SCIENTIFIC RESEARCH METHODOLOGIES AND TECHNIQUES

Unit 7: PROJECT PROPOSAL PREPARATION

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PhD PROGRAM IN ELECTRICAL AND COMPUTER ENGINEERING

1. PRELIMINARIES

You have an idea

A research proposal should be the result of a "good idea"

Which unsolved problem is the "idea" addressing ?

Why is it important and who will benefit ?

Develop your brilliant idea

Gather background information

Get more familiar with the problem and previous attempts to solve it.

Check the idea with some colleagues

Prepare a synopsis (1 or 2 pages) as a basis for discussion with potential partners and sponsors

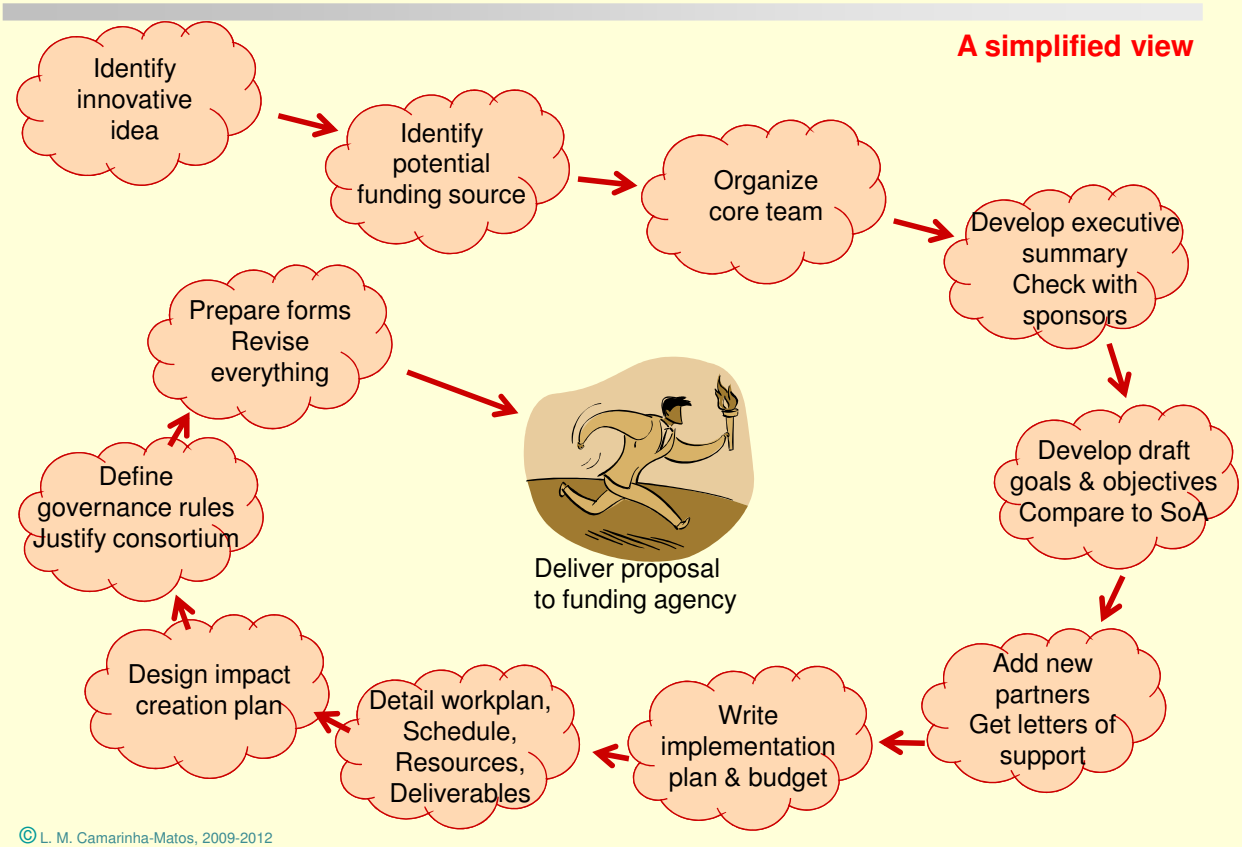
Focus on what is innovative!

Don't forget:
You need resources !

- Labor ?
- Equipment ?
- Traveling ?

Understand the process

A simplified view



Research funding possibilities

- **National funding agencies**
  - Typically fund national groups
  - Some programs for bilateral cooperation with other countries (usually small funds, mostly for traveling)
- **European Commission**
  - FP7:
    - Cooperation: Information and Communication Technologies (ICT), Energy, Nanosciences, Nanotechnologies, Materials and new Production Technologies (NMP), Transport (including Aeronautics), Security, Space, ...
    - Ideas (more oriented to basic research)
    - People: re-enforcing human potential (Marie Curie, ...)
    - Capacities: research capacities & infrastructures
  - CIP: Competitiveness and Innovation Framework Programme
    - Energy, ICT, Entrepreneurship
  - COST – European Cooperation in the field of Scientific and Technical Research
  - …
- **Industry** ... Strongly depend on personal contacts...
- **Others**
  - Foundations, NGOs
  - World Bank, ESA
  - ...

Types of grantseekers

Reactive Grantseekers

- Wait for a grantseeking opportunity to present itself.
- Attempt to develop an innovative, creative, well-organized approach to solving a problem while they are in a state of frenzied confusion.
- Difficult to develop a successful approach while under the pressure caused by acting reactively.

Proactive Grantseekers

- Begin with a need or problem they wish to solve through grant funding. They view problems as opportunities to interest a funder in working with them to implement solutions that will improve education.
- In order to determine the projects to pursue, they outline your opportunities in advance. Outlining opportunities does not entail writing down all solutions.
- By generating a list of needs (problems, areas of interest, and so on) they begin to develop a proactive system based on locating funding sources that are interested in the same problems … therefore likely to invest in their solutions.
  - It might happen that none of the opportunities address the topics in your list !

Constraints from sponsors

- **Time**
  - In most cases, sponsors open Calls for Proposals
  - Calls open on specific dates and for a specific time window
  - Only in a few cases there is a possibility for continuous submission
- **Priorities**
  - Sponsors define areas to be funded and specific objectives.
  - Proposals must demonstrate that they contribute to the stated objectives.
- **Funding rules**
  - Sponsors define funding rules (e.g. Eligible costs, % of funding, eligible organizations).
  - Finding matching funds (when funding is not 100%) is an extra difficulty.
- **Format**
  - Proposal formating, sections, limit of pages, forms and tables
  - Paper or electronic submission
- **Evaluation rules**
  - Evaluation panel, evaluation criteria, scoring, thresholds, etc.

Finding partners

- **Small projects**, typically funded at national level or by a company, can be carried out by a **single group**.
- **Larger / more ambitious projects,** frequently of a multi-disciplinary nature, require a variety of expertises and resources not possessed by single groups and a multi-partner research **consortium** is required.

  - **Core partners** need to be identified (and engaged) at an earlier stage of the proposal preparation.
  - **Other partners** can be added later when the details of the project are defined.

Partner search – some options:

- Existing contacts – „social network“
- Conferences / workshops / networking events
- (Scientific) literature
- Cordis Project Data Base
- Cordis Partner Search Data Base
- National Contact Points

} Not very effective ... Need to be careful ...

Which role?

Project leader or **simple partner?**

Or how to get involved in a proposal?

Joining an experienced consortium can be a more effective approach …
… but much less freedom !

Important to build a "social network" which can be of mutual help at the time of proposals

Important to be identifiable by the expertise and service that can be offered to the others

- Good scientific reputation takes time to build
- Need to be strongly proactive
  - One approach: start a proposal and then suggest a merging
  - Another approach: announce skills / interests in a networking event

Cost of preparation

- A project proposal involves hard work for several months
- In case of failure, preparation for re-submission adds additional effort
- In case of a proposal involving a consortium (namely international), there are costs with traveling and meeting(s) organization
  - e-mail is not enough

These costs are an investment of the proposer(s)
… and cannot be claimed from the project budget even if the proposal is successful !

Particularly to address European / International programs, there is a need for considerable "seed money".

In a few cases national governments might have some funds to help researchers preparing European / international proposals … But not so easy

2. GENERAL STRUCTURE

General aspects

Writing for a Call for Proposals is an art quite different from the research work itself !

Evaluators rarely have time to look for hidden answers

An average evaluator of our project proposal is an expert which most likely doesn't know the topic of our proposal in details

Evaluators have always limited time (usually just a few hours) to read our proposal

Most of the structure, the basic requirements, application forms, information and procedures are frequently defined by the sponsoring entity

RTD proposal

NSF Example:

- Cover sheet and certifications
- Project summary
  - Both intellectual merit and broader impacts described
- Table of contents
- Project description
- References cited
- Biographical sketches
- Budgets and justification
- Current and pending support
- Facilities, equipment and other resources
- Special information / documentation
  - NO reprints, preprints, letters of endorsement
- Single Copy Documents
  - Reviewer suggestions, deviation authority, confidential information, etc.

EC Example (ICT):

Part A
Administrative forms
Part B
Proposal abstract
Table of contents
Section 1: Scientific and/or technical quality, relevant to the topics addressed by the call
1.1 Concept and objectives
1.2 Progress beyond the state-of-the-art
1.3 S/T methodology and associated work plan
1.3.1 Rationale – overall strategy
1.3.2Timing of Work Packages and their Components
1.3.3 Detailed work description
Work packages, Deliverables, Milestones, Description of each Work package, Summary of efforts
1.3.4 Graphical representation of dependencies
1.3.5 Risks and contingency measures
Section 2. Implementation
2.1 Management structure and procedures
2.2 Individual participants
2.3 Consortium as a whole
2.4 Resources to be committed
Section 3. Impact
3.1 Expected impacts listed in the work programme
3.2 Dissemination and/or exploitation of project results, and management of intellectual property
Section 4. Ethical Issues

Two-stages proposals

EC Example (NMP):

Part A - Administrative forms
Part B
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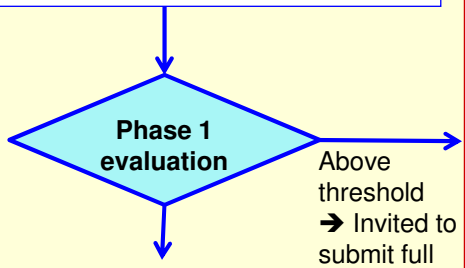

Part A - Administrative forms
Part B
Proposal abstract
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Coordination action proposal

EC Example (ICT):

• "*Co-ordination (or networking) actions*" aimed at coordinating research activities and policies.

• *"Support actions"* aimed at contributing to the implementation of the Programme and the preparation of future Community research and technological development policy or the development of synergies with other policies, or to stimulate, encourage and facilitate the participation of SMEs, civil society organisations and their networks, small research teams and newly developed or remote research centres in the activities of the thematic areas of the programme, or for setting up of research-intensive clusters across the EU regions.

Part A - Administrative forms
Part B
Proposal abstract
Table of Contents

1. Scientific and/or Technical Quality
1.1 Concept and Objectives
1.2 Contribution to the Co-ordination of High Quality Research
1.3 Quality and Effectiveness of Coordination and Work-plan
1.3.1 Strategic Overview of the Work Plan
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1.3.4 Table 1.3a - Work package list
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1.3.10 Risks and Contingencies
2. Implementation
2.1 Management Structure and Procedures
2.2 Individual Participants
2.3 Consortium as a Whole
2.4 Resources to be committed
3 Impact
3.1 Expected Impacts listed in the Work Programme
3.2 Dissemination Objectives (Steps to bring about Impacts)
3.3 Spreading Excellence, Exploiting Results, Disseminating Knowledge
3.3.1 Specific Dissemination Systems
3.3.2 Development of Dissemination Indicators
3.3.3 European Dimension
4 Ethical Issues

3. DETAILED PREPARATION

Technical part: Concepts & objectives

The initial section of the proposal is very critical !
It should "paint a picture" of the proposal in the mind of the evaluator.
It should establish the framework so that the rest of the proposal has a frame of reference.

- **Key Questions**
  - **What do you intend to do?**
  - **Why is the work important?**
  - **How does it satisfy the objectives / priorities of the sponsor?**
- **Make sure it is innovative and exciting**
  - **Survey the literature**
  - **Talk with others in the field**

Avoid giving the evaluator the opportunity to say things like:

Not an original idea	**Rationale is weak**
Uncertain outcomes	**Problem is not important**
Proposal is unfocused	**Project is too large**

Technical part: Concepts & objectives …

- **Goals are the large statements of what you hope to accomplish but usually are not very measurable. They create the setting for what you are proposing.**

- **Objectives are operational, tell specific things you will be accomplishing in your project, and are very measurable.**
  - **Evaluators like to see quantifiable objectives**
  - **The outcomes are much more clear if the objectives are described in measurable & verifiable ways.**
  - **Show how they relate to the topics addressed by the Call.**

- **Include specific information about the target users.**
  - **Are they involved?**

- **Carefully check the evaluation criteria !**

Technical part: Concepts & objectives …

S pecific	❑ Be specific in targeting an objective
M easurable	❑ Establish a measurable indicator of progress
A ssignable	❑ Make the objective capable of being assigned to someone for completion
R ealistic	❑ State what can be realistically achieved within budgeted time & resources
T ime	❑ State when the objective can be achieved - that is, the duration

Technical part: Progress beyond SoA

What has already been done?
How have others approached the problem?

How are you going to do the work?
Better: What will you do that will lead to a substantial progress / innovation beyond the SoA?

Position your project in relation to other efforts and show how your project:
a) will extend the work that has been previously done,
b) will avoid the mistakes and/or errors that have been previously made,
c) will serve to develop stronger collaboration between existing initiatives, or
c) is unique since it does not follow the same path as previously followed.

Convince people about your knowledge of the problem

Cite previous projects and studies that are similar to what you are proposing.

Show the funding agency that you know what you are proposing because you are familiar with what has preceded you.

Make sure you are familiar / use the terminology of the funding agency / evaluators !
"The bid language"

Methodology & workplan

■ **Give a rational of the methods to be used.**
There should be a very clear link between the methods described in this section and the objectives previously defined.

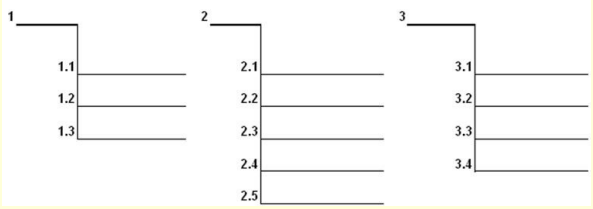
■**The work plan should be broken down into work packages (WPs) which should follow the logical phases of the implementation of the project.**
- Show the relationships among the WPs and between WPs and objectives
- Use diagrams (evaluators have little time to read !)

■ Typical elements to include:
- **Work package list**
- **Deliverables / Outcomes list**
- **Description of each work package**
- **Effort table (person-month)**
- **List of milestones**

Characteristics of a well-defined activity

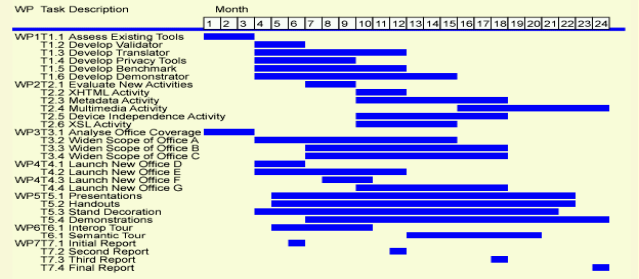
- **Its status and completion is easily measured**
- **It has a very definite beginning and ending date**
- **It is clearly explained and the time to complete it and its associated costs can be easily estimated from prior experiences with this or similar activities**
- **It comprises work assignments that are manageable, integratable, and relatively independent of work assignments in other activities**
- **It should normally constitute one continuous stream of work from start to finish**
- **It has clear responsibles assigned to**

It's understandable, manageable and its progress can be measured

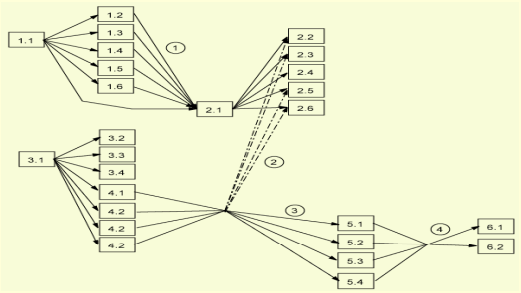


Methodology & workplan ...

Scheduling of activities (e.g. Gantt chart)



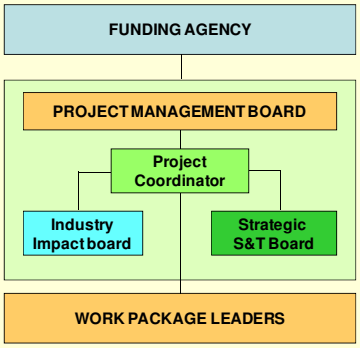
Inter-relations between components



WPs divided into tasks

- **Identification (and schedule) of results of each WP/Task**
- **Identification of responsibilities (partners assigned to activities)**
- **Identification of Milestones** - control points where decisions are needed with regard to the next stage of the project
- **Identification of potential risks and contingency measures**

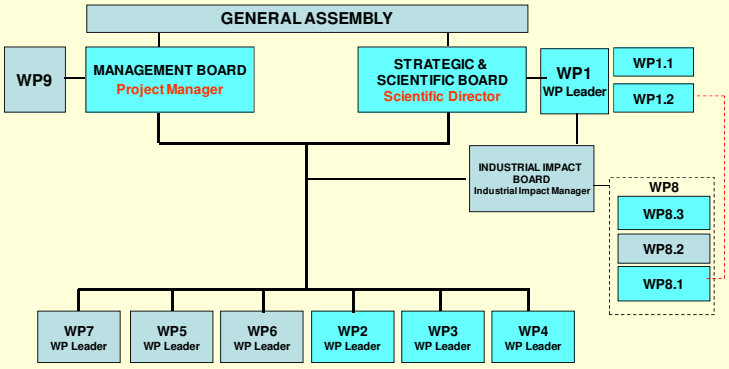
Governance / Management structure



Organizational structure and decision-making mechanisms

Structure depends on the complexity of the project

If you will be using a Steering Committee (Advisory Committee, Governing Board, etc.) to assist in your project, this is a good place to describe how it will be organized and who will be included.



Include
Description of each role
Communication mechanisms
Conflict resolution mechanisms

Consortium structure

Describe the participants, their experience, and role in the project

Describe the consortium as a whole, its rational

Why this consortium is needed

Why this consortium is adequate to implement the project

Clarify how each of the roles are essential to the success of the project and how each role clearly relates to operationalizing the methods described.

Take into account specific requirements from the funding agency
e.g.

Involvement of different categories of participants and their balance (research organizations, companies, end-users, etc)

Geographical balance

International participants and why

etc.

Budget planning & preparation

Elaborate the overall and per activity, per partner budget

Show how the overall financial plan for the project is adequate

Take special attention to the funding criteria:

Eligible costs:

- Labor?
- Equipment? Justification?
- Traveling & subsistence?
- Consumibles? Other costs?
- Indirect costs?
- Taxes? (e.g. VAT?)
- Upper limits?

Funding rate:

- 100%?
- Need own matching funds?

Other resources?

Need to be realistic
Fair distribution

Equipment & facilities

Major equipment needs to be properly justified as fundamental for the success of the project.

Important to consider reasonable estimates (not simple guesses). Evaluators are experienced!

Carefuly check the funding rules regarding equipment !

For instance, European Commission does not reimbourse the cost of the equipment at once!

It considers the life of the equipment and only the depreciation rate is paid every year!

Therefore, there is a need for extra funds to make the investment....

e.g. In Portugal, a simple PC is depreciated in 4 years !
Thus, we can only allocate 25% per year to the project....

Impact creation

Funding entities are very keen on potential impacts of a project

- If the funder is an industry, it is concerned with the ROI
- If it is a public agency, it has political accountability pressure

Therefore, the proposal has to show a convincing plan for impact creation. Specific actions depend on the type of project (basic research, applied research, technology transfer, etc.)

Examples:

- Dissemination
  - Publications
  - Participation & organization of events
- Summer schools & other training actions
- Business demonstration pilots & take-ups
- Exploitation plans

Quantifiable indicators

Ethical & other issues

This section is important in proposals having potential ethical issues

(e.g. Dealing with privacy, health issues, genetics, etc.)

Some funding agencies might have requirements regarding promotion of gender equality, involvement of Small and Medium Enterprises, promotion of specific regions, etc...

➔ Check the requirements and prepare good arguments for the evaluators

Formatting rules

The funding agency might impose specific (strict) formatting rules regarding

- Structure of the document
- Formatting (font size, etc.)
- Limit of pages (or even characters)
- Language
- Etc.

Often a number of administrative forms are required

- Identification / characterization of the consortium / partners
- Financial information
- Etc.

More and more funding agencies are promoting electronic submissions.

... and a strict deadline (date, time) for submissions !

Getting support

Preparing a proposal is a hard investment !
The success rate is very low in many cases !
Therefore ... the more support, the better!

So, in addition to the discussions with the consortium members, consider:

- **Early stage: Check ideas with colleagues**
- **When the idea is elaborated: Check with funding agency officer**
- **After a first draft: Check with other colleagues, National Contact Points (in the case of European programs), etc.**

- **It is good if some consortium members have experience as evaluators in the same program !**

Lobbying and ... business

In many cases lobbying is becoming a determinant success factor !

- Influence on Work Programmes during preparation phase via Funding Agency or Contact Points
- Early contact with Funding Agency and Contact Points
  - **E.g. EC officers are usually friendly and responsive, but one needs to contact them**
- Join strong consortia / attract strong partners
- No lobbying possible after proposal submission!

Some consultancy organizations make their business out of "helping" consortia in preparing proposals

Roles within a consortium

- **Coordinator:** the manager, leader, guide of the project
  - Should only be taken over by an expert with substantial experience
  - Previous participation in similar projects is a real prerequisite
  - Substantial work load in project preparation (3 person-months average)
  - Some projects divide this role into two: Project Manager and Technical Coordinator / Scientific Director
- **Work Package Leader:** the coordinator of a more or less substantial part of the project
  - Experience in similar projects is a plus but not a prerequisite
  - Medium work load in preparation (0,5 – 1 person month depending on work package size)
- **Other Project Partners:** participants with a defined role but without coordination tasks
  - Small work load in preparation
  - Core partners: Some complex projects might distinguish 2 groups of partners – core (responsible for the strategic direction) and non-core.

Some tips

Some *sins*

- Late start of project preparation, partner search, proposal writing
- Project only partially fits to the content of the call for proposals
- Selection of unsuitable partners
  - Missing expertise in the field of the project
  - Missing synergies with the other partners
  - Lack of experience in International Cooperation
  - Low commitment of participants
- Weak (or too forceful) Coordination

[Nicole Schröder]

Some tips ...

Some *sins* ...

- Proposal only comprehensible to few experts in that specific field of research
- Project proposal put together from incompatible elements delivered by different project partners without adequate adjustment; no clear structure
- Budget too small to keep all participants working
- Budget too high for the described work or not adequately justified
- Delay of legal and financial questions to project start

[Nicole Schröder]

Some tips ...

- When preparing a proposal be aware of the conditions how the proposal will be evaluated:
  - …evaluators have just a few hours per proposal
  - …all the proposals seem to evaluators, after couple of days, very similar to each other – small things decide
  - …if you pre-communicated with the Funding Agency officers, the officer at the consensus meeting can be your proposal's ally
  - …you can be unlucky with the selection of the evaluators:
    - they can be either too academic or to technical or too tired or too negative or too perfectionist, …
    - ...try to put into the proposal some cookies for each one of those psychological profiles

[Marko Grobelnik]

- Be aware of the scope:
  - "Too ambitious" vs. "Too narrow"
- Be honest and up-front:
  - Address issues instead of trying to hide them
  - Acknowledge possible experimental problems and have alternatives

[Rajinder P. Khosla, NSF]

Some tips ...

- Know your audience – the reviewers!
- Think about the reviewers
  - Write accurately, concisely, and clearly
  - Make it easy for reviewers to like your proposal
  - You never get a second chance to make a first impression
  - First page tells it all
  - Figures and tables get your point across clearly
  - Some reviewers (particularly on inter-/multi-disciplinary proposals) may not be an expert in your specific field
- Simplify and streamline:
  - Make sure you get your overall idea across!
- Pay attention to details:
  - Run the spell checker and proof-read
  - Prepare clear photos, graphs, etc.
  - Make the font size as big as you can

[Rajinder P. Khosla, NSF]

Some tips ...

Some reasons to fail:

- Absence of innovative ideas or hypothesis
  - Will provide only an incremental advance
  - Not exciting or cutting edge
- Errors
  - Unclear or incomplete expression of aims
  - Faulty logic or experimental design
  - Less than rigorous presentation
- Unrealistic, sloppy or incomplete
- Resources and facilities not in place
  - PI qualifications/expertise not evident
  - Necessary collaborations not documented

[Rajinder P. Khosla, NSF]

4. PROPOSAL EVALUATION

Evaluation process & actors

- **Funding agencies usually resort to external experts - from industry and academia – to evaluate / select proposals**

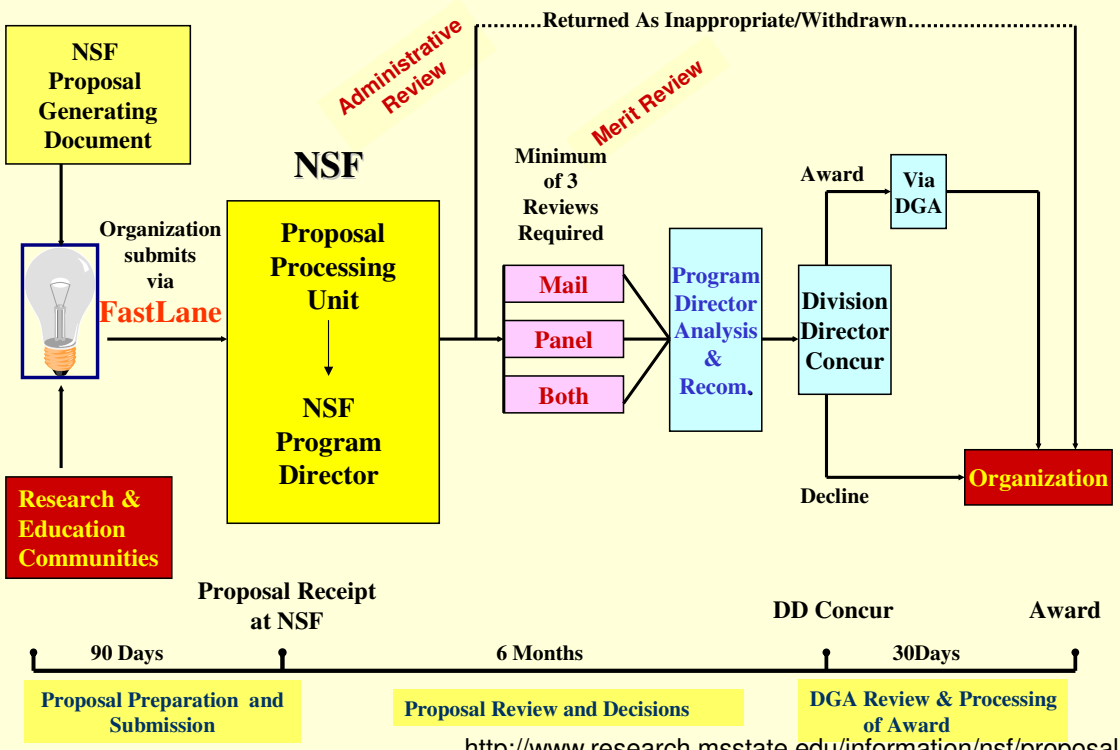
- **Final decision is often made in a panel with the participation of officers from the Agency**

Evaluation criteria example (EC):

1. Scientific and/or technological excellence (relevant to the topics addressed by the call) • Soundness of concept, and quality of objectives • Progress beyond the state-of-the-art • Quality and effectiveness of the S/T methodology and associated work plan	**Score:** *(Threshold 3/5; Weight 1)*
2. Quality and efficiency of the implementation and the management • Appropriateness of the management structure and procedures • Quality and relevant experience of the individual participants • Quality of the consortium as a whole (including complementarity, balance) • Appropriateness of the allocation and justification of the resources to be committed (budget, staff, equipment)	**Score:** *(Threshold 3/5; Weight 1)*
3. Potential impact through the development, dissemination and use of project results • Contribution, at the European and/or international level, to the expected impacts listed in the work programme under relevant topic/activity • Appropriateness of measures for the dissemination and/or exploitation of project results, and management of intellectual property.	**Score:** (Threshold 3/5; Weight 1)
Remarks	**Overall score:** (Threshold 10/15)

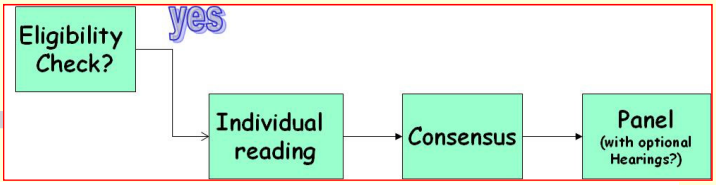
NSF example (USA)

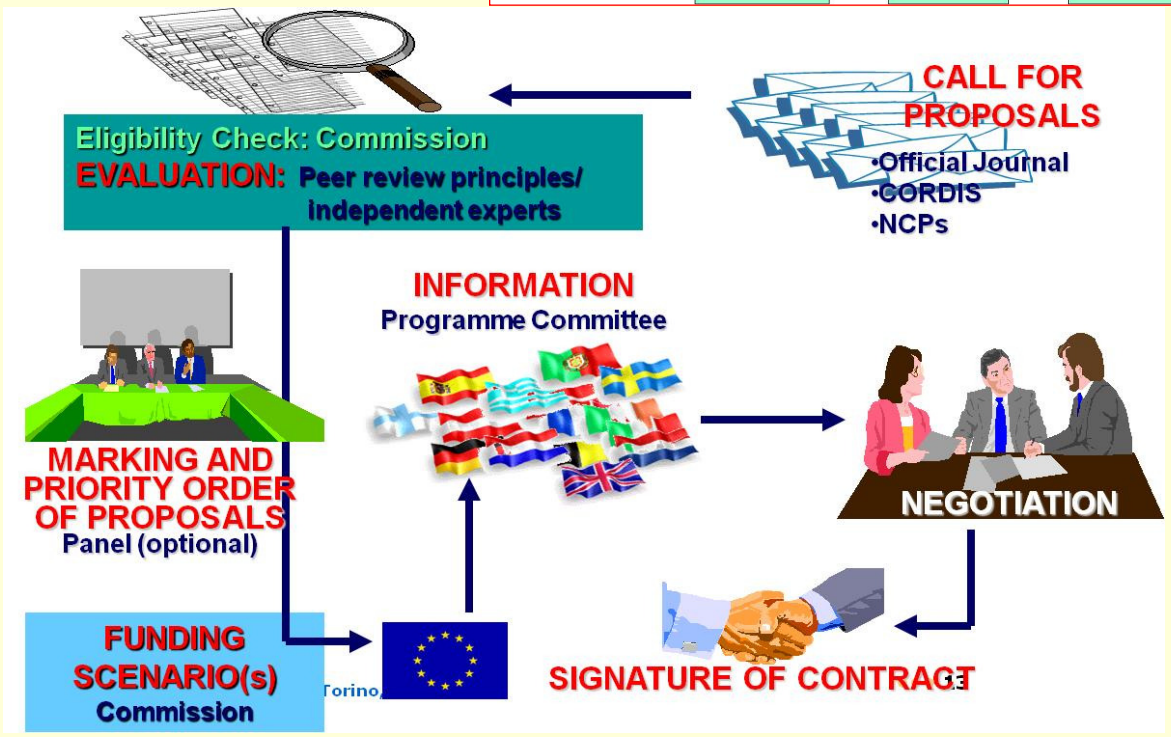
NSF Proposal & Award Process & Timeline



http://www.research.msstate.edu/information/nsf/proposal.ppt

EC example





Key reasons for rejecting project proposals in FP6

- Bad consortium 76%
- Bad relevancy 59%
  (EU, exploitation, dissemination)
- Bad Implementation 32%
- Not enough innovation 29%
- Not enough information 21%
- Bad management 20%
- Out of scope of the call 10%
- Too high costs 10%

Negotiation

Some Funding Agencies, after a successful evaluation of a proposal, invite the consortium for negotiations towards a grant agreement

Examples of negotiation issues:

- **Clarification of the project goals, objectives and approach**
- **Technical & implementation issues raised by the evaluators**
- **Legal & financial aspects of the participants**
- **Preparation of Technical Annex for the grant agreement**

... it may still fail !

http://www.txstate.edu/research/proposal_preparation/tutorials.php

http://www.accd.edu/sac/grantsac/write_grant.htm

http://www2.scholastic.com/browse/article.jsp?id=4165

http://www.wku.edu/Dept/Support/SponsPrg/grants/steps.htm

http://www.learnerassociates.net/proposal/hintsone.pdf

http://www.zbroz.cz/Publications/ICETA2007.pdf

http://www.migration4development.org/call-for-proposals/from-idea-to-proposal/

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