

Interuniversity Attraction Poles V/16

**The loyalties of knowledge.
The positions and responsibilities of the sciences
and of scientists in a democratic constitutional state**

OVERVIEW DOCUMENT

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1. INTRODUCTION

1.1. General information about the network

Title of the network: The loyalties of knowledge. The positions and responsibilities of the sciences and of scientists in a democratic constitutional state

Network co-ordinator: Prof. S. Gutwirth (Vrije Universiteit Brussel)

Promoters: Prof. Serge Gutwirth and Prof. Jean Paul Van Bendegem (Vrije Universiteit Brussel); Prof. Koen Raes (Universiteit Gent); Prof. Isabelle Stengers and Prof. Jean-Claude Grégoire (Université Libre de Bruxelles); Prof. François Mélard and Prof. Marc Mormont (Fondation Universitaire du Luxembourg) and Prof. Bruno Latour (Centre de Sociologie de l'Innovation, Ecole Nationale Supérieure des Mines, Paris).

Researchers involved during the 2002-2005 period

1. *Vrije Universiteit Brussel (VUB)*

Disciplines: law, legal theory, philosophy of sciences and mathematics

Hans Comijn, Daniel De Beer de Laer, Prof. Nicolas de Sadeleer, Laurent De Sutter, Karen François, Prof. Serge Gutwirth, Prof. Mireille Hildebrandt, Wim Schreurs, Prof. J.-P. Van Bendegem.

Occasional participation of : Eric De Caluwé, Els Soenens, Bas Schotel and Michiel Verlinden (since February 2005).

2. *Universiteit Gent (UG)*

Disciplines: ethics and philosophy

Dr. Geertrui Cazaux (from 1/10/2002 tot 30/09/2003), Dr. Dani De Waele, Valerie Smet, Prof. Koen Raes

3. *Université Libre de Bruxelles (ULB)*

Disciplines: philosophy of sciences, agricultural sciences

Sébastien Denys (since 1/1/2004) Jean-François Desaedeleer (from 1/1 to 31/1/2003), Prof. Jean-Claude Grégoire, Dr. Marius Gilbert, Prof. Isabelle Stengers, Nathalie Trussart, Prof. Jacques van Helden, Prof. Edwin Zaccai

4. *Fondation Universitaire du Luxembourg, Université de Liège since 2004 (FUL, ULg)*

Disciplines: sociology of environment affairs, food policy and technological challenges

Hamid Chifri, Prof. François Mélard, Prof. Marc Mormont, Gaetan Van Loqueren Gwenaëlle Verjans

5. *Centre de Sociologie de l'Innovation, Ecole Nationale Supérieure des Mines, Paris (CSI)*

Disciplines: history, sociology and anthropology of sciences and science policies

Christelle Gramaglia, Noortje Marres, Prof. Bruno Latour, Dr. Sylvie Lupton

Budget: (cf. see Technical specifications - Annex 1 to the contract - p. 34)

Total budget:	<u>1.979.112 €</u>
VUB	1.029.088
UG	475.000
ULB	375.024
FUL	-
CSI (European partner)	100.000

Remarks concerning the budget :

- As a result of its institutional legal status at the time of the signature of the contract, the *Fondation Universitaire du Luxembourg* (FUL, M. Mormont & Fr. Mélard) did not obtain any subsidies. It participates to the network as a corresponding partner, without any financial compensation (except for some minimal working costs paid by the VUB-budget). The later merger of the FUL into the Université de Liège should solve that problem for the future phases of the IAP programme. In the hypothesis of an extension of this IAP-network we assume that FUL-ULg will become a fully financed associate partner
- The subcontracting budget entries have following meaning :
 1. for the VUB (125000 €): subcontract with the Faculty of Law of the Erasmus Universiteit Rotterdam for the 85% seconding of postdoctoral researcher Mireille Hildebrandt in the VUB-IAP.V.16.team
 2. for the ULB (19831 €): subcontract for the creation and webmastering of the Imbroglio site.

1.2. History of the network in the IAP programme phases

The phase V (2002-2006) of the IAP-programme was the first phase our *Loyalties of knowledge*-network participated into.

We would like to stress the fact that we are writing this overview document for the ex-post evaluation in May-June 2005 which is 3 years and 6 months after the official start of the project and, say, only 3 years after the real/practical start of the project.

It is important to bear in mind that our project has been conceptualised and scheduled as a five year research project and that, as a result of the timing of the global IAP-programme, we have to participate to the ex-post evaluation process at a moment substantially earlier than the scheduled end of the project. This explains of course why a number of aims have not yet been reached and why some of our undertakings have not yet produced their results and fruits. At the same time, this report will show that the present state of affairs is sufficiently close to the final state of affairs to guarantee that the aims will effectively be reached before the end of the project.

1.3. Summary of the objectives of the research project

The main objective of our research is to re-think scientific and technical research activities in the contemporary democratic constitutional state. This broad goal can be split up in five more specific but intertwined objectives:

1°/ from a *theoretical* perspective, our research aims at re-thinking the relationship between sciences, technology and society. We have chosen to take as our starting and federating points two major contemporary issues, i.e. the questions of the 'correlatable human' and 'food safety and GMOs'¹

2°/ from a *legal* perspective, it aims at a rethinking of the law (and its limits), more particularly with regard to technical and scientific practices.

3°/ from a *political and constitutional* perspective, it aims at conceiving new forms of representation, of balancing of powers, and of transparency in a democratic constitutional state confronted to technical and scientific issues.

4°/ from an *ethical* perspective, it aims at rethinking the implications of scientific practices in terms of those who may be suffering the consequences of these practices.

5°/ from a *concrete and operational* perspective, it aims at the definition of new procedural instruments (legal, ethical, political and so on) which might contribute to the implementation of the theoretical results of the project.

1.4. Summary of the objectives of the partnership

Our project is an *action-research* or an 'experiment' conducted interactively with researchers from different scientific disciplines, universities, languages and backgrounds. We want to foster a scientific practice which lies beyond the barriers of mutual exclusion, focussing on the question of how to whet a common appetite and create a common interest.

Our project aims at producing (forms of) *communication* as well as (forms of) *knowledge*. This means that knowledge will not only be considered from the point of view of its content, but also as it can *count for* and *concern* the researchers from the perspective of their own questionings. This endeavour to create *interesting* ('inter-esse': to create bonds) knowledge between the different researchers of the network (lawyers, philosophers, agronomists, sociologists, mathematicians, ethicists, etc.) has also been transposed to other concerned actors, i.e. students in agronomy working on the field of 'biotechnology and food safety'.

We still plan to enlarge this process, notably by way of our multi-layered website (www.imbrogio.be, further details in the sequel of this report) to concerned actors in the 'open field', to the publics concerned. So, in addition to the more traditional targets of 'knowledge generation' defined in the various work packages, we are fostering the communication of knowledge, in the strongest sense of the word, for we consider knowledge not just as content that everyone can acquire, but as something that must 'count', 'be important', be part of the way in which a researcher states her/his questions.

This, of course, means that the topics of the research-project (1.3) and the ways partnerships are created (1.4) are intimately interwoven and cannot be dissociated: the partnership and the research project itself are mutually conditional. Up to now, the organisation of the project along the lines of a number of workpackages and two *common transversal themes* ('Food security and GMOs' and 'The correlatable human') has proven to be a fruitful way of constructing mutually interesting questions and knowledge. The next challenge is to open up

¹ The original project referred to 'correlated man' and 'food safety': the change of terms is twice an effect of the research itself and the reframing of the questions.

this process even further, beyond the academic networks, reaching out into society, i.e., to all the parties concerned.

2. RESEARCH RESULTS

2.1. Summary of the research results per workpackage

The following section contains a summary of the research results per workpackage. All workpackages are carried out in close collaboration amongst the different partners (see: the permanent exchanges on www.imbrogio.be, the 34 VUB-seminars, the 7 networkmeetings, our common participation to congresses, ...). However, when specific, the input of other network partners in the workpackages will be explicitly mentioned.

WP1@ULB² - Prototype researches taking the Web as the main territory to explore

The 'Séminaire d'exploration des controverses', which began in October 2003, is the main 'pedagogical' initiative in the frame of our network. It is addressed to 4th year students in Bioengineering and represents for the equivalent of a 15h class. It was initiated under the responsibility of Jean-Claude Grégoire. In autumn 2003 the seminar was organised by Jean François Desaedeleer and Nathalie Trussart with the help of Sébastien Denys; in spring 2004, it was organised by Sébastien Denys and Nathalie Trussart. Since autumn 2004 the seminar is organised by Sébastien Denys. For the list of the explored controversies, we refer to the progress reports and concentrate here on our project, on what we have learned and on what is now considered as a success, recognised as such by the Bioengineering Department.

In order to present the aims and means of this seminar, it is useful to contrast it with two other forms of 'controversy oriented pedagogy' which are experimented by members of our network, Bruno Latour, at the Paris Ecoles des Mines and François Mélard, at the Department of Environmental studies at the University of Liège. Following the presentations made by Nathalie Trussart of the séminaires organized at ULB and by François Mélard of the one organized at the University of Liège, this contrast was discussed at the IAP network meeting of June 4th 2004, at the Ecole des Mines in Paris, on *Public Controversies*, where we also heard about the techniques for analysing socio-technical controversies on the web by Noortje Marres.

Bruno Latour addresses his students as future 'ingénieurs des Grandes Ecoles', who will have power and responsibility positions, who will have to propose choices and options, and have a sound generalist knowledge about sciences. He wants to introduce them to the new challenge of their 'métier d'ingénieur', facing 'hot' situations where no rational sound modelling may transcend the uncertainties and social conflicting stakes. The aim is to have students following in real time, unfolding and cartographing an open controversy, and resisting the temptation to know beforehand what is the 'good position' and what are the aberrant ones. It is a true professional competency which must be acquired, that of mapping protagonists' positions, explaining their reasoning, interpreting the dynamics of the controversy and then producing an hypothesis about its possibility of resolution. The work extends from September till April,

² Legend: the symbol @ is followed by the partner carrying the initiative and responsibility for the work package (WP) described

students work mainly on their own, using all information resources they can, under tutorial conduct (a lot of work may be asked from the French étudiants des Grandes Ecoles)

François Mélard addresses already seasoned students coming from different disciplines and professional or cultural background, who made the choice of environmental studies. The 'integrated exercises' he experiments take 2 x 1 week. The main actors of a local controversy are brought back to the university in order to investigate its dynamic. The aim is to enable the participants to learn from different stories that may be told about a same situation, and work in 'mixed' groups associating students of different backgrounds and competencies. They have to face the diversity of the information provided, the comparison of both the different point of view expressed (sometime contradictorily) and what has been observed (during the one day field trip), the management of the intersubjective relation the actor has with the audience and his will or capacity to convince it. The idea is to learn from the uncertainties that are expressed by the speakers or the situations. Taking notes, questioning the actors, mapping the controversy, collectively debating are skills that are meant to be developed.

In contrast our 'séminaire d'exploration des controverses' is rather modest since it is restricted to five or six sessions, homework being only optional, not required. This implies we must address a well-defined challenge, and do not dream producing 'competencies', which would take a lot more time. The advantage and interest is that the formula we are experimenting may potentially be extended to other scientific curricula, the common feature of which being that students already lack time for scientific matters, and thus that time-consuming propositions concerning 'non scientific' matters simply cannot be envisaged.

But this heavy constraint also makes more precise the question a 'controversy oriented pedagogy' is never independent of, that is who it concerns, and what it aims at.

First we can attribute no clear vision about their future activities and responsibilities to our students as a group. They have made no choice as the Liege's ones, only the rather non-informed choice of Bioengineering when they came to the University, and have not passed demanding selection conferring social status as the Ecoles des Mines students. They happen to have, one way or the other, succeeded their three first years, this is all what we know about them.

Second we know that we have to face a credibility problem. This has nothing to do with a matter of persons, but with the very object of the seminar, the engagement with situations that challenge any clear ordering between what would be 'really scientific' and the remaining (which would be qualified as ideological, or political, or ethical). This directly confronts us with an ingrained habit, a very potent one since it was often already part of the initial choice to become a science student and was confirmed either explicitly or by the 'no time' answer all along their university experience. This habit would have students passively accepting 'science and society' questions as a kind of cultural 'supplément d'âme', which in no way may challenges the unquestioned demarcation between information claiming the authority of science and information that concerns aspects of situations involving 'non scientific' arguments.

We have thus seen it as our first priority, to activate interest, involvement and a sense that such situations and such 'non scientific arguments' matter, and that the way they matter cannot be dissociated from the way scientific knowledge matters for the situation. We consider it to be part of the problem our network is addressing, as it means that 'loyalty' is coupled with easy judgement and disqualification against what is not recognised as 'sound science', and that

scientists will then quite easily agree with a framing of the situations that confirm that coupling.

This is why our seminar, from the beginning, insisted on the 'discovery' experience, and relied on the web for the possibility to have groups of 4-5 students discovering the many conflicting arguments about the topic they have chosen in the list of proposed ones. So doing they also 'discover' the web as a resource *the required* use of which they usually ignored, and they also learn that in such a use, the question is less to find *the* relevant, authoritative account of the situation, than to face *the many* conflicting versions that make up the situation.

As a consequence, following the students work must be restricted to incentive attention and counsels, meant to activate the need to go on exploring and not stop when they feel satisfied with a first reassuring (usually by a scientist) version. The quest is open, as the situation, and they must not feel that somewhere the right answer is hidden and that we know it and are waiting for them to find it. This produces a remarkable contrast with the usual setting they are familiar with, in which freedom is just a pedagogical tool to have them getting 'for themselves' an already known answer. Here they may feel that what they deal with are situations about which 'we do not know', and more precisely about which many protagonists claim to know, and first of all scientists, but present arguments that are in fact counter-balanced by other well-designed arguments. The result is perceptible when students publicly present their research, the more so since the 'public presentation' is now organised in the presence of interested academic members of the Department. When there is an objection, they do not accept it as 'authority making', but take it along together with other positions, recognising its interest and relevance but not its exclusive 'truth'. We consider this attitude as a testimony of success, and so do the concerned members of the Department, who meet real interlocutors and not submissive students. It has even happened that the studied controversy had some kind of a follow up during the séance among members of the Department, thus confirming the students in their discovery that scientific competency does not lead to consensual authoritative agreement about the situations they explored.

At the beginning (two first seminars) Jean-Claude Grégoire and Isabelle Stengers considered it as necessary to introduce the seminar, and legitimate it, while Sébastien Denys also introduced his militant web using practice. We now feel that this is not needed as it led us to anticipate and describe what students were in fact to discover: not only (precious) time was lost but we provoked objections and misunderstanding only real time work was able to answer or dispel. On the other hand, a number of new elements have been introduced that take into account and build on one aspect of the situation that we had not anticipated. *In contrast with the kind of knowledge they usually get, the first interest of which is to enable them to gain still other knowledge (cumulative linear knowledge acquisition), the students in this case feel and trust that what they have learned may interest others, that they have achieved a grasp on a situation, however partial, that they can narrate as a personal learning experience, not as the reproduction, for people who do not know, of something they would themselves have received from someone who knows.* To use Bruno Latour's distinction, they are able to take the role of a mediator, creating connections, and not of an intermediary, transmitting as faithfully as possible. We consider this contrast as a very important, even crucial, point, and it may well be that it provides a key to the hard problem of having students used to receive authoritative knowledge, the outcome of the progress of 'hard' sciences, to actually and positively penetrate the reasons why the making of our world does not follow the same kind of clearly progressive logic.

The elements Sébastien Denys has introduced thus mainly concern the outcome of the student research. At the beginning, the idea was that the information collected by the students, as well as their analyses and comments, were to be downloaded in a web log (<http://www.imbrogl.io.be/controverses/>), also accessible to the other members of the IAP project and open to their comments and inputs. This is still being done, but a first supplementary proposition has been that the student groups, at the end of the session, correct, complete and modify the presentation of 'their' controversial situation as it was presented on the list of proposed ones. Then we introduced a public presentation of the work, and the students did not hesitate accepting the supplementary work needed for such a presentation (PowerPoint). In December 2004, a supplementary possibility was explored, associated with the idea that the controversy research is of general interest and may be part of the communication with a more general public. Again students accepted the challenge, and the supplementary work. One group presented its work on Radio Campus (émission 'Histoire de Savoirs' of Alexandre Wajnberg), together with S. Denys and I. Stengers, to explain the general project. One presentation was put on the ULB website 'Actuscience', together with the general WP1 project. (<http://www.ulb.ac.be/sciences/lubies/Fichiers/track1.zip>). In May 2005, two 'Histoire de savoirs' programmes on Radio Campus have been dedicated to three students presentations, while two other presentations have been put on the Actuscience website. Sébastien Denys has even experimented the need to refrain students' enthusiasm, sometimes forgetting the work and time investment involved and wanting to do 'everything'. An other innovation was to interest the bioengineering department in the proposition of possible research subjects for the students. During one séance, the students are now also meeting 'resource-persons' (from the department but also from the associative, administrative or political world) and are confronting their first conclusions and hypotheses with them. All those resource-persons are invited to the public presentation.

This opening is important both for the students and for the meaning they give to this seminar, and for the future of the seminar as it should eventually be officially not only inscribed in the Bioengineering curriculum, which is the case presently, but also financially provided for. In order to activate interest and discussions, Sébastien Denys also presented the Séminaire d'exploration des controverses at the LUBIES (Lutte biologique et Ecologie spatiale) the research group directed by Jean-Claude Grégoire.

We now feel that what we have experimented and learned can be usefully confronted not only with the other 'controversy oriented pedagogies' in the IAP network, but also more generally, and for instance first at the ULB level, where we have other initiatives engaging students in a personal or small groups active exploration. The problem is not what is the best method, but what each method aims to produce, that is also the kind of problem explored. Active knowledge construction may be useful as a mean to acquire the same kind of competency as ex-cathedra teaching, through other, hopefully more efficient, means. It is then a pedagogical innovation, to be characterised and evaluated as such. New interdisciplinary approaches may also be valorised, the collaboration around a problem between students from different backgrounds, or using different languages, and learning to communicate. In each case, as in ours, there is a lot to learn, but we are convinced that what is to be avoided is a general pedagogical discourse singing the praises of an 'active construction of knowledge' without making explicit the different stakes and exploring the corresponding needed distinctions in terms of aims and means. In other terms it is not a problem to be left under the responsibility of pedagogy, as it is not pedagogy's role to determine the stakes involved in the different modes of knowledge construction. We consider this could be one of the questions activating

the questions of loyalty of knowledge and the ecology of practices our IAP network has for its aim to rise and promote. We intend to publish and intervene on that subject.

Staff working on workpackage 1: Isabelle Stengers and Jean-Claude Grégoire (co-ordinators), Sébastien Denys (researcher under full time IAP contract). With the collaboration of Nathalie Trussart (PhD student, full time IAP contract), Dr Marius Gilbert (postdoc FNRS-ULB), Prof. Jacques van Helden (ULB), François Mélard (ULg-FUL) and Daniel De Beer (VUB).

WP2@ULB – Conceptual research into the relations between knowledge and power

This philosophical workpackage is closely related

- to WP1, with the problem of scientists' formation at a time when sciences' contribution to public problems can no longer be seen in terms of 'applications' of (pure) scientific knowledge,
- to WP3, for the mapping of controversies that entangle science, private and public interests,
- to WP4, because the GMOs story makes visible the contemporary entanglement between knowledge and power as well as the rise of counter-'power and knowledge', and
- to WP7, because of the crucial role of patents in the new configuration of interests that organise around and with scientific practices.

The problems of the relations between power and knowledge are today at the centre of a rich, problematic and controversial field, active in the historical analysis of scientific practices as well as in their contemporary transformations, as they can be prominently associated with the transformation of experimental molecular biology into biotechnology. The WP's work takes an original stand in this domain, as it is meant to resist both denunciation (biotechnology would 'betray' pure science) and relativism (biotechnology would be science as usual, the idea of an autonomous scientific production of knowledge being a pure ideology).

The transformation of experimental biology into biotechnology organised along the double axis of the power attributed to the genes over the organisms, and the power claimed by biology researchers over the gene. This may appear as an example of the old Baconian motto 'men are to obey nature (to accept the power of the genes and doing so to know it) in order to have nature obeying them (to be able to transform the organisms and to have power on them)', that is as the affirmation of the classical power/knowledge link at the very origin of experimental science. However this transformation also coincides with this motto put into crisis from both sides.

On the one hand, the so-called 'power of the genes' is more and more characterised as a dead scientific issue surviving for many reasons that have nothing to do with the kind of achievement associated with an experimental device, that is 'the invention of the power to confer on things the power of conferring on the experimenter the power to speak in their name' (Stengers, 2000, 88). Far from getting the power to federate the experimental and biotechnical results, unifying them as witnesses of the many aspects of its own power, genes have now multiple practical identities (Griffiths & Neumann-Held. 1999. Stotz, Griffiths & Knoght. 2004. Fox-Keller. 2000)

On the other hand, the 'power over the genes' is more and more characterised not as that of biologists on biological processes, but as that of non-scientific protagonists appropriating common knowledge and practices. As the historian of science Dominique Pestre characterises

it (Pestre. 2003), we deal with an historical transformation of the 'régime de production des savoirs' in which private science and private interests directly mobilise what was, till now, recognised as open (academic) science.

One of the aims of the WP is to approach this historical transformation in relation with Isabelle Stengers' concept of scientific practices, which is meant to resist a reduction of scientific (experimental) production to social and human conventions imposed on a 'mute matter'. Such a reduction plays an important part in the field of 'Sociology of Scientific Knowledge', as the very rich empirical analysis of historical and social context of sciences has led many researcher to agree with the claim that 'The contest among alternative (...) forms of intellectual product depends upon the political success of the various candidates in insinuating themselves into the activities of other institutions and other interest groups. He who has the most, and the most powerful, (human) allies wins' (Shapin & Schaffer. 1985. 342). The main discordant voice has been that of Bruno Latour, whose claim that we must count alliances with the 'non humans' among the allies of scientists has brought back the full problem of 'reality', and the specificity of scientific practices, at the heart of sociology of science (see Latour. 1999b, and for the controversies about Latour's position, Latour. 1999, Bloor. 1999 and Schaffer. 1991)

Stengers' concept of practice is not a descriptive one, but intends to actively relate a practice with what counts as an achievement for this practice, that is resisting the claim that science is 'a human practice *like* any other'. This stand is essential for our IAP research, since this research associates researchers under the question of 'loyalty' to their diverging fields. Any position claiming to judge this loyalty as a 'social construction only' would be condemning our enterprise from the start. However 'escaping' social constructionism does not mean 'ignoring' its claims, all the more so, since we deal now with a social, economical and political (re) construction of biology. It rather designates the field for a conceptual creation. Both Isabelle Stengers and Nathalie Trussart have worked on these issues.

A great part of Isabelle Stengers' activity in the IAP has been discussing and clarifying (both to the others and to herself) the notion of practice, which she derived from her characterisation of experimental sciences around the event of the transformation of 'non humans' into reliable witnesses, and she generalised around the generic notions of demands and obligations. The question has been fruitfully coupled with the discussion around 'La fabrique du droit' of Bruno Latour, together with Gutwirth, Hildebrandt, De Sutter, De Beer, Schreurs and Schotel. The emphasis of the obligations as designating the 'loyalty' of practitioners' as it can be disentangled from any denunciation about the demands they impose on their environment and their environment imposes on them, has created fruitful, habit-disturbing insights (See discussions on the weblog and the *Cosmopolitiques* issue)

Also, Isabelle Stengers has been (re)working the concept of scientific practice to include its fragility, as it may be exemplified by molecular biology turning into biotechnology, thus emphasising that the notion of obligation is not to be taken as a descriptive characterisation, the adequacy of which would be a matter of discussion, but a committed one, designing practices as 'something the very existence of which must be defended'. This has led to a conceptual inquiry about the consequences of addressing practices in the generic sense of the term (scientific practices no longer at the centre), and of taking those practices as 'existents', the survival of which depends on their environment, as well as to further developments about 'ecology of practices' with the challenge of putting on one and the same plane diverging practices that usually contradict each others. A book to be published in 2006, *Penser les*

pratiques: engagements politiques et philosophiques will develop those aspects which are a direct result of the co-learning dynamics of the IAP.

Nathalie Trussart's doctoral dissertation, « Dispositifs et biotechnologies. Mise en héritage de Michel Foucault dans l'étude des sciences expérimentales » could also be called « About dubious genes ». Indeed Trussart's starting point was the distinct uses of the same word, '*dispositif*' (device), in Isabelle Stengers' approach of the 'event' of modern experimental science, and in Michel Foucault's analysis of what can be characterised as 'dubious sciences', since they are associated, right from the start, with the problem of 'domination exercised by humans on other humans'.

The use of the same word could be seen as a simple homonymy, but can also be the starting point of a critical reprise. The idea of this critical reprise may be grounded in the fact that among those sciences which interested Foucault (psychiatry, economy, medicine, and others) are precisely the ones Isabelle Stengers criticises as 'modernist' (contra modern), that is mimicking the model of objectivity with which they identify experimental science. Foucault's *dispositif* would appear as a relevant conceptual means in order to analyse and denounce biotechnologies as 'dubious sciences'. However, such an interpretation would transmute the contrasts our IAP research is committed to negotiate into an 'opposition de nature' between sciences exhibiting a rationality transcending social conditioning and 'false sciences', with power being the hidden secret of knowledge. And it would also transform Foucault's problem with what he called 'dubious sciences' into simple denunciation, in contrast with what he would have recognised as 'true science'.

In order to avoid this trap, Nathalie Trussart needs to 'inherit' Foucault in a creative way, that is, experiment the relevance of Foucault's analysis for what concerns experimental sciences. It is clear that it should not concern the experimental achievement as isolated, which it never is, but the full unfolding of powers which we call science, that is what Bruno Latour called the 'coup d'Archimède' (give me a lab, and I will raise the world) (Latour 1983). She also needs to produce a characterisation of Foucault's concept of device that avoids 'dubious sciences' being denounced as 'false', or corrupted by 'power. This implies differentiating Foucault's analysis of power from whatever could be reduced to a denunciation, and accentuating what could be called Foucault's empirical stance, that is passionate interest for the each time novel intricacy of what is called power. In particular, she needs to escape identifying 'dubious' with 'suspect' or 'devoid of reality', and rather link it with a resolutely pragmatic position affirming the reality of whatever acts, produces effects, or is affected. That biotechnology's genes may be certainly be characterised as 'dubious', but 'dubious' can then be connected not with suspicion but with uncertainty, with the unfolding of the many heterogeneous but entangled trajectories along which they gain existence, with their many encounters with a world to the composition of which they contribute.

Nathalie Trussart's interrogation about the relevance of Foucault's concepts for what concerns experimental sciences is both akin and contrasted with that of the American philosopher Joseph Rouse (1993. 1994. 1996a. 1996b), which may be situated in the field of the *Cultural Studies of Scientific Knowledge*. Rouse is a critique of the « epistemic sovereignty » claimed by both sciences and the critical sociology of sciences as soon as sociologists define 'scientific knowledge' as if it was an 'object to be theorised', and he uses Foucault's model to follow the multiple heterogeneous, productive and strategic entanglement that create the power of propositions « in the name of science ». Rouse's 'post-sovereign epistemology' does not stop at the sociological criticism against the claims of scientific objectivity and unfolds the stakes and

effectiveness of political contemporary contestations about the normative role of the 'scientific' argument in the construction of our common world.

Rouse's position, grounded on the analysis of scientific practices as engaged, and as not restricted to the alignments of human agents, is of very great interest but it lacks the means to characterise the problems and questions of scientists themselves when a transformation such as the one that leads from experimental biology to biotechnology is concerned. It is important to describe scientific practices as cultural practices but it is also important to understand the specificity of different practices, both science producing and science contesting.

Precisely, the 'Actor-Network-Theory' (ANT), due to Bruno Latour (1989), Callon and others, helps to precise the specificity of scientific practice by describing in details the scientist's networking creation of local alliances that co-produce science and society. In this case, the specific achievement of experimental practices can be characterised (Latour. 1999b; 106-108) with the emphasis of the role of « Links and Knots », co-produced between scientists and the non-humans they deal with, that hold together the many heterogeneous resources required by scientific innovation. And the specificity of each practice is yet much more developed when Latour articulates the distinct contributions of different practices in the functioning of the « Parliament of things » (Latour. 1999b). Latour thus gives us means to transform the perplexity produced by 'dubious objects' into common concern.

The question of the genes not being able to enter into the cumulative production of Latourian links and knots, the question of biotechnology may indeed be associated as a matter of concern common to all those who deal with the 'power of the gene'. This is the contrast that may allow speaking of 'dubious genes', as associated with a new 'regime de savoir'. This same contrast is also at the heart of Donna Haraway's difference between 'Boyle's science', and his air-pump experimental device, and contemporary technosciences as symbolised by the patented oncomouse (Haraway. 1997).

Haraway's posture - her refusal to accuse, her engagement for a *semiotics of materiality*, her choice to tell 'caring' or 'concerned' tales about the bifurcations and entanglements that produce 'natureculture' - is a very inspiring example in order to approach Foucault's concept of power without reducing it to a denunciation. Power is usually identified with *potestas*, a power which implies the power to define its own effects, a power-over, and opposed to *potentia*, a power-(re)action very often identified as what *potestas* has to tame or alienate. Nathalie Trussart escapes this opposition, leading to the denunciation of *potestas*, by taking the rich relational intricacy between powers, as active, or affecting and passive, being affected, as her guideline in reading Foucault. The power attributed to *potestas*, to define its effect, is then the product of this very intricacy, something we have to describe in terms of an encounter between powers, active and passive.

This analysis gives Trussart the means to escape both the opposition between an epistemologically valid knowledge and what Foucault would have denounced as 'dubious science', and the reduction of all knowledge as socially conditioned, as in both cases, what is at stake is *potestas*. A device, be it experimental or Foucauldian, must be appreciated as organising and stabilising a complex encounter between powers, an encounter productive of new modes of existence. What is often read as denunciation refers to what was for Foucault 'good empirical cases' allowing what he certainly wished to resist, the usual tale of progress, which links necessarily scientific and social or human progress.

Constructing the relations power/knowledge in terms of « powers devices », Nathalie Trussart is able to correlate Foucault's and Stengers' use of this term and so doing she escapes the (epistemological) question of the « causes » of knowledge, and situates her problem in ontological terms, as the problem of the production of beings always entangling knowledge and the construction of a common world (the wording of the world). She is then able to follow the transformation of biology into biotechnology in its full novelty, not as again an other case of *potestas*, this time over scientific practices. In contrast with the circulatory system of experimental scientific facts (Latour. 1999b: 80-112), she describes the open multiple and diverging trajectories of genes encountering other powers, the process of stabilisation, the assigning of passivity and activity and their historical contingency. Further, continuing Foucault AND Stengers about biotechnology, Trussart asks why it was about biology that the power/knowledge that characterises the 'classical' circulatory system has taken a new turn, making it impossible to disentangle the heterogeneous network (rhetorical, administrative, industrial, legal, experimental, medical) that organises around the gene. Her hypothesis is that what is characterised in terms of the (biological) 'power of the genes', of which the very existence of the GMOs is taken as a witness, may also be understood as a full entanglement of active and passive powers. While experimental achievement for Stengers meant achieving disentanglement, and required the possibility of such a disentanglement, we would deal here with a situation in which any experimental question adds to the entanglement it depends upon.

Giving power to the genes, that is creating devices that activate and stabilise an encounter that transform many aspects of our world (experimental, legal, medical, industrial...) in such a way that this power appears as explaining the transformation, may then be considered not as 'wrong' but as one way of continuing a *style* of entanglement which already belongs to the organism. A style, and not *the* style, as in many biological cases no such power is exhibited. It may be that biology would benefit by escaping the exclusive model of experimental science, that is by cultivating the same kind of attention for the way biological entanglements of powers defy experimental framing, as the one Foucault devoted to 'social' power against its framing in terms of an unilateral *potestas*. In this way, Trussart's analysis is able to contribute to the opening and engagement for the future. A future in which, maybe, Foucault would have a name in the history of biology.

This workpackage is mainly driven by the researches of Isabelle Stengers (senior researcher) and Nathalie Trussart (PhD Student). Other researchers of the IAP are also actively participating (such as Daniel De Beer, Serge Gutwirth, Marc Mormont, Bruno Latour, Laurent De Sutter, Sébastien Denys...).

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WP3@CSI – Transformations in science policy

In this workpackage important work has been done on what we call the shift from 'matters of fact' to 'matters of concern'. What has been especially important is the impossibility of locating this shift in the traditional debate over proceduralism versus substance. Using Walter Lippmann's argument –especially in the *Phantom Public*- and through the crucial web design work of Noortje Marres and Richard Rogers³, it is clear that the public supposed to be mobilised for each matter of concern, is largely a phantom if, that is, we keep the older representation of a unified body politic exerting its sovereignty through its representatives⁴. But it is not because the requirement for a *substantial* interest in the matters of concern is moot that the respect for *procedures* is sufficient to obtain assent or at least benign indifference. This is where Marres argument is so important for our common project: issue politics is obviously a mixture of private and public, of procedure and substance. The difficulty then is to detect (through the web and quantitative tools) what are the telltales –as Lippmann calls them- that may allow the phantom public -pressed by time, uninterested in the precise content, unable to gain the expertise that the only insiders would have possessed- to nonetheless detect which of the contending parties are moving into accommodation and which is clearly hiding from public scrutiny and remaining decided not to compromise. The detection of those telltales is very important since there is no public good in this perspective which would be 'expressed' by some farther seeing specialists and of course, contrary to Rousseau's dream, no way to jump out of one's selfish position to the "general will".

Conceptually, much work has been devoted to the shift from matters of fact to matters of concern, and to the whole aesthetic, politics and practicalities going with this shift. One of them, of crucial interest for our project, is the notion of disputable facts taking the place of indisputable matters of fact. This signals a shift from what we now call the first empiricism – divide between what is indisputable and what is disputable- to the second empiricism defined by the ways to represent the issues of concern. The key change is that it's not an explication of

³ Rogers, Richard. *Information Politic on the Web*. Cambridge Mass: MIT Press, 2005.

⁴ Robbins, Bruce, ed. *The Phantom Public Sphere*. LIPPMANN PDP ed. Minneapolis, Minnesota: University of Minnesota Press, 1993.

the science, nor a debunking of its claims to reality, nor a weakening of its ability, but, on the contrary, a way to get closer to what is empirically at hand.

As we had anticipated in writing the proposal, the situation is very much the same as an extended *science policy*, where basic questions raised before in the secret of bureaucratic cabinet –which areas of research to finance? For how long? With what proof of possible success?— have now become shared by the public –public being understood as the ad hoc associates to a specific issue not as the 'populus romanus' interested equally, fully informed and equally important in all the issues. What we have been testing on the web by using a combination of issue crawlers, conversation mapping techniques and more classical tools of science policy developed around the web of science, is whether there exists a public virtual space which can be drawn and designed to make this extended science policy visible. The idea is to have easy 'cartographic' access to the issues –who is debating what?- and to the cycles of credibility of the main participants detected by the crawler –who has authority? Who is working with whom?

We can now say, after 3 years of work, that the relations of credibility which at an earlier time were traceable only for scientists -in the lines of the sociology of science- can now be extended to the 'context' of science. In other words, solid facts, vague rumours, conspiracy theories, legal cases, administrative decisions, media interpretations, newly evolving theories, all of those can be followed by using the same sort of basic quali-quantitative tools. Those tools have been tested in B. Latour's engineering class -see <http://controverses.ensmp.fr>- and by Noortje Marres, in a special session of the 4S-EASTT meeting of August 2005 on *Public Proofs* in Paris. In collaboration with the new research group installed at the Forshung Gallery in Vienna and headed by Albena Yaneva, it has been possible to develop with Andrei Mogoutov, Patricia Reed, Richard Rogers and the CSI, a platform that integrates those various tools and that we hope to test in the few remaining years of the program.. Thanks to the support of this latter group it might be possible in the near future to create a think tank in Vienna where all the “cartographers of controversies” could gather their tools and instrumentations. This is another synergy made possible by the IAP-program.

We think it's fair to say that we are now close to the design of a workplace where the scientometrics tools will merge fully with web based sites. A look at Google scholar is enough to show how powerful the help is we can get from the quick evolution of digital technologies. What is missing, but that this IAP-project will be able to gather, is the use of a generalised sociology of science as a way to navigate through the mass of newly digitalised information. In other words, what we think we can achieve is to have a layer of applied sociology of science on top of the search engines. Such is the decisive insight that we wish to render operational in this workpackage.

A more unexpected line of research has been developed by B Latour, Noortje Marres and Christelle Gramaglia and several others from the Paris group and the IAP. This time the idea was not to use web based and information technology to bring together scientometry and public debate (the core of the workpackage, see above) but to create a three dimension simulation of public arenas, what B. Latour now designates with the neologism in German *Dingpolitik*. Latour has thus directed a lot of the effort done inside the IAP toward the writing of a catalogue (see list of publications *sub* 5.1) and, more unusual, of a show in Karlsruhe under the title *Making things public. Atmospheres of democracy* (<http://makingthingspublic.zkm.de/>). What we have tried to do is to assemble a mock up version of the 'Parliament of Things' outlined in Latour's *Politics of Nature*. The mock up, as

in all simulations, aims at detecting where the difficulties lie in assembling or gathering such a 'parliament'. The results of this simulation will be debriefed in late 2005 once the show will have opened and been visited. We believe that such a 3-D medium is particularly well suited for testing several of the goals of this IAP. The fabrication of the show has crossed many of the other workpackages. Didier Demorcy implied in the weblog of the IAP has done a marvellous job in creating a full scale model of public debates around natural resources. Isabelle Stengers has offered a crucial paper for the catalogue around the notion of cosmopolitics - the first time her important concept is presented in English. Through an installation of Susan Silbey we have tried to give a visual equivalent of the trails of law developed by Serge Gutwirth. And so on. We think it's fair to say that the show demonstrates that new medium such as an exhibition is a powerful means to approach purely academic questions.

In « From Realpolitik to Dingpolitik – An Introduction to Making Things Public » (see list of publications *sub* 5.1). Latour defends that *Realpolitik* turns out to be a very unrealistic version of politics. In effect, most of our political passions and interests are turned toward things –the old English and German Ding- that could be translated nowadays by 'issues'. But in spite of this constant attention to things, political theory remained in a rather abstract level of opinions, positions, standing, problem solving and, in general, discursive attitudes (which is also the question at hand in the PhD of Laurent De Sutter, WP6).

WP4@FUL&ULB - Study of a scheme to evaluate biosecurity in connection with GMOs.

This workpackage, after a difficult start, is now in full development due to Sébastien Denys' now full time involvement in the IAP. Denys' work about the Belgian *Conseil Consultatif de Biosécurité* (CCB) has concerned two main aspects:

- the debates about the security assessment of the Bayer genetically modified colza MS8&RF3 (chronology and comments)
- the evolution of the 'public information' document to be completed by notifiers introducing a GMO file.⁵

In both cases the role of the 'public' is clearly perceptible under two distinct guises. For what concerns the MS8&RF3, it was through the effective presence of a concerned militant citizen's association. For the public information file, we may speak about an 'atmospheric public', a public the pressure of which may be felt through 'measuring devices' just as atmospheric pressure. The evolution and problem of what should be the information the public needs and asks may be considered as such a device.

In both cases also the role of public expertise (experts working for the CCB) appears in a problematic light, due to the self-imposed restrictions they accept due to 'economic feasibility' (this was also the object of Daniel De Beer's contribution on the 'Testing expertise' meeting, text on the weblog) and also due to the restriction on their own information because of commercial confidentiality. One of the outcomes of the militant's presence and question was to make perceptible the artificial « compartmentalisation » of the problem leaving deliberately outside aspects (pollen dissemination, toxicity of herbicides) that obviously concern « security ».

⁵ See Sébastien Denys, Laurent Jacob, « Vers un nouveau moratoire ? » Point de vue du bulletin Inf'OGM, n°63 - Avril 2005 ; Sébastien Denys, 'A open door on the expertise' presented April 29th at the Congrès trisannuel de l'Association Belge de Science Politique and Sébastien Denys, 'To engage GM in a democratic and scientific innovation ', presented at the same Congress April 30th; texts on the imbrogio.be website Tree of questions, as well as other, 'internal ones', by S. Denys, on the weblog

In both cases finally we concretely approach the novelty of the challenge faced by the CCB, whose prior only concern was what can be called the 'naked' GMO, that is its molecular biology definition. Alexis Roy's book *Les experts face aux risque: le cas des plantes transgéniques* (PUF, 2001) describing the functioning of the French Commission du Génie Biomoléculaire till the resignation of his president Axel Kahn tells a similar story: here also expertise was centred around the GMO 'as such', excluding the risks that may be related to agricultural practices. The English 'Farm Scale Evaluation', which was related to the consequences of the change of those practices when farmers use GMOs, and its wide public echo, was thus a relative turning point in the CCB MS8&RF3 risk assessment which finally led to reverse its first opinion and produce a 'first', that is a negative report. For what concerns the public information, an obvious point is that the public as 'felt' is interested in risks that widely exceed the 'security risks' addressed by the files. This is confirmed by the now famous PABE research on the perception of GMOs by the European public as well as by Laurent De Sutter's researches concerning the Flemish Institute for technology assessment (ViWTA) (cf. WP6). Citizens' concern addressed questions about agricultural, but also social and economic consequences, and they questioned the effective reliability of the supervision and control agencies that are the European states' answer to their concern. In short the public information, the first aim of which was pedagogical and reassuring, has to face the question of a public 'will to know', but to know about questions that nobody can disqualify as 'bad' or 'irrational' ones but that were not the mandated experts' ones as they are institutionally defined as 'political', 'ethical' and not 'sound science' questions. This is in direct connection with the 'discovery' of bioengineering students (WP1): the cut between 'scientific' and 'ethical' they rely upon does not hold when they follow 'true world' controversies.

Sébastien Denys' research is thus highly relevant as the security problem cannot be envisaged independently of the functioning of those State agencies responsible for security. It enlightens the crisis and perplexity due to the transition from a closed, compartmentalised problem to an open one, and strongly emphasises the 'evolution' of the expert's evaluation about recognised risks such as the plausible dissemination distance of the colza's pollen. While activists commonsensically affirmed that 'pollen is made to flight', experts very progressively came to a rather similar conclusion, the consequence of which was the security distance around the test fields and also the more general problem of the coexistence between GMOs and non GMOs cultures.

Apart from local specificities, like the active role of the responsible of the CBB who figures both the procedures respecting public servant and the ex-molecular biologist using his own experience in order to introduce his own questions, doubles and demands, we may consider that the CBB's story is quite representative of the 'destabilisation' of the usual frame for security questions, and of the experts' habits in their relations both to the industrial notifiers and the public. This leads to something obvious: there is no 'independent expertise', and this is not a denunciation but the consequence of the interdependency between the functioning of an expert commission and its 'environment', that is the way the problem is framed but also the way aspects or the problem are either downplayed or taken into account following the composition of the commission (presence of militant groups but also of 'field' biologists and agronomists), the media, the publication of scientific reports or papers or the anticipations of the European authorities, etc.

Such a situation can be characterised by a process of 'black boxes' opening, putting into question what was stabilised, or accepted without controversy (the use of pesticides in 'normal' agricultural practices, and the existence of non-GMOs pest resistance varieties that

can offer the same risks for inducing resistant pests as the GMO varieties, for instance. It could be denounced as a case of 'artificially maintained controversy', maintaining uncertainties in spite of sound science verdict. There has indeed been opposition by English activists against the 'Farm Scales Evaluation' program and the possibility environmental nuisances be reliably evaluated⁶. However the case of the MS8&RF3 colza also shows that so-called sound science certainties were rather systematically neglecting or downplaying relevant questions and well-established knowledge as the pollen long distance travelling and the herbicides' toxicity.

The possibility that the citizen's and militant groups the overwhelming concern of which are the social, economic and cultural (both biodiversity and diversity of human practices) consequences of the process of industrialisation and patenting of the seeds, get interested in the debates about 'sound science' and scientific assessment and produce 'learning trajectories' transforming them into strong and disturbing protagonists in the field of scientific expertise is a very interesting possibility, complementing the still stammering citizen's juries and other public assessment procedures. It was the object of our 21th October 'Testing expertise' meeting and gave substance to Isabelle Stengers' interventions at the European Science and Society Forum, 9-11 March 2005, and at the conference 'What Science - What Europe' organised by the Greens in the European Parliament, 2 -3 May 2005. It is also at the centre Marc Mormont's work (WP5) indicating the 'Not in my Backyard' (NIMBY) reaction that symbolises people enclosed into their own egotistic interest may or may not, be the last word according to the problem and the dynamics of working it with concerned people.

Furthermore the multiple and entangled trajectories associated to the GMOs and activating questions that largely exceed GMOs led the IAP working group 'GMOs on European ground' to work on the idea of a 'GMO event', an event that does not only affect the GMO technoscientific innovation, but also the very political definition of the role of science in our societies. We make the hypothesis that 1999 (the 'moratorium') can be associated not with 'politics affirming their responsibility in the GMOs case' but with the beginning of a process that questions the very political definition of the role of scientific innovation in the production of our common world.

One way of describing such an event would be to see it as an answer to the contemporary transformation of this role, with public research being put at the direct service of industrial private interest, what Dominique Pestre has called a transformation of the 'régime de savoir' (cf. supra sub WP2). Indeed the new aspects of the policy of science, with the role played by patenting and intellectual property right (WP7) is directly put into question through the GMO story. However, the scope of the event may well be wider as it can be connected with a critical coupling between two novel concerns, one expressed by the 'precautionary principle', the other by the (officially recognised but still rather abstract) need for a 'sustainable development' (cf. WP7 and the work of Nicolas de Sadeleer and Daniel de Beer on these subjects).

The fact that Europe has recognised and promoted the precautionary principle played quite an important part in the fate on GMOs on European ground. It indeed was first seen by European states as an opportunity to experiment with this principle and led to create special Biosecurity regulations about the GMOs, and it provided opponents with a 'grasp' on the situation, insisting on the uncertainties and dangers that can be associated with the innovation. The event is that the question of what counts as a risk became an open one. The precautionary

⁶ See about this theme two contradictory papers: Sahlins, M. (2003). 'Artificially maintained controversies: Global warming and Fijian cannibalism.' *Anthropology Today* 19(3): 3-5. and Mermet (2005) on the bears in Haut Béarn (to be published)

principle is concerned with (strong an/or irreversible) risks for human health and biodiversity, while many opponents conceived as 'risks' what is traditionally described as 'consequences', escaping politics, which may be unfortunate ones for some protagonists but are to be recognised as the price for general, human progress.

The opening of the question of the risks appears to be linked with the question of the 'perception of the public'. This expression 'the perception of the public' usually means that the public has biased perceptions, which must be pedagogically rectified, and here that the European public must be reconciled with its science. This is still the official stand of the European Commission. Such a stand would mean that the GMO 'event' must be reduced to a 'non event', the manifestation of the public irrational fears. However, an other 'perception' of the situation has been produced through the quality of citizen's questions and objections (public evaluation procedure, PABE research). It is very striking that the media have been a bit schizophrenically torn apart between echoing industry's and scientist's complaints about Europe being late in the course for GMOs and losing the opportunity offered by the 'second generation', the merits of which should be unanimously recognised, and a rather positive appreciation of the difficulties of European authorities to implement its GMOs policy with objections and refusal by many European regions to accept GMOs. The rational, objective/irrational, fearful divide is not holding.

If it was holding, the widening of the risks questions could have been counteracted by a strong, official recall of the scope of the precautionary principle addressing a misinformed public. We may advance the interpreting hypothesis that this is made difficult by the very dynamics of the event which has coupled the two distinct problems that are addressed by the precautionary principles and the sustainable development. The risks the public 'perceives' indeed exceed the health and biodiversity ones and point towards unsustainability. GMOs communicate with the question of what would be a sustainable agricultural development and citizen's concerns cannot officially be identified with irrational fears.

The way the question of sustainability impacts on the judgement about the 'public's perception' means that it is not only the new 'regime de savoir' which is in question, but also the previous one, with its linear connection between disinterested public research, research and development for industrial innovation and general human progress. This apolitical model, which stabilised for a time the relations between public research scientists, private interests and the State, comes now to be seen as a recipe for the kind of development that is now put into question as 'unsustainable' because it leaves to scientists as free entrepreneurs, and to the free enterprises the responsibility of transforming the world without being accountable in terms of a sustainable future. While the precautionary principle was only providing some further restriction on this freedom, the question of sustainability addresses its very principle; At least virtually and 'atmospherically' so, in the public perception of sustainability.

Our interpreting hypothesis of the 'GMO event' makes it the precursor of a very serious and interesting political and cultural crisis, marked by a gap between the functioning of political institutions and the public, but also between those institutions and the dynamics of awareness that unites the public and more and more concerned researchers and NGOs. Such an organisation as the 'Fondation Sciences Citoyennes' in the Conseil d'Administration of which Sébastien Denys is now part, as well of NGOs networking in order to be taken into account in the European science policy programs are highly significant in this perspective.

From this point of view our IAP network may be seen as a part of the GMO event as it was born from the promoters' concern about the lack of awareness and relative inadequacy of the scientists' answer to the challenge of our epoch. This was, by the way, how the idea of an 'atmospheric public pressure' appeared: to the question, 'how to measure the general public position?', what do we know about what 'people' really think?' the answer came: we ourselves are one of these measures as our interest and questions first derived not from an academic agenda but from a concern that makes us 'part of the public'.

The idea of the 'GMO event' also reflects the importance of the kind of 'narration' which can be given about 'events'. Those narrations are neither 'subjective' or 'ideological', nor 'objective', as this opposition does not apply: it is part of the event as are part of the event the narrations produced by scientific actors, European authorities, and so on. The difference is that we make it clear that our approach is an active one, and that the stakes are clear: our first interest is not 'pro or anti GMO', it is for the fact that, *at this occasion*, the role assigned to lay people, that of satisfied and confident consumers, gave way to active, demanding 'learning trajectories', and that as a result knowledge is in the process of being produced, made available, or taken seriously. That is, the fact that people learned how to interfere in a matter they saw as concerning them has produced a better quality and more reliable knowledge. To make this fact public, to make it matter, to put it into an historical and political perspective is to recognise the event as affecting our own conception of what is, or is not, possible.

Future prospects for Sébastien Denys' work:

- to follow the event in its development. Two directions are anticipated the problem of the nanotechnologies, and the problem of the public participation in decision making regarding GMOs in developing countries.
- to contribute to the debate about science policy. Sébastien Denys will participate in a study commissioned by Greenpeace International to Foundation Sciences Citoyennes on 'Science, expertise and democracy to the GM test in Europe'. The first part of the study investigates the obstacles that prevented a precautionary expertise of GM crops and prevented as well the emergence of a science policy that would answer address citizens' concerns. Related to the main trends identified, the second part will then seek to identify proposals and recommendations in order to improve the evaluation system of GM food, to protect scientific freedom and pluralism (protection of whistle blowers, etc.) and to democratise the governance of agricultural research in Europe.

Future prospects for collective IAP work: the writing of a book about 'L'événement OGM'.

This workpackage is mainly driven by the researches of Sébastien Denys with the collaboration of Isabelle Stengers, Jean-Claude Grégoire and François Mélard. Other researchers of the IAP are also actively participating: Nathalie Trussart, Daniel De Beer, Laurent De Sutter, Mirelle Hildebrandt, Serge Gutwirth, Marc Mormont, Bruno Latour, Dani De Waele and Valérie Smet.

WP5@FUL - Study of multidisciplinary research schemes for public action

This workpackage is mainly concerned with “practical” settings able to treat controversial situations in which public and scientific actors are involved. The FUL/ULg team is actively involved in a few processes that can be considered as “experiments” in this perspective:

- a process of collective building of a local development project including a nuclear waste deposit
- a process of “citizen conference” on genetic testing (to be followed and evaluated by social scientists)
- a process of public validation of a scientific model intended to help pesticides reduction
- a scientific study of the potential role of “labels” to reduce pesticides in food production.

Some of these experiments imply very active role of the FUL/ULg team while other imply a more scientific approach.

The approach

These projects are sustained by a specific vision on risk evaluation and risk management. Technician approach of risk – risk equals probability X damages – became a technocratic approach when (logical momentum) it was accepted to delegate both assessments of risks and of damages to experts. It could seem simplistic because some critics (about the impossible probability calculations or about the impossible evaluation of damages) have been expressed soon. So the limits of this definition of risk are now very common.

It is important to mention that critics were coming first from political activists and from public resistance that were called Nimby syndrome. Scientific critics follow close behind in different directions.

A first direction tried to understand public reactions in terms of perceptions (see WP3) by confronting expert definitions and lay definitions. Psychology and positivist sociology contributed to an approach that defined the problem as a lot of bias processes in the definition of risk. Anthropology (M. Douglas can be seen as the leader) proposed a vision of risk as social construction by which social groups define themselves against others. This direction was helpful by opening the question of diverging rationalities about risk situations.

A second direction tried to show that expert evaluations are poor, restricted to specific competence domains of experts, driven by cognitive and practical postulates that frame the risk evaluations. Biases are not only lay but also expert one. This more cognitive orientation (e.g. Brian Wynne) give some credibility to lay people in the process .

“... Does not exist ‘out there,’ independent of our minds and cultures, waiting to be measured. Instead, human beings have invented the concept *risk* to help them understand and cope with the dangers and uncertainties of life. Although these dangers are real, there is no such thing as ‘real risk’ or ‘objective risk.’ The nuclear engineer’s probabilistic risk estimate for a nuclear accident or the toxicologist’s quantitative estimate of a chemical’s carcinogenic risk are both based on theoretical models, whose structure is subjective and assumption-laden, and whose inputs are dependent on judgement.” (Slovic 1999: 690).

The first orientation have given place to what s called “risk communication” strategies that try to reconcile public evaluation and expert ones. It is not only communication as marketing to convince people to accept expert evaluation; some initiators are also open tn accommodate technologies to lay evaluation and to induce decisions that could make compromises between different rationalities. That is, in general, the perspective of consensus conference that try to

find the best acceptable way to introduce technologies, with a sound contribution of lay people, users, citizens or professionals.

The second direction has opened more radical initiatives and a lot of papers and books that try to give a more important place to populations and citizens in the risk assessment and management procedures. Recommendations are about pluridisciplinarity, participation, stakeholders involvement and finally risk governance of situations in which concerned groups are to be involved. But this direction is always concerned by the acceptability question.

Nevertheless this second direction puts the emphasis on the real competence and skills of lay people. Lay people are not egocentric, they are not ignorant : they are able to perform public and civic actions, they are able to understand problems, and to give scientifically relevant opinions⁷. So the question becomes : by which kind of institutional settings is it possible to involve lay people in an evaluation process ?

From that the research has to develop experiments to try to understand what kind of settings are able to deal with risk production and risk practices (in which we include living with risk).

The first question is a question of dispositif (see WP2). We use the fourcaldian concept not as a disciplinary perspective – the dispositif as a maker - but as a way to understand the way heterogeneous questions and actors can combine in strategic collective action – the dispositif as enabling setting -. The first application of this interpretation of the “dispositif” was explicit in a past research about agro-environmental policy implementation in France. It is used now to develop a methodology for risk management. This application is detailed in more recent publications around nuclear waste management. The main conclusions are that risk management implies radical changes in the power relationships in the process and procedures of risk evaluations.

An explanation of this conclusion can be found in the way people and experts are committed to the risk management. Consensus conference and other more or less experimental procedures clearly indicate that successful procedures imply a radical change in the way actors are involved. Involvement actually means the kind of relations can be performed in the setting. For example what kind of relation to political authorities can be performed in a consensus conference ? What kind of relation to knowledge as well ?

It seems interesting to shift from a research concerned with evaluation of risk to a research focused on the multiple ways people deal with uncertainties, and to include concepts like plausibility, collective likelihood. This can be inferred from the experiments that show that inclusion of scientific questions and results in a multi actor prospective actually transform the way people address risks/

That is the reason we intend in the next future to explore the potentialities offered by research in partnership or methodologies of intervention research. This has been initiated in a few research projects namely concerning organic production, sustainable consumption on one side and, on the other side, in a collective discussion with colleagues of the INRA (Institut National Agronomique, Paris).

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⁷ *Christophe Sibieude* EN DEBAT : ACCEPTABILITE - Justifier le risque en justifiant l'activité (à risque) Environnement & Technique Janvier-Février 2000 N° 193

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For the IAP, this workpackage is mainly driven by Marc Mormont and François Mélard. But other researchers and PhD students inside the SEED research unit deals with the same problematic: this is the case of Catherine Mougenot (biodiversity), Pierre Stassart (sustainable food sectors) or Hamid Chrifi (nuclear waste). Other researchers of the IAP are also actively participating, such as: Daniel De Beer, Sébastien Denys and Isabelle Stengers.

WP6@VUB- *The relationship between law and science from the perspective of law and legal theory*

This workpackage is mainly driven by the closely interrelated researches of Laurent De Sutter (PhD-student) and Mireille Hildebrandt (senior researcher), who both work a.o. on issues pertaining to legal theory, pTA and representation. Other researchers of the IAP are also actively participating, such as: Serge Gutwirth, Daniel De Beer, Wim Schreurs, Bruno Latour, Isabelle Stengers, François Mélard and Nathalie Trussart and Bas Schotel.

Laurent De Sutter is working along two axes.

The first axis is mainly theoretical insofar it aims at re-conceiving the legal theoretical apparatus. This aim was primarily given room through a close collaboration with Serge Gutwirth regarding an analysis of Bruno Latour's concept of law as exposed in *La fabrique du droit*. This collaboration first gave birth to an extensive review article (which has, already before its publication, been hugely commented on *imbroglio.be* in the *tree of questions*), to a round-table with Bruno Latour (incl. Daniel De Beer, Laurent De Sutter, Serge Gutwirth, Mireille Hildebrandt Bas Schotel, Wim Schreurs, Isabelle Stengers and Nathalie Trussart). This discussion is still ongoing on the *imbroglio* weblog (see entry: droit institution - droit énonciation - obligations - exigences) and feeds, as said, Stengers writing of a book about practices.

The attempt of re-thinking the legal theoretical apparatus has been further pursued through a confrontation of established legal concepts with Isabelle Stengers' 'cosmopolitics proposal'.

This confrontation, held with the collaboration of Frédéric Audren at the Ecole Nationale Supérieure des Mines (Paris, France) has given rise to a collective work *Pratiques cosmopolitiques du droit*, published in a special issue of the largely read review *Cosmopolitiques*, wherein the results of IAP-researches were published (articles of De Beer, De Sutter, Gutwirth, Latour and Stengers, next to U. Beck and Fr. Ost)

The second axis of research is issue-driven and concerns a positive program of research together with the other legal work packages (WP7 and WP8) and the preoccupations of the sociological, agronomical and philosophical work packages. In order to grasp the changes into the democratic constitutional state with regards to the particular case of genetically modified food, a key-concept seemed to be the *concept of 'representation'* – as it is mobilised by both interested people, institutional actors, and constitutional lawyers alike (cf. WP 3). For every actor of the GM-food case, representation seems to be both the problem and the solution. The problem: representation is not correctly insured. The solution: it is only with good representation that the breach between the public and the decision-makers can be filled. An interesting example of this paradoxical status of representation was the citizen forum citizen forum held by the Vlaams Instituut voor Wetenschappelijk en Technologisch Aspectenonderzoek at the Flemish Parliament in March 2003. Other foreign examples helped to define this problematic status, and to try to formulate a possible answer to the aporias of this status. This answer is to be developed in Laurent De Sutter's PhD thesis as it is currently being written, but can already be described as concerning to possibility of defining a constructivist conception of representation, as opposed to the conception of representation as legitimation. The central feature to reassess in this picture seems to be the concept of 'public' of representation: the main contemporary challenge to representation seems to be to imagine how to operate the jump from the guaranteeing of a given public (the 'people' or the 'nation') to the case-by-case construction of a specifically interested public (cf. WP3)

Pursuant to these researches it has become possible to show how law is actively intervening when scientific novelties (for instance the GMO event or the question of the 'correlatable' human) emerge, and is not simply implementing them into legal provisions. To be more precise: it has become possible to see how law participates to the emergence of such a scientific novelty – i.e. how law intervenes positively, how this novelty helps at the renewal of law as such, and how law itself can produce such a novelty.

This inquiry into such a role for the law has allowed the progressive elaboration of a set of concepts that has deeply renewed our conception of law as such: law must be considered as an actor participating in the emergence of the new beings which enrich our common world (Latour). This is why the researchers of the WP6 team have tried out the pragmatic or 'constructivist' vocabulary in describing the law as a practice interested in its own constraints inside a cosmopolis of practices. Understood as a practice, law can be accounted as a creative machine, and not only a coercive one. It becomes possible to see how law can contribute to the elaboration of a good common world rather than framing or limiting it. This is why several key-concepts of the Western legal tradition have been investigated with regard to such a conception of law – and notably the concept of 'political representation' as it is embedded in the form of a principle into the Belgian Constitution (Laurent Desutter). The ambition of such a re-description is to enlighten the constructive dimension of law were law really operates: it is so that principles, for instance, can not be understood as legitimisation tools anymore, but as instruments of creation of new realities that have to be politically taken into account.

After defending her Ph. D. in October 2002 Mireille Hildebrandt further developed a historical, anthropological and conceptual analysis of punishment on the basis of an action-theory of (legal) norms and an interdisciplinary theory of the (criminal) trial, starting from the Germanic 'thing' and related forms of process in other societies without a state. This interdisciplinary theory of legal process demonstrates how a less hierarchical conception of law actually works. This may be of importance if the relationships between science, technology, policy-making and adjudication are to be part of a new system of checks and balances in a globalising world that functions well beyond the national state. The research into the history of the criminal trial in the end focuses on the specific set of constraints that constitute the fair trial as it emerged within the framework constitutional democracy.

From this perspective, during the first two years of the IAP, Mireille Hildebrandt has researched the relationship between science and law by (resulting in complex case studies for first year law students in Rotterdam on the topics of 'testing expertise in court' and 'understanding causality in law'; several presentations and publications on legal assessment of expertise in court). The third year Hildebrandt has moved on to explore the findings of this research to locate good practices for the testing of expertise. She has read extensively into literature on participatory Technology Assessment (pTA) and correlated its focus on communication between laypersons and experts with the communication between judge, jury, parties and experts in fair trial. This has led to interesting ideas about representation in politics and social (and marketing) research. Instead of understanding representation as a matter of aggregation of ready-made individual opinion (votes, sociological surveys) or ready-made preference (consumer choice), representation can also be understood in a less quantitative manner. To explain this, one could take the example of the legal jury, which is often said to represent common sense, in a process of carefully examining and discussing the evidence. This common sense is not an aggregate of given individual opinion, but the result of a process of forming a shared opinion. One could call this deliberative or participative fact finding (knowledge construction by lay persons, often on the basis of expert evidence). What is represented is created in this process of knowledge construction; it does not precede its representation. The fair trial seems to have found an interesting way to constrain this process of knowledge construction (representing the common sense of a community): incorporating expert advice while leaving the final word to lay persons (judge and/or jury). This has also been investigated by Gutwirth, and presented by him during the *Testing expertise* colloquium of October 20, 2004.

If the constitutive constraints of the fair trial are understood in their *virtual sense*, they could be used as good practice for pTA. Especially since pTA seems to lack the necessary backbone, making it vulnerable to exploitation by those that are only looking for means to legitimate their own blue prints. This is of course not to suggest that pTA should incorporate the *actual practice* of the fair trial. Apart from the fact that the actual practice of the fair trial is being eroded from within and without, the demands to be met by adjudication form a setting very different from the demands to be met by technology assessment. As mentioned above, the research of Hildebrandt finds inspiration in a study of the Germanic thing-process and other forms of trial and assembly in societies without a state. The comparative study of such assemblies (that lack authoritative closure by organs of the state) can inform a better understanding of the mechanisms at work in participatory (Technology) Assessment practices. This links her research to other workpackages that explore new procedures for participation (wp 4) and new ways to think representation (wp 6). The ideas generated by this research have been presented by Mireille Hildebrandt, together with Serge Gutwirth and Wim Schreurs, at the 4S EASST World Congress on *Public Proof, Science, Technology and Democracy*, in

Paris 25th –28th August 2004, and during the IAP Conference on *Testing Expertise*, in Brussels 21st October 2004.

WP7@VUB - *The legal status of knowledge and information*

This workpackage is mainly driven by the research of Daniel de Beer (predoc researcher) which has been supported and stimulated by Nicolas de Sadeleer (senior researcher, 15%). Both have worked on issues such as patents law, GMOs, access to drugs, the precautionary principle, biodiversity and access to information. Nicolas De Sadeleer has extensively published on those (and related) subjects and is an internationally recognised expert in these matters⁸. Other researchers of the IAP are also actively participating in this workpackage (such as Serge Gutwirth, Isabelle Stengers, Wim Schreurs, Sébastien Denys, Jean-Claude Grégoire, Nathalie Trussart, François Mélard, Dani De Waele, ...)

Daniel de Beer worked on GMO-litigations in criminal, public, commercial and civil law which made appear very interesting connections with the 'GMO-event' as it was depicted in WP4. He also studied the role of patents at the international level (WTO) and at the regional level (European Community).

It is clear that the legal status of GMOs is still under construction, in spite of what European institutions claim. Actually as one question seems to be solved, another occurs. It seemed important to understand in which game we are players. After analysing the huge amount of regulations, green or white papers, communications, drafts, road maps and so on, issued by the European institutions since 15 years, it became obvious that the Commission has been very steadfast in its efforts to achieve a constant policy. Due to crises, citizens' worries or new environmental concerns, the Commission often updated its policy project but always without changing its mind. The principles underlying its policy have never been altered. A complex device (*dispositif*, cf. WP2) is working to prevent free GMO cultivation (as well as open market access) from happening and expanding. But this is not enough to explain what is going on. Three kinds of cartography closely interlinked have been done. Firstly on the different levels or institutions that are concerned with GMOs 'in law'. Subsequently on what these institutions say, on how they explain their 'legal attitudes' about GMOs. Thirdly on the policies and the rules these institutions are carrying on concerning patent issues. Indeed, the intellectual property rights, especially patents, are a key issue.

Obviously, Daniel de Beer concluded, the intellectual property rights, and especially patents, are a key issue. This is why he started a PhD on this subject 'Le brevet et le dispositif dans lequel il s'enchaîne, forteresse et machine de guerre, ou institution juridique perfectible?'. Intellectual property rights, especially patents, cannot be studied without considering their practice which involves a lot of things: law, the World Trade Organisation, the TRIPS Agreement, transnational firms etc. as well as several '*mots d'ordre*' (like 'patents mean progress'). Again, it seems that something like a complex 'device' (*dispositif*, cf. workpackage 2) has been built to protect patents from any confrontation with other rights or concerns. A hypothesis is that the huge dispute over the question of access to essential

⁸ To give one example: an updated paperback edition of his book *Environmental Principles: from Political Slogans to Legal Rules* (2002, Oxford: Oxford University Press, 433 p.) is now available. The book itself was reviewed 12 times in different Yearbooks and law journals highlighting that the book constituted 'a veritable font of knowledge that facilitated access to both continental and Anglo-saxon doctrine spanning the last 20 years' (*Leiden Journal of Intl Law*, 2004, vol. 17, n°1, 216).

medicines, that started in South Africa in 2001 and ended in Cancun in 2003, was a real ordeal by fire of the new system or 'device' set up in Marrakech in 1994.

In conceptualising his PhD Daniel de Beer explicitly has been influenced by the work of this IAP inasmuch that the confrontation with ideas, concepts and constraints of other disciplines (philosophy, agricultural sciences, environmental sociology) and results of researches of the other workpackages have obliged him, *as a jurist, as a legal researcher*, to go 'further' than normally is the case. This has led him to formulate the hypothesis that patent law, considered as a neutral and independent legal technique (even independent from the rest of the law), might well be the vector of the commodification or marchandisation of knowledge.

WP8@VUB - *Correlated man and man as seen by law*

This workpackage is mainly driven by the researches of Mireille Hildebrandt and Serge Gutwirth (senior researchers) and Wim Schreurs (predoc-researcher). Other researchers of the IAP are also participating (such as: Isabelle Stengers, Jean-Paul Van Bendegem, Karen François, Hans Comijn ...). An indirect but important external input is given by Paul De Hert (senior researcher, University of Leiden and Vrije Universiteit Brussel) who is member of LSTS and works/writes together with Serge Gutwirth on a permanent basis.

This workpackage has been the scenery of an important conceptual shift and clarification since the Gent-network meeting of May 17, 2003 dedicated to *The correlated human and the human as seen by law* (with presentations of Koen Raes, Serge Gutwirth, Mireille Hildebrandt, Jean Paul Van Bendegem, followed by intensive discussions which still are ongoing in seminars, and on imbroglio.be). The scientific and statistical approaches of 19th century were *prestructured or stratified* and human scientists and policy makers were searching for certain explicative etiological schemes: they choose to investigate the populations from the perspective of *certain* parameters which they believed to be relevant and pertinent. In other words, the correlations established were the result of an *oriented questioning*; they were *measurements* meant to be meaningful (and thus implying a stratification of variables'. This is *not* the issue at stake in this workpackage. What interests us is that today it are no longer preceding questions (and the structuration/stratification of parameters they imply) which are organising the search of correlations, but, on the contrary, it is the emergence of a correlation as such that has become the pertinent or interesting information, which in its turn will launch questions, suppositions and hypotheses. Nowadays, the upsurge of a correlation *is* the information. In this context Isabelle Stengers evoked the image of the generalised bubble chamber: a bubble chamber is a container full of saturated vapour such that if you have an energetic particle travelling through it, its many successive encounters with a gas molecule will produce a small local liquefaction: quantum mechanics tell us that we cannot define the path of a particle but because of the bubble chamber we can 'see' it, or its 'profile'. According to this metaphor there is an unlimited number of detectors and detections surrounding us, as we act and live. Hence, we leave traces and 'profiles' which allow to 'see' us. That is the new fact, as compared to the 19th century 'average human': a fact that Bruno Latour insisted a lot we learn to appreciate before diagnosing its dangers. The human is no longer identified in terms of meaningful, stratified categories only. The human is detectable, (s)he leaves and is surrounded by traces, (s)he is retraceable and as such (s)he is correlatable. The fundamental difference is that detections are *much wider than measurements* responding to addressed questions: by themselves detections as such are *asignifiantes*; they do not have a specific meaning, but they can acquire a meaning, as a result of the questions and

concerns of the one who uses them. Detections *may* correspond to measures, but first of all they are indeterminate. The conclusion is that the fact we want to address is better described as the '*correlatable*', '*detectable*' or '*traceable human*', than as the correlated human. It is also important to bear in mind that detections as such do not necessarily invade privacy as they do not build on sensitive personal data and because they are '*insignifiantes*' and undetermined until used. Gutwirth tried to show that the data protection legislations are in fact the result of an intuitive understanding of this shift by the legislators, because they organise protection for all data related to a person without distinction, they protect personal data that are still *asignifiantes*. Building on Deleuze and Stengers, Hildebrandt has further distinguished between correlated and correlatable humans by distinguishing actual and virtual identity: being a correlatable human is the virtual aspect of being an actual – correlated -human. Being correlatable in this virtual sense implies the indeterminacy of human 'nature' (or, the non-essential essence), that is forever becoming actual – in ways that are not entirely predetermined. This point is of course highly relevant for the role of law in a democratic constitutional state, as it indicates the importance of the concept/construct of the legal person as a means to confirm this virtual aspect of the human person. In several papers and publications Hildebrandt is elaborating on this point, researching the relationship between privacy, identity and profiling technologies (e.g. at the international conference on 'Is knowledge justiciable' in Essen, Germany, March 2005).

In the framework of this workpackage Mireille Hildebrandt has been investigating a number of interrelated issues. She undertook to describe how a relational concept of the subject is tied up with a relational concept of law; that there is a difference between the embodied, situated subject and the legal (artificial) subject; that correlatable humans demand a rethinking of traditional concepts of subject, identity and privacy and demand the construction of new legal frameworks to accommodate the new hybrids that are emerging on the nexus of information technologies and humans. She also studied into human genetics and law (which can be seen as the nexus of the transversal themes of the projects: genetic modification, the gene as knowledge construct, correlated genes as example of correlated humans) and into identification technologies, especially profiling, in relation to the idea of correlatable humans. She also actively participated (together with Serge Gutwirth and Isabelle Stengers) in the construction of shared meaning of correlatable humans as mentioned above and brought this new conceptualisation of profiling within the FIDIS-network (infra), STS study seminars and publications on privacy and identity.

Serge Gutwirth did contribute to the further exploration of concept of correlated human and he studied of the idea to replace 'correlated human' by 'detectable or correlatable human'. Continuing his longstanding cooperation with Paul De Hert, Serge Gutwirth wrote a report *-Making sense of privacy and data protection-* on the impact of the technological developments in the field of location based service, identity management systems and the virtual residence on privacy and data protection. In this report the authors came to the conclusion that two complementary sorts of legal tools can be used to deal with power in a democratic constitutional state: tools of opacity protecting and shielding individuals against intrusions on the one hand, and tools of transparency aiming at visibility of power in order to stimulate its control and accountability. Although no clearcut distinctions can be made, it can be stated that privacy is a tool of opacity limiting the exercise of power upon the individual by conceptualizing an opaque individual sphere, while data protection is a tool of transparency because (left aside some exceptions) it does not prohibit but channels, organises and regulates the processing of personal data. Serge Gutwirth has explicitly extended these reflections to the issue of the 'correlatable human' in a paper *The correlated human revisited. A slope beyond*

boom and doom during the sixth IAP 5/16 meeting of December 16, 2004 in Rotterdam (posted on *imbroglio.be*).

Wim Schreurs, who is a participant in the FIDIS and SWAMI projects, is actively involved in issues relating to the correlated or 'correlatable' human. Throughout these projects and his PhD, he has been focussing on the relation between privacy, data protection and ambient intelligence. More in particular, personal data processing, data collection, data storage and distribution and the use of profiles are important aspects of ambient intelligence which are closely related to the 'correlatable' human.

In his research, humans are more approached and considered as a kind of 'digital me's', where the correlated human is in fact a digital representation of a human being. In this sense, in order to create safeguards against the possible negative aspects of correlating humans (making digital humans), he works on the necessity to develop a model of interaction between law and technology, in which human beings and their correlations (their data - their digital representation) are protected throughout a convergence - synergy - of law and technology. In this view, he started to present overviews of several existing laws on the protection of privacy and data protection, and to propose new approaches and changes to these laws (which then also should apply in ambient intelligence situations). In this sense, he analysed in particular the process of individual profiling (correlating) in his presentations in the network meeting on the correlated human in Rotterdam and during the workshop on ambient intelligence and profiling in the FIDIS project. At the moment, he starts to test his proposals for 'codes' - i.e. law-in-technology applications - in which the focus is mainly human-centred and based on the necessity for an individual to have the possibility himself to be the controller against unwanted data collection and procession (and possible correlations).

The research of Wim Schreurs on correlated man is also linked with Workpackage 7. If the (automatic) processing of personal data (through identification and authorisation measures) becomes a condition to access to information or services (e/g. listening to music, going to a museum, electronic payment, facilities acces controls, GSM-use ...), higher possibilities of detection and profiling are generated. In his research, Wim Schreurs tries to study the map of technologies and scenario's in order to make a link with the legal field, especially concerning privacy and data protection. Wim Schreurs, who is a participant in the FIDIS and SWAMI projects (infra), is actively involved in issues relating to the correlated or 'correlatable' human. Throughout these projects and his PhD, he has been focussing on the relation between privacy, data protection and ambient intelligence.

In order to create safeguards against the possible negative aspects of detecting and correlating humans, Wim Schreurs reflects upon a model of interaction between law and technology, in which human beings and their correlations are protected throughout a convergence - synergy - of law and technology. In this view, he started to present overviews of several existing laws on the protection of privacy and data protection, and to propose new approaches and changes to these laws (which then also should apply in ambient intelligence situations). In this sense, he analysed in particular the process of individual profiling (correlating) in his presentations in the network meeting on the correlated human in Rotterdam and during the workshop on ambient intelligence and profiling in the FIDIS project. At the moment, he starts to test his proposals for 'codes' - i.e. law-in-technology applications - in which the focus is mainly human-centred and based on the necessity for an individual to have the possibility himself to be the controller against unwanted data collection and procession (and possible correlations).

Closely linked to the issues of this workpackage, the *Law Science Technology Society* (LSTS) research group directed by S. Gutwirth participates into three 6th Community Framework Programme (FP 6) initiatives, namely

- the FP6 Network of Excellence *The future of identity in information society* (FIDIS) (participation of Hildebrandt, Gutwirth, Schreurs, Van Bendegem, François). Hildebrandt and Gutwirth are the coordinators of the workpackage 'Profiling: implications for privacy and security'. The topic of profiling correlates well with the topic of correlatable humans (wp 8), but the interdisciplinary nature (legal, technological, information science perspectives) make the exchange within FIDIS a fertile play ground for studying the relationship between law and science from the perspective of the relational theory of law.
- the Specific Support Action (SSA) *Safeguards in a world of ambient intelligence* (SWAMI) (participation of Gutwirth, De Hert, Schreurs and Verlinden)
- the Integrated Project *Reflexive Governance in the Public Interest* (REFGOV)-Subnetwork: *Fundamental Rights Governance* (approved but still to be started up: promotor Gutwirth (LSTS) and Bart De Schutter (Institute of European Studies).

These three projects described again *infra* under 4.2.B. International activities

WP9@VUB - Mathematical practices, statistics, and society

This workpackage is mainly driven by the research of Jean Paul Van Bendegem (senior researcher), Hans Comijn and Karen François (both PhD Students). Other researchers of the IAP are also participating (such as: Isabelle Stengers, Bruno Latour, Mireille Hildebrandt, Laurent De Sutter, Wim Schreurs, Valérie Smet, Dani De Waele, François Mélard, Serge Gutwirth ...). An additional, important input was delivered by some researchers, member of the CLWF (*Center for Logic and Philosophy of Science* at the Vrije Universiteit Brussel, director: Jean Paul Van Bendegem), also related to the above-mentioned LSTS.

It was the initial objective to deploy three axes of research:

1. *The sources of objectivity and the need for mathematics*. We wanted to understand why the philosophy of mathematics has been interested almost exclusively in mathematics' internal problems, and, at the same time, mathematics also seems to function as a reference or necessary and irrefutable form of knowledge in *all* discussions and issues. Our hypothesis was that the ontology and epistemology of mathematics 'contaminate' the ontologies and epistemologies of the natural sciences and social sciences. The relevance to WP8 is immediately clear for the cluster of concepts, centered around correlation, detection and traceability are, at least, mathematically 'flavoured'.

2. *Statistics as a case of the complex and multiple relations among mathematics, the social sciences, and society*. The origin of the theories of probability and statistics can be situated within a society whose economic organisation must meet some special conditions. Today, in what is called 'analytic' philosophy, many studies have been conducted (*e.g.*, J. Pearl, *Causality. Models, Reasoning, and Inference*, 2000) to determine which correlations are or are not indicative of a cause-and-effect relationship. However, these studies are almost wholly internal in nature, and if we want to break out of this restricted framework, we need to deal with a) the question from where or from what are the correlations derived and, b) the question from where the notion of causality comes from. Again, the immediate relevance for WP8 is clear.

3. *Popularisation of mathematics*. In a direct application of the preceding, it was our intention to tackle the greatly neglected matter of the popularisation of mathematics. The self-

image that mathematicians broadcast all too often reduces mathematics to a sort of puzzle-solving therapy in an imaginary world.

Jean Paul Van Bendegem concentrated his research on the issue of *mathematical practices* in order to understand not merely how the mathematical process evolves but to get a grip on the problem of mathematical certainty, more specifically, what are the roots of the idea that mathematical knowledge is in some sense or other a *necessary* form of knowledge. If it turns out – as it does – that mathematics is just as fallible as any other piece of mathematics, this should have repercussions for the societal status of mathematics, as source of certainty (e.g., the expert statistician in court, see WP8 and WP6, especially concerning the status of an expert). In addition to detectability, traceability, he has proposed to add the concept of mathematisation (of our daily world), claiming the overall presence, often hardly detectable, of a mathematically supported worldview. In this connection an interesting exchange is going on with the FIDIS-project, mentioned above, on the nature of algorithms. This research has greatly benefited from the work of Bart Van Kerkhove, who wrote a Ph.D. on the external and internal philosophical-sociological views on mathematics, and Kathleen Coessens, who is presently working on cartography as a metaphor to understand knowledge change, both members of the already mentioned CLWF.

Karen François has focused her research on the ontology of mathematics and mathematical practices and beliefs, looking for an empirical support of the thesis that (variants of) *Platonism* is the mainstream ontology in the mathematical (and scientific?) community'.

Also, she now focuses on *Mathematics Education* (this actually was the 'translation' of the third original objective on popularisation) and is trying to understand empirically how hidden values are transmitted (see the imbrogio site and <http://www.vub.ac.be/CLWF/>).

During her research into the mathematics curriculum of Flanders (Belgium) secondary education (age 12-18), she first discovered that there is small scope for philosophy and history of mathematics. Second, she discovered a large gap between general and vocational education where general education is taught the capital M (which stands for mathematics as the academic scientific discipline) and where vocational education is taught the small m (which stands for a set of basic competences). Moreover, the more general the education, the larger the M, and the higher the respect in society. Our Western education system persists social cultural inequality.

It was a 'natural' move to incorporate *Ethnomathematics* into the research and its renewed role in Western curricula.

International comparative research on the results of mathematics educations show us –in the case of Flanders- nearly the best results all over the world. However, she shall criticize the way in which mathematics in schools makes the selection between the 'elite' and the 'losers' and what should be the role of ethnomathematics in western school curricula to overcome this social stratification.

We have to recognize the social stratification in education and the fact that our school system persists social inequality in society. Social inequality becomes visible in primary education and increases in secondary and high education. Mathematics selects pupils in hierarchical levels. The more hours reserved for mathematics in the curriculum, the higher the status in the education structure, the more chances to improve and to succeed in higher education. This kind of educational system is characterized by a contradiction and by a perpetual motion.

On the one hand, it is the educational system which made pupils and students feel that mathematics is important to study, to succeed in higher education and to achieve a higher status in society. On the other hand, it is the very same educational system that makes students fail and that persists social stratification. In Flanders' school system the so called

‘eight hours mathematics’ is reserved for the elite of the pupils from whom teachers dream to teach them. It seems to be a contradiction that the system that creates the need is at the same time the system that fails to satisfy that need.

Beside the contradiction within the system of mathematic education there exists a perpetual motion where the ‘successful’ ones never question their mathematical knowledge nor their mathematics education. After all, there is no need to do so if you are successful. Furthermore, you need to be a rather successful student to become a teacher in mathematics. Hence teachers do not really deal with the frustration of the ‘losers’ in mathematics.

If we try to generate a democratic school system, it is a challenge in teacher training, to try to teach mathematics to all. If mathematics education is about helping people to relate better to their environment, then it is clearly failing in this task.

In its turn from education to ethnomathematics, this leads to a more general framework of *Mathematics and Politics*, that is, a philosophical inquiry into the politics of mathematical formalisation and objectification.

The aim is to demonstrate that the notion of representation can be used outside the traditional sphere of politics, by covering non-humans, that are taken to be represented by the sciences. Using this outlook, influenced by Bruno Latours *Politics of nature: how to bring the sciences into democracy* (translated by Catherine Porter. Cambridge, Mass.: Harvard University Press, 2004), the purpose is to overcome the dichotomy between political and scientific discourse, making thereby a direct connection to WP 3. Traditionally, political and scientific discourse are attributed to have sharply differing characteristics.

Political discourse takes place at the heart of a representation process of individuals, citizens, trying to get a grip on their particularities, complaints, desires, needs and interests. The process of political representation is volatile, unstable and incomplete in principle, due to the nature of those who are represented. It is a kind of representation that needs to be rearticulated time and again to avoid ending up in a totalitarian system.

Scientific discourse is presented and presents itself as having direct and privileged access to the truth, unhindered by the resistances offered by individual human and non-human obstacles. On the contrary, it is usually presented as having direct access to the realm of transparent truth. In this politics of the representation of nature, mathematics plays a crucial part, due to the fact that it seems to be the only method to achieve certain knowledge.

The first observation is that while (s)he who engages in political discourse is held to give account, scientific discourse seems legitimated ‘by itself’ and apparently is in no need of further justification. On the contrary, it has been elevated to an authoritarian status when it comes to speaking ‘wisely’ about non-humans. Instead, we propose to recognize the political dimension of the representation of nature (non-humans). Therefore, the same requirements with regard to representation and democratic accountability could also be said to govern scientific discourse.

We believe it would be fruitful of *extending the representational discourse* to the natural sciences. With Latour, we argue that the notion of politics should cover the representation of both humans *and* non-humans. Moreover, signs are clearly present that the distinction between humans and non-humans cannot be maintained (Haraway, Donna, Manifesto for Cyborgs, in: *Socialist Review*, vol. 15, 1985, pp. 65-107). In view of the politics of concern, in any case, this dichotomy cannot persist, since both dimensions are connected, interrelated and of mutual influencing one another.

One of the historical case studies in her forthcoming Ph.D. will be the development of statistics, making thereby a direct connection to several of the workpackages already mentioned, but also WP 10-11-12-13, more specifically the work of Valérie Smet.

Considering the growing importance of statistics in the social sciences and in society in general, and the goal to teach statistics to all, we shall argue that we have to teach statistics in

an accessible and critical way. In order to do so we have to integrate the history of statistics, its social relevance and the political meaning of the use of statistics. We therefore look at the historical, philosophical and political aspects of statistics before returning to the question of the critical teaching of statistics.

During the nineteenth century 'statistics' had different meanings: 1) it was part of the daily business of administration (official statistics), 2) it was intertwined with the early social sciences and 3) integrating probability theories, it developed into a science of its own. We elaborate on the case of Belgium where these different meanings converged both in the *Commission centrale de Statistique* (created in 1841) and in the work of Adolphe Quetelet (1796-1874). Despite the coexistence of these different meanings of statistics, not all had equal importance. We argue that both the predominance of official statistics and its isolated development to a large extent determined the academic position of statistics and the way statistics was taught.

During the nineteenth century, official statistics heavily weighed on the dominant statistical methodology and consequently determined how 'true knowledge' was defined (and produced) and how 'reality' was grasped. Only exhaustive measurements or descriptions could result in 'true knowledge' or in a 'faithful' representation of 'reality'. During the nineteenth century, the dominant meaning of statistics gradually changed. We argue that this not only altered the statistical methodology, but also the ideas about 'true or objective knowledge'.

From the political perspective, we point at two intertwined paths. The first connection between statistics and politics refers to the role of statistics in government. We will discuss the case of the *Staatenkunde* and Petty's political arithmetic. The second connection refers to the philosophical meaning of statistics as the use of a method to gain knowledge in general. Quetelet revived the basic thought that statistical methods might produce significant laws for the social sciences as the way to reach a higher degree of objectivity. The question remains if this knowledge is a neutral one.

Teachers are challenged to teach their pupils so that they can understand, interpret and handle statistics in a correct and critical way. Instead of a purely technique-oriented curriculum, there has to be room for the historical, philosophical and political aspects of statistics in its content. Looking at the didactics we argue that a top-down approach should be replaced by cooperative learning as a form of didactics which allows teachers to teach in a personalised and critical way.

Hans Comijn articulated his view on mathematics *as a construction*, comparing the productions of a body of mathematical knowledge to the construction of a building – stressing, e.g., the distinction between the 'objectivity' of the plans by the architects and the 'practice' of the engineers to transform the plan into a (robust) building – and looking for the main actants in this process, the matters of concern, the power relations, metaphorically, the 'strength' of the building. There is an obvious connection here to the work done in WP3, as one important source of inspiration for his research is the work of Bruno Latour. The central part of this Ph.D. will focus on the development of a Tardean/Latourian *sociology of mathematics*. This is a rather challenging task because both Tarde and Latour did not and do not directly address mathematical issues. Here too Comijn will greatly benefit from the expertise present in the CLWF, especially from Bart Van Kerkhove. The endresult will be a *Politics of Mathematics*, the 'mathematical version' of *Politics of Nature*.

In summary, through the collaboration with the other members of the IAP, this workpackage underwent a gradual move from an internal mathematical focus – what is a correlation? how is it calculated? how reliable can it be? – to an external mathematical view, where the impact of the mathematical community onto society at large could be traced. To a certain extent we are

now involved in the process of creating a language wherein such and impact can be expressed (as such a language is not available at the present moment): Comijn's building metaphor is a perfect example, but so is the idea of Van Bendegem's 'ecology' of proofs and arguments, obviously related to the 'ecology' of practices, that is a founding theme of this project.

WP10-11-12-13@UG - Summary of the results and main achievements

These workpackages are mainly driven by the researches of Koen Raes, Dani De Waele and Geertrui Cazaux (senior researchers) and of Valérie Smet (predoc researcher). Other researchers of the IAP are also actively participating (I. Stengers, N. Trussart, S. Denys, D. de Beer, K. François, S. Gutwirth, M. Hildebrandt, F. Mélard, and E. Zaccāi).

It quickly appeared that the researches foreseen by the original four work packages could not be separated⁹. We approached the four questions in parallel and this as well general as specific, and we proceeded as well bottom up (from case-studies to theories) as top down.

The **general** research approach of the four questions, became outlined according to the different disciplines and affinities of the involved researchers and demanded general literature studies related to each domain:

- Drs. V. Smet (full-time except during half year of illness), moral scientist, treated these questions for the **social sciences**. She especially questioned the relationship between social science/scientists and policy and is preparing a PhD on this problematic relationship.
- Dr. D. De Waele (part-time), geneticist, treated the questions for the natural sciences, *in casu* for current **agro biotechnological research**. She especially questioned policy initiatives to enhance public participation in biotechnology matters.
- Dr. G. Cazaux (limited time), criminologist, treated the questions for the domain of **animal rights/animal ethics**.

These general approaches were **specified** by means of case studies:

- The '**Marion Van San**' case (by V. Smet), a case study concerning social research on juvenile delinquency of migrants, formulated as the relationship between ethnicity and crime, ordered in September 1999 by the Minister of Justice for the Federal Government of Belgium and done by Marion Van San; incl. the follow-up research, ordered by the Flemish Minister of 'Welzijn, Gezondheid en Gelijke kansen'.
- The '**Genetically Modified Organisms (GMO), esp. the GM Food**' case (by D. De Waele) with as items: debates concerning the release of GMOs and the labeling of foods and fodder containing GMOs; questions around the upheaval of the 1998-moratorium on the introduction of GMOs in Europe; the ethical acceptability of agro biotechnological developments; and interactions between agro biotechnology, public and policy.
- The '**Beastly markets**' case (by G. Cazaux), a case study concerning undercover filming by the animal rights organisation GAIA during July-October 2000 of treatment of cattle at cattle markets in Anderlecht and Ciney.

Analysis of the '**Marion Van San**' case revealed several problems concerning the relations between social science, policy and government. The statistical elements in this case were

⁹ These were Work package 10: Questions concerning the independence of scientific experts; Work package 11: Questions concerning the ethical acceptability of scientific research; Work package 12: Questions concerning professional ethics of scientific researchers; and Work package 13: Questions concerning scientific information as an ethical duty.

discussed, in collaboration with K. François. Regarding the professional ethics of scientists, questions were tackled whether social researchers have to consider the impact of their research on specific groups or individuals in society (e.g. chances of stigmatisation, abuse of results, etc.). This led to an analysis of the impact of secrecy in the Dutch 'Wallage' case: can social researchers be asked by their commissioners *not* to publish their conclusions, and which impact might this have on the controllability of social science research and science-based policy? The 'Van San' case was also an opportunity to analyse the debate on political correctness and taboo. Furthermore, this case stressed the importance of the media in the spreading of information on scientific research, and in making (some) research known or popular. This has an impact on the knowledge politicians have on existing research. And it made clear that researchers have 'to sell' their research in the media, in order to get funding for further research. This analysis was reported as *Een analyse van de casus Van San in termen van de relatie tussen sociale wetenschap en beleid* (June 2003, pp. 114). At several occasions, this case study generated discussions with other IAP researchers (S. Gutwirth, M. Hildebrandt, I. Stengers, K. François).

The 'Van San' case was then analyzed from a more theoretical perspective, embracing study of general literature on knowledge utilisation, policy-making and policy, of specific literature on the relationship between social scientists and policy-makers, and of policy-documents on Belgian science policy. After that, the theoretical literature was confronted with the day-to-day practice of social research and policy in Belgium, on the basis of case studies and interviews with policy-makers and social scientists.

A literature study was undertaken concerning processes of decision-making and policymaking, in order to confront this with the critical analysis (by D. De Waele, see below) of recent policy initiatives in Belgium to organise public participation in science and technology.

The results of this research, i.e. the general and specific analysis, literature studies, case-studies, interviews, etc. will be handled synthetically and in depth in the forthcoming PhD of Drs. V. Smet (foreseen 2006).

The '**GMO and GM Food**' case was generally explored in *Een eerste verkenning* (July 2002, pp. 66 with 2 Annexes). Reflections were made about the position of scientists in a biotechnology lab; about science/agro biotechnology and the 'arrival' of 'ethics', bioethics and bio-ethical commissions; or about procedures and 'contractual relationships' in biotechnology. A brief overview was then undertaken of the process in Belgium of evaluation and control for the deliberate release of GMOs. 'Preferential witnesses' and scientific experts were interviewed. Discussions about the labelling of foods and fodder containing GMOs were followed up, and e.g. an insider's analysis of the negotiation process of the labelling criterion of 0,9 proved to be instructive. At several points, this analysis was tested with the research of D. de Beer, N. Trussart and S. Denys.

Regarding the ethical acceptability of scientific research, a strict 'ethical' acceptability of agro biotechnological developments (acceptance of GMOs) proved to be problematic. Questions about 'ethical' acceptability are interpreted as questions concerning acceptability on environmental grounds, on grounds of public health, of 'fair trade', of sustainable agriculture, etc. Regarding the moral position/professional ethics of scientists and the ethical duty of scientific inform, interviews revealed uneasiness amongst experts to 'release' scientific information in situations where commotion can be foreseen. The case of an (interviewed)

expert scientist as 'whistle blower' of possibly 'subversive' information was followed up, as were the controversies around the 'Gaucho case' in France (Gaucho is the Monsanto seed insecticide that harms pollinating bees). Collaboration took place with E. Zaccai concerning an ongoing 'battle of numbers' on expected yields versus actual yields of GM crop growth of GM crops in several countries. Information about the 'Gaucho case' was useful for the ULB students, this case being one of their 'Controversies'.

A more specific analysis was undertaken for the process of 'the making and commercialisation of GM Food': specific literature, documents, congresses and media releases were followed up. Research dealing with the question of the ethical acceptability of GM Food was presented at the IAP seminar at the VUB (October 9th 2003), *Preceding and current 'positions and responsibilities' of a post-geneticist regarding the biotechnology debate: sketch of an experiencing and thinking process. Or: The very regrettable 'unappetizingness' of GM Food debates*; and was presented at the IAP Network meeting on GMOs at the ULB (December 17th 2003), *The GM Food debate: how tasteful is technology (and for whom)?* As an outcome of the discussion on these presentations with other IAP researchers (a.o. the group of I. Stengers, D. de Beer), a 'moral position statement in biotechnology matters' was undertaken which will be published as 'Hegel en biotechnologie: Een 'monologue intérieur' over Wetenschap, Technologie en Kapitalisme' in *Ethiek en maatschappij* (2005).

This 'GMO and GM Food' case was then analysed at a more critical distance, i.e. from a more speculative perspective, in order to reflect on the interactions between agricultural biotechnology, public and policy. A critical analysis of recent policy initiatives in Belgium to organise public participation in science and technology developments (participatory Technology Assessment) was confronted namely with the above-mentioned literature study of Drs. V. Smet concerning processes of decision-making and policymaking. We considered the following initiatives: the public *Evening debates on biotechnology in agriculture and food* (organised by VIB, Vlaams Interuniversitair Instituut voor Biotechnologie, April 17th and May 12th 2001); the Citizen panel on GMOs in Beernem (organised by the 'Fondation pour les générations futures' for the Ministry of Health and Environment, April 26th 2003); the Citizens' conference on genetic testing, *Is it in my genes?* (organised by Koning Boudewijn Stichting, from January to March 2003); the Public forum on GM food, *New impulses for the debate on genetically modified food* (organised by viWTA, Vlaams Instituut voor Wetenschappelijk en Technologisch Aspectenonderzoek for the Flemish Parliament, May 24th, 25th and 26th 2003); and the so-called 'public files' of the Belgian advisory board on GMOs and its Working Group on Public Information.

Analysis of all possible documents and interviews with 'preferential witnesses' and experts, resulted in the thesis that citizen forums –being the only places where a 'general' public is gathered with experts and policy makers for debating societal problems with GMOs– are (but?) ritualised forms of dealing with a democratic deficit concerning the societal use/embedding of science and technology. In collaboration with V. Smet, this thesis was confronted with her literature study of processes of decision-making and policymaking. This confrontation was worked out in a presentation, 'Democracy put on the scene: Backstage reflections on the rationality of the Public-Science-Policy connection' at the IAP Colloquium *Testing expertise*, October 21st 2004, VUB, Brussels. A more elaborated text of this presentation was posted in the Tree of questions of www.imbroglio.be and will form the basis for a publication in an appropriate journal.

The 'Beastly markets' case refers to the undercover operation of the Belgian animal advocacy organisation GAIA at two Belgian cattle markets (Anderlecht & Ciney) whereby footage was released of miscellaneous abuses perpetrated by cattle dealers and transporters. The images were broadcasted around the world and evoked national and international public indignation. We examined the protest action, which evolved around this case, and more in particular how diverging experts' appraisals regarding animal welfare were set against one another in this debate.

Regarding the independence of scientific experts in government service, the chronology of the 'Beastly markets' case was examined and an investigation was made of the regulations cattle market inspectors have to observe. An overview was made of the ongoing public debate, using media publications. Regarding the ethical acceptability of scientific research, an outline was given of the field of those who can be considered as experts with respect to animal welfare, and especially of those who portrayed themselves (or were assigned that position by others) as animal welfare experts in this case. Key persons were interviewed, in order to examine whether these experts take into account the 'precautionary norm' or the 'certainty norm' in the formulation of their advice, and what their ethical argumentation is.

Regarding professional ethics, a preliminary outline was made of the governmental standards that are used in demarcating those who are 'officially' considered as animal welfare experts. Further information was asked regarding deontological codes and specific rules of conduct of the respective governmental agencies and the Association of Veterinarians. Regarding scientific inform as an ethical duty, questions arose whether there is a gap between animal welfare experts and non-scientists in this debate, and about conflicting expert's appraisals with respect to a specific case of animal welfare/abuse.

This resulted in a presentation of Dr. G. Cazaux at the Annual Popular Culture Conference, New Orleans (April, 16-19, 2003), 'The case for/against 'beastly' markets: Divergent expert's appraisals of animal welfare'.

2.2 Main achievements

We will not consider here the 'achievements' in terms of outputs, that have been presented in the WPs reports as well as in the information which follows further about publications, colloquia, networks paper. We prefer concentrating on what we learned as a network. Indeed we must recall (and will recall again in this overview, when needed) the very specific character of our IAP network which was not thought of as a matter of seasoned teams producing an added value though networking. The IAP was the very condition of possibility for a new set of researches *plus* a research action. In other words, the 'loyalty of knowledge', which is our federating theme, has a double meaning. All our researches involve questions in which are implied competing disciplinary modes of knowledge, and the diverging loyalties they involve. But the IAP networking also entails the formation of researchers who would develop, while belonging to specialised fields, an active understanding of those divergences, thus becoming able to turn them into new resources.

This is why an important part of the networking activity has been dedicated to developing and experimenting new habits/practices in scientific research.

This was a bold step since we dealt with young pre-doc researchers, who also had to define their own position in their respective field, a period of insecurity where disciplinary boundaries have usually a highly useful protective value. For us it was a necessary step since our research action addresses the question of the kind of scientists we need to form in order to face questions which are not framed in disciplinary terms, that is also questions which impose the problem of the respective relevance of many disciplinary fields. Around the GMO issue were gathered biologists, agronomists, lawyers, philosophers, sociologists. Around the correlatable human issue were gathered lawyers, philosophers, ethicists, mathematicians, sociologists, computer scientists and the many disciplines represented in the FIDIS network.

Our method has a double source of inspiration.

First, we used and experimented the practice of gathering around 'things', due to Bruno Latour. This practice demands that a situation be not defined in terms of 'matter of facts' - which usually lead to some hierarchy between approaches, for instance between the 'facts' and unknowns as established by so-called 'sound sciences' and the uncertainty of human affairs around the facts – but in terms of 'matter of concerns'. This means taking seriously the evolving plurality of concerns, including those which may be associated with 'public' and accepting that none of them maybe a priori disqualified as a matter of belief, biased perception or irrationality.

Second, we used the notion of an 'ecology of practices', due to Isabelle Stengers, which positively acknowledges that the coexistence between practices, including scientific ones, has nothing to do with a simple 'division of work' but offers the challenge of having diverging ways of discriminating what matters, and how it should matter, and take seriously each other. Stengers proposes to analyse this divergence in terms of constraints, the demands a practitioner has to satisfy, which can be negotiated and depend on the historical environments, and the obligations a practitioner will refuse to betray but which should be made explicit because they make the difference between neutral authority and demanding commitment. In order to emphasise the challenge of having diverging obligations not to claim exclusive authority against each other, and not to be pacified either, Stengers introduced a term which signals that an ecology of practices communicates with ontology, the creation of links, rather than epistemology, the taming of knowledge ambitions: cosmopolitics.

We have discussed and experimented this coupled approach to avoid presenting a 'state of the art' situation as following anonymous rationality and general consensual starting points, rather learning how to present one own's constraints in an explicit and actively interesting way around concrete issues. This is made possible by the fact that constraints are not limitations but rather challenges the explicitation of which is a surprise for the practitioner him/herself as it leads to experiment what was usually taken for granted in his/her discipline as demanding rather than obvious. This surprise was highly perceptible in the discussions around Bruno Latour's 'La Fabrique du droit', theorizing law from the point of view of its specific 'régime d'énonciation', and then with the discussion around the distinction between obligation and institution. This led to a rethinking of the specialists of their positions as positive lawyers and legal theorists. While they were tempted first of all to criticise the role of legal institutions, they learned, because of the interest of others, to evaluate its positive singularity. They (re) discovered themselves as law practitioners.

Both approaches meet in the notion of 'diplomacy' needed to actively avoid any claim that one approach would have the power to put everyone in agreement, and to remember that the achievement of the gathering is not a matter of goodwill or tolerance but of creation, eventually putting at risk not obligations themselves but their usual taken for granted formulation. As a result we have concretely experimented what can be called non-representational forms of knowledge. While in usual disciplinary formations, definitions play often as boundary marks, making the difference between recognised insiders and intrusive outsiders, and claim to 'represent' a situation in a way that demands recognition from its environment, our approach leads to learn about boundaries in terms of the differences they make both for the practitioners and for their environment.

This is a demanding approach, since the environment is no longer outside, but also inside, as actively situated by the practice itself. We may claim that our most important achievement is that this approach, when really tried, produces very positive results with our researchers, that is, a new understanding of both their own discipline, with novel questions and challenges, and of the situation they study, which is no longer a matter of application of disciplinary frames but of co-learning of both the situation and the frame.

We cannot dissimulate that our network experience leads us to new ideas about the formation of researchers in so-called soft sciences. The difference between 'hard' and 'soft' sciences is that while hard sciences seem to enjoy exclusive authority on their field – nobody from the outside will dream contributing to the question 'do neutrinos have a mass ?' if (s)he is not a competent physicist in this restricted subfield -, soft sciences have to defend their boundaries as everyone may feel competent to discuss about law, society, philosophy or psychology. Furthermore, while hard sciences seem to benefit cumulative progress, with controversies that eventually can be closed, soft sciences are inhabited by unending conflicts between rivals competing for authority (see the ongoing controversy around 'Freudian' psychoanalysis).

Our network's functioning affirms from the start that the problem of so-called soft sciences are indeed shared ones, and that this specificity should be made explicit in the very production of knowledge. More precisely the heterogeneous network may play a role that can be compared to controversies in experimental sciences. Indeed such controversies have for role and value to verify that a scientific claim can be detached from his/her author and be considered as 'imposed' by what it takes for its object. As such they are creative and demanding, and are seen by the protagonists as the very condition of the cumulative progress that may follow when a proposition has resisted verification. Our approach stops mimicking controversies as

they may happen around questions actively defined by a discipline. It starts with the affirmation that in our field we never deal with situations able to give authority to one interpreter against all others. The network functioning however produces a new kind of demanding creative test, also involving the verification of a detachment, not from the field but from the appropriative authority of the field. Loyalty is addressed not to school definitions but to the relevance of questions as it may be verified by others, entertaining different loyalties.

In retrospect the success we have experimented when the formation of researchers is concerned is not more astonishing than the success in 'hard sciences' researchers formation, when a claim is always envisaged from the point of view of its robustness in a demanding, critical environment. The difference is only in the environment which provides the needed 'friction' and it gives its positive meaning to the difference between the questions that concern 'hard' and 'soft' sciences. While hard sciences' controversies may concern a rather homogeneous community because a claim concerns a situation the meaning and stakes of which concerns this community, so-called soft sciences deal with always-already multiply and heterogeneously linked matters of concern, and a creative demanding test then, demands this heterogeneous assembly to recognise the relevance and interest of a new proposed link.

We are convinced that when situations not defined in disciplinary terms are concerned - those situations which refer to 'sciences and society' domain – we need researchers able to participate in this demanding, hard friction environment, and we may now add that the formation of such researchers has nothing to do with the formation of reconciling generalists but will rather activate a dynamics of innovation in their own field.

Further, another very interesting result is the very positive answer of the students in the bioengineering department to the 'séminaire des controverses', which confirms Bruno Latour successful results at the Ecole des Mines. So-called hard sciences have generally privileged the idea of a 'protected' formation against friction with the problem of the 'real' world, with a very strong differentiation excluding 'non scientific' questions from serious concern. The discovery that in real cases situations, this differentiation is not simple, that the very position of a scientific approach may depend upon a 'non scientific' decision about priorities and stakes, has been an exciting and elucidating discovery for the students. We are convinced that such a formation, with the choice to have them actively exploring a situation, contributes to the production of protagonists who will feel as normal and rational to participate in open debates about innovations and consequences.

As for mathematics, the development of a positive (non-criticist, while critical) interest for the plurality of practices against the hierarchy with 'pure mathematics' and the certainty of mathematical proof at the summit is highly promising. Indeed the 'mathematisation' of non mathematical problems, that is the practice of modeling, is one of the great 'science and society' problems, as models usually claim the authority of both empirical data and mathematics. The need for a specific and critical formation in the 'art of modeling' is today generally recognised, but it needs a firm grasp on the meaning, scope and conditions of proof only interested mathematicians can provide, and it also needs the virtues of diplomatic lucidity in order to resist blind pragmatism, irony or relativism when dealing with the uses and misuses of models. Both at secondary school level, and at University level, the IAP network has initiated decisive progress in the needed culture of mathematics, the plural being here emphatically emphasised.

Finally, we want to underline the fecundity of one aspect of the 'gathering around things' approach as proposed by Bruno Latour. Such a gathering excludes appropriation, as the thing is that which must situate the many relevant approaches and cannot be used as an argument by one of them. But it also, and maybe more surprisingly, opposes criticism and denunciation, as they come from a transcendent, non situated or judging position. This was highly important for both our themes.

In the 'GMO' theme, we could associate a researcher closely linked with activist groups of civil society as Sébastien Denys, without divided loyalty, because we would take him right away as a relevant protagonist, whose experience was part of the situation as academic interests were part of it, whose political opposition against the GMOs was all the more relevant because without such an opposition GMOs would probably not have become interesting for us. Denys' testimony about how political stance 'against' entailed a learning trajectory about the GMO security procedures is all the more interesting because the transition from denunciation to learning does not mean forgetting political opposition but making it more inventive and challenging, becoming part of what we have come to call the 'GMO event'.

In the 'correlatable human', the temptation of denunciation concerned privacy and objectification of lived experience, the defenders of which would be law and ethics. Resisting it demanded putting at risk what we mean by privacy and lived experience, but it did not entail a relativistic position. On the contrary the historical transformation we are bound to experiment as we all become correlatable was more precisely analyzed, for instance distinguishing between the virtual reality of asignificant multiple correlations (with the problem of who owns them) and what should certainly be regulated, that is the actualisation of some correlations, their 'becoming significant' and producing new stratified human identities. We do not thereby fall back into the classical opposition between a (correlations producing) technique which would be neutral and its social use, as it is at the very level of the technique that we can detect the transformation. As for the smooth space of correlations as such, we see it not as innocent but as rich of many questions and insights (including the questions of 'individual recognition' and 'individual memory'), and as such a matrix for new tales, risks and problems playing again the question of identity in the dense entanglement of sciences, techniques and cultures: not something to denounce ; certainly something to pay attention to.

This last conclusion may also figure as a common feature of our scientific approach through non-representational knowledge. Representational knowledge, with appropriative definitions, entails focusing on situations as if they were already stabilised and stabilised in such a way that they confirm the relevance and power of already stabilised categories and definitions. Gathering around (new, problematic) things we focus on the construction of situations, and actively take into account the eventual responsibility of using those categories and definitions as they may occult the entangled stabilisation process, and may even be unwittingly part of it. The 'hard friction' environment the IAP network provides is testing indeed: it leads us away from the power to judge and denounce to the art of paying attention. So-called 'soft' sciences stop dreaming becoming 'hard'. They must be soft, that is supple, in order not to erase novelty in the making in the name of the already made. Inversely, the 'hard' sciences should 'soften up', reappraising their solidity as a result of a complex stabilisation process.

3. NETWORKING

3.1. Joint activities

3.1.1. Network meetings

Up to now we organised *9 general network meetings*: these meetings mainly focus on a specific substantial issue, but always also foresee a short chapter on questions of organisation and administration of the network. During our network meetings we always focus on research-on-tracks presentations by IAP researchers of different teams. Average participation is high (around 15), and mostly all the teams (of course including the European partner) are well represented. These meetings are quintessential to our project as they represent intense moments of both confrontation, controversy and mutual interest, and of self-evaluation and planning. They are the thumping heart of the network.

28th February 2002, at the VUB: the making of our *website imbroglio.be*

14th September 2002, at the VUB: presentation of the different *workpackages* and cross-fertilisation

5th February 2003, at the ULB, around Isabelle Stengers' *Cosmopolitiques*

23rd May 2003, at the UG, about *correlated humans*

17th December 2003, at the ULB, about *GMOs*

31st January 2004, at the ULB, working with *imbroglio.be*

4th June 2004, at the CSI in Paris, about the *exploration of scientific controversies*

16th December 2004, in Rotterdam, about the *correlatable/detectable humans*

23th June 2005, at the VUB, brainstorming about and finalizing this *overview document*

Agenda's and minutes of these meetings are annexed to the yearly progress reports and can be found on the imbroglio weblog. Most written presentations held during these meetings are posted and sometimes commented on www.imbroglio.be

3.1.2 (Co-)organisation of international workshops, colloquia, symposia by our network (cf. infra 4.2.2.2.)

Our network organised the well attended international colloquium *Testing expertise* on Thursday, October 21, 2004 at the Vrije Universiteit Brussel. The programme of this colloquium can be found in Annex 7 of the 2004 Progress Report and at: <http://www.imbroglio.be/seminar.html>. During this colloquium, first IAP-research results were presented by: Bruno Latour, Sébastien Denys, Nathalie Trussart, Serge Gutwirth, Mireille Hildebrandt, Dani De Waele and Valérie Smet, Laurent De Sutter, Marc Mormont, Jean Paul Van Bendegem Hans Comijn and Karen François, and Isabelle Stengers.

Our network was also involved in the realisation of *Making things public. Atmospheres of democracy* (2005) exhibition at the ZKM in Karlsruhe especially through the work of Latour. The impact of our IAP on this exhibition and its catalogue is described above in the summary report of WP3 (Cf. <http://makingthingspublic.zkm.de/>)

On October 4th, 2005, a IAP/GEC_o international encounter will be held at the ULB, on the subject **Quels savoirs pour l'altermondialisme ?**, and will interrogate the possible transformation of our production of knowledge at a time when the general theme of progress appears as no longer able to federate and pacify our perspectives.

In 2006 our network will co-organise with the Belgian section of the International Association for Legal Theory (IVR), a monthly series of 12 seminars around the question generated by our

network's work: **Is legal theory a practice ?**. Laurent De Sutter is in charge and has already obtained the participation of Peter Fitzpatrick (Bierbeck College, London), Juha Karu (Univ. of Lapland, Finland), Alain Papaux (Univ. of Lausanne), Frédéric Audren (ENSMP, Paris), Benoît Frydman (ULB), François Ost (FUSL), Mark Van Hoecke (KUB), Olivier Cayla (EHESS, Paris), Michel Troper (Univ. Paris X) and the IAP-networkers Serge Gutwirth, Bruno Latour and Isabelle Stengers..

In april 2006, our network will organise a one-day congress devoted to the theme **Experimental Politics** at the Ecole des Mines (Paris, France). This congress is in the hands of Laurent De Sutter and Dominique Linhardt (Ecole des Mines), and will feature IAP members Bruno Latour, Isabelle Stengers, Nathalie Trussart, Noortje Marres and Laurent De Sutter.

3.1.3. IAP-research seminars organised at the VUB

All researchers and promoters of all the teams participating in the network are invited. Often, external researchers do participate as well. These seminars are rather informal brainstorms initiated by a speaker. Agenda's, reports, comments and personal memories are posted on www.imbroglio.be in the weblog. These seminars are well attended (8-15 persons) and became a forum of sustained communication and mutual curiosity where time is made to discuss things in depth. One could say that these seminars have 'made the mayonnaise grip'.

Preliminaries:

May till July 2002 : weekly meetings for the VUB-staff exchange perspectives on the themes of the project, explaining the intellectual background and possible contributions from all the members of the VUB staff.

October 2002 till January 2003: weekly sessions for the pre-docs of the VUB. The meetings cultivated a Socratic discussion - initiated and facilitated by Mireille Hildebrandt - of several texts of Gutwirth, Latour, Stengers and Callon, Lascombes and Barthe, plus two detailed presentations of De Sadeleer on the legal aspects of GMOs and intellectual rights.

The seminars (mostly 2-3 hours afternoon sessions)

May 17th 2002: **Nicolas de Sadeleer** (LSTS-VUB, FUSL) *Précaution et sciences*

February 13th 2003: **Mireille Hildebrandt** (LSTS-VUB and Erasmus Rotterdam), *Science in Court: Expert Evidence and the Attribution of Causality*,

March 13th 2003: **Valerie Smet** (Universiteit Gent), *The Van San Case: Social Science and Policy*,

March 27th 2003: Discussion of the concept of *The correlated human* lead by **Serge Gutwirth** (LSTS-VUB)

April 10th April 24th & April 26th 2003: **Daniel de Beer** (LSTS-VUB), *Sciences du vivant et brevet: histoire et état des lieux*,

May 22nd, 2003: **Prof. Em. Boehm** (Universiteit Gent), *On an Interesting Subject*,

June 5th 2003: **Laurent De Sutter** (LSTS-VUB), *Que dire, que faire, que penser sans faiblir? Petit répertoire inquiet des doutes et scrupules générés par la recherche en droit* (text available in the Tree of questions on *imbroglio.be*)

June 19th 2003: **Karen François and Hans Comijn** (CLWF-VUB, LSTS-VUB) on *Philosophy of Mathematics*.

September 11th 2003: **Nathalie Trussart** (Université Libre de Bruxelles): *Dispositifs de savoir/pouvoir et multiples modes d'existence du gène: la construction d'un devenir-héritier de Michel Foucault*,

September 25th 2003: **Robby Berloznik** (ViWTA), *ViWTA and GMOs*,

October 7th 2003: **Nicolas De Sadeleer** (LSTS-VUB-FUSL), *Legal Aspects of GMOs*,

October 9th 2003: **Dani De Waele** (Universiteit Gent), *Preceding and current 'positions and responsibilities' of a post-geneticist regarding the biotechnology debate: sketch of an experiencing and thinking process. Or: The very regrettable unappetizingness of GMO-Food debates*.

November 13th 2003: **Virginie Gimbert** (ENS-Cachan, France), *Le politique à l'épreuve des risques sanitaires*.

December 11th 2003: **Laurent De Sutter** (LSTS-VUB), *In the Name of What: A Few Reasons to Allow a Lawyer to Speak about Representation when Representation Is Challenged by Criticisms Coming from Those Who Think that We Could Do Better*.

January 19th 2004: **Jean Paul Van Bendegem** (CLWF-VUB, LSTS-VUB), *'Feyerabend: We still need the medicine'*. (Plus a discussion concerning the possibility of contributions to be presented at the 4S/EASST congress on 'Public Proofs, Sciences, Technology and Democracy')

February 16th 2004: **Marc Van Montagu** (Plant Genetic Systems), *'The GMO Challenge'*.

March 1st 2004: **Sigrid Sterckx** (Universiteit Gent), *'The Ethics of Patenting, with Particular Attention to GMO Patents'*.

March 15th 2004: **Wendel Trio** (Greenpeace Belgium), *'Engineering and Patenting of Plant Varieties: A Threat to Food Security'*.

May 3rd 2004: **Christophe Bonneuil** (INRA – Paris), « *Tensions épistémiques et rôle des 'profanes' dans la construction scientifique des risques potentiels des OGM* ».

May 4th 2004: **Pierre-Benoît Joly** (INRA – Paris), « *Les brevets et le vivant: l'impossible compromis ?* »

May 10th 2004: **William Moens** (Belgian Biosafety Council), *'Molecular Characterisation of the Genetic Maps of Commercial Genetically Modified Plants'*.

May 17th 2004: **Claire Marris** (INRA – Paris), « *Approches sociologiques de la perception de la science et du risque par le public* ».

June 7th 2004: **Sébastien Denys** (Université Libre de Bruxelles), '*The Belgian Assessment Process of the Bayer Canola*'.

September 28th 2004: **Nicolas de Sadeleer** (FUSL/LSTS-VUB), '*Last Developments/Debates about the Precautionary Principle*'.

October 7th 2004: **Hans Comijn** (CLWF-VUB, LSTS-VUB) presents his researches on Bloor and Latour.

December 2nd 2004: **Erik de Caluwé** (Brussels Bar), '*Bone Scans in a Judicial Setting*'.

December 9th 2004: **Hilary Rose** (City University – London), '*DNA databanks: Mapping the Construction of a Technological Imperative*'.

January 20th 2005: Interactive seminar lead by **Isabelle Stengers** (Université Libre de Bruxelles) on '*Correlated human*'.

January 21st 2005: **Willem Halfman** (Twente University), '*Science /Policy Boundaries: Changing Divisions of Labour in Expert Policy Advice*'.

January 27th 2005: **Marion Jacot-Descombes** (Université Libre de Bruxelles): « *La double vie du jugement: solution d'un problème singulier et lettre décrétable ?* »

February 3rd 2005: **Jan Fermon** (Brussels Bar), '*Terrorist Labelling*'.

February 17th 2005: **Rhiannon Williams** (Institute of European Studies, VUB), '*Access to Documentation Concerning the Drafting of European GMO Legislation: Not in the Public Interest?*'

March 3, 2005: **Ana Canhoto and James Backhouse** (London School of Economics): '*The social construction of a money laundering profile: a semantic analysis of ontological dependencies and their implication for information systems design in financial services*'

March 11, 2005: **Sheila Jasanoff** (Pforzheimer Professor of Science and Technology Studies at the J.F. Kennedy School of Government at *Harvard University*) on *Epistemic Citizenship*

April 7, 2005: **Séverine Dussolier**, (juriste et Maître de conférence aux Facultés Universitaires Notre Dame de la Paix à Namur, CRID, responsable du Département 'Droits Intellectuels'): 'Droit d'auteur et partage du savoir'

(of course, to be continued ...)

3.1.4. Internal working groups

During the network meeting of December 17, 2003 it has been decided to install four working groups inside the IAP, with the expectance to stimulate cross-publication and cross-

fertilisation. These working groups did not comprise all the members of the IAP. They were expected to meet independently and produce co-signed working papers as a starting point. (see annual report 2003). Only two of these working groups really did take off.

The first group, lead by Daniel de Beer (VUB), started from Daniel de Beer's research on the European policy towards GMO'S. Six people worked inside this group which had 7 meetings: Isabelle Stengers (WP 1, 2 and 4), Jean-Claude Grégoire (WP 1 and 4), Nathalie Trussart (WP 1 and 2), Sébastien Denys (WP 1), François Mélard (WP 4 and 5) and Daniel de Beer (WP 7). The cross-fertilisation was very important, with regard to individual work (interdisciplinary contribution) and to a future cross-publication around several different aspects of the GMOs issue. This group is very concretely working towards the publication of a (IAP) book, namely: D. De Beer, S. Denys, J.-C. Gregoire, F. Mélard, I. Stengers and N. Trussart, *L'événement OGM*.

The second working group focuses on correlated (correlatable, traceable, detectable) humans and works on several papers and publications. It is actively involved in the EU FIDIS-Network of Excellence, where the VUB takes the lead on profiling technologies (based on data mining for correlations). This working group involves researchers from the VUB the ULB, U.Gent and Paris (Hildebrandt, François, Gutwirth, Van Bendegem, Stengers, Trussart, De Waele and Marres); it prepared the Rotterdam network meeting in December on correlated humans and is heavily involved in the production of FIDIS deliverables. This group will, together with the FIDIS-network, organise an international colloquium on profiling and correlatable humans in 2006.

Another working group has spontaneously emerged as a result of the discussions about Bruno Latour's book on the French Conseil d'Etat, *La fabrique du droit* and the article Laurent De Sutter and Serge Gutwirth wrote about this book in *Droit & Société*. This group consisting of Bruno Latour, Laurent De Sutter, Serge Gutwirth, Mireille Hildebrandt Daniel De Beer, Bas Schotel, Wim Schreurs, Isabelle Stengers and Nathalie Trussart has held one round-table on February 5, 2004, but did not stop discussing the issues on the the imbroglio.be website (both in the 'tree' and in the 'weblog'). It are the exchanges in this working group that have lead Laurent De Sutter and Fr. Audren (CSI) to make the special issue of *Cosmopolitiques* about *Pratiques cosmopolitiques du droit*. This group also has inspired Laurent de Sutter to propose the theme 'Is legal theory a practice' as the theme for the next year's international seminar of the IAP and the Belgian section of the International Association for Legal Theory (IVR) (supra). This group is also feeding Isabelle Stengers' writing of her forthcoming book *Penser les pratiques*.

3.2. Added value gained through network activities (versus individual team results)

This general question, addressed to all networks, sounds a bit paradoxical in our case, as the hypothesis that there would be an added value, i.e. that researchers of different, usually disconnected fields would benefit working together, was the very aim of the network. Hence, for us, the added value of the network is a redundant issue: the work that we have done e.g. on issues like the GMOs, the correlatable human, correlations, genetic correlations, the testing of expertise and public proofs, the legal practice, the practice of legal theory, the exploration of controversies, ... would simply not have been done without the network.

However it is possible to comment on one aspect of this achievement, that is the working answer we can now oppose to the idea that there would be a tension between being a specialist and being able to take a wider view and becoming an interdisciplinary generalist. What we have experimented may be called an 'ecological' process of creating and exploring links, and this process involves no generality. On the contrary, all those who have actively participated agree to the conclusion that in a way they have become 'better specialists'. That is specialists able to actively situate the constraints and specificity of their field, becoming aware that what they usually take for granted is not taken for granted by others. But better also because this awareness does not have for its effect a critical estrangement but a new lucid loyalty with a regain of appetite and the production of innovating questions and perspectives.

This experimentation has interesting implications as it may indicate that mutually taking seriously what counts for other researchers and even other publics, will precisely lead to the fabrication of qualitatively stronger and more trustable knowledge, both from the point of view of scientific robustness and of its democratic/constitutional (participatory) legitimacy. In other words there is no contradiction between two sets of demanding constraints : on the one hand we take seriously the scientific challenge to provide for resisting/hard scientific knowledge, for black boxes, for an exploration of the possibilities pertaining to the issues at stake (which must be 'opened up' in response of the 'perplexities' they spawn) and on the hand this production of bounds, agreement and contrasts, which are the conditions for any democratic decision making.

Moreover, the involvement of explicitly engaged researchers (e.g. Sébastien Denys), who are networked far outside the sciences in civil society movements as well as active engaged participants into the issues we deal with (e.g. the seminars on GMOs both by Wendel Trio, the Greenpeace campaign director, and Marc Van Montagu of *Plant Genetic Systems*) have confronted us with the different views of players in the field.

Finally, the network widened further through the experiences on scientific controversies launched and undertaken at educational level, at the ULB with the students in agricultural sciences, at the Ecole des Mines with engineering students and the 'Integrated exercises on environmental issues' at the FUL.

In other words: *our research would not exist without the network*. We could not reach any of our goals without the bonds and possibilities of our cooperation. The network and its internal diversity are the precondition of this research, which precisely tries to (re)think and experiment sound knowledge production beyond the postulate of partition, whereby science is limited to establishing 'facts', on the basis of which political deliberation is responsible for determining 'values'. By focussing on interdisciplinary, interuniversity, extradisciplinary network activities we take seriously the dynamic entanglements between science ('nature'), politics and society ('culture').

3.3. Circulation of information within the network

Of course, the general IAP-network meetings (supra 3.1.1.), the IAP events we organised (supra 3.1.2.), the IAP-seminar at the VUB (3.1.3) and the sessions of the working groups established (3.1.4) must be considered and crucial moments of face to face exchanges and circulation of information and of collaboration. As a result of their rather high frequency, the

researchers of the network developed rather intense informal bonds, helping each through the sometimes complex meanders of their respective disciplines.

Next to this we developed a powerful webtool for the exchange, the circulation but also for the common discussion and creation of information: our network's interactive website *imbroglio.be*.

Imbroglia.be has two parts:

1. The *Tree of questions* is aiming at the publication of 'stabilised' texts, opening up for discussion ('Comments') or for follow-up (new related questions). The idea of using 'questions' as headers aims at waking up the interest of others for the texts and to show how some questions in one discipline might generate other question in other disciplines. There is also the possibility to post 'homeless' texts without preliminary questions. In order to enter: click 'Tree of questions' or 'read' (under 'Tree of questions').

2. The *Weblog* is aiming at communication, information and on the spot discussions amongst the IAP-members. It organises shorter and less formal exchange of thoughts, links and agenda-items.

Both the *Tree* and the *Weblog* are functioning as *agora* of collective experimentation; sometimes they give rise to hectic discussions amongst researchers from different disciplines.

Imbroglia.be also recently provide a calendar which allows all IAP-related happenings to be announced in a user-friendly way.

New modifications, aiming at making part of the site (the tree of questions) accessible to the public should be implemented in the next future. We felt the need to keep the site relatively closed as long as we felt the younger researchers were in their beginning learning stage, as this becoming public is a test demanding a trust we feel they now have acquired.

Apart from the website a mailing list (archivemail@userlists.all2all.org) has also been developed that allows the sending of emails to all the researchers of the network. Currently there are 32 subscribers to this mailing list, which is almost daily used for the sending of information to other researchers and the organisation of meetings (etc.). This mailing list system also foresees an automatic archivation of the mails send, which can be consulted by all its subscribers (more info: see <http://userlists.all2all.org/mailman/listinfo/archivemail>)

3.4. Work of the follow-up committee

Our follow-up committee consists of:

5 external members

Prof. W. Callebaut (Konrad Lorenz Institute for Evolution and Cognition Research)

Mr. P. Charlier (Observatoire des migrations - Centre pour l'égalité des chances et la lutte contre le racisme)

Prof. R. Foqué (Centrum voor grondslagenonderzoek van het recht, K.U.Leuven)

Prof. G. Fourez (Facultés Universitaires Namur, Dpt 'Sciences, Philosophies Sociétés' & 'Centre Interfaces')

Prof. Fr. Ost (Vice-Recteur des Facultés Universitaires St.Louis, Faculté de Droit, Séminaire Interdisciplinaire d'Etudes Juridiques, Académie Européenne de Théorie du droit)

Prof. A. Ledent decided to retire because of his age

the promoters of the network

Prof. S. Gutwirth (coordinator)

Prof. J.-C. Grégoire

Prof. Br. Latour
 Prof. Fr. Mélard
 Prof. M. Mormont
 Prof. K. Raes
 Prof. I. Stengers
 Prof. J.P. Van Bendegem, *Promoters*
 the program administrators of the Belgian Science Policy
 Ms. V. Feys
 C. Lejour

The follow-up Committee has met on the 6th of May 2003 (about the annual progress report over 2002) and on the 28th of April 2005 (about the annual progress report over 2004). A meeting (about the annual progress report over 2003) on the 28th of April 2004 had to be cancelled due to unforeseen circumstances. This meeting was, with approval of the Belgian Science Policy, replaced by a written procedure.

4. POSITION OF THE NETWORK

4.1. Cutting-edge research

4.1.1 Scientific highlights of the network and comparison with mainstream (benchmark)

In human sciences or philosophy what counts as highlight is not as clear as in experimental sciences since the very fact of mimicking priority claims and of being recognised as the originator of an innovation recognised by the whole field generally results in the creation of a new school, producing a partial perspective which will be ignored by others. As philosophers of science, starting with Thomas Kuhn, have indicated and still do so, the use of proper names to qualify a subfield, be it in sociology, in the theory of law or in psychology, contrasts in a strong way with the specialised fields of experimental sciences, as the use of proper names signals multiple divergent ways to unify one and the same field, while specialised fields may be related to the specificity of their matter of concern and the corresponding models and instrumentation.

We can however claim that in comparison with mainstream our network produces knowledge the highlighting specificity of which is its robustness, as it is tested by the very 'hard friction' network functioning not to be dependent on the authority of a proper name, that is also on theoretical definitions claiming closed modes of appropriation that demand recognition from their environment. Not to be dependent on theoretical definitions does however not mean 'empiricism', but it may give its strong demanding meaning to 'pragmatism', as it is associated with American pragmatists like William James and John Dewey. Indeed robustness means making explicit that the questions we are exploring are not questions which would be 'disciplinary productions', like, for instance 'do neutrinos have a mass?' or 'is $2 + 2 = 4$?' but shared ones, escaping disciplinary boundaries. It means being explicitly concerned by the way one specialty's concerns impact on others, or make a difference for others, which is the pragmatic definition of verification of a proposition, through the differences it produces.

In order to better situate our specificity, we would recall the now well-known proposition, which can be associated with Ulrich Beck's 'risk society', about the necessity of introducing 'reflexivity' in modern scientific practices against the too simple opposition of scientific/non

scientific. Modern sciences should take into account not only 'objects for knowledge' but also themselves, that is the effects they produce, the problems, risks or error they induce.

Reflexivity does not mean denunciation, identifying or recognising guilt. And it does not mean going back to the source, analysing the foundation of knowledge. It means and demands a concrete practical transformation of scientists in relation with their knowledge. For Beck, such a transformation would have to be imposed on sciences by social pressure, and we may indeed recognise the existence and urgency of such a pressure, with a wide and insistent demand for responsible, accountable scientists. But what Beck could not specify was the way scientific research would react to this pressure, that is also the way scientists would answer it. This is still an unknown, but we may affirm however that our functioning shows that there exists a working possibility for such an answer to be positive, with new research practices promoting scientific robustness and relevance to the publics' concerns.

Indeed what we have experimented may be presented as an example of scientific research accepting the challenge of this pressure, not submitting to it, and discovering the possibility and relevance of what we have called a 'non representational' knowledge (2.2). Here non-representationality does not mean an epistemological interpretation of scientific knowledge in general, but a transformation that demands scientists to think of themselves not as 'representative' of what Joseph Rouse (an important protagonist in the knowledge/power field) calls 'epistemic sovereignty', legitimate as such in the name of a transcendent cause, but as concerned protagonists able to learn from others and with others the meaning and consequences of their own approach. Such a transformation is not a matter of goodwill, or of some kind of omni-competence: its stake is in the habit of being interested in the difference one makes, or that are made in our name.

In French there are two words, *partiel* and *partial*, for what converges in English with one word, partial. How to be 'partiel', without being 'partial', presenting itself as central, rationally decisive, is at stake in reflexivity. And what we have experimented is that this has nothing to do with some kind of an heroic renunciation but may be a factor of creativity, as it produces a better understanding of the risks and obligations attached to what disciplines usually present as normal, taken for granted.

We thus feel that what Ulrich Beck presented as necessary can now, because of our practical network experimentation, be also presented as desirable, producing interested, interesting and innovative researchers. What we initiated is also indicative – and this is what we will now have to study as such – of the necessary processual, collective and interpersonal character of this habit-changing reflexivity.

4.1.2. Perspectives of the network's research domain for the coming 5 and 10 years

Our perspectives are quintuple. What we have achieved now is a demonstration of feasibility and desirability, starting from two shared questions, that is first of all the formation of researchers for whom the network has become both a normal and challenging work environment, a bit like their community is the normal and challenging environment for so-called hard sciences (see 2.2 Main Achievement)

A first perspective is to stabilise and amplify this first achievement. The two issues we have dealt with are open, long term ones, and we are now becoming able to intervene and become important protagonists in the many important debates they will produce in the future. The pre-

doc researchers we are forming will thus be able to produce excellent innovative research, contributing to those important issues, and opening new ones. Some of them already participate in FP6 (FIDIS and SWAMI) and they will be able to enter European networks in the frame of the FP7. Also, we see it as our responsibility, when they will get independent positions in the academic or science policy worlds, to help them continuing the experience, in contact with our network, or enlarging it.

A second perspective is to make our experience and results known as such, which could not be done as long as our young researchers could not be the witnesses in their own name of those results. When we proposed the IAP project, we started with a conviction that had to be confirmed. Part of our work will address with producing the lessons we can draw from what we have learned concerning the possibility of answering the challenge of a reflexive production of science, and this will also be developed with propositions in the frame of the FP7.

A third perspective is related to the meaning of reflexivity as it depends on each domain. Our experience, till now, as it is centered around human sciences, has already concerned two other domains, agronomy and mathematics. This is not a contingent beginning. Mathematicians are concerned with the relation between mathematics and their many involved environments, with the price of a proof, and with proofs that may induce into errors (see the already mentioned 'ecology' of proofs and arguments). As such reflexivity is rather traditionally a mathematician's concern. As for agronomy, since it aims at producing results that should be relevant for non scientific (agricultural and others) practices, the need for learning to think about consequences, and the kind of difference one makes, and to work together with others explains the interest and support by the ULB Bioengineering Department to our 'séminaire de controverses'. But we feel that this cannot be generalised, as with every science, the relevance of reflexivity and its impact has to be produced. It may be that the coming problem of nanotechnology will be an opportunity for physics. It may be that the field of biomathematics including game-theoretical approaches to model stable evolutionary strategies and biological computational systems will be equally an opportunity for biology. More generally, the question of mathematical modelling will be of great interest here. It is our aim from this perspective to explore such possibilities.

A fourth perspective is enlarging our research to other human sciences issues. One of the major issues concerns the questions raised by political ecology and political economy as indicated by Bruno Latour:¹⁰ how to move beyond simplistic econometric representations of our common world while rethinking the nature of consumption goods, the forces of the financial markets or the interest of marketing. Another issue may be 'science at school' as it is already initiated with 'mathematics at school'. We see the possibility of approaching the delicate problem of 'biological evolution' facing the multicultural school challenge (a student of Isabelle Stengers has already proposed this subject to the Belgian FNRS). We also feel the gender issue to be an appropriate field in which reflexivity has already been developed under the name of 'standpoint'. Other directions may be pursued, which will mean new pre-doc students and active connections with other research groups.

A fifth perspective is to have 'another look' at the hard sciences, after having made a full circle a first time: we started out with the 'hard' sciences in the background both as source of inspiration and as the classical model of 'a knowledge producing machine', that heavily

¹⁰ Latour, B. (2002). "Cosmopolitiques, quels chantiers?", *Cosmopolitiques: La nature n'est plus ce qu'elle était* (1), p. 25 (Chantier 8 and 9).

impacts a community. Understanding the functions and workings of the machine, understanding how it relates to all those connected in one way or another to the machine, is one of the primary objectives of the project in its first stage. In a follow-up stage it is a challenging task to return in a sense to the 'hard' sciences *as a community of research* ourselves and see what the interactions produce.

4.1.3. National and international recognition of the network

We have here to make the distinction between the promoters' recognition (for instance Bruno Latour and Isabelle Stengers can submit a very long list of prestigious invitations and participations, which is also the case, but more modestly, for senior researchers as Nicolas De Sadeleer, Jean-Claude Gregoire, Serge Gutwirth, Mireille Hildebrandt, François Mélard, Marc Mormont and Koen Raes) and the recognition gained by our network as such. Its growing recognition is shown by invitations to give lectures and to participate into projects (see infra). Of course, this is also shown by the results we submit in other parts of this overview document (publications, networks, international activities, and so on) and in our three progress reports (see: www.imbroglio.be)

We can explicitly list the following elements (not exhaustive)

- our international colloquium *Testing expertise*, where we presented our work, on Thursday, October 21, 2004 at the Vrije Universiteit Brussel was well attended and attracted researchers from different European countries as well as representatives of technology assessment bodies and the EU-science policy;
- Also it is after attending to the meeting 'Testing expertise' that Nicole Dewandre, Head of Unit 'Scientific advice and governance', DG Research, invited Isabelle Stengers to deliver a key-note speech in the *European Science and Society Forum* in Brussels on March 9-11 (text on the Tree of question and on http://europa.eu.int/comm/research/conferences/2005/forum2005/docs/session2_stengers_fr.pdf).
- we were very strongly represented at the joint 4S-EASST World Congress on *Public Proof, Science, Technology and Democracy*, in Paris 25th –28th August 2004 (see: <http://www.csi.enscm.fr/csi/4S/index.php?page=accueil>). N. Trussart co-organised a session '*When socio-technical controversies challenge the role of responsibility in democracy*' and we presented 4 papers in the different sessions (Denys/De Waele/Trussart, Mélard, Comijn/François/Van Bendegem, Hildebrandt/Gutwirth/Schreurs);
- in the FP6 Network of Excellence *The future of identity in information society* (FIDIS), as already mentioned, Hildebrandt and Gutwirth are the coordinator/leaders of the workpackage 'Profiling: implications for privacy and security', which indeed refers to the IAP transversal topic of the 'correlatable humans'. This implies a recognition of our excellence in these matters (at least by the 25 European partners of this network) .
- our IAP-seminar at the VUB has attracted famous scientists (from INRA, Harvard, London School of economics ...) (supra sub 3.1.3).
- Sébastien Denys has organised a session at the conference "*Evolution du droit international européen et belge*" organised by DG « Environnement du SPF Santé Publique, Sécurité de la chaîne alimentaire et Environnement ». Brussels, 30 November 2004. He has presented two papers at the Congrès trisannuel de l'Association Belge de Science Politique (ABSP-CF) in April 2005. One at the workshop « Action publique: L'expertise et la participation au cœur de l'action publique » analysed public information as "A open door on the expertise". Another paper called "To engage GM in a democratic and scientific innovation " has been presented at the workshop « Evolution des formes d'engagement public

...

4.2. International role

4.2.1. Collaboration with the European partner: the CSI-Paris

The integration of the *Centre the sociologie de l'innovation* (Ecole des Mines, Paris) in our network is all but a problem. Bruno Latour and his team have shown to be very actively involved in the research and have had a decisive impact on some aspects of the research, such as :

- the (web)exploration of controversies
- the (re)thinking of the legal practice and legal theory
- the sociology of sciences dimension of our research
- the (re)thinking of politics
- and especially the interactive participation to our action research through meetings, interventions on imbrogio.be, presentations and writings

IAP publications involving the CSI can be found in the list of publications (e.g. *Making things public* and *Cosmopolitiques*)

The budget of the CSI has been used to finance the considerable amount of time that Bruno Latour has put in the IAP, as a well as for the organisation of IAP related events (network meeting in Paris, *Making things public* in Karlsruhe) and working costs (software, travelling) linked to IAP-activities. A significant amount of work has been put by Noortje Marres and Christelle Gramaglia on the design of scientific controversy platforms.

4.2.2. International activities

4.2.2.1. Participation in European and international research projects

Vrije Universiteit Brussel

The LSTS is a partner in

- the FP6 Network of Excellence *The future of identity in information society* (FIDIS) (participation of Hildebrandt, Gutwirth, Schreurs, Van Bendegem, François all also IAP-members). Hildebrandt and Gutwirth are the coordinators of the workpackage 'Profiling: implications for privacy and security'. The topic of profiling correlates well with the topic of correlatable humans (WP 8), but the interdisciplinary nature (legal, technological, information science perspectives) make the exchange within FIDIS a fertile play ground for studying the relationship between law and science from the perspective of the relational theory of law.
- the FP6 Specific Support Action (SSA) *Safeguards in a world of ambient intelligence* (SWAMI). Gutwirth is promoter of the LSTS-VUB participation in this network; Wim Schreurs and Michiel Verlinden are the researchers. This project is closely linked to the issue of the traceable, correlatable or detectable human as it focuses on a prospective but highly relevant application field (namely *Ambient Intelligence*).
- the FP6 Integrated Project *Reflexive Governance in the Public Interest* (REFGOV)-Subnetwork: *Fundamental Rights Governance* (approved but still to be started up: promotor Gutwirth (LSTS) and Bart De Schutter (Institute of European Studies). Gutwirth is the promoter of 8 ongoing Ph.D.-researches and succesfully completed 2 as a co-promoter

The CLWF is a partner in

- the International Research Community, funded by the Flemish Fund of Scientific Research (FWO-Vlaanderen), 'Philosophy of Science and History of Science of the Pedagogical Sciences'. Dr. Kathleen Coessens, member of the CLWF, and Jean Paul Van Bendegem play a central role in this community that is supervised by Professor Paul Smeyers of the Catholic University of Louvain. The relation to mathematics education and related issues is obvious.
- the Belgian Society for Logic and Philosophy of Science, directed by Professor Leon Horsten from the Catholic University of Louvain, itself dependent upon the National Center for Research in Logic, directed by Jean Paul Van Bendegem. The aim of the Society is to foster international contacts and exchanges in the field of philosophy of science and logic, thereby providing a necessary input for the IAP-project.
- the above mentioned FIDIS FP6-network.

Van Bendegem is the promoter of 5 ongoing Ph.D.-researches and has successfully completed 11 Ph.D.-theses.

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- Since may 2005 Isabelle Stengers is part of an European DG Research expert group on 'Science and Governance' to help develop a European approach to deal with the complex interactions between science, civil society and policy-making. She has also participated in the reflection by the 'Coordination of the Intermittents du Spectacle', in France, on the status of scientific expertise, and the production of valid expertise by concerned groups.
- Sébastien Denys is member of the Conseil d'Administration of the French Fondation Sciences Citoyennes, which takes a growing part in the French debates about policy of science, and will as such be a partner in international research. Such a nomination is quite significant as it shows the possibility of more open and confident relations between academic researchers and citizens' movements (of which Sébastien Denys is an active protagonist). This may be seen as a direct result of our network successfully working in such a way that no necessary conflict of loyalties exists between research and political commitments, that is pioneering active partnership with ONG, as it is now seen necessary in the European FP7.
- Jean-Claude Grégoire is member of the extended board of IUFRO (International Union of Forestry Research Organizations). He also chairs IUFRO Working Party S7.03.05 (Integrated Control of Scolytid Bark Beetles). He is one of the founding members of COST Action E16, "Bark- and Wood-Boring Insects Attacking Living Trees". He has recently been working as consultant for a range of foreign funding organizations [e.g. the Wiener Wissenschafts-, Forschungs- und Technologiefonds (WWTF), The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS), etc], and for research organizations (e.g. the Swedish Agricultural University, Uppsala; British Forestry Commission, Forest Research Agency, Tree Health Division)
- Marius Gilbert has been recently elected Deputy Chair of IUFRO Working Party 7.03.07 (Population Dynamics of Forest Insects). He also is a FAO consultant for Avian Flu in Thailand.

Centre de Sociologie de l'Innovation

The list of international contacts and projects in which the CSI and Bruno Latour are involved is too long to enumerate: in the fields of sciences studies and technical democracy the CSI is one of the most known European centres abroad . There are links with all important research centres working in these fields, and in particular with Maastricht (W. Bijker), Brunel (Steve Woolgar), Cornell (T. Pinch), Edinburg (Don Mackenzie), Munchen (Ulrich Beck) and Harvard (S. Jasanof). In addition we have been working for the IAP with the newly created Forshung Gallery in Vienna, with the Govcom group in Amsterdam and the ZKM centre in

Karlsruhe. Gramaglia and Latour have completed a European wide research on governance and ecology for the CNRS which has resulted in a lengthy report comparing case studies throughout Europe mainly around water issues.

4.2.2.2. Organisation of international symposia (cf. supra 3.1.2)

Our network organised the well attended international colloquium *Testing expertise* on Thursday, October 21, 2004 at the Vrije Universiteit Brussel. The programme of this colloquium can be found in Annex 7 of the 2004 progress report and at: <http://www.imbrogl.io.be/seminar.html>. During this colloquium, first IAP-research results were presented by: Bruno Latour, Sébastien Denys, Nathalie Trussart, Serge Gutwirth, Mireille Hildebrandt, Dani De Waele and Valérie Smet, Laurent De Sutter, Marc Mormont, Jean Paul Van Bendegem Hans Comijn and Karen François, and Isabelle Stengers

Our network was also closely involved in the organisation and realisation of *Making things public. Atmospheres of democracy* at the ZKM in Karlsruhe especially through the work of Latour. The impact of our IAP on this exhibition and its catalogue is described above in the summary report concerning WP3 (Cf. <http://makingthingspublic.zkm.de/>)

On October 4, 2005, a IAP/GECO international encounter will be held at the ULB, on the subject *Quels savoirs pour l'altermondialisme ?*, and will interrogate the possible transformation of our production of knowledge at a time when the general theme of progress appears as no longer able to federate and pacify our perspectives.

In april 2006, an international congress devoted to the theme *Experimental Politics* will be organised at the Ecole des Mines (Paris, France). This congress is in the hands of Laurent De Sutter and Dominique Linhardt (Ecole des Mines), and will feature IAP members Bruno Latour, Isabelle Stengers, Nathalie Trussart, Noortje Marres and Laurent De Sutter.

4.2.2.3. Invitations to give lectures at prestigious international conferences, seminars colloquia

The following section only provides examples, it is not exhaustive. More elaborated lists of activities can be found in the three progress reports

Nicolas de Sadeleer gave the inaugural lecture at the Academy of Sciences of Finland on 'the impact of the precautionary principle on risk assessment methods' on October 11th, 2004. He also gave a lecture on October 28th, 2004 at the World Bank, Legal Vice Presidency on 'Legal Measures to Protect Biodiversity: Lessons from Europe'. On the 11th January 2005 he gave a lecture on the precautionary principle at the law faculty of Waseda University, Tokyo. With respect to his EU Marie Curie chair, Nicolas de Sadeleer has organised on the 26-27th of May 2005 an international conference at the University of Oslo on Ecological Risks and Precaution in the Nordic Countries

Karen François has been invited to give a lecture on the philosophy of statistics at ICOTS-7, the International Conference on Teaching Statistics, Brazil, 2006. (<http://www.maths.otago.ac.nz/icots7>). She organized the international congress "Mathematics in education", Free University Brussels (in cooperation with CLWF/VUB), 2004. She presented on the topics of her research at several international conferences:

'Mathematics and Politics' at The Conference in Political Theory, 2004, University of Essex, UK; 'Philosophy of Mathematics in education' (together with J.P. Van Bendegem) at the 10th International Congress on Mathematical Education, Denmark; 'Philosophy of mathematics in the curriculum of secondary education' at the ERME (the European Society for Research in Mathematics Education) conference, 2004, Pödebrady, CZ and on the topic of 'Dynamic Ontology of Mathematics' at the Congress Dynamic Ontology, 2004, Faculty of Sociology, Trento University, Italy.

Jean-Claude Gregoire has been an invited speaker and session organiser at the 15th international Plant Protection Congress, Beijing May 11-16, 2004, and an invited discussant at the International meeting on Bioinvasions, Rennes June 31 - July 1, 2005.

Serge Gutwirth also teaches at the Erasmus University Rotterdam; he was invited to give the opening lecture for the academic year 2003-2004 at the European Academy of legal theory (<http://www.legaltheory.net/opening.htm>); he participates (as a promotor and a researcher) into three FP6-networks; he is regularly invited as a keynote speaker during international workshops; ...

Mireille Hildebrandt also teaches legal theory at the Erasmus University of Rotterdam, was invited to take over the course on 'Critical Perspectives on Comparative and European Law' within the LLM Program on International Legal Cooperation at the VUB during 2003-2005, and was invited to the international conference on 'Can Knowledge be Made Just' at the Kulturwissenschaftliches Institut in Essen, Germany.

Bruno Latour teaches at Harvard and the London School of Economics, he is the chair of the 4S- society (Society for Social Studies of Sciences), he gave the opening speech at the joint annual conference of 4S and EASST on *Public proofs* (which he also chaired). He has been an organiser of the 15-17 September 2004C Giorgio Cini Foundation's 'I dialoghi di San Giorgio' in Venice, on the theme 'Atmospheres of freedom. For an ecology of good government'. He is one of the two curators of *Making things public*, he is very regularly invited as a keynote speaker at prestigious scientific gathering; he held the Spinoza Chair, University of Amsterdam, Spring 2005.

François Melard was invited by the Gallery of Research of Vienna (Austrian Academy of Sciences) to take part to the workshop "Picturing Research" (2-4 december 2004). The aim of this workshop was to bring together young scholars from different fields and involved them in reflection on science communication today. The participants discussed new visualization issues as well as novel forms and approaches for communicating current scientific research in the field of Science and Technology Studies to a public of non-scientists.

Marc Mormont was invited to give a lecture on the concept of *dispositif* in a seminar gathering researchers from the Programme Science et Développement Régional. (Paris, INA-PG, 23 janvier 2003). But also : M. MORMONT, *Dialogue local sur l'installation d'un dépôt de déchets faiblement radioactifs*, invited conference Colloque COWAM, Cordoba, Février 2003. ; M. MORMONT, *Pour améliorer l'interface entre science et société*, invited conference, The European Regional Workshop on the Implementation of Article 6 of the United Nations Framework Convention on Climate Change, Le Grand Hornu, 6-8 mai 2003 ; MORMONT, *Conflicting values and interests: How can the method deal with them?* Invited conference Colloque FSC, Brussels, November 2003

Valérie Smet held a presentation on the role of social science for policy at the conference *Sharing Knowledge? Exploring the interfaces between science & society and the role of science communication* organised by the Da Vinci Institute, Centre for science communication & IITO (Institute for Innovation and Transdisciplinary Research), November 1st, Amsterdam. At this conference, she also was a member of the panel in the workshop 'Science and politics', organised by the Rathenau Institute, the Netherlands.

Isabelle Stengers has participated in numerous international encounters as a philosopher, and the list would be irrelevant here. As a promoter of the 'ecology of practices', which is a founding theme of the IAP, she is getting new recognition. Besides her new and growing involvement with the European DG Research, and usual international invitations pertaining to her philosophical activities, has been invited to give the key-note speech of the 'Ecology of practice' Symposium, by the Humanities Research Centre in Canberra, Australia, August 2003. She also gave a key-note speech at the 2nd. Biennial International Havana Complexity Seminar, January 2004, about The Ethics of cross-disciplinary and complexity research. She has also been part of the 15-17 September 2004C Giorgio Cini Foundation's 'I dialoghi di San Giorgio' in Venice, on the theme 'Atmospheres of freedom. For an ecology of good government'.

Jean Paul Van Bendegem is guest professor at Ghent University where he teaches courses related to the philosophy of mathematics and physics. He was invited to talk at the University of Thessaloniki on 'Proof and Demonstration in Educational Mathematics', he also spoke at several colloquia organised by a joint network of the Center for Logic and Philosophy of Science in Ghent, and the Universities of Torun and Zielona Gora in Poland, he was invited to speak at the 'Thought Experiments Rethought' conference, organised by Professor Erik Weber and dr. Tim De Mey of Ghent University. He was also invited for a lecture at the Department of mathematics of the Adam Mickiewicz University of Poznan, Poland on 'The creative growth of mathematics'.

4.3. Durability of the IAP V.16

4.3.1. Scientific justification for continuation of the network in the next IAP phase

As it was already argued in 1.2 and 2.2, our project is just beginning, as it was not 'seasoned teams' associating (with the exception of Bruno Latour's), but seasoned researchers associating to promote what was for each of them a new direction of research they would not have considered without the collaboration of the others. As such, the formation of researchers in this new direction was our first concern and achievement, and our networking team will reach its full functioning only when the pre-doc researchers get free from the task of writing their respective dissertations.

As we can safely foresee those dissertations will exhibit the 'added value' of the network functioning, we may state that we will be able to build on this first phase, in order to amplify, extend and reflect. The practices we have been initiating need learning as such, getting confident, experimenting the challenges and the risks of getting out of protective boundaries. In a way, our scientific production has for its specificity that it concerns not only innovative research results, but also innovation in research practices.

A continuation of the research project may certainly be scientifically justified by the growing interest and open development of the issues it tackled and the quality of the forthcoming work (let us recall that this overview comes at a rather early moment of the first phase), but also because this first phase was really a feasibility phase, producing the demonstration that there is no contradiction in coupling the development of research competence in scientific field and an active, not generalist but creatively reflexive, interest in the ecology of practices upon which our approaches impact. But in order for the fruits to fully mature, it is quite essential that our project gain both in consistency, producing the lessons of the experiment, and in opening, both towards academic departments and towards concerned actors in the Science and Society field. This last point can only be the result of a progressive creation, as the aim of our network is not that of 'diffusion of knowledge', but of production of relevant and active links with 'publics' in John's Dewey meaning of the term, that is not the sociological anonymous one, but the active concerned groups. Sébastien Denys' trajectory as well as Isabelle Stengers involvement with the expertise production by the 'Coordination des Intermittents du Spectacle', in France and the political discussion of the FP7 at the European Parliament, are witnesses of interesting beginning.

We feel however it is only at the second phase that we will be able to fully appear at the European and International level, i.e. with researchers able to participate in European research programs, as well as play a role in the public debates and initiatives pertaining to the roles of science in society.

4.3.2. Possible modifications of the current organisation for the next five years

The current organisation of the project is good, things are running smooth: in the future S. Gutwirth and, now, with LSTS (cf. infra sub 5.4) will continue to assume the responsibility of the coordination of the network. Jean-Paul Van Bendegem will remain co-promoter for the VUB, bringing in the support of his CLWF-group.

A priority for us in the next phase will be the full financing of the FUL-group, who, as we said, participated on a voluntary basis. As the institutional status of this group has changed and it became a part of the *Université de Liège*, ULg) financing will now be possible.

Bruno Latour will continue to participate into the network as a European partner, but as from September on he moves from the CSI-Ecole des Mines to *FNSP Sciences Po* he will operate from this institution in the new phase.

At the ULB, contact with the IGEAT will continue, but Isabelle Stengers will be part of the hoped for continuation of the IAP as head of the GECO group which has been officially recognised since 2004. The GECO (Groupe d'Etudes constructivistes) of which Nathalie Trussart is a founding member, associating researchers who pursue philosophical and cross-disciplinary inquiries on the construction of knowledge, that will contribute to the extension of our group. See <http://dev.ulb.ac.be/geco/>.

As mentioned in the WP3 results, the new Gallery of Research of Vienna, directed by Albena Yaneva, may be an interesting futur partner to our network in order to improve the production of the IAP's outcomes and its visibility; especially towards and with the "general public". In this respect, the gallery may constitute a stimulating platform or forum in order to reflect/communicate on the loyalties of knowledge with a non-scientist public; especially in

relation with WP1 and the use of controversy for pedagogical purposes, with WP4 and the GMO's issue and with WP5 and the elaboration of new modes of collaboration between experts and lay persons.

5. OUTPUT

5.1. The 12 most relevant IAP publications

Logic, Epistemology and the Unity of Science (LEUS), Dov GABBAY, Shahid RAHMAN, John SYMONS and Jean Paul VAN BENDEGEM (Eds.), Volume 1. Dordrecht: Kluwer Academic, 2004.

D. DE BEER, 'Les O.G.M., les délinquants et le juge', *Revue de Droit Pénal et de Criminologie*, La Chartre, sept.-oct. 2004, pp.865-888

N. DE SADELEER & BORN Ch.-H., *Droit international et communautaire de la biodiversité*, Paris, Dalloz, 2004, 770 p.

DE SUTTER, L. & GUTWIRTH, S., "Droit et cosmopolitique. Notes sur la contribution de Bruno Latour à la pensée du droit", *Droit et Société* 56-57, 2004, 259-289.

M. HILDEBRANDT, 'Wetenschap in rechte', *TREMA* 2004 april (*Special Deskundigen in het rechterlijk proces*), p. 187-196

M. HILDEBRANDT, "Citizenship, punishment and the meaning of the 'fair trial'" in: A. DUFF, L. FARMER, S. MARSHALL & V. TADROS (ed.), *The Trial on Trial II. Judgement and Calling to Account*, London: Hart 2005

B. LATOUR (2003), 'Why Has Critique Run Out of Steam ? From Matters of Fact to Matters of Concern', *Critical Inquiry*, *Special issue on the Future of Critique*, (30) n° 2 pp.25-248 (Winter 2003).

Making things public. Atmospheres of democracy, Bruno LATOUR & Peter WEIBEL (eds), Karlsruhe/Cambridge Masschusetts, ZKM-Zentrum für Kunst und Medientechnologie, Karlsruhe/The MIT Press, 2005 (ISBN 0262-12279-0). Cf. <http://makingthingspublic.zkm.de/> In this book, next to an explicit acknowledgement of the IAP, the following explicit IAP-publications are included: the introduction of Bruno LATOUR: 'From Realpolitik to Dingpolitik –How to Make Things Public ?' (cf. <http://www.ensmp.fr/~latour/articles/article/96-DINGPOLITIK2.html>); the two contributions of Noortje MARRES: 'Issues Spark a Public into Being. A Key but Often Forgotten Point of the Lippmann-Dewey Debate' and 'Recipe for Tracing the Fate of Issues and Their Publics on the Web' (with R. Rogers), Isabelle STENGERS' 'The cosmopolitical proposal' (cf. table of contents of making things public: <http://www.ensmp.fr/~latour/livres/MTP-TABLE%20OF%20CONTENTS.html>)

M. MORMONT and F. MELARD, *Conférence citoyenne sur les tests génétiques "Lire dans mes gènes" – Evaluation report*, 2003, Brussels, King Baudouin Foundation's edition.

Pratiques cosmopolitiques du droit, F. AUDREN & L. DE SUTTER (ed.) special issue of *Cosmopolitiques*, nr. 8, Paris, L'Aube, 2004 (with contributions of IAP-members: D. DE BEER, L. DE SUTTER, S. GUTWIRTH, B. LATOUR & I. STENGERS)

I. STENGERS, 'Pour une approche spéculative de l'évolution', part of the two-authors book *L'évolution*, with Pierre Sonigo, Paris, EDP Sciences, 2003.

J.-P. VAN BENDEGEM: 'Can There Be an Alternative Mathematics, Really?'. In: Michael H.G. Hoffmann, Johannes Lenhard & Falk Seeger (eds.), *Activity and Sign. Grounding Mathematics Education*, New York: Springer, 2005, pp. 349-359.

5.2 Forthcoming publications

D. DE BEER, "OMC, la preuve du dispositif pat l'épreuve du sida", 15 p., à paraître dans les *Cahiers d'Anthropologie juridique*

DE BEER D., DENYS S., GREGOIRE J.-C., MELARD F., STENGERS I. & TRUSSART N., *L'événement OGM*, in preparation.

D. DE BEER, S. DENYS & I. STENGERS, "Engager les OGM dans une innovation démocratique et scientifique", *Natures Sciences Sociétés*, forthcoming 2005, 18 p.

DE HERT P. & S. GUTWIRTH, Privacy, data protection and law enforcement. Opacity of the individual and transparency of power (30 p.) to be published in E. Claes, A. Duff & S. Gutwirth (eds.), *Privacy and the criminal law*, Brussels, Intersentia, 2005

DE WAELE, D. 'Hegel en biotechnologie: Een 'monologue intérieur' over Wetenschap, Technologie en Kapitalisme', for *Ethiek en Maatschappij*, foreseen 2006

FRANÇOIS (K.) and DE SUTTER (L.), 'When Mathematics Becomes Political: Representation and the Logical Truth', to be published in *Philosophica*, September 2005.

FRANÇOIS (K.) and VAN BENDEGEM (J.P.) eds. (to appear in 2006) *Mathematics in education. Is there room for a philosophy of mathematics in school practice?*, Kluwer Academic Publishers.

M. HILDEBRANDT, 'Are profiles justiciable?', in N. STEHR (ed.), *Can Knowledge be Made Just?*, New Brunswick, New Jersey: Transaction Books, 2006

M. HILDEBRANDT,, 'Profiling and the Identity of European Citizens', in: Mireille Hildebrandt (ed.) FIDIS deliverable 7.4, *Implications of profiling practices on democracy and rule of law*, www.fidis.net

S. GUTWIRTH & P. DE HERT, 'Privacy and Data Protection in a Democratic Constitutional State', in: Mireille Hildebrandt (ed.) FIDIS deliverable 7.4, *Implications of profiling practices on democracy and rule of law*, www.fidis.net

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I. STENGERS, *Penser les pratiques: engagements politiques et philosophiques* (provisional title), to be published with 'Les empêcheurs de penser en rond', Paris.

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5.3. Appeal of the IAP

Activities performed to improve the visibility of the network:

- we have created and developed a website (www.imbroglio.be) with a large public section;
- we participated very actively to the editing and writing of *Partiques cosmopolitiques du droit*, a special issue of the *Cosmopolitiques* review which is largely read.
- Sébastien Denys has become part of the Conseil d'Administration of the Fondation Science citoyenne, in Paris, and is involved in research projects which will produce and confirm cooperation of our group with this Fondation (i.e. a project in discussion with Greenpeace)
- Nathalie Trussart has become a member of the editorial committee of the political philosophy review 'Multitudes, in Paris, and is co-ordinating a special number devoted to "Expérimentation(s) Politique(s)" (forthcoming Autumn 2005), to which IAP and GECO's members participate (Daniel de Beer, Isabelle Stengers).
- cf. supra sub 4.1.3.

New marks of interest for the IAP or the partners (scientific collaboration, valorisation, ...):

- We got interest from an important number of scientific personalities who came to speak in our seminar and attend to our colloquium.
- We have already noted the interest of Nicole Dewandre, Head of Unit 'Scientific advice and governance', DG Research, and Isabelle Stengers being now part of the expert group 'science and governance'.
- Isabelle Stengers got in 2004 the 'palmes' of Interenvironnement-Wallonie for her contributions to the ecology of practices.
- Isabelle Stengers gave a keynote speech to the *Green/Efa conference and debate on the 7th Framework Programme 'What Science - What Europe ?'*, European Parliament, 2-3 May 2005.
- Laurent De Sutter has been appointed first secretary of the Belgian section of the European Association for Legal Theory (IVR), as a result of the interest of the IVR authorities for his work in this IAP, especially WP6.
- Nathalie Trussart has been invited to participate to a workshop in philosophy of biology - "New Issues in Philosophy of biology. New perspectives for philosophy of science" - organized by the group of research EGENIS (ESRC Centre for genomics in society, University of Exeter, UK, 24-28 May 2005, <http://www.centres.ex.ac.uk/egenis>). She has been chosen on the basis of her thesis

work characterized by the interdisciplinary dimension the IAP network and that the EGENIS research group attempts also to develop

- François Mélard has been invited by the Gallery of Research in Vienna as a scientific collaborator (december 2004 & june 2005) in order to evaluate or promote projects that link in novel ways scientific practices and their results with the public (picturing research, mapping controversies,...).

- Marc Mormont is member of the scientific working group in charge of defining rules and guidelines for research in partnership with social actors (2004-2005)

- Sébastien Denys has been engaged in several initiatives from civil society. He has participated in October 2004 at London at the launch of an the European Science Social Forum Network, which is a platform that works to get a model of scientific and technological progress in a society committed to solidarity, sustainability and fairness. He has been invited in April 2005 at Paris for the Roundtable of the association Inf'OGM and had been requested for an editorial (Sébastien Denys, Laurent Jacob, « Vers un nouveau moratoire ? » Point de vue du bulletin *Inf'OGM*, n°63 - Avril 2005, available on <http://www.infogm.org/>) He has also participated in a process of evaluation and proposition making in the frame of the setting up of the public debate about nanotechnology requested by Communauté d'Agglomération Grenoble, Alpe, Métropole (METRO).

(...)

5.4. PhD and postdoc training

5.4.1. Numbers and information

There are 9 Ph.D projects which are directly or indirectly linked to the IAP project:

Hans Comijn's Ph.D. proposal *A sociology of mathematics* has been approved by the Doctoral Committee of the Faculty of Arts and Letters. This committee organises a yearly evaluation (on the basis of a personal report and an evaluation report of the promotor) to determine whether the student can continue his or her Ph.D. work. So far all evaluations have been positive.

Daniel De Beer's PhD proposal *Le brevet et le dispositif dans lequel il s'enchâsse, forteresse et machine de guerre, ou institution juridique perfectible?* (see annex 9 to the Annual Progress Report 2004, www.imbrogio.be) has been approved by the Council of the Faculty of Law of the Vrije Universiteit Brussel, which constituted its follow-up committee as follows: Prof. Serge Gutwirth (promoter, VUB), Prof. Isabelle Stengers (ULB) and Prof. Fabienne Brison (VUB)

Laurent De Sutter's PhD proposal *Cosmopolitique de la représentation. Etude sur la construction juridique du public* (see annex 8 to the Annual Progress Report 2004, www.imbrogio.be) has been approved by the Council of the Faculty of Law of the Vrije Universiteit Brussel, which constituted its follow-up committee as follows: Prof. Serge Gutwirth (promoter, VUB), Prof. François Ost (Facultés Universitaires Saint Louis) and Prof. Jef Van Bellingen

Karen François' Ph.D. proposal *Politiek van de wiskunde. Veronachtzaamde aspecten van hoe wiskunde vorm geeft aan de samenleving (Politics of Mathematics. Neglected aspects of the ways in which mathematics shape society)* has been approved by the Doctoral Committee of the Faculty of Arts and Letters. This committee organises a yearly evaluation (on the basis of a personal report and an evaluation report of the promotor) to determine whether the student can continue his or her Ph.D. work. So far all evaluations have been positive.

In her thesis, soon to be completed, **Christelle Gramaglia** has explored the link between administrative law, river politics and the sciences of water around the various issues raised by an association (TOS) specialized in fishing will have completed her PhD in Fall 2005 on the *Politics of water in France and its relation to law*.

In her thesis "No issue no public" **Noortje Marres** defends the point of view that Lippmann and Dewey had discovered in their pragmatism a powerful new way of rethinking politics not around representation per se -as is usually considered in political science- but around "things", pragmata, issue. It will be defended the 8th of November in Amsterdam.

Wim Schreurs' PhD proposal *Ambient intelligence and the protection of personal information* (see annex 10 to the Annual Progress Report 2004, www.imbroglio.be) has been approved by the Council of the Faculty of Law of the Vrije Universiteit Brussel, which has constituted its follow-up committee as follows: Prof. Serge Gutwirth (promoter, VUB), Prof. Jean Claude Burgelman (IPTS-JRC, EC, Sevilla & VUB) and Prof. Paul De Hert (Leiden University and VUB).

Valérie Smet's PhD project on the problematic relationship between social science/scientists and policy will be completed in 2006, under the direction of Koen Raes at the UGent. In this thesis, the results of her research on the relationship between social science/scientists and policy, i.e. a general and specific analysis, literature studies, case studies, interviews, etc. will be handled synthetically and in depth

Nathalie Trussart's PhD project, to be completed at the end of 2006, 'Dispositifs et biotechnologies. Mise en héritage de Michel Foucault dans l'étude des sciences expérimentales », is done under the direction of Isabelle Stengers, at the ULB. Her 'comité de these' is constituted by Isabelle Stengers, Thomas Berns and Benoit Timmermans.

Furthermore, following researchers were involved in the post-doc training activities of the project: the promoters, Prof. Nicolas de Sadeleer, Prof. Mireille Hildebrandt, Dr. Bart Van Kerkhove at the VUB; Prof. Edwin Zaccai and Prof J. Van Helden at the ULB, Dr. Dani De Waele and Dr. Geertrui Cazaux at the UG and Prof. Phillippe Barret and Dr. Gaetan Van Loqueren at the FUL.

5.4.2. Added value of the IAP for PhD-students and postdocs

Our project has been of crucial importance for the researchers involved, as it has immediately created and immersed them in a context of interdisciplinary, interuniversity, international and trilingual work. As a result of the rather intensive structuration of the cooperation within the network (cf. the IAP-seminar, working groups, network meetings, etc) their research immediately took roots in the network rather than in a secluded process of questioning.

The research of the different pre- and postdocs of the project was indeed shaped and given substance by the confrontation with the questionings of the other researchers, looking and understanding the issues from other and different perspectives. In our network, however, the aim has never been to produce generalist knowledge or solutions that would flatten the differences of approaches and absorb those in a necessarily reductive generalist or universalist common thought or knowledge. On the contrary, our network focuses on what Deleuze calls the *travaux minoritaires*, meaning that the findings and the knowledge produced should not be considered as generalisable but as *loyal* to what counts for the researchers and for the obligations which are determining their respective (disciplinary) scientific practices.

The effect of this *démarche* has already been proven extremely interesting because the process of interdisciplinary controversy and cooperation has not tended to a still more colourless synthesis, but it has helped us to rediscover what makes us jurists, philosophers, agricultural scientists, mathematicians, ethicists and sociologists. We are building paths of research leading to a permanent process of construction of a common world, wherein both universalism and relativism are refused, but wherein the different scientific practices are taken seriously by the practitioners themselves inasmuch that they remain attached and loyal to what obliges them as practitioners, and by the others because they take seriously the way the other practitioners construct their questions and objects.

Furthermore one of the most striking characteristics of the IAP-environment is that the different expertises present, mainly through the promoters, the post-docs and, of course, the different networks these researchers have access to, show a range going from the so-called 'hard' sciences on the one hand (mathematics, physics, biology, genetics, agricultural sciences, etc.) to the 'soft' sciences on the other hand (and even within the scope of the latter a great variety is present: lawyers, philosophers, sociologists, criminologists, etc.). This obvious denial of the still raging Science Wars - remember the infamous Sokal-Bricmont affair - is a unique element of this network. It is very hard to imagine where else a junior researcher having to deal with a legal problem about licences on GMO's has the opportunity to consult in the most direct way possible lawyers, biologists, sociologists, philosophers and mathematicians? Transcending the Science Wars also entails that, as far as methodologies are concerned, what is usually considered to be mutually exclusive is here brought together for a fruitful confrontation. Thus a methodology related to Continental philosophy, is brought together with a methodology related to analytical philosophy, the object not being to find out who is the 'better', but to see what the one has to offer to the other. Here too it is worthwhile to remark that hardly any research-network exists where in discussions philosophers such as Foucault, Derrida and Deleuze can be mentioned as well as Popper, Feyerabend and Kuhn, whereby, as has been noticed above, everyone retains his identity.

5.5. New research teams

When we submitted the original project we were asked to mention which teams of our network could be considered as young and promising teams that would benefit from the cooperation with established teams of excellence. There were none. Considering their record and reputation the five teams submitting the proposal could effectively not be considered as young teams, neither could the promoters be considered as young researchers.

In our opinion, however, the IAP has had a rejuvenating effect upon these research groups and researchers. The IAP gave birth or, at least, stimulated the establishment of two new research teams.

At the Vrije Universiteit Brussel the project was originally submitted by Centre for the Interaction Law & Technology of the Department of Legal Development, Comparative Law and European Law of the Law Faculty. At that time, however, this department was under reorganisation and was actually dissolved into other existing departments. Gutwirth and his team became a part of the large department of *Metajuridica*.

Mainly as a result of the IAP work, in November 2003, Gutwirth and Van Bendegem founded the interdisciplinary *Research Group on Law Science Technology & Society* (LSTS) which is devoted to analytical, theoretical and prospective research into the relationships between law, science, technology and society. LSTS focuses upon the integration of the legal perspective in current *Science Technology and Society* (STS)-research. The starting point is that notions or principles such as legal mediation between rights and interests, democratic participation, rule of law, transparency, accountability, public interest, human rights and individual freedom should form a part of the constraints of scientific work. Crucial for LSTS is the challenge of conceiving scientific practices in such way that they respond to the demands of the democratic constitutional state. LSTS can be considered as the successor of the former *Centre for the Interaction Law & Technology*, but the monodisciplinary legal research did move towards an interdisciplinary undertaking. That is why, since its foundation LSTS comprises also researchers of the *Centre for Logic and Philosophy of Science - CLWF* covering disciplines such as philosophy, philosophy of science, mathematics and logic.

Today all the VUB-researchers working on the IAP are members of LSTS, which also comprises some other senior and junior researches. The team is a young and dynamic one, and it is, next to the IAP, already involved and networked in three EU-FP6 projects (see *supra* 4.2.2.). For more information see: www.vub.ac.be/LSTS

At the ULB, the formation of the new team GEC_o partly results from the IAP, since Nathalie Trussart, who played together with Isabelle Stengers, a decisive role in its formation had the possibility to do so because of the IAP. The Groupe d'Etudes constructivistes has for its federative theme the challenge of a radical constructivist approach, as opposed to criticist ones (social constructionism for instance). It takes knowledge not as an epistemological problem but as a speculative, ontological one, as considered from the standpoint of the links knowledge practices produce and stabilise. Some themes will provide very useful connections with the IAP network, for instance Didier Debaise's research on the philosophy of biology, Maria Puig della Bellacasa, on feminist standpoint theories, and Marion Jacot-Descombes, on the specificity of the Belgian *Droit du travail* in contrast with civil right. As most of the GEC_o members are philosophers, the GEC_o will enter into productive symbiosis with the IAP network. See <http://dev.ulb.ac.be/geco/>.