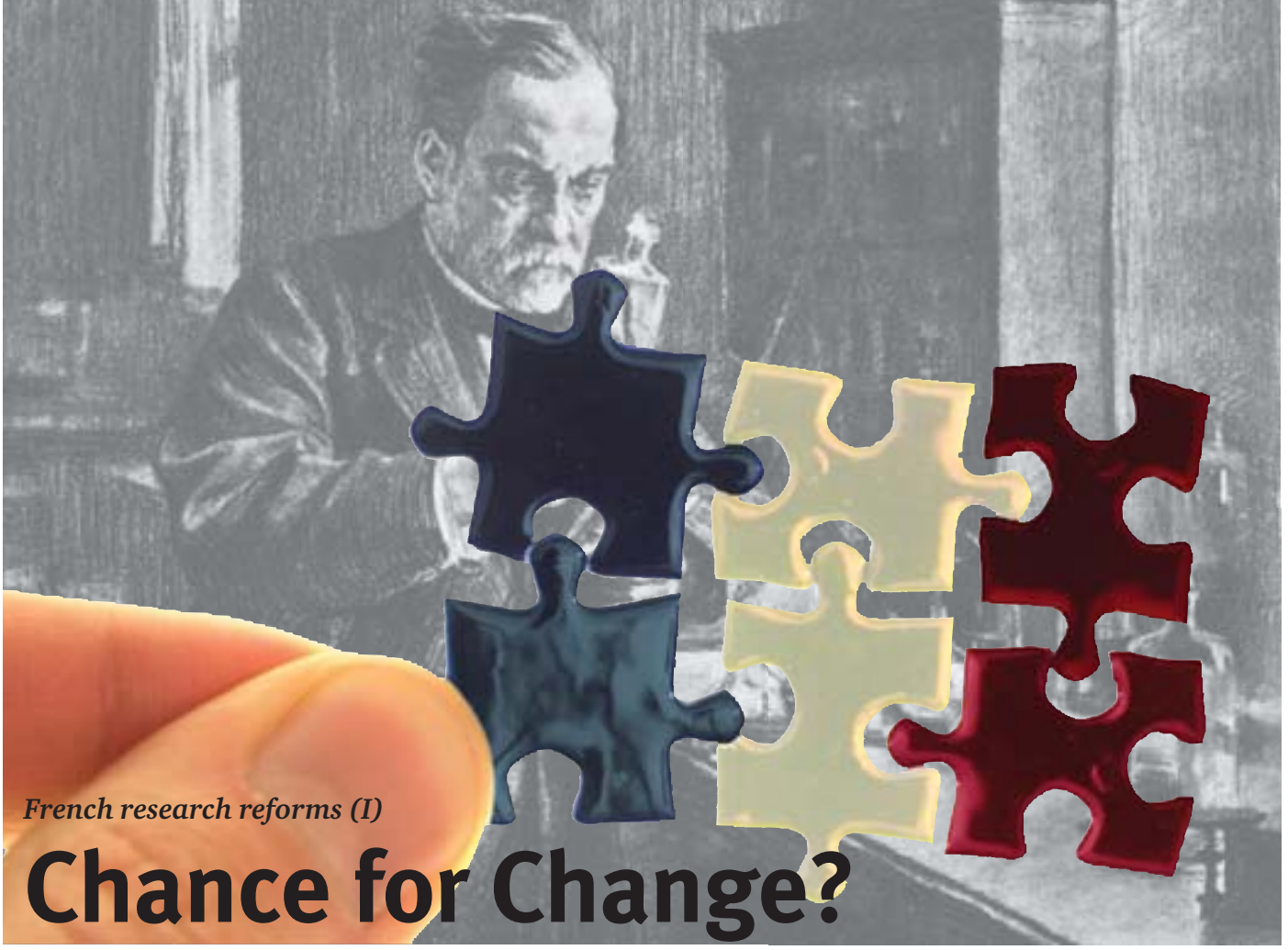


French research reforms (I)

Chance for Change?

According to those involved, earthquakes have been hitting French research and higher education over the last couple of years. Jeremy Garwood takes a good look at the ongoing struggle for reforms and presents his analysis in two parts. Part one explains the reason why everyone agrees that reform is needed and deals with the major points of the 2006 'Law On Research'.

Science or engineering? Money-makers or free thinkers? The schism at the heart of French public research reforms.

Starting in 2005, the French research system has been reeling from a series of governmental reforms that have introduced radical new changes to the organisation, funding, assessment and orientation of France's universities and public research institutions.

To lend weight to declarations affirming the importance of research and development to the nation's future, the French government has been promising to significantly increase funding to 3% of GDP by 2010 (a target set by the European Council's Lisbon Strategy in 2000).

However, although extra public money is forthcoming, there are new political strings attached. Furthermore, much of the new funding is going to industrial development rather than scientific research. To continue to obtain funding, research can no longer be open-ended: it must have short-term "finalised" aims and should demonstrate economic and industrial interest. The recent creation of autonomous universities also seems to be linked to an inevitable disintegration of the existing research institutions, particularly the CNRS.

The schism in French higher education and the blurred image of French public research. A system in chronic need of reform.

An international observer might naively assume that in France, like in other industrialised countries, universities are the summit of the higher education system. Indeed, it can come as quite a shock when the truth sinks in: within France, the French universities are in fact considered to be inherently second rate when compared to the highly selective system of *grandes écoles* (professional schools) – a series of parallel elite "schools" of engineering, commerce, and administration.

While France's 85 universities struggle to educate almost 1.5 million students, 120 well-funded schools in the other more prestigious system teach barely a fifth that number.

Selection or no selection? All the "best" students are in the grandes écoles...

The only requirement for entry to a French university is the possession of a *baccalauréat* (*bac*), the school leaving qualification. The numbers of school students passing the *bac* has steadily been increasing to over 70% of the age group (0.5 million students) with a pass rate of 86.9% in the *bac général* and 89.1% in the *bac scientifique*. 58% of successful *bac* students proceed into the university system, which, due to decades of inadequate funding, finds itself unable to cope with the annual influx of first year students. Lecture halls and amphitheatres are woefully overcrowded and universities are obliged to exercise radical surgery to drastically reduce student numbers to manageable proportions; first year failure rates are in excess of 50%. Although many students may try again or change subjects, the lack of direction and advice in the university system leaves hundreds of thousands of students with nothing to show for their time spent at the *fac* (the final drop-out rate is a whopping 41%).

The contrast with the *grandes écoles* is total. Here, the rigorous selection process has become so highly competitive that a system of post-*bac classes préparatoires* (preparatory classes) exists to prepare the top 12% of *bac* students for the entrance exams. In the two years post-*bac*, these students undergo intensive, high quality training. Those who fail at this stage end up in the third year of university studies.

The cost per student eloquently illustrates the sad situation in the university sector. Although, in 2006, some €10,320 was spent on actually teaching high school students to pass the *bac*, with a further €13,940 allocated to those that attended the *classes préparatoires*, only €7.840 was spent on university students (the OECD average is almost €11,000).

...but the best scientific research is found in the universities (and associated research institutions).

So what, you may ask, does this have to do with the world of French scientific research? Well, a lot more than you might think. Because, although the cream of France's students is skimmed off by the *grandes écoles*, the vast majority of French public research is heavily concentrated in and around the less respected university system.

Some 200,000 people are employed in French public research, mostly as *fonctionnaires* (civil servants with very secure jobs). However, although university lecturers are expected to do research (and are referred to as *enseignant-chercheurs*, 'teacher-researchers', the powerhouse of French scientific research lies with the full-time researchers of the big research establishments – the CNRS (National Centre for Scientific Research – 23,000 researchers); INSERM (National Institute for Health and Medical Research – 6,000 researchers); INRA (National Institute for Agricultural Research – 2,000 researchers) etc. Research teams from these organisations are often located within university campuses and are composed of a mixture of researchers, university teacher-researchers, and university research students. Notably, over 90% of the 1,200 CNRS research units have a "mixed" status, incorporating university personnel.

Unfortunately, the French public's general impression of the universities and scientific research is, at best, confused, at worst, condescending. One of General (subsequently President) Charles de Gaulle's famous maxims is often quoted at frustrated French scientists: "Des chercheurs qui cherchent, on en trouve, des chercheurs qui trouvent, on en cherche." ('Researchers who search, we can find, it's researchers who find that we're looking for'.) Furthermore, nobody really knows what a PhD is: the only *docteurs* are medical, since PhDs don't use their titles in France, and a *professeur* is more likely to be a high school teacher than a university professor. Indeed, most people think that the highest academic qualification in France is an advanced teaching diploma (the *aggrégation*) rather than a doctorate.

Naturally, the most influential and powerful people in French government, bureaucracy, and industry were all educated at a *grandes écoles* not a university. The only university students they will have known are those from their *classes préparatoires* who failed to get into a *grande école*, and who have carried this stigma of failure with them into the second-rate faculties of the university system. There is very little mixing of the two systems. Everything is done to ensure that their own children study at a *grande ecole*.

And with reason. Unlike many university graduates, who launch themselves onto the employment market clutching nothing but unfocussed academic degrees, students from the *grandes écoles* have training tailored to meet industry demands. Moreover, their teachers and alumni will often have extensive personal contacts in industry and government.

The public-private research divide.

Engineering is not taught at university; it is the preserve of the engineering schools (and engineering in France includes biotechnology as well as *autoroutes*, Airbus aeroplanes, and *TGV*s). Those with the best aptitude in technical science (judged in France as the ability to pass mathematics exams) become highly-paid engineers, the backbone of French industry. They are also the majority of those working in private research, which in 2004 represented 55% (or €19 billion) of total research expenditure (€35 billion or 2.13% of GDP).

An influential 2004 study by MEDEF (the 'Federation of French Industry') found that more than half the researchers in industrial research groups were engineers, but only around 15% had PhDs. Indeed, possessing a PhD can be a liability for employment in French industry. The most desirable qualification is an engineering diplo-

ma but an engineer who has subsequently obtained a PhD is considered to have devalued their diploma!

Ernest-Antoine Seillière, head of MEDEF until 2005, called for a reform of public research because it wasn't "at the service of development". He maintained that, "research was only of interest if it led to economic development, as seen in terms of patents, the creation of new companies, and of new goods and services".

Given French industrial prejudices against the universities and public research, it is hardly surprising to discover that possession of a PhD in France (eight years study post-*bac*) leaves you with few alternatives: either you try to get a job in higher education and public research, or you go overseas, or you retrain (again) and get another more "applied" diploma.

Although, the public research system also has its prejudices about private research. Pierre Jacquot, a former director general of the CNRS remarked that, "when researchers work with a very finalised perspective, it's always hard to say if they're truly researchers or whether they're aren't just technicians."

Consensus on the need for reform: but which reforms?

Everyone seems agreed that major reforms of higher education and research are necessar. But at a time when the government has been more concerned with balancing its budget and reducing public sector debt, it has been very reluctant to invest huge sums of money in new infrastructure, jobs and running costs.

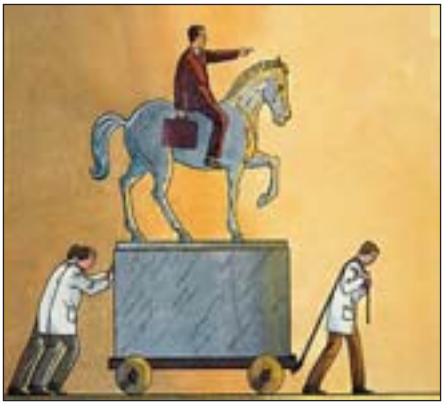
In 2000, at Lisbon, the European Council recommended that European countries should embark upon an enormous expansion in research funding to attain 3% of GDP by 2010 in order to "make Europe the most competitive and the most dynamic knowledge-based economy in the world". Although the French government publicly embraced the Lisbon Strategy, their actions were initially less positive.

The 2003/04 Chirac budget games and the rise of 'SOS Research'.

At the same time as President Chirac was declaring research to be one of the nation's highest priorities, the public research budget actually fell as a percentage of GDP from 1% in 2002 to 0.8% in 2005. In 2003, the announcement of 30% cuts to the budgets of the CNRS, INSERM and others, and of job cuts led to the formation of a coordinated protest movement, *Sauvons la Recherche* (SOS Research). Worried and angry researchers at all levels became politically active with highly publicised protest marches, petitions and the resignation *en masse* of all research directors from their administrative duties. Surprised by the favourable public and media support for the researchers, the Chirac government backed down in April 2004, releasing blocked finances and promising not to introduce any new changes without due consultation of representatives of the research community.

Victory? The États Généraux *and the deceptive* Pacte pour la recherche *(2005/2006).*

Researchers provocatively chose to appeal to historical republican values by choosing the term, *États Généraux*, to designate their public assemblies for anybody who had something to say about the contemporary state of French research and how it might, through judicious and long overdue reforms, evolve in the future. From 30 regional gatherings in July 2004, a national *États Généraux* met in October 2004 and made its written recommendations for reform.



Too much guidance from "above"?

Unfortunately, although the government publicly claimed to have taken account of researchers' views, it seemed to have largely ignored them when it finally proposed radical new reforms in its *Pacte pour la recherche* (November 2005). Instead, the *Pacte* seems to have been inspired by industry groups, such as MEDEF, and a desire to emulate international models in American, Japanese, British and German research.

Filled with rhetoric, the Minister of Research boasted that, "the *Pacte* permits French research to rival, under the best conditions, worldwide scientific and technological competition and seeks to enhance France's international influence."

Its six main declared aims are:

1. "reinforcement of the capacity of strategic orientation," i.e. greater direct political control of approved research topics;

2. "construction of a unified, coherent and transparent system of evaluation," i.e. a new body, AERES, to confirm that the research performed conforms to newly defined targets;

3. "to reassociate the energies of those involved in research and to facilitate their cooperation." The key point here is what kind of research and who is involved;

4. "to intensify the dynamic of innovation by bringing public and private research closer together";

5. "to offer attractive scientific careers";

6. "to reinforce the integration of the French research system into the European research space".

The new reforms: direct government intervention; funding of approved "finalised" research projects; reevaluation of the significance of public research; money for development.

The *Pacte* introduced radical changes to the whole system of French research, both public and private. Clearly motivated by the conviction that the existing public research establishments were too preoccupied with irrelevant academic scientific research rather than developing economically meaningful goods and services, the government has placed French research under a direct line of control from the President and Prime Minister's cabinet via the High Council of Science and Technology, MIRES (an interministerial committee for research and higher education), and the DGRI (General Direction of Research and Innovation). However, the job of bringing everyone into line is left to two new agencies: the ANR (National Research Agency), which controls an ever-increasing proportion of the research budget, and AERES (Agency for the Evaluation of Research and Higher Education), which will decide whether the universities and public research institutions are fulfilling their newly-defined goals.

Although the French government is committed to increasing the research budg-

et, these increases won't necessarily go to public research as such. For a start, about 20% of the public research budget (around 1% of GDP in 2006) is, in fact, for military research and development (R&D). 14% is allocated to space and aerospace R&D, and other engineering projects on energy (mostly nuclear) and matter consume a further 14%. In fact, universities and public research institutions receive little more than half. In addition, several measures, largely subsidised by public funds, were implemented to increase the private research sector.

The ANR ('National Research Agency')

The ANR funds specific research projects for three years. Previously, most French research was funded through recurrent annual grants to laboratories, based on numbers of researchers, with separate large equipment and infrastructure grants. The ANR has seen its budget increased from €350 million in 2005 to €955 million for 2008. By comparison, the CNRS receives €592 million (excluding salaries) and has seen its budget frozen. Each year, the ANR announces the project areas that the government has decided are national priorities. Not surprisingly, given a political redefinition of research priorities, these projects are now to be more "applied" in nature, with clear emphasis on economic and industrial relevance.

As if to reinforce this point, someone at the ANR, clearly inspired by semiotics and the hidden meanings of language, has decided that terms such as 'fundamental' or 'basic' research are too generous, implying as it does that the knowledge acquired from such research is somehow fundamental to society or the base of our scientific culture. To replace such terms and their opposites, 'pure' and 'applied' research (the former suggesting too much clear thinking, the latter not enough), the ANR have created 'cognitive' research (from "connaissance", 'knowledge', almost theoretical, chalk-on-blackboard, research) and contrasted it with much more meaningful, 'finalised' research (since obviously the only research worth doing is research with a clear end in sight).

A major criticism of the ANR has been its lack of a scientific council. All members of the ANR are appointed directly by the Ministry. The notion of elected research representatives who play key roles in university scientific committees, CNRS, INSERM etc. has been abandoned in favour of unquestioned governmental control of research priorities.

Applicants for ANR funds face two choices: Either they must find a way of squeezing their research project into one of the approved programmes (in 2007, there were 46 such programmes grouped into six categories: Matter and Information; Engineering, Processes and Security; Renewable Energy and Environment; Human and Social Sciences; Ecosystems and Durable Development; Biology and Health). Alternatively, if unable to cope with the combined emphasis upon interdisciplinarity and short-term economic potential, a seventh "non-thematic" programme exists for the vast majority of researchers, who have been working for many years under the old system in their own particular research domains with on-going long-term research teams. This is the *projet blanc* ('white project') and any project that doesn't fit the other categories can be submitted here. The catch is that only 15% of ANR funds are allocated to *projets blancs* – hence a high failure rate and only partial funding of successful applications.

Where will they end up?

After the ineptitude and self-service that characterised the distribution of project funds in 2005, the ANR has improved. But the selection of politically-approved project areas that look fine on paper has left many laboratories starved of research funds. They cannot obtain ANR funding because their research is either deemed to be insufficiently 'applied' or it fails in the tight competition for the *projets blancs*. At the same time, the recurrent research budgets are diminishing as funds are shifted away from existing institutions towards the ANR. Since the vast majority of researchers are *fonctionnaires* with secure jobs for life, more and more research groups are finding themselves in the perverse situation of possessing the manpower to do the work but not the research consumables to achieve it.

The ANR website helpfully reminds biomedical researchers that they can still apply to medical charities such as ARC (the 'Anti-Cancer Association'), which will continue to fund projects they may have overlooked. (Unfortunately, the French aren't very charitable, donating 0.14% of GDP in 2006 compared to 0.73% in the UK and 1.67 % in the US).

And the future direction of scientific careers suggests that the one huge advantage of the existing French research system – long-term job security that allowed researchers to work for years on speculative, exploratory research without constantly worrying about their personal finances or capacity to remain in the same locality – may disappear: ANR projects now finance short-term research fellowships.

Not that the introduction of short-term research contracts is a bad idea. On the contrary, under the old system, it was fine when you finally got a *poste* and became a *fonctionnaire* (once possible even at the start of doctoral studies) but, with budgetary constraints and fewer new job openings, young French post docs found themselves in a worryingly precarious situation: very little money was available for the short-term contracts needed to feed themselves while they tried to obtain the long-awaited *poste*. The ANR now funds some 10,000 short-term contracts for post-docs and technicians. However, a corresponding reduction in new recruitment to replace retiring *fonctionnaire* researchers seems destined to shift the balance from (very) long-term to short-term research jobs – a situation that seems highly unlikely to render public scientific careers more attractive to French students. Alas, in practice, difficulties in assessing the significance of such projects have tended to favour the research interests of large companies, despite the original declared intention to help smaller enterprises that lacked the means to conduct their own research.

(*Our series on French research reform continues in the next issue with an examination of President Nicolas Sarkozy's 'Law on Universities'.)*