



Science and Innovation Made in Switzerland



*vision*

# In the race to innovate

## Switzerland must move quickly

Interview with Eric Fumeaux, Director of the Federal Office of Professional Education and Technology

**Feature:**  
Energy research  
in Switzerland

**Higher education:**  
Evaluation of the newly  
created universities of  
applied sciences

**SUPPLEMENT: National Centre of Competence in Research "North-South"**

# “In the race to innovate, Switzerland must move quickly”

As the Swiss Federal Government prepares to publish its general policy document on education, research and technology for the years 2004 to 2007, Eric Fumeaux reviews the situation with regard to the universities of applied sciences and encouragement for innovation, two issues for which he is responsible as director of the Federal Office for Professional Education and Technology (OPET). He underlines the need to intensify the reforms that have taken place. Otherwise, Switzerland will be left behind in the international race to innovate.

*Scientific and business leaders stress more and more the need for Swiss science not to rest on its laurels in a situation of ever tougher international competition. Is the competitiveness of Swiss science under threat?*

**Eric Fumeaux:** Projections on the basis of international indicators such as expenditure on research or economic growth show that, in effect, Switzerland could soon lose its leading position if it does not react now. For a small country such as we are, that means among other things that we can no longer allow ourselves to try to do everything. We have to make choices, something we are not accustomed to do. But the international indicators also confirm that Switzerland still has a very solid scientific base. We have to devote ourselves to better exploiting this potential, notably in strengthening the interface between research and business. The gap existing between

these two worlds today represents one of our big weaknesses. We also have to consider education at all levels, from primary school to university. This is why I argue for a global strategy for innovation.

*What do you mean by that?*

**Fumeaux:** The arrival of the knowledge society obliges us to improve the performance of our whole system of education and research with two complementary objectives: excellence – to be the first to discover and to teach – and innovation – to be the first to apply discoveries. And, to be the first to apply, we must offer an education adapted to the new demands of the knowledge society, to make active and systematic use of our scientific potential, promoting a real culture of innovation and entrepreneurial spirit, and, finally, affirming Swiss excellence and innovative capacity at an international level.

Training, research and technology will in future determine the reputation of our country.

*Let's start with training. The universities of applied sciences, the UAS, were created exactly for this reason – to provide education close to practice and to link research and business. Are you satisfied with progress here?*

**Fumeaux:** I am relatively satisfied. The universities of applied sciences are today a reality on the Swiss higher education scene. The organizational model chosen, that is concentration and a geographic division into seven universities, is generally accepted. Collaboration is starting to be institutionalized, not only among the UAS but also between them and the other types of universities in Switzerland, the Federal Institutes of Technology and the cantonal universities. The project is progressing well. But there is still much to do, both by 2003, the year when the certification given by the Confederation to the UAS is to be renewed, and afterwards during the next financial period of 2004–2007.

*Is the certification renewal the reason why the Confederation peer-reviewed the universities of applied sciences last year?*

**Fumeaux:** That was not the aim. All the courses of study were evaluated by international groups of experts by



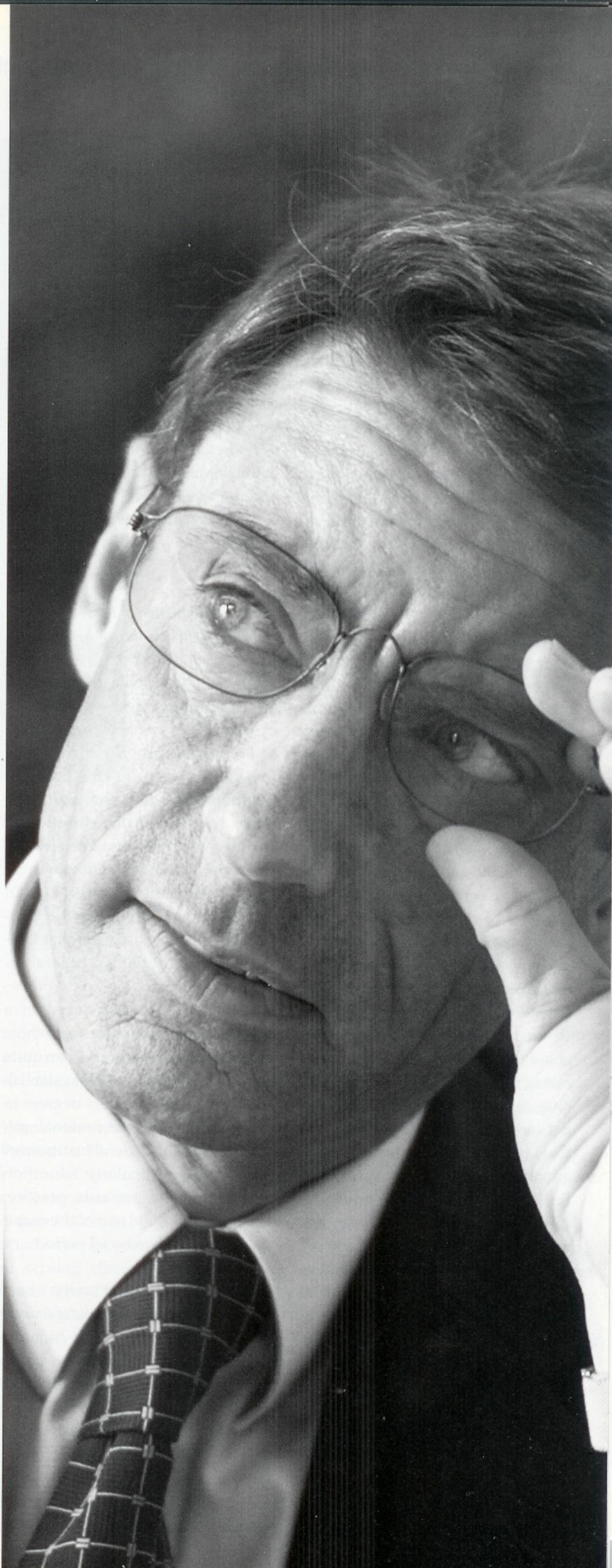
✓ **We can no longer allow ourselves to try to do everything. We have to make choices.**

✓ **Geographic concentration is certainly one of the challenges. It is a difficult but indispensable operation.**

on-site-visits. Primarily we wanted to have the outside experts view on the quality of the services of the UAS at a particular point in time and obtain an indication of their situation in relation to the objectives they have been set. But there was no idea of sanction in this procedure. The results – which we recently published – are moreover globally positive. As in all the stages of the creation of the UAS, the peer review took place in an atmosphere of dialog. The evaluation report is designed to help the institutions define their strategy: if it shows that a particular domain of teaching is weak, it is for the university to decide, depending on its goals, whether to drop the subject or devote more resources to it. Through this evaluation of unique breadth for Switzerland, we also wanted to promote a culture of evaluation in higher education in the longer term.

*What remains to be done to complete the reforms of the UAS? There is a lot of talk about concentrating courses of study that will be necessary to reach the critical mass demanded by the Swiss Federal Government...*

**Fumeaux:** We currently find ourselves in a phase of reengineering – a phase when we are getting the UAS really up and running. This will end in 2003. But the time to sit back and rest will still be a long way off. We



✓ **The more a UAS obtains third-party financing for its research projects, the more it will receive in grants.**

have to face a whole series of challenges to make a reality of our vision of a unified and complementary academic landscape integrating the UAS, the Federal Institutes of Technology and the cantonal universities all with the same level of quality and international recognition. Geographic concentration is certainly one of the challenges. It is a difficult but indispensable operation. I think that the UAS have understood this. And certain regions have already done some remarkable work. Be that as it may, the question of concentrating forces is not just an issue for the UAS. All the Swiss institutions of higher education have to face this challenge and will have to continue to do so in future.

*Because their certification is to be renewed in 2003, however, the UAS are much more nervous about this situation...*

**Fumeaux:** The UAS must develop a strategy. Given that the monetary resources of the cantons and Confederation are limited, the UAS are advised to make choices and decide about their principal efforts in education, research and services. In the long term, the Confederation will not continue to finance departments that attract too few students. The quantitative criteria of the Swiss Federal Government for renewing certification in 2003 have been defined and are known by the cantons. We will make them more detailed in the next financial period (2004 to 2007).

*What are the other challenges you identify in the next financial period?*

**Fumeaux:** In education, it will be to introduce the bachelor and master system according to the EU's Declaration of Bologna. The education profiles, the descriptions that serve as a reference for a university course

of study on national level, are still not uniform. They have to be refocused. Then, once the Federal Law on Universities of Applied Sciences is revised, it will enable education in the domains of health, social work and the arts to be incorporated into a unified national system. At the moment, they are regulated by the cantons.

*Are the introduction of the bachelor and master system and the concentration of courses of study linked? One could envisage that, in a particular discipline, the basic education would be offered by several UAS and the masters by one or two institutions only at a national level...*

**Fumeaux:** The discussions will certainly be going in the direction of an inter-UAS masters. We are currently in the conception phase of the bachelor and master system in collaboration with CRUS, the Conference of Rectors of Cantonal Universities and of the two Federal Institutes of Technology, so that these diplomas will be introduced in a coherent fashion across the whole higher education system. I can quite envisage that the UAS will establish and offer certain masters degrees in collaboration with the cantonal universities and the Federal Institutes of Technology, particularly education that is oriented towards practice. This reform will be one of the major tasks of the next financial period.

*Is it also possible that the system would be split between the two types of university – the UAS offering the bachelors and the cantonal universities and the Federal Institutes of Technology offering the masters degree?*

**Fumeaux:** That does not correspond to the political goal of creating, through the UAS, a new channel of education of a standard that is equivalent to university-level train-

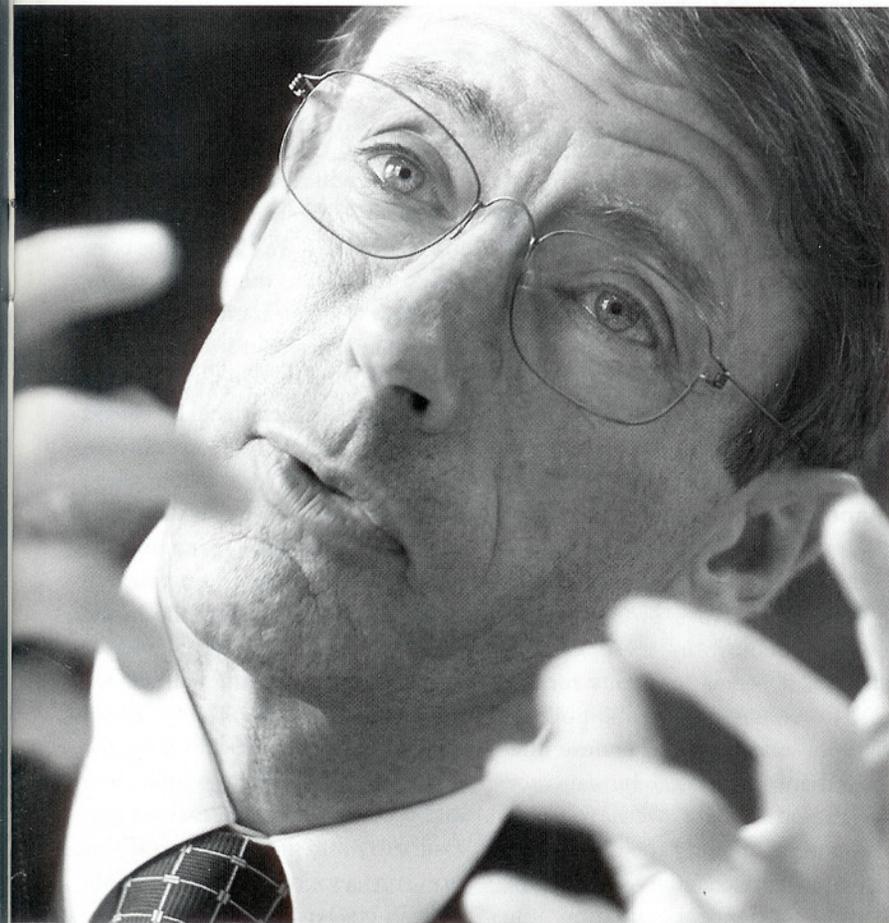
ing. To be recognized as universities at a national level and above all internationally, the UAS must offer education leading to masters degrees. It is not excluded that such a division of responsibilities may be considered in certain specific cases. But creating the UAS would have made no sense if they could not offer their own masters.

*Another major task with regard to the UAS concerns the two new missions given to these universities, that is applied research and services to the outside world. How do you plan to encourage their development?*

**Fumeaux:** More resources must be devoted to these activities. This will be one of the topics of the next Message from the Swiss Federal Government on the promotion of education, research and technology during the years 2004 to 2007, which will set out the prime strategic orientation of the Confederation in these domains. Currently, according to federal statistics, 9% of the global staff of UAS work in applied research and services. This is clearly insufficient if we want the UAS to play a key role in the chain of innovation.

*How can the financing of applied research be increased within the Confederation's powers? Through the budget of the CTI, the Commission on Technology and Innovation?*

**Fumeaux:** That is one way. We would also like to give proper financing to research by collaborating with the cantons: a part of the grant to UAS will be explicitly reserved for these activities. To that will be added the introduction of financing specifically dependent on performance. This will correspond to the situation of the university world: the more a UAS obtains third-party financing for its research projects, the more it



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will receive in grants. This will help research to expand. I hope this new model of financing can be introduced with as little delay as possible.

*The CTI itself was also the object of a peer review recently. The results have not yet been published. What was the aim of this evaluation?*

**Fumeaux:** The CTI was evaluated jointly with the National Science Foundation by international groups of experts, some of whom served in both groups. From the CTI side, we wanted to know if our strategic conceptions were heading in the right direction. Because of an acceleration in the number of requests, the CTI faces two choices: should it restrict its range of services to respond better to demand in certain sectors or, on the contrary, expand and ask for

more resources? As I have already said, we are asking for our budget to be increased.

*What do the experts say?*

**Fumeaux:** First of all, the experts confirmed the validity of the strong customer orientation of the CTI. This element is crucial in the field of applied research, where it is a question of serving clients with short-term needs. The CTI was also judged as very flexible, capable of adapting its services very quickly to scientific developments. The third point highlighted in the peer review was that the CTI responds rapidly to the requests that are presented to it.

*And the weak points?*

**Fumeaux:** The first concerns financial resources. By international com-

parison, public funds for applied research are incredibly small in Switzerland. The experts recommend doubling, even tripling, the budget of the CTI rapidly. The second weak point: although things are going in the right direction, notably through the creation of the UAS, the interface between universities and business has been neglected. The reviewers noted in particular that no one in Switzerland has responsibility for what they call "Discovery Projects": projects that are no longer of interest to scientific researchers but have not yet been picked up by enterprises. This job should be the CTI's. In addition, entrepreneurial spirit has to be developed. For that we want to encourage the universities, and especially the UAS, to integrate courses in entrepreneurship into their curricula.

*One weak point often mentioned in the creation of businesses in Switzerland is insufficient coaching for young entrepreneurs and the difficulty of finding capital in the earliest stages of launching a new business...*

**Fumeaux:** These problems do exist. Since last year, the CTI Start-Up Initiative run by the OPET has started to evolve in the direction of becoming a turntable for contacts between entrepreneurs and coaches. We plan to continue efforts in this direction and are now drawing up several agreements with experienced business leaders who are prepared to mentor company creators. With regard to funding the launch phase, the idea of investing public funds in new technological enterprises is worth studying.

*This proposal is somewhat unusual for Switzerland, a country traditionally very careful to have a clear division of jobs between the public and private sector...*

✓ Entrepreneurial spirit has to be developed.

**Fumeaux:** The Swiss attitude aroused incomprehension among the experts. In the United States as in the EU, the state invests directly in start-ups to enable them to put their ideas into reality as quickly as possible. Culturally, Switzerland is not yet ready for that. However, one day

we will have to do some basic thinking about our way of looking at industrial development. Time has become too important a factor in the initial phase of launching a business for us not to study such a possibility.

*Has the possibility of moving the CTI out of the federal administration in the same way as the Swiss National Science Foundation also been studied?*

**Fumeaux:** The question is not posed in these terms. The CTI's job of encouraging innovation is very much related to activities promoting the Swiss economy. In these circumstances, it seems judicious for the CTI to remain close to the political decision-makers and therefore integrated in the federal bureaucracy. On the other hand, we have asked the experts to study the question of a fusion between the CTI and the National Science Foundation into one body responsible for encouraging research. Their recommendation was clear: the cultural differences between these two organizations are such that a merger is not advisable for the moment. The energy required to overcome these differences would divert the new body from its essential tasks.

*The content of the next Government general policy document on education, research and technology for 2004–2007 will be known at the end of November. Apart from the need to increase financial resources, what elements should it include?*

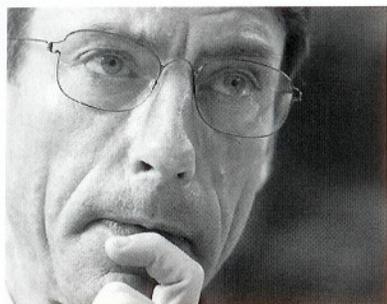
**Fumeaux:** This policy document will speak of the necessity of continuing the reform of the system of ed-

ucation and research. One of its innovations will consist of the fact that it will set out a strategic orientation in a more global way than in the past. Up to this point, the former policy documents were very detailed about how financial resources were to be attributed. Today, science and innovation are characterized by speed and unpredictability. How can one then plan in detail for concrete action in several years? It has become impossible. I hope that managing the global system of education, research and technology will develop in the direction of delivering a service agreement: Parliament will set the objectives and allocate global amounts; it will then be up to the relevant bodies to use these funds best and to determine the measures necessary to fulfill these objectives. This presupposes a relationship of confidence between Parliament and the educational/research system. It will no doubt take some time before this is completely established, but I think we are now going through a period of cultural change.

*How do you mean?*

**Fumeaux:** Gradually Switzerland is becoming aware of the effort that it is being called on to make to preserve its competitiveness and the well-being of its population in a durable way. Tomorrow, I am convinced that the question of the contribution of education, research and technology to growth, to innovation and to individual development will be a central theme of the public debate.

**Interview: Philippe Gagnebin and Almut Bonhage**



**ERIC FUMEAUX**

After graduating as an engineer-chemist from the Federal Institute of Technology Zurich (ETHZ) in German-speaking Switzerland, this Valaisan born at Vétroz in French-speaking Switzerland joined the Lonza chemical concern. He worked there from 1976 to 1988, first as a researcher, then in production and management of the firm's factory in Visp/Viège, and finally joined the group's headquarters in Basel. In 1988, he left the private sector to join the Cantonal administration of the Valais. His job: to establish the School of Engineers of Valais (EIV). In 1995, his mandate as director of EIV expanded to heading the Haute école valaisanne which groups the five cantonal higher education institutions within the University of Applied Sciences of Western Switzerland (HES-SO). He also, from 1998 to 2000, held the vice-presidency of the Governing Board of the HES-SO. Eric Fumeaux has headed the Federal Office of Professional Education and Technology since 1 September 2000.

✓ The idea of investing public funds in new technological enterprises is worth studying.