Can the Three-Dimensional Evaluation Method Be Aligned For Potential Standardisation?

The case with networking and infrastructure projects

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About TUBITAK

Evaluation by peer-review

Three-dimensions of:
Research Infrastructure Projects
Networking Projects

Method
Phrase-anchored rating:
most attractive and not-attractive criteria

Validation
Total Budget ~600 million Euros / year

- To identify Science, Technology and Innovation Policies
- Research – Institutes
- Funding (~300 millions Euros / year)
  - Academic research project support
  - Industrial research, development and innovation support
    (More than 7000 projects; less than %30 selected for funding)
  - People (Fellowship) support
A Proposal is a Scenario

- Proposed by someone
- For the benefit of something
- To be attained in someway
• Funding organizations invest in scenarios

• Select by evaluation of the scenarios
Is that someone (person / institution) the most eligible / right one?

Is that something really the most beneficial thing?

Is that someway really the best way?
### Three Dimensions

<table>
<thead>
<tr>
<th>Research Infrastructure</th>
<th>Networking</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Scientific Merit and Technological Integrity</td>
<td>• Authenticity and Legitimacy</td>
</tr>
<tr>
<td>• Potential Utilization and Operability</td>
<td>• Potential Impact of Expected Outcomes</td>
</tr>
<tr>
<td>• Viability</td>
<td>• Viability and Manageability</td>
</tr>
</tbody>
</table>

All three-dimensions are given equal weights
Panel System

5-8 Individual Panelists (Reviewers)

a meeting for a final verdict

evaluate up to 8 proposals by referring to the sub-criteria phrases
Phrase-Anchored Rating Scale
(instead of Likert Scale – 1, 2, 3, ...)

Sub-criteria phrases describing

* Very attractive  (3 points)
* Attractive       (2 points)
* Not-attractive  (0 point)

features of the proposal
• scientifically and professionally outstanding and very well justified project

• points to an opportunity for a major contribution to the advancement of the knowledge and/or to the resolution of a problem of practical importance

• …
Attractive

• Scientifically and professionally **competent** and **justified** proposal which will make a contribution to the advancement of knowledge and/or the resolution of a problem of practical value

• ...

Attractive
Not Attractive

• work routine in character

• scientifically and professionally unsatisfactory and poorly organized

• ...
Research Infrastructure
Research Infrastructure - Three Dimensions

• Is that someone (person / institution) the most eligible / right one?

Viability of proposed infrastructure with respect to qualifications and synergy of research team, and efficacy of infrastructure

• Is that something really the most beneficial thing?

Potential utilization (exploitability) of proposed infrastructure

• Is that someway really the best way?

Scientific merit, technological integrity and operational feasibility of proposed infrastructure
**TUBITAK – PROPOSAL EVALUATION FORM**

**Research Infrastructure**

<table>
<thead>
<tr>
<th>PROPOSAL NO &amp; TITLE :</th>
<th>PI :</th>
</tr>
</thead>
</table>

### 1- Team & Efficacy

- [ ] Very attractive
- [ ] Attractive
- [ ] Not-attractive

Justification:

### 2- Exploitability

- [ ] Very attractive
- [ ] Attractive
- [ ] Not-attractive

Justification:

### 3- Sci & Tech Integrity

- [ ] Very attractive
- [ ] Attractive
- [ ] Not-attractive

Justification:
Team & Efficacy – Very Attractive

- Principle investigator is professional in infrastructure management, others are proficient in basics, & necessary training for set-up, operation & maintenance has been planned

- Institution is competent in total quality management practices including environmental & personal safety & accustomed to external evaluation / accreditidation

- Team & institution have excellent record of
  - operating facilities in excellent conditions & full capacity &
  - university – public - private sector cooperation
  - serving without discrimination
Team & Efficacy – Not Attractive

- Principle investigator lacks experience even for a much smaller scale infrastructure
- Insufficient information on credentials of critical team members
- Unsatisfactory commitment & record of team / institution regarding management of facilities open to wide group of users
- Unspecified / very limited users implying low capacity service
Exploitability – Very Attractive

- High priority critical research will be undertaken to tackle national or regional / sectoral problems

- Access & procedures are convenient for researchers from other locations / centers / institutions as well

- High potential for investments to be warranted by rewarding results & achievements

- Extended use realistically envisioned for future projects as well
Exploitability – Not Attractive

• Limited use expected because
  – expertise & interests of team not compatible with infrastructure
  – focused on a single project / random & unintegrated studies / experiments
  – duplication of facilities used undercapacity elsewhere
  – not modular & not upgradable
  – although quite relevant, industrial use has not been envisioned

• Insufficient managerial commitment for extended use
• Unspecified / very limited users implying low capacity service

• Added value of expected impact of research not worth the investment
• Compatible with the vision, mission, strategies and present assets / facilities of the institution

• Well-defined relationship between research & selected equipment, specs & accessories & well-justified budget for work to be undertaken

• User friendly & compatible with technological developments

• High-tech facility for investigation of scientific & technological problems
Sci & Tech Integrity – Not Attractive

• Irrational collection of unintegrated equipment & full accessories

• Outdated / unflexible / short life / poor quality

• Not related to major research / need

• Proposed equipment & budget not compatible with the project in terms of capacity & specs

• Institution / team not compatible with proposed infrastructure project
Networking
Networking - Three Dimensions

• Are those people / institutions the most eligible / right ones?

Authenticity and legitimacy of proposed networking

• Is that something really the most beneficial thing?

Potential impact of expected outcomes

• Is that someway really the best way?

Viability and manageability of proposed network
**PROPOSAL NO & TITLE :**

**PI :**

**1- AUTHENTICITY & LEGITIMACY**

- [ ] Very attractive
- [ ] Attractive
- [ ] Not-attractive

**Justification:**

**2- POTENTIAL IMPACT OF EXPECTED OUTCOMES**

- [ ] Very attractive
- [ ] Attractive
- [ ] Not-attractive

**Justification:**

**3- VIABILITY & MANAGEABILITY OF PROPOSED NETWORK**

- [ ] Very attractive
- [ ] Attractive
- [ ] Not-attractive

**Justification:**
Authenticity – Very Attractive

- Compatible with
  - vision, mission, strategies & present assets / facilities of partners
  - national / sectoral priorities in science, technology & innovation

- Major stakeholders all included

- Concrete steps planned to cooperate / integrate with similar international networks
Authenticity – Not Attractive

- Synthetic association of irrelevant teams / institutions / facilities / activities: rationale / scope / objectives not well defined

- Major stakeholders not all associated

- Not eligible to cooperate / integrate with international networks
Impact – Very Attractive

• Wide audience for knowledge to be generated / elaborated / exchanged / disseminated

• Aiming to explore / exploit national resources & enhance national innovation / competitiveness

• Potential to attract researchers & encourage academia-industry mobility
Impact – Not Attractive

- Short term / modest improvement over current state-of-the-art / technology / business / employment

- Unclear impact on
  - partners’ current status
  - uncertain audience

- Narrow range of users / scope limited to single project / unlikely to catalyze new projects / industrial benefits disregarded
Manageability – Very Attractive

- Management plan intelligently formulated in terms of well-defined
  - work packages & distribution to working groups & time tables
  - assignments of mandates & responsibilities
  - budget & financial procedures
  - sustainability measures
  - performance criteria & impact analysis
  - flexibility to accommodate expansion & new partners
  - measures against adversities & unethical conduct
• Partners’ infrastructure, culture & mechanisms inadequate to contribute to & sustain the network

• Inadequate / unjustified budget & resources requirements & allocations

• Unsatisfactory commitment & record of teams / partners in cooperation & in sharing facilities
Three dimensional evaluation used by TUBITAK for the evaluation/selection of research project proposals grouped under eight categories:

1. Research Infrastructure
2. Networking
3. Curiosity-driven academic research
4. Scientific meetings and missions
5. Organizing & hosting scientific meetings
6. International research projects
7. Customer-driven applied research
8. Industrial research, development and innovation
METHOD
1. Principal Investigator: Potential to perform world class research

**Quality of research output:** Has the Principal Investigator published in high quality peer reviewed journals or the equivalent? To what extent are these publications ground-breaking and demonstrative of independent creative thinking and capacity to go significantly beyond the state of the art?

**Intellectual capacity and creativity:** To what extent does the Principal Investigator’s record of research, collaborations, project conception, supervision of students and publications demonstrate that he/she is able to confront major research challenges in the field, and to initiate new productive lines of thinking?

2. Quality of the proposed research project

**Ground-breaking nature of the research:** Does the proposed research address important challenges in the field(s) addressed? Does it have suitably ambitious objectives, which go substantially beyond the current state of the art (e.g. including trans-disciplinary developments and novel or unconventional approaches)?

**Potential impact:** Does the research open new and important, scientific, technological or scholarly horizons?

**Methodology:** Is the outlined scientific approach (including the activities to be undertaken by the individual team members) feasible? (Stage 1)
1-10 versus 3, 2, 0

The range of the marks

Marks range from 0 (missing information), 1 (very poor) ... to 5 (excellent). Marks are awarded in integers or halves.

Reviewers are encouraged to reserve the extremes at the scale (0, 1, ...5) for exceptionally bad / good proposals.

In all cases, reviewers are requested to stick strictly to the review criteria.
SCIENCE

Does the proposed Action address real current problems/scientific issues?

4: Highly exciting and interesting proposal on a very important and/or timely topic

3. Interesting proposal on an important topic

2. Some interesting aspects, but lacks clarity and/or coherence

1. Serious lack of substance and/or relevance.

yes no

4 3 2 1
Panel Score Distribution of Proposals in 2007

3393 Proposals

Number of Proposals

Panel Scores (Out of 9)

≤0.49 0.5-1.49 1.5-2.49 2.5-3.49 3.5-4.49 4.5-5.49 5.5-6.49 6.5-7.49 7.5-7.99 8.0-8.49 8.5-8.99 9
VALIDATION
## ARDEB Research Grants

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Proposals</strong></td>
<td>946</td>
<td>1149</td>
<td>1198</td>
<td>867</td>
<td>1742</td>
<td>4201</td>
<td>4163</td>
<td>5005</td>
</tr>
<tr>
<td><strong>Accepted Proposals</strong></td>
<td>335</td>
<td>421</td>
<td>549</td>
<td>338</td>
<td>480</td>
<td>1479</td>
<td>1366</td>
<td>1333</td>
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<tr>
<td><strong>Ongoing Projects</strong></td>
<td>843</td>
<td>1001</td>
<td>1242</td>
<td>1227</td>
<td>1353</td>
<td>2358</td>
<td>3160</td>
<td>3472</td>
</tr>
</tbody>
</table>
Statistics of ARDEB Research Grants

PROJECT PROPOSALS AND ACCEPTED PROJECTS BETWEEN 2000-2007

NUMBER OF PROJECTS

YEARS

- Yellow bars represent the number of project proposals.
- Green bars represent the number of accepted projects.
- Red bars represent the number of ongoing projects.

Yearly Breakdown:
- 2000: 946
- 2001: 843
- 2002: 421
- 2003: 549
- 2004: 338
- 2005: 1227
- 2006: 1479
- 2007: 2358

Total Numbers:
- 2000-2007: 6005
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Hundreds of scientists, researchers & reviewers participated in workshops for the development of the criteria & phrases.

Their contributions are gratefully acknowledged.