

Review

Interactions and Partnerships with Academic Teams as a Source of Innovation: from Collaborative Research Projects to Open Innovation

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Introduction

HORIBA Jobin Yvon is committed to serving the scientific and spectroscopy communities. These are fast moving communities, and in order to keep a leading position, innovation is a must. The scientific community is also a major innovation source, and as a consequence it is of foremost importance for HORIBA Jobin Yvon to work with academia. The objective of this paper is to present some of our current innovation practices in HORIBA Jobin Yvon, that combine a variety of interactions with academia and internal innovation efforts, to better serve Scientific Instrumentation users.

Development of New Scientific Instruments through Collaboration with Leading Scientists

Formal and Informal Collaboration with Scientists

Collaborating with academic leaders is in the genes of HORIBA Jobin Yvon, from its foundation in 1819 as Ateliers Soleil manufacturing the original lenses of Augustin Fresnel or at the turn of the century when Amédée Jobin built instruments for the famous optician Charles Fabry, the inventor of the ubiquitous “Fabry-Pérot” interferometer. A few other examples of collaborations that proved very successful are the collaboration with astronomer A. Labeyrie on the holographic inscription of gratings, for which HORIBA is now a world champion or the collaboration with Raman pioneer, professor Delhayé, who was amongst the first to envision the coupling between Raman analysis and microscopy, and with Australian scientist Dick Payling, who was amongst the first to envision a broad use for the Glow-Discharge Optical Emission Spectroscopy technique. These long-term collaborations have been key for building the leadership of the company in these fields. Presently, new contacts and interactions are built with scientists

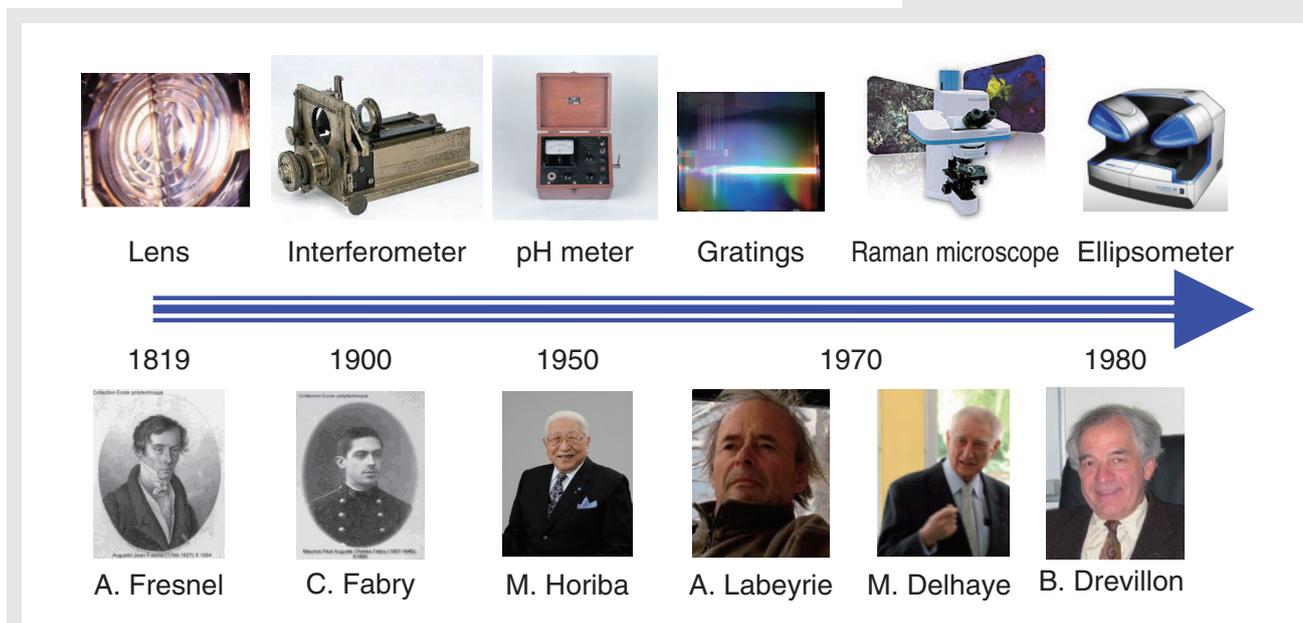


Figure 1 Cooperating with leading researchers worldwide to transform scientific discoveries into scientific instruments

all over the world, and win-win collaborations are developed, with the ambition to provide new technologies and new instruments to the company for the 21st century. (Figure 1)

The company has appointed a handful of scientific advisors, who are scientists with major recognition in their field, who spend several days per year in the company, interacting with both management and technical teams, to help with their expertise and networking ability.

While some decades ago partnership was mainly based on individuals, the present trend is to have more formalized partnerships, that encompass several institutions. An example is the recently-created Institute for PhotoVoltaics in Paris region, denominated IPVF. This institute has been created under the impulse of two major French research institutions (Ecole Polytechnique and CNRS), two very large energy companies (TOTAL and EDF), and has been opened to companies with a more focused interest. HORIBA Jobin Yvon joined this Institute, and anticipates fruitful interaction with high-level scientists in the field of instrumentation for photovoltaics, and more generally for thin film research.

Collaborative Projects

HORIBA Jobin Yvon has been participating to several collaborative projects, either at regional, national, or European level. These projects include one or several academic teams, and in some cases other companies. It is a general trend worldwide that academic teams get an increasing part of their research money through research project grants, after a competitive process of project selection. This is an incentive for scientist to build projects that include industrial partners. Participating to collaborative research projects has



Figure 2 The AutoSE ellipsometer benefits from the advances obtained during the “scatteromueller” collaborative program

become for HORIBA a useful path for improving our instruments and adapting them to the demand, as well as prototyping brand new solutions.

In some examples, the collaborative project includes a workpackage on instrument improvement. As an example, the “scatteromueller” French collaborative project included one academic team with extensive knowledge in polarimetry (Figure 2), one applied research institute focused in microelectronics, and HORIBA Jobin Yvon. In the course of the project, several improvements have been achieved, such as increased spatial resolution, and higher precision. These improvements have been included in the latest version of the Auto-SE commercial ellipsometer.

Another very important aspect of collaborative projects is that it allows us to adapt our current instruments to new fields of science. As an example, the “OLAtronic” project is a multi-partner European project that deals with a field of growing importance (Figure 3), which is plastic electronics. While ellipsometry is well known in the semiconductor community to be a useful tool for research, development, and process control, the interest of this instrument in the context of plastic electronics had yet to be established and documented. HORIBA Jobin Yvon participated to this program, which included the adaptation of an ellipsometer to a Roll to roll unit, on the pilot line of a partner. We were able to demonstrate and publicize the interest of ellipsometry for plastic electronics.

Because scientists use many different instruments to carry on their research, coupling between instruments has become very important. Collaborative projects encourage scientists and companies with different fields of expertise to join forces, and as a consequence they provide very efficient ways of investigating both the technical aspects and scientific impact of coupling between different instruments, in various applicative contexts. As an example, the French-funded “Hybrid Imaging for Oncologic Microscopy”

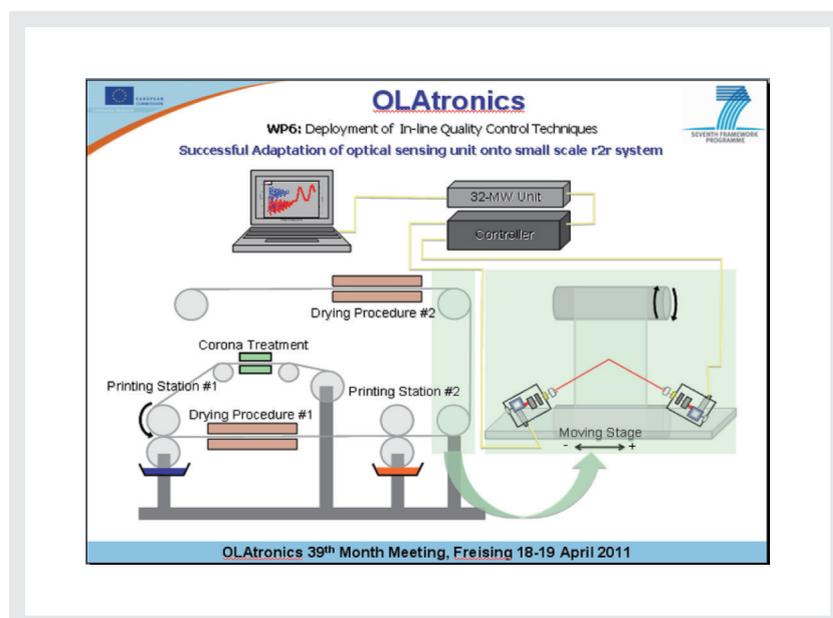


Figure 3 An example of European project in which HORIBA Jobin Yvon participated, and successfully adapted one of our ellipsometers to the field of organic electronics

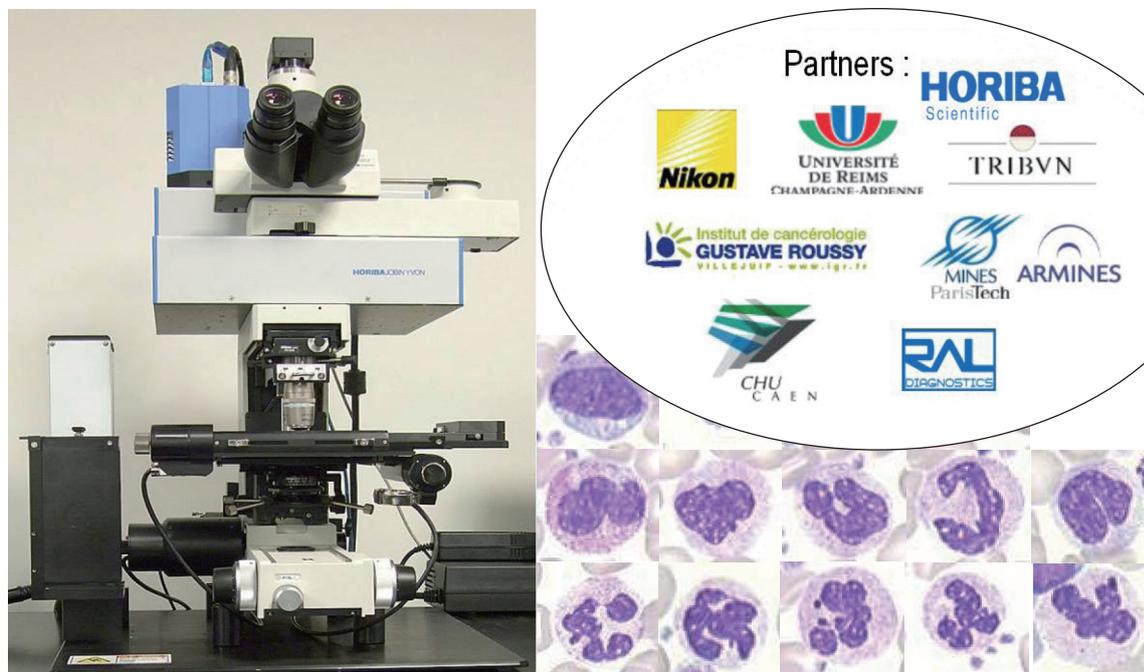


Figure 4 Special Raman microscope including multispectral imaging ability (left), built within a collaborative program with nine participating partners (logo on the upper right), in order to perform automated classification of human lymphocytes (bottom right)

(IHMO) project ambioned to perform automatic classification of human lymphocytes, for health-related applications, based on combined hyperspectral and Raman imaging. This work was carried by nine partners, including two hospitals. HORIBA contributed by building a dedicated version of a Raman microscope that included hyperspectral imaging, and the combination of the two techniques was shown to be very promising. (Figure 4)

The coupling of Raman with AFM, along with new imaging modalities on our Raman and ellipsometric platforms, have also been investigated both in the frame of collaborative projects.

Last but not least, collaborative projects can be a very adequate frame for developing entirely new instruments, based on the vision of one of the partners. This is the case of PP-TOF MS instrument, described in detail by Patrick Chapon and Agnès Tempez in this READOUT.

Open Innovation

The term “Open Innovation” is a term that has been coined in recent years^[1] by Professor Chesbrough, to express that companies can tap into innovation resources not only in their R&D and marketing departments, but also in many other places within and outside the company. It also states that some findings of R&D team within a company, can be exploited in a more fruitful

and rewarding way, outside the company, rather than inside the company. The “Open Innovation” movement led to numerous success stories, featuring cases where the company staff, but also the customers, the industrial partners, or contributors completely unknown to the company, could interact in a win-win situation to create innovation and value. This may be a not so new statement for Horibarians, following the founding principles of Dr. Masao Horiba.^[2] Indeed, the OEM activities in the field of gratings and spectrometers, can be seen as an excellent example of Open Innovation practices, though they have been developed long before this term was coined. This is because our OEM activities involve long term win-win relations, with a customer who acknowledges that some part of the system he is designing (the spectroscopy part in our case) could benefit from our guidance and expertise in the design phase, and from our commitment in the production phase.

Open Innovation is useful to a wide range of our activities in addition to OEM. The company has a number of assets for carrying successful Open Innovation approach, as will be discussed below.

Being in the Right Place

While collaborative programs with academics follow very formal procedures once they are engaged, Open Innovation relies on more informal encounters and connections. As a consequence, a key enabling factor for innovation is being connected in a rich environment. Under that respect, the new HORIBA building, at the heart of the Paris Saclay Campus, is a major asset. The Paris Saclay area is a major Science place, hosting some of the most prestigious universities, research centers, and engineering schools in France. In 2008, it represented about 10% of the Public Research in France, 10 000 researchers, and 21 000 students. By 2016, 7 new engineering schools and 3 major research institutions will move to the Paris Saclay area, increasing the number of researchers by 3000, and nearly doubling the number of students. The new HORIBA Building in Paris Saclay is an asset not only because of the quality of its technical facilities, not only because it is conveniently located in a major hub for HORIBA Scientific customers, but also because it will facilitate interactions with innovative researchers, visionary customers, highly creative and motivated students. It is our responsibility to make the best out of this situation. (Figure 5)

Sharing Knowledge and Experience

The “Open Innovation” paradigm underlines the importance of cross-fertilization. Cross-fertilization begins inside the company, and the monthly 1-hour seminar is one of the opportunities for that. As an example, the presentations in that seminar given by Dr. Benferhat on “Serving the Chinese Scientific market”, and by Dr. Ayasse on “Serving the Brazilian market”, were very well attended and appreciated. It participates to the shared knowledge within the company, and this knowledge is expected to contribute to the success of one of our products specifically designed to cope with specific requirements of Chinese customers. It is to be noted that the innovation in this product has not so much to do with technical features, but



Figure 5 New HORIBA building in Palaiseau, at the heart of Paris Saclay Campus: Artist's rendering (left); building work in progress (right); Map of the research and high education places located nearby the HORIBA building on the Paris Saclay Campus

rather with sales and delivery aspects. This is consistent with the Open Innovation motto, that innovation is not something specific to R&D. Scientific and professional societies are also useful for networking and promoting fruitful encounters. HORIBA Jobin Yvon is active in the SFO and EOS, which are the scientific societies at the national and European level; in the French Optics and Photonics industrial association (AFOP), presently headed by HJY President; and in European-scale European Photonic Industry Consortium (EPIC).

Tapping into the Company's Creativity

In 2009, HJY organized an Innovation challenge in France, where employees were encouraged to suggest ideas for innovative products or improvements. This challenge was conducted in two steps: in the first step, a very short description of the innovation was required, so that it was possible to participate even with little extra-work from the individual or the team that carried the proposition. The Strategic Committee selected the propositions that appeared as the most relevant, and asked more details. In the second round, the person or the team that carried a nominated proposition presented the idea in an oral form to the Strategic committee, allowing a direct interaction. The most promising suggestions were prized and investigated in more detail through cooperation between the proposer, the HJY Innovation

team, and in some case an academic partner. With a three-year distance, it is now possible to draw some conclusion of the impact of the challenge and subsequent actions. One of the most ambitious proposition issued during this challenge has turned into an ongoing instrumentation project, with the first beta users to be served in possibly less than a year. It should be mentioned that at the time of the challenge, this proposition had appeared as a desirable but unrealistic dream, and as a consequence it had been rejected by the Strategic Committee. But the Innovation challenge had made it possible to share the dream, and some time later other people in the company found some ways so that the dream could become reality. Building connections and initiating cooperation between people who would not have worked together otherwise, has been another positive outcome of the challenge. In 2010 a challenge was carried in the German branch, focusing both on sales practices and innovative products.

Acting Swiftly to Seize Opportunities

Having nice ideas is not sufficient to carry on innovation projects, since it may require some time and resources that do not fit within existing plans. Making bottom-up initiative possible, allowing people to spend some time and resource for it, and providing recognition for the most promising ones, is therefore necessary. The BlackJack contest is one of the useful paths to it for all Horibarians, and the IP challenge is also very useful in that respect. In order to seize opportunities that require significant time and effort to be pursued, the creation of the Innovation team in 2009 has made possible the investigation of several projects. These projects were started from suggestions coming from different parts of the company, and from academic teams. Some of these projects are expected to go into development phase by the end of the year.

Conclusion

HORIBA Jobin Yvon has been using many of the Open Innovation best practices, such as combining fruitful interaction with academic partners, with the vision and the contribution of many different people within the company. The new implantation at the heart of the Paris Saclay Campus is an asset not only to be closer to some of our major clients, but also to maximize interactions with academia, as a source of innovation.

References

- [1] “Open innovation”, Henry W. CHESBROUGH, Harvard Business School Press (2003)
- [2] «JOY and FUN», Dr. Masao HORIBA, Published by «JOY and FUN» publication project (1998)



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