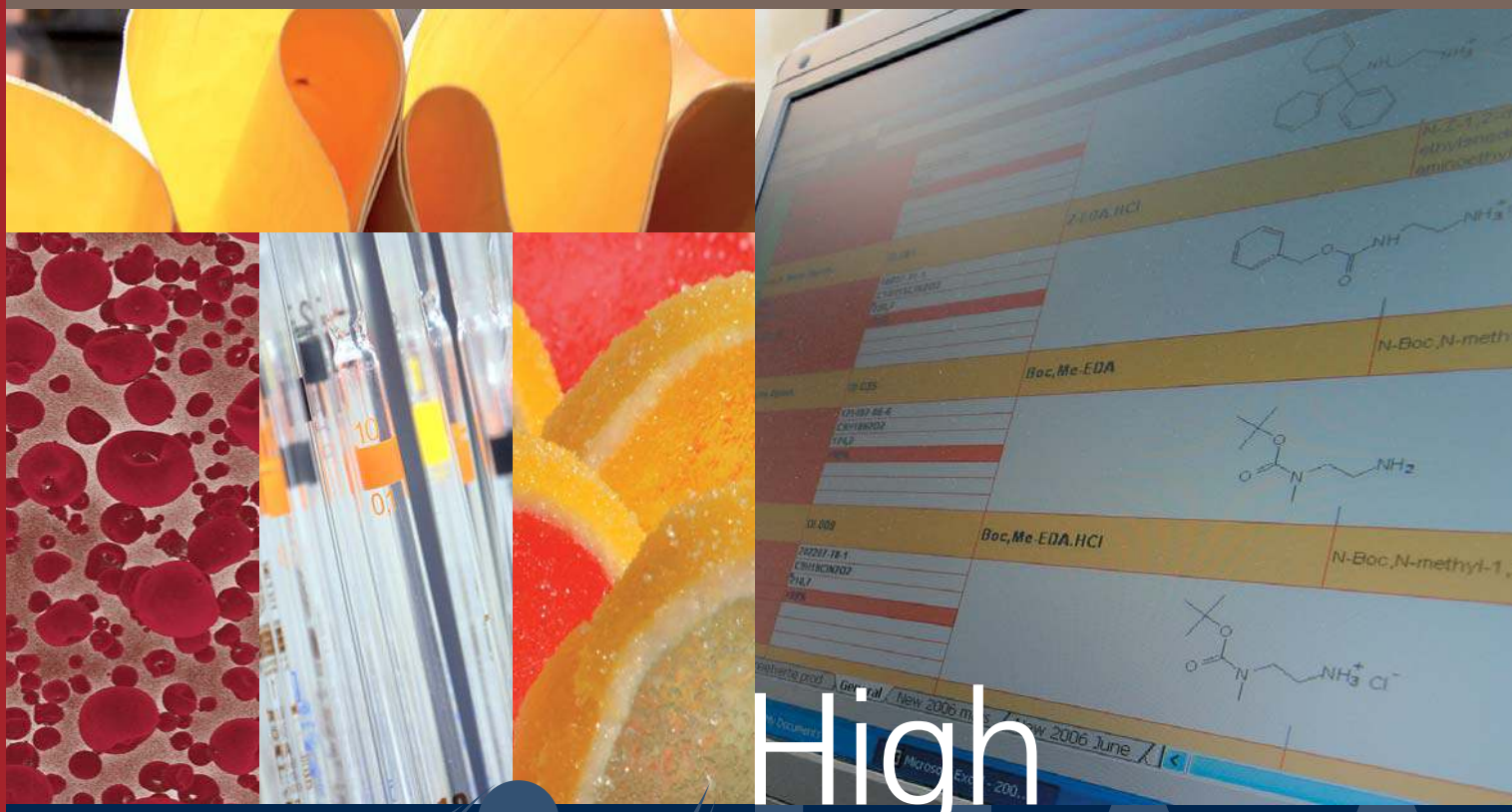

High Technology in Latvia

2007

Latvijas Investīciju un attīstības aģentūra
Investment and Development Agency of Latvia
LIAA

High-tech potential goes hand in hand with technological competitiveness

Jurijs Strods,
Minister for Economics

In today's global economy, the pressure for change is greater and the rate of change faster than ever before. Every commercial enterprise now competes globally irrespective of whether it provides goods or services on a local, regional or worldwide level. Conversely, the global economy has actually reinforced the importance of success at the local level as a key to overall progress. In different parts of the world, competition is more and more clearly based on business- and labour-skill factors.

These rapid changes in globalisation, the concentration of knowledge and manufacturing structures, together with the shift of competition from an inter-country to a city basis, has increased entrepreneurs' needs for talented people and advanced technological environments. It is no longer unusual for even entrepreneurs from small countries to readily move production to countries with larger markets and lower cost bases.

Rapid economic growth, the equalisation of energy and raw material prices, and other external factors have accelerated the necessity for local enterprises to raise their productivity levels and technological competitiveness, gain access to new markets and increase their own added value.

Today, the progress of technologies can no longer be considered just in the context of individual enterprises. Restructuring of the Latvian economy to increase the proportion of high technology enterprises in all sectors is being planned and implemented at the national level, thus fostering the development of a knowledge-based economy.

The Ministry of Economics of the Republic of Latvia has in recent years implemented numerous measures to promote the transfer of knowledge and technology and to strengthen the links between the education, science and entrepreneurship sectors. In other words, to facilitate the development of a national economy that is based on a competitive, knowledge-driven model.

Latvia has already become an attractive platform for a number of high-technology companies that have sited operations here. We are proud of that and continue to focus our work on improving the business environment, fostering technology transfer, and motivating local companies to modernise their production and facilities.

At the same time, I would like reinforce Latvia's position as a supplier of technology, combining as it does long-standing research traditions and world-renowned scientists in several fields, a competitive higher education system and a strong industry sector. Successful cooperation between the involved parties has great potential to promote the commercialisation of knowledge and turn ideas into innovative, high value – added products and services.

I have every confidence that this catalogue will be a useful guide for international companies considering doing business in Latvia or seeking new, promising business partners. At the same time, I trust it will become a driver and source of good practice for other Latvian companies, not only to gain new ideas, but to promote understanding of the role of technology in developing enterprises themselves, as well as competitiveness.

Latvia – a new technological frontier of opportunity!

Andris Ozols,
Director,
Investment and Development Agency of Latvia

Although it is only sixteen years since the restoration of Latvia's independence, many dramatic changes have occurred – the transfer to a market economy, the development of industry and the drive towards a knowledge-based economy. This progress and achievement have been internationally acknowledged, with Latvia now a fully-fledged member of NATO and the European Union.

Over the last five years, Latvia has had the fastest growing economy in the whole of Europe and annual GDP growth has exceeded 10% for three successive years. This dynamism comes from taking advantage of a number of key factors – Latvia's strategic geographic location, the expertise of its highly educated workforce, fully committed government support and particular advances in technology.

During the Soviet era, Latvia became a major research hub, with major R&D centres being established in a variety of technological disciplines. Materials, components and equipment were developed for advanced projects such as the Soviet space programme and several military sectors. Education curricula favoured the needs of science and technological industries.

Local universities and research institutes are highly regarded for their advanced courses in science, technology and engineering and have long and proud traditions. Research and development is keeping pace with the latest accomplishments and global links have been well and truly re-established; the European Commission has formally recognised five Centres of Research Excellence in Latvia.

Research and knowledge-based innovation underpin the multi-disciplinary expertise that forms the cornerstone of our country's economic competitiveness and quality of life. By developing an environment conducive to innovation and streamlining the transfer, absorption and diffusion of best practices and new technological advances, we are increasing the value added for our customers in the future. Value will grow ever more rapidly as Latvian companies evolve the confidence and ambition to reap the full benefits to be gained from technological know-how and good international partners. One advantage remains home-grown though, our highly competent personnel, pioneers in their own fields, bold innovators and avaricious seekers of new solutions.

We are proud to introduce to you Latvia's trailblazers in technological expertise: in pharmacy, biotechnology and biomedicine, information technologies, electronics, energy, food technology, chemistry and the wood-processing industries.

The Investment and Development Agency of Latvia is happy to be your first point of contact for any and all business activities in Latvia – we look forward to helping you with your enquiry and telling you more about the opportunities on offer.

Innovation in Latvia

Surprise; *verb, definition –*
to do something unexpected or unusual. The intention of this publication is to surprise you, because the last place you would expect to find successful innovative, high-technology businesses is Latvia. We will demonstrate that you will, though, and explain how a small country on the north-eastern edge of the European Union has come so far, so quickly.

To understand this apparent phenomenon, we need to put the feats of Latvia's innovation achievers into some sort of perspective. In Latvia's case, history and geography are intimately linked. Latvia's location helped it, and particularly capital city Riga, become a trade-route crossroads, the intersection of major north-south and east-west routes, part of the important Hanseatic network. Add to that the northernmost ice-free ports in the Baltic Sea and you have a stretch of territory desirable to many colonial powers. Hence Latvia's colourful history, not the least of which was the outcome of the Second World War, when Latvia became part of the Soviet Union.

Since independence in 1991, Latvia's progress has been astounding with both EU and NATO membership achieved by 2004. While the Soviet era definitely held back Latvia's progress, it was responsible for some of the country's hidden technological gems that you will read about here. For whatever reason, Latvia became a significant part of the Soviet military-industrial complex and many top-secret research institutes and projects were located here. As a result, Latvia possesses a highly educated population and some very specialised technical know-how.

In the sense described, Latvia is unusual – what are not unusual are the fundamentals which the companies who appear in this publication share with their peers in other countries around the world. They are ideas, a vision of where to go with them, and the persistence and determination to keep going with them. We hope you enjoy meeting these enterprising Latvians and will be interested enough to make contact or even visit them – there are plenty more surprises where these came from!

The country's long experience and traditions, the availability of highly qualified specialists, cost efficiency, high competence in R&D and a strong manufacturing base are the factors that form an excellent foundation for business and innovative activities in Latvia's burgeoning bio/pharma sector.

Latvia possesses an extensive R&D base with good co-operation between industry and the scientific and academic sectors covering a diverse range of research spheres: microbiological synthesis, virology, the synthesis of physiologically-active substances, bioorganic chemistry, molecular biology, genetics, biotechnology, biomechanics, magneto-biology and others.

Latvia was the principal location for these sectors in the former Soviet Union, with 25% of all new Soviet drug technology designed here. Thus, one in every four medical preparations manufactured in the former USSR and intended for the USSR market was actually made in Latvia.

Grindeks

Pharmaceuticals
In the globalised economy we now live in, pharmaceutical companies are among the biggest players, and continue to grow larger with continuing acquisitions and mergers. There are some compelling reasons for this: the amount of research, testing, development and registration required for any new active compound or product. The complete development cycle from the synthesis of a compound (which may come from as many as 10 000 variations initially) to the appearance of the finished product on pharmacy shelves is from 12-15 years, by which time there will only be five years left on the original patent, enabling generic-producing competitors to copy it.

You have to do everything the big players do, but with much fewer resources

A microcosm of Latvia itself
This makes it all the more surprising to find Latvian companies holding their own in this market. In a sense, *Grindeks*, as a small (by world standards) player, is a microcosm of Latvia as a country. If you want to compete in the big leagues, you have to do everything the big players do, but with much fewer resources. This is a huge task in this sector, with all the quality, safety, legislative and environmental requirements additional to the R&D tasks listed above. So how has *Grindeks*, one of Latvia's largest publicly listed companies, managed this?

Latvia's most successful export product

Naturally, there is a successful product underpinning *Grindeks* development, the company's most important brand – *Mildronate®* is a very effective cardiovascular drug, originally developed at Latvia's Institute of Organic Synthesis, a body that *Grindeks* maintains a close relationship with. *Mildronate®* enjoys huge sales in Latvia, Russia, the Ukraine and several CIS countries, and accounts for nearly 70% of the company's turnover.

For the last four years, *Mildronate®* has been named Latvia's most successful export product. But *Grindeks* is well aware that the good times cannot last, and has a whole raft of products at different stages of development, as Business Development Director, Kintija Veisa is only too happy to demonstrate by showing her innumerable fifteen-year planning schedules. It is working on new forms of and improved delivery for *Mildronate®*, and already has another *Grindeks*-branded product - *Ftorafur®*, an anti-cancer drug, on the market and showing strong sales, including in Japan.

Looking ahead
It continues to invest in new facilities, with a major research and development centre in the pipeline, is taking advantage of EU funding availability for research, production development and training, and has more than 100 final dosage forms of other products ranging from heart and cardiovascular medications, to anti-cancer agents, CNS drugs to analgesic, cough and flu medications. *Grindeks* also produces active pharmaceutical ingredients, which the company uses to manufacture its own ready-made medications and sells to pharmaceutical companies all over the world. Exports are already sent to more than 40 different countries, and *Grindeks* has four subsidiary companies in Latvia, Estonia and Russia as well as representative offices in seven countries. That is a serious achievement.

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Olainfarm

Olainfarm was accorded Good Manufacturing Practice status for its new tabletting and capsuling facility, completed in 2004

Pharmaceuticals on a major scale

In some ways, what was once the sleepy village of Olaine, barely 20 km south of Riga, might be considered an example of insensitive 1960s Soviet planning. In this day and age, most people would call it green-field development. Whatever one's opinion about Olaine's status, there is no question that it is the home of a modern and successful pharmaceutical enterprise - a testament to the vision and determination of *Olainfarm's* principals. It would have been much easier to "sell off the farm", to strip the assets for a few people's short-term gain. Rather, we see the result of conviction, of loyalty to one's colleagues, the town and to Latvia itself. *Olainfarm* inherited the industrial synthesis of several active pharmaceutical ingredients and the manufacture of several products. It has managed to keep all those products going with much improvement along the way. Current major branded products include *Fenkarol*®, *Remantadin*, *Furamag*®; *Neiromidin*®, and *Etacizin*®.

Meeting international standards

The company has invested major sums in upgrading its facilities and systems, achieving both ISO 1400 and 9001 certification and was accorded Good Manufacturing Practice status for its new tabletting and capsuling facility, completed in 2004.

Research for the long term

Olainfarm has long-term plans to develop additional products through its own research and its relationship with the Latvian Institute of Organic Synthesis and other scientific institutes. The company also continues to synthesise active ingredients and intermediates, both for its own use and for other pharmaceutical industry customers, in large quantities for production or smaller amounts for research purposes; it can also offer assistance with the syntheses of new compounds. Importantly, it maintains a relationship with the local community, where the great majority of the 900 employees live, and, as Olaine's largest enterprise, operating on a self-sufficient site with even its own water supply, provides services like waste-water treatment to neighbouring companies.

www.olainfarm.lv
e-mail: olainfarm@olainfarm.lv

Silvanols

While other Europeans are rediscovering herbal teas, many Latvians still collect their own

Natural remedies in innovative forms

Every country in the world has a tradition of local remedies taking advantage of the flora around them. Unfortunately, technological progress and the discovery and synthesis of new drugs has often meant that these remedies are lost in history. In this sense though, Latvia is special, as it has always had strong rural traditions, in both agriculture and forestry, and its inhabitants continue to maintain a closer relationship with nature than their peers in more industrialised countries. While other Europeans are rediscovering herbal teas, many Latvians still collect their own linden blossoms, mint leaves, cranberries and other flora to last them through the long winters.

Applying science

Against this background, it is not surprising to find a company like *Silvanols* producing a range of remedies based on active natural ingredients and to see their offices decorated with real examples and delightful prints of the sources of their ingredients. The surprise lies in the applied science which has gone into building the company and its products, and into obtaining the Good Manufacturing Practice certificate also displayed on the wall of the company's own purpose-designed premises, not far from the centre of Riga.

And all this has been achieved in the 12 years since the company was founded by research chemist Dr Ieva Leimane, when all she had was a few sheets of paper outlining the company's future - a vision and her own optimism. Dr Leimane also had her own knowledge, because, as a researcher at Latvia's Wood Research Institute, she had completed her dissertation on cellulose electrolyte complexes. This in turn provided the basis for innovative liquid gel carriers for some of the water-soluble ingredients extracted from plants. Dr Leimane continues her research interests, but now they are more focussed on new ingredients and ways of extracting them, and Latvia offers many sources, from raspberries to herbs and wild grasses.

Leading the way

Silvanols is by no means the only company in Latvia working in this sector, but they are way ahead of the field, with their GMP certification and the fact that several of their products have gone through registration, no mean feat in a regulatory environment where even EU legislation is still evolving. Thus, *Silvanols* is poised to expand by exporting into neighbouring markets.

www.silvanols.lv
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Fitosan

The need for healthy animals is universal

Natural veterinary feeds and remedies

You need some background information to understand why an agricultural products company like *Fitosan* has been founded in Latvia and why the company has high hopes for the future. Despite Latvia's northerly latitude, its coastal position ensures a more temperate climate than might otherwise be expected. Animal husbandry has always played a significant part in local agricultural practices. Proof of this lies in what will be a revelation to many that Latvia was the main exporter of bacon and butter to Great Britain between the two world wars, during the first independence period.

Research links

The Soviet era changed many agricultural practices. But the need for healthy animals is universal, which explains why Sigulda, more known as a popular tourist destination, hosts *Fitosan*. The firm is conveniently based near the Sigra Institute which carries out research into veterinary medicine, feed technology and animal nutrition and is a part of Latvia's Agricultural University. *Fitosan* enjoys a close relationship with the researchers and, alongside the company's own original ideas, realises many mutual projects to promote the development of natural-product-based veterinary remedies.

Going the natural route

Originally founded to continue the production of Soviet-era veterinary pharmaceuticals, *Fitosan* has now settled into a promising niche the development and manufacture of veterinary feeds and remedies based on natural ingredients. Although some people remain sceptical about the move, or return to green, organic agricultural methods, an example from *Fitosan*'s product range puts forward a strong argument in favour: the occurrence of certain udder infections in dairy cattle which precludes the use of their milk. Those infections can be treated with antibiotics or with a natural product. There is no argument that antibiotics produce a faster cure, but the now-healthy cattle must still be kept in quarantine to prevent traces of the antibiotic reaching the milk. *Fitosan*'s natural remedy acts more slowly, but the cattle can actually be returned to production more quickly that would appeal to most dairy farmers.

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MedPro Inc

Pharmaceuticals and packaging
From the outside, a typical, five-storey, central-city, ornamental Jugendstil (*Art Nouveau*) apartment building just like many others frequently photographed by the architectural tourists flocking to Riga. The inside tells a very different story though. Workers in protective clothing and masks operate fast-moving machinery under Good Manufacturing Practice conditions. For this is the headquarters of *MedPro Inc*, packaging specialists and purveyors of a number of vitamin-supplement and nutritional products. Despite these impressive sights, the main activity of *MedPro Inc* is the manufacturing of active pharmaceutical ingredients and fine chemicals at a separate facility.

MedPro Inc export synthesised actives to 20 countries around the world

Upgraded manufacturing *MedPro Inc* is a spin-off from the huge Soviet-era pharmaceutical complex at Olaine (see the story about *Olainfarm* on page 9), and initially found itself with the task of manufacturing large amounts of a number of active ingredients. They also found themselves with synthesis processes that required much improvement to bring the finished products up to international standards. That that has been achieved is proved by *MedPro Inc*'s ISO certification for manufacturing and the fact that they now export these and other synthesised actives to 20 countries around the world, even as far as Australia.

Although such syntheses accounts for 70% of the business (and 95% of that is for export), the company felt that it also had more to offer the market in terms of the accumulated know-how that could be applied to the formulation of other products. Hence *MedPro Inc*'s move into finished products such as those referred to above.

Packaging and labelling line
What is also interesting is their strategic decision to develop an in-house packaging and labelling specialty. This is a niche service which they offer to other pharmaceutical and therapeutic product manufacturers on a contract basis. That packaging service, a result of wise investment, is available to all for their own products, for re-branded versions of existing *MedPro Inc* products, or for completely new formulations which can be developed from scratch with the help of the company's team of research scientists.

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Technology profile of Latvia

Basic facts

General (2006)

Location	North-east Europe
Area, km^2	64 589
Population, mill	2.33
Capital	Riga (population 0.7 million)
Other cities	Daugavpils, Liepaja, Jelgava, Jurmala, Ventspils
Foreign languages generally spoken	English, Russian, German
Currency	1 lats (LVL) = 100 santims
Exchange rate	1 EUR = 0.7028 LVL (fixed)

Economy and R&D

	2005	Avg. yearly growth rate (2000–2005)	
GDP per capita, EUR	5 550 (7 005*)	14.2	↑
GDP growth rate	10.2 (11.9*)	9.5	↑
Inflation rate	7.0 (6.6*)	3.9	→
GERD[1] (percentage of GDP)	0.57	19.2	↑
BERD[2] (percentage of GDP)	0.19	22.9	↑
PERD[3] (percentage of GDP)	0.27	21.7	↑
FERD[4] (percentage of GDP)	0.11	8.9	↑
Number of researchers (FTE[5])	3 282	- 3.0	→
R&D personnel (FTE)	5 483	1.2	→
Innovative active enterprises as percentageof total enterprises	17.5	n/a	
Innovative active enterprises as percentage of total turnover of enterprises	42.3	n/a	

[1] Gross expenditure on R&D
[2] Business expenditure on R&D
[3] Public expenditure on R&D
[4] Foreign expenditure on R&D
[5] Full-time equivalent
* Data on 2006

A small country playing its part in meeting global prosperity challenges

Rapid global development and the huge capital invested into the resolution of global problems would initially appear to be the responsibility of the world's major economic powers, not of small countries like Latvia. We have understood though, for some time, that the solution to these problems is knowledge, not capital investment.

Latvia can be proud of its developments in the field of knowledge both in the past and in the present. These developments have been achieved both independently and by group collaboration with scientific organisations and technology development companies in other countries, often solving very challenging problems. The examples below are given as an introduction to the evaluation of Latvia's contribution.

Fossil fuels and nuclear fission were the energy sources of the first two millennia, but will not be main fuels of the third. The search for new energy sources may be the most important issue, one concerning every country. One of the most challenging projects in this field is *ITER*, the first prototype of a nuclear-fusion energy reactor at Cadarash in France. This type of reactor poses a wide range of technological problems, each of which requires the world's best specialists to solve them. Latvian scientists from the Institute of Physics, Institute of Solid State Physics, Institute of Mathematics and the Chemistry Faculty of Riga Technical University are amongst the many working on these solutions. Their particular focus includes the use of liquid metals and lithium-containing ceramic materials in equipment, plasma diagnostics, and the calculations of parameters for high-capacity, high-frequency gyrotrons (high powered electron tubes which emit a millimetre wave beam by clustering electrons, inside a strongmagnetic field, with cyclotron motion).

Health and the life sciences is another field challenging mankind, often in more diverse and complex ways than technology and the inorganic world. Cancer causes a quarter of all deaths in developed countries. Latvian scientists were amongst the first to make significant discoveries in the field of anti-cancer drugs as early as 50 years ago. The Latvian Institute of Organic Synthesis developed the compound *ftorafur* an anti-metabolite drug used in chemo-therapy. The entire process of developing this product, starting from its design and synthesis, through testing and manufacture took place in Latvia. Today, this preparation is known as the medicinal products *Tegafuri* and *Tegafur*, which have been produced at some of the world's largest pharmaceutical companies. In Japan, the *Taiho* company continues to manufacture this preparation, and it has became the most popular anti-cancer product sold in that country. Latvian pharmaceutical manufacturer *Grindex* has been exporting this product for more than 25 years. Altogether, 17 fundamentally new drugs have been created by the Institute of Organic Synthesis, mainly for the treatment of cancer, cardiovascular and infectious diseases.

Currently, elite European biotechnology company *Cytos Biotechnology AG* of Switzerland, the world's largest manufacturer of liquid-metal products Ferrotec of the USA, and the US Energy Department are amongst those who have recognised, valued and continue to utilise the technological knowledge available in Latvia – knowledge capable of developing new solutions to some of the world's most acute issues.

Technology competence centres – the key to open innovation

Latvia has a number of fields of scientific endeavour which can hold their own in world league tables; the capabilities in these fields are attested to by patents, worldwide publications and the success of Latvian scientists in EU-framework research and technology development programmes. These fields include:

- modern materials;
- information technology;
- magneto-hydrodynamics;
- biomedicine;
- pharmaceutical chemistry;
- wood chemistry.

Latvia's institutional structure for the sciences comprises 11 national scientific institutes, 21 independent scientific institutes – formally linked to universities, five state-funded universities, and 15 higher education institutions with their own scientific structural units.

The intensity of international scientific publication – above the average EU index, on a par with the USA index.

The most widely known technology competence centres on the international scale, in terms of having the largest return on their scientific activity, are the University of Latvia's Institute of Solid State Physics and the Latvian Institute of Organic Synthesis.

Between 1996 and 2002, the scientists of the Institute of Solid State Physics (ISSP) published 503 scientific papers (internationally recognised SCI), whereas Institute of Organic Synthesis scientists authored 342 scientific publications. ISSP's publication intensity is comparable to the average publication intensity in the USA which is higher than the EU average of 639 publications per 1 000 000 inhabitants.

Statistical data on the distribution of Latvian inventions developed to production, according to their scientific field, show that the most promising sectors are the pharmaceutical chemistry and gene engineering. The Magneto-hydrodynamics-metallurgical industry can also be considered to be a strong contender (for example, MHD crystal growth). The Institute of Organic Synthesis (IOS) and the Biomedical Research and Study Centre (BMC) of the University of Latvia are particularly noteworthy in terms of the number of inventions developed and internationally patented. Between 1997 and 2004, IOS scientists were the main authors of 16 pharmaceutical-chemistry patent applications submitted by internationally recognised pharmaceutical companies. Similarly, BMC scientists were the authors of three international gene-engineering patent applications submitted in cooperation with *Cytos Biotechnology Ag* (Switzerland), Michigan State University (USA) and *Celltech Pharmacy Ltd.* (UK).

Latvia's most exported intellectual product

To date, the Institute of Organic Synthesis (IOS) has developed and introduced 17 original compounds and more than 60 new drug-manufacturing technologies. IOS is successfully continuing its work with new patentable products, as proved by the 70 patents obtained during the last five years. Furthermore, IOS has sold several licences, including that for Mildronateŗ to the publicly-listed Grindex company, and this preparation has become Latvia's most exported product.

Contract research at the IOS has already become one of Latvia's most important scientific-technical exported goods/services. Thus in 2003, contract research to a total value of EUR2 million was carried out, 90% of which was for EU chemical and pharmaceutical companies.

In terms of research infrastructure, Latvia's globally best-regarded research centres, with their relevant competencies, are the following:

Institute of Solid State Physics
of the University of Latvia;

- new optical recording environments, including holographic stickers and diffractive elements;
- multifunctional electronic sensors;
- multifunctional segneto-ceramics and the thin segneto-electric layers for microelectronics, optoelectronics and micro-electromechanical systems (MEMS);
- functional sources of light for the visualisation of information, including light-emitting and laser diodes;
- instruments with artificial intelligence.

Biomedical Research and Study centre
of the University of Latvia:

- genome analysis;
- determination of DNA structure;
- molecular diagnostics.

University of Latvia:

- lasers and digital-image-visualisation data-processing systems for obtaining high-quality images of nanostructures and biomedical objects;
- precise measurement of satellite distances with laser location methods.

Latvian Institute of Organic Synthesis:

- structural research and analysis of bioactive substances.

Riga Technical University:

- Mechanical engineering and transport competence centre;
- Energy efficiency competence centre;
- Structural materials research competence centre;
- Industrial design.

Dobele Horticultural Plant Breeding
Experimental Station:

- research on storage of fruits and vegetables in Ultra-Low Oxygen or modified atmosphere storage;
- research on processing of fruits and vegetables;
- quantitative determination of simply separated and coloured compounds;
- HPLC (high pressure liquid chromatography).

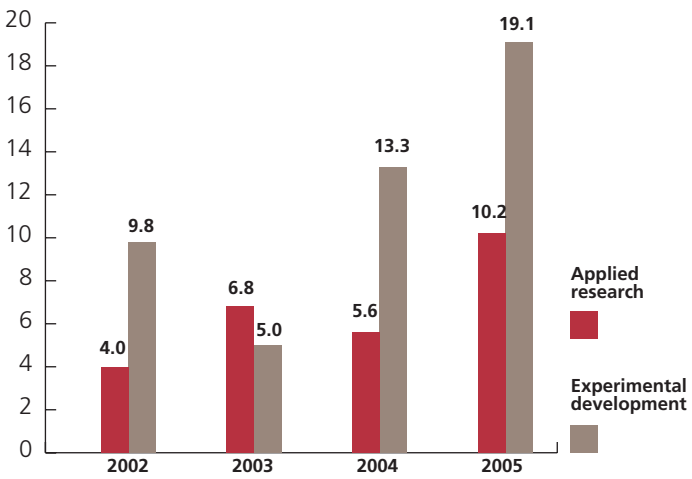
Diverse hi-tech companies

After Latvia regained independence in 1991, scientists and the technological developments they brought with them from various Soviet-era research institutes became the foundation of many successful hi-tech companies. Currently, Latvia has around 250 hi-tech companies showing sustainable growth trends, mostly concentrated in sectors such as IT&C, electronics and electrical engineering, equipment manufacture, pharmaceutical chemistry, basic & fine chemistry, biotechnology and medical technologies.

Additionally, the generally positive attitude of the Latvian private sector towards innovation is very encouraging. On average, since 2002, companies have increased their annual expenditure on applied research by 37% and for experimental developments by 25%. Also the number of hi-tech companies has increased.

In the same period, the government has developed support instruments in order to stimulate the creation of more new technology-based companies (NTBC). As a result, by 2013, the best 30-150 hi-tech ideas could be supported by way of these support instruments, enabling them to be implemented within companies or as projects. These factors give confidence to predictions that forecast that the number of hi-tech companies will even double over the next five years.

Figure 1.
Private-sector R&D spending back on the increase
Internal R&D spending in the private sector by research type, EUR million.



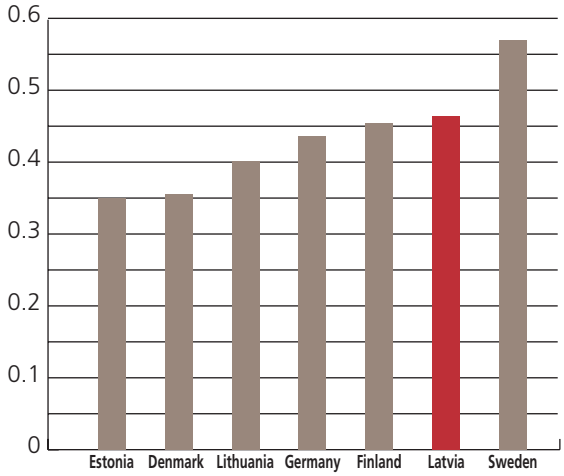
Source: Central Statistical Bureau, 2006.

Latvia is the Baltic States leader according to the Deloitte Technology Fast 500 study.

In the 2006 version of this study, Latvia was the 12th best performing hi-tech country in Europe. Latvia's *Lursoft IT* is listed among the top 500 hi-tech companies, with an annual growth rate of 174%.

Lursoft IT operates in the field of information processing & software development. The company has developed the SIETS Server search engine software for international customers in the USA, Switzerland, Sweden, UK. Another product is the Pledge Register, developed for widely known US consultancy company *Booz, Allen and Hamilton*.

Figure 2.
Latvia is an innovation leader in the Baltic Sea Region service sector
Service sector innovation index from the European Innovation Scoreboard



Source: European Innovation Scoreboard, 2006.

Partnerships and clusters are among the factors facilitating the competitiveness of Latvian technology companies. In the Innovating Regions in Europe (IRE) studies, it is reported that, in the Baltic States, it is Latvia's clusters which are the most recognisable internationally[1]. The government has supported the development of clusters since 2000, and it is intended to strengthen and create a total of 8-12 industry clusters by 2013 by further utilisation of this support.

[1] Ketels, K., Örjan, S., *Clusters in the EU-10 new member countries.* Europa Innova, also available at http://www.europe-innova.org/exportedcontent/docs/56/6056/en/Eucluster.pdf

Forests, 42% of Latvia's territory, and timber, 40% of current exports, are not the future.

Seeking the most appropriate utilisation of Latvia's "green gold", a state-of-the-art R&D base has been developed. The most significant scientific centre is the Institute of Wood Chemistry whose activity has historically been very extensive and shown much promise.

Biolat is one of a number of companies combining scientific potential with business experience and its current market offer includes a series of products with high added value. *Biolat* has extensive experience in estimating the chemical composition of plant materials, especially of tree foliage, as well as in evaluating the usage potential for plant extracts. The company offers original products in the fields of food supplements and additives, plant protection methods, biological fertilisers, and raw materials for cosmetics and pharmaceuticals. The company also carries out projects on the complex non-waste processing of plant raw materials and on the extraction of biologically active herbal substances using polar and non-polar solvents. The future promises many more such examples from *Biolat* and its peers.

The largest technological clusters have developed in sectors such as wood processing and the timber industry, and in the pharmaceutical development and production sector. The newest and most rapidly growing clusters are those in the information technology and materials science sectors.

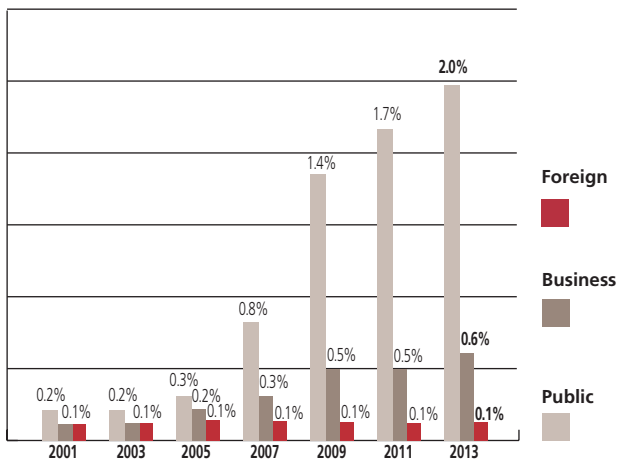
Meeting global R&D challenges

Up to 2006, Latvian technological and innovation results have been achieved with surprisingly low levels of investment. An outstanding knowledge base and the very effective use of that limited investment have enabled this barrier to be overcome and the achievement of remarkable progress in R&D.

The increased contribution to R&D planned by the government is in line with Latvia's National Development Plan which sets the objectives of balanced and sustainable development for the country, and an increase in its competitiveness against other countries. The underlying strategic aims of the plan are improving education and increasing the knowledge base to facilitate economic growth and technological excellence.

On the basis of these objectives, the public financing allocated to science and development is being increased annually by 0.15% of GDP, reaching 2% of GDP by 2013.

Figure 3.
Expenditure on R&D (percentage of GDP) 2001–2013



Note: For foreign expenditure, the forecast is based on a linear trend line, for business expenditure a linear trend line plus absorbed co-finance from public support, for public the national strategic framework document for the period 2007–2013. No correction factors are used.

Source: Central Statistical Bureau 2006, LIAA calculations.

In light of the growing role of R&D in the national economy's development, the government has opened the door to a substantial breakthrough in this sector. In addition to the direct national financing envisaged in the financial support measures developed for 2007-2013, around EUR 860 million will be available for the development of innovations, of which about EUR 600 million would be the public contribution to R&D as such.

Contribution of EUR 860 million to innovation through the National strategic framework document & Operational programmes for the period 2007–2013.

This component of state, EU and private financing, in addition to the increase of the financing from the state budget will significantly boost R&D expenditure for the period 2007-2013. The forecast distribution among innovation system priorities is as follows: 65% - research excellence, 24% - innovation demand, 9% - linkages, and 2% - mobility.

The facilitation of innovation will be further ensured by two operational programmes, Business & Innovation (EUR 744 million) and Human Resources & Employment (EUR 457 million). The total amount of those programmes allocated to innovation will be an investment of EUR 860 million, of which 70% is from state and EU support and 30% is from business financing.

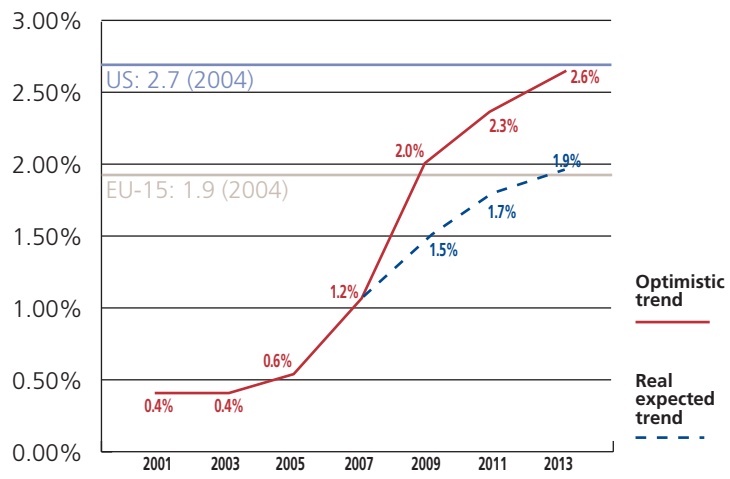
Compared to 2006, the annual public contribution to R&D will almost be quadrupled in the period 2007–2013. At the same time, the sector will continue to attract an average annual contribution of EUR 23 million from the private sector. Such a rate of investment would represent a contribution to R&D of at least 2.64% of gross domestic product in 2013.

Such an initiative from the government will provide a significant boost and comprehensively improve the innovation environment, both increasing its capacity and creating the pre-conditions for future investment in R&D by the private sector. Having evaluated specific investment measures and their results, it can be promised that Latvian technological supply and the availability of knowledge will become more diverse and even more attractive to foreign partners.

Along with the development of knowledge there has been an increase in the significance of Latvia's activities on an international scale. The traditionally close links between Latvian researchers and the R&D sectors of CIS States have expanded significantly since Latvia acceded to the EU, because of the country's integration into the common space of the Baltic Sea Region States and the EU. Since 1999, Latvia has been successfully involved in EU Framework programmes, and up to 2007, the number of project applications in which Latvian researchers have become partners in Framework 5 and 6 programmes has reached 2000. Latvia's successful participation is also demonstrated by its very high comparative indicators both among central and eastern European States and the old EU States. For example, Latvia is one of the most flourishing states in terms of success rate having leapfrogged Baltic Sea Region countries such as Finland and Sweden in the international competitiveness stakes.

The existing knowledge base, excellent growth indicators, international cooperation and strategic and innovation-based economic management enable Latvia to be considered one of the most promising technology centres in the EU and the Baltic Sea Region. We believe that our knowledge will contribute to global welfare and many people will benefit from it.

Figure 4.
Gross R&D expenditure (percentage of GDP) 2001–2013



Source: Central Statistical Bureau 2006, LIAA calculations.

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