

From idea to a successful grant: grant development and writing course for early career researchers

The course developed and delivered by Professor Alexei Lapkin, School of Engineering, University of Warwick

Report submitted on 31st July 2012 by Prof. Alexei Lapkin

1. Purpose

The purpose of this course is to equip early career researchers with the skills necessary to develop good ideas into excellent proposals. Key questions to be discussed and developed during the course are:

- What is a 'good idea'?
- What is 'good science'?
- Technology trends and science road-maps.
- Research priorities and funding bodies.
- Structure of research proposals and specifics of different types of proposals.
- Interdisciplinarity and collaboration: how to describe in a proposal?
- Blue-sky vs industrial relevance.

These are key topics of the course, which is delivered through interactive discussions in a small group with homework tasks relating to the actual proposals being developed by participants. All participants are expected to develop a research proposal for a specific funding scheme and submit it.

The expectation is that participants will learn from an experienced grant writer how to develop excellent proposals that stand out in competitions. This should improve the chances of first grants of young researchers being funded.

2. Programme details

The programme detailed below was delivered between July 2011-January 2012 to a group of four early career researchers including:

- Dr Konstantin Loponov (Research Fellow, School of Engineering)
- Dr Xiaolei Fan (Research Fellow, School of Engineering)
- Dr Simon Leigh (Research Fellow, School of Engineering)
- Dr Olayiwola Alatise (Associate Professor, School of Engineering)

One session was also attended by Dr Michael Jennings (Research Fellow, School of Engineering)

Session 1 (2h)

Introduction by the workshop leader. Identification of the goals of participants (kinds of grants they are looking to learn to write). Setting of the workshop goal (finished submitted proposals). Discussion of previous experience, stage of career, introduction of research areas of participants.

Discussion topics:

Who funds research in the relevant areas: identify top funders.

Proposal must be excellent scientifically (technically). What does it mean, 'good science'?

First attribute: relevance. Research priorities. EPSRC research landscape. Roadmaps.

Homework: find relevant roadmaps (web) and relate the topic chosen for proposal with specific priorities of the roadmaps.

Session 2 (2h)

Roadmaps and priorities: what was found by participants. Fundamental blue-sky science (out of 'range' for priorities?). What is blue-sky science for Engineering?

Second attribute of 'good science' - what is the real problem being addressed and does the solution correspond to any real need? Discussion of concepts of ideality, ideal final result (IFR), technology trends, technology evolution. Idea should be 'bullet-proof' from the point of relevance and potential impact on technology/science. This can be ensured through analysis of technology trends and analysis of IFR for the particular system.

Homework: find IFR for the problem you are solving and attempt to identify relevant technology trends.

Session 3 (2h)

Review IFRs for different topics. Are they real IFRs or only staying within current technology? How significant is the impact if IFR is reached? IFR should stay within physical reality, but could border on science fiction or initially formulated as a science fiction. Example from Simon: IFR for 3D printing is 'replicator' from the sci-fi Voyager series.

Detailed discussion of the structure of proposals. Outline: what is the difference between outline and full proposals. Importance of justification (facts and figures). Where to find impact statements (citations confirming importance of an area of research). Pictures or text to explain the main ideas? Importance of addressing ALL criteria of the call in the outline. Outline is rarely about technical detail!

Specific topic of short industrial proposals: 1-2 pages of specific deliverables, work-plan and cost. No need for context setting *etc.*

Homework: example outline or a first page of a full proposal. Finish formulating ideas for proposals.

Session 5 (whole day)

Workshop with external consultant, Dr Darrell Mann, head of "Systematic Innovation" and part of "Black Swan" innovation companies.

How to focus on a key technological challenge
Technology breakthroughs
Technology development trends
Innovative solutions

Session 5 (2 hours)

Review outlines/first pages that were prepared. Review an example of a successful EU proposal (FP7) outline. Discuss with the whole group what was good in the outline, what was missing in prepared outlines and first pages.

Full proposal structure. GANTT charts. Methodology Work-plan sections. Work packages vs tasks. How much technical detail? How many references?

Establishing collaborations and generation of ideas: 'speed dating'. Each member of the group has 3 minutes to describe their research area to each of the other members, with the aim to find potential points for collaboration. Discussion of the importance of clear formulation of research ideas and topics.

Session 6 (2 hours)

What is impact? Economic impact, Impact on Scientific community, Impact on Society, Impact on Education and Training.

Homework: two grants are given, one was a failure and another its resubmission which was later funded. Why? What made the second proposal a winning one?

Discussion of ideas of participants

Session 7 (2 hours)

Linking everything together into a well-laid out grant: main idea, key objectives, is it achievable? is it generic? what's likely impact and on whom? are you the right person to do this piece of work? does it fit with current research priorities?

3. Actual outcomes of the workshop

It is difficult to quantify the impact of such a workshop on an individual. Detailed are successes and failures that followed the workshop:

- Dr Simon Leighs fellowship application to EPSRC failed at the full proposal stage
- Dr Xiaolei Fan's application for internal Warwick fund under "Developing Leaders" Scheme was funded
- Dr Xiaolei Fan's application for internal strategic partnerships fund to establish a new collaboration with NTU Singapore was submitted with Prof Lapkin as PI and was funded
- Dr Olayiwola Alatisè's first grant to EPSRC was funded.

Summary and conclusions

The sessions were very interactive, with minimal lecturing and maximum individual work and discussion. The aim was to ensure that key ideas about what makes a successful grant would be translated into individual practice. Three out of four participants had subsequently submitted grant applications of different significance and two of them had successful outcomes. At least three of participants shown real drive, motivation and enthusiasm towards developing new ideas and being successful academics.

As an additional outcome of the workshop, the School of Engineering made an appointment of a Visiting Professor for Darrell Mann in recognition of his potential contribution to the School's students and staff in developing innovation skills.