MATHS A VENIR 2009

Michael Harris, November 2009

As a member of the Société Mathématique de France, and again as member of my laboratory, I have been twice informed of the organization this coming December of a "grand colloque pour ouvrir un débat public" under the title MATHÉMATIQUES A VENIR, a play on words that means both "mathematics to come" and "future mathematics." Even after fifteen years in France, I am more attuned to the politics of my own country than to French politics, and it's unsettled in my mind whether or not I am part of the "public" to whom this discussion is addressed. But the organizers are up front about their motivations and describe the stakes of the discussion in terms I find distressingly familiar. Like the first edition of MATHÉMATIQUES A VENIR which was organized by the SMF and the SMAI in 1987, this one is aimed at decision-makers ("*décideurs*") and public opinion ("*opinion*"), and mainly at the former, to judge by the account of the 1987 meetings by Jean-François Méla, then president of the SMF, who wrote that, prior to the meetings,

> *...nous n'avions pas encore su convaincre les décideurs que* [les mathématiques] *étaient une "ressource stratégique pour le futur"*

where the expression in quotes is taken directly from the title *Renewing U.S. Mathematics, Critical Resource for the Future*, better known as the "David Report," on everyone's lips early in my career. "Quite a few *décideurs"* showed up in 1987, according to Méla, along with "*tous ceux qui comptaient dans notre milieu*"[1], and the *décideurs* will be back for the 2009 meeting. In fact, the message circulated by the CNRS promises not only that "representatives of various sectors of society" will participate in the round table discussions alongside mathematicians, but that the event as a whole will be under the sponsorship ("*devrait être parrainé*") of the Prime Minister, the Number Two *décideur* himself! And there will be a sampling of VIPs:

> *Le colloque s'adresse en priorité à des non-mathématiciens : décideurs, élus, responsables de l'enseignement supérieur ou de la recherche, journalistes, et devrait être intéressant pour toute personne, homme ou femme, concernée par la démarche scientifique : étudiant, ingénieur, enseignant, chercheur ou enseignant-chercheur.*

Note in passing the juxtaposition of "decision makers" with "elected officials" symptomatic of the effortless acceptance of a social order, to which we return below, in which deciders decide without having been elected to do so.

You already know the correct answers to whatever questions you may want to pose in such a setting about the future of mathematics. Here they are in French:

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[1] One hopes the SMF has kept the register up to date.

> *...les applications irriguent les domaines les plus variés. Des interactions étroites et profondes se nouent avec le monde économique de l'industrie et des services, les autres branches de la science contemporaine, et la société dans son ensemble.*

Of the five plenary presentations by three distinguished mathematicians, a specialist in computational brain imaging, and the head of Google Research, at least four (and probably the fifth as well) are devoted to applications. As for the round tables, the first two explore the relations between mathematics and industry and science, respectively, while the fourth will apparently focus on the problems of mathematical education, specifically addressing the disaffection for mathematics on the part of students ("*Formation par les maths, métiers des maths*"). I plan to attend the third round table, of which more later. The fifth and plenary round table with which the meeting concludes returns to the theme of mathematics as "*ressource stratégique pour l'avenir"*.

The word *stratégique* has a different resonance today than in 1987, at the tail end of the Cold War, but spoken in the presence of *décideurs* — a group of the "*plus importants responsables industriels français*" invited to form the *Comité de parrainage*, are by now so convinced that we are a *ressource stratégique* that they will be present for the closing panel — it can only refer to the perennial struggle to maintain France's economic and political standing. Méla alludes to the problems inherent in relying on the economic argument to convince decision-makers:

> *L'importance de la recherche pour le développement économique est devenue un leitmotiv, mais il en résulte une volonté de la piloter étroitement par des programmes finalisés qui ne correspondent guère à la dynamique propre des mathématiques.*

Indeed, at last April's meeting in Rennes, a sort of trial run for the third of December's round tables, on maths et société, Marie-José Durand-Richard warned that

> *il conviendrait que la prise en compte du contexte ne conduise pas à s'enfermer dans une stricte technicité au service de l'entreprise. Poser la question du lieu des savoirs, et des conditions de leur échangeabilité, doit permettre de réfléchir sur les conditions de la démocratisation des connaissances, et non de leur réification.*

To judge by the MATHS A VENIR program, Durand-Richard could have saved her breath;[2] if *démocratisation* of anything is on the agenda it is well hidden.

The promotion of "mathematics" — and here by "promotion" I just mean economic support, which is after all the whole point of a "débat public" addressed primarily to "décideurs" — in the guise of "strategic resource," can only be justified as a return on investment. You will already have noticed that the discussions focus almost exclusively on applied and applicable mathematics.[3] Méla's enigmatic allusion to "la dynamique propre des mathématiques" is an entry

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[2] If indeed she said the words attributed to her; I have been told that the article in the *Gazette* from which this and other quotations are taken are not an accurate reflection of the Rennes discussion.

[3] Since pure and applied mathematicians in France are constantly competing for funding, I should make it clear that I have no argument with applied mathematics as such — quite the contrary — but rather with the view, unfortunately

point to a familiar and perfectly conventional discourse about the necessary but unfathomable relation between pure and applied research in general. Briefly: you can't squeeze fundamental research into a timetable, and you certainly can't predict its economic spinoffs. But experience has shown that they are inevitable and indeed of "strategic" importance. The "you" above refers to the *décideurs* who, naturally unhappy to be told by outsiders what they can or cannot decide, have to be steered away from asking questions incompatible with the conventional discourse[4].

Invited, on behalf of my research project which had just been awarded a prize, to provide a soundbite for the general public, I declined to repeat the standard formulas and instead came up with this:

> *Il y aura inévitablement des applications mais ce n'est pas pour cela qu'on fait de la recherche en mathématique. On ne demande pas aux archeologues ni aux ecrivains si leurs travaux auront des applications* [the foundation whose prize we won also offers prizes in archeology and literature]. *La reflection mathématique est une activité dont chacun de nous est capable et qu'on retrouve dans toutes les civilisations, comme le fait de s'intéresser à nos origines ou le besoin de laisser des traces écrites pour le futur. Si ce n'est pas gachée par un enseignement mauvais, et avec l'obsession regnante avec le rendement immédiat c'est malheureusement trop souvent le cas, l'expérience des mathématiques se revèle la source d'un grand plaisir et d'une liberté incomparable. Donc je dirais que l'importance de notre travail, au-delà de ce que nous pouvons apporter a la résolution des problèmes de notre discipline, est de montrer la possibilité d'organiser sa vie autour d'une activité libre et libératrice.*

I have no illusions about the quality of this paragraph, whose only interest here — apart from justifying my decision to write the present remarks in English — is to show that it is possible, in public, to depart from the conventional wisdom about the necessary relation between pure mathematics and applications without being reminded of the rules.

To avoid any misunderstanding, let me make it clear that, in spite of the involuntary echo of Cantor ("the essence of mathematics lies in its freedom"), the point of this soundbite was to defend not a romantic conception of the researcher but rather the right to choose one's own boss, whether one prefers to define the latter as the head of one's research group or the internal constraints of the discipline. This is manifestly a luxury in a world where people consider themselves fortunate to have a boss at all, even one likely to drive them to suicide. But defense of a position of relative privilege is inevitably self-interested, and I could have done worse than to point to my choice to pursue a pleasurable activity without (directly) exploiting others, free of the control of unelected *décideurs*.

Pleasure deserves to be considered a legitimate motivation for research and not subordinated to serving national priorities as determined by those licensed to make such determinations. It is

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promoted by our representatives who should know better, that pure mathematics can only be defended in public as a source of potential applications.

[4] For example, why is it that France has positions for young advanced researchers from "developed societies" like Germany and Italy, while there is so little movement in the opposite direction?

ridiculous to complain about students' lack of interest in mathematics while insisting that pure research is primarily justified as a "strategic resource." Already in 1987 there was apparently talk of the "aspect ludique" of mathematics, and on the MATHS A VENIR website this theme is suggested as an entry point for presenting mathematics to the general public. If this is meant to refer to the intellectual pleasure of mathematics in all its richness, and not just the pleasure of mathematical games and puzzles, then of course I agree. But I cannot accept the implicit contrast between the merely pleasurable aspect of mathematical research with its serious and respectable role as *ressource stratégique*. Am I really the only one who feels this way?

There is a terrible expression that always comes up when one is a member of one of the committees charged with applying official directives to the practical problems involved with maintaining the community of educators and researchers to which I belong. *"Jouer le jeu*", literally "playing the game," is best translated "playing along," concealing one's true feelings and misgivings in order to obtain the favors of the *décideurs* on whom the future of one's discipline, not to mention one's livelihood, depends. Those of us who chose to devote our lives to pure research in mathematics, and no doubt in other fields, are unable to talk openly about our true motivations, because *société* is structured in such a way as to make these motivations irrelevant.[5] All three participants in the Rennes meeting expressed misgivings[6] with the formula "mathématiques et société," especially René Padieu, who looked at his audience of mathematicians and asked "*Qui est la porte-parole de la société?*" The structure of *la société* as the uneven playing field of *décideurs* and everyone else is such that, in discussing the interactions between mathematics and society in a forum primarily addressed to *décideurs* and their associates, it is not even possible to refer to this structure.

The exercise becomes particularly grotesque under the sponsorship of a *décideur* number two implementing the policies of a *décideur* in chief — who has made a point of displaying his esteem for the research community in unusual terms — that, at least as far as universities and research are concerned, were not only opposed by a large proportion, probably a majority, of the mathematicians now trying to get the attention of the *décideurs* — that's bad enough — but that were imposed without respecting the minimum standards of democratic consultation. The same government, of course voted without hesitation to approve the main provisions of a European constitution that had been rejected by a popular referendum two years before its own election. In these circumstances, the meaning of "*jouer le jeu*" is painfully obvious.

Playing at playing the game is another matter, and that is just what an anonymous protector invited me to do on October 6 at the Ministère de l'Enseignement Supérieur et la Recherche, for a morning seminar on the *Stratégie nationale de recherche et d'innovation: quels projets pour le grand emprunt national?* Entrepreneurs sat beside researchers and representatives of associations[7] in the seats and the aisles of the auditorium in the old Ecole Polytechnique to listen

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[5] Yuri I. Manin, at least, is not afraid to say what he thinks: "I always say, 'Why should we put ourselves on the market? We (a) don't cost anything, and (b) don't use up natural resources and don't spoil the environment.' Give us salaries, and leave us in peace." *Notices of the AMS*, November 2009, p. 1269.

[6] According to the transcript in the *Gazette*; see note 1.

[7] Or so claimed the minister. Those who spoke up at the round table I attended were either business executives or representatives of various levels of government; the only researchers visible were those who had created either partnerships with industry or their own startups.

to Minister Valérie Pécresse outline her hopes for the morning's four simultaneous round table discussions. The historic significance of the Grand Emprunt National, coordinated by a committee led by one former Prime Minister from each of the main parties, eludes me, insofar as its scope is not limited to Madame Pécresse's ministry. Keywords pronounced by the minister — *visibilité*, *esprit d'entreprise*, *valorisation*, *gouvernance* — resurfaced throughout the morning's events. In her greetings, and again at her concluding speech three hours later, she insisted that basic research, not subject to *retour sur investissement* was "au coeur de notre stratégie nationale de recherche et d'innovation". My notes have the minister saying that "progress of science must not be neglected" and a reference to "quête de rente, quête de sens".[8] There is an "urgency to renew and rationalize research" to confront its "major defect" — the absence of *fluidité* between research and innovation. Otherwise basic research was hardly mentioned at all, at least not at the round table I attended, entitled *Le grand emprunt pour renforcer l'écosystème de l'innovation*. Finally a key concept— ecosystem — that might help me figure out how I fit into the grand national scheme. A big enough fish to merit invitation to the seminar, I am nevertheless too small to be a predator. Most likely a bottom-feeder. No enlightenment on this score was likely at the other three round tables, on health/well-being/food (biotechnology), *l'urgence environmentale* (ecotechnology, especially energy and transport), or information/communication (nanotechnology and telecommunications). The minister situated the innovation ecosystem in a "new research landscape" characterized by three more key concepts: *autonomie*, *décloisonnement*, and the *université au coeur de l'innovation* as a "post-crisis springboard" (*tremplin d'après-crise*).

Opposite a panel too numerous for the space at the table, the innovation ecologists in the audience were a comparatively young and hungry crowd, overflowing the assigned seminar room ("*Je suis désolé de ces conditions matérielles*") and compulsively consulting their portable communications devices. The session was led by the president of something called the *pôle de compétitivité* SYSTEM@TIC who made a distinction I couldn't quite follow between *problèmes de moyens* and *problèmes soft* and introduced four themes of the presentation, namely

1. Getting from *emergence de l'idée* to *création d'un startup*
2. Technology transfer
3. *Problèmes de financement*
4. *Décloisonnement de l'écosystème*

Of these, only the fourth theme seemed at all relevant to my situation — they want to break down the barriers and let me out to swim among the sharks, and vice versa. And of course this was the theme dropped from the program for lack of time. But I did learn from the other presentations, as well as from the *décideurs* in the audience, that

1. Professors and researchers as well as entrepreneurs suffer from *problèmes soft émotionnels.* For example, do researchers have an interest in working on projects that are not their own?

[8] My handwriting here is blurry and I can hardly believe anyone really said this, but Google finds the expression "quête de rente" in 101,000 web pages, so who knows?

2. There is concern about the condition of the researcher, especially in the creation of spinoffs; and how to manage the return of the researcher to the university if the spinoff is sold.
3. That it is important to focus on the people rather than just on patents — has the researcher released from the *cloison* made millions or tens of millions of euros?
4. Research turns money into ideas; innovation turns ideas into money.
5. Universities have to agree to finance their offices of transfer/innovation on their overhead budgets; "*alors elles seront viables*".
6. Mao's image of the "hundred flowers" is still alive among French *décideurs*.

And, most relevant to MATHS A VENIR, three themes attributed to Sarkozy — the knowledge economy, industry/technology, and competitiveness of the French economy— on the one hand, and my own responsibility in all this, on the other hand:

> *Il reste aux scientifiques de sortir du labo à la rencontre du citoyen et d'expliquer comment ce qu'ils font contribuera à son bien-être*;

it is understood that it is the well-being of the citizen rather than the scientist, but not whether the scientists will really meet ordinary citizens rather than *décideurs* beyond the *cloison*.

In the concluding remarks, while it was understood that basic research brings no *retour sur investissement*, in the sense that the research laboratory cannot help to repay the *Grand Emprunt*, the speakers insisted that basic research be *associé* with *laboratoires d'innovation*.

> *Toute notre recherche va évoluer dans la direction d'encourager ces échanges* [public-privé].

At one point during the *ecosystème* panel, I was tempted to speak up and point out that, actually, the *esprit d'entreprise* was not unfamiliar to scientists, and if most of us have chosen to follow a not especially easy path to a not particularly lucrative career, it was because we decided early in our lives that the *esprit d'entreprise* was a mindset to be avoided at all costs! This is just another way of developing the "freedom" theme from the earlier soundbite, and one might think it would make sense for the *décideurs* to hear how the *chercheurs* feel about the *décloisonnement* in store for us. But I looked at my neighbors, asked myself how even the most well-meaning marine ecologist would react if an organism under study looked up from the sludge and offered to share its own observations, and decided to hold my peace.

Anyway, you see that the *décideurs*, elected or otherwise, to which MATHS A VENIR 2009 is addressed, have made no secret of how they intend to play the game. But you were right to be skeptical about Sarkozy's claim to authorship of the three themes cited above. These themes as well as three of Pécresse's keywords[9] can be found on the first two pages of the report on the *First European Forum on cooperation between Higher Education and the Business Community*, held in Brussels in February 2008 "in line with the European Commission's initiative of May 2006 on modernizing Higher Education in Europe, a key element of the Lisbon strategy"; Valérie Pécresse gave one of the opening speeches. These same themes and keywords reappear in item

[9] governance, commercialization, entrepreneurial mindset

9[10] of the 2009 *European Commission Legislative and Work Program List of Strategic and Priority Initiatives*, where one reads that

> The Communication of the Commission "Delivering on the Modernisation Agenda for Universities: Education, Research and Innovation" (COM(2006) 208 final) highlights that Universities have to recognize "*that their relationship with the business community is of strategic importance and forms part of their commitment to serving the public interest*".

In neither of these documents does one find even a single reference to mathematics[11], but at least one French *décideur* has seen the connection:

> *Les mathématiques sont au coeur de la plupart des grands enjeux technologiques et économiques… Il est plus que jamais crucial de favoriser le rapprochement entre le monde de la recherche mathématique et celui de l'entreprise.*

That's Philippe Camus, President of Alcatel-Lucent, co-gérant of Lagardère, former co-president of EADS[12]— and Président du Comité de parrainage of MATHS A VENIR 2009! In the latter capacity he will participate in the closing panel on mathematics as *ressource stratégique* and the answers he will propose to the questions addressed by that panel —

> *En quoi les mathématiques sont-elles au coeur des grands enjeux économiques et sociaux ? Pourquoi faut-il favoriser leur développement ?*

will be informed by his impeccable *esprit d'entreprise.*

One thus has every reason to expect that the *responsabilités sociales des mathématicien-ne-s* to be identified by the round table on "Maths et Société"[13] will be defined exclusively in terms of that "part of … the commitment to serving the public interest" formed by the "relationship with the business community." I have no wish to call into question the motives of those who have agreed to participate[14] in the "Maths et Société" panel or any of the other panels or plenary sessions, but I hope I am not alone in regretting the lost opportunity to address our other social responsibilities. Now that mathematics is not only relevant to war in the literal sense, as it was already in Plato's time, but has become the primary *ressource stratégique* for the manufacture of what, as early as 2003, American investor Warren Buffett termed "financial weapons of mass destruction," one has to agree with colleagues Amaury Lambert and Laurent Mazliak that

> *Il est grand temps pour la communauté mathématique de réfléchir collectivement à la nature de ses liens avec la finance.*[15]

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[10] see the attached Appendix

[11] In the report of the second European University-Business Forum, held last February, one reads that "We also need more students – and particularly more women – in mathematics, sciences and technology." Who can argue with that?

[12] The "D" stands for "defense"

[13] whose two leading questions are: *Comment la société voit-elle les mathématiques?* and *Quelles sont les responsabilités sociales des mathématicien-ne-s?*

[14] other than the eventual defenders of Finance Mathematics, see below.

[15] *Gazette des Mathématiciens*, **120**, avril 2009, 103-105. The authors were reacting to an article by Yves Miserey that had appeared in the previous issue of the *Gazette*, entitled "La finance française ne doit pas laisser passer les

And one can hope, along with Durand-Richard, that the *communauté mathématique*, in some not too distant *avenir*, will not only reflect on *démocratisation* as well as *responsabilité sociale* but will become a *décideur* in its own right.

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chances que la crise comporte pour notre pays". Miserey, science journalist at *Le Figaro*, will moderate the round table on Maths et Société.

APPENDIX

European Commission Legislative and Work Program
List of Strategic and Priority Initiatives

Title of the initiative**: Communication on University-Business Cooperation**
Expected date of adoption of the initiative: April 2009

A. Context and problem definition

What is the political context of the initiative? How does this initiative relate to past and possible future initiatives, and to other EU policies?

Knowledge, skills and competences of Europe's citizens are at the heart of the revised Lisbon strategy. Europe cannot compete solely on costs. Only a well educated and well trained work force that practices lifelong learning and updates its skills during the whole lifetime will allow Europe to stay competitive, to create jobs and to keep so its high living standards.

The revised strategy underlines therefore the importance of a partnership approach: the Lisbon agenda must be owned by all stakeholders at EU, national, regional and local level. All should contribute to construct Europe's future. It is important to get the different players to work together. Mobilisation and collective effort are the key elements of the partnership.

Universities and companies are crucial actors in such a partnership: Universities appear as "providers" of knowledge, skills and competences, companies as "users". It is therefore important to ensure that these partners understand each other, that they operate in synergy and that they support each other in the best possible way. It is crucial that students have the required knowledge, skills and competences when they leave university and enter the labour market (employability). Universities have also to get a more involved in the development of lifelong learning.

In the follow-up of the informal meeting of Heads of State and Government at Hampton Court, the "Education" Council held an exchange of views on *higher education*, focussing on how the quality of higher education could be improved and on promoting top quality universities. The relationship between business, universities and research was identified as one important point.

The Communication of the Commission "Delivering on the Modernisation Agenda for Universities: Education, Research and Innovation" (COM(2006) 208 final) highlights that Universities have to recognize "*that their relationship with the business community is of strategic importance and forms part of their commitment to serving the public interest*". Most stakeholders recognise the potential of closer cooperation between universities and business; however effective implementation does not progress adequately.
In the course of the dialogue to date, the point has often been made that the scope of discussion should not be confined to third level education but should cover other aspects of education and training. The university-business dialogue may therefore also be considered within the larger context.

What are the main problems identified?

- The potential of partnerships between universities and business for modernising higher education in Europe is recognised and shared by the different stakeholders, however implementation seems difficult;
- The cooperation with business is not part of the overall policy and strategy of universities;
- Higher education institutions (HEI) do not or only in a very limited way support the implementation of lifelong learning;
- Many curricula are not sufficiently linked to the needs of the labor market and/or do not prepare the students well for it;
- Governance structures of HEI need to be modernized; they could benefit of the experience and knowledge of companies in managing/steering their organization, in particular in view of a growing autonomy of HEI;
- Insufficient entrepreneurial mindset amongst students;
- Insufficient mobility and exchange between HEI and companies.

Explain how EU action is justified on grounds of subsidiarity

The subsidiarity principle applies insofar as the proposal does not fall under the exclusive competence of the Community
The issue of better cooperation between business and universities is on the agenda of all stakeholders (Member States, universities, companies, intermediary organisations, regional development agencies, foundations). They recognise that an improved cooperation between universities and companies will raise the quality and relevance of university education and is a key element to further the implementation of lifelong learning.

B. Objectives of EU initiative

What are the main policy objectives?

General objectives
- Support the implementation of the Lisbon agenda;
- Improve the quality of the European Education and Training systems;
- Support the implementation of lifelong learning in the EU.

Specific objectives
- Improve curricular development, leading to employability and an entrepreneurial mindset among graduates;
- Improve continuing education, more precisely the cooperation between universities and companies in the provision of training/retraining programmes;
- Support the modernisation of governance structures within universities, with the help of business expertise;
- Support the development of mobility including student mobility, but also mobility of staff of HEI to companies and vice versa.

Does the objective imply developing EU policy in new areas or of strategic importance?

The objectives imply EU policy development in an area of strategic importance, namely improving the education and training systems in Europe, increasing the employability of Students; making lifelong learning a reality to ensure that Europe's citizens have the right skills to benefit of the knowledge economy.

C. Options

What are the policy options? What legislative or 'soft law' instruments could be considered? Would any legislative initiatives go beyond routine up-date of existing legislation?

Option 1: The first option would be to take no action, and to continue with the current set-up. University-business cooperation is considered an important element in the modernisation agenda for higher education. Article 149 of the Treaty is the basis for action on EU level. The possible actions under this article are:

Option 2: Communication of the Commission reporting on the results which have emerged from the dialogue to date, addressing how structures for a wider dialogue might be strengthened, and proposing the establishment of a platform on European level for a structured dialogue between the different stakeholders. This platform should support the exchange of best practice and mutual learning but also allow for a follow-up of the implementation of university-business dialogue on national level.

Option 3: Recommendation of the European Parliament and the Council on concrete measures to be undertaken in support of the objectives identified above.

Does the action proposed in the options cut across several policy areas or impact on action taken/planned by other Commission departments?

The action proposed should relate to Enterprise policy on developing entrepreneurship in Europe. It should also relate to research policy on strengthening the cooperation of universities and companies in the field of research. And last not least it should relate to Employment policy, in particular in view of lifelong learning and the permanent updating of the skills required.

Explain how the options respect the proportionality principle:

University-business cooperation is an issue and challenge in almost all Member States. Both the field of higher education and most business areas are facing globalisation and there are thus important cross-cutting elements to the problems identified above that can have a significant impact on the future development of these fields. The Commission seeks thereby to support the Member States and the different stakeholders in the most effective and efficient way. Independently of the option chosen, the implementation of measures proposed is at the discretion of Member States.

D. Initial assessment of impacts

What are the significant impacts likely to result from each policy option (cf. list of impacts in the impact assessment guidelines), even if these impacts would materialise only after subsequent Commission initiatives?

Option 1: The pilot forum in February 2008 demonstrated very clearly that an action on European level would be welcomed by all stakeholders. Doing nothing would therefore create frustration and would not be understood by the stakeholders. It would thereby continue the negative impacts for the labour market that the lack of dialogue has proven to create.

Option 2: This option balances the need for action with its costs. It is a non-legislative approach that has no direct economic or environmental impact but would create positive social impacts due to the improved employability of university graduates. It is expected to be used by a number of stakeholders as a steering instrument. The establishment of a platform on European level for a structured dialogue between the stakeholders would support and facilitate sharing of good practice and mutual learning. It would also allow to support and follow-up on the implementation of measures identified in the communication.

Option 3: This option has a soft-law aspect without economic or environmental impacts. The expected positive social impact resulting from this option would be somewhat lower than for the non-legislative option as the main actors in the field at the current stage are autonomous universities and private businesses and not governmental bodies.

In conclusion, is seems at current stage more efficient and effective to support stakeholder dialogue than to intervene with concrete action proposals.

Could the options have impacts on the EU-Budget (above 5 Mio €) and/or should the IA also serve as the ex-ante evaluation, required by the Financial Regulation?

The proposed option 2 would require an annual operational budget of around 1 Mio € starting from 2009 (University/Business Forum; workshops with experts; identification, documentation and dissemination of examples of good practice).

Could the options have significant impacts on simplification/administrative burden or on relations with third countries?

N/A

Who is affected?

The initiative would affect both the universities and other higher education institutions as well a whole range of business stakeholders including interest organizations and other representation bodies. The results would have an impact on users of higher education in Europe and contribute to the modernization of the sector.

E. Planning of further impact assessment work

What information and data is already available? What further information needs to be gathered? How will this be done (e.g. internally or by an external contractor) and by when? What type and level of analysis will be carried out (cf. principle of proportionate analysis)?

Some information is available demonstrating that the cooperation between universities and business is not satisfactory in many Member States; discussions with stakeholders show that action is needed and that support from European level would be appreciated. This issue had already been highlighted in the Commission's communication of 2006 “Delivering on the Modernisation Agenda for Universities: Education, Research and Innovation” (COM(2006) 208 final).

A survey undertaken in the framework of an Erasmus project illustrates that ~ 80% of universities recognize that a closer cooperation with business is required.

The pilot forum organised on 28-29 February 2008 demonstrated a strong demand from all stakeholders: politicians; higher education (rectors, presidents, professors, students); business community involving large and small enterprises; public authorities.

A thematic forum on continuing education and lifelong learning on 30 June 2008 made clear that closer cooperation between universities and business is required to make progress in the area. Universities have to play their role as providers of LLL.

Interesting in his context is the forth-coming LLL Charter for Universities, prepared by the European University Association on request of the French Government.
2008 is used to collect additional examples of good practice, surveys, analysis, reports from different Member States, to get a clearer picture of what is on-going in this field in the Member States and to collect additional opinions from the stakeholders.

The thematic forum on Curriculum Development and Entrepreneurship (30-31 October 2008) highlighted the need for closer linkage between universities and business. Universities have to ensure that their study programmes are relevant for the labour market and that their students are learning what they need to face future challenges and to benefit from the knowledge economy. Cooperation between universities and business can substantially contribute to the development of future entrepreneurial students.

The thematic forum on knowledge transfer (7 November 2008) explored in detail questions related to Intellectual Property Rights (IPR). This forum is meant to monitor and support the implementation of the recommendation on the management of IP in knowledge transfer activities, adopted by the Commission in April 2008.

The second European University-Business forum is scheduled to take place in February 2009.

Which stakeholders & experts have been/will be consulted, how and at what stage?

Workshops with stakeholders/experts and projects have addressed the issue in the past; the pilot forum in February 2008 brought together more than 250 representatives of Higher Education, Business and public authorities. The thematic forum on Continuing Education and Lifelong Learning gathered around 70 representatives from the different stakeholders, the thematic forum on Curriculum Development and Entrepreneurship around 120, and the one on Knowledge Transfer around 40 experts
Additional targeted contacts with relevant organisation on European and national levels are established on an ongoing basis.

FIRST REACTIONS, December 3, 2009

I was only able to attend the second day's workshops and will have to wait until recordings are made generally available before I can write a sensible account of the proceedings. Had I taken the advance publicity literally, my biggest surprise would have been to see that the *décideurs* mainly stayed away. I was not surprised, however, because I received several reminders the week before the event, strongly suggesting that the organizers were counting on mathematicians to fill the auditorium. There were few jackets and ties in evidence, and the audience members who asked questions identified themselves either as mathematicians or as mathematics teachers. There was also a substantial group of high school students and a sixth round table, a *débat entre lycéen-ne-s et mathématicien-ne-s*, was added to the program.

Applications were not in evidence during Wendelin Werner's plenary presentation, and I was told that Etienne Ghys took a similar tack during his presentation the first day. Sociologist Michel Grossetti managed to make subversive observations on *Maths et Société*; as I should have anticipated, several other panelists spoke at length, though without much depth, about the mathematicians' responsibility for the current financial crisis. The mathematicians attending the round tables asked challenging questions, especially during the *ressource stratégique* panel. The crucial moment of the two-day meeting may well have come when Yann Delabrière, agrégé de mathématiques and president of the auto parts supplier Faurecia, reacted to one of these questions with something along the lines of "so what you want is an *éducation nationale fonctionnarisée*". He claimed he was being intentionally *provocateur*, but it was pretty clear to me that he lost his cool. I can't be sure, though, until I've seen the transcript.

Otherwise the program was much as I had predicted. Some of the arguments I had caricatured in November were stated in practically the same form in December, and during the final panel I even heard the word *écosystème*. My Paris 7 colleague Josselin Garnier summarized the two days' deliberations, with almost supernatural good cheer, in five points broadly compatible with the Lisbon strategy; nevertheless, point 5 :

> *Approfondir la réflexion sur la responsabilité et l'éthique des mathématiciens*

provides an opening that I hope my colleagues will know how to exploit.

Prime Minister François Fillon never did show up, but his message, featuring an impressive number of words of Greek origin, was read aloud in his absence. Champagne was then served in the Salle Odéon of the Mutualité.