

Baltic Biotech Ecosystem Mapping

BIOCONNECT project

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Setup

Methodology

The purpose of the [BIOCONNECT project](#) is to create a development action plan for a more integrated, robust, and valuable Baltic biotechnology ecosystem. In order for the plan to be *relevant*, *achievable*, and *measurable* the first phase of the project focused on thoroughly mapping the current state of the ecosystem and understanding the goals, challenges, and aspirations of all involved parties.

The underlying data has been collected in four primary ways to ensure a mix of quantitative and qualitative data from all relevant sources: 1) publicly available information 2) ecosystem participant questionnaires 3) personal interviews and 4) consortium member insights.

1) *Publicly available information* has been collected on all relevant biotech ecosystem stakeholders, including startups and SMEs, larger industry players, academic and research institutions, funding sources, as well as hubs, associations, and other connective organisations. The data has been organised into a **master database** which will be made publicly available on the [official website](#) after the completion of the project.

2) *Ecosystem participant questionnaires* were used to collect in-depth personalised insights from key representatives of various stakeholder types. We've devised four separate questionnaires to be as relevant as possible to specific stakeholder types: startups and industry, capital providers, universities and research institutes, as well as advanced ecosystem players.

3) *Personal interviews* have been used to supplement questionnaires as an alternative means of obtaining highly detailed in-depth insights from individual players. In order to increase compatibility of the interview results we have devised guidelines for all consortium members to follow.

4) *Consortium member insights* were used to supplement the above data sources with high-level strategic ideas as well as hard-to-come-by details.

Data Overview

As a result of the above efforts, we have collected detailed information on 223 organisations in the Baltic biotechnology ecosystem, which constitutes, by our estimates, around 95% of all existing relevant players. In addition to organisation data we have compiled *key personas* as well as *connective meta-data* such as funding rounds (startups <> investors), spinoff relations (institutes <> startups), and partnerships (industry <> institutes, industry <> startups, etc).

In addition, we have obtained long-form insights from 44 key players in the form of questionnaires (31) and interviews (13). Transcripts and filled questionnaires are available on request. Country-level and stakeholder type breakdown is available below:

Country	Lithuania	Latvia	Estonia	Finland	Int'l
Respondents	25	8	2	5	4

Type	Startups	Academia	Funding	Connector	Talent
Respondents	21	10	3	5	5

In order to close certain gaps and maximise relevance we are planning to continue data collection throughout the duration of the project.

Results

Ecosystem Mapping

The ecosystem mapping efforts have been yielding a number of observations that feed into the SWOT analysis and further the [Action Plan](#):

- Startups and SMEs
 - There are over 50 life sciences startups in the region, mainly clustered around academic hubs.
 - Lithuania is leading the pack across most activity metrics, including the number of companies and accounting for more than 50% of the total employee count in the region.
 - Estonia has 4 startups already matured into growth stage, which is the highest relative and absolute amount in the region.
 - Only a few of the current generation startups have passed Series A and we still are awaiting an exit event.
 - The region still needs to solidify the ecosystem by transitioning from a nascent to a mature level and ideally even become self-sustaining with former founders providing liquidity for the next generation of entrepreneurs.
- Capital providers
 - Funding rounds in biotech startups totalled to €15M EUR over the last 5 years, with by far the largest round being €8M for Atrandi (LT) led by Vsquared Ventures, Practica Capital, and Metaplanet.
 - Both private and public sources have provided similar amounts of liquidity so far, this allows founders to flexibly choose their growth path either by maintaining equity and seeking grant funding, or selling their company shares for financing and more rapid growth.
 - There is still a lack of dedicated biotech investors for the very early stage teams and companies, with most existing providers of capital focusing on prototype/growth stage.
- Universities and research institutes

- Five major academic hubs can be outlined across the region, each a concentration of research and educational activity clustered around prominent universities (Tallinn, Tartu, Riga, Vilnius, Kaunas).
- Lithuania has historically been a significant centre for enzymology, with current world-class achievements such as contributions to the CRISPR-Cas gene editing systems.
- Latvian research and academic excellence has long inclined towards cell biology and biopharmaceuticals, as well as hardware design.
- A lot of emphasis in Estonia has been put on genomics and bioinformatics, with target applications in personalised medicine and population health.
- Mature industry
 - The most notable biotech related industry transaction is still the purchase of Lithuania's Fermentas by Thermo Fisher Scientific in 2010.
 - Currently Thermo Fisher Scientific Baltics is the most valuable company of the region (not only in biotech, but overall), valued at €6.2B, with annual revenues of €1.5B and 38% net profit margin solely producing 2.3% of the Lithuanian GDP.
 - The largest biotech investment case in Latvia is China's MGI Tech, which opened a 7,000 square metre production site in Riga in 2019 for an initial cost of €15 million, which is the biggest FDI in Baltic life sciences for a greenfield project so far.
 - Estonia's largest CRDMO Icosagen recently arranged an €18 million financing agreement with the European Investment Bank (EIB) backed by the InvestEU program to strengthen the company's mammalian protein drug discovery, development and production services.
- Policymakers
 - All Baltic countries have life sciences in their top priorities (smart specialisations) GDP (or other) goals for each country and align with the broader European Bioeconomy Strategy.

- Lithuania has the most ambitious goal of generating 5% of national GDP from biotech and life sciences related industries by 2030.
- While national strategies in essence are focused on strengthening the ecosystem and already leading industrial sectors, little direction is given in terms of high potential technological areas.
- Allocating sufficient funding for all possible ways of facilitation on a national level is a challenge and Baltic countries are not near the levels of funding dedicated to R&D relative to larger economies.

Insights Summary

Based on the questionnaire and interview data collection several key themes and insights can be identified throughout the Baltic and Finnish biotech ecosystem:

- Future of Biotechnology and Synthetic Biology
 - There is a consensus that biotechnology and synthetic biology will grow significantly in Europe over the next 5-10 years, particularly in drug discovery, development, and personalised therapies.
 - Synthetic biology is seen as a crucial tool that will gradually replace traditional organic synthesis methods.
- Policy Awareness and Challenges
 - Policy makers are generally aware of the potential benefits of biotechnology but lack a deep understanding and sufficient financial support to maximise innovation.
 - Major challenges include attracting foreign investment, insufficient early-stage funding, and a lack of qualified workforce with specific biotech expertise.
- Role of Industry
 - The industry's role in promoting biotechnology varies, with larger companies like Thermo Fisher Scientific in Lithuania serving as significant influencers, while in Latvia, the impact is smaller.

- There is a need for stronger collaboration between academia and industry to bridge the gap and promote innovation.
- Funding and Investment
 - Access to funding is a critical bottleneck, with a need for more local funds focused on deep tech and hardware.
 - Successful strategies include participation in matchmaking events and proactive engagement in biotech-focused conferences.
 - Existing funding mechanisms like ERDF and local innovation grants are helpful but often insufficient.
- Infrastructure and Resources
 - Available infrastructure includes state-of-the-art laboratory facilities and equipment, but accessibility for start-ups is limited.
 - There is a demand for more open-access wet laboratories and core facilities to support biotech innovation.
- Regulations and Intellectual Property
 - There are significant regulatory challenges, particularly in the transfer of IP from academia to start-ups, which can hinder investment and growth.
 - Simplification of legal obligations for start-ups and clearer guidelines for IP transfer are necessary to foster a more supportive environment for biotech innovation.
- Diversity, Gender Equality, and Workforce Development
 - Gender equality plans are in place in several institutions, promoting an inclusive work environment.
 - There is a recognized need to develop more dedicated biotech and synthetic biology programs at the university level to build a skilled workforce.
- Impact and Collaboration
 - Start-ups and research institutions are working towards creating impactful solutions to global challenges, such as improving drug discovery efficiency and reducing animal testing.

- There is a strong interest in co-creation and collaboration across different stakeholders to drive innovation and share resources effectively.

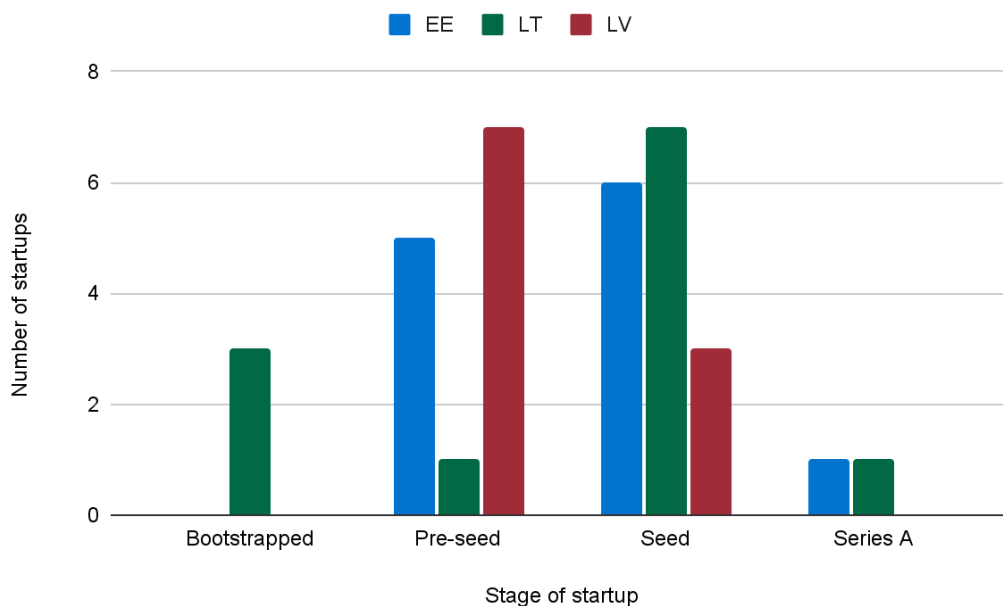
The above insights serve as the basis for the action plan structure and directions, to be discussed in the following section.

Detailed Overview

Startups and SMEs

Each of the academic hubs of the Baltic is proliferating deep tech startups which leverage local technological advancements and highly educated workforce. We have identified 34 active life sciences startups in the region mainly clustered around academic hubs.

Country	Startups	Employees	Total funding raised
Estonia	12	73	€20M
Lithuania	12	158	€21M
Latvia	10	33	€3M



Lithuanian startups are leading the pack across revenue generation and employee count, nonetheless, we expect Estonia to quickly catch up as there are many startups in pre-seed and seed stages primed for growth.

Name	Location	Key people	Founded	Specialty	Latest financials
Atrandi Biosciences	Vilnius Sunrise Valley, Lithuania	CEO - Juozas Nainys Ph.D CSO - Rapolas Žilionis Ph.D	2016	High throughput single cell analytics by droplet microfluidics	€8M raised in Late-stage VC round in 2023 €1.9M Revenue in 2022

Harvard-trained experts in single-cell genomics brought back the technology for commercialization in Lithuania. Atrandi's proprietary semi-permeable capsule technology enhances researchers' ability to understand individual cell biology. They address limitations of conventional microfluidic technologies, offering a highly cost-effective, versatile platform for molecular analysis. Atrandi's technology has broad applications, including personalized cancer treatments and novel disease therapies.

Name	Location	Key people	Founded	Specialty	Latest financials
CasZyme	Vilnius, Lithuania	Chairman - Prof. Virginijus Šikšnys CEO - Monika Paulė Ph.D CSO - Giedrius Gasiūnas Ph.D.	2017	CRISPR based Molecular Tools and Services	€1.0M grant from EUROSTARS in 2022 €1.8M Revenue in 2022

Pioneering and globally acclaimed scientists in CRISPR-Cas9 technology spun out CasZyme from the Vilnius University to expand the portfolio of CRISPR tools and develop innovative gene-editing and biosensing applications, optimize existing workflows. The company is closely connected to Vilnius University and leverages historic strengths in enzymology to maintain a pipeline for discovering and characterizing novel nucleases.

Name	Location	Key people	Founded	Specialty	Latest financials
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ÄIO	Tallinn, Estonia	co-CEO - Nemailla Bonturi Ph.D co-CEO - Petri-Jaan Lahtvee, Ph.D	2022	Microbial alternatives to animal fats and plant oils	€6.1M in Series A in 2024 €1.0M in pre-Series A in 2023 €189K revenue in 2023
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One of the 15 winners of the 2023 European EIT Food Accelerator Network contest ÄIO have rapidly gained momentum through multiple financing rounds to bring their grand vision to reality – replacing animal fats and plant oils with microbial alternatives for human use. Palm oil alone is nearly a €100B p.a. industry that is ripe for disruption as it currently leads to deforestation. ÄIO are upcycling waste products from the wood and food industry thus creating a cost-efficient alternative for agri-oil production.

Name	Location	Key people	Founded	Specialty	Latest financials
Gearbox	Tartu, Estonia	CEO - Arvi Jõers Ph.D CSO - Marje Kasari PhD COO Villu Kasari Ph.D	2021	Novel strains for antibiotic-free industrial protein production	€515k total in pre-seed in 2023 €19K revenue in 2023

Even though there already are microbial strains widely used in industry they often require antibiotics to remain uncontaminated and effective. Need for antibiotics is a cost driver and also contributes to the global problem of antibiotic treatment resistant infections. By leveraging a fundamental understanding of bacterial gene transmission and regulation Gearbox have crafted an ingenious synthetic biology approach for high-yield protein production.

Name	Location	Key people	Founded	Specialty	Latest financials
CellBox Labs	Riga, Latvia	CEO - Gatis Možeļevskis Ph.D CTO - Roberts Rimša PhD CSO - Artūrs Ābols Ph.D	2020	Organ-on-chip systems for diagnostics and research	€0.5M Grant funding in 2022 €0.3M revenue in 2023

One of the biggest obstacles for large scale drug development is the requirement of screening your candidates in humans. CellBox labs have developed a Gut on a Chip solution, which is especially tricky considering the complex structure and function of the intestine surface. Gut function and impact to our health is a key area of scientific interest and having a cheap way to test drugs and hypotheses without human trials is key to accelerating development.

Name	Location	Key people	Founded	Specialty	Latest financials
Alternative Plants	Riga, Latvia	CEO/CSO - Anna Ramata-Stunda COO - Mārtiņš Boroduškis CTO - Matīss Ričards Baumanis	2017	Plant stem cell cultures	€0.5M Investments in 2022, €32K revenue in 2023

The WHO estimates that over 80% of the world's population relies on plant-based cosmetics and medicines. However, the most in-demand plants are either already endangered due to human actions or require highly specific conditions for cultivation, whereas the process of extracting valuable materials requires large amounts of plants to be farmed. Alternative Plants are perfecting the process of cultivating plant biomass in bioreactors – increasing the yields, speeding up the growth times, and reducing resource consumption.

“We even have this joke that something is unhealthy and shouldn't be used because it has genes <...> I would give us as a society an additional 5 – 10 years and the impact (of gene editing) will be way broader and deeper” - Monika Paulē, CEO @ CasZyme

The Baltic region is successfully leveraging historical innovation and research excellence centers and its educated workforce to churn out tens of early stage companies in each country. Nonetheless, the most notable startup exit was the Fermentas acquisition over a decade ago in 2010 by Thermo Fisher Scientific for \$260 million in cash. Only a few of the current generation startups have passed Series A and we still are keenly awaiting a major exit event. The region still needs to solidify the ecosystem by transitioning from a nascent to a mature level and ideally even become self-sustaining with former founders providing liquidity for the next generation of entrepreneurs.

Private and Public Funding

Investment dynamics in the Baltic biotech sector are a testament to its growth potential. It's a great sign that both private and public funds have provided similar amounts of liquidity, this allows founders to flexibly choose their growth path either by maintaining equity and seeking grant funding, or selling their company shares for financing and more rapid growth.

Funding highlights

Total funding raised in 2023

Largest funding round

€15M across Lithuania, Latvia and Estonia	€8M for Atrandi Biosciences led by Vsquared Ventures, Practica Capital and Metaplanet
Most active VC in life sciences	Most active public funds
Practica Capital	European Institute of Innovation & Technology (EIT) and Horizon 2020

Vilnius-based Baltic Sandbox Ventures have garnered high visibility by establishing a new fund dedicated to **investing in life sciences** and deep tech. €13M will be invested equally into almost a hundred pre-seed and seed stage startups across the Baltic states to facilitate the ecosystem over 2024 and 2025. Grassroots financing is key to filtering through innovative ideas and finding hidden gems.

“In order to attract investors, the early stage biotech companies need 100k for a proof of concept but they cannot get it without the help of investors. This is a serious bottleneck” - Alex Morgunov, Partner and biotech lead @ Metaplanet Venture Capital

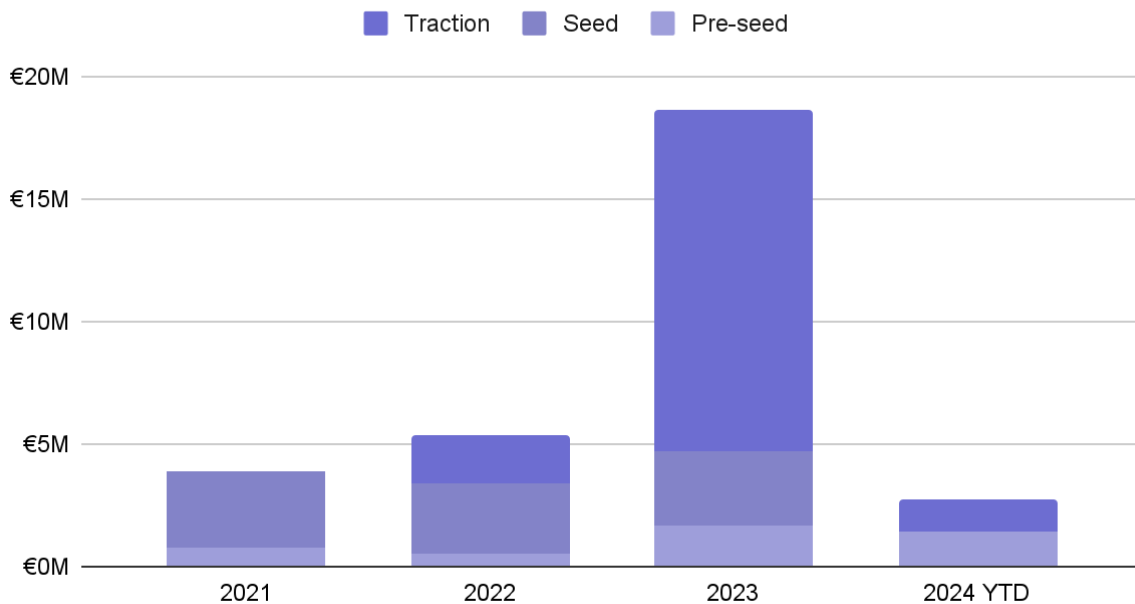
Biocatalyst Foundation, with its first **biotech focused incubation program** in the Baltics and CEE, is the main life sciences ecosystem driver in Latvia, we have connections and partnerships with many regional leading organizations. In addition to the startup mentorship and incubation program, some of the projects we are running include the open biolab, biohackathons, Baltic life sciences development roadmap. We track all Baltic investors and funding agencies, their main investment areas, stages and financing ranges. Finally, we have also mapped out local incubation and acceleration programmes for new founders. These are strategic steps towards increasing the pipeline and raising the ecosystem maturity level in Latvia as well as the whole Baltic states.

Tartu University has created a well-oiled pipeline for spinouts. Tartu Sparkup Incubator offers mentorship, structured incubation and equity free pre-seed financing. They are the organizers of one of the main deeptech events in Estonia - sSTARTUp Day. To complement this, in 2021 the university also established a **dedicated venture arm – UniTartu Ventures** which gives traction to Estonian startups and have most recently co-led an investment round together with Specialist VC into the Synthetic Biology company GearBox Biosciences.

“In solving the food system’ sustainability and health risks, we see remarkable potential in biotech startups in the region, but the ecosystem needs to be fostered to make this a reality” - Mika Kukkurainen, Partner @ Nordic Foodtech VC

We have cataloged 12 organizations headquartered in the Baltic States offering incubation and acceleration programmes, which can be provided upon request, where researchers with commercial ambitions as well as young startups can apply to kickstart and mature their projects.

Investment in Baltic Biotech Startups



The investment landscape in the Baltic biotech sector demonstrates a robust and promising growth trajectory, supported by a balanced influx of both private and public funds. This dual-channel funding model empowers founders with the flexibility to choose between maintaining equity through grant funding or opting for more rapid growth via equity sales. Key players such as Baltic Sandbox Ventures, Practica Capital, the European Institute of Innovation & Technology (EIT), and Horizon 2020 have been instrumental in driving early-stage funding, particularly at the pre-seed and seed stages, laying a strong foundation for future growth. Each Baltic country now has initiatives for nurturing early-stage startups through mentorship, structured incubation, and equity-free financing. The need for startups to gain market traction to secure foreign investments poses a significant challenge. Despite these challenges, the emergence of new funds and accelerators, such as the €13M Baltic Sandbox Ventures dedicated to life sciences and deep tech, signifies growing interest and commitment to the sector, enhancing the ecosystem and paving the way for continued growth and innovation.

Industry / Established Companies

The Baltic biotech industry has emerged as a dynamic and rapidly growing sector, showcasing significant advancements in biotechnology, pharmaceuticals, and life sciences. With impactful foreign investments, innovative local research, and a collaborative ecosystem, the Baltic industries are positioned as key players in the global biotech market. Companies in the region are not only contributing to the local economy but are also making substantial strides in areas such as gene therapy, biomanufacturing, and drug development. This industry's growth is supported by robust infrastructure, skilled talent, and favorable regulatory environments, making the Baltics an attractive destination for biotech investment and innovation.

“Politicians used to say - we can understand investing €10M to build a bridge, but investing €10M in science is nonsense. After we sold our business for €290M their jaws dropped and nonsense was cleared” - Prof. Viktoras Butkus, former CEO, Fermentas International

Creating a globally successful biotech company is not a dream in the Baltics, but a reality, as the most valuable company of the region is **Thermo Fisher Scientific Baltics**, valued at €6.2B, with annual revenues of €1.5B and 38% net profit margin solely produces 2.3% of the Lithuanian GDP. It's important to remember that this company was originally a spin-out called “Fermentas” from the Biotechnology Institute of Vilnius University and was acquired by the Thermo Fisher Scientific corporation in 2010 for \$260M, becoming the largest company acquisition in the region at the time. Thermo Fisher Scientific visits high schools with its Mobile Bioclass as well as partners with local universities to support study programs, overall acting as an exemplary attractor for people in Lithuania to choose STEM careers. The original founders are now deploying their capital to fund new startups through the Future Biomedicine Fund, which has a financing budget of €10M, and personally as angel investors, with at least €1.8M already given out.

Northway Biotech is developing BIO CITY in Vilnius, projected as the largest biotech hub in Europe, with an envisioned total cost of 7 billion euros. This initiative includes four GMP manufacturing plants and two research centers, spanning an area equivalent to 10 football fields. Nonetheless, at the moment most of BIO CITY is only an idea, and only the first one of the planned facilities is under construction - the Gene Therapy Centre. It is set to open in 2024, will focus on developing and manufacturing gene therapies for genetic diseases and

is expected to create over 100 jobs. The final vision of BIO CITY includes additional complexes for R&D, virology, and other biotech sectors, aiming to bolster Lithuania's global biotech standing and create approximately 2,100 high-value jobs. The project is led by a Lithuanian-owned CDMO Northway Biotech, which already operates one of the largest mammalian bioreactor capacities in the EU and had an annual revenue of €124M in 2023. It's great to see how this company applies their market and operating knowledge of cGMP manufacturing to diversify into the most novel treatments.

In due time Estonia's privately owned **Icosagen Cell Factory** could follow suit. It is an independent organization and employs 170 CRDMO staff. It also has offices in San Francisco and Berlin. Icosagen is a research-driven, mammalian protein drug specialist. Icosagen Cell Factory CRDMO is a contract research, development, and manufacturing organization service arm for biotechnology and pharmaceutical companies globally, combining CRO and CDMO capabilities for recombinant antibodies and proteins.

With its proprietary IcoCell stable CHO cell line development platform and the new GMP facility, its range has expanded to large-scale protein manufacturing for clinical trials. Icosagen recently arranged an €18 million financing agreement with the European Investment Bank (EIB) backed by the InvestEU program to strengthen the company's drug discovery, development and production services. Their revenue in 2023 was €19.6M and has been steadily growing since the company's inception in spite of disruptive global events.

We are committed to our mission to make top-level science, technology and pharmaceutical development possible in Estonia. We need a stronger science base in Estonia and also a larger number of specialists with doctoral degrees. The situation in the Estonian science landscape is challenging and certainly requires attention, but we will do everything we can to improve it. We hope that the state will also make its contribution

"We are committed to our mission to make top-level science, technology and pharmaceutical development possible in Estonia. The situation in the Estonian science landscape is challenging and certainly requires attention, but we will do everything we can to improve it. We hope that the state will also make its contribution." - Mart Ustav, CEO @ Icosagen Group

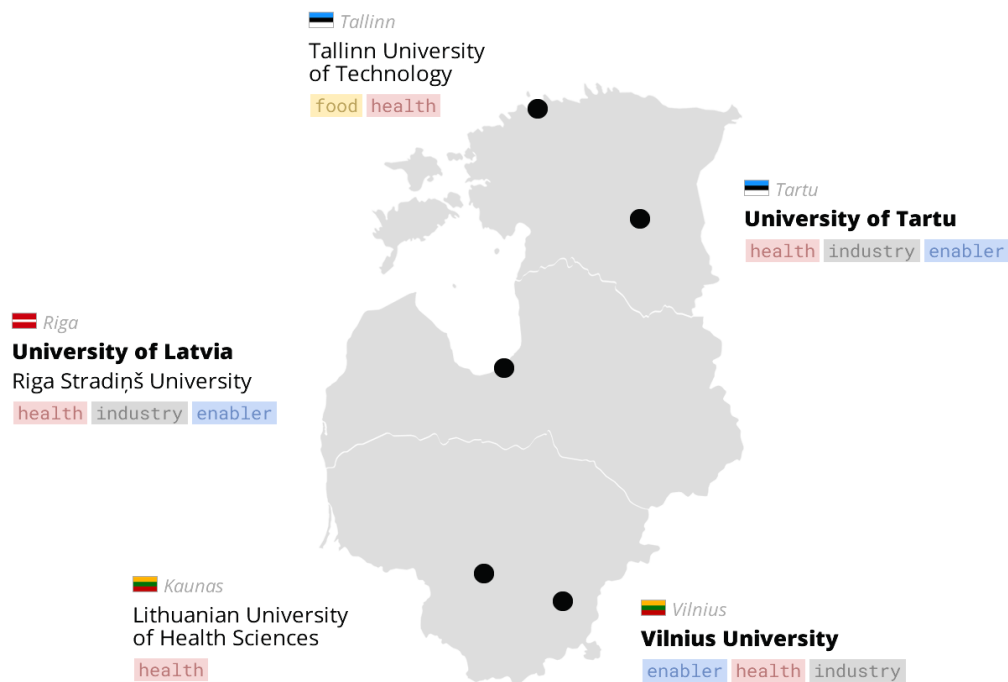
Chinese **MGI Tech** opened a 7,000 square meter production site in Riga in 2019 for an initial cost of €15 million, which is the biggest foreign investment in Baltic Life Sciences that went on an empty plot of land. This site manufactures state of

the art gene sequencing devices and reagents, making it one of the most high-tech life sciences instrument manufacturing sites in the region. Regional field application support, customer excellence and training services are also supported from this MGI Tech hub.

The biotech industry in the Baltic region is on a robust growth trajectory, driven by strategic initiatives, innovative research, and significant investments. With flagship projects like BIO CITY and major players such as Thermo Fisher Scientific Baltics and Icosagen Cell Factory, the region is rapidly becoming a global hub for biotech excellence. The ongoing development and expansion of biotech capabilities in the Baltics promise not only to boost the local economies but also to contribute significantly to global advancements in biotechnology and pharmaceuticals. Most of the largest advancements in industry have been funded by foreign investments. As the Baltic states continue to nurture this vibrant industry, they are poised to make lasting impacts on the global biotech landscape.

Universities and Research Centres

When it comes to functioning innovation ecosystems, higher education and research institutions form the very foundation, providing two essential inputs: talent and intellectual property. The Baltics can boast a strong educational and research infrastructure in most areas of biotechnology, with certain institutions' traditions of excellence going back over half a century. **Five major academic and research hubs** can be outlined across the region, each a concentration of research and educational activity clustered around prominent universities:



Predictably, Estonia is the only Baltic state where the bulk of biotech and synbio related studies are happening outside of the capital city, with Tartu University leading the way; on the contrary, Latvia is the only country where the vast majority of research is concentrated exclusively in the capital of Riga. In Lithuania, the medicine-focused cluster formed around the Lithuanian University of Health Sciences in Kaunas provides a sizable addition to the Vilnius core.

"The Life Sciences Center embodies the fusion of tradition, rich legacy in enzymology, high-standard fundamental science, and innovation, positioning Vilnius University and Lithuania as emerging global leaders in biomedical research and education." - Daumantas Matulis, ex-Director @ Vilnius University Life Sciences Center

While most major areas of research overlap across the Baltics, one can note certain "specializations" - biotechnology fields that have historically and/or recently seen more significant development in each country, both academically and commercially - for example:

- Lithuania has historically been a significant center for **enzymology**, with world-class achievements such as contributions to the CRISPR-Cas gene editing systems.

- Latvian research and academic excellence has long inclined towards **cell biology** and **biopharmaceutics**, as well as **hardware** design.
- A lot of emphasis in Estonia has been put on **genomics** and **bioinformatics**, with target applications in personalized medicine and population health.

The following table summarizes major research institutes across the Baltics dedicated to a significant degree to biotechnology research; you can find the full list in our open [Baltic Biotech Database](#).

Notable biotech research institutions across the Baltics

	Research institute	Affiliated university	Primary focus	Main research areas
EE	Estonian Centre for Biosustainability	University of Tartu, TalTech	Enabler Industry Food Health	Sustainable biomanufacturing
EE	UT Institute of Genomics	University of Tartu	Health	Interdisciplinary genomic research
EE	UT Institute of Biomedicine and Translational Medicine	University of Tartu	Health	Molecular medicine
LV	Latvian Biomedical Research and Study Centre	-	Health	Molecular medicine, virology and vaccines
LV	LU Institute of Microbiology and Biotechnology	University of Latvia	Enabler Industry	Industrial and environmental biotech
LV	RSU Science Hub	Riga Stradiņš University	Health	Molecular medicine, structural biology
LT	VU Life Sciences Center (3 research institutes)	Vilnius University	Health Enabler	Biochemistry, systems biology, biotechnology
LT	VU Institute of Biomedical Science	Vilnius University	Health	Microbiology, genetics, pharmacology
LT	LSMU Medical Academy (4 research institutes)	Lithuanian University of Health Sciences	Health	Molecular medicine

Several major projects have been initiated in recent years to create **new research hubs**, notably in Tartu and Riga. Co-funded by local grants and EU funding vehicles, such projects aim to establish cutting-edge research capabilities by upgrading the infrastructure, upskilling talent, and creating new international collaborations, while leveraging the unique strengths of its host institutions and local ecosystems:

Notable ongoing/recent biotech research infrastructure projects in the Baltics

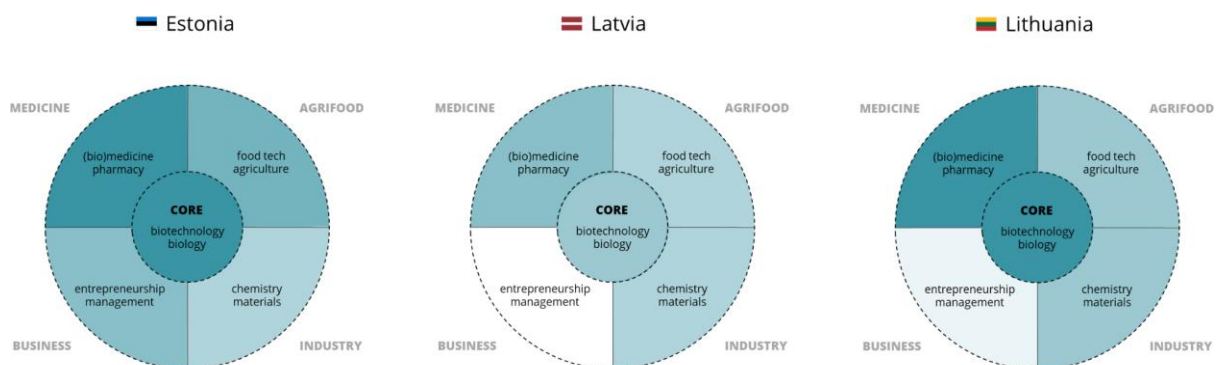
	Center of excellence	Project lead	Primary focus	Budget	Completion
EE	Centre for Data Enriched Medicine	University of Tartu	Health	€30M	2029
EE	Centre for Digitalisation of Biology Towards the Next-Generation of Biosustainable Products	University of Tartu	Enabler	€30M	2029
LV	Baltic Biomaterials Center of Excellence	Riga Technical University	Health	€30M	2026
LV	Biotechnology Group at Latvian Institute of Organic Synthesis	Latvian Institute of Organic Synthesis	Health Enabler	€4.5M	2023

On the talent supply side, **over a thousand** life science and biotechnology majors graduate across the Baltics every year, across over 30 academic programmes entirely or significantly focused on biotechnology.

Around half of the above are **Masters** (MSc) degrees, the rest being **Bachelors** (BSc) and pre-high education degrees. 15 programs are offered in **English**, with international focus particularly prominent in Lithuania.

“It’s very important to not only work with students in an academic way, but also incentivize them to think about future biotechnology companies.” - Talis Juhna, Rector @ Riga Technical University, Head of Biotechnology study program

The following diagram summarizes the region’s educational landscape, juxtaposing core programs entirely dedicated to biotechnology with applied programs focusing on specific sectors (medicine, agrifood, industrial) as well as entrepreneurship and business administration:



In addition to studies, Baltic students are actively engaging with extracurricular projects such as iGEM (Tartu, Riga, Vilnius teams) and Nucleate Baltics.

As the various strands of biotechnology continue to advance in the next years and decades, academic institutions throughout the Baltic States will need to stay agile in order to keep pace. Some of the challenges and opportunities include:

- More emphasis on **cross-functional training**, blending both technological strands (e.g. bioinformatics) as well as sector-specific applications (e.g. industrial and environmental biotech)
- Better **academia-industry ties**, including more courses and modules on entrepreneurship and business management, hands-on internships, as well as involving industry professionals of all levels in workshops, mentorship, and networking activities.
- Closer **Baltic collaboration**, weaving a more diverse set of educational paths across the region through joint programs, internalization, and further specialization afforded by de-duplication of offers.

Policymakers and Facilitators

All Baltic countries have life sciences in their top national smart specialization priorities (RIS3) and align with the broader European Bioeconomy Strategy.

National smart specialization priorities related to biotechnology for Baltic states

Estonia	Latvia	Lithuania
<p>Valorisation of local resources</p> <ul style="list-style-type: none"> • Chemical refining of timber • Improved recovery of various waste flows as secondary raw materials • Valorisation of food and food ingredients • Map and explore existing and exploitable mineral resources 	<p>Knowledge-intensive bio-economy</p> <ul style="list-style-type: none"> • Bio-resource processing into innovative products • Sustainable construction • Smart, climate-resilient agriculture and forestry 	<p>Agro-innovation and food technologies</p> <ul style="list-style-type: none"> • Sustainable agro-biological resources and safer food • Innovative development, improvement and processing of biological raw materials (biorefinery) • Functional food
<p>Health technologies and services</p> <ul style="list-style-type: none"> • Solutions for data use and 	<p>Biomedicine and medical technologies</p> <ul style="list-style-type: none"> • Biopharmaceuticals and 	<p>Health technologies and biotechnologies</p> <ul style="list-style-type: none"> • Molecular technologies for

<p>automated decision support in the medical system</p> <ul style="list-style-type: none"> Integrating new services, such as e-health and personalized medicine, into healthcare Supporting the entry of private services into the market alongside public services 	<p>biotechnology</p> <ul style="list-style-type: none"> Biomaterials for medical applications Translational medicine Health services, digital health 	<p>medicine and biopharmaceutics</p> <ul style="list-style-type: none"> Advanced medical engineering for early diagnostics and treatment Advanced applied technologies for individual and public health
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Notably, Lithuania is the only Baltic state to officially adopt an **explicit goal** relating to the life sciences smart specialization, of generating 5% of national GDP from biotech and life sciences related industries by 2030 and has created many documents outlining the national strategy and breaking down into actionable steps in improving the regulatory and tax landscape, raising the number of qualified specialists, expanding and maintaining infrastructure, and finally stimulating R&D and implementation activities.

Nevertheless, allocating sufficient funding for all possible ways of facilitation on a national level is a challenge and Baltic countries are not near the levels of funding dedicated to R&D in comparison to larger economies. The major provider of R&D and commercialization funding is the EU Horizon program.

“Achieving the 5% GDP target for life sciences in Lithuania is more than just a milestone; it reflects our commitment to building innovation and shared growth. Annual growth rate of 30%, progress is evident and needs teamwork and a clear vision as well as hands-on action plan. We take pride in funding companies early, before private investors step in, and making sure that industry leaders, academics, entrepreneurs, government departments, and research institutions all come together in the same room.” - Jekaterina Kalinienė, Head of BioTech Lab, Invest Lithuania

It’s notable that while national strategies in essence are focused on strengthening the ecosystem and already leading industrial sectors, little direction is given in terms of high potential technological areas. High focus is given to established and growing medical sciences, industrial biotech, forestry, agriculture, food technologies. A good international example could be taken from Scotland, which in 2019 raised a goal to establish the first biogas refinery in the country by 2025. That is a very concrete goal and also a novel addition to the established industries in the country. It would be interesting to see more countries in addition to general stimulatory policies also pick a concrete niche with high economic potential and drive it to industrialization.

Main national contact points for advice and relation building

Country	Government Agencies	Facilitators	Tech parks
Lithuania	Innovation Agency of Lithuania	LithuaniaBIO	Sunrise Valley Science and Technology Park Vilnius City Innovation and Industrial Park
Latvia	Investment and Development Agency of Latvia	Biocatalyst Foundation	
Estonia	Enterprise Estonia	Estonian Bioindustry and Bioengineering Association	Tartu Biotechnology and Science Park Technopol Science and Business Park

All three Baltic countries are taking significant steps toward aligning their national priorities with the broader goals of the European Bioeconomy Strategy. However, despite the focus on fostering biotechnology within the framework of smart specializations, it is essential to emphasize that coordination, innovation, and funding remain critical challenges that must be addressed to unlock the full potential of the sector.

While Lithuania stands out for setting a concrete target of generating 5% of its GDP from biotech by 2030, Estonia and Latvia could benefit from adopting similarly ambitious, specific goals that provide measurable outcomes and clear pathways for growth. The emphasis on valorizing local resources, sustainable agriculture, biomedicine, and digital health technologies is well-founded, but to stay competitive, Baltic states should prioritize emerging high-potential niches like biofuels, biorefining, and precision agriculture. These targeted initiatives could elevate the region's international profile in biotechnology and create new economic opportunities.

“Estonia must prepare for the widespread adoption of biotechnologies, because biosciences and technologies have the potential to shape the world's economic development in 2040-2050” - Marek Tiits, Institute of Baltic Studies; Erkki Karo, TalTech

In addition to national policies, cross-border collaboration and regional networks (e.g., via the EU Horizon program) will be key to overcoming the challenges of limited funding and infrastructure development. Facilitators, including innovation agencies and science parks, must play a more active role in supporting startups and SMEs, especially in testing new technologies through

instruments like regulatory sandboxes, which help reduce regulatory hurdles and accelerate commercialization.

To maximize the impact of existing initiatives, governments should introduce clear goals and key performance indicators (KPIs) for each Research and Innovation Strategies for Smart Specialisation (RIS3) specialization area, offering concrete roadmaps for execution. By focusing not only on strengthening existing industries but also driving technological breakthroughs in underserved areas, the Baltic countries can ensure they remain at the forefront of Europe's biotechnology evolution.

*“The government should be much closer to the key-players of the synthetic biology and biotechnology field and to communicate more with industry, start-ups, and research organizations to understand their needs and to allow them to contribute to the development of the upcoming funding programmes” -
Jekaterina Romanova, CEO @ PrintyMed*

In summary, while strides are being made in aligning policy with industry needs, there remains a pressing need for more targeted, innovation-driven goals alongside enhanced regulatory frameworks and funding mechanisms to fully realize the region's bioeconomic potential. With the right focus, the Baltics could emerge as key players in Europe's life sciences and biotech sectors, contributing to both economic growth and global sustainability goals.

Analysis and Recommendations

The Baltic biotech sector stands at a critical juncture, demonstrating significant promise while facing notable challenges. Our analysis reveals an ecosystem with considerable potential, yet requiring strategic interventions to fully realize its capabilities on the global stage.

The foundations for success are firmly in place:

- A robust academic infrastructure, with world-class research institutions producing cutting-edge discoveries and a growing talent pool
- An emerging startup ecosystem, with over 50 innovative life sciences ventures across the region
- Established industry leaders like Thermo Fisher Scientific Baltics, demonstrating the potential for global success

- Increasing investment activity, with both public and private funding sources supporting growth
- Supportive government policies aligning with EU bioeconomy strategies

These elements collectively position the Baltic states as an emerging force in the biotech landscape.

Several key hurdles must be addressed:

- **Scaling and Commercialization:** While early-stage innovation is strong, many startups struggle to scale and bring products to market.
- **Talent Retention:** Despite strong educational programs, brain drain to more established biotech hubs remains a concern.
- **International Investment:** Attracting large-scale international funding remains challenging, limiting growth potential.
- **Regional Collaboration:** Greater cooperation between Estonia, Latvia, and Lithuania is needed to leverage complementary strengths.
- **Niche Specialization:** The region must identify and focus on specific high-potential areas within biotech to differentiate itself globally.

To capitalize on its potential, the Baltic biotech sector should prioritize:

- Develop targeted programs to support scale-up and commercialization, including mentorship from successful biotech entrepreneurs and partnerships with global pharma companies.
- Implement initiatives to attract and retain top talent, such as competitive compensation packages, research grants, and improved career development pathways.
- Enhance international visibility through coordinated marketing efforts showcasing Baltic biotech innovations and investment opportunities.
- Establish a pan-Baltic biotech alliance to coordinate research efforts, share resources, and present a unified front to international partners and investors.
- Identify 2-3 niche areas of biotech where the Baltic region can become a global leader, based on existing strengths and future market potential. Direct resources and policy support to these areas.
- Foster closer academia-industry collaboration through joint research programs, industry-sponsored PhDs, and increased private sector involvement in curriculum development.

The stakes are high, but so is the potential reward. The Baltic states have a unique opportunity to position themselves at the forefront of the bio revolution, which is set to reshape industries, economies, and lives globally. Success in this endeavor would not only create high-value jobs and attract global talent and investment, but also contribute to solving some of the world's most pressing challenges through innovative biological solutions.

The coming years will be pivotal in determining whether the region can fully capitalize on its biotech potential. With continued commitment and strategic action from all stakeholders - governments, academia, industry, and investors - the Baltic biotech ecosystem can flourish, driving economic growth and establishing the region as a key player in the global biotech landscape.

“Biotechnology is integral to Europe’s industrial, competitive and sustainable future. Within this unfolding industrial paradigm shift, the Baltic region will need to decide whether it wants to be a serious player or merely an observer. The key choices need to be made now.” - Claire Skentelbery, Director General, EuropaBio

The most exciting chapters of the Baltic biotech story are yet to be written. By addressing current challenges and leveraging existing strengths, Estonia, Latvia, and Lithuania can transform their biotech sector from a promising contender into a global leader, shaping the future of this transformative field.

Best practices to share

Based on the findings of the regional mapping, we have identified key cross-border best practices across six major dimensions, to be used as templates for strengthening the Baltic biotech ecosystem:

Category	Best Practice	Country/Institution	Key Impact
Startup Ecosystem	Structured incubation and pre-seed equity-free financing	Tartu University, Estonia	Accelerates startup maturity and funding readiness
	Strong linkage between academic spin-offs and industry	Vilnius University, Lithuania	Successful commercialization (e.g., Fermentas exit)
	Public-private funding balance enabling growth flexibility	Baltic Sandbox Ventures	Enables diverse funding strategies for startups
	Long-term biotech growth strategies with government support	Business Finland	Ensures sustained ecosystem development

	International accelerator participation	Various Baltic startups	Exposure to global investors and partners
Funding	Creation of dedicated biotech VC funds	Lithuania, Latvia, Estonia	Provides targeted financial support for early-stage startups
	Leveraging EU Horizon and EIT grants effectively	Regional governments	Supports foundational R&D and commercialization
	National innovation funding agency with targeted biotech focus	Business Finland	Directs substantial resources to biotech innovations
	Tax incentives for biotech companies	Lithuania	Encourages biotech investments and expansions
Academia-Industry Links	Integration of entrepreneurship into curricula	Riga Technical University	Prepares students for biotech careers and startups
	Joint research programs with industry	Icosagen, Estonia	Strengthens commercialization and application potential
	Industry-sponsored PhDs and internships	Vilnius University, Lithuania	Increases workforce readiness and innovation potential
	Open innovation programs with corporate partners	VTT, Finland	Bridges academia and industry for applied research
Infrastructure	Development of open-access wet labs and research hubs	Baltic Biomaterials CoE, Riga	Facilitates startup access to cutting-edge facilities
	Bio-city development to attract foreign investment	Vilnius, Lithuania	Enhances regional biotech infrastructure and visibility
	National biotech clusters for resource sharing	HealthBIO Cluster, Finland	Enhances collaboration and resource access
Policy & Regulation	Clear IP transfer guidelines for academic spin-offs	Lithuania	Encourages tech transfer and commercialization
	National biotech strategies with measurable goals	Lithuania	Provides clear roadmap and investment attractiveness
	Simplified regulatory pathways for biotech startups	Estonia	Reduces barriers to market entry
	Strong national biotech strategy with sustainability goals	Finland	Supports long-term innovation and commercial viability
Talent Development	Targeted workforce training programs	Baltic states collectively	Addresses biotech-specific skill gaps
	Gender equality initiatives in research institutions	Latvia Biomedical Centre	Promotes inclusive and diverse talent
	International student programs and scholarships	Vilnius University	Attracts global biotech talent to the region
	Strong vocational training in biotechnology	Finnish universities	Produces highly skilled technical talent

These Nordic and regional best practices can serve as inspiration for the Baltic region to adopt more structured long-term support mechanisms, robust funding strategies, and enhanced collaboration between academia and industry.

Areas for tighter regional cooperation

1. Funding and Investment Synergies

- Creation of a **joint Baltic biotech investment fund** to pool resources and attract larger-scale investors.
- Coordinated lobbying for increased **EU Horizon and EIT grant allocations** for the region.
- Development of a **shared early-stage financing mechanism**, ensuring access to pre-seed capital across all countries.

2. Joint Research and Innovation Programs

- Establishing a **Baltic Biotech Research Alliance**, combining strengths in genomics (Estonia), enzymology (Lithuania), and biopharmaceuticals (Latvia).
- Collaborative efforts on **synthetic biology and personalized medicine**, leveraging regional expertise.
- Cross-border **clinical trial infrastructure**, allowing startups to scale product development faster.

3. Policy Alignment and Advocacy

- Harmonizing **IP transfer regulations** and biotech-friendly policies across all Baltic countries.
- Unified positioning within EU institutions to advocate for increased **biotech R&D funding**.
- Regional cooperation on **regulatory frameworks**, streamlining product approval processes.

4. Infrastructure and Shared Resources

- Development of a **regional open-access biotech hub**, offering shared wet lab and pilot-scale manufacturing facilities.
- Cross-country startup exchange programs to facilitate **knowledge transfer and networking**.

- Coordinated efforts to establish a **Baltic-wide biobank** for research purposes.

5. Talent Retention and Attraction Strategies

- Joint initiatives to create a **Baltic Biotech Talent Attraction Program**, offering incentives for skilled professionals to stay or relocate.
- Cross-border collaboration on **biotech-specific educational programs**, ensuring harmonized curricula and international recognition.
- Development of a **Baltic Biotech Career Fair**, connecting talent with industry leaders across the region.

6. Market Positioning and Promotion

- Establishing a unified **Baltic Biotech Brand**, promoting the region as a global hub for biotech innovation.
- Coordinated participation in major international biotech events, representing the region collectively.
- Launch of a shared **biotech investment attraction platform**, showcasing success stories and opportunities.

By focusing on these areas, the Baltic region can enhance its competitiveness, attract investments, and foster a more robust and interconnected biotech ecosystem. The Action Plan seeks to address the above items to build a solid foundation for cross-border synergies within the Baltic/Nordic region.