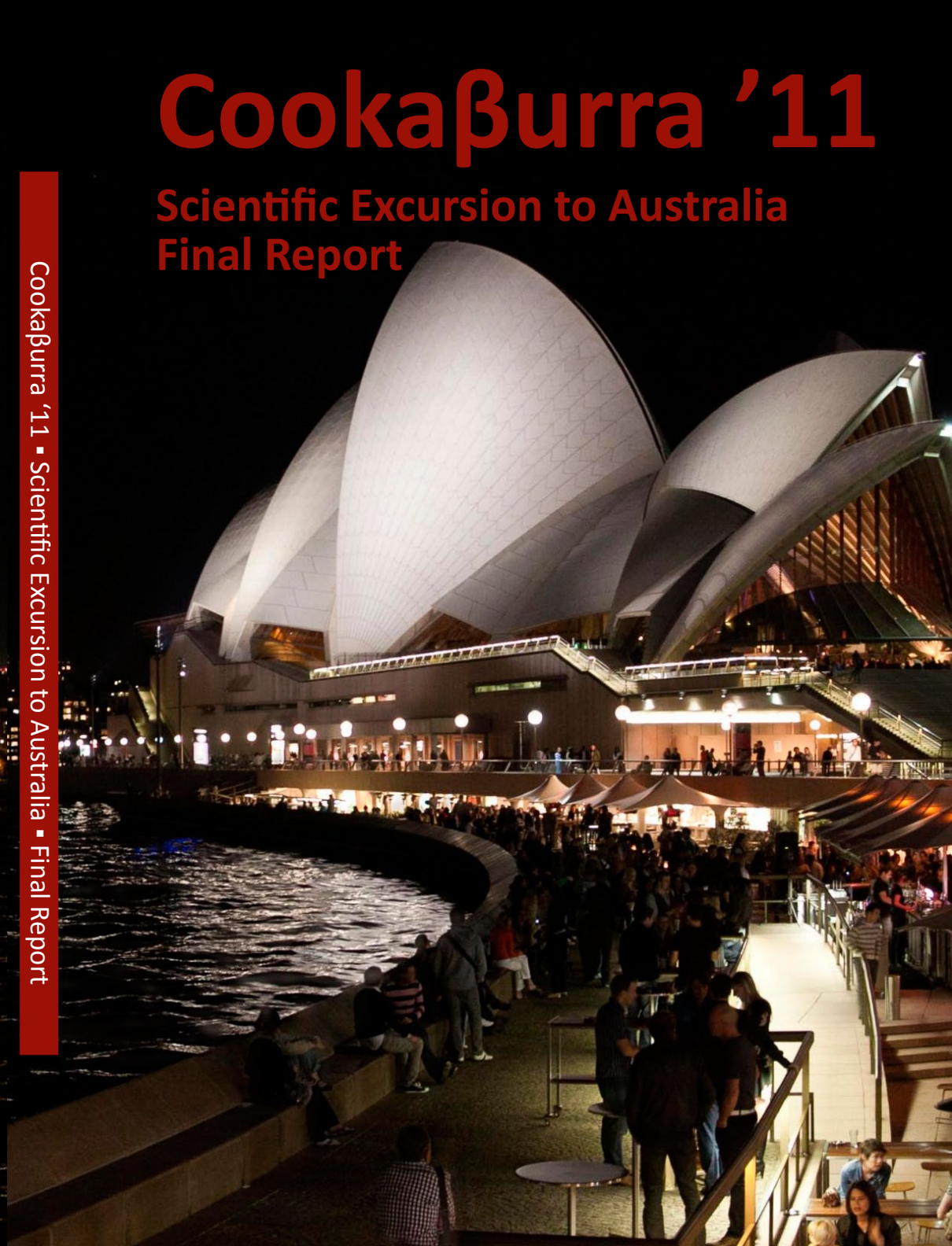
Cookaβurra ’11

Scientific Excursion to Australia
Final Report



Cookaβurra ‘11 ▪ Scientific Excursion to Australia ▪ Final Report

This is a publication of the Foundation Grote Buitenlandse Excursie(s) - Fysisch Mathematische Faculteitsvereniging (Foundation GBE-FMF), best to be translated as Foundation for International Student Excursions. The foundation was established by the Fysisch-Mathematische Faculteitsvereniging (FMF), the organisation for students in Astronomy, Computing Science, (Applied) Mathematics and (Applied) Physics, of the University of Groningen.

The goal of the Foundation GBE-FMF is to organise intercontinental study tours for students of the FMF every two years. The foundation consists of a board and a committee. The board acts as a supervisor while the committee is involved in the actual organisation.

Photo cover: Armin Palavra

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Final Report

Cookaburra '11

Preface

I am proud to present to you the final report of the Scientific Excursion to Australia organised by the committee Cookaβurra '11. On the 19th of april, 23 students and a staff member of the University of Groningen started a great scientific excursion to Down Under and learned in 23 days about the science, technology and culture of Melbourne and Sydney.

This study tour is organised by the Cookaβurra '11 committee under the Foundation Grote Buitenlandse Excursie(s)-FMF (GBE-FMF). This foundation is tightly linked to the Fysisch-Mathematische Faculteitsvereniging (FMF), a student association for students in (Applied) Mathematics, Computing Science, (Applied) Physics and Astronomy at the University of Groningen. The association organises a lot of activities that contribute to the students' scientific education, such as symposia and colloquia.

The main purpose of the Foundation GBE-FMF is to organise study tours for members of the FMF to a different continent every two years, to let them learn about research and science around the globe. The three-week study tour focuses on scientific excursions but also has cultural aspects and is organised for senior members of the FMF. In the past years there have been excursions to Brazil and Argentina (2009), South Korea and Taiwan (2007), China and Malaysia (2005) and Mexico and the United States (2003).

Besides subsidies and contributions of the participants, the main source of funding are cases tudies. A case study is a research project for a company or institution, performed by two participating students. In the final report you can find reports of case studies performed for Cookaβurra '11. The main part of this report exist of reports of the official and non-official activities during the trip. Each participant has reported on the activities of at least one day and all the these reports combined form the daily reports section.

In addition to the case reports and daily reports this booklet also contains the views and impressions of the Foundation GBE-FMF, of the staff member Prof. Dr. Onderwater and of all five members of the committee on the organisation of Cookaβurra '11. This final report concludes with some words of thanks to all the people who made the Scientific Excursion to Australia as amazing, wonderful and unforgettable as it was.

I hope you will enjoy reading the report of this fantastic experience!

On behalf of the committee Cookaβurra '11,

Monique Ankoné

Chairman Cookaβurra '11

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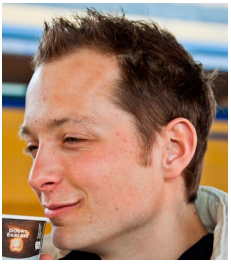

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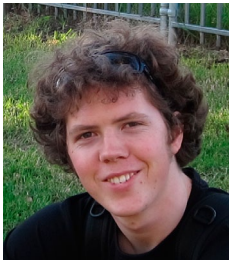

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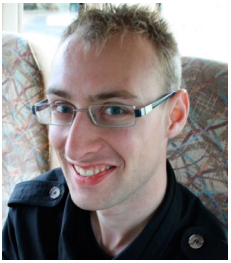

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Nuclear Physics

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Experimental Nuclear Physics

Case Reports

“Als extern adviseur van financiële ondernemingen kun je jezelf hier enorm snel ontwikkelen.”

Naam: Arjan de Ridder
Opleiding: Technische Wiskunde
Functie: Senior Consultant
Afdeling: Capital Markets

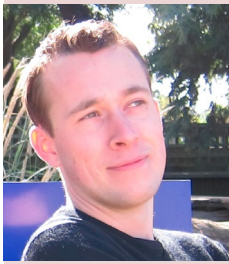
“Bij Capital Markets gebruiken we statistische modellen om financiële risico’s van banken, verzekeraars en pensioenfondsen in kaart te brengen. We leveren kennis die onze klanten zelf niet bezitten of zorgen tijdelijk voor extra capaciteit. Maar bovenal kennen wij de best practices van al onze klanten, waardoor wij unieke ervaring bezitten. Momenteel ontwerp ik zelf een model voor een Europese bank, die daarmee de risico’s van haar leningen aan particulieren en het MKB beter wil beheersen. Ze wil dit model in zes vestigingen gaan toepassen, waardoor ik behalve in Nederland ook regelmatig in Engeland, Frankrijk, Portugal, Spanje en Italië aan tafel zit. Ik overleg daar met de projectmanager en met specialisten op diverse deelgebieden. Het leuke is dat ik tijdens zulke meetings merk hoe veel en snel ik hier geleerd heb over risicomanagement. Vaak hebben mijn gespreksgenoten veel meer ervaring dan ik, maar kan ik toch direct op hun niveau meepraten. Deloitte is écht een goede leerschool.
Eigenlijk kwam ik hier ook binnen met het idee om mezelf twee à drie jaar maximaal te ontwikkelen, een netwerk op te bouwen en daarna weer verder te kijken. Ik leer echter nog steeds erg veel, ben net senior consultant geworden en heb het ook prima naar mijn zin hier. Dat ik vrij snel een stap omhoog heb gemaakt heeft te maken met verantwoordelijkheid. Die krijg je bij Deloitte, maar kun je ook zelf naar je toetrekken. Zo kun je zelf veel invloed uitoefenen op de projecten die je doet, je rol binnen die projecten en de kennis die je daarin opdoet.”

Geïnteresseerd? Ga voor meer informatie naar werkenbijdeloitte.nl.

Deloitte

Implementation of the potential future exposure method for plain vanilla EUR interest rate swap contracts

Anneroos Everts



Roel Tempelaar

Deloitte Touche Tuhmatsu Limited is one of the world's largest companies in the field of accountancy, consultancy, risk management and financial advisement. As an international organisation, it provides these services through its independent member firms, all of which operate in a particular geographic area. The member firm in the Netherlands, simply referred to as "Deloitte", contributed a case study, which we performed under supervision of Anisa and Koen.

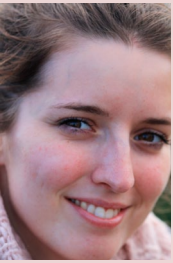
In the field of finance, a swap-contract is an extensively used instrument. Such a contract concerns the exchange of cash flows between two parties. For example, by means of an interest rate swap, one party can exchange a floating rate for a fixed rate. However, such a contract always involves the risk that the other party cannot meet the payment requirements. This so-called counterparty risk must be taken into account once valuating a swap contract.

Our case study consists of the valuation of a floating vs. fixed interest rate swap. All future cash flows represent a lower present-day value, which derives from the principle that one could in principle increase the amount of cash by means of a fixed-rate savings account. This devaluation is accounted for by discounting of all cash flows in the contract.

Furthermore, one has to deal with the uncertainty concerning the time-development of the floating interest rate. We have determined this time-development by simulating the floating rate following a differential equation. This is a mean-reverting stochastic process, which implies that the rate converges to a mean value if the stochastic term is neglected. Furthermore, a volatility parameter accounts for the size of the deviations from the mean value. By simulating the time-development of the rate with trinomial trees, one can make a worst-case prediction of the value of a swapcontract. This is called the Potential Future Exposure method.

Through the case study, Deloitte offered us an interesting encounter with the financial world. The combination of programming, mathematics and professional slang made our case a challenging one. Piece-by-piece, and thanks to a pleasant supervision of Anisa and Koen, we managed to get ourselves familiar with the material and apply our mathematical and physical expertise.

GasTerra



Meike Door

Tim van der Beek

GasTerra has traded with natural gas at the European energy market for more than 40 years. The company purchases and sales gas and has an important contribution to the supply of gas in the Netherlands.

The problem

It´s clear, that in winter more gas is consumed for heating buildings than in summer. But also due to varying temperatures in winter, the gas consumption varies. The colder it is, the more gas is consumed. In order to be able to predict the amount of gas costumers need, data is collected from serveral years which contain the outside (effective) temperature and the gas consumption. One of the possibilities to analyse the data is to is fit it to a linear function, so that the graph can be extrapolated to very low temperatures like -17°C. This makes it possible to predict the gas consumption at this temperature.

Our task was to examine whether it is mathematically allowed to use the least squares method on the available data sets, and to weigh the quality and (dis-) advantages of this method compared to others.

Results

Analysing the autocorrelation of the residuals (=differences between observed and fitted values), we could conclude that the least squares method is suitable for the data analysis, although it is not perfectly applicable in our particular case. The method does lead to meaningful results that can be used easily to make predictions about the future consumption of gas. Additionally, we explored the dependence of the -17°C prediction on the temperature range used for the linear fit and found interesting results which can improve the data analysis.

INCAS³

Arnette Vogelaar

Observations in Australia

INCAS³ is a research institute in the field of sensor technology. They are seeking to improve scientific and technical knowledge, in collaboration with industry and scientific community. The aim of INCAS³ is to answer questions like, "Is this water safe to drink?" or "Can I grow potatoes on this land?" with the help of sensors. INCAS³ is an institute, which offers Ph.D. positions. The idea is sharing knowledge to obtain solutions to problems.

INCAS³ has five research lines all based on Cognitive Systems and Systems&Control. Cognitive Systems is all about turning data into information and designing systems that are able to learn. In the end a system must be user friendly for everyone. Within the System&Control group, the focus lies on the reliability, reduction of energy usage and applicability in open environments of a certain designed system. The other three research lines are application orientated research: Environmental Monitoring, Health&Sports and Radiation Detection.

I AM PART OF THE **SOLUTION**

My granddaughter means the world to me. Wonderful to see her grow up. And when I look at her, I'm reminded of our obligation to pass this world on to future generations in a habitable, clean and sustainable state.

GasTerra shares this obligation. We strive to create a sustainable society in which the potential of clean energy sources is optimally realised. And if the wind or sun happen to take a day off, natural gas can function as a responsible backup. We are therefore part of the solution.

www.gasterra.nl

GasTerra

Energizing the future

INCAS³ is a non-profit, independent research institute focused on the reliability, reduction of energy usage and the applicability of sensor systems in open environments. To reach our ambitious goals, we are looking for excellent scientists, engineers and PhDs.

INCAS³ scientists and engineers are strongly encouraged to build international networks to truly excel in their research. By participating in international projects and spending research periods in internationally leading institutes, INCAS³ researchers are actively building up a knowledge base on par with top international standards.

INCAS³ is always looking for talented and ambitious PhD candidates. We encourage graduated master students to put forward their research ideas. Innovative proposals that could contribute to the INCAS³ knowledge base will be rewarded with a pre-doctoral research position for a period of six months with the potential to develop into a PhD project.

Detailed information at
www.incas3.eu

INCAS³ is co-financed by the Ministry of Economic Affairs, the Province of Drenthe, the European Fund for Regional Development and the Municipality of Assen.

The case for INCAS³ was based on doing observations in Australia, the goal was to gain knowledge about structures and problems et cetera. The largest problems in Australia are the droughts and bushfires. Some interesting problems and further possibilities were found. Afterwards a report was written including the problems observed, other interesting issues or things that were totally different in comparison to the Netherlands.

Math4All

Math4All is a non-profit organisation based in the Netherlands. The main focus of this organisation is to develop good educational material for the use in math classes in secondary schools. The material that is developed ranges from projects that can be used in math lessons to guides on how to work with different programs to help solve mathematical problems.

Coen Pijpker

Oscar Heslinga

Paulus Meessen

The Problem

Our case consisted of a cooperation between the organisation Math4All and the company "de Wageningse Methode" which produces math books for all grades of the secondary school. The process of making these books consists of a couple of stages: first the exercises are made by mathematicians, then the book is designed by a group of graphical designers. Especially this second part of the process is very cost and time inefficient. If in a later print of the book an exercise had to be added or changed, a lot of time was wasted redesigning the entire book, to preserve the appearance. Math4All tries to reduce this time inefficient method by transferring from a classic approach towards a method where the entire book is changed into XML code. To this XML code a DTD is applied which interprets the code and applies the layout to produce a PDF file which resembles a conventional book again.

Results

De Wageningse methode wanted to have their current print of books translated into XML code. This was done by a program which uses a PDF as input to produce a file with XML code. However the code that is produced by this program is far from perfect. Some major issues include detecting paragraphs, images, tables and mathematical expressions.

Our part of this project consisted of manually checking these files for errors and correcting these errors. Most of the errors consisted of defining a proper hierarchy for all the different items of an exercise. The other major part of the errors was caused by mathematical expressions, which had to be manually reproduced by us using MathType to produce the expression in XML. Each one of us had to correct five chapters of the books, which consisted of about twenty hours of work for each chapter. The corrected code was then used to produce a proper PDF of the chapter.

Philips

Ivar Postma

For my case study I worked on an assignment for Koninklijke Philips Electronics. Philips started off as small company producing lamps in 1891 and has since grown into a big multinational in electronics. The focus of the company lies on home appliances, lighting and health care. One of its factories is located in Drachten. This location is most famous for its production of electronic shavers.

Home appliances such as electronic shavers or toothbrushes contain a lot of small metal parts. A relative simple metal part like a metal strip bended in a v-shape can be made by pressing two metal blocks together with the strip in between. After strips are bended they are tested to see if they meet the quality standards. If not, the strip is discarded.

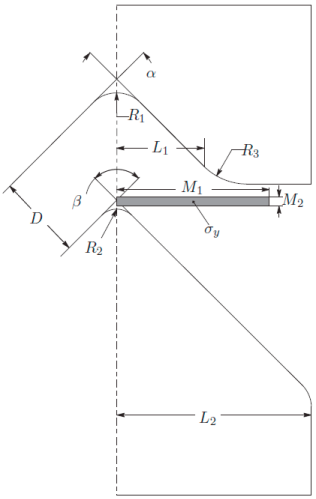
Reducing the scrap heap has both financial and environmental benefits. This is why it is interesting to analyse the production process and find ways to improve it. The bending process is simulated with a computer. A seemingly simple process like bending has many input variables as is demonstrated in figure 1. Optimising the production process basically means finding the right values for the input variables. Even though all variables have an upper and a lower bound the search space to find the optimum is still substantial. The search is complicated by the long running time of the computer simulation.

To speed up the process of finding an optimum a surrogate modelling technique is used where a model can make fast predictions on the output of the computer simulation. The model is built with a limited set of sample data that is computed with simulations. After we have created the model we can then search it for the global optimum which gives us the best parameters for the production process.

The case

Before I started my case, there already was a tool written in Matlab to create a good surrogate model. I was asked to help develop it further. This consisted of two parts: researching and implementing a new type of model and creating a graphical user interface.

There are many ways to create a model, some of which have been implemented in the tool. One model that works quite well is a Kriging interpolation model. Unfortunately, this model is very sensitive to small errors in the computer simulations. These small errors include round-off errors and discretisation errors. To make the model more robust one can tweek the Kriging interpolation model which results in a regression Kriging extrapolation model. I managed to integrate this model in the optimisation tool and tested it for some simple cases.



The other -- quite different -- part of my case was the implementation of a GUI. The current tool is nothing more than a set of Matlab scripts and a manual. To improve the user-friendliness I developed a GUI. Even though the current version of the GUI does not support all features that the Matlab scripts do, it is very useful in demonstrations of the tool. Philips and its partners are now exploring the options of creating a commercial version of the tool.

Haak aan

Ideaal voor elektronisch schoolbord, thuisgebruik en voor maatwerk op papier.
Gratis praktische ondersteuning voor elke docent en leerling:

- **Theorie**
- **Uitleg**
- **Voorbeelden**
- **Applets**
- **AlgebraKIT**
- **GeoEnZo**
- **Rekenen**

Math4all *Gratis!* maar niet goedkoop

Simplicity is techniek die het leven eenvoudiger en aangenamer maakt

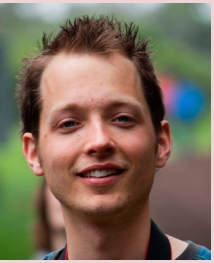
Bij **Philips in Drachten** zijn we ervan overtuigd dat technologie tegelijk zinvol en eenvoudig moet zijn. Wij brengen dat dagelijks in de praktijk met de ontwikkeling en productie van producten als sapcentrifuges, shavers, stofzuigers, Senseo, Wake-up Light en Airfryer. Producten die het leven van mensen vereenvoudigen en veraangenamen. Jij kunt daaraan een bijdrage leveren. Want wij zijn voortdurend op zoek naar gedreven **technici op hbo- en academisch niveau** die hun deskundigheid en creativiteit willen inzetten ten dienste van andere mensen.

Groei mee met Philips. Kom werken bij een innovatief bedrijf dat een verschil maakt in de gezondheid en het welzijn van mensen. Je gaat deel uitmaken van één van de grootste ontwikkel- en productiecentra van Philips. Op deze site werken 2000 medewerkers, waaronder 600 ontwikkelaars van meer dan 30 verschillende nationaliteiten. De samenwerking in multidisciplinaire teams binnen de onderdelen High Impact Innovation Center, Innovation Personal Care, Innovation Domestic Appliances en Shaver Production Center biedt interessante loopbaanmogelijkheden.

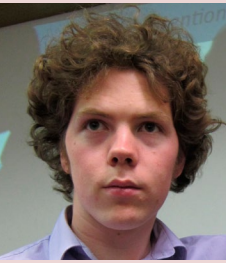
Wil je meer weten? Bezoek dan **www.philips.com/careers** of **www.philips.com/engineers** en ontdek nieuwe kansen voor je carrière.

PHILIPS
sense and simplicity

Schut Geometrical Metrology



Cees Draaijer



Jelle Nauta

Schut Geometrical Metrology (Schut Geometrische Meettechniek bv) is an international organisation, founded in 1949, with five offices throughout Europe, specialised in the development, production and sales of precision measuring instruments and systems. Its head office is located in Groningen.

The Case

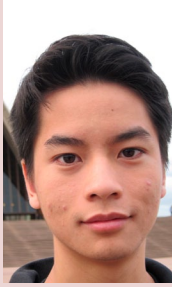
Products developed and produced by Schut Geometrical Metrology include a 3D coordinate measuring machine called "DeMeet". The newest machine in this line "DeMeet A7" is equipped with air bearing guides. In this case study, which is part of a joined bachelor project in (applied) physics, the use of Computational Fluid Dynamics (CFD) for the analysis of air bearings is investigated. The aim of this analysis is to optimise the air gap stability.

The air bearings under investigation can be viewed as flat discs floating on an air film generated by a supply pressure exerted from their bottom face. The thickness of this air film depends on the load applied to the bearing. By varying the profile on the bearing's bottom face, different air gap vs. load characteristics can be obtained. These serve as a measure of stability.

This was a highly versatile project with considerations ranging from physics to computing science, from gas dynamics to mesh generation.

SKF

Armin Palavra



Henry Ong

We have worked on a case for SKF, the bearing company we've also visited in Melbourne. The aim of our research was to do a tensile test with two types of bearing steel, with and without artificial inclusions. Inclusions are small particles inside the steel consisting of a different kind of material than the steel itself. This tensile test had to be done inside the Scanning Electron Microscope, so it would be possible to look at the inclusions in high detail and pull the samples apart at the same time. The hypothesis was that micro cracks and delamination would start at the inclusion, spread out through the entire sample and would ultimately lead to fracture of the entire sample.

The procedure was as followed: before applying any stress, we took a snapshot of a number of inclusions and then applied an amount of strain on the sample. After looking for any visible changes and taking another picture, this procedure was repeated with increasing stress until the sample fractured. Later, we improved this method by adding a coating which consisted of a large number of white nanoparticles. These particles can be identified by software and their position can be calculated relative to the position at the zero stress level. This way, the strain could be made visible in the picture. It is a very good way to see how the inclusion behaves compared to the rest of the material.

We haven't found any micro cracks which were initiated around the inclu-

sions. We did see some delaminations, but from the first results, it seems that the inclusions barely have any effect on the fracture. Most of the time, the fracture did not occur around an inclusion. Using the nanoparticle method, an increase of strain was observed around the inclusions which might affect the strength of the material, but this is still under investigation.

University Library

Elwin Dijck

Herbert Kruitbosch

In addition to paper books, the Library of the University of Groningen (UB) also maintains digital archives of scanned books, dissertations, articles, maps and other published materials. These are organised into a few dozen repositories, most of which can be accessed from the internet.

To allow academics to locate the information contained in these repositories, the web interface of each repository includes a search engine and the UB also has a search engine searching through all repository of the university. However, these search engines only take the metadata of the items in the repositories into account: the most important information about the items, including title, authors, a short description, etc., but not the actual text in the case of dissertations or articles, the so-called fulltext.

The Case

Our case study consisted of investigating how a search engine that also searched through the fulltext could be implemented for the repositories of the UB, as the existing one could not easily be extended.

A search engine essentially consists of two parts: a routine that takes the available information to create an index and a routine that uses this index to locate items whenever a user enters a search query, because it is infeasible to look through all documents every time a search is performed. Since programming an efficient search engine is a rather complicated task, we used Lucene, an existing open source search engine library written in the Java programming language.

The metadata of the records in the repositories of the UB can be accessed using the Open Archives Initiative (OAI) protocol, using XML-encoded information over a HTTP connection. This gives a uniform way of obtaining the metadata from the various repository and in the case of the UB the original files of the items can also be located (typically PDF-files). From these original files, the full text can be extracted using a suitable computer code.

We combined all this to construct an indexer: a computer program that queries any number of repositories for all their metadata, extracts the full text from the original files and creates an index containing all this information. In addition, we developed a web interface written in PHP where a user can enter search terms, the index is consulted and all items are returned that matched, either in the metadata or in the actual text of the document, resulting in more and hopefully more relevant search results compared to the existing search engine.

university of groningen
library

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Schut Geometrische Meettechniek is een internationale organisatie met vijf vestigingen in Europa en de hoofdvestiging in Groningen. Het bedrijf is ISO 9001 gecertificeerd en gespecialiseerd in de ontwikkeling, productie en verkoop van precisie meetinstrumenten en -systemen.

Aangezien we onze activiteiten uitbreiden, zijn we continu op zoek naar enthousiaste medewerkers om ons team te versterken. Als jij wilt werken in een bedrijf dat mensen met ideeën en initiatief waardeert, dan is Schut Geometrische Meettechniek de plaats. De bedrijfsstructuur is overzichtelijk en de sfeer is informeel met een “no nonsense” karakter.

Op onze afdelingen voor de technische verkoop, software support en ontwikkeling van onze 3D meetmachines werken mensen met een academische achtergrond. Hierbij gaat het om functies zoals ***Sales Engineer, Software Support Engineer, Software Developer (C++)***, ***Electronics Developer*** en ***Mechanical Engineer.***

Er zijn bij ons ook mogelijkheden voor een technisch interessant **stage-** of **afstudeerproject**. Dit kan in overleg met de docent worden afgestemd.

Open sollicitaties zijn ook zeer welkom. Voor echt talent is altijd ruimte.

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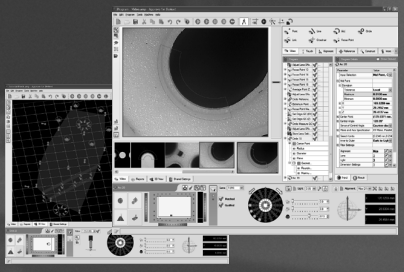
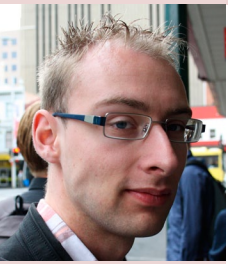


APPROVE for DeMeet

UMCG



Marcel Tiemens

The University Medical Center Groningen (UMCG) is a hospital in Groningen that works closely with the University of Groningen. Students from the Faculty of Medical Sciences get their first medical experiences in this hospital. The UMCG employs about 10,000 people, making it one of the largest hospitals in the Netherlands as well as the largest proprietor in the northern part of the Netherlands. The main focus of the scientific research conducted here lies on Healthy Aging. The UMCG main building consists of three parts; one housing the hospital itself, one housing the Faculty of Medical Sciences and a part in between called "De Brug" (The Bridge), where executive staff members of both the hospital and the Faculty of Medical Sciences work.

The case — introduction

It is in "De Brug" where I did my case. One of the departments housed in De Brug is the Research Bureau (Bureau Onderzoek). Every year, the Research Bureau collects all scientific publications published in the previous year. There are two main motivations for this. The first is to obtain a complete set of UMCG publications for the NFU. Every couple of years, the Dutch government supplies funding to, among others, the UMCG for scientific research. The NFU uses the publications list to justify the funding supplied to each of the Dutch University Medical Centers (UMC's), thereby making sure each UMC gets the funding they are entitled to. This funding is then distributed among the research departments of the hospital. To ensure each department receives the proper share of the funds, one of the parameters is the quality and quantity of the scientific publications made by each department. To do this, the check is not simply on the number of publications, but also on which magazines are published to. For publishing in high-ranked scientific magazines (e.g. Nature), the departments get 'bonus' points, but for publishing in very low-ranked magazines, they risk losing points. This is to ensure the quality of the research being done. After the inventory is complete, the number of points gathered is matched to the size of the departments to determine their performance. The second motivation is to acquire a complete set of publications per UMCG-department for the in-house inventory.

The case — implementation

Gathering all relevant publications is quite a labour-intensive task, and is handled through a Standard Operating Procedure or SOP, which is explained below.

The UMCG has a database with information about nearly all of its researchers. The first part of the inventory consists of downloading publications per department from an online database (ISI Web of Science and Embase.com). Of course, not the entire publication is downloaded, only information like title, authors, abstract, etc. The publications have strict rules which they must obey in order for them to become eligible for acceptance into the inventory, e.g. they need to contain the UMCG in their address field.

The information is then imported in a Microsoft Office Access database using a Visual Basic script. The online databases sometimes overlap in their publications, so the next part consists of removing all doubles from the newly created database. This is partly done by another Visual Basic script, but for some reasons, it doesn't find all doubles, so we need to manually go through the database to remove the rest of the excess publications later on.

First, the Access database containing the information uses another Visual Basic script to insert information about the publishing authors from the UMCG database, such as department and research school. Sometimes, one of the publishing authors has the same name and initials as one of the UMCG scientists, but does not work there. This also needs to be corrected later on.

After this, Access outputs a text file which can then be imported in Reference Manager, a program more suited for handling the publication references. In this program, the rest of the work is done. First, the database is checked manually for doubles. Then, the database is checked for singularities, such as publications that clearly cannot originate from the UMCG

Once this has all been done, the list is compiled per department and sent to the research groups for validation. They check to see if the publications in the list provided match their own list, and are asked to respond if this is not the case. The second stage of the inventory consists of processing the replies from the researchers, checking to see if their comments hold true. This usually results in quite a few mutations in the database, and also solves the problem of the non-UMCG publishing authors with the same name as one of the researchers here. Any missing publications are added to the Reference Manager database via the above procedure.

After a couple of weeks, all researcher replies have been processed, and the final stage of the validation can commence. This consists of double-checking the processed replies, as well as checking the department codes, research schools, etc. in the database. The number of publications per department is checked with the numbers from last year's inventory, to see if there are any unexpected changes, i.e. the numbers shouldn't differ too much.

As for me, I got halfway to double-checking the replies. Not everything was done by me alone, but I'd like to think that I contributed considerably. The inventory may not be the most challenging of tasks from a scientific perspective, but is an important one, and has provided me with much insight on the UMCG as a research institute. Furthermore, a number of people are working on the SOP to make it easier and less labor-intensive, as the reader might have guessed is possible in the above procedure.

UOCG

Erika Bakker

Ricardo de Ruiter

The company that supplied and supervised our case is the UOCG. This is an abbreviation which stands for Universitair Onderwijs Centrum Groningen and in English it's called University Centre for Learning & Teaching. One of our supervisors, Louwarnoud van der Duim, is Head Education Technology and Innovation. He shared his supervising task with Hans Brouwers from the Donald Smits Centre for Information Technology.

Case

In 2009 a new exam hall with the name Aletta Jacobshal became operational. One of the rooms in this building is equipped with 300 network and power connections. These were integrated in the floor, in order to implement a system for digital examination. This digital examination has not been started because there are no computers in the room. One of the most important difficulties in realising this project is that the room must be suitable for both digital examination and non-digital examination. Before buying and installing 300 computers, one also has to think about the tables. Normal tables might not be suitable .

Before starting this case one option had already been tested. There were some concerns about the moving parts in this setup. It involved a special table with a lift in it which could move the computer screen up and down.

During our case we investigated and tested a specific option for the computers and tables. We looked for options to integrate the computer screen in de table top. We thought that if we tilted the table top a little bit we could get rid of reflections of the sun and the lamps.

Testing and conclusion

After a lot of research on the internet and a talk with an expert on computer screens we ordered some screens. Unfortunately the screens didn't arrive on time, so we used another screen for testing. On a sunny day we went to the room with the network and power connections. On various locations in the room we tested which angle would eliminate the reflections. We came to the disappointing conclusion that we needed an angle of approximately 50 degrees to make the screen readable. This observed angle is too large to apply. After that we tried a special anti-reflection film but this made the problem even worse.

In the future other options have to be tested before the room can be a digital testing room.

101 PIZZA

Daily Reports Melbourne

Tuesday April 19 and Wednesday April 20

Armin Palavra

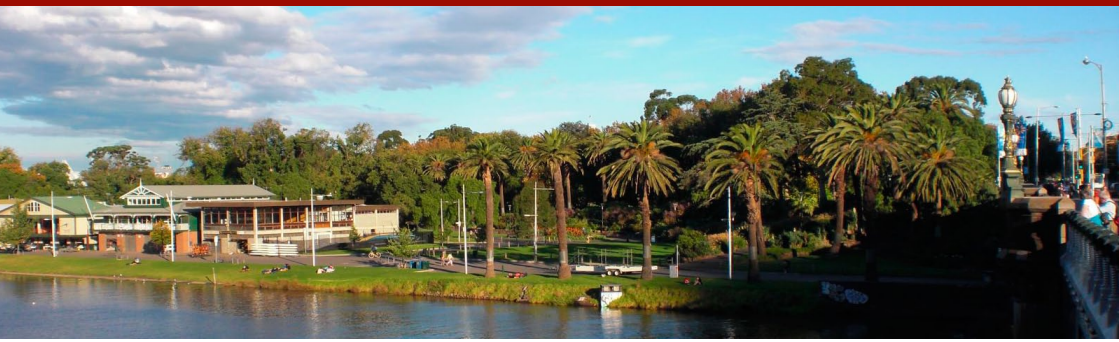
4:05 AM: the start of a trip to Australia for three weeks long! Luckily I was able to hop on the train not in Groningen but in Zwolle, which meant I could sleep for almost three hours more compared to the rest of the group! (Except for Henry who was in Indonesia and would be joining us at Melbourne Airport). Well, after I joined the group we were ready to head to Arnhem where the ICE, which would bring us to Frankfurt with a speed of 300 km/h, was already waiting. After a really comfortable ride, which included a few games of 'klaverjassen' and/or a good nap, our next stop was Frankfurt Airport where we could walk around for about three hours after checking in. Then a Cathay Pacific Boeing 747-400 was waiting to take us to our next stop: Hong Kong. The flight took about ten hours. Luckily there was an in-flight entertainment system on board, which meant everyone had his own screen and lots of movies and music to choose from! And in case you actually would get bored, it was time for food! The food was pretty good (although it consisted of chicken curry with rice half the time).

The next morning (local time) we landed at Hong Kong Airport. We had almost three hours to investigate this impressive airport, so we took our time to walk from one end to the other (which really was a big end) and assemble at the gate again which would lead to our next plane to Melbourne. Again the entertainment system was present and we actually got an extra hour to enjoy it, because we had to circle around for a while close to Melbourne before there was a spot for us to land. But we landed safely at Melbourne Airport, although there was a man not acting very safely by walking during the landing. Of course this made the flight crew really angry. Arriving at Australia also meant passing their very strict customs, they are afraid of every sort of living species which does not originate from the island itself. This includes dirt and food which you may bring with you. Australia has had some trouble in the past with an overpopulation of rabbits, frogs, camels and more species. Eventually, everyone passed security and some people even managed to bring food with them. The only thing that remained was a bus trip to the station and a walk to our hostel. There, everyone could finally go to bed and have a good rest after a very, very long trip!

Thursday April 21

Cees Draaijer

For the first time during our stay in Melbourne we arrive at the majestic Southern Cross railway station. From there we debark to Glenferrie station, passing the famous Rod Laver Arena on our way. On the first full day in Melbourne we start off with a visit to the Swinburne Centre for Astrophysics and Supercomputing, part of the Faculty of Information and Communication Technologies at Swinburne University of Technology.



This young centre (established in 1998) has world class astronomy research and is rapidly growing to be one of the largest astronomy centres in Australia. Work is done on a variety of subjects: adaptive optics, where a fake star is projected into the atmosphere to tune real observations; 10 billion particles simulations, making use of a super computer; and gravitational lensing, observing multiple images of the same quasar by virtue of the bending of light around heavy astronomical objects. Also the centre is proud to host her own 3D-movie production facility, founded to improve public outreach on one hand and make some money on the other.

After seeing a few dazzling 3D-productions we return to our hostel. Here Matt, our Australian Melbourne expert from Groningen, picks us up for a tour around the city. We see the betting at Crown Casino and Flinders Street station at Liberation square. A horse's buttocks appears to have determined as much as the number 42. After a sneak peak at the botanical gardens and a dive at St. Kilda beach, we have dinner at the Beachcomber cafe. "Waiter, waiter! Can I get a root in my soup? It is too powerful!", our tour of the night life hadn't even begun yet...

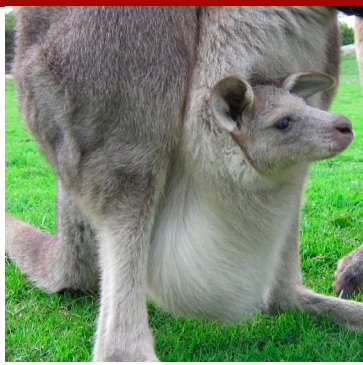
Friday April 22

Coen Pijpker

After a good night's sleep we assembled at 11am in front of our hostel. There we were greeted by our jolly bus driver, who introduced himself as Dave. Soon all FMF members entered the bus and picked their places as Minties (sweets) were handed out by Dave to all of us. We then left the civilised surroundings of Melbourne to visit the outback of Victoria and to learn more about the flora and fauna of that region.

After a short break to have some lunch, we arrived at our first stop of the day: the Gurdies winery. The region where this winery is based was named after the small creek which flows through the area. During the early twentieth century a travelling circus named Hurdy Gurdy circus set up camp close to the creek. Among their attributes was a large fair wheel, which somehow got loose from its bearings and rolled into the creek. They tried and tried, but the wheel was stuck in the creek and remained there for another twenty to thirty years. Because of this accident the region now has the name 'The Gurdies'. The wine tasting session which we were supposed to have did not happen, because the winery was closed. We did however enjoy the scenic view from the hill, where we could see French Island and our final destination: Phillip Island.

Our next stop on the route was the Maru Koala & Animal Park, where we had our first encounter with the Australian wildlife. Among the different animals were emus, koalas, wallabies, kangaroos, Tasmanian devils and wombats. Armed with a tray of animal



food, we spent a lot of time feeding and petting the wallabies and kangaroos.

When everybody had had their portion of cuteness for the day we crossed the bridge from the mainland onto Phillip Island. There we first visited the Phillip Island chocolate factory, which strangely enough produced Belgian chocolate. However we all received a free tasting sample from the factory and some people bought different delicacies with the famous chocolate in it. Soon after, we moved onward to Dave's favourite beach named Woolamai beach. This was the first beach where we could spot the legendary surfing waves which you hear about when people speak about Australia. Some participants took this opportunity to play around and paddle in the waves. The tour continued with a visit to Seal Rocks, where we would be able to spot wild seals and maybe some penguins. Unfortunately the seals were too far away to spot with the naked eye, but we did enjoy a glorious view of the mainland and the waves breaking on the rocks creating a spectrum of colours of blue.

After the visit to Seal Rocks we drove through the national park, playing the game 'spot the wild wallaby', on our way to Cowes to have a quick dinner. This lead to 24 people devouring 13 pizza's in a little under twenty minutes. Soon we were off again towards the penguin parade for which Phillip Island is most famous. At the penguin parade the little penguins came ashore to find shelter for the night in the bushes near the beach and in the dunes. Anxious Japanese and Chinese people gave up their seats soon after the first penguins arrived on shore, giving some people of our group the opportunity to take the best seats. On the way back to the bus, we had a lot of opportunities of spotting the penguins as they passed by as close as a meter to us.

After checking if there were no penguins hiding in or under our bus, we set off back home while some people enjoyed singing along with the music, and others slept like roses. Soon after returning home a group discussed their trip and played some pool in the Hostel bar, while others explored the nightlife of Melbourne.

Saturday April 23

Roel Tempelaar

Today was the first day off, deprived from any scheduled activity other than a barbecue. I will limit this report to my personal experiences, as the participants spent the day scat-

tered over all of Melbourne.

Ivar and I kicked off the day with a morning run passing the Yarra River, the botanical gardens and the ANZAC monument. The latter consists of a dome in memory of the Australian and New Zealand contribution to World War II. In preparation for ANZAC Memorial Day, the monument was surrounded by a crowd of people, including a rehearsing drum band. The moment that the drill instructor viciously corrected the little fat drumming girl had a rather high entertainment value.

Directed by the Lonely Planet and an empty stomach, Gerco, Ivar, and I found ourselves a nice restaurant. Our excellent brunch was topped with a 15 dollar espresso. This escapade turned out to be financially attractive as we were given the wrong bill.

Ivar and I decided to spend our after dinner dip on the 88th floor of the Eureka sky scraper. There we met Armin, Coen and Oscar. The view over Melbourne was as impressive as the ear-blowing elevator ride, exceeding a 9 meters per second velocity.

In the evening, we had a collective barbecue on the Yarra riverside. While frying dead animals and vegetables on the "barbie", we celebrated Elwin's 23rd birthday.

Sunday April 24

Anneroos Everts

At 7.00 in the morning, we again stepped into Dave's van. This time he would take us to the Great Ocean Road: a 243 kilometres long road that starts in Torqay and ends in Warnamool.

The road was built by veterans of World War I and it is dedicated to the casualties of this war. It is the world's largest war memorial. We stopped every now and then to enjoy the spectacular views that Victoria has to offer: beaches, cliffs, big waves and green hills.

Dave did not merely drive us around, he also told us many interesting stories about Australia and the things we saw, and played us songs that matched his stories to get us in the mood. He told us that bushfires occur frequently in Australia, due to Australia's mostly hot and dry climate. Some eucalypt trees have evolved to rely on bushfires: fire causes seed pods to

open, which allows them to germinate. The trees even incite fire, since the eucalypts contain flammable oils in the leaves. Other species have adapted to recover quickly from fire. If the government does not carry out controlled bushfiring, the undergrowth gets really dry and flammable, which can eventually result in a giant, explosive bushfire that can cause a lot of property damage and deaths.

At some point Dave took us to some trees where we found koalas and parrots. We got some bird food from Dave and soon our hands, heads and shoulders were covered with green-red feathered friends.

The next stop was for a good lunch, after which some participants dared to take a quick dive in the ocean, while others visited a souvenir shop. After these refreshments, Dave took us for a walk in the rainforest. We saw some really high and old trees between the green ferns.

Then it was time to pay a visit to the Twelve Apostles. These are eight limestone formations that rise from the ocean. This is a very touristic place, since the view is gorgeous. The next stop was at Loch Ard Gorge. When Dave told us we could swim here, we hesitated at first; the water in the little bay looked very wild. Big waves splashed against the cliffs of the entrance of the bay. Although the water was cold according to Australian standards, soon half of our group was playing and jumping around in the big waves despite the 'swimming not recommended' sign. For many participants, this was the best part of the day.

The next stop was London Arch, which is also a limestone formation. Before it partly collapsed, it was known as London Bridge. Of course, Dave told us the juicy story of the London Bridge and he played the accompanying song, which we all sung lustily. After a quiz about the things we learned this day, in which we could win the leftover Minties, we enjoyed ourselves on our way back to Melbourne by singing Dutch songs. We had a wonderful day!

Monday April 25

Erika Bakker

Today was a special day because of a few things. The weather was beautiful. It was sunny so we could wear our nice-weather clothes. Unlike other days we didn't know the program for today. And last but not least, today was Anzac Day.

Like almost every day we walked to Southern Cross Station. There the committee revealed the location of today's activities: Ballarat. This is a small city approximately 100 kilometres north-west of Melbourne. We went to Ballarat by train. This took us about ninety minutes. In Ballarat everyone could choose his or her own activities. Some of us went to the Anzac Day Service. Others went to the Wildlife Park or Souvereign Hill, an open air museum. Most of us combined one of these activities with a walk through the city and around Lake Wendouree.

Anzac stands for 'Australian and New Zealand Army Corps'. Every year on April 25 the people in Australia and New Zealand commemorate the soldiers who died during the First World War and in wars that occurred after that. Anzac Day is a public holiday, but Anzac day and Easter Monday were on the same date this year. The day off was moved to Tuesday so there was some confusion about the date of the ceremonies. Fortunately the ceremony in Ballarat was today, so students who wished to attend the Anzac Day Services could do so. At eleven o'clock the march around the parade started. Veterans and family of killed soldiers marched around the city centre. After a few speeches the Last Post was played by a bugler. A minute of silence followed and was ended by the playing of a piper. The whole program was very impressive. You could compare Anzac Day with the Dutch Remembrance Day on May 4.

Souvereign Hill is a museum that tells you the story about the gold rush. In 1851 gold was discovered in the neighbourhood of Ballarat. Nowadays the museum is located on one of the largest gold mines. Visitors can walk around historic buildings. Employees of the museum wear costumes and show how things were done in the nineteenth century. There are two mines you can visit with a guided tour. A small stream is constructed for finding your own gold, but the students who visited the museum didn't find anything in there.

Ballarat Wildlife Park was opened in 1987 by a man who loved the Australian native animals and reptiles. You can see animals you would not like to meet outside a park, like different species of crocodiles and alligators. You get the total wildlife experience because kangaroos and emus walk around you.

Lake Wendouree is a lake outside the centre of Ballarat. Some of us didn't walk around it. They just enjoyed the sun on side of the lake.

Not everyone walked around the lake in the same direction, so they met halfway. After a small chat everyone continued on their own track. There was much to see. We saw black and white swans and many small swans. There were white cockatoos with a yellow crest, but if you approached them, they flew away. We saw a lot of ibises too. These areblack and white birds with long beaks.

At half past six everyone came together at the station of Ballarat. Because not everyone had seen the same things, we had a lot of stories to tell each other in the train that brought us back to Melbourne.

Tuesday April 26

Herbert Kruitbosch

The day before yesterday I enjoyed the enormous ocean waves during the trip along the Great Ocean Road and since today was a free day I decided to visit the ocean once more. Therefore I joined the group of Henry, Roel, Cees, Ivar and Kim, which had decided to go to the beach. Before getting wet we wanted to find some street musicians and enjoy their tunes. Unfortunately we could only find Lamborghini's, BMW's and Ferrari's behind windows. So we took the advice of some guy and went to the 'Dinnes', a department store where you could buy all kinds of ugly stuff.

Fortunately there was a tram station nearby this horrible store, so we could run off to St. Kilda Beach, where we already had spent some time the day after we arrived. There we tried to meet up with another part of the GBE group: Marcel, Jelle N, Anneroos and possibly even more people. But we could not find them and decided to play on the beach without them. Eventually we did find them as they were playing volleyball on some other part of the beach.

After a while, Henry and I decided to leave and walk by the shops near St. Kilda Beach. Along the way we found an excellent opportunity to buy some quiche and watch a live jazz band which was on the street nearby. So we actually found them! We stood there for a while before we took a tram back to the hostel.

When we were acting like beach guys, another group went to an AFL match. It was a fight between the Geelong Cats and the Hawthorne Hawks with their visually challenged clothes. Drawn by their ugly scarves Paulus, Tim, Oscar, Coen and Armin went to the Queen Victoria Market to buy some Hawthorne Hawks's gear. Some train tracks, tickets and a refreshment later they got into the stadium and witnessed the game. The Dutch supporters were worried that soon they would be beaten up when they saw that the sup-

porters of different teams were mixed throughout the stadium. Fortunately this did not happen. Although AFL has quite some violence on the field, their supporters are fairly calm.

The game kicked off great for our supporters, as the Hawthorne Hawks quickly led the game. Soon the Dutch fans met a mathematics professor who was in favor of the Cats and sat nearby. He worked at the University of Ballarat, a small university, for with a 300 000 Ballarat population it had only a few thousand students. The Cats took over the lead later on and after some futile attempts of the Hawks to get back, the Cats won massively by scoring a lot of points during the lasts ten minutes of the game.

So that's what a free day in Melbourne could be like!

Wednesday April 27

Gerco Onderwater

After a long Easter and Anzac day weekend this is the second day with a scientific program. Today we will visit the Australian Synchrotron and the Mountain Goat brewery. After an early rise we depart for the Southern Cross station, where some of the participants are so eager to leave that they hop on the train before all of us have arrived on the platform. A brief moment of stress for the organising committee is quickly overcome when it is found out that they are at least heading in the right direction. After this false start the rest of the group boards the train as well. Interestingly enough even the train driver doesn't know for sure where he is heading: perhaps he'll end on Flinders Street, perhaps not?

The Australian Synchrotron (AS) is located in Clayton, one of the suburbs of Melbourne, next to Monash University.

At the lab we all register and are decorated with a colourful badge. Our hosts are Dr. Mark Tobin, one of the beam line scientists, and the outreach officer Jonathan de Booy (indeed, of Dutch descent). Mark gives us an overview of the history and principles of the synchrotron. The AS is the second synchrotron on the southern hemisphere and produced "first light" in 2006. It operates as a user facility and is open to users from Australia and the rest of the world.

The facility is used to produce highly intense light, ranging from infra-red to hard X-rays. This is done by accelerating electrons, first in a LINAC (a linear accelerator) to about 100 MeV (a velocity of 99.99% of the speed of light) after which they are injected into the 130 m circumference synchrotron. In this circular accelerator the electrons are further accelerated to 3 GeV (99.9999985% of the speed of light). These electrons are then transferred into a storage ring where they can be kept for about 20 hours. This 216 m circumference ring consists of 14 pieces which each consist of a bending section and a straight piece. In each bend so-called synchrotron radiation is produced. In the straight sections "wigglers" or "undulators" can be inserted to also generate radiation. The radiation is channeled towards (currently) nine experimental areas.

Because the beam was off during our visit, Mark and Jonathan took us on a tour of the experimental setups. The broad range of produced wavelengths (IR to X-ray) makes it possible to perform a variety of experiments, ranging from macro-molecular and micro crystallography, infrared and X-ray spectroscopy, powder diffraction, small and wide angle X-ray scattering (SAXS and WAXS) and imaging and medical therapy. Some memorable experiments were the study of the solidification of chocolate and the investigation of the chemical composition of paintings.

The afternoon is off for lunch and a trip back to the hostel. In the evening we visited the Mountain Goat micro-brewery in Richmond, also one of Melbourne's suburbs. A very enthusiastic brew-master (perhaps he had tasted a little too much of his concoctions?) tells us of the history of the brewery and explains us the technique of brewing beer by showing us the various stages of the process. Various quantities of hops and malts are mixed to compose beer with a specific taste. The mixture is boiled, filtered and stored to created beers with imaginative names like "Skipping Girl", "Fantsy Pants", and "Steam Ale". After the tour we carefully examine the various types of beer in the brewery's tasting locale ("Goat Bar") while enjoying a slice of pizza. A delightful finale for this interesting day.

Thursday April 28

Jelle Nauta

On our penultimate day in Melbourne we visited Melbourne University. Getting up very early, we ventured deep into the university district where we were welcomed by Professor Tordesillas of the mathematical department. After introducing us to the university, she gave us a talk on granular materials and how she applied complex graph theory to study them. Next was an interactive lecture on chemistry in a vintage classroom, which had an incredibly steep seat arrangement. We got to experience superhydrophobic glass (which we didn't break), breathed helium and xenon (with according voice pitch changes, xenon is surprisingly heavy) and Ivar ignited a hydrogen balloon. We thanked our host and walked down a mysterious, dark tunnel, decorated by a diagram of the evolution of the universe. The reason for this soon revealed itself; the physics group that resided here was doing research in collaboration with ATLAS; aiding in the quest for the Higgs boson. Both professors and students told us about their work. Finally, there was a talk

at the geology department. We heard about flowstone, a child archeologist and the Australopithecus sediba.

After these interesting talks we were left in the hands of MUMS, the Melbourne University Mathematics & Statistics association. About 70% of the students here were from China, and they led us north to Princess Park to feast on the typically Australian public barbies. They had also brought a cricket set, so some of us gave this, by our standards exotic game, a try, as well as frisbee and soccer. Soon we pulled out our juggling balls; giving our Australian hosts the impression that juggling was in the Dutch curriculum.

At last, the sun sunk below the gum trees, and we said farewells to our hospitable, antipodean colleagues. Spreading out, each of us roamed the city for another night under the Southern Cross.

Friday April 29

Henry Ong

This was our last full day in Melbourne. Having enjoyed the city a lot - thanks to the celebration days like ANZAC and Eastern - it was now time for a full day with a serious program. We went to Oakleigh to pay a visit to SKF, a Swedish bearing company.

Here we were welcomed with a nice breakfast after which we had an introduction to the company and to Australia. We heard a lot of comparisons between Australia and Europe and they showed an upside-down world map, which really gives northern hemisphere-people a headache. However, not all of the claims turned out to be true. So let me put one thing straight here: the Netherlands might be a small country, but Melbourne is by no means as big as our entire country, even considering all of the suburbs.

During the introduction of the company we learned that SKF is a multinational present in 130 countries with an annual turnover of 10 billion AUD. Founded in 1907 as a bearing factory, they have grown to a company which is world leading in bearings, but nowadays they're also active in maintenance, mechantronics, lubrication systems and seals.

We were given a nice overview in three presentations about engineering, service and marketing at SKF. The engineering division turned out to have set up a world-wide network of expertise and development software. In Australia, there are about 100 engineers working on a lot of projects, which mostly follow the cycle of failure analysis, calculations, design, engineering, manufacturing and installation of new bearings, seals or lubrication systems.

The service and maintenance was showed with a hands-on presentation showing some of the tools used 'in the field'. It clearly showed that the company had changed their focus from creating new bearings after a failure to monitoring wear and preventing failure.

The last subject was 'mining', which is one of Australia's biggest sources of export products. SKF works together with BHP Billiton, the world's biggest mining company headquartered in Melbourne. They showed us some astonishing examples of current projects;

digging holes the size of the Netherlands to win gas or other resources.

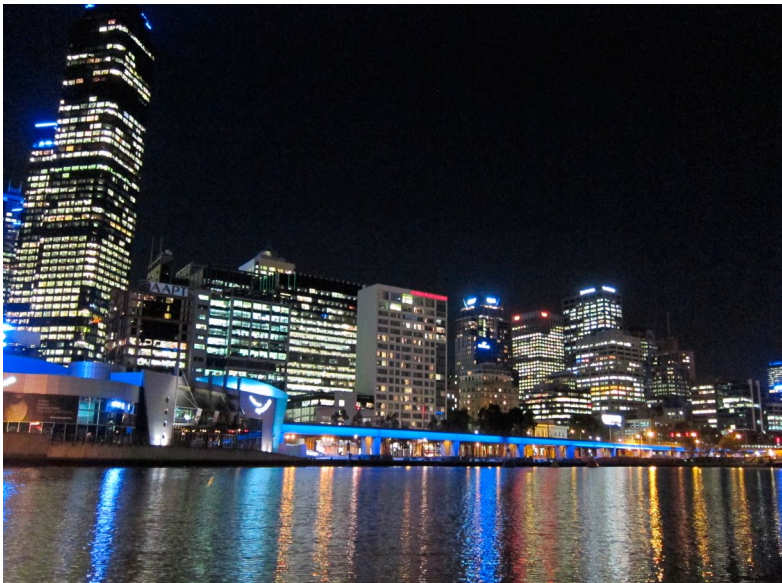
After this long morning session there was a great lunch, including the typical Australian scones. While eating, our organising committee realised that we were running out of time in order to get to the Royal Melbourne Institute of Technology on time. The solution was simple, but great: six SKF-employees were willing to take us in their cars to the Oakleigh train station, so we arrived right on time at the RMIT.

Here we had the second serious part of the day: three presentations showing the relevance of the combination of geospatial sciences and mathematics.

The first presentation was from Steven Davis, a mathematics PhD student who told us about the plague in Kazakhstan. The plague is transmitted by flees living on the skin of gerbils. Davis had put this in a mathematical model, even using Google Earth to view the gerbils' holes! It turned out that the spreading of gerbils and the plague-flees can be described by a so called percolation theory, which states that beneath a certain threshold there will be no outbreak of the plague.

Secondly, we heard prof. McEvoy who spoke about the Climate Change Adaptation Program. He studied the social consequences of climate change, flooding, heat waves and bushfires in Australia and the adaptation of the population to those events.

Finally, James Minas, also a math PhD student, concluded with his research on controlled bushfires in Australia. He had made a model to help with the decision making on which area to burn preventively in order to prevent huge bushfires in periods of drought. A very nice presentation which concluded a very serious and interesting day!

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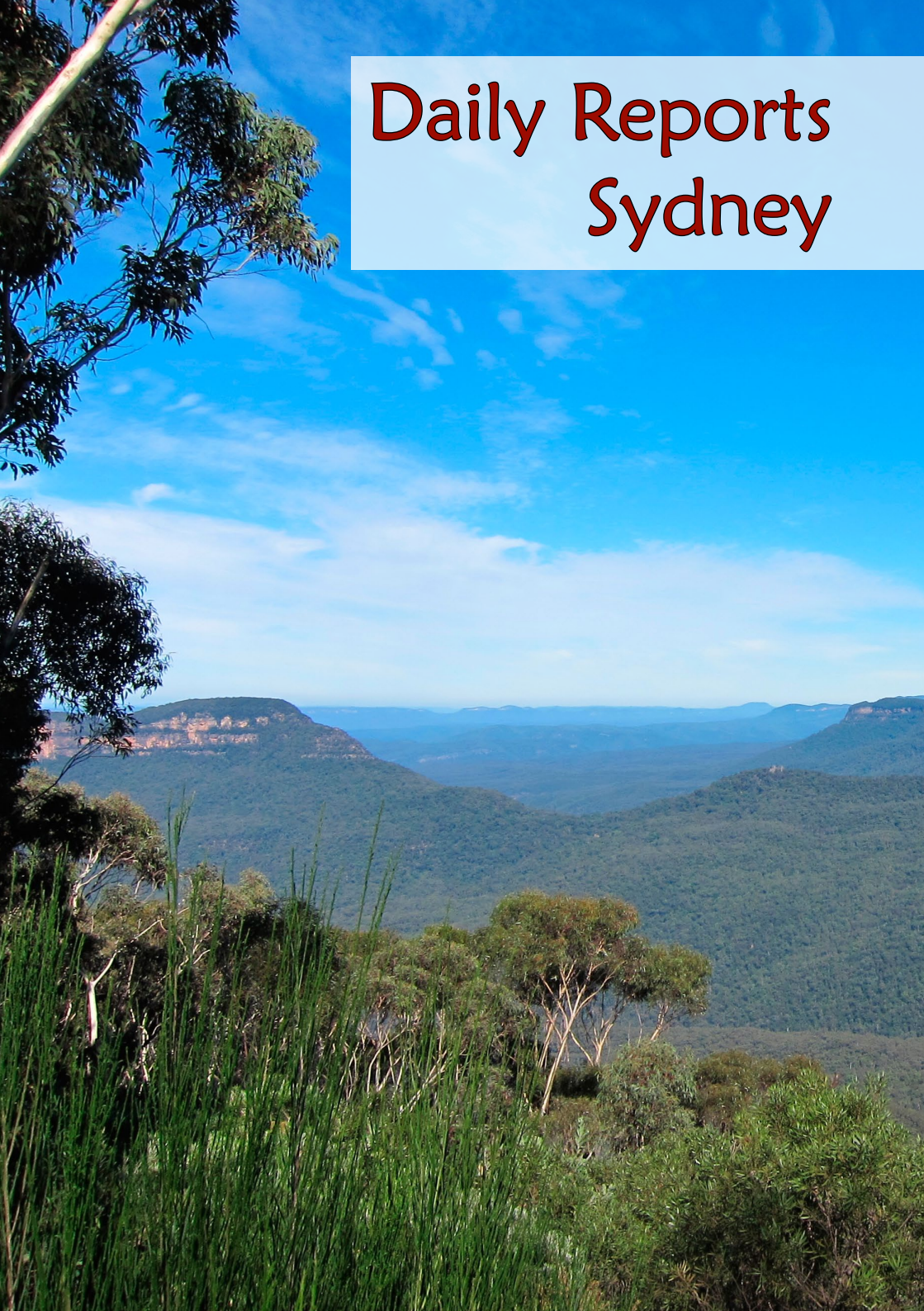

Saturday April 30

Marcel Tiemens

Today is the day we'll be departing from Melbourne and fly to Sydney. In the morning, we had breakfast and checked out with our bags. Since no one had a valid public transport ticket, we had to walk all the way back to Southern Cross station. Just our luck, it was one of the warmest days yet, right on the day of our departure.

Shortly after noon, the bus taking us to Avalon Airport arrived, and about one hour later, we arrived at the airport. As we checked in, we noticed that our flight to Sydney was delayed by half an hour. As it turned out, this was only the beginning of our misfortune. After we passed the security check-in, we all had lunch. I ate a typical Australian dish, namely meat pie. Most of us began noting that the Easter Bunny, albeit somewhat late, had put chocolate eggs in everyone's bags. To some, the reason for this still remains a mystery.

At 2:50pm, we were called to board the airplane. As we took our seats, the captain announced that the plane's on-board computer was malfunctioning, and a mechanic was underway to take a look at it. Shortly after, the air in the cabin started to smell like kerosene, and we became even more worried that the plane might actually explode. Just then, the mechanic arrived and after some inspection concluded that it would not be safe to fly the airplane. All passengers were called to evacuate the aircraft, and retrieve their luggage from the airport terminal.

In the main hall of the airport, we set up camp. Everyone in 'Camp Holland' needed to entertain themselves until we'd learn more. Some played football, some volleyball, and some juggled. Others just lay about and chilled. It must have appeared funny to others, seeing a group of people dressed in bright orange sitting in the middle of an airport, occasionally shouting "long live the queen!". About an hour later, we received refreshment vouchers, and got ourselves something to eat and drink. We were told that a bus would come to pick us up and bring us to another airport, where our replacement flight would depart for Sydney. At 5:15pm, the bus arrived, and over an hour later, we reached Melbourne Airport. Everyone hurried to pick up their tickets, since the replacing flight would depart in half an hour. Unfortunately, not everyone had been booked to the replacing flight, and so some needed to wait for the next flight departing at 8:00pm. This meant the group had to split up and meet at Sydney Airport, with the first part of the group having to wait an hour.

Finally, everyone was in a plane heading for Sydney. We would originally fly on a low budget flight, but as we got dinner in the airplane, we concluded that the replacement flight was not. Of course, we didn't mind. At a quarter past nine, over five and a half hours later than we originally planned to, everyone was in Sydney. An airport shuttle bus took us directly to our hostel in Chinatown. After everybody had picked a room and unpacked, the committee proposed to attend the after party of the Queens's Day party

which we originally planned to go to. But most of the travellers were tired of the long journey and went to bed.

Sunday May 1

Meike Door

Today was the first day in Sydney which was completely free for everybody. We explored the city centre in small groups. The first places of interest in Sydney everybody wanted to see were the famous Opera House and the Harbour Bridge. In a few days, we'd have a guided tour through the Opera House and most of us would even watch the movie "Lord of the Rings - the Fellowship of the Ring" with the music played live by an orchestra. Therefore, we just took a quick look at the Opera House from the outside, because there's a lot more to see in Sydney. For example, the Harbour Bridge, which can be seen from the Opera House. It's possible to climb on the bridge and walk all the way to the other side (on top of the bridge) with a tour guide, but it's very expensive and it takes a few hours. Monique and Gerco were seriously thinking about doing this, but in the end they decided against it. Most of us enjoyed a nice view from one of the towers of the Harbour Bridge. Some participants joined a walking tour and saw some interesting, also non-touristic, places.

Fortunately, we got tickets for Sydney's public transport, including most of the ferries. Taking a ferry was a nice way to see the city, from the water. The ferries departed on Circular Quay with the Opera House to the right and the Harbour Bridge to the left. There were many interesting destinations, e.g. Manly with its famous beach, Sydney Aquarium and The Rocks.

Nine of us (Roel, Martine, Coen, Herbert, Tim, Anneroos, Armin, Jelle N. and I) didn't enjoy the city centre at all this day, because we went surfing. On our last day in Melbourne, we booked a beginners surfing course at a small tourist/backpacker travel agency which was located in our hostel. Our surfing teacher Dino quickly remarked that we were from the Netherlands and as soon as we were sitting in his car, he said some

Dutch words I don't want to repeat. After practicing on the beach for half an hour and some unsuccessful tries in the waves, we were all standing on the surfboard and surfing towards the beach. After 4,5h surfing lessons, a barbecue and a competition, we drove back to the hostel. Martine and I decided for "Power-Napping", which resulted in 2 hours of sleep and waking up with hurting arms, hands, shoulders, legs and hips. We were only able to buy some food in the evening and to go to bed again. All surfers had extremely sore muscles the next days, but it was totally worth it!

All participants were very excited about what they had seen today and gave hints to others about the "must-sees" on the next free day. This was a successful start of our time in Sydney!

Monday May 2

Oscar Heslinga

After a free day in Sydney, today's program was full of visits to different study related activities in the biggest city of Australia. We got up around 8:15 am and we gathered in front of our hostel to start our trip to the University of Sydney.

This trip was not as far as we had expected it to be. Although Sydney is a very big city, the University of Sydney has a beautiful green campus nearby the city centre. The first stop at the campus was the Department of Physics. Although the building was under construction, the staff found us a room where they had prepared a talk for us. One of the staff members told us about their research in the field of Photonics and Optical Fibres. Being well supported by the government, the CSIRO has great ambitions to achieve a lot in the field of Physics. After the talk, we had a look in the laboratory.

The next stop on the campus was the Department of Applied Mathematics. It was a talk about Dynamical Systems applied to sports. It was really interesting to see Physics and Mathematics being combined to make calculations for the jump of an Olympic diver.

Finally, also the astrophysicists in our group got satisfied. Nine PhD's of the Department of Astrophysics talked for five minutes about their own research. In this way, we got a good overview about the fields in Astrophysics that are of interest in Sydney. Together with this PhD's we got off to lunch.

While enjoying the pizza's arranged by our host Katrina, we discussed with the PhD's and got to know more about being a researcher in Sydney. We also received a manual with information about the University of Sydney and possibilities for foreign students.

When we finished our lunch, a local student of the uni-

versity's promotion team led us around the campus. He told us interesting historical facts about the old buildings and the different facilities for the students in Sydney. We concluded the tour with a group photo in front one of the beautiful buildings that can be found on the campus. We said goodbye to our host who had guided us through the day and we went off to our next scientific activity.

We got off to the University of Technology Sydney (UTS) which was also not far away from the centre of Sydney. Although the building had a less classic attitude, the inside was quite beautiful. We got a talk about the UTS Shopfront, an institute of the UTS that uses its knowledge in community projects. Afterwards Paul, a History professor, gave us a tour through Sydney. We walked through the centre and Paul told us a lot of historical facts about different sites. We ended up in a bar having a beer and a sandwich together with a tour through the cellar which contained a lot of anecdotes.

Around 19:00, the committee announced that the program for this day had ended and that we were free to enjoy our own evening. Most of the people took this opportunity to get something more to eat and to enjoy a drink at the bar.

Tuesday May 3

Paulus Meessen

After yesterday's academic program to Sydney University and the UTS Shopfront, today it was time for a company visit. We had been invited to Philips Dynalite in Mascot. Mascot is the industrial area near Sydney's airport. We were welcomed by dr. Ronald Tol. Ronald Tol is a born-and-raised Groninger who, after receiving his degree in Mathematics and Computer Science from the RUG, went to work for Philips. As a member of the acquisition team of Philips, that bought Dynalite almost two years ago, he came to Australia to run the R&D department of the 20 year old family business.

Philips Dynalite is one of the subdivisions of Philips Lighting and their main business is the development and production of lighting control systems. They offer their customers solutions to manage their lighting systems. Dynalite produces their solutions, networks, products and software in-house in their small factory in Mascot.

One of their clients is the Shangri-La Hotel in Sydney where the control-system for lighting and air-conditioning has been designed by Philips Dynalite. A part of the travel-party had, later thatsame day, indeed confirmed that the beautiful view from the thirty-sixth-floor bar over Circular Quay were accompanied by drinks from a table that had been decorated with an energy-efficient LED candle-replacement from Philips.

Our visit continued with a tour through the factory after which we were treated to a delicious lunch of wraps and sandwiches. Mugged, informed about network controls solutions and well-fed, we said our goodbyes to Philips Dynalite and travelled back into the city.

Here we had some time of our own. So I decided to visit the Museum of Contemporary Arts. We found a copy of Benoit Mandelbrot's book about fractals which the currently exposing artists had used as an inspiration for his work. The regular exposition was nice but quite small. We decided to take the long walk, through the Royal Botanic Gardens, towards the Sydney Opera House, where we

would rendezvous for the next group activity; a tour of the Opera House.

Our tour guide told us about the long history of this Australian icon. While the wildly creative proposition of the Danish Architect Jørn Utzon had been submitted in 1957 it took until 1973 to complete the project. Although the intended shape of the building had been why the design was chosen, it took many years and several of the greatest minds in engineering to figure out how to construct the shells that make up the roof. Eventually they found the elegant solution in taking partitions from a sphere. This ensured the load baring capabilities while remaining the funky shapes. The seven concert halls have a combined capacity for over 10 000 people and are used for a variety of performances, such as concerts, opera, theatre, dance, films and rock concerts. This building has been a major push for arts and culture in Australia which is known for it on the world-stage.

After the tour, some of us managed to get tickets to watch the Australian Ballet in the Opera House while others found the simple pleasure in consuming steak sandwiches (Australian specialty) whilst watching a game of rugby with the local stockbrokers.

Today's story ends on the aforementioned thirty-sixth floor with your writer enjoying the view, the wine and the Philips-produced table ornaments.

Wednesday May 4

Ivar Postma

Have you ever asked yourself the question: Who invented Wi-Fi? Or: What's the best place in the world to put a ginormus radio telescope? Or even: Where in Sydney could I get a nice 10 dollar steak? Well, I'd never asked myself these questions, yet by the end of the day I would have learned the answer to all three.

The name CSIRO had popped up a few times before during our travels. At both Melbourne and Sydney University they mentioned research involving CSIRO. In case you're wondering, that stands for the Commonwealth Scientific and Industrial Research Organisation. CSIRO is the biggest research organisation in Australia and is mostly funded by the Australian federal government. One of its centres is located in the suburb Epping, about an hour away from our hostel.

By Australian standards, CSIRO is quite an old institution. It was founded in 1926. In its history CSIRO has been involved in quite a few technological milestones. For example, amongst its facilities the organisation has some large radio telescopes which we had seen while entering the compound. In 1969 CSIRO's telescopes were used to pick up the TV-feed from Apollo 11, which landed the first humans on the moon. The famous images and cracking voice of Neil Armstrong reached households all over the world thanks to CSIRO's antennas.

Another good example of innovation from the institute is the invention of Wi-Fi, or WLAN. CSIRO holds the patent on Wi-Fi technology and makes quite a bit of money off it, as one could imagine. With colourful examples like this one and some necessary figures, our host of the day, Robert Hollow, gave an introduction about CSIRO.

The introduction was followed by a presentation on the Mathematics, Informatics and Statistics department, given by Murray Cameron. He explained how there is essentially no fundamental research at the institute as its research is aimed at applications.

The next topic was one that fills Australian scientists with quite a bit of pride: the Australian Square Kilometre Array Pathfinder (ASKAP for short). The ASKAP is a project connecting many radio antennas together somewhat like the LOFAR project in Europe. The antennas are currently being placed all around Australia and New Zealand. Because the density of population in Australia is so low, it is the perfect place in the world to pick up faint signals from space. Areas with large populations suffer from disturbances such as mobile phones.

Though the ASKAP project is a 200 million dollar operation, the Australians already have their eye on a bigger project: the Square Kilometre Array (SKA). The SKA is a 2 billion dollar international astronomy project. Though the set up is similar to ASKAP, the data output is about one hundred times bigger. Currently the best location for the project is being determined. Besides Australia, South Africa is also in the running. I

could dazzle you with figures on the SKA, like how it produces the entire internet worth of data within a week, but I'll let you Wikipedia those numbers yourself.

Next up, Robert took us around the facility to show us some of the work in action. One of the stops was a test set-up of a communication system. A very enthusiastic computer scientist showed us how we could conference call with a different part of our group in the next room and explained us how this system aided in working in high security containment labs.

After lunch, there was one more presentation, the last one of the day. Duane Hamacher, an American researcher working at CSIRO, gave us an introduction in Australian aboriginal astronomy. Aboriginal is the term used to describe the native tribes that inhabited the mainland of Australia before the European settlement. Across the country there are about 500 aboriginal tribes, each with their own language and culture.

The aboriginal people suffered greatly under the European settlement, though some tribes more than others. Because the aboriginals have an oral tradition for passing on knowledge and no written language it is hard to verify scientific theories.

Like all cultures do, the aboriginal tried to make sense of the things around them. There is evidence that they had figured out seasonal changes and the effect these changes have on nature. For example, they were able to predict at what time of the year certain birds would lay eggs. Also, some rock carvings suggest that the aboriginals witnessed solar eclipses. Though most of these findings are based on speculation, some of the explanations have been made plausible by stories from the aboriginal community.

After Duane's presentation many questions were still unanswered. Luckily, Duane and the committee quickly agreed on an excursion to see some real aboriginal drawings on Sunday morning.

The rest of the afternoon and the evening were listed as free time. Together with Elwin, Gerco, Jelle B. (or Yellow, as the Aussies like to call him), Keri, Kim and Roel, I took the opportunity to explore Manly beach by night. Manly can be reached from central Sydney by ferry within half an hour. Because the sun sets early in New South Wales this time of year we were treated to a magnificent sunset that coloured the sky behind the Opera House and the Harbour Bridge beautifully.

While walking through Manly our tummies started to protest. Finding a nice restaurant was our new mission. This was when three magic words appeared: ten. dollar. steak. Keri tried to persuade us not to go but it was too late. For ten dollars I got myself some salad, a bunch of fries and a tasty steak topped off with red wine-honey-mustard sauce. Sitting there, on the balcony of our 10 dollar steak restaurant, we talked, we ate and we laughed, not even wondering what the next day would have in store.

Thursday May 5

Tim van der Beek

This day was one of those days that started a bit too early for many of us. At about 7 am the group had to collect and depart. Missing our somewhat wobbly hostel beds we were, however, lucky enough to have some time left to sleep on the train. Those that stayed awake had other things to enjoy, such as beautiful ocean views and distinctly Australian sounding names of the stations we passed. One of those was the place we were to visit: Wollongong, which may mean, according to some sources, in a local Aboriginal language: "the sound of the sea".

In Wollongong we visited the steelworks at Port Kembla, which has been around since 1928. BlueScope Steel is the company that operates this rather large industrial site. At Port Kembla, BlueScope produces about 5 million tons of steel a year and specializes in the production of flat steel, including steel slabs, coils and plates.

The visit included an introductory video, the usual safety warning and a tour of the site. The port area's steelworks turned out to be quite impressive: a wisecracking tour guide took us past halls that were over half a mile long, past blazing blast furnaces, red-hot steel slabs (freshly cast) and a few fish that seemed to enjoy themselves in a cleaned up, waste water stream.

Then, having taken in all of this industrial grandeur, we headed back for Sydney. In Sydney, we had a free afternoon to spend and a good dinner to find. In the author's case, the latter amounted to a fine pint of cider accompanied by "one of the world's best" (quoting the bar tender) steak sandwiches in a typical Central Business District "suit up" kind of bar.

Saying goodbye to our new friend the bar tender, the author - with accompanying crowd - went for a leisurely evening walk to the age-old Sydney Observatory. There the entire group met again to go for a stroll through the observatory's museum, where one of the guides showed us a bunch of stars (among which a double star). A few of these we saw through a telescope, in a dome with amusing acoustics, though most

were projected in a mini planetarium.

There, in the planetarium, with everyone lying on bean bags, many eyes were seen to close for times longer than those required for simple blinking. Unsurprisingly, afterwards many of us drowsy souls returned directly to the hostel, marking the end of yet another day.

Friday May 6

Roel Tempelaar

The relationship between Melbourne and Sydney is characterised by a profound rivalry. Both cities were arguing for decades which of the two should be the capital of Australia. The Aussies solved the thing by establishing a new capital city by the name of Canberra. These days, Sydney and Melbourne have one thing in common: they both hate Canberra. However, as we are neither Sydneyan nor Melbournian, we did not want to miss this "waste of land".

In order to get to Canberra, we had to wake up pretty early. Today's success was entirely due to the coffee-to-go, served by Dutch ladies in a desolated place close to the middle of nowhere. Once in the capital, we visited the Australian National University (ANU), where John Love welcomed us with a very interesting talk on the broadening role of optical fibres. Subsequently, we were given an introduction on precision measurements of distances by using lasers. The underlying technique is utilized in large interferometers for detecting gravitational waves. Furthermore, ANU accommodates Quintessence Labs, a research and development corporation. In its laboratory, we were introduced to the work on quantum cryptography. The icing of the cake was a visit to a laser lab, where we had the opportunity of creating our own fibre-guided laser pulse.

One does not get rich in science. In order to get our budget straight, the Cookaburra committee had scheduled a visit to the Royal Australian Mint. The Mint provides freshly pressed dollars for the price of three dollars each. That's Australian economics! Nevertheless, not so many participants accepted this offer. We were merely interested in the robot Titan, which regularly performed a gigantic ad fundum.

A long drive led us to the Canberra Deep Space Communication Complex. Yet, due to a miscommunication, there was nobody present to introduce us to the intriguing enor-

mous radars which were spread over the area. After a short stay, we decided to call it a day.

Saturday May 7

Arnette Vogelaar

This day was another cultural day; a national park called the Blue Mountains was visited. It is called the Blue Mountains because the reflection of the light from the Eucalyptus trees gives the air a beautiful blue glow. The Blue Mountains are characterized by its wide, partly impassable, areas with cliffs, but also by the valleys and the waterfalls in this area.

After having breakfast, we took the train at 8.18 from Sydney Central to Katoomba. It took us about two hours to get there. After arrival the group split into several smaller groups, each having other plans to do that day. One of the options was to catch the Trolley Bus with some rides through the "Scenic World". This Scenic World trip included a trip through the mountains by a cable-way and with a train on a very steep train way. Others decided to rent a bike and enjoy the view while cycling. First they had to adapt themselves to driving on the left side of the road. Another thing they faced, were the very steep roads, which were tough to cycle on. Then walking sometimes seemed to be a better option. Most of the people decided to go walking in the mountains, including me.

First we decided to go to the "Three Sisters", these three rocks are connected with an Aboriginal legend of three petrified sisters. Then we walked to the "Echo Point" to enjoy another beautiful view. After a short, quite flat, walk, the real descending and climbing started. First we were wondering why people were so sweaty and breathless, this became clear after starting the descend! Going down to the valley was about 900 steps, but after descending you also have to climb to get up again… This walk was very exhausting, but I am so glad that I did this!

The views during this walk were amazing; we saw a lot of beautiful waterfalls and other lovely views. After about six hours of walking, we arrived at another train station, called Leura, to travel back to Sydney. Finally we were able to sit and relax! In Sydney everyone arranged his own dinner. Afterwards some people of the group went to the pub, others were impressed and exhausted from this day and decided to go to bed early to prepare for the next day…

Sunday May 8

Elwin Dijck

On this Mother's Day most of us got up early for Duane Hamacher's excursion to a few Aboriginal rock engraving sites close to Sydney. We had met Duane four days earlier at CSIRO, where he had told us about Aboriginal astronomy and enthusiastically suggested showing us some of the petro glyphs from up close.

Around eight o'clock Duane, a colleague and his wife arrived in two minibuses, taking us north across the Harbour Bridge in the bright morning sun. After a brief detour in a Sydney suburb, we arrived in Ku-ring-gai Chase National Park and parked the cars.

We walked a short distance on the Elvina Track, before Duane took a sharp turn and headed straight into the bush. He led us onto a large sandstone rock with several engravings scattered across it. Among numerous fish, shields and a whale, there was a depiction of the Emu in the sky that Duane had told us about before, a silhouette the Aborigines had recognized in the dark nebulas of the Milky Way. Also pictured was Daramulan, a peculiar creator spirit of the Ku-ring-gai people with an emu-back and a rather large foot. Duane took some of us a little further into the bush to see an arrangement of stones in two circles, possibly used during Aboriginal initiation ceremonies.

We drove to another part of this large national park, where more petro glyphs could be found close to the Basin Track. The pictures there included many enigmatic human figures and animals, but most interesting were the engravings of a superimposed man and woman under a crescent shape (which is apparently subtly different from a boomerang), that Duane speculated to depict a solar eclipse when the Sun-woman united with the Moon-man and had her nasty way with him.

We then had lunch at West Point, Duane's favourite spot in Sydney with a gorgeous view of the Pacific Ocean. Unfortunately we had little time to appreciate the place before we had to return to the city. Back in the hostel we dressed up smartly for our visit to the Sydney Opera House where we would attend a screening of the first of Peter Jackson's The Lord of the Rings movies accompanied by live music.

The show started at two o'clock and the musical portrayal of the various events and peoples of Middle Earth was expertly performed by the Sydney Symphony Orchestra, augmented by two large choirs and vocal soloists singing in English as well as several of the languag-

es crafted by Tolkien. The special venue and performance, and for some the experience of drinking champagne in the Sydney Opera House, made for a very satisfying way of enjoying the movie.

When the spectacle was over, it was time for dinner and the group split up. Everyone found someplace to eat before reuniting in the Irish pub for a few beers with those who had preferred to spend their afternoon on the beach rather than in a concert hall.

Monday May 9

Cees Draaijer

Without being apocalyptical about it: this is our last full day in Australia. After another journey by train, we mentally awake transferring into a nearly group-sized "free nuclear science tours"-minibus at Sutherland railway station. On the road a marriage takes place between a superposition of GBE-participants. Asking about it causes a legally binding collapse of the wave function. After marriage comes the retirement home, which is the first impression we have of the Australian Nuclear Science and Technology Organisation (ANSTO). Luckily this only appears to be a group of pensioners visiting the ANSTO cafeteria.

Dave, paleontologist, and Robin, chemical analyst, introduce us to another facility at ANSTO: the Open Pool Australian Lightwater (OPAL) 20MW research reactor. It uses low enriched uranium for scientific, production and industrial purposes, i.e. providing the Australian hospitals with Molybdenum. A special interest is taken into showbizz. With the assistance of Oscar at the Geiger-Müller counter a genuine plate from Charlie Sheen's "Two and a half men" is determined to be highly radioactive. To see how the more cutting edge science (not edge cutting lines) is done, we enter the commonwealth restricted area in which most of ANSTO is located. Unfortunately we cannot bring any weaponry.

After getting an overview of the work done in the different institutes, from materials – to life sciences, we visit the 10MV Australian National Tandem Research Accelerator (ANTARES): a state-of-the-art facility for ion beam analysis and accelerator mass spectrometry. A real safari follows at the Bragg Institute. We see how Koala, a Laue diffractometer, and Emu, a high-resolution backscattering spectrometer, are fed neutrons by OPAL.

In the evening, rather than just neutrons, most of us have something like "signature mixed grill" and a few glasses of wine. From the Star Bar we do scatter into two principal directions: the Irish pub and the Side bar. Here, independently, shocking events occur. Since their descriptions are unsuitable for printing, reference is hereby made to Monique, Oscar and myself.

Tuesday May 10 and Wednesday May 11

Ricardo de Ruiter

Tuesday morning, May 10, would be the last morning we would spent in Australia. The morning was mostly filled with packing the last pieces of luggage, looking for that last thing you almost forgot, while for some others, this morning was spent by having a nice, decent English breakfast. Later that morning, we all gathered in front of our hostel one last time, waiting for the buses to arrive. They would bring us to Sydney International Airport from where we'd fly back to Frankfurt via Hong Kong.

At the end of the morning we checked in our luggage at the airport and went through customs, waiting for the departure of our flight. Here we already said goodbye to one of the members of our group, who took a different flight over Malaysia, to Amsterdam. By the clock of 2 pm, we were allowed to board the plane and only after a short while, we departed, starting the 9-hour flight to Hong Kong.

Most of the time on the plane was spent with listening music, watching television or films, reading or sleeping. Doing so made time pass by more quickly than expected, and we landed in Hong Kong by 9 o'clock that evening, local time. Here we had to wait for a few hours before we'd get our transfer flight to Frankfurt. Despite arriving on time, however, the departure from Hong Kong was delayed by unfortunate local weather conditions. Because of this, we had to wait 2 hours in the plane before leaving. Fortunately, the cabin crew provided us with extra drinks and sandwiches, and by 2 am we left Hong Kong, flying back to Frankfurt on another 11 to 12 hour flight.

At around 7.30 am, we arrived in Frankfurt from where we would take the train back to Groningen. We had a transfer in the city of Köln, from where we would travel to Arnhem. From Arnhem we travelled back to Zwolle. During this trip, another group member left the group to travel home directly. The same happened in Zwolle, where several group members went their own way. In the end, the remainder of the group arrived in Groningen safely. The excursion proved to be intriguing, exhausting and fun and taught us a lot of things about the work done at the companies and the universities we visited. Unfortunately such a journey has to come to an end at some point, but most of us will probably go back to Australia sometime later in our lives.

Organisation


Martine


Monique
Keri

From the chairman

Monique Ankoné

After the GBE to Brazil and Argentina in 2009 I made up my mind: I wanted to organise the next GBE. However there was one problem. I wanted to graduate the same year. To be in the organisation I had to be a member of the student association FMF which meant that I had to be a student. To solve this, I decided to graduate anyway and start another master!

In January 2010 was our first meeting. The meeting was all about deciding where we would go, the name of our committee and what our logo would look like. These were the things on the agenda; however these things doubled very quickly. Before I knew it, we were already halfway. Especially the chairman has the job to organise everything but finishing your master while your computer is crashing at the same time, is pretty stressful.

After graduation I totally focused on the organisation of the GBE and while the meetings became longer they also became funnier. To get in the Australian mood, each cookie dinner we all drank Australian red wine. Very soon everything went according to schedule. Then the day came of the go/no-go meeting where the board members of the Foundation GBE-FMF decided that we could or couldn't proceed with the study trip. We got a GO!

I still had one favour to ask my boss… Because in the meantime I started the master of education and worked at a high school. Luckily after a couple of arrangements, the only thing my boss said was: have a good time Down Under! And that was exactly my plan!

Then, finally, after one and a half year of hard work, the first day of the journey began: the day of departure. My hands hurt of crossing my fingers and hoping that everything went well and that we didn't have to deal with (big) problems. It helped, because everyone was on time in the early morning of the 19th of April and while we were on the train we started our journey to Down Under.

Arriving in Melbourne we took the bus to Southern Cross and walked for the first time

in the city of Melbourne to our hostel. In the hostel everybody was exhausted and went straight to bed.

In the first couple of days we had planned all kinds of tours due to Easter. The Great Ocean Tour and the Phillip Island Tour were some of the first things that our commissioner for the excursion program arranged and was thrilled about. She was right! The tours were a lot of fun and they were made even better due to our tour guide, Dave. He could tell us plenty about the Australian culture and stories and had always an appropriate song. Of course we cannot forget the 'minties', because at the end of the tour we had a little quiz and with each correct answer you could win a mintie!

Hereafter the scientific program started and we visited SKF and the University of Melbourne among other things. After a week and a half in Melbourne it was time for Sydney. Very carefully I told the treasurer, Jelle, that I had a funny feeling about the flight to Sydney. That's something I shouldn't have said. The plane was ready to fly and all of a sudden the pilot announced that the board computer was broken and that we couldn't fly!

Three hours later we heard that the flight was definitely cancelled. Jetstar arranged another flight for us, although from the other airport in Melbourne. While the committee thought that the worst was over and our stress level sunk a little, the worst had *jet* to come. Arriving at the airport we had only ten minutes (!) to check-in. It most certainly will not surprise you that not everybody could check-in on time. Luckily, those eight people could take a flight one hour later. The total stress level sunk again when the whole group was reunited in Sydney!

The first day in Sydney everyone explored Sydney in their own way. While some ran straight to the Opera House, others went surfing. In Sydney we had a busy programme. Beside the Blue Mountains and Canberra, we visited Sydney University, Shopfront, Philips Dynalite, CSIRO, Blue Scope Steel, ANSTO and the Sydney Observatory. Everything went according to plan.

Looking back I have to say that I had a great time organising the trip and of course during the journey itself. We had also an amazing group who listened carefully, did not cause any problems and therefore I would like to thank all the participants! Of course I also want to thank my cookies (Keri, Kim, Martine and Jelle) for their hard work and for the fun we had during our meetings and cookie dinners.

Finally, I have to say that I am glad that I studied a little longer, because who wouldn't do the same for such a great trip?!

From the treasurer

Jelle Blijleven

What a ride..! Twelve months of preparation to make sure three weeks of intensive programme work out fun and smoothly, the last weeks before the trip stressing together with the committee, only to come up with new programme even during the journey itself…

Already in April 2009 I was inspired by the study trip of that year to Brazil and Argentina. That was such a great experience, and I figured it would be neat to organise something like that myself as well. So it came that in 2011 Keri, Kim, Martine, Monique and myself were put to work, brainstorming over our destination. It was soon clear that we wanted to go Down Under! A choice I didn't regret, not even as a treasurer. Who would go to Australia in times of financial uncertainty, a western country with a high living standard to be reached after a day-long flight, the sixth largest country in the world where travelling from one place to another takes hours, a country with deserts, amazing aboriginal culture, magnificent mountains and shores, a laid-back attitude, famous landmarks and buildings… I think I gave it away already.

In the time we organised the trip I learned much. For the trip we needed a website, a logo, a name, letter paper, financial reserves and planning, a final report – things I had not done before and were a very fun experience to get to know. Having the task of handing out the pocket money every day was tough though. And to control every spending and receive all the money, every penny going through your hands — hard times.

I must say one cookie's wine gusto made a lot of our brainstorming much easier. Selecting participants together, trying almost every member of staff in the faculty only to find that most of them have young kids and a wife to remind them of it. We were very lucky to have Gerco with us, he was great company (one more beer)!

To describe the trip itself is almost impossible since there were so many impressions in such a short time, but I can try. We started in Melbourne. A great city with an extensive tram system which I used happily with other students — we really discovered the art of 'tramhopping' there. Melbourne is friendly and, typically Australian, has free barbies in the parks. At night we enjoyed ice cream on the Yarra river banks whilst the decorative flames burst out above us. Barbecuing with the whole group in the park as twilight fell and the possums (strange local marsupials the size of a cat) came to visit us. The hostel in Melbourne was great, you did not even need to go into town to find entertainment — many nights there was music in the bar and I'll never forget the electrical guitarist who played fabulously (although completely over-amplified) and drank as much beers as he played songs. The trip started out really nice with some relaxing days. Seeing the small penguins on Phillip Island come ashore and find their nests, and their calling, fluffy young. Many of us opted to take a swim in the "Blow Hole" ("swimming not recommended"), an amazing sight with the waves rushing and crashing in through the small entrance almost flooding the beach to where we were. The Twelve Apostles along

the Great Ocean Road were fantastic, the spray of the sea constantly around them and the sun shining god rays through the clouds. I saw my first koala in the wild! In the rainforest there were trees of a thousand years old that would regenerate every time after a great bush fire, a major ecological drive in Australia we would hear more about in a talk in Sydney.

Sydney was very different. Of course there are the Opera House and the Harbour Bridge which make it a unique city, but it is also much larger than Melbourne and, at least in the centre, more compact and very busy. We stayed in Chinatown and here we'd take buses with our all-day-travel passes to Circular Quay, where we could take the ferries to the outlying parts like Manly Beach. Good Thai restaurant over there and —a very good idea!— many restaurants are BYO: bring your own (beverages)! Take those ferries anyway, because the view on the Bridge and Opera House is very good. I also remember the aftermath of a visit to Shopfront's staff, who then took us on a tour through the city ending in the Hero of Waterloo bar in The Rocks. They had a history of a ghost, a Poltergeist on their premises… Really unforgettable for me was the Ku-ring-gai Chase national park we visited with a small group on a free day. Of course we took the public transport, but we didn't realise we would have to walk a long way already just to get into the park from the train station… Walking in the park boiled down to being very alert for spiders the size of a hand in their path-spanning webs. Or so we thought — another thing to take care of is the time you leave the park, because dark falls quickly and you wouldn't want to get caught in pitch dark between the mountains, somewhere in a rainforest a long way from Sydney… We were only slightly lost and very happy and excited when we at last discerned which way the Gibberagong track went in the near dark: over some rocks across a stream we had to wade through with bare ankles, back to Wahroonga. By the way, they say fresh water streams are home to leeches… Let's leave it at that two members of the group unintentionally collected some local fauna that day.

Space is too scarce, but I cannot resist mentioning that we listened to a talk about the Bubonic Plague in Kazakhstan researched with Google maps, that we went to the NASA space centre in the outback around Canberra and saw ancient rock paintings of the aboriginals, even some places hidden from public eyes! Or the Blue Scope Steel factory — walking on the stairways with intense infrared heat beaming in your face from the just forged steel bars between huge machineries.

Setting up and being part of this journey was thrilling and I had a lot of fun with all the participants and our staff member. And, above all, with the committee! Hearing about the local research going on in Melbourne and Sydney, doing and seeing so many interesting things in between was great. We wanted to go to Australia at the other side of the globe, we did it, and it was a fantastic experience!

From the commissioner of business relations

Martine Schroor

As members of the organising committee my colleagues and me had quite a lot of work to do before we were able to set out on our big adventure in Australia. After all cases had been brought in, my job as a business-steward ended quite early as Keri took over the remaining work and I more or less turned into a 'jack-of-all-trades'.

The bringing in of cases though, was all but easy as a result of the economic crisis, whereas the whole enterprise ultimately depended on sufficient private funding. This final report is proof of the success of our operation.

On April 19 2011 we finally were able to take the train to Frankfurt and from there we took the plane to Melbourne, and although we had to leave in the middle of the night we nonetheless travelled in a pleasant atmosphere. Once arrived, the weather was less fine than I initially expected, presuming the 20 degrees or so we experienced more fitting to winter than to autumnal conditions in this part of Australia. We of course paid visits to a number of companies and institutions, on the ins and outs of which you will find information elsewhere in this report. What remained most clearly in my memory were the beautiful excursions we made in and around Melbourne, like along the impressive Great Ocean Road — where thousands of photos were taken, whereas the Penguin Tour took us on an visit to some very small and cute penguins.

On April 30 we left for Sydney which took some trouble because the plane destined to take us there was out of order, and our party subsequently had to be divided among two other planes. The committee anyway kept cool and everything was arranged in good order.

Sydney to us meant a rather full programme, partly as a result of the many days off we had in Melbourne. The most pleasant excursion in my opinion was our visit to Blue Scope Steel, where everyone was able to criss-cross and view selected production facilities under protection of helmets, glasses and blouses. All in all no redundancy considering the heat of freshly made steel coming out of the blast furnaces.

After having paid visits to several companies, we finally had a day off in the Blue Mountains, where everyone could go his own way and I went mountain biking. A very

cool sport that is, except of course the return trip mountain upwards! With pain in our hearts we had to pack on May 10 for the journey homeward, where we arrived the day after in very warm weather. We all look back to a great, unforgettable journey and who knows, maybe one day I will return to Down Under.

From the commissioner of business relations

Keri Vos

When the board members of the Foundation GBE-FMF asked me to be part of the GBE committee, at first I had some hesitations. Luckily for me the board members where very convincing, with their stories about previous trips! So in January 2010 my GBE adventure started! And what an adventure it was. Almost one and a half year later I can look back at a fabulous journey, a great adventure, in which I learned a lot!

While writing this page, I realise that one page wouldn't be sufficient to describe the process, the trip, the late nights, the fun, the frustration, the hard work, the very late and long meetings, the relaxing days in Melbourne, the days back and finally the end of our committee. So let me give you a glimpse.

After joining the committee, I soon learned that Jelle, Martine, Kim en Monique where my partners. Our first task was to decide on the destination and Australia came out as the favourites. The Kookaburra, the laughing bird, became our mascot, with the K replaced by a C, as a tribute to captain Cook! Then the real work began.

I was commissioner for business relations, a task I shared with Martine. All participants had to do a case study. These case studies are small projects assigned by a company or institute. The major part of our finances came from these cases, so it was a pretty stressful job! Many phone calls resulted in a: "I will ask around if we have something, and call you back", which they didn't. A lot of unreturned phone calls, redirected phone calls, persuasion, and some new ideas later, we found a case for every participant!

I liked my task, since as a theoretical physicist I wanted to know what possibilities there are working for a company and as a business commissioner I got a good idea of this! When all students had a case assigned, the only thing left was supervision of the cases. Luckily all participants were very eager to go on the trip, so all went well!

Since the cases were mainly taken care of, our attention was drawn to the programme! Many frustrating days went by, some days ending with me and Kim in a very dark NCC trying to call to Australia. When trying to organise the programme we already found out some of the relaxing culture of Australians, which was of course for us sometimes a bit frustrating.

In the end we were able to present a nice, full, but not too busy programme! So we got a go from the board.

Arriving in Melbourne on the first day, tired, I already got a good impression of the city and its people. Though Australian customs are said to be the strictest in the world, I thought they were relaxed, chill, happy to see tourists! On our way to the hostel we could already see what an enormous city Melbourne is, and as we were also told later on, Australians like their cars and six bedroom houses, so the city was enormous en expanding every year, but with enough roads for all the cars!

Seeing Melbourne by daylight and luckily sunshine was a spectacular sight! Parks everywhere, the nice Yarra river, rippling through the city, not too many high buildings and the

best part a nice and clear city centre! A tour given on our first day by Matt, a Melbournian student which we met in the Netherlands, showing us some nice places and the beach, I got even more enthusiastic about the trip, what a city! The Easter holidays were a good excuse to take two beautiful excursions, one to Phillip Island where we could see the cutest, smallest penguins ever! Especially Kim was looking forward to this moment for a long time! For me the tour on the Great Ocean Road was one of the best days! A tour with a crazy driver, 24 singing Dutch students, beautiful views, swimming in a gorge, seeing koalas in the wild and of course the twelve apostles (read: four stones)! What more could you wish for, and how can you better describe the Australian 'chill-lax' mood?

After Easter our scientific programme began with a visit to the Synchrotron, a highly diverse programme at Melbourne University, a visit to SKF, the largest bearing company in the world and a visit to RMIT, with some interesting talks about what problems mathematics can help you solve.

A delayed flight, a cancelled flight, a bus trip, another flight with half of the group, and then finally a minivan brought us in less than twelve hours from chill Melbourne to busy Sydney (800 km). Having complained about noise in Melbourne, where they decided to empty a thousand containers full of glass at 5 am next to our window, in Sydney it was worse! The rivalry between the cities apparently even stretched to our beds! Luckily our programme in Sydney was so full that I could sleep anywhere!

Sydney sparkled at night, with the beautiful Opera House, the Harbour Bridge and all the skyscrapers (not all dimmed by Philips Dynalite), which all could be admired from the public ferries. Unfortunately there were no trams in Sydney, which was a shame, since 'tram-cruising' was my new and extremely relaxing hobby in Melbourne, but the ferries made up for it. After a firm walk through Ku-ring-gai Chase national park, where Gerco and me even got a little black souvenir, the next day our programme in Sydney began. The beautiful campus of Sydney almost convinced me to stay in Australia. For me our last visit to the ANSTO, a centre for nuclear research was interesting. And the talk about aboriginal astronomy even resulted in us going to Ku-ring-gai (again) to see aboriginal drawings.

In the weekend we visited the Blue Mountains, which are only two hours by train away from Sydney! The Giant Stairway (900 steps) brought us into the valley, away from all the tourists, and we had a fantastic walk, with beautiful views, lots of cascades and waterfalls. And then the next day on Manly Beach, with amazing waves, fairly hot sea water, though the temperature on the beach was not that nice.

After these three weeks our adventure in Australia ended, though it will not be forgotten soon.

Let me end by thanking all participants for

being little 'sheep' when necessary, for all the nice dinners, the nights outs, the fun and their support, I had a really great time. Thank to the board members of the Foundation GBE-FMF for giving us advice and support! And finally thanks to Jelle, for looking after the money, a woman could not have done it better. Thanks to Martine and her fresh look, and the joined annoyances when busy for the cases. Thanks to Kim for all the nice Kim&Keri moments in Australia, all the enthusiasm in the preparations and for not giving up when emails were not responded. And thanks to Monique, who did an excellent job in keeping everyone on the good track.

So chill-lax and no worries!

From the commissioner of foreign relations

Kim van Oost

"Not so fast, I'm almost standing still" I yelled to Ivar who was cycling ten metres before me up the hill. I was out of breath so I stepped off my bike and decided to walk further. While walking I could also enjoy the nice view from our surroundings. Today we were mountain biking in the Blue Mountains with Oscar, Martine and Coen. After a few seconds also Ivar had to step off his bike and he told me that not even in the Tour de France they have to climb such a steep mountain. So probably it was a bit stupid to think that we could do it. Although it was really exhausting to cycle in the Blue Mountains, it is probably the most beautiful place I have ever been mountain biking. It was again another terrific day of our trip Down Under! But how did I end to get up here? To answer that question let's go back to the beginning of this adventure.

In December 2009 I applied for the committee GBE. I had never been out of Europe, so this would be a great opportunity to finally go to another continent. Soon I learned that I would be organising the GBE together with Keri, Jelle, Monique and Martine and I was the lucky one who got to organise the excursion programme!

First you have to pick a destination and when we finally decided to go to Australia I was really happy. I've always wanted to go to Australia and it would happen very soon! We were not sure which cities we wanted to visit. Melbourne and Sydney we knew for certain but we were still thinking of a few days Canberra. But now I am happy that we only visited Canberra for one day!

After we decided we would go to Sydney and Melbourne and we named ourselves Cookaβurra the real work began. I contacted a lot of staff members of our own university to ask if they had interesting contact persons in Australia for us. Furthermore I contacted the consulates of Melbourne and Sydney and I spent a lot of time on the internet looking for interesting companies to visit and for great cultural experiences which you must do once you're in Melbourne and Sydney. One can probably imagine that this takes a lot of time and that I received so many emails per day that sometimes it drove me crazy. But if I arranged another visit to a university or a company I was so happy that I didn't care anymore that it sometimes takes so long. At some point I even began to get used to the fact that because of the time difference I had to call to Australia in the middle of the night.

To keep the committee also informed on everything we saw each other almost every week. Once in the two weeks we spent the whole evening together just to get to know each other better and also the most creative ideas came in the evening after some drinks. On these evenings half the committee learned to drink red wine, thanks to our little addicted cookie, whose name I won't mention here.

There were a few things that weren't going as well as planned. For instance we had

trouble finding a second staff member to join us on our trip. Luckily Gerco talks for two and we didn't miss a second staff member at all during our trip! Also we had a lot of trouble finding a hostel in Sydney. A week before the go/no-go date was set we still hadn't found a hostel. Well actually we found a lot of hostels but they didn't respond to our calls and emails at all. So frustrating! We were of course very happy when we finally found a hostel and much happier when we got a 'Go' from the Foundation GBE-FMF. We would really be going to make this trip for which we already worked so hard!

On the 19th of April we gathered at Central Station at 4.15 am and our great adventure could begin! After a travel time of 34 hours we finally set foot on Australian land. All very excited for what was waiting for us the next three weeks, but also all very tired after the long travel, so we were glad to sleep on a normal bed.

I would like to mention some things that stood out for me during these three weeks. From the moment we booked the Phillip Island Tour I was already really enthusiastic to see the penguin parade and I didn't do a great job to hide this enthusiasm. It turned out to be so much fun to see all these penguins wobble onto the beach and into the bushes. It was also funny to see that they had actually made a road sign which said that you had to check under your car for penguins when you left the parade. Also feeding and petting the kangaroos was a fun thing to do, they were all so cute!

Furthermore I really enjoyed the landscape of Australia. During the Great Ocean Road we saw big waves along the coastline and with our trip to Ballarat and Canberra we could see a glimpse of the outback. Also our aboriginal tour, which we organised during our trip itself, was a success.

I was really proud of our scientific program too. We had very much luck with all the people who gave a presentation to us. Most of them were really fun to listen to and had interesting presentations. Also the tours around the facilities were a nice change from all the presentations. At the universities they had done a really good job to prepare a varied program for our group. And I am very proud of our committee that we searched out everything so well and that we were everywhere on time!

And of course the free barbies you can find through the cities, the 'bring your own' drinks to restaurants, aboriginals playing music on the streets, the creepy clown from Luna Park, the beautiful Opera House and Harbour Bridge, the fireworks at Darling Harbour, playing in the big waves, learning how to play pool, the great entertainer at Urban Central bar, the sundial which has its numbers going counterclockwise and always drinking one beer with Gerco in the evening were all great experiences which I wouldn't want to miss for the world!

But unfortunately, there comes an end to everything, so also to our trip. Time flies when you're having fun and I really didn't want to go back already, because I wanted to see so much more from Australia. Who knows, maybe in the future I will.

I'm really looking back to this year with a good feeling and a big smile. We had to arrange so many things and there was sometimes so much stress, but we did it. I want to thank everybody who helped us with the organisation, but especially my beloved Cookies! We put together a great excursion and I think everyone had a wonderful time. I can truly say that I had the time of my life!

Scientific Staff

In retrospect …

Gerco Onderwater

Somewhere last October (2010) Keri walked into my office and asked me whether I was interested to join the FMF study tour to Australia. The trip would last a little over three weeks time and would not interfere with my teaching schedule she told me (this turned out to be the first demonstration of the careful preparation by the organising committee). I have been curious about the way science is done in Australia, being so far away from the rest of the world. Also an opportunity to experience the unique flora and fauna of Australia first hand was high on my wish list. So I gladly accepted the invitation, even after learning I would be the only "senior" participant.

In the following months I learned that we would be visiting Sydney and Melbourne, the two largest cities of Australia. In the preparatory meetings I also got to meet the rest of the organising committee and the other participants, 23 young and ambitious students in (Applied) Physics, (Applied) Mathematics, Astronomy and Computing Science. All together an excellent combination that promised an interesting trip!

This promise was certainly kept. We were presented a diverse scientific program ranging from visits to industrial facilities (SKF in Melbourne and Philips Dynalite and Blue Scope Steel in Sydney) to various scientific research groups and facilities (among others RMIT, ANSTO and the Australian Synchrotron). The latter left me with the impression that Australia holds a strong position in astronomical and material science research and that there is significant interest in "applicable" research. Two examples of this are the mathematical modeling of forest fire prevention policies that is obviously relevant for Australia and the modeling of the rotation of bendable pendula in 3D,

which serves as an aid to the Australian diving team in perfecting their technique. We briefly visited the ATLAS group at Melbourne University, which built part of the detectors currently mounted at CERN in Switzerland. The emptiness of the lab confirmed my prejudice that participation in a worldwide collaboration is indeed difficult if you are from Australia.

In addition to the scientific programme there was ample opportunity to experience natural beauty (e.g. Great Ocean Road and Ku-ring-gai Chase national park) and city culture in two of the larger cities of the world (including Opera House and night life). What surprised me was that even in the direct neighbourhood of Melbourne and Sydney there are ample opportunities to escape the crowd and experience "wilderness" in one of the many natural parks. Here it should be mentioned that the public transportation system in both Melbourne and Sydney is excellent, even for getting to the somewhat remote parks! Melbourne and Sydney had quite a different "feel". Melbourne seemed less dense and more relaxed than Sydney, which felt more like a big city to me (as testified by the apparent need for a large number of security people). An interesting fact I learned about Australia was that it was perhaps the only Western society not suffering from the depression. The reason for this is the enormous amount of natural resources. Money is literally dug out of the ground!

This trip was a highly enjoyable experience to me, not in the least because of the pleasant atmosphere in the group, for which I would like to thank all participants. Despite being the only staff member on this trip, you never gave me the opportunity to feel alone! All this would have been impossible without the dedication and commitment of the organising committee. Monique, Jelle, Martine, Kim and Keri, well done!


I jump... I bite...
and I eat meat
so please keep your
fingers to yourself

Foundation GBE-FMF

When the sun rose for the first time, the god Bayame ordered the kookaburra to utter its loud, almost human laughter in order to wake up mankind so that they would not miss the wonderful sunrise. Or so the old aboriginal legend of the kookaburra goes.

We were positively surprised when we received word that the next Great Foreign Excursion (GBE) would go to Australia. Although the GBE has been to Asia three times before, Australia was apparently too big of a leap. However, proof to the contrary was provided when 24 members of the FMF set foot on this far away land.

The Foundation GBE-FMF is affiliated with the study association FMF for (Applied) Physics, (Applied) Mathematics, Astronomy and Computing Science. The Foundation basically instates a committee to organise a long-term excursion abroad for the FMF once every two years. Such an excursion is a great opportunity for students to explore exotic places, learn about the local technological status quo and experience a new culture first hand.

However, all the credits go to the organising committee: five driven persons working together to pick an awesome location, wrapping up the finances, finding students and scientific staff to go along and creating a well-balanced day-to-day programme. Notwithstanding that this sounds easy, many challenges and things to be done show up as the excursion takes shape. It is thanks to the mutual effort of Cookaβurra '11 that this GBE was possible and very successful. They have done exceptional and great work the last two years and although it was not always easy, they can be very proud of what they have accomplished. We are.

On behalf of the board of the Foundation GBE-FMF, I would like to thank all the people

involved in the organisation of the excursion Cookaβurra: without the funding from the University of Groningen, other subsidisers and the partners where case studies were performed, the excursion could not have taken place. Special thanks go out to all the contacts at the university here and abroad for help with the programme. A very big thank you goes to Monique, Jelle, Keri, Martine and Kim for their efforts in making this excursion unforgettable and a wonderful experience for everyone awakened by the call of Cookaβurra!

The Foundation will do its best to offer many more Great Foreign Excursions for the FMF in the future and this cannot be accomplished without enthusiastic students who organise or participate in the next Great Foreign Excursion, because getting there is half the fun!

During the Cookaβurra 2011 excursion the board of the Foundation GBE-FMF consisted of:

Samuel Hoekman Turkesteen (chairman)

Ivar Postma (secretary)

Martien Scheepens (treasurer)

Erik Duisterwinkel

Corine Meinema

Hidde-Jan Jongsma

Willem Kuipers (FMF board representative)

Financial Report

The next pages show the operating statement of the Cookaβurra '11 study trip, as per december 1 2011.

The bi-yearly study trips are supervised and administrated by a foundation, the Foundation GBE-FMF. Any revenues and expenses go through the foundation, which is non-profit. The foundation has some equity, or reserves, that are allocated into provisions for cases, organisation and computer materials. Because over the years finding cases has become more difficult, the median date of payment has shifted more and more towards the journey, whereas most expenses, in particular the airplane tickets, have to be paid in advance. The main reason, therefore, to keep a financial reserve is to increase liquid assets and reduce the sum of a short-term loan. We are very thankful to the Faculty of Mathematics and Natural Sciences of the University of Groningen that they can provide such a loan to us every time for free.

It is quickly deduced from the numbers that the trip did not make any profit, although some money was put into reserves. Specifically, the positive amount left by the previous trip has been used up, and the provision for cases was increased again. This provision had been used in previous years for an unexpected case money setback. This brings the total reserve up to the amount of two case studies again, of the same order as a typical loan needed for the trip.

The larger part of the expenses goes to travelling by airplanes and trains, followed by expenses for staying and living in Australia and excursions to see for instance the Aboriginal culture. Major financial windfalls were the final report, of which much fewer were printed and more sent digitally, and the local expenses in general, governed by a relatively good exchange rate of euros to Australian dollars. It should still be noted that Australia is a pretty expensive country to live in because of its western standards.

That the total expenses are lower than previous years is due to the fact that only one staff member was taken along and fewer participants were selected.

Revenues consisted of the fees of the participants, paid case studies by the participants, and subsidies. We are very thankful to the case providing enterprises, and also to the subsidiaries. Because of the financially positive result, they received about a third of their subsidies in refund. This brings the self-earned revenue of the trip to a, I might say, magnific seven out of eight parts.

Operating Statement

December 1 2011

All numbers in euros and rounded to integers.

Revenues

Case studies	€ 34 200
Deloitte GasTerra INCAS³ Philips Schut SKF Stichting Math4all University Centre for Learning & Teaching (UOCG) University Library (UB) University Medical Center Groningen (UMCG)	
Participation fees	€ 21 700
Subsidiaries	€ 8 416
European Physical Society (EPS) Foundation for Fundamental Research on Matter (FOM) Fysisch-Mathematische Faculteitsvereniging (FMF) Koninklijk Wiskundig Genootschap (KWG) Nederlandse Natuurkundige Vereniging (NNV) Stichting Groninger Universiteitsfonds (GUF) Stichting Niemeijer Fonds University of Groningen — Centre for Theoretical Physics (CTN) University of Groningen — Faculty of Mathematics and Natural Sciences (FWN) University of Groningen — Communication Office University of Groningen — Johann Bernoulli Institute for Mathematics and Informatics (JBI) University of Groningen — Kapteyn Astronomical Institute University of Groningen — Kernfysisch Versneller Instituut (KVI) University of Groningen — School of Computing and Cognition (OIC) University of Groningen — School of Natural Sciences and Technology (ONT)	
Total	€ 64 316

Expenses

Organisation		€ 3 263
Banking	€ 405	
Foundation and Committee	€ 579	
Participant Meetings	€ 1 231	
Promotion amongst Students	€ 108	
Gifts Foreign Contacts	€ 179	
Representation	€ 561	
Computer Write-off	€ 200	
Printing and Stationery		€ 1 221
Final Report	€ 970	
Letter Paper	€ 149	
Printing	€ 102	
Journey — Travel		€ 41 437
Airline Tickets Frankfurt-Melbourne Sydney-Frankfurt	€ 28 218	
Airline Tickets Melbourne-Sydney	€ 1 011	
Train Retour Groningen-Frankfurt	€ 1 859	
Public Transport	€ 4 348	
Excursions	€ 6 002	
Journey — Stay		€ 18 134
Hostels	€ 8 675	
Meals	€ 9 323	
Telephone	€ 96	
Visa	€ 40	
Provisions		€ 260
Provision Cases	€ 850	
Provision GBE '11	-€ 590	
Total		€ 64 316

Acknowledgements

Board of the Foundation GBE-FMF

- Samuel Hoekman Turkesteen
- Ivar Postma
- Martien Scheepens
- Willem Kuipers
- Erik Duisterwinkel
- Corine Meinema
- Hidde-Jan Jongsma

Board of Recommendation

- Mr. dr. J.P. Rehwinkel (Mayor of the Municipality of Groningen)
- Prof. dr. J. Knoester (Dean of the Faculty of Mathematics and Natural Sciences)
- Prof. dr. K.H.K.J. Jungmann (Director of the Kernfysisch Versneller Instituut)
- Drs. P. de Wit (President-Director of Shell Nederland)
- Prof. dr. F. Zwarts (Rector Magnificus of the University of Groningen)
- H E Ms. L. Morton (Ambassador of Australia to the Kingdom of the Netherlands)
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