



Coordinated by
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Presentation of the Forward Look on Mathematics & Industry



Warsaw 10 May 2009
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Background

- The current trend towards a ***global economy*** and a ***knowledge society*** has situated information and innovation technologies increasingly dependent on scientific research driven by **Mathematics**.
- Mathematics is a universal framework for innovation, vital for society and industry, a necessary instrument for achieving significant competitive advantages: ***mathematics truly gives industry the edge***.
- However, the interaction between mathematics and industry is far from optimal. Consequently, a strong inter-connected community and a **vision** for Europe are more than ever needed.

European Context

- Counted together, European mathematics is by **far the World leading school**. Moreover, communication channels between Industry and Academia are frequently already established.
- However, regardless of the vital societal and scientific role of industrial mathematics, its **recognition** is not high in the European and national political **agendas**.
- Finally, **careers** in academia and industry in the field of industrial mathematics have somehow suffered from a lack of recognition and of a clear identity.

Added values of the Forward Look

- **Its dimension at European scale:** initiatives at national level risk being fragmented and non-strategic; on the other hand, an initiative at world level risks being less focussed and difficult to implement.
- **The right timing** at a moment in which Europe is engaged in its ambition to become the world's most dynamic *knowledge-based economy*.
- **The inclusiveness** through the involvement of all the main stakeholders in the process: i.e. industry (large companies and Small and Medium Size (SME) companies), research-intensive and consulting companies, researchers, and policy makers.
- **Its impact on European strategy** through the dissemination of its outputs to key players.

Participants

- **Members of the Applied Mathematics Committee of the European Mathematical Society (EMS)**
- **Members of the ECMI** (the European Consortium for Mathematics in Industry) **Council** and of its **Educational Committee**
- **Representatives of the laboratories** where the practice of contracts is an established tradition
- The **European members of the OECD Global Science Forum.**
- Representatives of the **large multinational research-intensive companies** having important presence in Europe, both from the strategic level and the R&D sectors.
- Experts from specific areas (in industry and/or services) with career experience in small and medium enterprises (**SMEs**).

Purpose and Objectives

- The goal of the Forward Look is to explore ways of **stimulating** and/or **intensifying** the collaboration between Mathematics and Industry.
- The present project will identify common issues, questions, and “good practices” between Mathematics and Industry in order to envisage **strategies** for a stronger **interaction** of mathematicians with large and medium size companies aimed at technological advancement.
- The Forward Look will build on the results of the corresponding OECD report by focussing on the **specificities of the European context**. It will systematically include past extensive experiences in the cooperation between academic and industrial researchers together with the political views.
- **Three working groups** will concentrate on specific topics, dedicated to “Training and career development”, “Academia-Industry interface” and “Opportunities and challenges”.

Working Groups

**WG1a:
Training**

(Magnus Fontes)

**WG2:
Academia-Industry
Interface**

(Volker Mehrmann)



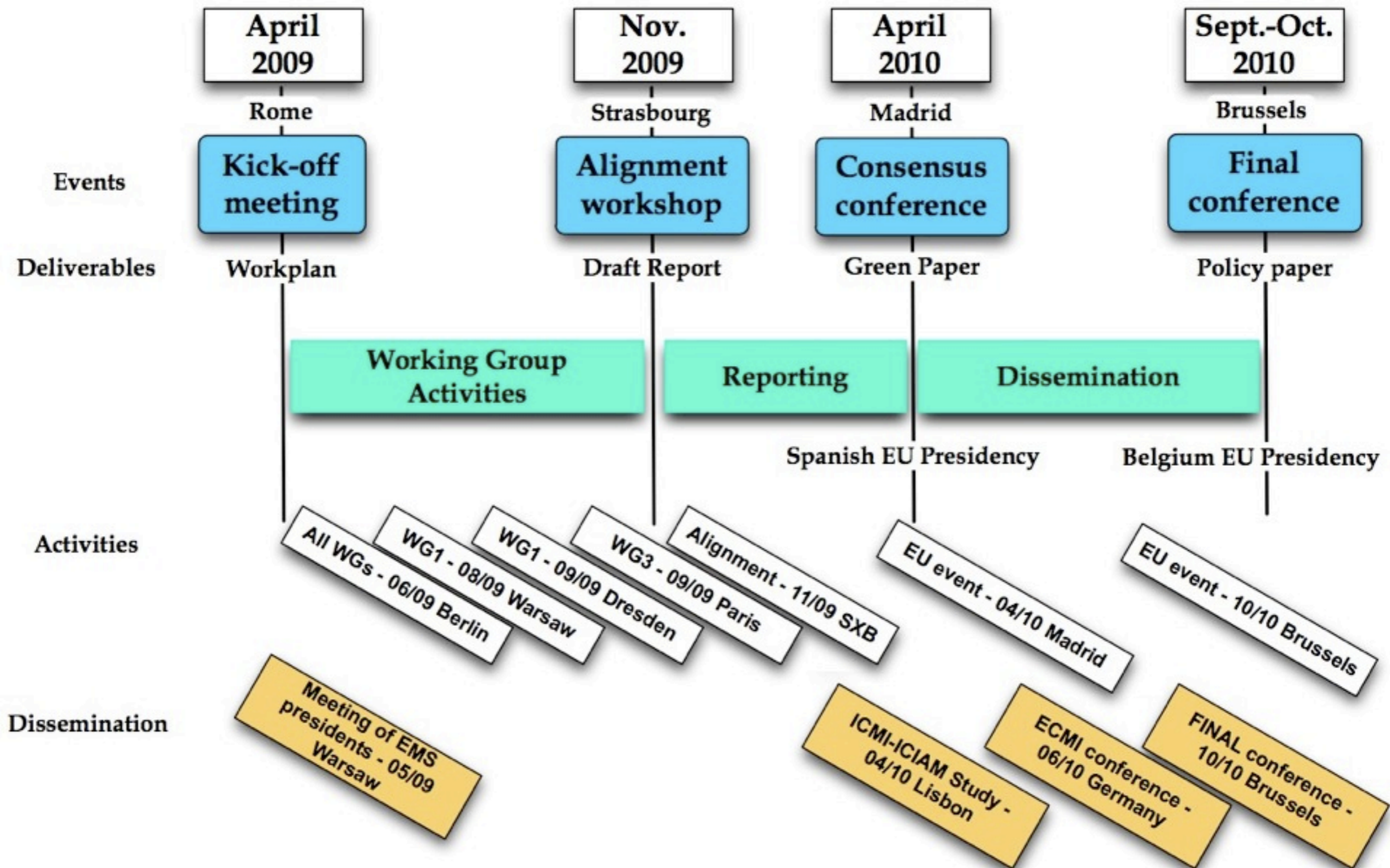
**WG1b:
Jobs and
Careers**

(Magnus Fontes)

**WG3:
Opportunities and
Challenges**

(Yvon Maday)

Timeline



Working Group 1a: Training



Work Plan

collect information from a sample of European universities
ECMIMIM + ESIM + more...

Workshop: Wroclaw (PL) August 28, 2009

Methodology: Delphi

Workshop Responsible: M. Heilio, W.Okrasinski

Deliverables:

- working paper describing the state of the art;
- recommendations for stronger European connections in national educational systems;
- Best practices in Education in Industrial Math;
- increasing the awareness of Industrial Math as a discipline:
training of teachers

Working Group 1b: Job and Careers



Work Plan

Collect information from Mathematicians working in Industry

Questionnaire, database

Workshop: Dresden (D) September 10-11, 2009

Methodology: Delphi - surveys

Workshop Responsible: M.Fontes, A.Micheletti

Deliverables:

- working paper on the key questions;
- recommendations for stronger Academia-Industry connections;
- Best practices in Academia-Industry collaborations in Education;

Working Group 2: Academia-Industry interface

WG 2 Key questions: **State of the art.**

- What is the state of the art of interaction between universities and companies in mathematics.
- Which are the business sectors and technological areas. Where is the cooperation more developed. How can differences be changed.
- Which are the differences between large companies and SMEs.
- Geographical differences in European countries.
- What is the role and importance of consulting companies.

Working Group 2: Academia-Industry interface

State of the art: **Actions.**

- What is the state of the art of interaction between universities and companies in mathematics. **Create an online survey and distribute it via national and European organizations. Individual approaches to decision makers in major multinational companies. Workshop in June 10th.**
- Which are the business sectors and technological areas. Where is the cooperation more developed. How can differences be changed. **Survey of different business sectors included in point 1.**
- Which are the differences between large companies and SMEs. **Collect some cases of cooperations and their differences. Interviews about special demands.**
- Geographical differences in European countries. **Survey with societies, academies and research labs included in point 1.**
- What is the role and importance of consulting companies. **Create a brief note about the situation and carry out some interviews with some consulting companies.**

Working Group 2: Academia-Industry interface

Strategy

- **Two way benefit:** How can a permanent beneficial two-way exchange between industry and academia be established?
- **Cultural marketing:** How can the visibility of mathematics as a driving force for industrial innovation in Europe be increased? How can the impact be measured. How can confidence and trust building be improved.
- **European strategy:** What should be done to meet European industrial strategy? What are the gaps and structural changes and can they be overcome?

Working Group 2: Academia-Industry interface

Strategy: Actions.

- **Two way benefit:** How can a permanent beneficial two-way exchange between industry and academia be established? **Make suggestions based on survey results. Link up with activities in engineering and other sciences. Test within national constraints.**
- **Cultural marketing:** How can the visibility of mathematics as a driving force for industrial innovation in Europe be increased? How can the impact be measured. How can confidence and trust building be improved. **Collect information from national activities, in particular concerning media, schools etc. Make suggestions building on experience in science years and national activities.**
- **European strategy:** What should be done to meet European industrial strategy? What are the gaps and structural changes and can they be overcome? **Make suggestions based on experience in successful cases.**

Working Group 3: Opportunities and Challenges

WG 3 Key questions:

- **Success stories** : scientific experiences and people
- **Boundaries of mathematics** : mathematicians that do maths, mathematicians that do not use maths any more, non mathematicians that do maths....
- **Challenges for SMEs** : example, confidentiality
- **Diversity as a resource** : get information on the diverse actions
- **Building a Community** : attraction, benefit, education, teach to ask for mathematicians when required
- **Strategic opportunities** : dissemination plan

Working Group 3: Opportunities and Challenges

WG 3: **State of the art**

Existing reports ... collect

analyse, summarize and make it available

- Contribution to a common questionnaire
- 3 targetted audience
 - general industries including SMEs
 - Mathematicians
 - Chief Technical Officers in Companies
- Gathering of contacts in the field

Working Group 3: Opportunities and Challenges

WG 3: **Strategy**

- More people involved
- survey and statistic through software.. ready end of may
- Wiki : short emails
- June 15-16 : first brainstorming meeting with people from industries
- Interview of some strategic people

Timeline

