Report from the Advisory Committee of the Solvay Institutes

2009

Executive Summary

The committee has found that

- The Solvay Institutes are run in a most impressive and competent way.
- Within the existing organization there is not much room for a large extension of the activities.
- The Solvay Meetings are the pearls in the activities and every effort should be spent to uphold this level.
- The Solvay Workshops are held at very high scientific levels with excellent speakers and participants.
- The Solvay Chairs and the Solvay Colloquia play a very important role for the universities in Brussels to get exposed to world-class scientists.
- The Solvay Public Lectures are of utmost importance to foster interest in the most modern science within the public mind.
- The Solvay Institutes play an important role by providing means for postdoctoral and graduate student fellowships.
- The Solvay Institutes build an important bridge between the two language groups in Belgium.

The committee has the following recommendations

- The Solvay Institutes should strive towards at least 50% funding from the endowment to ensure long-time planning stability.
- The Solvay Institutes should broaden the scientific committee to also have members from outside Brussels.
- The Solvay Institutes could increase slightly the number of workshops and try to cover a broader spectrum of topics both in the workshops and the colloquia.
- The Solvay Institutes should take an active role in promoting new subjects to facilitate for the universities to go into new modern areas.
- If new initiatives are taken they must carry the same excellence stamp as the other programmes.
- The Institutes should try to open up towards bio-physics/bio-physical chemistry, which are present in other departments than physics and chemistry. Issues in life science will most certainly be driving much of science this century.

Introduction

The committee that consisted of Prof:s Lars Brink (Gteborg), chair, Leticia Cugliandolo (Paris), Gunnar von Hejne (Stockholm), Hermann Nicolai (Potsdam) and Hirosi Ooguri (Pasadena) met in Brussels on March 23 and 24, 2009. Unfortunately Prof. Jacques Prost (Paris) was unable to attend the meeting. In order to prepare ourselves we had obtained the annual reports for the last three years together with information about the budget. On March 23 we interviewed Prof:s Alexandre Sevrin and Marc Henneaux and on March 24 we had extensive interviews with Prof:s Barnich, Craps, De Wit, Gaspard, Geerlings, Goldbeter, Lambert, Wyns and again with Marc Henneaux. Between and after the interviews and at the dinners the committee had its deliberations.

The committee found that all interviewees were very enthusiastic about the Solvay Institutes. They are all committed to the cause to run the various activities and to uphold the excellence stamp that the name Solvay carries. Apart from the secretariat, the work behind the activities is performed on a voluntary basis within the academic positions. This puts a limit as to how much work the staff can do for the Solvay Institutes. We will comment more on this fact later. Let us first discuss the economy and go through the various activities.

Economy

The committee was impressed by the fact that the Institutes could be run on such a relatively small budget. One reason is that the funding is very efficiently used and another that the universities contribute their share by paying for the salaries of the academic staff and for the localities. **The committee is quite concerned about the proportions in the budget. Only some 20% of the funding comes from the endowment.** For corresponding institutes the figure is considerably higher. Even though most of the remaining funding is secure on a long-time scale **it would be advantageous to strive towards a funding from the endowment which is at least 50% to consolidate the financial base for the institutes.** This would make the long-term planning much easier and would reduce the workload for the director. We will remind that all the activities around the Nobel Prizes including the prize work and the prizes themselves are paid for by the Nobel endowment.

Within the existing organization there is not much room for a large extension of the activities. If it is decided to increase an activity or to start a new one it is crucial that the excellence level is kept.

The committee will make some suggestions for slight increases in the activities that should be possible to implement with just a small budget increase.

The Solvay Meetings

The committee can only congratulate the Institutes for having re-established these meetings at a level comparable to the famous ones of the first half of the last century. The meetings are the pearls in the activities and every effort should be spent to uphold this level. These meetings are unique in the scientific world.

The Solvay Workshops

Together with the meetings these workshops on more restricted topical issues are the most demanding activities. Three or four workshops a year have been organized and the quality

of them has been very high. It is clear that the name Solvay carries such weight that it is easy to get top-level speakers and participants. With an increased activity in chemistry we can foresee a demand for a slight increase in the number of such workshops. This can be achieved without lowering the quality but it will require more work from the staff. We will comment more on this fact below.

The committee that decides about the workshops as well as the Solvay chairs is a local one from the two universities in Brussels. Even though the workshops are regarded within Belgium as a Brussels activity, from the outside they are more regarded as a Belgian activity. It would be advantageous to have a broader base for the committee. In a first step some members could come from other Belgian universities and in a second step some from outside Belgium, say from neighbouring countries. Such a committee will bring in new ideas, which will broaden the programme. Adding external members would enhance the authority of the committee and help to keep up the excellence. It would be healthy to have competing suggestions for workshops and it would help the staff in Brussels if also people from other Belgian universities sometimes take responsibility for organizing a workshop. They should still be held in Brussels and with the short distances between Belgian cities there should be no problem for people from other universities to both organize and participate in the workshops.

Especially the chemistry community in Belgium should be made more aware of the activities and be encouraged to be involved in planning and organizing workshops. The committee has found that the name Solvay is more known for excellence in scientific activities within the physics community than in the chemistry one. A number of high-level excellent workshops in chemistry can change that. This should have a high priority.

Solvay Chairs

This activity has been very successful so far. A number of very distinguished scientists have accepted to come to Brussels for a month or two and in all cases they have brought a lot of life, excitement and new knowledge into the Belgian scientific community. We foresee a level of at least one in physics and one in chemistry a year. Since the aim should be to get the leading scientists in the world it is more important to be able to keep up the excellence than to expand the programme too much.

With the broadening of the scientific committee we foresee proposals of names representing subjects not directly present in the departments in Brussels. Such proposals should be encouraged and sometimes the chairs could be used to introduce the local scientific community to new important subjects. This could be a way to prepare the departments to open up into these fields and make young researchers interested in those subjects. In such cases it is of course especially important to make sure that the chair be well integrated into the host department.

Solvay Colloquia

The Solvay colloquia have by now been very well established even though it seems that the chemistry community has been slower to embrace them. Again the committee is impressed with the choice of lecturers and sees it as imperative that the excellent level be maintained. With a broader scientific committee we believe in a broadening in the choice of subjects and this activity can also be used to introduce the local community to new important subjects.

This has certainly been done already, but the committee should keep in mind its role in the strategic planning of future activities in the departments.

Colloquia are very important in the scientific activities of a department. In the modern world when the scientists get more and more duties it is easy to skip a colloquium. That is not a good solution though. An interesting colloquium broadens the knowledge and introduces the scientists to new ideas and techniques that might be useful in the future. One way of getting the whole faculty to attend a colloquium is to let them meet the speaker both before the event and after, to involve the whole department in the activity. To get the graduate students involved, a good idea could be to have a free-lunch pre-colloquium with a local scientist giving a background to the subject of the colloquium.

Solvay Public Lectures

The Solvay public lectures have been of utmost importance to foster interest in the most modern science within the public mind. The lecturers chosen have been extraordinary and the lecture theatre has been full at every occasion. Even though this is a very costly activity one cannot overestimate its importance in the modern world with so many temptations. It shows to the young students the beauty of science and will help some of them to contemplate a scientific career. It shows to the common listener how advanced and how fantastic modern science is, and it helps to demystify the world and show that it is governed by scientific laws which we can comprehend.

Solvay Graduate Programme

Recently the Solvay institutes have got involved in a graduate course programme in String Theory together with Paris and Amsterdam. This course is held for first-year graduate students from the three cities and the students spend three weeks in each city. This programme has been very successful. The students get exposed to very qualified teachers and they get a chance to meet and work with the students from the other two cities. The committee strongly believes that this effort should be encouraged. A modest contribution seems to be enough to have the programme going. The committee would encourage the Director to examine if this could be called a Solvay Graduate Programme. This would mean that the overall responsibility is taken over by the Solvay institutes.

Even though chemistry is divided into small disciplines and it might be difficult to find enough many first-year graduate students with common interests, it should be known in the chemistry community that the possibility of having a Solvay Graduate Programme exists. It is imperative though that such a programme must involve excellent teachers and be held in a subject of great importance. Again, collaboration with one or more universities outside Belgium is desirable.

Post-doctoral and Graduate Student Fellowships

The committee has noticed the great voluntary work that many people on the faculty perform for the Institutes. A good way of rewarding this work is to finance either a graduate student or a post-doctoral fellow for those persons. Apparently, within the Belgian system of financing graduate students it is difficult to find funding for foreign students in their first years in Belgium. A grant from the Solvay institutes can be a handy way to overcome this problem.

If Solvay Institute funding is used for such positions it is mandatory to ensure that the excellence of the students match the status that the name implies. The post-doctoral fellow or the graduate student could be called "Solvay fellow" and "Solvay graduate student" resp. to increase the attraction of the positions.

Another scheme for fostering excellence in Belgian science that the Institutes may wish to contemplate is to advertise two "Solvay Post-doctoral Fellowships" one in physics and one in chemistry, each year. The winners of the competition should then get a position for five years where it is mandatory that the first two or three years be spent abroad and the remaining years at an institution in Belgium. This would give exceptionally gifted Belgian students a chance to get postdoctoral training in the best universities in the world for a longer period and then be given enough time back home to get established in the Belgian system.

Staff and Support for the Director

The committee has understood that the success of the Solvay Institutes rests heavily on the tireless and excellent work that the Director and the secretaries perform. Also the enthusiasm of the other persons involved is necessary for the success. The board should be aware that within the present set-up one is close to the limit for what can be achieved. As the staff becomes more and more experienced a modest increase in the number of workshops could be accommodated but any new activities will have to be balanced against the administrative load.

The committee finds the workload of the Director to be extremely heavy. Not only does he have to actively work for the funding of the Institutes and oversee all the activities but also take a very active role in the daily running of the Institutes. It would probably be advantageous if the Director could be helped in his endeavour by a Deputy Director with clear administrative responsibilities. This would allow the Director to concentrate on the more strategic work. If such a Deputy Director is appointed she/he should preferably be chosen from a field that is complementary to the one of the Director.

A very important aspect of all the activities is the documentation on internet. To promote the activities and to lighten the burden for the secretariat an efficient system for registration and communication with lecturers and participants in meetings and workshops is mandatory. Some external professional help is probably necessary to implement such systems. The normal running of the web pages is performed very expertly by the staff. At some stage an efficient search engine would be needed. That would also demand an extra effort both in workload and in costs.

The Solvay archives contain material of utmost importance for the history of science. In some respects they are unique in the world containing correspondences between some of the most important figures in the history of science. The Institutes should try to set up a programme financed outside the normal budget where all this material be made available to the general public. Also the lectures and discussions at the Solvay meetings should be made available. One can here compare with the Nobel archives, which are increasingly made available on internet (apart from the ones which are still confidential.) It would be advantageous to have as much as possible of this done before the anniversary in 2011.

Benefits for the Belgian Community

During the discussions with the staff and the Director the committee became well aware of the important bridge that the Solvay Institutes build between the two language groups in Belgium. The commitment to this cause is very strong and we heard appreciations for it from many corners. These efforts will of course continue but it is important for the board to be well aware of it and support it.

The Institutes can also build new bridges between physics and chemistry. The overlap does not seem to be too strong now, and the Institutes can take advantage of having physics and chemistry together under the same board and director. The committee also noted that bio-physics/bio-physical chemistry does not seem to be present in the physics or chemistry department but in the biology and to some extent in the medicine departments. The Institutes should try to open up towards those directions and get them more integrated in the work.

The institutes should also use its position to introduce new important fields in physics and chemistry to the universities. In the end it is the departments and the universities that decide about future directions but the activities of the Solvay Institutes should help them in these decisions. This is another important role for the Solvay Institutes within the Belgian scientific endeavours.

Conclusions

The committee is well aware of the differences between physics and chemistry. In physics the most basic questions about our world are raised and the Solvay meetings became famous precisely for raising those issues. This is still true for the modern Solvay meetings. Physics also has a long list of heroes with Albert Einstein and Niels Bohr as the top figures. They are all well known by everybody and their association with Solvay meetings are equally well known. In contrast, the great achievements in chemistry are not as well appreciated by the general public, and the Institutes have to keep this in mind when planning their activities. On the other hand chemistry is closer to the industrial activities and those industries have played a vital role in Belgium. Opening up towards the interfaces between physics, chemistry and biology could bring in basic questions about life, issues that will most certainly be driving much of science this century. Here the different Solvay activities could play a decisive role in the contemporary world.

One experience from recent Solvay Conferences and Workshops that the committee noted is that while the physicists want to have all the talks directly available on the internet, the chemists often want to have meetings between closed doors, being afraid that intellectual property rights might otherwise become compromised or that important new ideas might be exploited by competing groups. The Institutes have to keep this in mind when making information available.

The overall impression that the committee has obtained is that the Solvay Institutes are run in a most impressive and competent way. It is remarkable that the director and his staff have re-established the Institutes as world-leading institutions so swiftly, and the committee can only congratulate Belgium and the scientific communities in physics and chemistry to this achievement.

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