FOUNDED ON FOUR FIRM PILLARS

Racurs

Founded in 1993 in Moscow, Racurs developed rapidly from a small, specialised software developer into a major, international photogrammetric systems supplier and service provider. About 20% of employees at this high-tech firm work in research and development. I visited the company in the darkest month, December 2007.<P>

Winter lies grey and gloomy over Moscow. The snow is not the white of scenic pictures, but dingy. Just after lunchtime, the traffic moves at a crawl; only occasionally does the driver succeed in edging our speed into double digits. Most cars are covered with a thin layer of dust, sometimes concealing the number-plate. The Lada is represented in a convincing minority; most cars are of German, Japanese and Korean origin, often high-end. After a nearly an hour's drive, I arrive at the office of Racurs, in the north of Moscow. Receiving me in his office, managing director Dr Victor Adrov confirms my impression. 'Traffic in Moscow is very unpredictable,' says he. 'It seems like rush hour all the time, only the intensity varies randomly.' With a jovial gesture he invites me to take a seat.

University Links
'We founded Racurs in 1993,' continues Adrov, who was once employed at the Russian Academy of Science. 'By "we" I mean myself and three colleagues, all of us then lecturing and researching at the Physics and Technology Institute of Moscow University, which was and still is a very prestigious institute. To get in one had to pass exams of high standard; the door stayed forever closed to 75% of candidates. English was obligatory to enable us to read the scientific literature, and later on our language skills became a business advantage. My three colleagues and I still form the four solid pillars of the company. As board of directors we are also the shareholders, with me as the major one.' Today, the company offers product support to Moscow University, and in turn Victor Adrov has been appointed honorary professor. This mainly entails his participation in ceremonial events, although he is also a member of the Masters examination committee. With respect to research and development, the company co-operates with universities, especially at the level of exchange of ideas. 'We do development all ourselves, and my membership of the examination committee at Moscow University puts me into contact with bright young people who may be interested in a career with Racurs.'

Scientific Roots
'Our first product consisted of modules for the digital processing of stereo-pairs of aerial photographs,' Adrov continues. 'This set of modules gradually evolved into Photomod, which photogrammetric processing software can now deal with all types of digital imagery, be it air or spaceborne, optical or microwave, or generated by line scanner or frame camera.' The first Photomod licence was sold in 1995 to a Russian organisation. 'That,' says Androv, 'was a very exciting time for us, with our scientific roots grounded in the Soviet regime, to experience that one could ask money for a sequence of bits andbytes called "software". In 1994 I prepared an article for the ISPRS Washington congress describing the features of the software. However, we had ignored naming the product, and after some puzzling I alighted rather hurriedly on Photomod. This was the name under which I presented the product to the ISPRS, and it has stayed with our flagship product to this day.' Photomod was one of the first digital photogrammetric systems on the market that was entirely designed for working on off-the-shelf PCs. Alexander Chekurin, co-founder and marketing director, joins us. He tells me, 'In addition to Photomod we now have two other main activities: photogrammetric production and resale of remotely-sensed data, particularly SPOT 5 images, to customers mainly in Russia and Belarus. Racurs nowadays has considerable capacity. And the scale of our business is growing by the year.'

Production Services
The photogrammetric production services consist of processing aerial and satellite images for a variety of customers, both in Russia and abroad. The products include topographic and cadastral maps, orthophotos, mapping for forestry, disaster management, environmental monitoring, and many others. 'We started offering production services about five years ago,' Chekurin elaborates. 'One of the biggest projects we have carried out so far in Russia concerns mapping power-line networks in Siberia from a strip of six thousand images taken at scale 1:15,0000.' Adrov adds, 'We are also successful in acquiring international projects. An example is the French National Mapping Organisation IGN, for which we mapped an area of about 25,000km2 and created a database of 3D-vector data.' Each of the three activities, Photomod, production, and resale, contributes roughly one third to company revenue. In a geographical sense, around half of revenue is generated within the CIS constellation (countries of the former Soviet Union), and the other half in the rest of the world. Revenue generated in Russia is greatly dependent upon exploitation of natural resources, because this requires the planning, design and creation of pipeline infrastructure and so on. And thanks to an increasing awareness of the environmental effects of such exploitation, monitoring too becomes important. All these activities are growing very fast. 'We expect that as a result of the booming exploitation and associated monitoring of natural resources, demand for our solutions will also grow accordingly,' concludes Alexander Chekurin.

Global Footprint
Pointing to a map on the foyer wall, Victor Adrov indicates the orange dots showing places running Photomod software. About fifty countries are marked with one or more dots. The CIS countries show the highest concentration, while North America is completely free of dots, but for one in California pinpointing a licence sold to a US company but running in another part of the world. 'We tried setting foot on US ground but soon discovered it would be a vain effort and waste of time; the cultural differences are too big. Asia is definitely a growth market, mainly as a result of the outsourcing of European mapping activities to countries in this region. India, in particular, has become an

interesting and important market. Our penetration in Latin America is modest at present, but growing fast, and we are actively focusing on this continent.' Over three hundred Photomod licences have been sold in Russia, and about six hundred in other parts of the world: around nine hundred in total. The product is sold by single licence or as a network. Victor Adrov elucidates, 'I estimate that the software is currently running on nearly four thousand workstations. Europe is definitely another interesting growth market. We have a dealer network covering the whole world, apart from the former Soviet Union, where we work directly with our clients.' Alexander Chekurin enlarges, 'We do this because we know the market for photogrammetry in the former Soviet Union and are able to speak the same languages as our clients. We want to combine affordable prices with high levels of service, and where we can do that with our own staff, we do so.'

Company Structure
Racurs consists of three departments: Research and Development, Production, and Marketing and Sales. There are no plans to take over other firms, or to be taken over. 'For our mapping projects we like to involve one or more of our partners to carry out the job together in good co-operation. And we have established sound relationships with many of them,' Alexander Chekurin confirms. 'These are not only Russian partners but also firms in other parts of the world. Such co-operation is for us an important factor in growth. For example, in an international project that we carried out for IGN we were assisted by various partners to fix the job.' Illustrating the point, Victor Adrov describes how only the previous day a meeting culminating in a partnership agreement had taken place between Racurs and Eurosense.

Photogrammetry
In a neighbouring room, ten or so photogrammetric operators are gazing in concentration through special glasses at computer screens, mapping from aerial photographs. The company employs more than forty people, not all of them working in this building. 'Renting office space in Moscow has become extremely expensive,' comments Victor Adrov, 'so part of our production segment is located outside Moscow, at a less expensive venue. Nearly twenty people work there on six workstations, often in shifts, especially during busy periods.' In the meantime, Dr Andrej Sechin, co-founder, scientific director and head of the Racurs Research and Development Department, has joined us. 'As you might have noticed,' he remarks, 'most of our photogrammetric operators are female, which is in great contrast to my department, where the nine highly-educated people, some with a PhD degree or working towards such, are all male.' Yet another room accommodates developers and researchers. Like their colleagues in the production room, they are sitting in front of a computer screen, but what they are looking at is completely different. In place of images, the screen displays parts of software programs written in C++ and other code. One developer is writing a specialised module for a customer who wants to carry out a specific task within a mapping workflow. 'It is extremely important that we quickly adapt our software to the needs of our customers,' says Sechin.

Matching
But the Photomod flagship also requires continual extension, updating and adaptation to client needs, rapidly evolving hardware and possibilities offered by internet. Other developers are working on this. Andrej Sechin takes up the story again, 'The Photomod software family, which embraces a group of modules for photogrammetric processing of aerial and satellite data, allows extraction of geometrically accurate geo-information from almost all currently marketed imagery. So captured by film or digital camera, high-resolution satellite scanner and/or synthetic aperture radar. The variety of modules can be configured according to client wishes. Modules cover automated aero-triangulation and generation of digital terrain models and ortho photos, and 2D and 3D mapping from stereo-pairs.' He later explains how the matching algorithm for automated interior and relative orientation has proved so robust and satisfactory that it has remained unadulterated, founded as it is on area-based correlation implemented such that affine transformations can be coped with. For the generation of DTMs, use is made of epipolar geometry and an algorithm based on least-squares and hierarchical matching.

Scientific Drive
'The research we carry out is innovative, so that it is very uncertain whether the outcome will ever become operational, at least in the short term,' Andrej Sechin goes on. 'We work in this way because it extends our knowledge base, keeps us in touch with the scientific world, and in the hope that knowledge so acquired might be of use for development purposes. It also satisfies the scientific drive of our R&D people. Recently, research on automatic matching of boundaries of objects imaged on two overlapping photos resulted in an algorithm based on Fourier transform that was presented at a 2007 ISPRS Conference. Our strategic development today focuses mainly on multi-image correlation and multiprocessor calculation.'

Computing Heart
'Now that you have visited the brain centre of our company, you should also see the computational heart.' Victor Adrov leads me to a small room with two tower racks full of computers, everything, as seems to be customary for this type of environment all over the world, a little tacky. 'Data storage and management is of course very important for a photogrammetric firm. And to communicate our data to our clients in a fast and reliable way we use a very fast internet connection. Because photogrammetric computation and data transport are both massive jobs they are often carried out at night.' He laughs, 'While our employees are sleeping, the company is still working and on air.'

Final Remarks
On our way back to the managing director's office I see that complete darkness has descended upon Moscow. I check my watch: 5 p.m. Victor reads my mind. 'It is Friday today, and that means for us directors that we evaluate the week in my office in an enjoyable atmosphere. I would like to invite you in.' I gratefully accept. Soon we are all, including the four directors, sitting round a table laden with delicacies, and Victor Adrov sets the tone, 'We have known each other since 1974, when we were students; such a long time guarantees stable relationships. In 2008 the company celebrates its fifteenth anniversary.' Andrej Sechin joins in, 'That is maybe the secret of our success; we are all very different but we all have the same goal, and that is also the meaning of the word Racurs: "course", in the sense of a route to follow in order to arrive at your destination.' Determined to avoid traffic jams on my way back, I take the metro. During rush hours there are trains every one and a half minutes, stopping at every station and moving at high speed through the tunnels, dissecting the city from north to south, from east to west, from north-west to south-east, from north-east to south-west. No delays and no traffic jams. Moscow Metro: fast and reliable. Public transport: the solution for an urbanised world.