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Avantium Technologies CEO Ian Maxwell

‘Don’t keep universities at arm’s length’

Avantium Technologies is a very special research company. It is developing a revolutionary approach to chemicals research and it also has a remarkable structure. Alongside the chemical and pharmaceutical companies working together through Avantium, there are also universities acting as both research partners and shareholders. According to Managing Director Dr Ian Maxwell it is a unique network company that fits well into the new economy.

by Wiebe van der Veen

Avantium’s new base in the Sloterdijk district of Amsterdam is not that far as the crow flies from Shell’s Amsterdam Research and Technology Centre. Until last year it was there that Ian Maxwell headed up the Anglo-Dutch multinational’s catalyst research activities. After a research career with Shell going back more than twenty years, he made a significant move at the beginning of 2000. He seized the opportunity to build up a completely new research company. Nine months later Avantium Technologies is in full swing and the new office/laboratory premises are filling up. The step from a secure job in a major corporation to a completely new business is a remarkable one, but Maxwell is in his element.

‘It’s fantastic to see how quickly things develop in small hi-tech companies. A large corporation often has too many management levels to move this fast. For example, you can see how quickly you can set up joint ventures with a small enterprise... We see this kind of speed among Internet companies, of course, particularly in the United States. The chemicals industry might not be moving quite that fast but now I am also seeing a trend, among large companies looking to innovate, to team up with small firms, which can operate faster and more flexibly. I consider myself extremely fortunate to be involved at the heart of these developments.’

Avantium Technologies focuses exclusively on research. Maxwell defines the company’s activity as R&D services—doing research for the chemicals and pharmaceuticals industry using a new approach to chemistry. This approach is called high-speed experimentation and simulation and it involves conducting a large number of tests simultaneously in sophisticated robotized laboratories using intelligent software and simulation techniques. At Shell, Maxwell was involved with these developments at their inception, particularly for the rapid comparison of catalysts, which make chemical reactions go faster. Several alternatives that are relatively similar to one another can be tested at the same time.

‘Shell had to make a choice—invest in this technology themselves or involve others to form a broad technological platform. They opted for the latter alternative through Avantium because of the access to a much wider market and far greater opportunities. The scope of the activities has by now gone far beyond catalysis. Our work is extremely interesting to the pharmaceuticals industry as well, for example. This industry is not particularly well represented in the Netherlands, but there is considerable interest in the United States and Asia in what we are setting up here. In fact, the level of interest is far higher than we had expected. I predict that every chemical company will soon need access to high-throughput facilities in order to keep up. It’s going the same way as the introduction of PCs—I’m quite sure of that.’

This is a real revolution for the conservative chemicals industry

‘Absolutely, but the penny is beginning to drop. However, there is a major debate going on in scientific circles. Opponents say that this technology is used to do a large series of ‘dumb’ tests and that you no longer think about what you’re doing—just loads of simulations and experiments without making proper preparations. But in fact this technology adds extra ‘wings’ to the intuition and creativity of the chemist, who is supported by the many new developments in intelligent software and databases. To be quite frank, I don’t understand what this debate is about. Particularly not if you see how young professionals are really stimulated by working in a hi-tech environment like this. Chemistry and engineering both become more interesting. More modern.’

When Avantium was set up it was decided to have a special relationship with the universities. The University of Twente, Delft University of Technology and Eindhoven University of the Technology have a stake in the new company alongside investors from the corporate sector. They do contract research and they are also shareholders.

‘The universities in the Netherlands are demonstrating how enterprising they are by investing in a new company themselves. I think it’s great, and I also think that boldness is a quality that is particularly suited to the technological universities. This means that greater involvement and a strategic link are replacing an arm’s-length relationship. We believe this approach will enable us to conduct leading-edge research. We are going to share research-related intellectual property. Universities are also sharing in the rise in value, thus making new investment possible. The collaboration is providing a basis for what I consider to be a very bright future.’

Can the universities and research policy in the Netherlands cope with the speed?

‘Well, I admit that a degree of acclimatization was necessary. University research in the Netherlands is based on project proposals and government grants covering periods of three or four years. This sort of timescale is just inconceivable for us. As far as we are concerned six months or a year is very long term. This means you need to think carefully about how roles are assigned.’

The research institute MESA+ from the University of Twente is participating in Avantium, primarily because of the development referred to as the lab-on-a-chip. These are miniature chemical laboratories with tiny dimensions that require minimal quantities of substances.

‘I see the lab-on-a-chip as the next generation, after the robotics we’re using now. I have high hopes for it. So far chips have been used primarily for analysis. They are already on the market for DNA diagnosis, for instance. However, analysis is only one step. What we want to achieve, together with the University of Twente, are real chemical reactions on this very small scale. I’m talking about catalysis here, but also about scaling up to complete plants for new substances.’

This is an area where universities are already doing a great deal of ground-breaking research

‘That’s right. Developments have already come a long way, but in order to achieve a provable system I want to turn the question around and start with the application. I want to make a chip for particular chemicals and reactions. What do I need and where do I need to make improvements? There is certainly no ready-made solution—all sorts of new research questions will come up. But the goal is to have a practical system. The universities are particularly important in this preliminary phase in order to address fundamental questions, to design and to make models. When it comes to actually making the chips, we’ll work with another company, for example a new spin-off.’

There are already 80 people working at Avantium’s Amsterdam base, and the target is 100 by the end of the year. Add a further hundred-plus people in the associated companies and in university research groups, then according to Maxwell the critical mass will have been achieved. ‘Come back in a year’s time and you won’t recognize it,’ he says.

Avantium Technologies is a research organization with Shell Chemicals, Akzo Nobel, W.R. Grace & Co, SmithKline Beecham, Pfizer Inc., software company GSE Systems and venture capitalists SR One, NIB Capital and the Generics Group as shareholders. The University of Twente, Eindhoven University of Technology and Delft University of Technology are also participating in the company, which was set up in February of this year. They will subsequently be paid a guaranteed amount of money to conduct research. The primary contribution from the University of Twente’s MESA+ Institute comes in the form of the strategic research area Micro Chemical Systems of Professor Albert van den Berg. He notes that the world of chemicals is changing rapidly and is actually quite interested in exploring new approaches. ‘The era of microchemistry has really arrived,’ he says. Cooperation in Avantium can give this development a substantial shot in the arm, and he is really keen. ‘The industrial environment keeps you on your toes, because concessions in terms of quality are not permitted. MESA+ is up to this challenge. We have built up a reputation in microsystems through, among other things, involvement in a European microfluidics centre of competence.’

More information: www.mesaplus.utwente.nl.