LES AMIS DE
l'École de Paris

http://www.ecole.org

Technological Resources and Innovation seminar

Organised thanks to the patronage of the following companies :

Air France
Algoé[2]
Alstom
ANRT
Areva[2]
Cabinet Regimbeau[1]
CEA
Chaire "management de l'innovation" de l'École polytechnique
Chaire "management multiculturel et performances de l'entreprise" (Renault-X-HEC)
Chambre de Commerce et d'Industrie de Paris
Conseil Supérieur de l'Ordre des Experts Comptables
Danone
Deloitte
École des mines de Paris
EDF
Entreprise & Personnel
ESCP Europe
Fondation Charles Léopold Mayer pour le Progrès de l'Homme
Fondation du Crédit Coopératif
France Telecom
FVA Management
Roger Godino
Groupe ESSEC
HRA Pharma
IDRH
IdVectoR[1]
La Poste
Lafarge
Ministère de l'Industrie, direction générale des Entreprises
Paris-Ile de France Capitale Economique
PSA Peugeot Citroën
Reims Management School
Renault
Saint-Gobain
Schneider Electric Industries
SNCF[1]
Thales
Total
Ylios

[1] For the "Technological resources and innovation" seminar
[2] For the "Business life" seminar

(liste at july 1, 2009)

OPEN INNOVATION : WHERE DO FRENCH COMPANIES STAND ?

by

Thierry Weil
Professor, Mines ParisTech
Member, FutuRIS work group on management practices concerning innovation

with contributions from

François de Charentenay
Former research director, PSA
Member, FutuRIS project

Germain Sanz
Former director of innovation, Arcelor
Member, FutuRIS project

February 5th, 2009
Report by Élisabeth Bourguinat
Translation by Rachel Marlin

Overview

Open innovation has been adopted by a large number of companies including the very large organisations. With open innovation, there is an opportunity for them to cut costs, to discover and better control technologies and markets, as well as the ability to offer comprehensive solutions and make money from their skills. However, open innovation can only work if the company adopts this approach over the long-term, if it aligns its process of internal management of innovation with this point of view, and if it makes its plans and objectives with its partners clearer. It should also maintain its own internal research and development (R&D) department if it wants to master the technical culture which is essential in order to understand the solutions of other organisations, and to integrate them into its product. However, this may lead to a dilemma : should the company bring limited changes to its own system of innovation, or would it be better to change the models radically in order to benefit fully from open innovation ?

TALK : Thierry Weil

In the course of my various activities, I have been in a position to observe numerous forms of innovation resulting from collaboration between different organisations. I wrote my thesis at a time when 'corporate labs' thrived. These were company laboratories which worked closely with both university and operational research units. My theoretical work was based on the physics of solids, but I might have been asked to help my fellow scientific researchers, or even be called to a factory, if there was a problem concerning a manufacturing process.

I carried out my post-doc research at Stanford, and realised that Stanford was much more open to the outside world than French universities. It had even gone so far as to build the environment. Some people thought that Stanford was the force behind Silicon Valley.

I then spent a few years in the management of the research department of the École des mines. One of the characteristics of this establishment is that more than half its research budget comes from contracts, most of which are for companies. Subsequently, I had numerous occasions to hold discussions with manufacturers and service providers, and I pointed out that most of them could have taken much more advantage of their partnerships with our research centres. Even though Snecma or Gaz de France had chosen to start a long-term relationship with us, sometimes using our laboratories as an extension of their own internal research, many other companies usually only used our services for occasional work.

I returned to Silicon Valley in 1995 until 1996, and I was particularly interested in the local ecosystem and innovation networks. I noticed how SMEs (small and medium-sized enterprises) joined forces to launch products or services which, in Europe, would have been considered to be solely the privilege of large companies because of the wide range of abilities on offer. I also noticed that some European and Asian companies spent a great deal of money in order to have a subsidiary in Silicon Valley so that they would be at the heart of the information network, but that they benefited very little from their geographical location with minor exceptions.

Since 1997, Christophe Midler, Dominique Jacquet and I have been in charge of the seminar entitled 'Technological Resources and Innovation' at the École de Paris du management, in which each of us discusses at length subjects which are important to us. In Christophe's case, it is project management, especially in partnerships ; for Dominique, it is the financing of research ; and, as far as I am concerned, it is innovation networks.

Sources of information

The summary which I will present is based on many sources of information. These include the 120 sessions of the present seminar series ; about thirty interviews, conducted by Germain Sanz, François de Charentenay, the team at ANRT (*Association nationale de la recherche et de la technologie* : national association for research and technology) and myself in relation to the FutuRIS project on research, innovation and society, with managers in charge of innovation in important companies ; several external sources, including an OECD (Organisation for Economic Co-operation and Development) report entitled 'Open innovation in global networks' published in November 2008, drawing on both quantitative studies and about fifty interviews with companies in all the OECD countries ; the French part of this study entitled '*Réseaux mondiaux d'innovation ouverte'*, published separately by Frédérique Sachwald in January 2009 ; and the two annual reports from the new *Observatoire du management de l'innovation*. In total, this enabled us to examine about one hundred companies, directly or indirectly.

A successful formula

The expression 'open innovation' was coined by Henry W. Chesbrough in his book 'Open innovation : the new imperative for creating and profiting from technology' which was published in 2003. Many authors have described similar processes, for example when discussing innovation networks or cooperative innovation. However, the formula of open innovation has turned out to be much more attractive in terms of sales and has spread and caught on very quickly.

It covers two processes : the 'outside-in' process which consists of gathering ideas from outside the company which can strengthen the company's current skills ; and the 'inside-out' process, which aims to realise the potential of the company's internal capabilities in the outside world.

There are various reasons for companies to take part in these open innovation approaches.

The response to the problem of cost

The motivation for open innovation comes from the difficulty a company has in organising its research so that it can respond efficiently to its needs for innovation.

At the present time, everyone realises that innovation represents one of the major sources of competitiveness for developed countries. In today's consumer-saturated society, in order for a consumer to buy something other than commodities produced in countries with low salaries, one must constantly invent products that have new and very attractive functions. More recently, people realised that innovation was also essential in order to gain access to markets in developing countries. Indian customers, even if they only have limited resources, want products which correspond to their needs which are not the same as those of developed countries. Therefore, innovation is necessary. Tata's new car is not a stripped-down version of Western models…

These innovations are not always technological, but even commercial-style innovations often have technical dimensions. In so far as innovation is essential to competitiveness and R&D is generally strongly involved in the innovation process, companies should logically devote more and more money to R&D. However, this is not always the case, and many companies even reduce their research budget. How should this inconsistency be interpreted ? If one excludes the hypothesis of irrational behaviour, one might be led to think that the relationship between research and innovation is not all that clear.

Yves Dubreil is in charge of innovation at Renault. He likes reminding people of the Montreal Club motto 'research consists of transforming money into ideas, and innovation, of transforming ideas into money.' Economists have shown that there is indeed a correlation between corporate efforts regarding research and innovation, and profitability, but the causal relationship is not that straightforward. AT&T (the American telephone services company) at the height of its monopoly, or IBM when it had hardly any rivals, had laboratories which were full of Nobel prize winners. When competition arrived and profit margins were reduced, their laboratories were cut back in size. Clearly, if one has money, one can invest in R&D, but it should not be taken for granted that R&D is a sure means for a company to get rich.

Open innovation may appear to be a way of limiting spending because one can earn money with one's own ideas and also with other people's ideas (such as customers, suppliers, universities, or even competitors), often at lower cost. As a director of innovation at Procter & Gamble said 'All the experts in one area do not necessarily work in your company. You have 500, but there are perhaps another 50,000 elsewhere in the world. Why deprive yourself of the 49,500 others ?'

The response to a planning problem

Open innovation appears to be the answer to a planning problem. Two important methods of organisation of innovation are possible. In the first method called 'techno-push', researchers perfect technologies and then look for commercial outlets. This approach has been shown to be successful with disruptive innovations such as nylon, the transistor radio, integrated circuits, the laser, the use of recombinant DNA, biochips, and so on.

The second method of innovation organisation is based on the principle of 'market pull'. One identifies products which the consumer wants, and then manufactures them using technologies which exist in the company or the market. If the solution still does not exist, researchers are called in to perfect it. The problem with this solution is that the limiting time factors of industrial projects and research projects are not the same. Depending on the sector, completing a development project may take anything from a few weeks to a few years, whereas the acquisition of new scientific or technical skills may take many years. Programming today's research according to the needs of tomorrow may turn out to be difficult.

In her PhD thesis as a result of working with Christophe Midler's team, Lise Gastaldi showed that the imperative of the 'time-to-market' factor forces companies to discover both technologies and markets at the same time, and in so doing brings teams closer to sources of knowledge both on the market side and on the scientific and technical side. Frédérique Sachwald stresses that, as a result, the objectives of international R&D units tend to change. For example, an R&D department set up in Japan intended to adapt products to the Japanese market will also be given the responsibility of managing relationships with Tokyo University.

Offering comprehensive solutions

One of the preferred solutions for capturing markets consists of offering solutions to clients which are increasingly tailor-made and wide-ranging. For example, today one no longer sells just cars, but cars which are equipped with car-radios, SatNav systems, financing plans, and insurance and maintenance contracts.

The production of a car which is equipped with all these accessories and services necessitates a variety of skills which car manufacturers do not necessarily have in-house. Partnerships with companies which have complementary skills are an answer to this problem.

Specialisation and concentration

The development of the market for technologies, components, equipment and services enables certain companies to specialise in a stage of a process or in a component of a system. This situation amounts to a 'disintegration' where companies contract out a growing part of their activity to specialists. It also involves a concentration of these specialised suppliers who, as a result, profit from considerable innovation efforts and maintain leadership in their speciality.

This more concentrated focus also concerns large companies. Ten years ago, Essilor produced lenses for spectacles, contact lenses and optometric instruments. Today, the company specialises in ophthalmic lenses, and has sold off all its other activities. Its R&D budget is the equivalent of that of all its competitors put together, which means that Essilor occupies a very comfortable position.

The emergence of these specialised companies, which is the consequence of the development of open innovation, gives yet more force to this movement.

Controlling technology better

The FutuRIS report shows that open innovation enables one to anticipate changes in technology due to collaboration with suppliers. CGGVeritas and Bull, both of which are important computer users, established partnerships with IBM and Intel in order to be the first to use IBM and Intel's products and to learn how best to use them. As far as suppliers are concerned, it is to their advantage to listen to the opinions of 'test clients' before marketing their products. Collaboration with public research also enables one to benefit from scientific advance. This is a long tradition at Rhodia and EdF (Eléctricité de France).

Controlling technology does not always mean that one will have exclusive use. Sometimes, it is wiser to promote one's option about standards and norms. Selling a license for an innovation to a competitor enables one to impose the innovation on the market by legitimising it, and to reach critical volumes more quickly. When PSA licensed its diesel injector system to Ford, consumers thought that it was a guarantee of the quality of this technology.

Numerous sessions in this seminar series have shown that it was also possible to take financial options on technologies through corporate venture capital, as was the case for Thales, France Télécom and Schneider Electric. Other sessions showed that one could host start-ups on the company's premises, following the examples of Solvay and Philips.

Knowing one's markets better

Open innovation enables one to work with one's clients on their specific needs. At CGGVeritas, it was shown that one of the ways of acquiring business was to send two or three experts to the client in order to study the problem and to demonstrate their ability to provide specific answers to the needs of the client. Air Liquide did likewise: their specialists had to learn more about the freezing methods of strawberries, and the manufacture of electronic components in order to prove to their clients they could work more efficiently using Air Liquide gases.

Open innovation also enables one to benefit from the skills of users, for example using 'crowdsourcing'. When Eli Lilly, the pharmaceutical manufacturer, became aware that its leading drug, Prozac, was about to be no longer protected by its expiring patent, it asked people to put forward ideas on the Internet, and agreed to pay people whose suggestions were subsequently adopted.

Another way of benefiting from the skills of users is to finance meeting and discussion places for individual software producers (such as La Cantine, created by the geeks at Silicon Sentier). France Télécom contributes to the budget of this association because France Télécom gets feedback about good ideas on market trends.

Open innovation may also bring one closer to far-flung clients. For example, Groupama had difficulty in reaching the very broadly scattered clientele of SME owners. Having identified chartered accountants as the privileged intermediaries to this group, the insurance company bought a company which sold software to accountants and installed modules into this software to appraise different insurance policies, including Groupama policies, as well as those of their competitors. This innovation enables the chartered accountant to promote his insurance skills with clients and allows Groupama to recruit new clients.

Making more profit from one's skills

The knowledge and know-how which a company has accumulated, with a great deal of effort, is always greater than the amount it needs for its own market. The second side of open innovation, inside-out, allows the company to make a profit from its skills beyond its original market. For example, this may mean extending the company's area of activity : Tefal changed from manufacturing frying pans to making machines for warming babies' feeding bottles in order to take advantage of both the reputation it had earned from its original market, and the skills it had acquired during subsequent developments.

Another solution is spin-offs which allow one to earn money with products which are far removed from those at the heart of the company's activity. When EdF was involved in research designed to prolong the life of nuclear power stations, it learned a great deal about engineering, and became an expert on the ageing of buildings. It was sufficiently confident to create a spin-off which carries out audits on these subjects. The mother company may decide to reinvest if this market proves to be profitable.

Joint ventures allow one to exploit an innovation which requires complementary skills. Technology transfers can also be envisaged. In any case, when one tries to realise the potential of its knowledge and know-how, there must be rigorous management of intellectual property.

Factors for success

It is widely accepted that there are increasing returns from open innovation. Longstanding relationships allow one to understand better the aims and workings of one's partners to build trust, and to create cohesive and efficient means of co-ordination. Numerous companies now prefer to choose their partners based on whether they are motivated, loyal and proactive, rather than only the criteria of their excellent reputation or price.

It is also imperative to make one's concerns very clear. In the Californian joint venture between Toyota and General Motors, the former wanted to learn to work with American workers and the latter wanted to learn Japanese manufacturing methods. Relatively early on, General Motors forgot its own goal and only sent a few of its executives to the joint subsidiary, preferring to minimise its costs. Toyota, on the other hand, persisted with its desire to learn and gathered together large numbers of people in the United States. At the end of the day, General Motors felt that the co-operation had not been fair.

Partners will work together more easily if they decide in a very precise way what they want to share and what they want to keep for themselves. They should also define what action to take if there is lack of conformity ('reprisals'), and decide in advance the conditions under which they will revise the rules of collaboration or separation if there is any conflict.

Finally, experience has shown that collaboration is much easier when at least three hierarchical levels are involved in the project. These include the project managers, their teams (the members of which should be able to contact each other without having to pass through their superiors), and, importantly, the highly-placed managers in the two companies, so that potential conflicts can be eased and the search for compromises encouraged if certain aspects of the partnership were badly assessed from the start.

Keeping an in-house R&D department

In view of the advantages of open innovation, in the 1980s some people did not think twice about abandoning R&D in favour of 'pillage and development'. The reasoning was epitomised by the following remark made at the time : 'Since the English persist in amassing Nobel prizes for innovations which are subsequently exploited by Japanese companies, one might as well copy the Japanese rather than the English.' Companies like Cisco consider it less expensive to buy a start-up – even if it costs a great deal – which has developed a good technological solution, rather than financing the equivalent of research conducted in vain by all the rival start-ups.

However, it is essential that the company keeps its own R&D department, if only to build and maintain a capacity to assimilate the ideas of others. The solutions that it develops will not necessarily be used, but will allow it to make use of the technical culture which is essential to

understand the solutions of others, and to integrate them into the product. This new type of R&D, where the main function is to increase the capacity of a company to incorporate products and integrate, is different from the usual R&D regarding its aims, organisation and the people involved.

The necessary adaptation of innovation management

Innovation management in a company consists of building, keeping up and implementing a collective capacity for innovation. This is based on three factors : dynamic management of individual and group skills ; co-ordination of the innovation process ; and the creation and maintenance of group cohesion.

When innovation involves other organisations, each of these three factors must be adapted accordingly. The company will be based partially on external skills, and so should co-ordinate the processes involving third parties, and it should construct strong and flexible relations with various external stakeholders, which will allow for efficient group action.

Definition of the objectives and creation of skills

Having identified the skills necessary to reach one's innovation objectives, the company has to choose the skills it wants to control in-house and discover how it can gain access to the skills its partners must have. It should then define the practical details of the partnership in order to involve these external collaborators efficiently, and to organise the in-house processes to enable the correct integration of outside contributions.

This is how Intel, for example, defines open architecture and invites other companies to enhance its platform, in a win-win situation. If this platform succeeds, then these companies will find important markets. Similarly, to help this type of collaboration, one of the six towers on the Oracle complex is reserved for partners. Some companies also create new programmes to share and capitalise on knowledge such as Thales' 'TechnoDays' and IBM's 'Innovation Jam' which are open to certain partners.

Co-ordination of the processes

The second important function of innovation management is the co-ordination of the processes, including business and technological intelligence, design tasks, R&D, training, integration, transfers to other companies, industrialisation, commercialisation, and so on.

In open innovation, relations with other companies occupy a central place. The Laguna 2 project was suspended for six months because of bad relations with a foreign equipment supplier : both parties had tried to interpret the contract to their own advantage, and manufacture was halted. One of the important tasks of co-ordination consists of establishing contracts and monitoring systems adapted to design partnerships. One must also be sure to improve the purchasing relationship which should not be based purely on finding the lowest possible price. Thales appointed one of its technical directors to manage its purchasing department so that he could lead multidimensional purchasing negotiations.

Management of human resources

In terms of human resource management, open innovation emphasises the team-players, people giving priorityto their network rather than to their span of control. Management should, encourage people who make sharing information a source of influence rather than those who retain information and use this element as a personal power lever. As far as management instruments are concerned, 360-degree assessments help to see not only if the individual has reached his personal objectives, but also if he contributes to the group effort and group cohesion. Such an evaluation is made by asking the employee's colleagues, partners in the project and clients.

with special skills are favoured - not only artists, but also impresarios, translators or other people who know how to put people in touch with each other. Rather than favouring the people who are at the 'top of the class' who generally try to resolve the problems by themselves, in this situation priority is given to the dunces and copycats who know how to look for and find information. The need to decide whether to do something oneself or to find someone else who knows how to do it, has always existed, but new technologies benefit more from the latter approach than the former. Organisational tools, for calculation, modelling and simulation have improved, but research motors and the tools which make group work easier have progressed even faster and to such an extent that the second option now seems globally more advantageous. One also favours 'T profiles', in other words, people who have knowledge about many subjects which allows them to talk with a number of people while at the same time, retaining their area of speciality.

Open innovation requires one to know how to manage diversity and all the problems that occur because people do not understand each other, do not see things in the same light, and are hurt because other members of the group do not share their opinion. Finally, it supposes that one should accept variations and errors. Too little acceptance of failure probably constitutes one of the weak points in many innovation systems. The personal behaviour required by these new forms of innovation organisation is not necessarily that which is taught in school…

Strengthening the cohesion

Earlier in my talk, I defined innovation management as the construction, up-keep and implementation of a collective capacity for innovation. In open innovation, this collective aspect becomes crucial, with a very strong emphasis on the ability to maintain the cohesion between the different partners on a long-term basis. After a few years of working together, the need for co-ordination might appear to be less necessary, but maintaining cohesion around common objectives sometimes becomes tricky. This is not a situation where a client gives specific orders to a supplier : innovation creates uncertain situations where the interests of the various people involved may change or diverge.

On the other hand, when the well-organised implementation strategy of innovation partnerships in a win-win situation has been achieved, it becomes a strategic asset of the company. The company acquires the reputation of knowing how to work in a network, of seeking and integrating high-quality partners, and of maintaining fair relationships with them over the long term. Such a positive reputation is likely to attract both high-quality collaborators and new offers of partnerships. However, the company still needs to convince the financial markets (or at least its financial director) of the merits of this strategy.

The need for a coherent system

Many very promising experiences of open innovation have had to be abandoned because of incompatibility with the rest of the company's activities. EdF had devised a very clever means of investment in American start-ups exploring new services with its North American arm, Easenergy. They did not invest money but sent R&D experts to use their skills and networks to help start-ups, and, for the EdF experts, to discover new technologies and to understand better how these new markets work. Unfortunately, the reintegration of these R&D experts into the company proved to be difficult because EdF did not know how to offer them positions which were sufficiently attractive after this kind of experience. The operation was abandoned.

Very early on, Thales embarked on a corporate venture. However, constant indecision between the search for profit (the primary objective of a normal capital risk fund), and the search for technologies which would be likely to interest the group, even though they were not immediately profitable, prevailed over experience, and, after a certain amount of vacillation, the venture was suspended.

The ‘double ladder’ system for management or expertise, put in place in many American companies in the 1960s and 1970s, was also disappointing because, despite inspiring speeches about the participation of experts in company strategy, and in opening up companies to the outside world, this system too often merely leads to an increase in the salaries of a small number of specialists. Similarly, the integration of foreign subsidiaries is often hindered by the composition of the executive committee which generally favours the country of origin.

When I worked in Silicon Valley, I helped an important French telecommunications group to acquire a technology which it needed in a not too costly way. Three middle-managers from an important local company wanted to create a start-up, and were ready to transfer to the French the technology that they were looking for in order to finance the launch of their company. The French telecommunications group could also help them to sell their future product in Europe and Asia. Unfortunately, the lawyers of the French group got involved, and tried to impose clauses which the Americans and their advisors found unacceptable. Suspicion ran so high that the transaction had to be abandoned, and the director of the French division handed in his notice, extremely disappointed that he had been unable to seize this opportunity. In this case, it was the incompatibility between the open innovation policy and the normal legal practices of the company which brought about the failure.

Ptolemy’s dilemma

In order to understand all the movements of the stars and planets, Ptolemy had to complete continually his geocentric system with new epicycles. Taking his example, should we add ‘puncture repair patches’ to research and innovation procedures in companies, running the risk of incompatibility as we have just mentioned, or should we radically change the model to facilitate open innovation ?

When one is not in the field, like a management researcher sitting at his desk, one tends to recommend the second choice which is the one ambitious young executives in a hurry also prefer. However, managers who have been in their jobs a long time know how difficult it is to construct an innovation dynamic which, clearly, is not perhaps perfectly adapted to open innovation, but nevertheless produces good results, and so they think twice before throwing the baby out with the bath water. Consultants adapt their position depending on whether they feel that their client wants them to change a linkage or whether he is ready to replace the entire plumbing system. The choice appears to me to depend on the precise needs of each individual company.

DISCUSSION

One fad after another ?

Qustion : *There was a time when closed innovation seemed extremely efficient : the 2CV car or the Vache qui rit cheese triangles are examples of this. How come we cannot establish an accurate comparison between the different methods of organising innovation and the different results obtained, apart from what is written in good practice manuals ?*

Thierry Weil : One can speculate about what would have happened if Napoleon had not crossed the Vistula in his haste to reach Moscow. This remains speculation because it is not possible to test what did not take place. In 1982, in their book entitled 'The price of excellence', Tom Peters and Robert Waterman claimed to draw from the experience of about thirty companies, all of which were successful, 'recipes' which undeniably resulted in success. A year-and-a-half later, two-thirds of these companies were in trouble. In 1994, Jerry Porras and James Collins, in their book 'Built to last : successful habits of visionary companies', identified companies, in groups of two, working in the same sector and in the same field, and compared their results at the end of ten years in order to determine what were the differences between the companies which succeeded and those which had failed. However, apart from the explanations which they took into account, the contrasting results which they observed could be completely linked to the fact that one was the leader in the German market, and the other was the leader in the Japanese market, and the two markets had not developed in the same way. All attempts at generalisation are risky, because one is never sure that all the relevant factors have been taken into account.

An open-minded movement, not a revolution

Q. : *If open innovation is really a measure of competitiveness, one might predict that, sooner or later, only companies specialising in this method of innovation would still exist. Alternatively, this would signify that this is only a fad.*

T. W. : In our investigations, we have seen lots of companies which have adopted interesting schemes, but the majority have not changed the whole of their model. Having said this, there is a general movement of open-mindedness including companies such as Michelin which traditionally favoured confidentiality. We have not noticed any regression.

Q. : *Open innovation is without a doubt very well adapted to start-ups. In the case of important groups, it is a bit like wanting to make arthritic mammoths do gymnastic exercises. Out of all the various companies which have attempted open innovation, is it not possible to find one which is really a specialist in open innovation and which can serve as a reference ?*

T. W. : Google is probably one of the most open companies, and is capable of making good use of developments which seem to be somewhat removed from its fundamental savoir-faire, but unfortunately its model has flaws. For example, Google is not as 'mixed' a company as one might think : almost all its employees are young and brilliant with PhDs from the best universities. There are very few people over 50 and their professional experiences are not always well used. Even companies which may seem to be the most convincing prototypes of open innovation, are not necessarily shining examples across the board.

François de Charentenay : Obviously we are dealing with a strong trend which is part of an on-going movement, seen for years inside companies. It consists of breaking the silos. At PSA and Renault, the creation of transversal groups, which integrate teams which are completely foreign to R&D, has given us examples of internal open innovation which has been extremely successful.

Germain Sanz : One should still keep in mind that there are no 'good' or 'bad' models. For some companies, it would be a grave error to adopt blindly a model of open innovation in all the areas where the company has activities. It is a strategic choice which should be based on a

detailed analysis, the conclusions of which may be different because no two companies are identical.

What is R&D worth ?

Q. : *Generally, R&D is considered to be poor value by analysts. However, as you have underlined, it signifies an external sign of wealth.*

T. W. : Let me ask Dominique Jacquet to respond to this point.

Dominique Jacquet : Capital markets neither promote the talent of chefs nor the ingredients they use, but the quality of the dish they produce. In this case, they only take into account the returns on the capital invested.

Q. : *In the case of an LBO (Leveraged Buyout), is the capacity to innovate seen to be most important ?*

D. J. : The LBO is seen to be valuable only if it has the capacity for free cash flow and the dividends to pay off a debt.

Q. : *The Oslo Manual, which is the principal international source of regulations in terms of the collection and use of information about the activities of innovation, attaches importance to the amount of R&D in its assessment of companies.*

G. S. : We know that it is not possible to establish a clear correlation between the performance of a company and its R&D budget. What counts is not the R&D, but the capacity for innovation, in other words, the skills to achieve a concrete result from an initial idea, such as a product which finds a market, a process which does not use up a great deal of energy, or a more efficient service. A number of companies are starting to try to quantify this impact of innovation. Generally speaking, one might expect much better consideration in the future of all the immaterial dimensions in a company, even when it is not a question of a corporate sale or merger.

T. W. : Financial analysts find it hard to assess the capacity for innovation, and the choice which it represents for a company's future. The method of real options, which Dominique Jacquet presented to us some time ago, did not catch on because the necessary data were too difficult to collect and evaluate.

Public research

Q. : *In some areas, such as buildings and public works, companies rely greatly on the public sector for their research. However, this sector no longer necessarily provides the early part of research which is the most important part for companies.*

T. W. : Companies tend to reduce the potential of their central laboratories and depend more on public research for the early stages of research. It makes sense provided public research maintain high levels of quality and awareness of the problems of companies. However, some R&D managers consider that there are no public laboratories which can provide specific research about metallurgy which will be necessary for new generations of nuclear power stations and aeroplanes. One of the principal recommendations of the OECD report concerns the need to invest heavily in public research, and making sure that it is oriented towards the needs of companies.

Q. : *How can companies determine the correct positioning of the cursor in terms of R&D, in other words, keep enough internal expertise in order to interact with their environment while at the same time making full use of open innovation ?*

T. W. : In the early days of these seminars, Daniel Kaplan explained to us how he succeeded in making researchers and manufacturers work together[1]. He demonstrated that in order to understand both the needs of manufacturers and the possible contributions from public research, it was necessary to have special characteristics and detailed knowledge of both these areas. Kaplan had the necessary know-how as he had been professor at the University of Orsay, president of the *Société française de physique* (French Physics Society), technical director of the *Compagnie générale de radiophysique* and director of Thomson CSF's central laboratory. He could operate in both networks. He created a small company, Alliage, which employed post-docs to be the interface between researchers in public laboratories and companies. However, these project managers did not remain in these jobs very long because the salaries in these positions were much lower than those in a more managerial career. When the day came for Daniel Kaplan to become heavily involved in a start-up creation project, he pulled out of Alliage, and the interface was much less efficient. High-calibre profiles like his are called for in jobs which are much more highly regarded.

In Silicon Valley, some Japanese companies which I studied, realised that the interface with organisations which had a very different culture needed very high calibre profiles. They had no qualms about entrusting the running of a small team of about ten people to executives who had previously managed around 4,000 people. Unfortunately, most companies are not yet able to assess correctly the level of qualifications and knowledge necessary to ensure this role of interface appropriately, or the benefits such a well-designed interface might bring.

Presentation of the speakers :

Thierry Weil : graduate of the École polytechnique and Corps des mines, PhD (physics). He is a professor at *Mines ParisTech*, chairman of the *Observatoire des sciences et des techniques*, and advises companies on innovation management. He was a researcher at Thales, research director at the *École des mines*, and technical advisor to the Prime Minister.

François de Charentenay : graduate of the *École Supérieure de Physique et Chimie Industrielle*, PhD. He began his career at the *Institut Français du Pétrole* as a research engineer. In 1973, he joined the founders of the Compiègne University of technology where he created a laboratory for polymer and composite materials. In 1986, he joined the PSA group : he was appointed research director in 1992. In 2001, he created a consultancy, ITAC. He is a founding member of the *Académie des technologies.*

Germain Sanz : graduate of the École polytechnique. He carried out research on steel, following which he was in charge of IRSID. He subsequently managed the R&D department at Sollac, then Usinor, and finally he was head of innovation at Arcelor. He is a member of the *Académie des technologies* and a corresponding member of the Spanish *Real Academia de Ingenieria*. He is president of the working group on sector-based studies at FutuRIS.

Translation by Rachel Marlin (rjmarlin@gmail.com)

[1] Daniel Kaplan, Faire vraiment coopérer chercheurs et industriels, *Les Annales de l'École de Paris,* Vol. IV.