and Year ended	2009-2011
Description of the Program/Project/activity:	To develop a management journal of JIMS To Increase a quality of writing a paper of IndoMS member To online journal of JIMS
Significant outputs:	JIMS has been accrediuted by Higher Education for year 2010-2013
Program/project cost:	Rp 500.000.000
Funding agency (if any):	Higher Education, Ministry of National Education-Indonesia
Number of beneficiaries :	Member of IndoMS and Higher Education
Remarks:	The result is good and we can reaccredited JIMS again for year 2013-2017 as an national journal, which is onel and only one accredited journal on mathematics field in Indonesia

Country	Indonesia
Name of Project/Program/activity:	National Conference on Mathematics (KNM)
Program/Project/activity proponent:	Diisemination or publications of Member IndoMS on Mathematics
Year started and Year ended	1976-2012, each two years
Description of the Program/Project/activity:	To publish the result of research on mathematics To link with invited keynote speaker To do congres of IndoMS for election president of IndoMS
Significant outputs:	Contribution of member of IndoMS in publication of proceeding
Program/project cost:	Member fee
Funding agency (if any):	Sponsorship
Number of beneficiaries :	Member of IndoMS and Higher Education

Remarks:	The result is good and we will have a national conference on mathematics at 2014 at ITS Surabaya-East Java

Country	Indonesia
Name of Project/Program/activity:	National Conference on Mathematics Education (KNPM)
Program/Project/activity proponent:	Disemination or publications of Member IndoMS on Mathematics Education
Year started and Year ended	2005-2013, each two years
Description of the Program/Project/activity:	To publish the result of research on mathematics education To link with invited keynote speaker
Significant outputs:	Contribution of member of IndoMS in publication of proceeding
Program/project cost:	Member fee
Funding agency (if any):	Sponsorship
Number of beneficiaries :	Member of IndoMS and Higher Education
Remarks:	The result is good and we will have a national conference on mathematics education at 2015

Country	Indonesia
Name of Project/Program/activity:	SEAMS Council member
Program/Project/activity proponent:	As a member of SEAMS, for 2014 to be a president of SEAMS (Prof. Dr. Edy tri Baskoro) IndoMS has a contribution on some of discussion about mathematics at South East Asia
Year started and Year ended	2002-2013, each four years we folow the Asia Mathematical Conference (AMC)
Description of the Program/Project/activity:	To publish the result of research on mathematics To link with invited keynote speaker To get meetingfor election president of SEAMS
Significant outputs:	Contribution of member of IndoMS in publication of AMC
Program/project cost:	Member fee
Funding agency (if any):	Sponsorship
Number of beneficiaries :	Member of IndoMS and SEAMS member
Remarks:	The result is good and we will have a chance to be an organizing committee of AMC 2016 at Bali-Indonesia

Country	Indonesia
Name of Project/Program/activity:	SEAMS School on Combinatorics
Program/Project/activity proponent:	Give a lecture for student from South East Asia
Year started and Year ended	2013 at ITB (Prof. Edy tri Baskoro)
Description of the Program/Project/activity:	To link between students at South East Asia To help student To give a chance for lecturer to teach and doing research which Ph.D students
Significant outputs:	To increase an experience of students
Program/project cost:	Fee from research funding of individu, CIMPA
Funding agency (if any):	Sponsorship
Number of beneficiaries :	Member of IndoMS and mhas lainnya
Remarks:	The result is good and we will have a chance to do this program at each country of south east asia

Country	Indonesia
Name of Project/Program/activity:	Workshop or school of CIMPA
Program/Project/activity proponent:	Development of mathemtics skill
Year started and Year ended	2008-now
Description of the Program/Project/activity:	To link between students at South East Asia To help student To give a chance for lecturer to teach and doing research which Ph.D students
Significant outputs:	Contribution of member of IndoMS or SEAMS on softskill
Program/project cost:	CIMPA
Funding agency (if any):	Sponsorship
Number of beneficiaries :	Member of IndoMS or SEAMS
Remarks:	The result is good and we will have a national conference on mathematics at 2014 at ITS Surabaya-East Java

Activity Report 4: Recent Mathematics Projects and Programs in the Philippines by Prof Jose Maria P. Balmaceda

PHILIPPINES

1.

Country	Philippines
Name of Project/Program/activity:	Asia Link International Masters in Applied Mathematics and Information Science (IMAMIS)
Program/Project/activity proponent:	Main proponent: University of Nice-Sophia Antipolis with partners – University of the Philippines Diliman Institute of Mathematics (main partner); Asian partners – Ateneo de Manila University Math Department, Institute of Mathematics Hanoi, Universiti Kebangsaan Malaya; and European partners – Pisa, La Rochelle, Paris VI, U. Autonoma de Madrid
Year started and Year ended	2005-2008
Description of the Program/Project/activity:	Three-yerar program to develop and upgrade the ability of Philippines (and generally, Southeast Asia) in the fields of applied mathematics and information sciences through: (1) creation of 10 courses in applied maths and 5 courses in computer science; (2) training of Philippine teachers and students through the visit of 15 European professors, who taught the new courses initially, and one-month visits of counterpart Philippine professors to Europe for additional training in the teaching of the new courses; and (3) organization of three international research schools, co-sponsored by CIMPA
Significant outputs:	10 new (or upgraded) courses in the MS Applied Mathematics and 5 courses in MS Computer Science programs were created in the University of the Philippines Diliman (UPD), that are now capably taught by Philippine professors. Lecture notes for the new courses have been developed. Three research schools in the region (Financial Information Systems – Kuala Lumpur 2006, Mathematical Finance – Hanoi 2007, and Numerical Methods for PDEs – Manila 2007) were organized. Several master's and PhD theses have also been written focusing on the themes of IMAMIS (e.g. mathematical finance, mathematical biology, numerical analysis, PDEs).
Program/project cost:	EUR 438,211.00
Funding agency (if any):	European Commission
Number of beneficiaries :	The 15 courses have been regularly offered since 2006 with enrolment per class of around 5-15 students each. The summer research schools had around 50 participants each.
Remarks:	After the end of the IMAMIS program, some of the coordinators put together a proposal for an Erasmus Mundus Action 2 mobility program in 2009 (with Nice as main proponent), called EMMA (Erasmus Mundus Mobility for Asia). EMMA has been implemented with several renewals since 2009 to the present.

2.

Country	Philippines
Name of Project/Program/activity:	SEAMS Manila School on the Applications of Algebra and Analysis
Program/Project/activity proponent:	Institute of Mathematics, UP Diliman (organizers) for the Southeast Asian Mathematical Society
Year started and Year ended	4-15 April 2011
Description of the Program/Project/activity:	Two-week intensive study program bridging undergraduate mathematics education and research-level mathematics
Significant outputs:	Participants attended the following short courses: (1) Introduction to PDEs (15 hours); (2) Number Theory, Coding and Cryptography (20 hours), and; (3) Introduction to Mathematical Modeling (15 hours).
Program/project cost:	Euro 8,380.00
Funding agency (if any):	CIMPA; Mathematical Society of the Philippines; Philippine Council for Industry, Energy, and Emerging Technology Research and Development; National Research Council of the Philippines; UP System
Number of beneficiaries :	27 participants (10 participants form Cambodia, Laos, Indonesia, Malaysia) and 12 lecturers
Remarks:	This school is inspired by the successful EMALCA schools organized by UMALCA (Latin America and Caribbean Mathematical Union) and is the inaugural school of the SEAMS Research Schools.

3.

Country	Philippines
Name of Project/Program/activity:	CIMPA-UNESCO-Philippines Research School on Pseudo-Random Sequences
Program/Project/activity proponent:	CIMPA; organized locally by the Institute of Mathematics, University of the Philippines Diliman
Year started and Year ended	04 – 18 July 2005
Description of the Program/Project/activity:	Pseudo-random sequences are used in industry in various contexts like cryptography in computer security and simulation in numerical analysis. The aim of the school is to gather industrial and academic partners to make a survey and a synthesis of the diverse mathematical techniques (arithmetic, logic, combinatorial) employed in the various applications.
Significant outputs:	There is now a core of researchers in coding theory and cryptography, perticularly in the Institute of Mathematics, University of the Philippines Diliman, Ateneo de Manila University Math Department and University of the Philippines Los Banos Institute of Mathematical Sciences and Physics.
Program/project cost:	Around EUR 15,000
Funding agency (if any):	CIMPA; Department of Science and Technology, Philippines, Commission on Higher Education, Philippines
Number of beneficiaries :	35 participants and 5 lecturers

4.

Country	Philippines
Name of Project/Program/activity:	CIMPA-IMAMIS-Philippines Research School on Numerical Methods for PDEs
Program/Project/activity proponent:	Asia Link IMAMIS (International Master in Applied Mathematics and Information Sciences) program, coordinated by University of Nice-Sophia Antipolis; locally organized by Ateneo de Manila University.
Year started and Year ended	27 August – 07 September, 2007
Description of the Program/Project/activity:	Advanced numerical techniques for Partial Differential Equations. Applications to some classes of PDE, namely to fluid mechanics and mathematical finance. It is part of the Asia Link program IMAMIS (International Master in Applied Mathematics and Information Sciences) that has been worked out mostly by the University of Nice Sophia-Antipolis (UNSA) and the University of the Philippines (UP).
Significant outputs:	Strengthened training and education of Southeast Asian researchers in the subject matter. Some schools in the region have started offering new master's courses on the topics of the research school.
Program/project cost:	Around EUR 17,000
Funding agency (if any):	CIMPA; Asia Link IMAMIS Project; International Mathematical Union; International Center for Theoretical Physics
Number of beneficiaries :	58 participants, 7 lecturers
Remarks:	This is one of three related CIMPA-IMAMIS schools held in Southeast Asia as part of the Asia Link IMAMIS program.

5.

Country	Philippines
Name of Project/Program/activity:	CIMPA-UNESCO-Philippines Research School on Semidefinite Programming in Algebraic Combinatorics
Program/Project/activity proponent:	CIMPA; organized locally by the Institute of Mathematics, University of the Philippines Diliman
Year started and Year ended	20 – 31 July, 2009
Description of the Program/Project/activity:	To train participants in a new technique (semi-definite programming in algebraic combinatorics) which has applications in fields such as graph theory, coding theory, association schemes, and Terwilliger algebras.
Significant outputs:	Participants received training in semi-definite programming, including related areas (harmonic analysis, coding theory, spherical designs, point distributions on spheres). Problem-solving and computer laboratory sessions were incorporated in the two-week school.
Program/project cost:	Approximately EUR 17,000
Funding agency (if any):	CIMPA; Philippine Council for Advanced Science and Technology Research and Development; University of the Philippines Diliman; Commission on Higher Education

	(PHIL); National Research Council of the Philippines; Embassy of France in Manila
Number of beneficiaries :	37 participants, 5 lecturers

6.

Country	Philippines
Name of Project/Program/activity:	CIMPA-ICTP-UNESCO-MESR-MINECO-Philippines Research School on Algebraic Curves over Finite Fields
Program/Project/activity proponent:	CIMPA; organized locally by the Institute of Mathemtics, University of the Philippines Diliman
Year started and Year ended	22 July – 02 August, 2013
Description of the Program/Project/activity:	The research school covered theoretical, computational and applied aspects of the topic. The school included introductory classes on finite fields and algebraic curves; aspects of the theory of elliptic curves over finite fields as well as the application of the Riemann-Roch theorem to the zeta function of an algebraic curve over a finite field.
Significant outputs:	The lecturers developed the subject almost from scratch, and therefore was accessible to all the participants.Applications figured prominently with sessions on elliptic curve cryptography, coding theory and computational examples using Pari GP and Sage, including explicit construction of elliptic curves over finite fields with group of points of large prime order (as needed by cryptographic applications) via complex multiplication.
Program/project cost:	Around EUR 17,000
Funding agency (if any):	CIMPA; International Centre for Theoretical Physics; Ministère de L'enseignement Supérieure et de la Recherche (MESR), France; Ministerio de Economía y Competetividad (MINECO), Spain; Philippine Center for Industry, Energy, and Emerging Terchnology Research and Development
Number of beneficiaries :	51 participants, 10 lecturers

7.

Country	Philippines
Name of Project/Program/activity:	MaThCryst Workshop on Mathematical Crystallography, Manila 2011
Program/Project/activity proponent:	Commission on Mathematical and Theoretical Crystallography, International Union of Crystallography; organized locally by the Institute of Mathematics, University of the Philippines Diliman
Year started and Year ended	2-6 November 2011
Description of the Program/Project/activity:	Workshop on current topics in mathematical crystallography and its applications, particularly geometry of periodic and crystalline networks, color symmetry, coincident site lattices, twinning in crystals, mathematical diffraction theory and crystal GAP.

Significant outputs:	Exposure of young researchers to researach topics through conference-workshop lectures; poster session of research results of participants.
Program/project cost:	Around EUR 7,000 (excuding travel costs of lecturers)
Funding agency (if any):	International Union of Crystallography University of the Philippines
Number of beneficiaries :	48 participants (7 foreign) and 9 lecturers

8.

Country	Philippines
Name of Project/Program/activity:	Philippine-Taiwan Symposium on Analysis
Program/Project/activity proponent:	University of the Philippines Institute of Mathematics and the Taiwan Mathematical Society
Year started and Year ended	The activity was started in 1996. The recent symposiums held in the Philippines were in 2003, 2007, and 2011.
Description of the Program/Project/activity:	This is a biennial symposium (usually 4-5 days) between Philippine and Taiwan mathematicians (particularly working on various aspects of analysis). The symposium is held every two years, with the venue alternating between Taiwan and Philippines.
Significant outputs:	Venue for dissemination of research results and collaboration between Taiwan and Philippine mathematicians. The papers presented in the symposium have been published as special issues of the Matimyas Matematika (Journal of the Mathematical Society of the Philippines) and in Proceedings of the Symposium (when held in Taiwan).
Program/project cost:	Local expenses are supported by the host country.
Funding agency (if any):	National Science Council (Taiwan); Department of Science and Technology (Philippines)
Number of beneficiaries :	Each symposium has at least 25-30 speakers (senior mathematicians and several new PhDs) and around 10-20 additional participants.

9.

Country	Philippines
Name of Project/Program/activity:	Assessment of Tertiary Mathematics Programs in the Philippines: State of the Art of the Discipline
Program/Project/activity proponent:	Technical Panel on Science and Mathematics, Commission on Higher Education (CHED)
Year started and Year ended	July 2012 to December 2013
Description of the Program/Project/activity:	Technical assessment of higher education institutes (colleges and universities) in the Philippines offering graduate and undergraduate degree programs in Mathematics, covering faculty, instruction, curriculum, facilities, research and publications, linkages.

Significant outputs:	90 schools (out of around 130 schools with active programs)were visited by teams of assessors (pool of 30 active mathematicians and researchers, including members of the CHED Technical Committee for Mathematics); results are now being consolidated and will be put together to provide a comprehensive state of mathematics in the country.
Program/project cost:	Around EUR 50,000
Funding agency (if any):	Commission on Higher Education (Philippines)
Number of beneficiaries :	The results of the project will be presented in a National Forum on Mathematics, and will be used in the on-going revision of the CHED Policies, Standards and Guidelines for mathematics programs.

10.

Country	Philippines
Name of Project/Program/activity:	Various international conferences and symposia on Mathematics and/or Mathematics Education
Program/Project/activity proponent:	Several universities, mathematics departments, and professional organizations.
Year started and Year ended	Conducted regularly
Description of the Program/Project/activity:	The academic content and target groups of participants vary according to the objectives of the activity.
Significant outputs:	The following are some recent and forthcoming major international conferences in the country: • Algebra and Combinatorics 2006 : an International Conference in honor of J. Marasigan, N. Quimpo and M. Ruiz (organized by Ateneo de Manila University). Other conferences in algebra and combinatorics were held in 1994, 1998, 2002. • 9th Biennial International Mathematics Conference in Mathematics Education 2013 (organized by the Philippine Council for Mathematics Teacher Educators-MATHTED, Oct 2013). The first conference was held in 1997. • National Science and Mathematics Education Conference 2013 (organized by the National Institute for Science and Mathematics Education Development, University of the Philippines Diliman), Oct 2013. These national conferences (which also feature international speakers) is held every 2-3 years by the NISMED.
Funding agency (if any):	Government agencies, professional organizations, academic institutions, and industry.

11.

Country	Philippines
Name of Project/Program/activity:	Programs and Projects of the Science Education Institute

Program/Project/activity proponent:	Science Education Institute (agency of the Department of Science and Technology, Philippines mandated to develop S & T education and innovation)
Description of the Program/Project/activity:	Various initiatives under the following categories: • S & T Human Resource Development through Undergraduate and Graduate Scholarships • Promotion of Science and Technology Culture • Innovations and Trainings in Science Education • Human Resource Studies and Education Policy Development
Significant outputs:	The following activities directly focus on mathematics and mathematics education: • Co-sponsorship of Philippine Team to the IMO, including training camp • Sponsorship of the Philippine Mathematical Olympiad and other mathematics competitions; support for international participation • Participation in international assessment studies, including TIMMS • Formulation of Science and Mathematics Frameworks for Teacher Education and Basic Education (School Mathematics) • Science, Engineering and Math camps
Funding agency (if any):	Department of Science and Technology (with co-sponsors from academe and industry)

Submitted by:

Professor Jose Maria Balmaceda,
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Activity Report 5: Recent Mathematics Projects and Programs in Singapore by Prof Ling San

The main projects can be divided into two categories: (1) publicly funded research programs and (2) major activities (programs, conferences and workshops) under the Institute for Mathematical Sciences in the National University of Singapore.

(1) Publicly funded research programs

The list here (8 items) contains only programs funded at S$1 million and above. There are at least 20 other programs, each of funding <S$1 million.

Country	Singapore
Name of Project/Program/activity:	Theory and Practice of Coding and Cryptography
Program/Project/activity proponent:	Nanyang Technological University Lead PI: San Ling Co-PIs: Chaoping Xing, Yeow Meng Chee, Huaxiong Wang, Frederique Oggier, Axel Poschmann, Hongjun Wu, Igor Shparlinski, Kees Schouhamer Immink
Year started and Year ended	2008 – 2013
Description of the Program/Project/activity:	The programme consists of two major subprogrammes: Coding Theory and Cryptography, divided into 7 interwoven projects: • Constructions, Algorithmic Issues, and New Applications of Block Codes • Development of Quantum Error-Correcting Codes • Design of Space-Time Codes • Mathematics Of Public Key Cryptosystems • Designs and Analysis of Private Key Cryptographic Primitives • Designs and Analysis of Cryptographic Hash Functions • Secure Multiparty Computation
Significant outputs:	• Published 117 papers in international journals • Published 95 papers in international conferences • Delivered 61 invited talks/ presentations at major conferences/ scientific meetings • Received 8 external awards for at international/national level • Filed 2 patents
Program/project cost:	S$$8,594,368.73
Funding agency (if any):	National Research Foundation
Number of beneficiaries :	Trained 11 PhD students, 4 Master's students and 23 research staff
Remarks:	

Country	Singapore
Name of Project/Program/activity:	Algorithmic aspects of coalitional games
Program/Project/activity proponent:	Nanyang Technological University Edith Elkind
Year started and Year ended	2009-2014
Description of the Program/Project/activity:	Study of algorithmic questions in game theory and social choice, with a particular focus on cooperative game theory
Significant outputs:	Book “Computational aspects of coalitional games” (Morgan & Claypool, 2011). Two best student paper awards (AAMAS’11 and AAMAS’12), runner-up for best paper award (AAMAS’11)
Program/project cost:	S$ 2 618 546
Funding agency (if any):	National Research Foundation
Number of beneficiaries :	Trained 4 postdoctoral fellows and 3 PhD students
Remarks:	

Country	Singapore
Name of Project/Program/activity:	Information theoretical security for wireless communications
Program/Project/activity proponent:	Nanyang Technological University Frederique Oggier
Year started and Year ended	August 2009 – July 2014
Description of the Program/Project/activity:	Study of wiretap codes for wireless security
Significant outputs:	Construction of lattice wiretap codes, Design criterion for fading and MIMO codes
Program/project cost:	S$ 1,490,103
Funding agency (if any):	National Research Foundation
Number of beneficiaries :	1 PI
Remarks:	

Country	Singapore
Name of Project/Program/activity:	Analysis and Conception of Symmetric-key Cryptography Primitives
Program/Project/activity proponent:	Nanyang Technological University Thomas Peyrin
Year started and Year ended	2012 to 2017
Description of the Program/Project/activity:	The first goal of this research proposal is to study the security of current block ciphers and cryptographic hash functions, two of the most important primitives in cryptography, backbones of the security applications in various industries such as telecommunications, banking, access control,

	etc. and used in everyday applications such as PC, cellphones, smart-cards, Internet, etc. The second phase will consist in designing new secure cryptographic components and eventually building new block cipher and hash function proposals.
Significant outputs:	First cryptanalysis of the full RIPEMD-128 cryptographic hash function standard
Program/project cost:	S$ 2,966,050
Funding agency (if any):	NRF
Number of beneficiaries :	1 PI + 4 postdocs
Remarks:	

Country	Singapore
Name of Project/Program/activity:	Wavelets and Information Processing
Program/Project/activity proponent:	National University of Singapore Say Song Goh, Seng Luan Lee, Zuowei Shen and Andy Ming-Ham Yip
Year started and Year ended	October 1, 2001 to September 30, 2010
Description of the Program/Project/activity:	The program was multidisciplinary in nature, comprising specific application projects in image and signal processing as well as basic research in mathematics, science and engineering related to them. It involved integrative research collaborations among mathematicians, computer scientists and engineers. The specific application projects under the program include underwater acoustic signal detection and identification using adaptive wavelet techniques, wavelet-based image and video compression, transmitter identification, time-difference-of-arrival estimation, and restoration of digital video sequences.
Significant outputs:	For the specific application projects under the program, many useful algorithms and software were produced. The basic research under the program yielded numerous research papers of fundamental importance, which include state-of-the-art mathematical results in image restoration, compressed sensing, and wavelets and frames.
Program/project cost:	S$4,124,000
Funding agency (if any):	Defence Science and Technology Agency, Singapore
Number of beneficiaries :	The algorithms and software generated by the application projects are useful in handling the specific practical problems addressed by them. Many of the basic research results are published in top

	journals in the field for access by the international community.
Remarks:	The program was an illustration of the synergy among the trinity of basic research, applied research and systems development.

Country	Singapore
Name of Project/Program/activity:	Imaging in Biomedical Science
Program/Project/activity proponent:	Paul Matsudaira, Zuowei Shen, Hui Ji
Year started and Year ended	2013 to 2018
Description of the Program/Project/activity:	Research grant on An Integrated Framework to study the dynamics of biological structure
Significant outputs:	Papers and software
Program/project cost:	$1,672,580 including support for graduate student scholarship
Funding agency (if any):	MoE
Number of beneficiaries :	
Remarks:	

Country	Singapore
Name of Project/Program/activity:	Age and individual differences in mathematical abilities: From kindergarten to secondary schools
Program/Project/activity proponent:	National Institute of Education Kerry Lee Ng Swee Fong
Year started and Year ended	2005 - 2013
Description of the Program/Project/activity:	The main study is a five-year longitudinal study tracking the development of children's working memory, executive functions and mathematical skills. In addition, we conducted three supplementary studies that address issues arising from our existing findings. *Supplementary Study 1* is a qualitative study investigating how children solve a pattern recognition task. *Supplementary Study 2* examined ways to enhance pedagogical practice in order to enhance children's working memory, and to develop a professional development package for teachers. *Supplementary Study 3* examines the relationship between test anxiety, working memory, and test performance.
Significant outputs:	1. *Longitudinal Study*: Executive functioning, in particular updating or working memory capacity, is strongly associated with mathematical

	achievement. The magnitude of this association is at its peak at Primary 2 and 3, but remains strong even for the older children. Our data suggest that earlier assessment of updating or working memory capacity provides good prediction of later achievement and explains around a quarter of individual differences in mathematical achievement three years later. 2. *Supplementary Study 1:* The teaching of mathematics at all levels should not only focus on problem solving but also on the nature of relationships and the relationships between operations. Failure to develop this knowledge may impede children when they learn to solve algebraic equations. 3. *Supplementary Study 2:* The evidence emerging from our lesson observations suggests that it is not the case that children cannot learn mathematics. Rather the delivery of mathematics lessons must be well-thought through. 4. *Supplementary Study 3:* Provided data that challenged existing theory on the relations between trait versus state test anxiety, working memory capacity, and performance.
Program/project cost:	S$ 1,281,169
Funding agency (if any):	MOE
Number of beneficiaries :	Ministry of Education, National Institute of Education, Researchers, Teachers
Remarks:	Nil.

Country	Singapore
Name of Project/Program/activity:	Singapore Mathematics Assessment and Pedagogy Project (SMAPP)
Program/Project/activity proponent:	National Institute of Education Academic Group in Mathematics & Mathematics Education
Year started and Year ended	September 2008 – December 2012
Description of the Program/Project/activity:	To develop an assessment for learning system that includes an IT system that delivers extended tasks about real-life mathematics , captures student responses, provides semi-automatic marking and customisable feedback, and reports performance at individual, class, and school level.

Significant outputs:	A printed and e-book entitled “Real-life mathematics tasks: A Singapore Experience”; various electronic resources; a prototype of computer-based assessment for learning system. Conference and journal papers.
Program/project cost:	S$1,036,659
Funding agency (if any):	Centre for Research in Pedagogy and Practice, National Institute of Education, Nanyang Technological University
Number of beneficiaries :	All Singapore secondary schools receive printed book and all the electronic resources.
Remarks:	None

(2) The list below contains the activities (programs, conferences, workshops) organized by the Institute for Mathematical Sciences at the National University of Singapore, in 2012 and 2013. The institute has been organizing programs since 2001. The institute received an initial seed funding of S$2 million from the Singapore Ministry of Education in 2001, and was subsequently funded by the National University of Singapore. Program/project cost in each item reflects the cost for each program.

Country	Singapore
Name of Project/Program/activity:	Financial Time Series Analysis: High-dimensionality, Non-stationarity and the Financial Crisis
Program/Project/activity proponent:	Co-chairs: -Ying Chen (National University of Singapore) -Piotr Fryzlewicz (London School of Economics) -Qiwei Yao (London School of Economics)
Year started and Year ended	1 - 22 Jun 2012
Description of the Program/Project/activity:	The objectives of the program were (1) to bring together world-leading researchers in the field of Financial Time Series, with a view to learning about the state of the art through workshop presentations, as well as to continuing existing and kick-starting new research projects; and (2) to expose graduate students to the state of the art in the field, as well as enabling them to interact with experts through active participation in the special lectures, poster presentations and informal discussions.
Significant outputs:	Financial time series is an extremely hot topic both academically and commercially, and it is only becoming more exciting and important as the world’s financial markets are being reshaped both by technological changes and by after-effects of the financial crisis. This brought to the fore such statistical issues as high-dimensionality and non-stationarity, which made up the core themes of the program. The program was successful in inviting the world leaders in the field for research interactions and collaborations with local scientists.
Program/project cost:	USD65,000
Funding agency (if any):	National University of Singapore (NUS)
Number of beneficiaries :	92
Remarks:	Held at the Institute for Mathematical Sciences, NUS

	http://www2.ims.nus.edu.sg/Programs/012hidim/index.php

Country	Singapore
Name of Project/Program/activity:	Random Matrix Theory and its Applications II
Program/Project/activity proponent:	Chair: -Ying-Chang Liang (Institute for Infocomm Research)
Year started and Year ended	18 Jun - 15 Aug 2012
Description of the Program/Project/activity:	Random matrix theory (RMT) has emerged as an extremely powerful tool for a variety of applications, especially in statistical signal processing, wireless communications, finance, statistics and bioinformatics. For example, RMT has become the key ingredient for designing and analyzing detection and estimation techniques in array signal processing as well as wireless communications. The large-dimensional RMT results have been used to design multiantenna wireless systems and multiuser detection schemes and to analyze the information-theoretic limits of multidimensional wireless channels. The objective of the two-month program was to provide the mathematicians and engineers a unique platform to discuss interesting fundamental problems, results and explore possible solutions related to RMT and its applications in wireless communications and statistics.
Significant outputs:	Random matrix theory is one of the most active fields in mathematics and probability theory and it finds applications in the fields as diverse as statistics, wireless communication, finance and chaotic system. The program brought together experts active in all these fields to share their respective discovery and thoughts on random matrix theory. The program covered most of the subjects in random matrix theory and invited a number of leading experts from all over the world to participate in the program. At least 9 research collaborations/papers were initiated during the program.
Program/project cost:	USD75,200
Funding agency (if any):	National University of Singapore
Number of beneficiaries :	85
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/012random/index.php

Country	Singapore
Name of Project/Program/activity:	Meeting the Challenges of High Dimension: Statistical Methodology, Theory and Applications
Program/Project/activity proponent:	Co-chairs: - Peter Hall (University of Melbourne) - Xuming He (University of Illinois at Urbana-Champaign) - Yingcun Xia (National University of Singapore)
Year started and Year ended	13 Aug - 26 Oct 2012
Description of the Program/Project/activity:	The topic of high-dimensional data analysis has many aspects, motivated by many applications, sometimes relying heavily on dimension reduction and variable selection, and sometimes co-habiting happily with more conventional multivariate methods. The August workshop, the first of two in the program, addressed

	all of these aspects. They lie at the frontiers along which statistical methodology, the applications that motivate it, the questions that it answers, and the theory that underpins it, are advancing today. The October workshop continued to address the challenges of high dimensional data analysis with more focuses on the methods and applications where sparsity is present.
Significant outputs:	The program was successful in bringing together the existing work and identifying new research problems and directions. A survey after the program revealed that most of the participants had commended on the quality and organization of the program. They have learnt important new developments and applications; developed new research ideas and approaches; made contacts with prominent international and local statisticians and people working on the related problems; and established international and local collaborations. This program has helped strengthen their research capabilities.
Program/project cost:	USD83,100
Funding agency (if any):	National University of Singapore
Number of beneficiaries :	126
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/012statheory/index.php

Country	Singapore
Name of Project/Program/activity:	Optimization: Computation, Theory and Modeling
Program/Project/activity proponent:	Co-chairs: - Defeng Sun (National University of Singapore) - Kim Chuan Toh (National University of Singapore)
Year started and Year ended	1 Nov - 23 Dec 2012
Description of the Program/Project/activity:	The field of optimization has found numerous applications in science, engineering, economics, finance, and risk management. The optimization research has achieved much progress recently in theory, algorithms and applications. Yet, exciting new developments continue to emerge at a speed that has never been seen in the history of optimization. The program consisted of three workshops, which consisted of tutorial lectures and invited talks.
Significant outputs:	This program provided a platform for exchanging ideas and fostering collaborations in solving large scale conic optimization problems including semi-definite programming (SDP) and symmetric cone programming (SCP). Participants reported on the latest exciting developments in complementarity and beyond and discussed on another closely related theme - optimization under uncertainty.
Program/project cost:	USD114,700
Funding agency (if any):	National University of Singapore, and Society for Industrial and Applied Mathematics (SIAM)
Number of beneficiaries :	189

Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/012opti/index.php

Country	Singapore
Name of Project/Program/activity:	Algorithmic Game Theory and Computational Social Choice
Program/Project/activity proponent:	Co-chairs: - Ning Chen (Nanyang Technological University) - Edith Elkind (Nanyang Technological University)
Year started and Year ended	7 Jan – 8 Mar 2013
Description of the Program/Project/activity:	The objective of the program was to bring together experts on algorithmic aspects of economics and group decision making in order to foster interdisciplinary collaboration in two burgeoning research areas, namely algorithmic game theory and computational social choice. The two areas are closely related to each other, and share strong mathematical foundations; however, at the moment there is limited interaction between the two groups of researchers, leading to missed research opportunities. To overcome this communication barrier, the organizers designed the program as a meeting point for researchers from different areas that study incentives and collective action, such as mathematics, game theory, theoretical computer science, artificial intelligence, economics, social choice, and operation research, in order to expose the participants (and especially junior researchers) to a wide variety of tools, techniques, and modeling perspectives.
Significant outputs:	The program brought together international experts in algorithmic game theory and computational social choice for research interactions and collaborations, and emphasized the commonalities between the two fields. The invited speakers also presented their research findings to the participants.
Program/project cost:	USD75,300
Funding agency (if any):	National University of Singapore, and Nanyang Technological University
Number of beneficiaries :	69
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/013game/index.php

Country	Singapore
Name of Project/Program/activity:	Workshop on Mathematics for Defence
Program/Project/activity proponent:	Institute for Mathematical Sciences Defence Research & Technology Office, Ministry of Defence, Singapore
Year started and Year ended	13 Apr 2012
Description of the Program/Project/activity:	The one-day workshop focused on four areas, namely computational PDE, cryptography, high dimensional data analysis, and imaging. The speakers included 4 defence scientists and 4 mathematicians.

Significant outputs:	The workshop provided a platform for defence scientists and mathematicians to discuss their research, exchange ideas, and explore for future collaborations.
Program/project cost:	N.A.
Funding agency (if any):	National University of Singapore
Number of beneficiaries :	96
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/012wmathd/index.php

Country	Singapore
Name of Project/Program/activity:	Workshop on Non-uniformly Hyperbolic and Neutral One-dimensional Dynamics
Program/Project/activity proponent:	Co-chairs: - Juan Rivera-Letelier (Ponfica Catolica Universidad de Chile) - Weixiao Shen (National University of Singapore) - Mitsuhiro Shishikura (Kyoto University)
Year started and Year ended	23 – 27 Apr 2012
Description of the Program/Project/activity:	The aim of the workshop was to bring together some of the leading experts working on parabolic renormalization, statistical properties and thermodynamic formalism of one-dimensional dynamical systems and related topics, to disseminate and explore possible research collaborations.
Significant outputs:	The talks in the workshop covered various aspects of non-uniformly hyperbolic and neutral one-dimensional dynamical systems, including the theory of (nearly) parabolic renormalization and its application to holomorphic dynamics with indifferent fixed points, the thermodynamic formalism of interval maps and complex polynomials, typicality of non-uniformly expanding one-dimensional maps, statistical properties of systems with non-uniform hyperbolicity, the monotonicity conjecture of topological entropy of interval maps defined by polynomials, the topological equivalence of certain non-uniform expanding condition, dynamics of rational maps, the topological complexity of wild attractors, and skew-product systems constructed from one-dimensional maps. Several collaborations were initiated during the workshop.
Program/project cost:	USD26,700
Funding agency (if any):	National University of Singapore
Number of beneficiaries :	27
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/012wmathd/index.php

Country	Singapore
Name of Project/Program/activity:	School and Workshop on Random Polymers and Related Topics
Program/Project/activity proponent:	Co-chairs: - Rongfeng Sun (National University of Singapore) - Frank den Hollander (Leiden University and EURANDOM) - Nikos Zygouras (University of Warwick)

Year started and Year ended	14 - 25 May 2012
Description of the Program/Project/activity:	During the last few of years, the probability community has witnessed a burst of groundbreaking developments centered around the theme of random polymer models. These models, originating from the physical and the chemical sciences, show fascinating behavior and pose formidable challenges (both at the rigorous and the non-rigorous level). Their study has motivated the development of novel methods covering diverse mathematical fields (stochastic analysis, large deviation theory, random matrix theory, representation theory) and physical fields (quantum mechanics, renormalisation group analysis, statistical mechanics). The school aimed to introduce some of the most recent and exciting developments to young researchers, while the workshop aimed to bring together key players working on random polymers and related fields, with the common goal to facilitate exchange of ideas and future collaborations.
Significant outputs:	The school and workshop provided the venue for much ongoing collaboration among the participants, and a number of new collaborations were initiated as well.
Program/project cost:	USD62,600
Funding agency (if any):	National University of Singapore
Number of beneficiaries:	46
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/012randompoly/index.php

Country	Singapore
Name of Project/Program/activity:	Joint Workshop of IMS and IMI on Mathematics for Industry: Biological and Climatic Prospects (3 - 7 Sep 2012)
Program/Project/activity proponent:	Organizing Committee: - Robert S. Anderssen (CSIRO) - Kenji Kajiwara (Kyushu University) - Tomoyuki Shirai (Kyushu University) - Kim Chuan Toh (National University of Singapore) - Masato Wakayama (Kyushu University)
Year started and Year ended	3 - 7 Sep 2012
Description of the Program/Project/activity:	The aims of this program were (1) to help create/enhance the awareness on the applicability and importance of mathematical sciences in industry, and (2) to foster closer interactions among industrial researchers/practitioners and mathematical scientists to solve contemporary industrial problems.
Significant outputs:	The wide spectrum of industry-related problems described in the talks has widened the perspectives of NUS researchers. The expositions on the successful applications and creation of mathematical knowledge to solve various challenging industrial problems have certainly provided important templates and models on how successful collaborations between academia and industries can be achieved. The latter point is significant for mathematical researchers in NUS, and more generally in Singapore, as the links between the academia and industries are expected to

	deepen in the future because of the shift in the focus of the funding agency to provide scholarships to train industry-ready graduate students.
Program/project cost:	USD46,000
Funding agency (if any):	National University of Singapore, and Institute of Mathematics for Industry, Kyushu University, Japan
Number of beneficiaries :	40
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/012wind/index.php

Country	Singapore
Name of Project/Program/activity :	Workshop on Topological Aspects of Quantum Field Theories (14 -18 Jan 2013)
Program/Project/activity proponent:	Organizing Committee: - Ralph Cohen (Stanford University) - Fei Han (National University of Singapore) - Stephan Stolz (University of Notre Dame) - Peter Teichner (University of California at Berkeley and Max-Planck Institute for Mathematics at Bonn)
Year started and Year ended	14 -18 Jan 2013
Description of the Program/Project/activity :	In recent years, the interplay between algebraic topology and theoretical physics, in particular quantum field theories and string theory, has played a significant role in the work of many researchers. The workshop brought together researchers working on the areas to communicate ideas and dig out the connections as well as stimulate possible research collaboration. The workshop also provided opportunities to graduate students, both locally and internationally, to learn new progresses of the relevant fields as well as communicate with working mathematicians.
Significant outputs:	The workshop had been structured in a way that participants were informed of the main stream of the field. In addition, graduate students and young researchers had a great opportunity to discuss certain topics intensively with experts as well.
Program/project cost:	USD56,000
Funding agency (if any):	National University of Singapore
Number of beneficiaries :	46
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/013wquantum/index.php

Country	Singapore
Name of Project/Program/activity:	Asian Initiative for Infinity (AII) Graduate Summer School
Program/Project/activity proponent:	Institute for Mathematical Sciences, NUS

Year started and Year ended	20 Jun - 17 Jul 2012
Description of the Program/Project/activity:	The AII Graduate Summer School consisted of a set of four intensive short courses conducted by renounced speakers.
Significant outputs:	The summer school provided a platform for graduate students to learn from and interact with young and senior researchers in mathematical logic. It also helped to create a platform for a community of researchers to get together working on some of the most challenging problems, with the common goal to discover truth about Infinity.
Program/project cost:	Unable to disclose
Funding agency (if any):	John Templeton Foundation, USA, and National University of Singapore
Number of beneficiaries :	60
Remarks:	Held at the Institute for Mathematical Sciences, NUS http://www2.ims.nus.edu.sg/Programs/012aiiss/index.php

Activity Report 6: Recent Mathematics Projects and Programs in Thailand by CEPMART

Chulalongkorn University Information

Country	Thailand
Name of Project/Program/activity:	**Annual Mathematics Conference**
Program/Project/activity proponent:	Department of Mathematics and Computer Science, Faculty of Science, Chulalongkorn University, Bangkok
Year started and Year ended	March 27 - 28, 2008
Description of the Program/Project/activity:	
Significant outputs:	
Program/project cost:	
Funding agency (if any):	# Office of the higher education commission # Department of Mathematics and Computer Science, Chulalongkorn University
Number of beneficiaries :	163
Remarks:	

Country	Thailand
Name of Project/Program/activity:	**Annual Pure and Applied Mathematics Conference** (Its former name is **Annual Mathematics Conference**)
Program/Project/activity proponent:	Department of Mathematics and Computer Science, Faculty of Science, Chulalongkorn University, Bangkok
Year started and Year ended	held on May (since 2009 except 2010)
Description of the Program/Project/activity:	
Significant outputs:	
Program/project cost:	
Funding agency (if any):	2009 # Office of the higher education commission # Department of Mathematics and Computer Science, Chulalongkorn University Since 2011 # Department of Mathematics and Computer Science, Chulalongkorn University
Number of beneficiaries :	250 – 300
Remarks:	

Country	Thailand
Name of Project/Program/activity:	**International Conference on Mathematical Analysis and Its Applications**
Program/Project/activity proponent:	Department of Mathematics and Computer Science, Faculty of Science, Chulalongkorn University, Bangkok
Year started and Year ended	May 24-26, 2006
Description of the Program/Project/activity:	
Significant outputs:	
Program/project cost:	
Funding agency (if any):	# NRCT (National Research Council of Thailand) # Department of Mathematics and Computer Science, Chulalongkorn University
Number of beneficiaries :	150
Remarks:	

Country	Thailand
Name of Project/Program/activity:	**International Conference on Algebra and Related Topics**
Program/Project/activity proponent:	Department of Mathematics and Computer Science, Faculty of Science, Chulalongkorn University, Bangkok
Year started and Year ended	May 28-30, 2008
Description of the Program/Project/activity:	
Significant outputs:	
Program/project cost:	
Funding agency (if any):	# Southeast Asian Mathematical Society # Mathematical Association of Thailand under the Patronage of His Majesty the King # NRCT (National Research Council of Thailand) # UNESCO # Department of Mathematics and Computer Science, Chulalongkorn University # Chulalongkorn University
Number of beneficiaries :	165
Remarks:	

Country	Thailand
Name of Project/Program/activity:	**International Conference on Mathematical Analysis**
Program/Project/activity proponent:	Department of Mathematics and Computer Science, Faculty of Science, Chulalongkorn University, Bangkok
Year started and Year ended	December 7-9, 2010
Description of the Program/Project/activity:	
Significant outputs:	
Program/project cost:	
Funding agency (if any):	# Centre of Excellence in Mathematics # Mathematical Association of Thailand under the Patronage of His Majesty the King # NRCT (National Research Council of Thailand) # UNESCO # Department of Mathematics and Computer Science, Chulalongkorn University
Number of beneficiaries :	127
Remarks:	

Country	Thailand
Name of Project/Program/activity:	**CIMPA Summer School 2011 hosted by Chulalongkorn University**
Program/Project/activity proponent:	Department of Mathematics and Computer Science, Faculty of Science, Chulalongkorn University, Bangkok
Year started and Year ended	May 22 – June 4, 2011
Description of the Program/Project/activity:	Spectral Triples and Applications
Significant outputs:	
Program/project cost:	
Funding agency (if any):	# CIMPA # ICTP # IMU # French Embassy # UNESCO # NRCT (National Research Council of Thailand) # Department of Mathematics and Computer Science, Chulalongkorn University
Number of beneficiaries :	56
Remarks:	

Country	Thailand
Name of Project/Program/activity:	**First Asian International Statistical Institute Satellite Meeting on Small Area Estimation**
Program/Project/activity proponent:	Department of Mathematics and Computer Science, Faculty of Science, Chulalongkorn University, Bangkok
Year started and Year ended	September 1 – 4, 2013
Description of the Program/Project/activity:	The main purpose of this meeting is to assess the current state of development and usage of small area methodology. Moreover, this meeting are expected to serve as a bridge between mathematical statisticians and practitioners working on small area estimation in academia, private and government agencies. Although there have been a number of conferences on small area estimation in the recent past, they have been in Europe and North America, and have had a focus on practitioners in the developed world. This meeting in Bangkok will give researchers in developing south Asian countries an opportunity to learn about state-of-the-art small area estimation techniques from the experts in the field.
Significant outputs:	
Program/project cost:	
Funding agency (if any):	# International Association of Survey Statisticians (IASS) # The Survey Research Methods Section of ASA # Mathematical Association of Thailand under the Patronage of His Majesty the King # The Institute for the Promotion of Teaching Science and Technology (IPST) # Department of Mathematics and Computer Science, Chulalongkorn University
Number of beneficiaries :	80 – 100
Remarks:	

Mahidol University Information

Country	Thailand
1. Name of Project/Program/activity:	International Conference on Mathematics and Applications 2005
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	December 15-17, 2005.
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	300
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	International Conference on Mathematics and Applications 2007
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	August 15-17, 2007
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	300
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	International Conference on Mathematics and Applications 2009
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	December 17-19, 2009.
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	194
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	International Conference on Mathematics and Applications 2011
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	December 17-19, 2011.
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	271
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	International Conference on Mathematics and Applications 2013
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	January 19-21, 2013
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	291
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Asian Simulation and Modeling
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	January 19-21, 2013
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	85
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Workshop : Wavelet Applications by Prof. Dr. Hideaki Kaneko
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	December 21 - 29, 2009
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	30
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Workshop : Nevalina Theory by Prof. Dsc. Ha Huy Khoai
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	December 15 - 16, 2009
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	30
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Workshop : Probability measure, Estimators and their properties, MLE and variants, Bayesian estimation by Prof. Andrea De Gaetano
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	January 10 - February 4, 2011
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	30
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Workshop on Rings Module Theory : New Trends in Research by Prof. Dinh Van Huynh
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	January 7 - 20, 2011
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	30
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Workshop : Mathematical Modelings of Junctions by Prof. Dr. Christian Licht
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	March 11 - April 1, 2011
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	30
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Workshop : Applied Nonlinear Statistical Methods by Prof.Timothy O'Brien
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	July 21 - 22, 2011
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	30
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Applied Nonlinear Statistical Methods by Prof.Timothy O'Brien
2. Program/Project/activity proponent:	Mahidol University, Bangkok
3. Year started and Year ended	July 21 - 22, 2011
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	30
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : VARIATIONAL METHODS IN MATERIALS AND IMAGING by Prof. Irene Fonseca
2. Program/Project/activity proponent:	Mahidol University
3. Year started and Year ended	November 19, 2009
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : A REFLECTION ON THE CHOICE OF COVARIATES IN PLANNING OF EXPERIMENTS by Prof. Bikas K. Sinha
2. Program/Project/activity proponent:	Mahidol University
3. Year started and Year ended	November 21, 2009
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Prime and Coprime , Rings and Corings by Prof. Dr. R. Wisbauer
2. Program/Project/activity proponent:	Mahidol University
3. Year started and Year ended	December 15, 2009
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Some research directions in commutative algebra by Prof. Dsc. Ngo Viet Trung
2. Program/Project/activity proponent:	Mahidol University
3. Year started and Year ended	December 16, 2009
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Interim Analysis – A Must in Clinical Trials by Prof. Bikas K Sinha
2. Program/Project/activity proponent:	Mahidol University
3. Year started and Year ended	August 3, 2010
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Role of Statistics in US Government by Prof. Bimal K. Sinha
2. Program/Project/activity proponent:	Mahidol University
3. Year started and Year ended	March 16, 2010
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	30
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Number Theory by Prof.Michel Waldschmidt
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	February 3,2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Stationary Subdivision Schemes By Using Radial Basis Function Interpolation and Non-linear Image Up sampling Method Based on Radial Basis Function Interpolation by Dr. Yeon Ju Lee
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	March 12, 2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Approximation Theory, Convex Analysis, and Fixed point Theory in Machine Learning an Image Analysis by Prof. Charles A. Micchelli
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	March 14, 2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Multi-Phase Flow Modelling and Applications by Dr. Teeradech Mookum
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	March 15, 2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Financial Modelling by Prof. Amnuay Kananthai
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	April 3, 2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : ARITHMETIC FUNCTIONS AND THEIR INDEPENDENCE by Prof. Vichian Laohakosol
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	May 2, 2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Copulas and Measure of Dependence by Asst. Prof. Dr. Songkiat Sumetkijakan
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	May 23, 2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar ; Some Finer Aspects of de la Garza Phenomenon by Prof. Bikas K Sinha
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	June 1, 2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar ; Period Lattices and Complex Elliptic Logarithms by Dr. Thotsaphon Thongjunthug
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	August 1, 2012
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : A Trajectory Analysis of Body Mass Index for Finnish Children by Prof. Tapio Nummi
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	January 8, 2013
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : EFFECTIVE COMPUTATIONAL MODELS FOR A CLASS OF CONSTRAINED PATH PROBLEMS by Prof. Louis Caccetta
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	January 22, 2013
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : VIRTUAL DOCTOR SYSTEM by Dr. Hamido Fujita
2. Program/Project/activity proponent:	Mahidol university
3. Year started and Year ended	February 28, 2013
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar ; PERIODIC REVIEW INVENTORY POLICY WITH ORDER QUANTITY DEPENDENT DELAY IN PAYMENT by Prof. Manisha Pal
2. Program/Project/activity proponent:	Mahidol University
3. Year started and Year ended	May 9, 2013
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Country	Thailand
1. Name of Project/Program/activity:	Seminar : Statistical Analysis of Noise Multiplied Data Using Multiple Imputation by Prof. Bimal K. Sinha
2. Program/Project/activity proponent:	Mahidol University
3. Year started and Year ended	May 31, 2013
4. Description of the Program/Project/activity:	
5. Significant outputs:	
6. Program/project cost:	
7. Funding agency (if any):	
8. Number of beneficiaries :	20
9. Remarks:	

Ramkhamheang University Information

Country	Thailand
Name of Project/Program/activity:	CIMPA school hosted by Ramkhamheang University, Bangkok
Program/Project/activity proponent:	Graphs, Codes and Designs
Year started and Year ended	May 20 - 31, 2013
Description of the Program/Project/activity:	Simeon Ball, Universitat Politecnica Catalunya(Spain), spoke on Linear algebraic methods applied to combinatorial problems. San Ling, Nanyang Technological University (Singapore), spoke on constant weight codes and constant composition codes. Yeow Meng Chee, Nanyang Technological University(Singapore), spoke on combinatorial approaches and new applications in coding theory. Curt Lindner, Auburn University(USA), spoke on constructions for Steiner triple systems and associated packings and orthogonal latin squares. Chris Rodger, Auburn University(USA), spoke on graph decompositions and embeddings. Akihiro Munemasa, Tohoku University(Japan), spoke on codes generated by designs, and designs supported by codes. Tom McCourt, University of Bristol(UK), spoke on (v, k, λ) - designs and spherical latin bitrades. Diane Donovan, University of Queensland (Australia), spoke on different representations for latin squares and orthogonal latin squares.
Significant outputs:	The Research School attracted over 70 participants from 13 countries including Singapore, Thailand, Philippines, Iran, Indonesia, Laos, Pakistan, USA, UK, Japan, Spain, and Australia. Many open problems were discussed throughout the workshop. These efforts have resulted in some new collaborations, and it is expected that some publications will arise from discussions held at the workshop. The development of an extensive webpage which is a repository for notes

	and copies of all talks. A Facebook page has also been developed.
Program/project cost:	26115 Euros
Funding agency (if any):	CIMPA, ICTP,CDC, IPST: The Institute for promotion of Teaching Science and Technology, Chulalongkorn University, Ramkhamhaeng University
Number of beneficiaries :	79 (Foreigner 29 including invited speakers and a representative from CIMPA, local 49)
Remarks:	

Naresuan University Information

Country	Thailand
Name of Project/Program/activity:	The Second Asian Conference on Nonlinear Analysis and Optimization (NAO-Asia2010)
Program/Project/activity proponent:	Naresuan University
Year started and Year ended	September 9-12, 2010.
Description of the Program/Project/activity:	International conference involving nonlinear analysis and opitimization
Significant outputs:	The researchers can enhance the knowledge involving nonlinear analysis and optimization leading to the development in doing research in the future
Program/project cost:	1,640,470
Funding agency (if any):	Faculty of Science Naresuan University, Department of Mathematics Naresuan University, Department of Mathematics Chiang Mai University, Centre of Excellence in Mathematics , National Research Council of Thailand.
Number of beneficiaries :	188
Remarks:	-

Chiangmai University Information

Country	Thailand
Name of Project/Program/activity:	**The 8th International Conference on Fixed Point Theory and Its Applications**
Program/Project/activity proponent:	Chiangmai University, Chiangmai
Year started and Year ended	July 16-22, 2007,
Description of the Program/Project/activity:	
Significant outputs:	
Program/project cost:	
Funding agency (if any):	
Number of beneficiaries :	150
Remarks:	

Srinakhorinwirot University Information

Country	Thailand
Name of Project/Program/activity:	**International Conference on Discrete Mathematics 2007**
Program/Project/activity proponent:	Srinakharinwirot University, Bangkok
Year started and Year ended	May 2007,
Description of the Program/Project/activity:	
Significant outputs:	
Program/project cost:	
Funding agency (if any):	
Number of beneficiaries :	150
Remarks:	

Silpakorn University Information

Country	Thailand
Name of Project/Program/activity:	National workshop and conference on mathematics commemorating the 35th anniversary celebration of faculty of science, Silpakorn University
Program/Project/activity proponent:	Applied Mathematics, Algebra, Inversion method, Mathematical Models
Year started and Year ended	October 1-5, 2007
Description of the Program/Project/activity:	The program is composed of workshop program on applied mathematics and algebra on 1-3 October, 2007. The conference on mathematics is organized during 4-5 October, 2007 with a variety of mathematical research topics.
Significant outputs:	
Program/project cost:	257,280.00
Funding agency (if any):	Faculty of Science, Silpakorn University
Number of beneficiaries :	74
Remarks:	

Country	Thailand
Name of Project/Program/activity:	1^{st}- 8^{th} mathematics and computation seminar
Program/Project/activity proponent:	Computational Mathematics, Mathematics Education and Applied Mathematics
Year started and Year ended	November 2010-February 2011
Description of the Program/Project/activity:	The researchers who are working on the mathematics and computation are invited to talk about his/her research topics for the graduated and undergraduate student.
Significant outputs:	We have more connection with the researchers from outside communities.

Program/project cost:	46,000.00
Funding agency (if any):	Mathematics Department, Faculty of Science, Silpakorn University
Number of beneficiaries :	143
Remarks:	

Country	Thailand
Name of Project/Program/activity:	Workshop on Applied Mathematics
Program/Project/activity proponent:	Regime-switching models and genetic algorithm
Year started and Year ended	19 January 2011
Description of the Program/Project/activity:	The professor from the department of Economics, University of Kansas, USA, is invited to talk about the genetic algorithm in searching the initial values for regime-switching models.
Significant outputs:	The attendee has the idea on the genetic algorithm.
Program/project cost:	7,600.00
Funding agency (if any):	Mathematics Department, Faculty of Science, Silpakorn University
Number of beneficiaries :	33
Remarks:	

Country	Thailand
Name of Project/Program/activity:	Workshop on Mathematics
Program/Project/activity proponent:	Algebra and Hyperstructure
Year started and Year ended	17-25 January 2012
Description of the Program/Project/activity:	The professor on universal algebra is invited to give a talk about universal algebra and natural duality for young staff of mathematics department.
Significant outputs:	The staff has the idea to do the research on the universal algebra.
Program/project cost:	15,000.00
Funding agency (if any):	Mathematics Department, Faculty of Science, Silpakorn University
Number of beneficiaries :	15
Remarks:	

Country	Thailand
Name of Project/Program/activity:	1st Undergraduate student conference on applied mathematics
Program/Project/activity proponent:	Applied Mathematics
Year started and Year ended	14 March 2012
Description of the Program/Project/activity:	The conference for the undergraduate student is organized together with the Department of Mathematics, Faculty of Science, Chaing Mai University in order to present the outstanding student project from both universities.
Significant outputs:	The students have the opportunities to present their research project in the mathematic communities and to see other idea to do the research.
Program/project cost:	5,000.00

Funding agency (if any):	Mathematics Department, Faculty of Science, Silpakorn University
Number of beneficiaries :	95
Remarks:	

Country	Thailand
Name of Project/Program/activity:	Mathematics in our life and the development of an idea with mathematical project.
Program/Project/activity proponent:	Mathematical Education
Year started and Year ended	17 August 2012
Description of the Program/Project/activity:	The participants are divided into small groups to work on the mathematical project which is inspired by the experts.
Significant outputs:	The participants have the inspiration to do the project and notification about the mathematics in their life.
Program/project cost:	30,000.00
Funding agency (if any):	Mathematics Department, Faculty of Science, Silpakorn University
Number of beneficiaries :	271
Remarks:	

Country	Thailand
Name of Project/Program/activity:	2nd Undergraduate student conference on applied mathematics
Program/Project/activity proponent:	Applied Mathematics
Year started and Year ended	25 March 2013
Description of the Program/Project/activity:	The conference for the undergraduate student is organized together with the department of applied mathematics, King Mongkut's University of Technology North Bangkok in order to present the

	outstanding student project from both universities.
Significant outputs:	The students have the opportunities to present their research project in the mathematic communities and to see other idea to do the research.
Program/project cost:	10,800.00
Funding agency (if any):	Mathematics Department, Faculty of Science, Silpakorn University
Number of beneficiaries :	48
Remarks:	

Country	Thailand
Name of Project/Program/activity:	**The Annual Meeting in Mathematics**
Program/Project/activity proponent:	The host institute is nominated by the Center for Promotion of Mathematical Research of Thailand.
Year started and Year ended	held on March or April
Description of the Program/Project/activity:	
Significant outputs:	
Program/project cost:	
Funding agency (if any):	
Number of beneficiaries :	300
Remarks:	