Industrial research and innovation in Latvia

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You should know that this all comes from Latvia...

**VEF Minox** – smallest photo camera since 1936!

**Violet and JZ Microphones** – setting the world standard! Used to record Madonna’s and Lady Gaga’s hits. Awarded as Innovative Product of Latvia 2008

**MÁDARA**
A brand which offers 100% clean organic cosmetics made from herbs picked up in a Baltic region

**Anticancer, antileucose preparate**

LIAA - Investment and Development Agency of Latvia
Based on the science excellence in the past....

Rīga – born rocket scientist **Friedrich Zander**, one of world’s pioneers of rocket building and astronautics, designed the 1st jet-propelled rocket engines powered with liquid fuel (GIRD-X)

Latvian chemist **Pauls Valdens** (Paul Walden 1863-1957) was the first scientist to discover the origin of oil (petroleum)

**Wilhelm Ostwald** - awarded the **Nobel Prize for Chemistry** in 1909 for the invention of nitrate fertilizers that caused a revolution in farming.
....and the present

Contribution to the world challenges of prosperity (examples):

- Latvian researchers are participating in developing the ITER nuclear synthesis reactor in Cadarche, France (Competence - use of liquid metals & lithium-containing ceramic materials in a plant; plasma diagnostics; calculations of high-capacity & high-frequency gyrotrones)

- Institutes involved – Institute of Physics of the University of Latvia, Institute of Solid State Physics of the UL


- Alternative Fuels - Institute of Wood Chemistry. Dr. habil. chem., Prof. Jānis Grāvītis has been working for years in the Institute for Priority Research, Tokyo, on obtaining fuel from cellulose
According to a NASA estimate, Latvia provides 7.9% of all Satellite Laser Ranging Systems (SLRS) supplied to the world market. Latvia has been the leading supplier of SLRS to the Soviet Union (at times 100%).
Science excellence as basis for innovation

Intensity of international scientific publications of the leading research institutes on US average level – exceeding EU average level

- Leaders – UL Institute of Solid State Physics (UL ISSP – LU CFI) and Institute of Organic Synthesis (OSI)
- Intensity of publications 639 per 1 million population – on US level, higher than EU average

Most competitive science sectors in Latvia
- Material science – solid state physics, composit materials
- Information and Communication Technologies
- Magnetohydrodinamics, liquid metal technologies
- Biomedicine
- Pharmaceuticals
- Wood chemistry
Science Infrastructure

**Centres of scientific excellence**

**New materials**
- Institute of Solid State Physics of the University of Latvia

**Biomedicine**
- Biomedical Research and Study centre

**Pharmaceutical chemistry**
- Latvian Institute of Organic Synthesis

**Information technologies**
- Institute for Mathematics and Informatics of the University of Latvia

**Electronics**
- Institute of Electronics and Computer Science

**Wood chemistry**
- Latvian State Institute of Wood Chemistry

**Magnetohydrodinamics**
- Institute of Physics of the University of Latvia

**Space observations**
- Ventspils International Radio Astronomy Center

Riga Technical University and University of Latvia as main resource of scientific knowledge

**Investments in infrastructure**

- 2004-2006 more than 35 MEUR invested in modern research infrastructure

- 2008-2013 additional 210 MEUR under disbursement
Leading research institutes - Institute of Organic Synthesis

History

Institute of Organic Synthesis (IOS) was established in 1957 to perform investigations in organic, bioorganic, medicinal and physical organic chemistry (www.osi.lv)

Strengths of IOS

- Flexible teams of organic chemists capable both to solve challenging synthetic tasks and to assist medicinal chemists in setting the targets
- Combination of advanced structure assignment methods (multidimensional NMR etc.) with molecular modelling approaches thus supporting chemists during the design of active molecules
- Focusing on development of flexible synthetic strategies and discovering of appropriate building blocks allowing efficient modifications of the core structures
- Efficient teamwork with pharmacologists, molecular modeling professionals and other experts for higher success rate.
Leading research institutes - BioMedical Study & Research Centre

VLP Technologies

3D structure and self-assembly of virus-like particles (Hepadnaviruses, bacteriophages, papova viruses, plant viruses)

Modeling of viral replication (HBV, HCV)

Protein engineering and modification of VLPs for vaccines, diagnostics, gene and immune therapy tools.

phage coats
Hepatitis B virus cores
Coats of plant viruses
Major focus of Latvian pharma & biotech

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<thead>
<tr>
<th></th>
<th>Synthetic drugs</th>
<th>Biotech drugs</th>
<th>Phytochemicals</th>
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<tr>
<td>Cardiovascular</td>
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<td>Anti-cancer</td>
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<tr>
<td>Central Nervous System Success stories</td>
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<td>Mildronate (Grindeks) – heart performance enhancer</td>
<td><img src="image" alt="Mildronate" /></td>
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<td>Rigvir (Virotherapy Center &amp; PharmIdea) - adapted ECHO virus against melanoma</td>
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<td>Vaccines based on Virus Like Particle technology (Biomedical center)</td>
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Major focus of Latvian pharma & biotech II

Stem cells in Latvia:

• Dr. Andrejs Erglis, Riga Stradini University clinic
  • application of stem cells to cure miocardi infarctis (heart)

• Dr. Dmitrijs Babarikins, Institute of Innovative Biomedical Technologies
  • research of pancreas stem cells for insulin producing for diabetis

• Dr. Ancans, Latvian University
  • research of adult’s (somatic) stem cells of dermal and mezinchimal origin for application in medical technologies

• Dr. Berzins, Biomedical Study and Research Center
  • Research of embryotic stem cells for differentiation of hepatocytes for application in Hepatytis B and C diagnostic and vaccines
Leading research institutes – Riga Technical University


WP-1: Airliner Wing
20% weight saving in the wing structure, with zero increase in recurring cost against the reference state-of-the-art metallic wing

RTU-IMS Task: To optimise skin and stringer dimensions, lay-ups and stacking sequences under operating loads.

FILOSE
The robotic fish mechanisms, on which RTU is working together with experienced scientists within the framework of the 7th European Union framework program FILOSE, have been listed by the Latvian Academy of Sciences as one of the most significant scientific achievements in 2010.
Leading research institutes –

INSTITUTE OF SOLID STATE PHYSICS

- Electron and ion processes in crystals and glass;
- Organic molecules and polymers for photonics and organic electronics;
- Materials for light emitting diodes, photovoltaic elements and coatings for solar batteries, storage of hydrogen for fuel cell devices;
- New materials and technologies for Hydrogen Economy; Polymer membranes with ionic conduction for fuel cells and gas separations;
- Inorganic single crystals, ceramics, glasses, thin films, and nano-structured surfaces for applications in optics, electronics, photonics and energetics;

ISSP UL has expertise and applies following technologies in R&D work:

- High temperature crystal growth;
- Sintering and hot pressing of transparent electro-optic ceramics and nanostructured oxide materials;
- Pulsed laser deposition (PLD);
- Metal – organic chemical vapour deposition (MOCVD);
- Organic thin film deposition;
- Technology for producing of chalcogenide films for holographic recording;
- Modification of materials by laser radiation

Cooperation with industry: GroGlass - “Smart Coatings” to increase and decrease penetrability of radiance in different areas of spectrum

Baltic Crystal - a manufacturer and supplier of modern materials made of monocristalline sapphire for optical electronics and other sectors.
Leading research institutes –
Institute of Physics of the University of Latvia

Electromagnetic pumps and other specific devices for alloys transport, stirring, pouring, conditioning of ferrous and non-ferrous metallurgy.

Technologies of composite material production and growth of semiconductor single crystals.

PARTNERS
- Paul Scherer Institute Switzerland - Modification of electromagnetic pumps
- Corus Research, Development and Technology -
- SIEMENS
- CEA, Departement de technologie nucleaire, France. EM pump related to m3 irradiation devices
- Los’Alamos National Laboratory (LANL)
- Oak Ridge National Laboratory (ORNL)
- EURATOM

MHD converters
- For space applications:
  - Planetary power systems (Mars, Moon)
  - Electric propulsion, orbit transfer
Grindeks – leading pharmaceutical company in Baltics

- Vertically integrated pharmaceutical company
- 32 years supply of anti-cancer compound to Taiho Pharmaceutical
- Product portfolio:
  - 2 brand products
  - 60 generics
  - 22 active pharmac. ingredients
- Sales in 50 countries
- FDA (USA) approved synthesis plant
- 10% of net sales for R&D
- 800 employees – 75 of them in R&D

LIAA - Investment and Development Agency of Latvia
EXAMPLES OF INNOVATIVE COMPANIES

- 40 years of “OlainFarm”

- One of the biggest Chemical - Pharmaceutical manufacturers in the Baltic States
- 2011 turnover 51 m€, increase of 43% comparing to 2010
- About 900 employees
- More than 70 finished Formulations
- More than 40 API’s and chemical products
- Export more than 30 countries
- Excellence in chemistry of adamantanes, effective anti-virus drugs
PharmIdea LLC is only GMP certified company located in Latvia dedicated to the research, development and commercialization of sterile pharma products with a focus on synthetic and biotech drugs for the cure of women healths and treatment of cancer. ([www.pharmidea.lv](http://www.pharmidea.lv))

**Business activities and networking:**
- EU GMP certificate for sterile production since September, 2010
- Own product portfolio development with focus on sterile pharma products and medical devices
- Licence for manufacturing of Investigational medical products for clinical trials, also CMO
- Well developed networking with scientific institutions in Latvia, Estonia, Finland, Poland and Russia for development of biotech active ingredients or up-grading of old technologies
EXAMPLES OF INNOVATIVE COMPANIES

Since 1962 Sidrabe has been manufacturing vacuum deposition equipment and developing unique technological processes for production, pilot and R&D coaters.

- Customers include microprocessor producers in Taiwan, other recognizable companies in Japan (Sanyo), Korea, Taiwan, USA (3M), Holland and Germany
- Technological solutions so advanced that their customers want to be kept confidential and prohibit to publicize them.
EXAMPLES OF INNOVATIVE COMPANIES – Baltic scientific instruments

The company Baltic Scientific Instruments specializes in the development and serial production of the spectrometric devices based on silicon, high-pure germanium and cadmium-zinc-tellurium detectors.

The products of the company are detectors, spectrometers and systems for registration of various types of ionizing radiation.

Our products are applied in nuclear energetic and ecology, geology and mineral resource industry, medicine and research activities, customs control and other spheres.
EXAMPLES OF INNOVATIVE COMPANIES

Kenwood, Panasonic, Hitachi Home Cinema buy license of Latvian developed technology

Has a daughter company in Tokyo

CONEQ is a patented technology that corrects and improves the response of all manner of loudspeaker systems ranging from studio monitors to concert arrays.

In 2008 Real Sound Lab won “Par Excellence” Award from Pro Audio review at New York Audio Engineering Society Show

Hollywood, CA - Renown for meticulous sound quality on world class projects including Lord of The Rings, Golden Compass, Pan’s Labyrinth and numerous other “A-list” feature presentations, Mi Casa Studios recently purchased a full surround-sound CONEQ correction system for “Studio C.” “CONEQ makes this room sound better than ever before. It tightens up the bass and adds a new level of clarity to the midrange, improving both the clarity and realism of instruments and voices. CONEQ has made a dramatic difference.”
EXAMPLES OF INNOVATIVE COMPANIES

SAF Tehnika

- Data microwave transmission equipment for telecom operators, ISPs, railway, power, gas;
- The latest product line is High capacity radio equipment with data transmission speed up to 155 Mbps.
EXAMPLES OF INNOVATIVE COMPANIES

Traditional forest inventory

Nowadays!

Forest inventory based on airborne remote sensing

Image processing – usage of satellite images in agriculture and forestry, which could substantially increase efficiency of these national sectors.

FORAN Baltic SIA
FORESTRY AND NATURE CONSULTING
Innovations in IT sector

DPA – IT company continually builds, supports and manages IT infrastructure solutions that help more than 1200 of their customers to achieve business goals.

Case - Design, implementation and support of IT life-cycle management for Riga Public Transportation company Rīgas Satiksme. RS provides public transportation services in Riga, servicing about 150 million rides a year.

Increased IT service availability, reliability and performance, Reduced desktop support and help desk costs, Ensured business continuity using Microsoft software.

Development of a IBM Lotus/Domino –based software suite automating SEB banka business operations

• An ATM defect registration application allows SEB banka to keep track of reported defects. This significantly eases the burden on bank employees and improves cooperation with SEB business partners.

• A call center application is used to record customer issues and requests. Records can be kept for analysis in application views or be exported to Microsoft Excel. Each month, more than 24,000 customer calls are registered in the system.

"Lattelecom Technology“ nominated by Microsoft Latvia in 2011 as the Most Successful Player in Foreign Markets – for developing solution of automatic digitalization of invoices, bills, waybills and other documents based on "Microsoft SharePoint workflow" technologies. Solution implemented in all subsidiaries of "Tuifly" group in Europe. This multiuser system processes many thousands of documents monthly.
New innovative companies (1)

Private accelerators

TechHub Riga is the first international expansion location for TechHub and it creates a similar collaborative ethos to the successful London initiative, offering dedicated co-working space, community gathering point and international network to product-orientated technology start-ups.

TechHub Riga has been open since January 2012.

TechHub Riga was founded by a group of like-minded start-ups and community members from Riga. TechHub Riga is proud to be supported by a dedicated group of Founder Members who committed to three years membership before official launch. These include Latvian companies, Pan-Baltic start-ups with at least one member in Riga and UK-based start-ups with development teams in Riga. The leadership team is composed of active members of the Riga start-up community:

Andris Berzins (Chairman of the Board)
Gunars Grundstoks, Ernests Stals, Viesturs Sosars (Board members)
Results – new innovative companies (4)
JIC Incubator graduates

**HYGEN**

Personal CNG Refueling Systems

New technology refills your car with CNG in 5 minutes at home.

Winner of startup competition in Israel.

**MAILIGEN**

An e-mail marketing tool.

Seed investments 100.000 EUR, Planned turnover 500.000 EUR.

Clients include "Japan Airlines", "Flight.com", "Ibank.com"

**UAVFACTORY LTD.** specializes in unmanned composite airframe development and manufacturing. Our mission is - to bring the most comprehensive composite airframes to the marketplace.

**July 09, 2012 - 54.5 hour nonstop flight - new world endurance record**
EXAMPLES OF INNOVATIVE COMPANIES

MOTTRA is utilizing the most fish friendly approach in harvesting caviar.

- Sturgeons are milked or “stripped” of their eggs rather than being culled or performing a cesarean section. The fish receives a pleasant stomach massage that’s sets off the natural process of spawning. No hormones or steroids used.

STERLET

- Black Caviar of the sturgeon (Acipenser Ruthenus) whose natural realm of habitat is in Russia. Sterlet - one of the smallest type of sturgeon. It is well known for their meat and caviar due to incredibly rich flavor.
- The total water volume is 4200 m³, which consists of 5 different fish tank sizes ranging from 0.2 to 330 m³. This is one of the biggest closed system recirculation plants in Europe with 32 employees working 24/7.
Innovation System of Latvia 2007-2013

Science
- 10-50 infrastructure & ITC projects;
- 600 additional scientists;
- Support to 200 priority researches;
- 10-70 international tech. projects;
- Society motivation in science.

Competence centres
- 7 centres additionally

Technology incubators
- 105 enterprises working at incubators

Technology transfer centres
- 360 commercialized ideas

Education
- 10-100 new technology study programmes

Businesses
- 10 new hi-tech projects;
- 420 new products;
- 1200 person months of innovation staff.

8-12 industry clusters created or/and strengthened
Key policy directions and support instruments 2007-2013

• DEVELOPMENT OF RESEARCH POTENTIAL
  • Support for doctoral studies and young scientists
  • Support for fundamental and applied research (5 State research programmes)
  • Support for scientific infrastructure development (9 National level research centres)

• DEVELOPMENT OF COOPERATION BETWEEN ENTERPRISES AND RESEARCHERS
  • Support for knowledge-intensive industrial research and product development (6 Competence centres)
  • Support for clustering (11 clusters)

• SUPPORT FOR DEVELOPMENT OF INNOVATIVE ENTERPRISES
  • Grants for enterprises in order to support industrial research, experimental work, prototyping and production equipment acquisition
  • Seed and venture capital investment fund
  • Innovation vouchers (NEW)
  • Business incubation services for start-ups, in particular for green technology development (NEW)
Key policy directions and support instruments 2007-2013

Key priority areas – Development of cooperation between enterprises and researchers & Support for development of innovative enterprises

| Competence Centres (2010-2015) | 6 projects  
| Environment, Bioenergetics and Biotechnology Competence Centre | 53 MEUR public financing + 30 MEUR private co-financing |
| Clusters (2012-2015) | 11 projects  
| Life Sciences Cluster of Latvia | 3,4 MEUR public financing + 1 EUR private co-financing |

LIAA - Investment and Development Agency of Latvia
Venture capital instruments
2007 - 2013

5 Pre-Seed projects
(MolPort, Naco Technologies, BuzzPodium, E-Tag, Blue Bridge Technologies)

3 Investments
(Primekss, EUROLCD, Oobelisk)
Development of New Products and Technologies

- **Objective**: to provide support for development of new and/or significantly improved existing products, services, or technologic processes, as well as to promote enterprises to invest in research and development (R&D)
- Program covers almost all new product development phases including the introduction of the on stream production of the product

<table>
<thead>
<tr>
<th>Type of Development</th>
<th>Total Amount (MLVL)</th>
<th>Max Support in MLVL</th>
<th>Submitted Projects (amount., MLVL)</th>
<th>Approved Projects (amount. MLVL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development of New Products and Technologies</td>
<td>8.3</td>
<td>0.350</td>
<td>291 (30.6)</td>
<td>120 (8)</td>
</tr>
<tr>
<td>Introduction of New Products and Technologies</td>
<td>38.0 34.0</td>
<td>0.350 1.0</td>
<td>91 (20.2) 183 (58.1)</td>
<td>56 (11.8) 113 (35.7)</td>
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<tr>
<td>Protection of Intellectual Property</td>
<td>0.17</td>
<td>0.020</td>
<td>32 (0.42)</td>
<td>17 (0.24)</td>
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</tbody>
</table>
The long-term vision of BSR Stars is to establish the Baltic Sea Region as a functional region with an internationally competitive position in a number of strategically prioritized areas. The overall objective of the BSR Stars programme is to achieve this integrated resource base by linking strong research environments, clusters and SME-networks – creating a number of globally-leading research and innovation hubs in the BSR in order to achieve stronger critical mass, attractiveness, and a competitive international position.
Economic development trends

Qualitative changes in Latvian export structure
Share of high and medium-high R&D products in export (%)

- **2007**:
  - Medium and low R&D intensity products: 30.6%
  - High R&D intensity products: 69.4%

- **2011**:
  - Medium and low R&D intensity products: 38.5%
  - High R&D intensity products: 61.5%

LIAA - Investment and Development Agency of Latvia
Cooperation in macro region – BIRTI

• **BIRTI** – (B)altic (I)nfrastucture for (R)esearch, (T)echnology and (I)nnovation

• **BIRTI** – cross-border co-operation platform (policy + projects) aiming at coordinated development of human resources and infrastructure in research, technology, development and innovation (RTDI) in all three Baltic States, focusing on developing research and innovation capacity and strengthening excellence in the Baltic Sea region

• **Objective** – to develop RDI resources, implementing Europe 2020 Strategy in Baltic states and making efficient use of EU funds in 2014-2020

**BIRTI: growth through innovation**
Cooperation in macro region – BIRTI

• **3 clusters of BIRTI in Latvia**
  - **BioPharmAlliance** – Cluster of Biopharmacy and Organic Chemistry
  - **NanoTechEnergy** – Cluster of Nanostructured Materials and High Energy Radiation
  - **BaltSmartTech** – Cluster of Smart Technologies in Engineering and ICT

• **BIRTI activities in Latvia**
  - **Research** (Improved research labs in Universities, research institutes and University hospitals to ensure study and lifelong learning opportunities)
  - **Technology transfer** (Science and technology parks that ensure versatile support for prototype elaboration, approbation and scaling possibilities for development of new products and services)
  - **Innovative entrepreneurship** (Experimental production of internationally competitive goods and services with high added value)
New knowledge intensive services: Baltic Cyclotron centre

Salaspils Research Nuclear reactor (1961.- 1998.)

University – 26%;
Investors – 74%

Proton accelerator – CYCLOTRON (2012. - )

diagnostics, material science, element analysis.
Innovation in traditional branches of industry
Environment friendly wood processing

Hardwood

Hemicellulose
- Furfurol
- Acetic acid

Cellulose
- Ethanol

Lignin
- b-glucans,
  biologically active substances

70% business investment

LIABA - Investment and Development Agency of Latvia
THANK YOU FOR YOUR ATTENTION