



# **Complexity-NET: 'Interdisciplinary Challenges for Complexity Science' Brokerage Workshop**

Radisson Blu Royal Hotel  
Brussels  
28-29 May 2009

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Cross-Disciplinary Interfaces Programme  
Engineering and Physical Sciences Research Council, UK

# Complexity-NET: Brokerage Workshop

Agenda: Thursday 28 May 2009

- 09.00** Welcome and introduction to Complexity-NET and the pilot call
- 09.30** Invited speaker 1: G Nicolis (Brussels)
- 10.15** Invited speaker 2: P Schuster (Vienna)
- 11.00** Coffee
- 11.30** Discussion themes overview
- 13.00** Lunch
- 14.00** Round-table discussions
- 16.00** Coffee
- 16.30** Feedback from discussion groups and general discussion
- 18.00** Close
  
- 19.00** Pre-dinner drinks
- 19.30** Dinner

# Complexity-NET: Brokerage Workshop

Agenda: Friday 29 May 2009

- 09.00**    **Invited speaker 3: S Solomon (Jerusalem)**
- 09.45**    **Invited speaker 4: J Kurths (Potsdam)**
- 10.30**    **Coffee**
- 11.00**    **Round-table discussions**
- 13.00**    **Lunch**
- 14.00**    **General discussion and concluding remarks**
- 15.00**    **Close**



## Introduction to Complexity-NET: the Vision

- Exploiting the growth potential that exists for Complexity Science research across Europe
- To create a stimulating environment for the best Complexity Science researchers, which
  - Enables sharing of facilities
  - Encourages international mobility and communication
  - Promotes public dialogue
  - Catalyses innovation



## Contributing to a European Research Area

- **ERA-NET Support**

- Co-ordination Action by the European Commission through the FP6 ERA-NET scheme
- European science and technology funding agencies, research councils and ministries

- **Synergy and Added Value**

- Support for networking and strategic coordination of planned national research activities in Complexity Science and Complex Systems
- Opportunity to accomplish together things we find difficult to tackle independently

# Countries involved in Complexity-NET

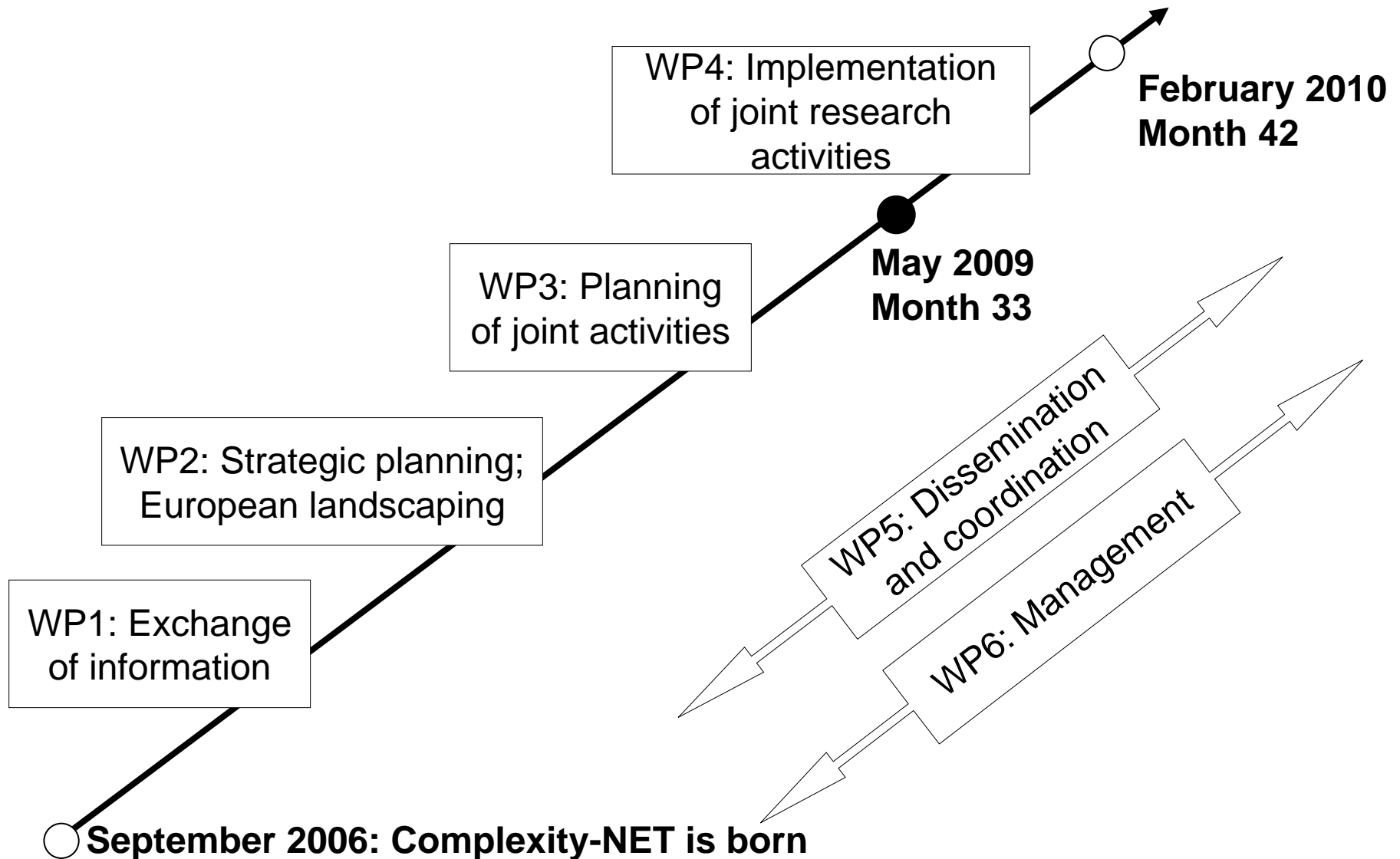
## Complexity-NET European Partners:

-  **United Kingdom** - Engineering and Physical Sciences Research Council, ERA-NET Coordinator
-  **Belgium** - Fonds National de la Recherche Scientifique
-  **Denmark** Danish Agency for Science, Technology and Innovation
-  **Estonia** - Eesti Teaduste Akadeemia
-  **Greece** - General Secretariat for Research and Technology
-  **Hungary** - Nemzeti Kutatási és Technológiai Hivatal
-  **Ireland** - Irish Research Council for Science, Engineering & Technology
-  **Italy** - Istituto dei Sistemi Complessi - Consiglio Nazionale delle Ricerche
-  **Netherlands** - Nederlandse Organisatie voor Wetenschappelijk Onderzoek
-  **Portugal** - Fundação para a Ciência e a Tecnologia
-  **Spain** - Ministerio de Ciencia y Innovación
-  **European Commission** - funded by the Sixth Framework Programme

## Turning the vision into reality

- Gather and share information
- Produce national level Complexity Science landscapes
  - National strengths, weaknesses, opportunities and threats
- Document and analyse the European-wide Complexity Science landscape
  - European strengths, weaknesses, opportunities and threats
- Exploit opportunities and oppose threats
  - Identify and recommend strategies
  - Develop and launch a joint action plan

## Where we are now and the road ahead



## **WP1 Information Exchange: National Programmes and Landscapes**

- WP 1 has been completed
- It involved obtaining, exchanging and documenting information on Complexity related national programmes, including:
  - their respective implementation approaches
  - Complexity Research and Technology Development (RTD) landscapes
  - Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis for each country



# WP1 Information Exchange: Outputs D1.1–1.2: National Programmes

Position and status of participants  
Funding modes  
Funding instruments/programmes  
Legal and administrative considerations  
Role of industry

European Network of Funding Agencies  
Coordination of National Complexity Research and Training Activities

Instrument: Coordinated Action  
Thematic Priority: ERA-NET

*D1.1 Report on complexity relevant national programmes*  
*D1.2 Report on implementation approaches*



# WP1 Information Exchange:

## Output D1.3: National Landscaping

- 793 researchers and 205 research groups supported by a total of ca €136M across the partner countries

Non-linear mathematics and dynamical systems	Fluid dynamics, non-linear optics, plasmas, non-linear waves, solitons	Atmosphere and climate modelling	Optimisation, intelligent systems, pattern recognition, image processing
Time series analysis, synchronisation, prediction, control	Dynamics of interfaces and dislocations	Astrophysical and geophysical systems	Biodynamics, systems biology
Emergence, collective behaviour and pattern formation	Complex materials, catalysis, friction, granular matter	Statistical mechanics, stochastic processes and probability theory	Organisational complexity, complex networks, distributed systems
Phase transitions, critical phenomena	Disordered systems, growth processes, fractals	Non-equilibrium thermodynamics	
Soft matter	Economic complexity, risk, game theory	Biocomplexity, evolution, ecology, bioinformatics	
Environmental and energy transport processes		Complex social systems	



## WP1 Information Exchange: Output D1.3: National Landscaping - Main Conclusions

- Strength in diversity
- Exploitation of new technologies appears low
- Great need for public dialogue
- Consider international cooperation outside EU
- Further strengthen links to economic & social sciences and humanities

European Network of Funding Agencies  
Coordination of National Complexity Research and Training Activities

Instrument: Coordinated Action  
Thematic Priority: ERA-NET

*Report on National Complexity RTD landscapes*



## WP2 Strategic Activities Implementation Options and European Landscape

- WP2 is also complete and has involved:
  - analysing the European Complexity RTD landscape
  - identifying strategies to exploit opportunities and oppose threats
  - understanding funding processes and limitations
  - considering industry engagement in Complexity Science research
- **Outputs (available on the website)**
  - **D2.1** Report on strategies and implementation options
  - **D2.2** Report on the European Complexity RTD, with SWOT analysis
  - **D2.3** Report on industry engagement in relation to Complexity Science



## WP2 Strategic Activities

### European Research Landscape Workshop (Nov 2007)

#### Keynote Speakers

- **Tamás Vicsek, Eötvös Loránd University (ELTE), Hungary:** 'From "snapshots" to evolution'
- **Steve Lansing, Santa Fe Institute, US:** 'Water Temple Networks' in Bali
- **Peter Grindrod, University of Reading, UK:** 'The Impact of Complexity Analysis'
- **Tassos Bountis, University of Patras, Greece:** 'Complexity - a new science or a new direction in science?'
- **Gregoire Nicolis, Université Libre de Bruxelles, Belgium:** 'Complex Systems Research'
- **Erik Mosekilde, Technical University of Denmark:** 'Complex Phenomena in Biomedical Systems'
- **Miguel Rubi, University of Barcelona, Spain:** 'Complexity in Marine Ecosystems'.
- **Jürgen Kurths, University of Potsdam, Germany:** 'Some problems in Complex Systems Science'
- **Paul Bourguin, École Polytechnique, France:** 'Towards a Complex Systems Science'.
- **Antonio Politi, CNR-Istituto Dei Sistemi Complessi, Italy:** 'Complex Systems'
- **Devaraj van der Meer, University of Twente, Netherlands:** 'The effect of air on fine granular matter'
- **Anders Malthe-Sørensen, University of Oslo, Norway:** 'How are complex patterns of the Earth formed'



## **WP2 Strategic Activities**

### **Output D2.2: European Research Landscape**

- Working together – across national borders, discipline borders, and the academic/user interface – towards delivery
  - Increase cooperation between disciplines, especially natural and social sciences
  - Ensure there is delivery of results and follow through
- Education and Training
  - Numbers of trained people need to increase
  - Cross-boundary training needed



## **WP2 Strategic Activities**

### **Output D2.2: European Research Landscape**

- Real-world and big science problems – defining the problems where complexity science can play a role
  - Complexity science needs to start to address real-world and big science problems e.g. energy, transport, finance, environment
- Promotion and recognition of Complexity Science – including external perceptions/ visibility/ enthusiasm



## **WP2 Strategic activities**

### **Output D2.2 - European Research Landscape**

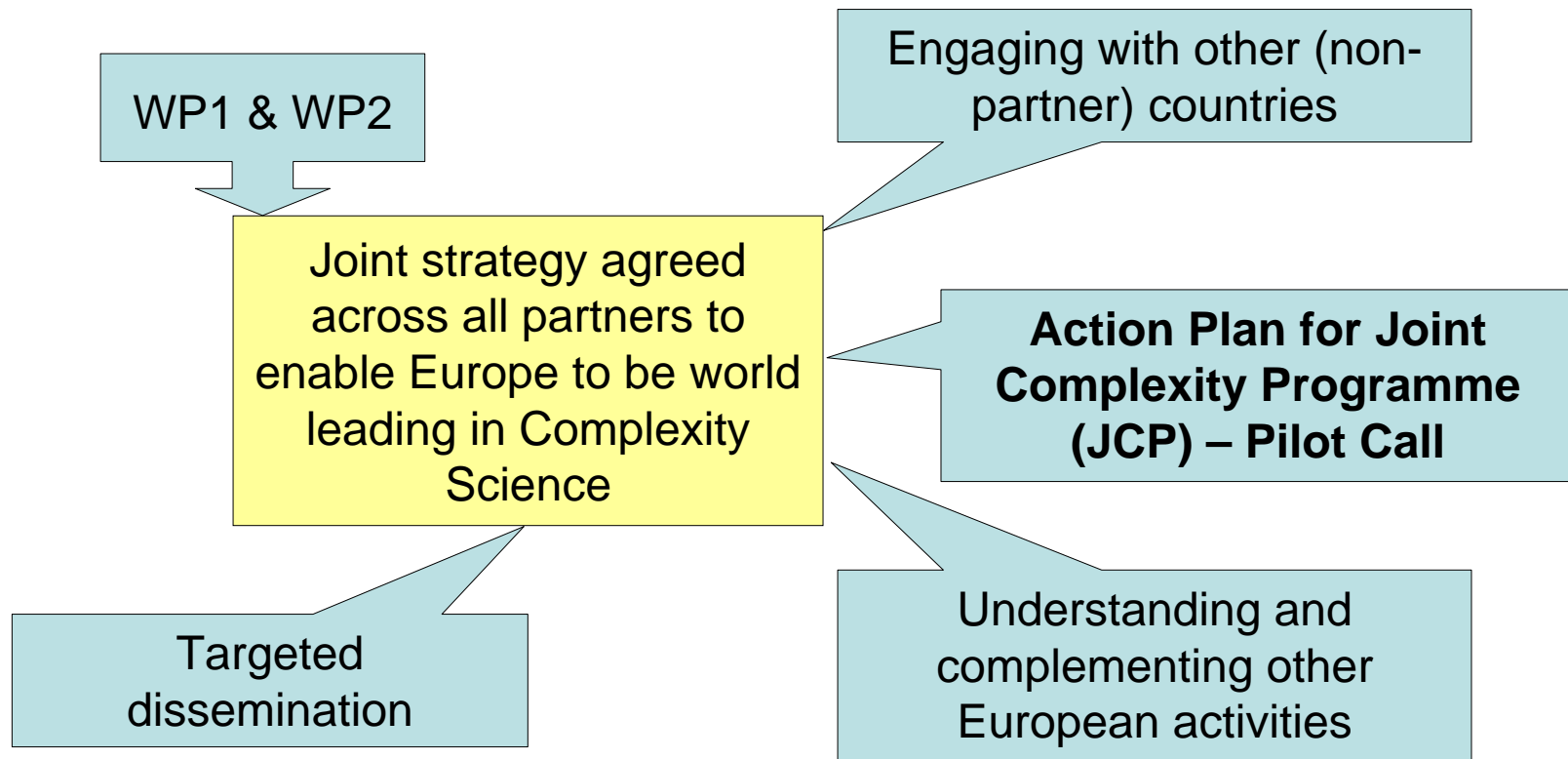
#### **Key conclusions to feed into strategy:**

- Complexity Science research - high relevance to industry, society and policy making
- Current impact on society is limited and must be substantially improved
- Improving impact requires more research and training across traditional scientific disciplines
- Both “challenge-driven” and “investigator-driven” approaches are important



## Current activities and next steps

- WP3: Preparing a Joint Action Plan



- WP4 Implementing the Action Plan



## Next Steps: Implementing the strategy

- Networking opportunities, in particular:
  - physical and social scientists (workshop held in January)
  - complexity scientists and users of complexity, including business, industry and policy makers
- Pilot Call:
  - specifically for research in Complexity Science, rather than relying on complexity science being supported by existing calls with ‘non-complexity’ titles



## **Next Steps: Opportunities of the Pilot Call and Possible Future Joint Activities**

- Strengthen European activity by better engagement between institutes and organisations
- Continue to build a vibrant research community, breaking down barriers in the process
- Raise awareness of Complexity Science
- Work to demonstrate the applications of Complexity Science
- Consider supporting training activities in the future



## **Introduction to the Complexity-NET Pilot Call: Interdisciplinary Challenges for Complexity Science**

- Aims of the call
- Scope and parameters of the call
- Peer-review process
- How to apply
- Evaluation criteria
- Call timetable



## Aims of the call

- To fund high-quality, exploratory complexity science research projects
- To facilitate new transnational collaborations in complexity science



## Scope of the call

- Proposed projects should be grounded in the mathematical and physical sciences and designed around meaningful collaboration with other scientific disciplines
- Proposals should have a clear emphasis on the development of methodologies, tools and techniques of complexity science for addressing real-world challenges
- The principal themes of the call are:
  - Emergence and self-organisation, individual to collective behaviour, micro to macro
  - Dynamics and (un)predictability, risk and extreme events
  - Resilience, sustainability, management and control of complex systems



## Scope of the call (2)

- We are looking for interdisciplinary research projects with the potential to bring new insight to important problems in real-world complex systems
- Challenge domains include but are not restricted to
  - biomedical systems
  - ecosystems and environmental hazards
  - financial and economic systems
  - infrastructure
  - learning, cognition and innovation
  - policy and regulation
  - social networks and exclusion



## Parameters of the call (1) – Participating Agencies/ Countries (Call Consortium)

- Fonds National de la Recherche scientifique (FNRS), Belgium [€150,000]
- Belgian Federal Science Policy Office (BELSPO), Belgium [€150,000]
- Fonds voor Wetenschappelijk Onderzoek (FWO), Belgium [€200,000]
- Eesti Teaduste Akadeemia (EAS), Estonia [€125,000]
- General Secretariat for Research and Technology (GSRT), Greece [€500,000]
- Nemzeti Kutatási és Technológiai Hivatal (NKTH), Hungary [€500,000]
- Irish Research Council for Science, Engineering and Technology (IRCSET), Ireland [€500,000]
- Istituto dei Sistemi Complessi – Consiglio Nazionale delle Ricerche (ISC-CNR), Italy [€700,000]
- Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO), The Netherlands [€500,000]
- Fundação para a Ciência e Tecnologia (FCT), Portugal [€400,000]
- Ministerio de Ciencia e Innovación (MICINN), Spain [€300,000]
- Engineering and Physical Sciences Research Council (EPSRC), United Kingdom [€1,000,000]



## Parameters of the call (2)

- Applicant groups must include investigators from **at least three different countries participating in the call**
- Funding is available for research projects with duration of up to **24 months** and a total budget of up to **€500,000** across all investigators
- Total budget for the call ~€5M. This sum will be administered through a virtual common pot
- Each funding agency will fund only investigators in its own country according to its own regulations



## Parameters of the call (3)

- Applicant and funding eligibility restrictions vary from agency to agency. If you have any doubts on any aspect of eligibility you are advised to ask your national contact, as named in the call for proposals
- Partners from industry or private enterprises may participate in the project proposals, but must provide their own funding and provide a letter of commitment to the project.



## Parameters of the call (4)

- Applicant groups may also include investigators from countries not belonging to the Call Consortium, but those investigators cannot be funded through this call and must assure their own funding
- Any such extra investigators must provide a letter from their institution to guarantee that funds are available for them to carry out their part of the project



## Peer-review process

- We will operate a two-stage process – Expressions of Interest (Eols) and invited Full Proposals
- The Eols will be assessed by the Pilot Call Scientific Council, made up of members nominated by each funding organisation in the Call Consortium
- On the recommendation of the Scientific Council, a number of applicant groups will be invited to submit a Full Proposal, which will be assessed by independent anonymous reviewers from territories outside the Call Consortium



## Peer-review process (2)

- The Principal Investigator (PI) of each Full Proposal may suggest, on behalf of all project partners, up to three independent reviewers
- The PI of each proposal will also have an opportunity to provide a written response to the reviewers' comments
- Based on the anonymous reviews and the applicants' responses to those reviews, the Scientific Council will draw up a prioritisation list of proposals
- The Call Consortium will decide which proposals will be funded based on the prioritisation list provided by the Scientific Council and availability of funding



## How to apply

- All proposals must be submitted in English
- The call will be administered by the Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO)
- Both Eols and invited Full Proposals must be submitted to the NWO via the web portal dedicated to this call:  
<https://www.iris.complexitynet.eu>
- Only one joint proposal per applicant consortium should be submitted by the Principal Investigator (PI) of the consortium at each stage



## Information to submit to the web portal – Expression of Interest stage

- Title of project proposal
- Project acronym
- Proposed start and end dates of project
- Summary of proposal [limited to 250 words]
- Applicants' details [PI and all other named investigators]
- Requested budget total from **each research institution** involved in the project, giving the overall total proposed budget
- The Expression of Interest in PDF format



## EoI – PDF contents

- The EoI PDF should include the following information:
  - Title
  - Applicants' names and affiliations
  - Up to five keywords to describe the theme of the proposal
  - Project description, to include sections on:
    - Objectives, novelty and outline of methodology
    - Scientific track record of applicants
    - Relevance to themes of the call
    - Added value of transnational collaboration
    - Added value of interdisciplinary cooperation



## EoI – PDF contents (continued)

- Requested budget total from **each research institution** involved in the project, giving the overall total proposed budget
- List of selected references

**No further financial details are required at this stage**



## EoI – format

- The EoI PDF is limited to a maximum of **three sides** of A4, and should be in the following format:
  - 11-point font (Arial)
  - single line spacing
  - margins of at least 2 cm on all sides

**Proposals exceeding this page limit will not be considered**

**Deadline: Thursday 30 July 2009 (23:59 local time)**



## Evaluation criteria – Eol stage

- Scientific excellence of the proposal
- Scientific track record of applicants
- Relevance to the aims of the call
- Added value of transnational collaboration:
  - meaningful input from each national applicant or applicant team
  - a significant proportion of the proposed research should be carried out in each of the participating countries
- Added value of interdisciplinary cooperation – level of integration and collaboration



## Call timetable

- April 2009 Call launched
- 30 July 2009 Deadline for the submission of Expressions of Interest
- October 2009 Scientific Council meets to evaluate Eols; Full Proposals invited
- 1 December 2009 Deadline for the submission of Full Proposals
- February 2010 Reviewers' comments to go to PIs, 5 working days for written response
- March 2010 Scientific Council meets to evaluate Full Proposals; prioritisation list agreed
- April 2010 Call consortium meets to decide which projects will be funded; contracting of projects at the national level begins



Any questions?

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