DEAKIN UNIVERSITY

FACULTY OF SCIENCE, ENGINEERING AND BUILT ENVIRONMENT

Research Development Workshop Series   **Workshop 4 2014**

"Dealing with the ARC"

Monday 3 November via video conference

Notes and documents following the workshop

Chair: David Cahill. Associate Dean (Research)

Invited speakers for this workshop

- Professor Neil Barnett, Personal Chair, School of Life and Environmental Sciences.
- Dr Anne Brocklebank Proud, Research Grants and Analysis Manager.
- Professor Wanlei Zhou, Head of School, School of Information Technology.

Secretary: Teresa Treffry

…Contents…

This is the fourth in a series of 5 workshops. The remaining workshop in this series is as follows, it will be by VMP to all campuses. The format allows for discussion and questions following presentations from invited speakers.

Faculty Research Development Workshops		
Workshop 5	**Leading by example: Future Fellows & DECRAs** *Speakers for this workshop are* **Associate Professor Paul Francis,** ARC Future Fellow **Dr Jacqui Adcock**, ARC DECRA Research Fellow **Associate Professor Kate Buchanan,** ARC Future Fellow **Dr Lee Rollins** ARC DECRA Research Fellow	**20 November 2-4pm** *Burwood SCI-L1.05 *Warrnambool J2.19 *Waterfront D4.154 *Waurn Ponds KA 4.207

This is the fourth in the series of Faculty research workshops, aimed particularly at middle and early career researchers. The theme today is 'Dealing with the ARC'… which on the face of it sounds a daunting prospect, perhaps engaging with the ARC for a successful outcome may be considered a better term.

We are fortunate in having three eminent speakers for this session, who are able to provide insights into the process from three very different viewpoints. That of a manager of research grants, a member of the ARC College of experts and one of Deakin University's most successful ARC and Linkage grant winners

Guest speakers for this session are:

> **Dr Anne Brocklebank Proud,** *Manager Research Grants and Analysis. A new role within SEBE and an important one for the faculty. Anne brings a wealth of experience to the area, having previously spent 10 years working with Deakin research in the grants office*

> **Professor Neil Barnett,** *Neil holds a personal Chair in the School of Life and Environmental Sciences and is a member of the ARC college of Experts for the Physics, Chemistry and Earth Sciences group. Receiving a DSc from Deakin University for his contributions to analytical chemistry in 2005. Neil has been active on numerous committees of both the Royal Society of Chemistry and of the Royal Australian Chemical Institute for more than three decades. He has co-authored over one hundred and seventy papers and is one of the editors of Analytica Chimica Acta.*

> **Professor Wanlei Zhou,** *currently the Head of School for the School of Information Technology. Wanlei is an Alfred Deakin Professor, (the highest honour the University can bestow on a member of academic staff), and one of Deakin University's most successful ARC and Linkage grant winners. His research interests include network security, distributed and parallel systems, bioinformatics, mobile computing, and e-learning. Professor Zhou is a senior member of the IEEE (Institute of Electrical and Electronic Engineers) and has published more than 200 papers in refereed international journals and conference proceedings.*

Presentation 1

Dr Anne Brocklebank Proud, worked as a medical scientist before joining Deakin University as a grants officer and gaining Australasian Research Management Society (ARMS) accreditation.

Drawing on ten years of experience in the Deakin research Grants office, the following presentation shows the track record for the Faculty over the past 5 years, gives an overview of where SEBE stands at present and notes the areas for improvement.

Poor outcomes for a previous Linkage round and an even worse NHMRC round have led to the development of a new process for category 1 grants, with the aim of implementing an improved, streamlined process across the University. This is also detailed

Initially this will mean looking at the NOIS much earlier next year (*perhaps May or June*) so that recommendations regarding development and the next steps in the process may be given. The proposed SEBE process is now on the website in draft form.

In response to the questions; why do applications fail? How do we move more applications into the near miss area? What makes a successful application? The following points are made.

- Two of the main reasons why applications are unsuccessful are the track record and /or serious questions regarding the methods section.

- Remember that even assuming a 20% success rate a number of applications in the 'Excellent' categories will still not achieve funding.

- Don't give up the first time - All being well a near miss application can be worked up and go back.

- Take heed of all the assessors remarks and be careful with the makeup of your team, noting that the criteria for Partnerships allocates 25% to track record but this is only 20% for Linkage applications.

- As for the causes of success, these are more difficult to define but two reasons suggested by Melbourne University are the number of A* papers and the seniority of partners. (*Though it was agreed that this is open to debate.*)

The full slide presentation from **Dr Anne Brocklebank –Proud** follows

SEBE WORKSHOP DEALING WITH THE ARC

NOVEMBER 2014

ANNE BROCKLEBANK PROUD –
MANAGER, RESEARCH GRANTS & ANALYSIS, SEBE

ACKNOWLEDGEMENTS – NEIL BARNETT

DISCOVERY AND LINKAGE

- Where SEBE is at right now
  - compared with the rest of Deakin
  - compared with the national average
- Where should we be heading?
  - areas for improvement
  - new Category 1 process

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ASSESSMENT CRITERIA

ARC Discovery scoring scheme:

Investigators*	40%
Project Quality and Innovation	25%
Feasibility and Benefit	20%
Research Environment	15%

* relative to opportunity

SEBE'S LAST 5 YEARS - DISCOVERY

SEBE	2010	2011	2012	2013	2014	2015
Applications	28	22	19	14	24	18
Successful	1	3	1	2	3	??
Unsuccessful	27	19	18	12	21	??
Success rate	4%	14%	5%	14%	13%	??
Unsuccessful - top 10%		1	1	1	0	??
Unsuccessful – band 11-25%		2	1	0	4	??
Unsuccessful - not in top 25%		15	15	11	17	??
Ineligible		1	1			
Percent not in top 25% unsuccessful	0%	68%	79%	79%	71%	??

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SEBE Success Rate last 5 years - Discovery
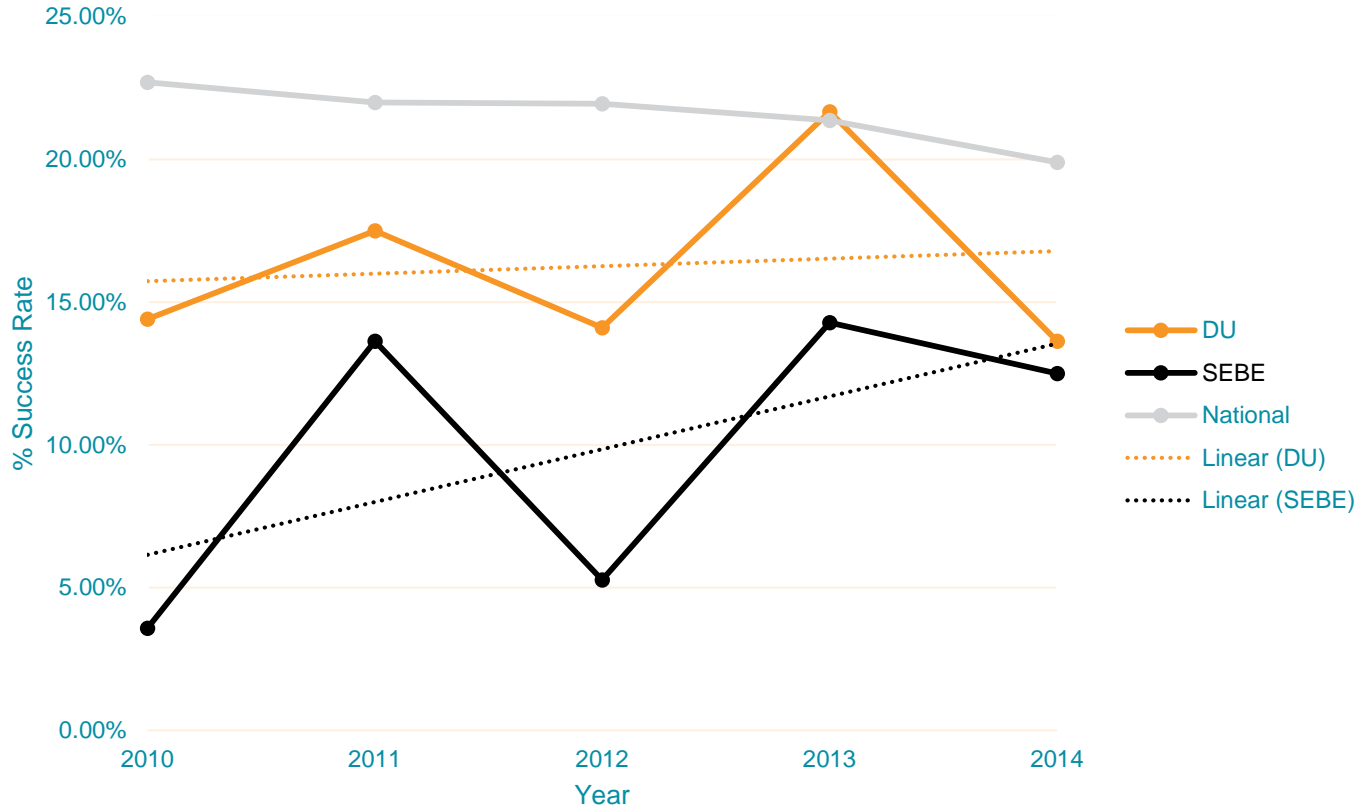
IN A PERFECT WORLD 1…

SEBE	2010	2011	2012	2013	2014	2015	2015 predicted average	Assuming a 20% success rate…
Applications	28	22	19	14	24	18	18	100
Successful	1	3	1	2	3	??	4	20
Unsuccessful	27	19	18	12	21	??	14	80
Success rate	4%	14%	5%	14%	13%	??	22%	20%
Unsuccessful - top 10%		1	1	1	0	??	1	8
Unsuccessful – band 11-25%		2	1	0	4	??	3	12
Unsuccessful - not in top 25%		15	15	11	17	??	10	60
Ineligible		1	1					
Percent not in top 25% unsuccessful	0%	68%	79%	79%	71%	??	56%	60%

IN A PERFECT WORLD 2…

Scoring band	Criteria	
A	**Outstanding:** Of the highest quality and at the forefront of research activity. Approximately 10% of Proposals should receive ratings in this band.	**Recommended Unconditionally**
B	**Excellent:** Of high quality and strongly competitive Proposal. Approximately 15% of Proposals should receive ratings in this band.	**Strongly support recommendation of funding**
C	**Very Good:** Interesting, sound and compelling. Approximately 20% of Proposals should receive rating in this band.	**Conditionally support recommendation of funding**
D	**Good:** Sound, but lacks a compelling element. Approximately 35% of Proposals are likely to fall into this band.	**Unsupportive of recommending for funding**
E	**Uncompetitive:** The Proposal is uncompetitive and has significant weaknesses or major flaws. Approximately 20% of Proposals are likely to fall into this band.	**Not recommended for funding**

Assuming a 20% success rate…	
Successful	20%
Unsuccessful – top 10%	8%
Unsuccessful – band 11-25%	12%
Unsuccessful – not in top 25%	60%

SEBE last 5 years not in top 25% - Discovery
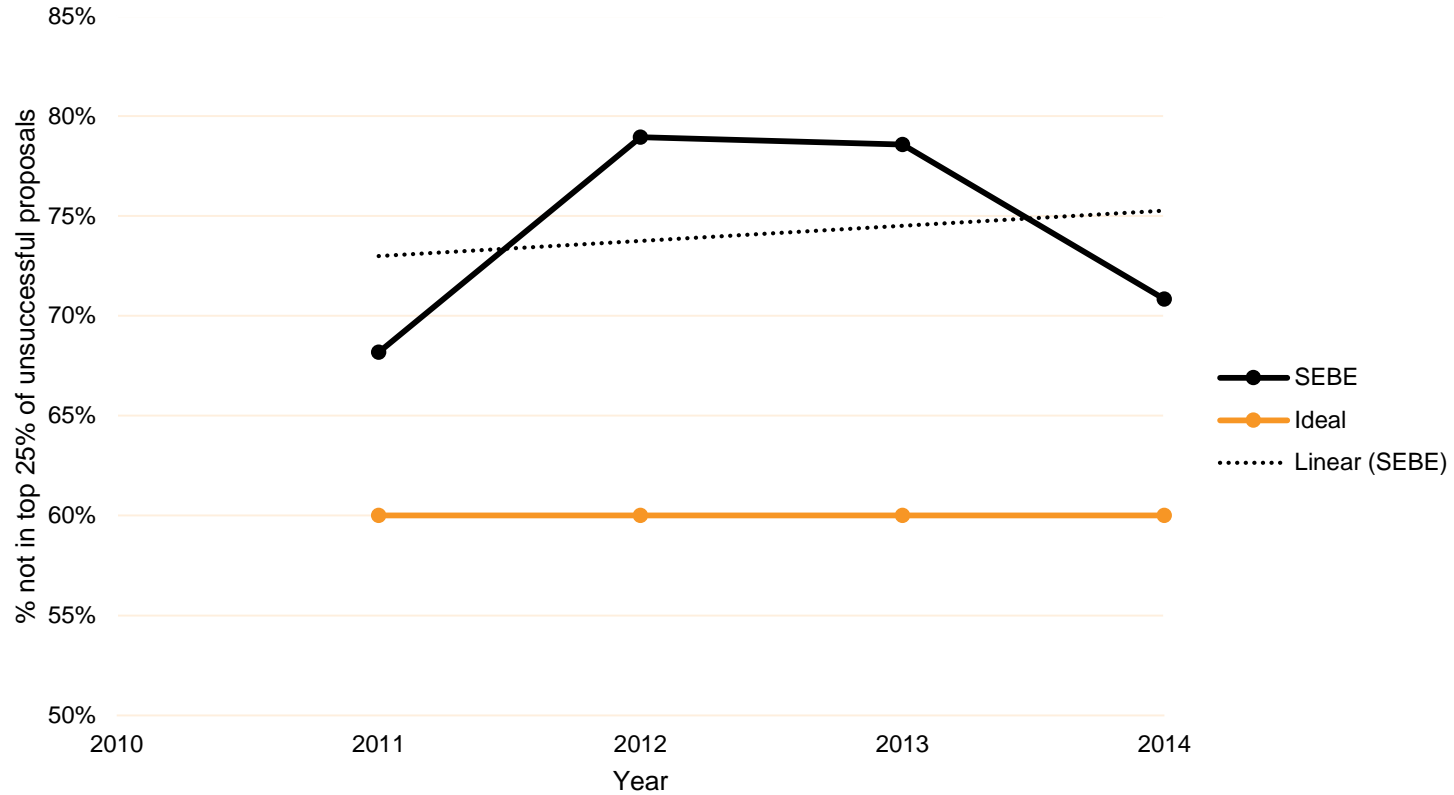
ASSESSMENT CRITERIA

ARC Linkage scoring scheme:

Investigators*	20%
Significance and Innovation	25%
Approach and Training	15%
Research Environment	10%
Commitment from POs	30%

* relative to opportunity

SEBE'S LAST 5 YEARS - LINKAGE

SEBE	2009 R1	2009 R2	2010 R1	2010 R2	2011 R1	2011 R2	2012 R1	2012 R2	2013	2014
Applications	3	0	4	5	3	4	4	5	9	8
Successful	0	0	3	0	0	1	1	1	1	3
% success rate	0%	N/A	75%	0%	0%	25%	25%	20%	11%	38%
Unsuccessful - top 10%	0	0		1	1	1	1	0	1	2
Unsuccessful – band 11-25%	0	0		0	0	0	0	1	1	1
Unsuccessful - not in top 25%	3	0		3	2	2	2	3	6	2
Percent not in top 25% unsuccessful	100%	N/A	N/A	60%	67%	50%	50%	60%	67%	25%

NEW CATEGORY 1 PROCESS

- "New Idea" form assessed by Panel (Team composition, CVs, first page of 10-pager, Significance/Innovation)

- Next deadline is for full 10-pager and brief budget – early December

- Process on SEBE Wiki;
  https://wiki.deakin.edu.au/display/SEBE/Research+Grants%2C+Fellowships+and+Travel+grants+for+Faculty+staff

FACULTY OF SCIENCE ENGINEERING AND BUILT ENVIRONMENT

Draft Timeline and Process for Discovery 2016

When	What	Who	Notes	Compulsory?
May – Jun 2014	New Ideas	Applicants work with School/SRC	Workshop/brainstorm ideas	No
Jul	Call for New Ideas EoI	Faculty	Call via e-mail with reminders	Yes
Sep 1	New Ideas EoI due	Applicants submit to Faculty	3-4 pages of information provided plus pubs:- • Title • Team composition – CVs, last 10 years' publications • 1st page Executive Summary • Brief Significance/Innovation • Brief Methods • Brief statement on Feasibility	Yes*
Sep 1 - 12	Assessment Panel	School/SRC Panel	• Assess New Ideas EoI proposals to go to full submission • Assign Faculty Mentor if required	Yes
Sep 15	NOIS	Faculty to DR grants	Advise DR grants of submissions proceeding to NOIS	Yes
Sep - Nov	Writing of full proposal	Applicants work with Faculty/ School/SRC and DR grants	Support and work-up of proposals to full submission: • DR grants workshops • Faculty ARC workshop • Faculty grantsmanship reviews • Mentor advice	No
Dec 1	Full Proposal	Applicants submit to DR grants with cc to Faculty	Full Proposal includes: • Final title • Final team composition with any new CVs/last 10 years' publications • 100-word summary • 10-page Project Description • Brief Budget/Justifications	Yes*
Dec 1 – 19	Internal review	2x other applicants	Grantsmanship review	Yes
Jan 2015	Submit full	Applicants	Faculty support for final submission:	Yes

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Presentation 2

Professor Neil Barnett, feels that he is privileged to lead of one of Australia's prominent analytical chemistry research groups and has served on various panels of the Australian Research Council (ARC) including the Future Fellowships Selection Advisory Committee in 2009 and 2010 and the ERA Research Evaluation Committee in 2012. In 2013 he was appointed to the ARC College on Physics, Chemistry and Earth Sciences group.

When considering the assessment process Professor Barnett believes that the outcome cannot be predicted and notes that there are a number of misconceptions about the ARC and how it operates. These misconceptions are addressed in the slide presentation (together with the assurance that none of these could be further from the reality!)

In the first instance potential applicants are advised to go to the ARC website for information http://www.arc.gov.au/ to note the rules for funding and to see who the relevant panel of experts are and who they should be addressing. The website lists every panel member and not all of them are from the group of 8 as might be expected.

In response to a number of questions the following advice and comments are offered.

- The peer review process is the only way to aid the development of your application. There isn't a formula and the panel discusses applications at length. Accept the feedback given and don't 'fish around' looking for other approval, work on what you have, before resubmitting your project.

- Be succinct, remember that not all panel members will be experts in your field. The educated generalist is your target audience. Again check the ARC website and see whom you should be addressing.

- The first page of your proposal is very important, the assessor needs to be convinced that it is interesting.

- Work should be original.

- Have a realistic budget and consider the question does this project deliver value for money?

- The applications must be outstanding. Examples of winners are given, if one of these is in your area make contact.

- Consider asking the successful applicant if you can view the grant.

- There is a perception that your team should include a professor from a group of 8 University. This is not necessarily the case but it is true that a member of the group of 8 will have more success because they have more people and therefore more applications.

- It is not mandatory that a proposal be aligned to a research priority area but the areas themselves are so broad it would be difficult to present a proposal that is not aligned to a priority area. Be aware of these.

- For ECR's and the question of how important publications are – yes this is a consideration but it is also very important to show that initial funding has been awarded and used well.

- To answer the question of, when is a track record ready? Be self-critical here, a track record is ready when it is competitive with those who have already been awarded grants.

- Again with reference to the track record and how career breaks are perceived. Senior members of the ARC are adamant that career breaks are taken into account. Track records are assessed on opportunity vs output. As stated on the ARC website *"The quality of Investigators involved in Proposals for funding under the NCGP (who meet the eligibility criteria) will be assessed on the basis of their Research Opportunity and Performance Evidence (ROPE), and other scheme dependent criteria."*

- What if your application has a PhD scholarship associated with it - how is this viewed? To answer; as any budget item, if it can be well justified then it will be acceptable.

- Regarding the observation that some areas have a higher number of successful applications than others and the relevance of this. – This is because more applications have been received for this area.

- As an assessor, how much time do you allocate for each application?
  - In the initial assessment, as a personal rule, one hour for every application, without exception. These may have to be read again during the moderation period.

- It is also important to make very clear that no assessor is allowed to review any application they may have a conflict of interest with. The ARC requires members of the ARC College of Experts to provide assurances that they will abide by the ARC's confidentiality requirements and will disclose to it any conflicts of interest related to their official duties as members.

- Where do you make the call of including someone on your application if, for example, you have a collaboration with someone overseas and they are unable to sign our agreement or are not able to be C1 because they have been on other grants?
  - In the first case, the real issue will be, is the team doing work in Australia?
  - In both instances it will need to be made very clear exactly how this team member will help the project – lead the assessor here, don't leave them to guess.

- Should we aim for Linkage rather than Discovery grants? Bearing in mind the need for category 1, we should be aware that we are in the best position to build on industry links. To assist with this the University has employed 2 new staff members as Research partnerships Managers for the Faculty. Dr Ashley Bowen (*who will liaise with the Schools of Architecture and Built Environment and Life and Environmental Sciences*) and Dr Steven Trpkovski (*Engineering and Information Technology*)
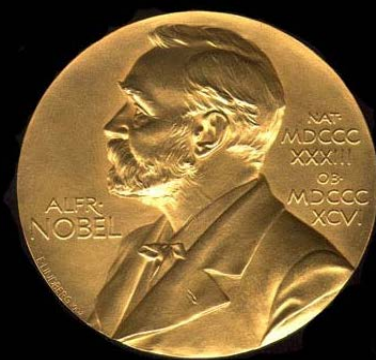
The full slide presentation from **Professor Neil Barnett** follows

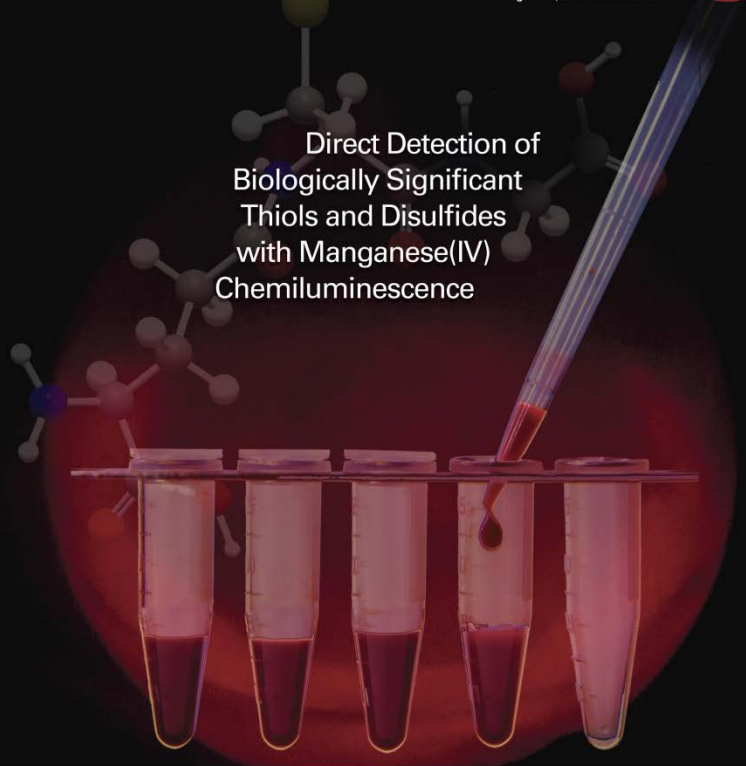# Australian Research Council (ARC)

Assessment?

Neil Barnett

Direct Detection of
Biologically Significant
Thiols and Disulfides
with Manganese(IV)
Chemiluminescence

The Process?

Discovery Projects (DP)

Support excellent basic and applied research by individuals and teams

Enhance the scale and focus of research in the Strategic Research Priorities

Expand Australia's knowledge base and research capability

Discovery Projects (DP)

Encourage research and research training in high-quality research environments

Enhance international collaboration in research

Foster the international competitiveness of Australian research

Discovery Early Career Researcher Award (DECRA)

Support and advance promising early career researchers

Promote enhanced opportunities for diverse career pathways

Discovery Early Career Researcher Award (DECRA)

Focus research effort in the National Research Priority areas to improve research capacity and policy outcomes

Enable research and research training in high quality and supportive environments

DP Selection Criteria

Investigator(s)	40%
Project Quality and Innovation	25%
Feasibility and Benefit	20%
Research Environment	15%

DECRA Selection Criteria

Project Quality and Innovation 40%

DECRA Candidate 35%

Research Environment 15%

Feasibility and Benefit 10%

Submission to ARC?
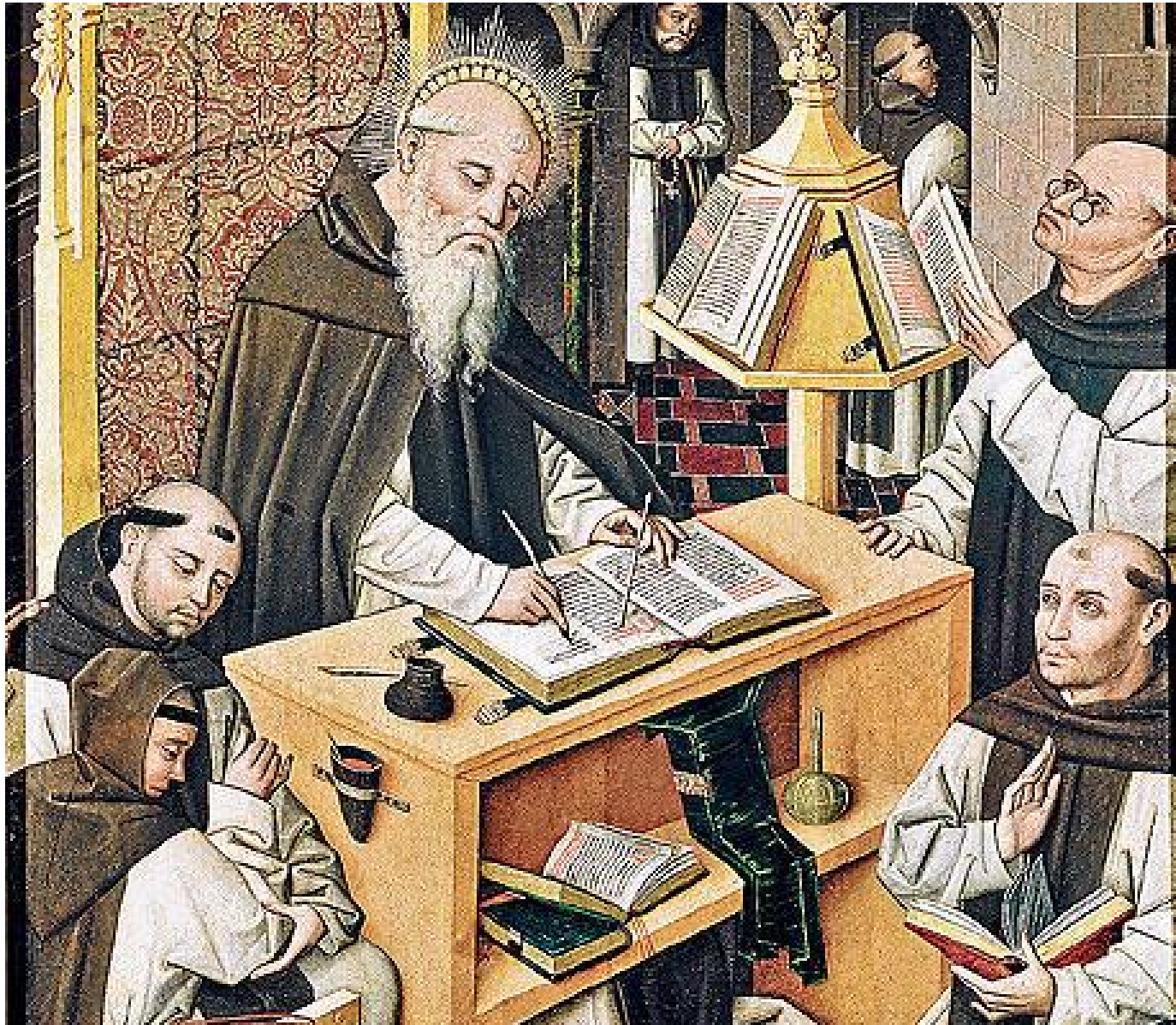
ARC College of Experts?

ARC College of Experts?

Australian Government

Australian Research Council

Peer Review Process
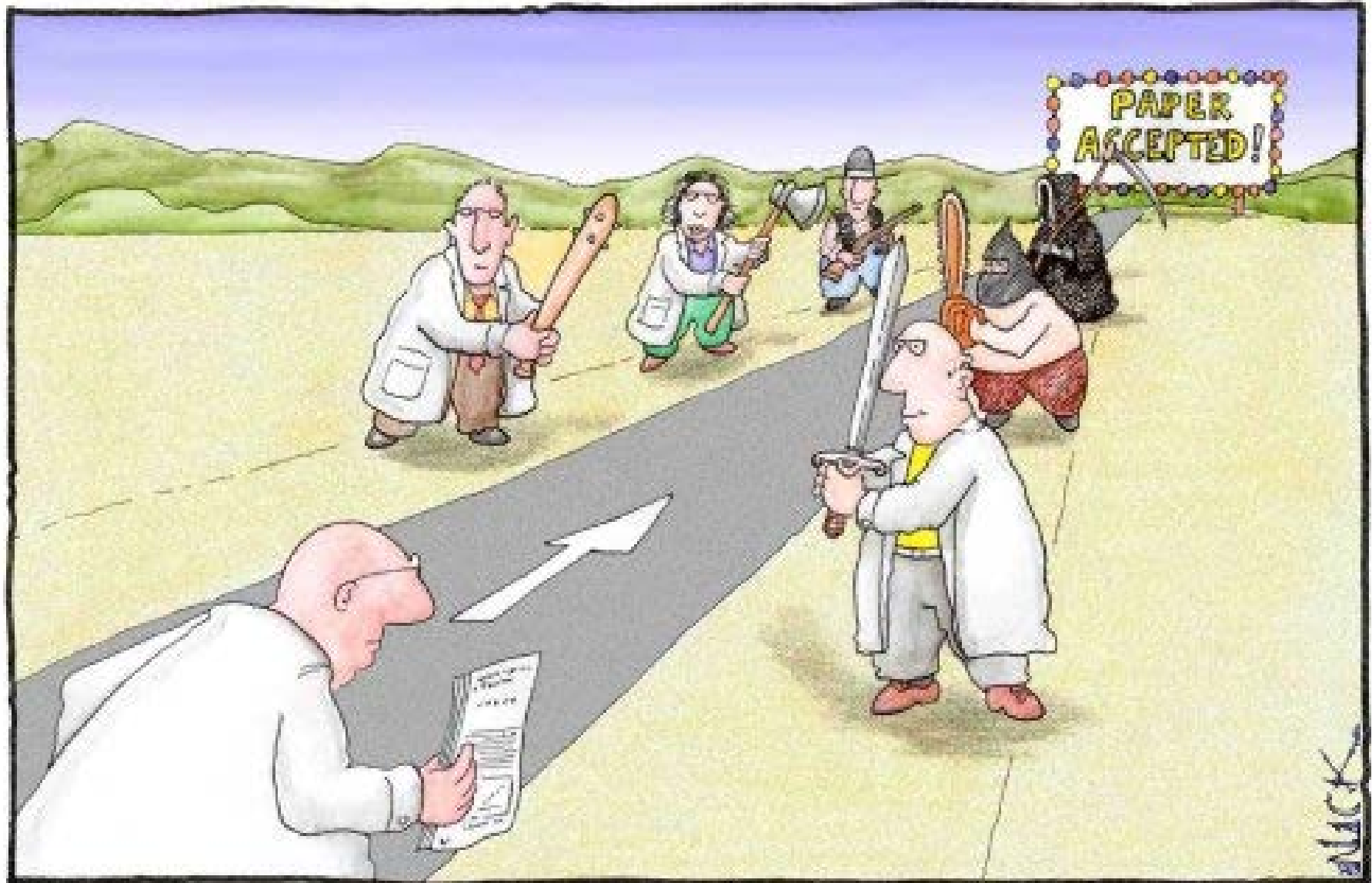
ARC College of Experts has five Panels

Two General Assessors (College)

Four Detailed Assessors (external)

A to E ratings on the selection criteria

ARC Panels

BSB Biological Sciences and Biotechnology

EMI Engineering, Mathematics and Informatics

HCA Humanities and Creative Arts

PCE Physics, Chemistry and Earth Sciences

SBE Social, Behavioural and Economic Sciences

Rating band	Criteria	
A	**Outstanding:** Of the highest quality and at the forefront of research activity. Approximately 10% of Proposals should receive ratings in this band.	Recommended Unconditionally
B	**Excellent:** Of high quality and strongly competitive. Approximately 15% of Proposals should receive ratings in this band.	Strongly support recommendation of funding
C	**Very Good:** Interesting, sound and compelling. Approximately 20% of Proposals should receive ratings in this band.	Support recommendation of funding with reservation
D	**Good:** Sound but lacks a compelling element. Approximately 35% of Proposals are likely to fall into this band.	Unsupportive of recommending for funding
E	**Uncompetitive:** Uncompetitive and has significant weaknesses or more fatal flaws. Approximately 20% of Proposals are likely to fall into this band.	Not recommended for funding

Ergo, A or highly rated B funded?

Assessments?

Two to four Detailed
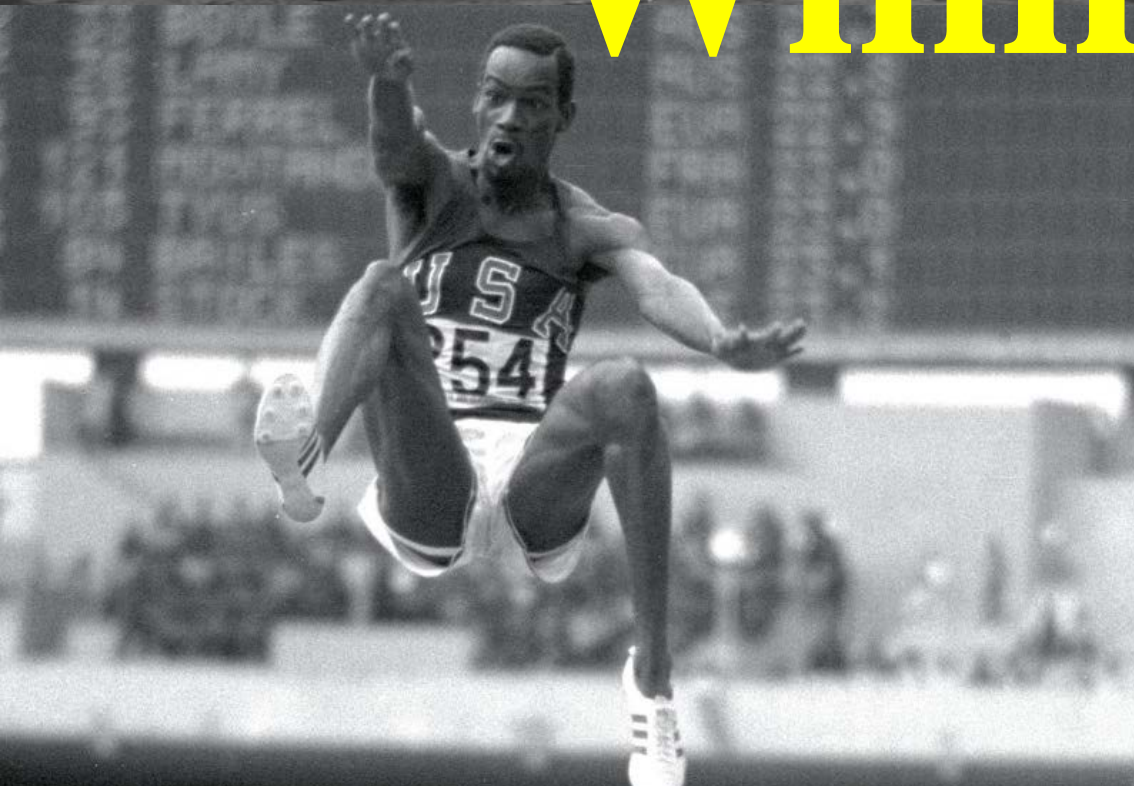
Two General (independent)

Rejoinders

Moderation

College meeting August/September

Winners?

DP 2014

Panel	Proposals considered	Proposals approved	Success rate %	Requested funds $	Approved funds $
BSB	703	129	18.4	385,733,994	53,988,259
EMI	1005	194	19.3	518,210,102	76,482,510
HCA	440	95	21.6	184,948,105	26,511,060
PCE	653	139	21.3	369,810,599	54,571,216
SBE	733	146	19.9	320,169,858	46,079,496
Total	3534	703	19.9	1,778,872,658	257,632,541

DECRA 2014

Proposals considered	Proposals approved	Success rate	Total requested funds	Funds allocated
1468	200	13.6%	$554,880,909	$75,789,232

DECRA 2014

Discipline panel	Proposals considered	Proposals considered %	Proposals approved	Success rate %	Allocated funds $
BSB	365	24.9	50	13.7	19,206,721
EMI	402	27.4	55	13.7	20,722,516
HCA	218	14.9	30	13.8	11,114,332
PCE	239	16.3	32	13.4	12,210,894
SBE	244	16.6	33	13.5	12,534,769

DP140100975

Glass micro and nano smithing of devices and sensors

for extreme environments;

Prof John Canning (Sydney)

PhD 1996, ARCPF 2007, 160 publications since 2001

A/Prof Matthieu Lancry Université Paris-Sud XI

100s of publications since 2006

Dr Pu Xiao UNSW

BSc (2004) PhD (2009) Wuhan

Post doctoral fellow Switzerland and France

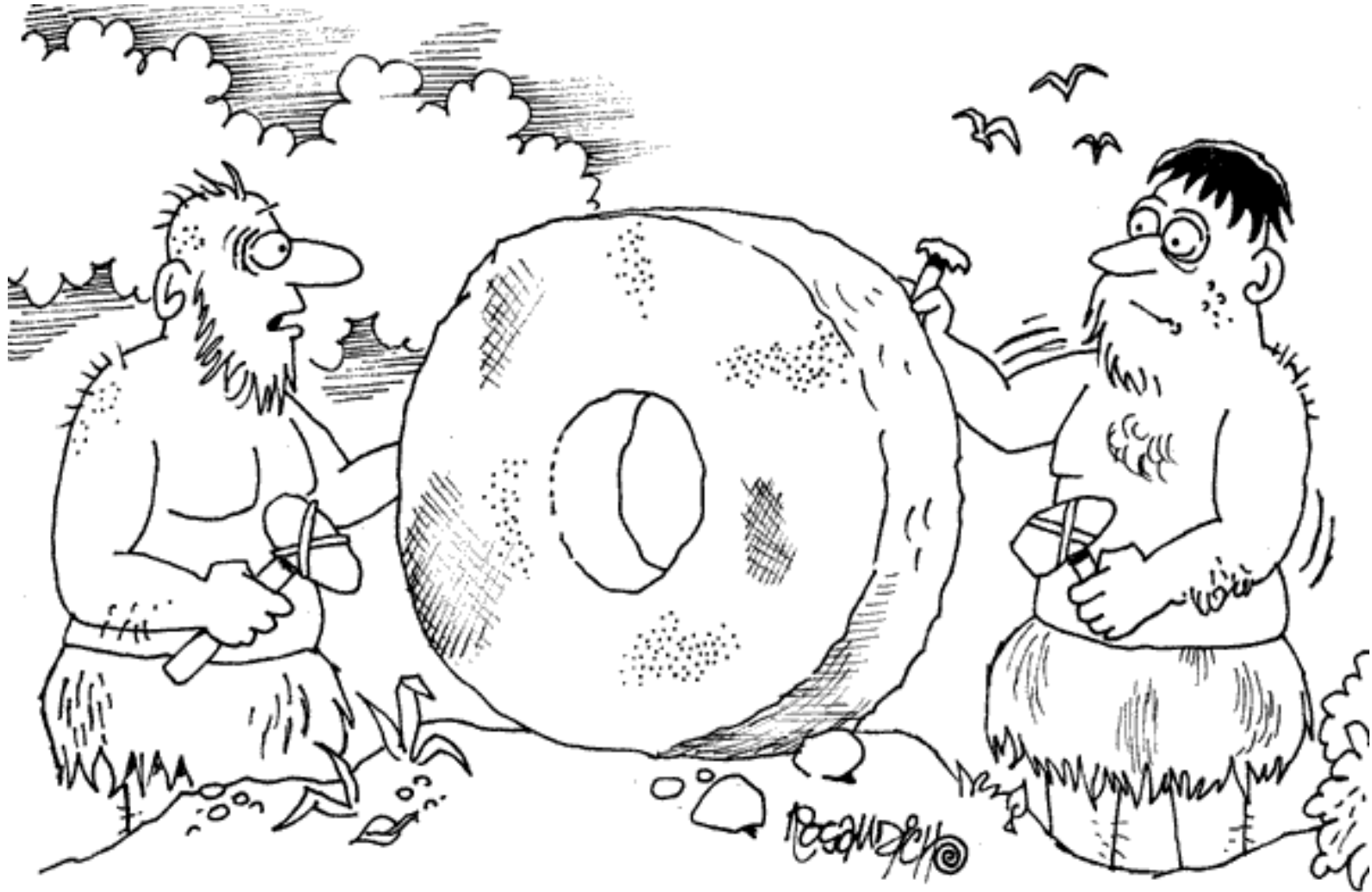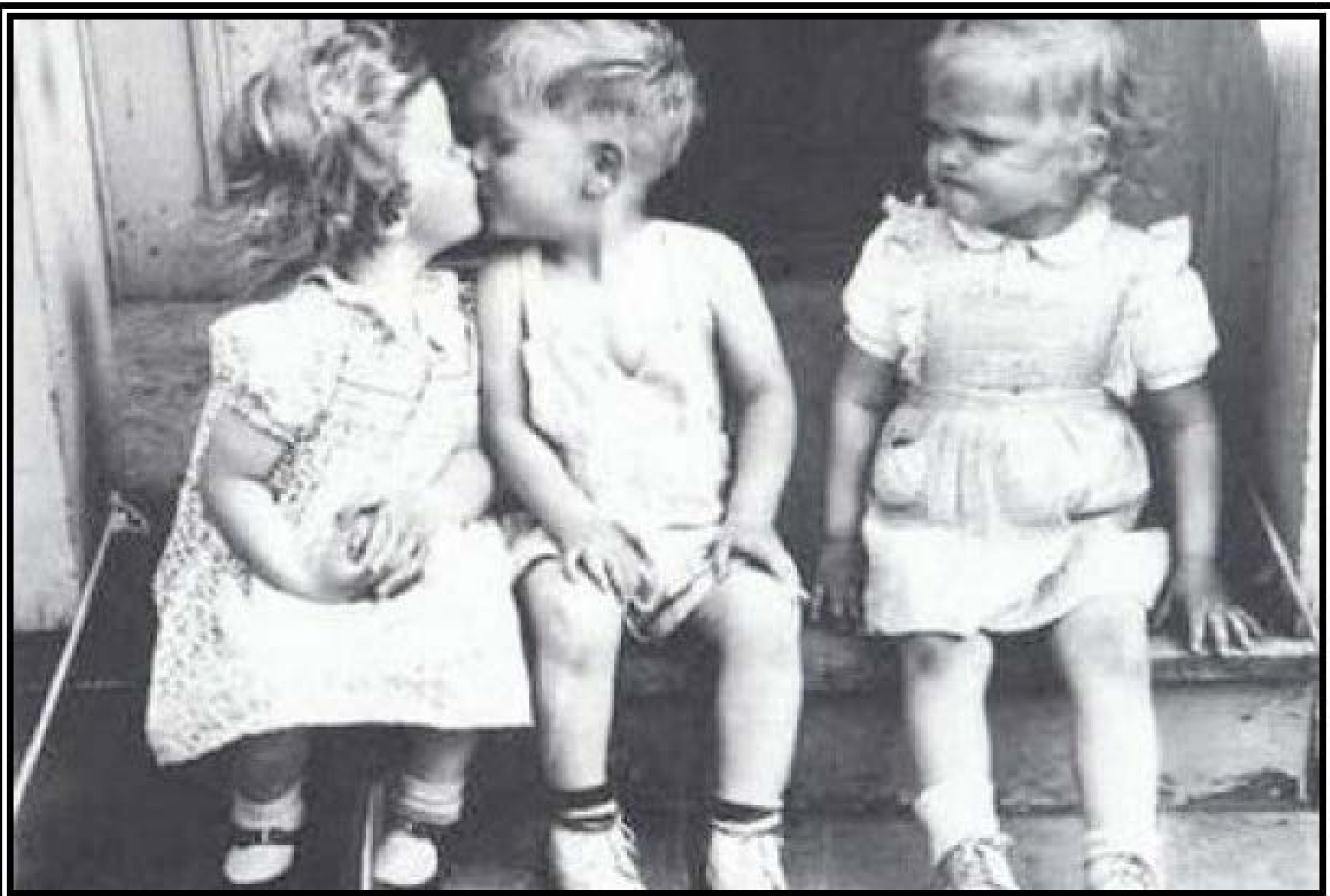Over 30 papers since 2009

DECRA Fellow 2014

Outcomes 2015?

REJECTION

Unsuccessful?

One day of self indulgence!

The team and environment?

Project Quality?

Strategic Alignment?

Collaboration?

National Research Priorities?

Be critical/realistic!

Penfolds

Grange Hermitage

BIN 95

VINTAGE 1967 BOTTLED 1968

Awarded two Gold and two Silver Medals at State Shows. Grange Hermitage is generally recognised as Australia's finest red wine. Made from Hermitage Grapes grown at Penfolds' Grange Vineyard at Magill in the foothills just outside of Adelaide, South Australia. Matured in small oak casks prior to bottling. Will improve with further bottle age. Grange Hermitage was developed by Penfolds' chief winemaker, Mr. Max Schubert, commencing with the 1952 vintage.

This wine undergoes a long maturation in bottles and in consequence it is liable to throw a slight crust or deposit— it is therefore recommended that the wine be rested and decanted prior to serving.

Bottled by PENFOLDS WINES PTY. LTD.

Adelaide

NET 1 PINT 6 FL OZ

F/10068

Dom Pierre PÉRIGNON · Hautvillers
App'd. 1668
Champagne
Dom Pérignon
Œnothèque 1969
12.5% VOL.
750 ml
Brut

Problems are only opportunities in work clothes.

Henry J. Kaiser 1882-1967

In challenging situations; look as though you know what you are doing!

Professor Wanlei Zhou is an Alfred Deakin Professor and currently the Head of School for the School of Information Technology. He also received a DSc. degree from Deakin University in 2002 for his "substantial contribution to knowledge and authoritative standing" in the field of distributed computing". Prior to Joining Deakin University Professor Zhou worked in a number of organisations including University of Electronic Science and Technology of China in Chengdu, China, Apollo/HP in Massachusetts, USA, National University of Singapore in Singapore, and Monash University Melbourne.

Professor Zhou addresses the process of applying for ARC grants from an applicant's point of view and offers insights from his own experience, covering both fundamental research via ARC Discovery grants and collaborations with industry via ARC linkage grants.

Regarding fundamental research and the lessons learned from the first successful application.

- Start from a critical problem that needs an urgent solution

- Where possible concentrate on a small aspect of a big area and do this well. Have a well-defined aim with (if possible) no more than 3-4 features. All features must be clearly and precisely defined and must be feasible.

- Past success is critical - a number of highly cited key publications from the previous ARC DP project were instrumental in the success of the second.

- Be aware of the changing environment and address the same problem – but do so from a fresh angle, offering innovative solutions. In a fast moving area of research you may be able to resubmit several times

Regarding Industry collaboration via ARC linkage grants.

- Start small, expand later to a larger project and larger company.

- Initially, networking, an industry grant and publications led to contact with industry partners. Make use of conferences for networking not only for potential Linkage but also Discovery projects

- Deakin Commercial should also be contacted to provide advice and support.

- Be careful as regards the budget - as a personal strategy, most applications submitted have had a budget around the $200,000 mark.

- Note that the cost component from industry has increased and is now about 30%

- A student can be added to the project as a potential postdoc once they have submitted their PhD.

A detailed presentation from **Professor Wanlei Zhou** giving examples of the successful applications follows.

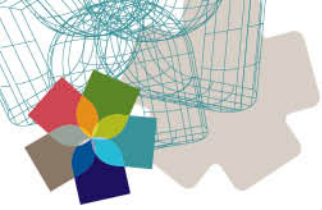# Applying for ARC grants: Experiences and lessons

Prof. Wanlei Zhou

Alfred Deakin Professor, Head of School of Information Technology, Deakin University

wanlei@deakin.edu.au,

http://www.deakin.edu.au/~wanlei

Outline

- Fundamental research via ARC Discovery grants
- Industry collaborations via ARC Linkage grants
- Questions and discussions

Fundamental research via ARC Discovery grants

- Start from a critical problem that urgently needs solutions
- Build on the past success
- Refresh an old problem to address the changing environment

Fundamental research: Start from a critical problem that urgently needs solutions

- ARC Discovery Project DP0773264: 2007-2009, Wanlei Zhou and Yang Xiang, "Development of methods to address internet crime", Total: $222,000.
  - Start from a critical problem that urgently needs solutions:
    - "Internet crimes can result in serious consequences such as disrupting critical infrastructure; causing significant financial losses; and threatening public life. Although a number of countermeasures and legislations against Internet crimes are developed, the crimes are still on the rise. One critical reason is that researchers and law enforcement agencies still can not answer a simple question easily: who and where is the real source of Internet crimes? The main aim of this project is to develop an effective traceback scheme to discover the real source of Internet crimes."
    - Internet crime was a serious problem in 2006/7 (still is today).
  - Start from a well defined aim that provides solutions to a well defined sub-problem:
    - The main aim of this project is to develop an effective IP traceback scheme that, compared to existing traceback schemes, has the following features:
      - » Automatic: the ability to find the real source of attacks with low level of human intervention,
      - » Efficient: can complete the traceback in short time, if not real-time,
      - » Scalable and accurate: can trace a large number of sources with high accuracy,
      - » Economical: can complete the traceback with low requirement of resources, and
      - » Reliable: can perform the tracing functions even under adverse conditions.
  - Application
  - Lessons: better to have less number of features. If there are many of them (such as in this application), then define them clearly and precisely and make sure they are feasible.

Fundamental research: Build on the past success

- ARC Discovery Project DP1095498, 2010-2012, Yang Xiang, Wanlei Zhou, and Yong Xiang, "Tracing real Internet attackers through information correlation," Total: $220,000.
  - Address the same problem from a fresh angle that provides innovative solutions:
    - "Internet crime and terrorism result in serious consequences such as disrupting critical national infrastructures; causing significant financial losses; or threatening public life or health. Tracing the real source of Internet attacks is essential to the control of such attacks. Current Internet attackers prevalently use stepping stones to hide their real sources. The aim of this project is to develop an effective distributed information correlation tracing system to enable Australian governments to identify, locate, and punish Internet criminals and terrorists."
  - Focus on the key issue (stepping stones) and the innovative solution (information correlation):
    - The aim of this project is to develop an effective tracing system to enable law enforcement agencies and proper authorities to identify, locate, and punish Internet criminals and terrorists. This will be determined by investigating:
      - » Robust and accurate information correlation algorithms that can correlate information flows through stepping stones even the flows are encrypted and resist both packet-conserving transformations and non-packet-conserving transformations perturbations from attackers,
      - » Highly scalable distributed information correlation algorithms to process huge amount of traffic data over a large number of stepping stone hops with low resource requirement, and
      - » Comprehensive tracing system prototype that can defeat both IP spoofing and stepping stones and find the route from the victim directly back to the real Internet attacker.
  - Application
  - Experiences: past success is critical (e.g., a number of key publications from the previous ARC DP has been highly cited).

Fundamental research: Refresh an old problem to address the changing environment
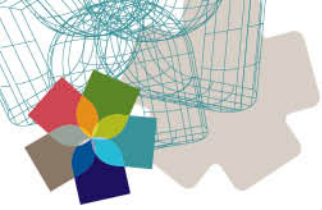
- ARC Discovery Project DP140103649, 2014-2016, Wanlei Zhou and Yang Xiang, "Modelling and defence against malware propagation," Total: $330,000.
  - Security is an "old" problem now (2013/14), but the environment is changing – e.g., online social networks:
    - "The aim of this project is to develop key technologies that can precisely model the malware propagation process on the Internet. These novel technologies will help develop effective defence systems against malware propagation at an early stage, within given defence resources, minimise the damage caused by the malware, and so as to provide a capability to effectively identify and control malware spreaders."
  - Address the increased complexity (the social / human factor in malware propagation) and solutions:
    - The aim of the project will be achieved by investigating:
      - » A novel realistic malware propagation model framework that can precisely capture the propagation dynamics of time, network topology, human factor, defence effect, and the changing conditions in the network;
      - » New algorithms to discover the logical propagation networks, which are essentially different from the physical communication networks, by considering the social effects of the nodes;
      - » New algorithms to accurately identify the origins of an outbreak of malware propagation, to facilitate the identification and punishment to the most influential malware spreaders; and
      - » Methods to find epidemic thresholds that are the key element to control the propagation process. This will help develop effective defence systems against the propagation.
  - Application
  - Experiences: good track records and proven success in collaborations.

Industry collaborations via ARC Linkage grants

- Start from small
- Expand to a larger project
- Expand to a medium sized company
- Expand to a large company

Industry collaborations: Start from small

- ARC Linkage Project LP0562156: 2005-2008, Wanlei Zhou and Wei Shi, "**Protecting Web Services from Distributed Denial of Service Attacks**", Total: ARC: $72,444. Industry: $18,000.
  - Start from a real problem and hot topic:
    - "BCC's Internet Service Provider hosts a large number of Internet services for customers and businesses. Many of these services have experienced intrusion and DDoS attacks in the past a few years. It is vital for BCC to make sure that these services are safe from these attacks. BCC has carried out some market research in the past three years related to the proposed project. So far, BCC did not find a product suitable for this particular purpose, that is, effective protecting of web services from DDoS attacks."
    - Security for web services was a hot topic in 2004/5.
  - Start from a well defined project and ask for limited resource support:
    - "The aim of this project is to develop a defense system to protect web services from DDoS attacks"
    - Only asked for an APAI scholarship from ARC.
  - Application
  - Lessons: very hard to adjust the requirements of a PhD student and industry needs.

Industry collaborations: Expand to a larger project

- ARC Linkage Project LP100100208, 2010-2012, Wanlei Zhou and Yang Xiang, "**An active approach to detect and defend against peer-to-peer botnets**," Total: ARC: $159,160. Industry: $33,000.
  - Address a real problem and hot topic:
    – "In the past a few years many of the services hosted by BCC's Internet Service have experienced significant botnet attacks. In particular, the P2P botnets have become a serious problem disrupting its critical services. It is vital for BCC to make sure that these services are safe from the botnets attacks."
    – Attacks from P2P botnets was a serious problem in 2009/10.
  - Start from a well defined project and ask for limited resource support:
    – "The aim of this project is to develop an active defence system to protect computers or networks from peer-to-peer (P2P) botnet attacks"
    – Asked for a Research Assistant salary from ARC.
  - Application
  - Lessons: Asking the RA to draft publication in high quality journals is almost impossible as he / she will be heavily involved in the practical side of the industry project. So CIs have to do the most in high quality publications.

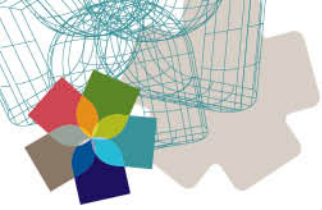# Industry collaborations: Expand to a medium sized company

- ARC Linkage Project LP100100816, 2010-2012, Wanlei Zhou and Robin Doss, "**Secure and Efficient Communication in Vehicle-based Radio Frequency Identification Systems**," Total: ARC: $159,160. Industry: $33,000.
  - Address a real problem and hot topic:
    - "Our industry partner, Express Promotions Australia (EPA) specialise in the development of asset tracking systems using RFID technologies with current customers including major Australian companies and local governments. In collaboration with the CIs, they have identified vehicle based RFID systems to be a new niche area critical to the sustainability and international competitiveness of their business. Targeted applications for vehicle based RFID systems include real time container tracking in ports, automated fuel dispensing for vehicle fleets, automated pick up, and drop off of liquid based and hard goods, and overall fleet management."
    - RFID and Internet of Things (IoT) was a hot topic in 2009/10.
  - Start from a well defined project and ask for limited resource support:
    - "The aim of this project is to develop a vehicle based RFID system that can guarantee secure collision-free communication in large scale deployments"
    - Asked for a Research Assistant salary from ARC.
  - Application
  - Lessons:
    - It's hard to negotiate IP with a company that is high-tech sensitive, and bringing along people from Deakin Commercial will help.
    - Clearly negotiate the terms for academic publications.

Industry collaborations: Expand to a large company

- ARC Linkage Project LP120200266, 2012-2015, Yang Xiang, Wanlei Zhou, Vijay Varadharajan, and Jonathan Oliver, "**Developing an active defence system to identify malicious domains and websites**," Total: ARC: $240,000. Industry: $90,000.
  - Address a real problem and hot topic:
    - "Our industry partner, Trend Micro, is the 3rd largest antivirus company in the world, which is listed on the Tokyo stock exchange. It observed that the attackers are growing increasingly intelligent and their attack mechanisms and strategies are becoming more and more sophisticated. Therefore, Trend Micro has initiated several R&D projects in this area and formed the Web Reputation Solution (WRS) team. Trend Micro regards malicious domains and websites as a primary challenge to Australia's national security and is making contributions to solve the problem."
    - Phishing was a serious problem in 2011/12.
  - Start from a well defined project and ask for limited resource support:
    - "This project aims to develop an innovative active defence system to effectively identify malicious Internet domains and websites"
    - Asked for a Research Assistant salary and a PhD scholarship from ARC.
  - Application
  - Lessons:
    - Negotiating IP with an international company is hard, and should start early.
    - Clearly negotiate the terms for academic publications.

Thank you…
QUESTIONS + DISCUSSION