European funding for long-term research

Facts and a personal perspective

Carlo Ghezzi
Politecnico di Milano
Deep-SE Group @ DEI
carlo.ghezzi@polimi.it
The EU and research

- Research recognized as key to the competitiveness and growth of Europe: it is an EU initiative that also involves non-member states
- Framework programmes (FPs) are the main financial tools through which the EU supports R&D covering almost all scientific disciplines
  - EUR 50.5 billion for 2007 – 2013
- Lead by EU's Directorate-General for Research
  - now managing FP7 (2007-2013)
ERC

- Officially launched February 2008
- Part of the 'Ideas Programme' of the FP7
- Previously, long term research was completely delegated to member states
- *The ERC is the first pan-European research funding organisation for frontier research*
- ‘Investigator-driven', or 'bottom-up', in nature, the ERC approach allows researchers to identify new opportunities and directions in any field of research, rather than being led by priorities set by politicians
A unique opportunity

- Other EU programs
  - have short-term goals
  - are driven by predefined objectives
  - require a consortium
  - need an exploitation plan
  - have high overhead
  - foster trans-national cooperation
  - require industry commitment
  - unsuitable to building and stabilizing a research environment around new challenging ideas
One goal, two programs

- *It aims to stimulate scientific excellence in Europe by supporting the very best, creative researchers*
- *Scientific excellence is the only selection criterion in the ERC's peer reviewed grant competitions*
- 3 macro areas
  - Life Sciences, Social Sciences and Humanities, and Physical Science and Engineering
- Directed to individuals
- The ERC funds both
  - early-career researchers **ERC Starting Grants**
  - top senior scientists **ERC Advanced Grants**
Where is our field?

- ERC
  - Physical Science and Engineering
  - Life Sciences
  - Social Sciences and Humanities
  - Computer Science and Informatics
Starting grants

• Principal Investigator
  – candidates can be of any nationality
  – 2 years <PhD (or equivalent) <= 12 years
  – host organization: legally recognized public or private research organization situated in an EU Member State or an Associated Country
    • Albania, Bosnia and Herzegovina, Croatia, Iceland, Israel, Faroe Islands, Liechtenstein, FYR of Macedonia, Norway, Republic of Montenegro, Serbia, Switzerland, Turkey
• Funding: up to € 2.0 M per grant (normally up to € 1.5 M per grant)
• Duration: up to 5 years
Starters and consolidators

- Starting from 2010, indicative budget of each panel divided in proportion to the budgetary demand of the proposals submitted by 2 categories (starters and consolidators)
- PIs will be assessed by the evaluation panels as being starters ($2 < \text{PhD} \leq 7$) or consolidators ($7 < \text{PhD} \leq 12$) at the time of the application
The proposal

• Section 1
  – The PI
    • Scientific Leadership Potential
    • CV
    • Early achievements
  – Extended synopsis (5 pages)

• Section 2
  – The scientific proposal
The evaluation panel

• Step 1: cut down to 3 times the number of fundable proposals
  – Section 1 evaluated by panel members
  – panel meets to establish a ranking list of those proposals meeting the quality threshold

• Step 2: selection within retained proposals
  – Sections 1 and 2
  – final decision of the panel is based upon the interviews and opinions from the individual reviews
Advanced grants

- PI candidate
  - scientifically independent
  - recent research track-record and profile which identifies PI as leader
  - host organization: legally recognized public or private research organization situated in an EU Member State or an Associated Country
    - Albania, Bosnia and Herzegovina, Croatia, Iceland, Israel, Faroe Islands, Liechtenstein, FYR of Macedonia, Norway, Republic of Montenegro, Serbia, Switzerland, and Turkey
- Funding: up to € 3.5 M per grant (normally up to € 2.5 M)
- Duration: up to 5 years
Objective and process

- Projects being highly ambitious, pioneering and unconventional
- For exceptional research leaders only
- Process similar to starting grant (but no interviews)
- Two panels (A and B); active in turns and appointed every year for a maximum of 3 active calls
- **Starting Grant**
  - calls published in summer, deadline fall
- **Advanced Grant**
  - calls published in fall, deadline spring

<table>
<thead>
<tr>
<th>call Id</th>
<th>budget</th>
<th>#received</th>
<th>#grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Grant 2007</td>
<td>335 M€</td>
<td>9167</td>
<td>299 (3.3%)</td>
</tr>
<tr>
<td>Advanced Grant 2008</td>
<td>553 M€</td>
<td>2167</td>
<td>282 (13%)</td>
</tr>
<tr>
<td>Starting Grant 2009</td>
<td>325 M€</td>
<td>2503</td>
<td>244 (9.7%)</td>
</tr>
<tr>
<td>Advanced Grant 2009</td>
<td>515 M€</td>
<td>1584</td>
<td>244 (15.4%)</td>
</tr>
</tbody>
</table>

• Starting Grant – calls published in summer, deadline fall
• Advanced Grant – calls published in fall, deadline spring

*official data released by the ERC*
Current state

- Starting grant 2011 has an open call
- Advanced grant 2011 will be open early 2011
- Starting and advanced grants 2010 still in evaluation process
## PSE

### Physical Science and Engineering

<table>
<thead>
<tr>
<th>call Id</th>
<th>#received</th>
<th>#grants</th>
<th>#PE6 grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Grant 2007</td>
<td>4406 (48%)</td>
<td>137 (46%)</td>
<td>11 (*)</td>
</tr>
<tr>
<td>Advanced Grant 2008</td>
<td>997 (46%)</td>
<td>114 (41.5%)</td>
<td>10</td>
</tr>
<tr>
<td>Starting Grant 2009</td>
<td>1112 (44%)</td>
<td>107 (44%)</td>
<td>11</td>
</tr>
<tr>
<td>Advanced Grant 2009</td>
<td>736 (47%)</td>
<td>105 (44%)</td>
<td>7</td>
</tr>
</tbody>
</table>

Note(*): this was PE5 Information and Communication

---

official data released by the ERC
# PE6 grants by country

<table>
<thead>
<tr>
<th>Country</th>
<th>total #grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL</td>
<td>8</td>
</tr>
<tr>
<td>UK</td>
<td>7</td>
</tr>
<tr>
<td>FR</td>
<td>6</td>
</tr>
<tr>
<td>CH</td>
<td>4</td>
</tr>
<tr>
<td>DE</td>
<td>3</td>
</tr>
<tr>
<td>IT</td>
<td>3</td>
</tr>
<tr>
<td>SE</td>
<td>3</td>
</tr>
<tr>
<td>BE</td>
<td>2</td>
</tr>
<tr>
<td>FI</td>
<td>1</td>
</tr>
<tr>
<td>NL</td>
<td>1</td>
</tr>
<tr>
<td>PL</td>
<td>1</td>
</tr>
</tbody>
</table>
My personal 2 cents

- As a community, we should increase participation
  - helps increasing the share
- To be successful
  - carefully craft your application
    - a strong part 1 is very important
      - PI CV
      - synopsis must be convincing on a long-term vision and commitment
    - phrase part 2 as non-incremental research case that focuses on breakthroughs
**SMScom: a successful case**

- Self-Managing Situational Computing—C. Ghezzi PI
- A 5 years research program; 2.5 M€
- Started Dec. 2008
- Enabler of
  - long term planning
  - blue-sky explorations
  - internal cooperation
  - PhD and post doc support
The *machine* and the *world*

**World (the environment)**

- Domain properties (assumptions)
- Goals
- Requirements

**Machine**

- Shared phenomena
- Specification

19
What changes in the environment?

• The **requirements** we wish to achieve
  – e.g., because business goals change

• **Domain assumptions**
  – e.g., because the context/situation changes
    • users, user profiles
    • external resources/services/libraries/devices
Standpoint and research goals

- Development should be model-driven
  - Emphasis on models to achieve dependability
- Operation must provide feedback data to development, identifying the needed adaptations
- Adaptation should be as autonomous as possible, to support continuous operation
- Quantitative reasoning (and quantitative models) are key to model-driven development and adaptation
- Models are kept alive at run-time
- Continuous verification needed
Further focus

- Distributed architectures
- Decentralized control
- Heterogeneous infrastructures and infrastructure-less solutions
- Dependability, trust
Situational adaptive software

Offline evolution

Reasoner

Models

“Real” parameters

Learner

Monitor

Model-driven development

Probes

Code

Goals
Requirements
Assumptions

Components
Services

the world

Changes
User profiles
External services
So far...

- We are building the bricks of novel paradigm
- Traditional development-time/run-time strict boundary becomes blurring
- We are understanding what it means to move development-time approaches (formal methods) to run-time
- We are in the process of consolidating a few case-studies as demonstrators that the approach is feasible
- ... at month +18 we collected 66 published peer-reviewed papers (journals, conferences, workshops)
Questions?

If you are interested, contact me for a memory stick with collected papers from the SMScom project