Inovacijų agentūra

Research and experimental development and innovation (smart specialisation) concepts

Mid-term evaluation of progress

REPORT

Authors and Funding

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TABLE OF CONTENTS

List of tables

I. INTRODUCTION

The Strategic Evaluation of Smart Specialization Implementation provides the interim evaluation findings of the 2021–2027 Lithuanian Smart Specialization (S3) concept implementation and provides strategic recommendations for changes up to 2027, alongside insights for the upcoming 2028–2034 planning cycle.

The evaluation concludes that the current S3 implementation system is institutionally integrated, administratively functional, and highly effective at absorbing European Union Regional Development Funds. The financial instruments are actively utilized, exhibiting high participation rates, and the strategy is well understood by SMEs, research organizations, and innovation intermediaries. The current system successfully acts as a "thematic grant allocation" mechanism, enabling R&D-intensive business innovations that would not have been developed without state support.

However, the system remains structurally limited in converting these investments into a broader economic transformation, failing to significantly drive productivity growth or shift the economy toward an innovation-based model. The primary barriers to further growth are not thematic choices or funding volumes, but rather fragmented policy coordination, a lack of cohesive support measures across different Technology Readiness Levels (TRLs), slow administrative cycles, and the absence of well-integrated long term oriented innovation pipelines linking R&D to market expansion. Consequently, businesses typically utilize S3 support as one-off interventions rather than continuous innovation trajectories, with only a few deep-tech projects successfully navigating from prototype to market without falling into the "Valley of Death".

The broader impact of the S3 strategy exhibits uneven development, where investments in innovation grow faster than actual innovation outputs. Several systemic paradoxes underscore this issue:

The "1% R&D Trap": Despite rapid absolute growth in public and EU ERDF funding, the total R&D intensity has stagnated at 1.0–1.1% of GDP over the past decade. Business R&D expenditure fluctuates between 0.3% and 0.5% of GDP, failing to reach the 1% target seen in peer Central and Eastern European countries, suggesting that public funding may sometimes substitute rather than stimulate private investment.

The Input vs. Output (IP): The system efficiently generates knowledge, evidenced by a relatively high volume of joint public-private publications; however, technology transfer and commercialization remain highly insufficient, reflected by low public-private patent application rates as compared to total numbers of patents coming from academia solely. This hinders knowledge transfer speed and volumes to support the original IP backed innovation that is necessary for further technology upgrading.

The ICT and Absorptive Capacity Gap: While Lithuania boasts 90% broadband penetration, only 8.8% of enterprises utilize advanced technologies like Artificial Intelligence, far below EU targets. Furthermore, while innovative firms advance rapidly, the broader SME base lacks the organizational capacity and innovation management routines required to effectively absorb public support, hindering broader technological diffusion.

Regional asymmetry: Innovation regimes fundamentally differ between the Capital Region (RII score of 96.6; driven by deep tech, R&D, and ICT talent) and the Central and Western Lithuania (CWL) Region (RII score of 66.0; driven by

process efficiency and industrial manufacturing). EU cohesion rules direct most funding to the CWL region, yet the deep-tech talent, especially in ICT, required to absorb these funds is concentrated in the Capital. Without explicit policy linking the Capital's high-tech capabilities (e.g. AI, photonics, and etc.) to CWL's manufacturing base, S3 risks exacerbating regional disparities rather than fostering complementary value chains.

The specific focus areas were indicated for deeper focus of this report, namely Defence and dual use technology promotion, deep tech development across the startup base, and artificial intelligence development as a horizontal technology. Defence and Dual-Use Technologies: Geopolitical realities have transformed defence into a system "stress test" requiring speed, regulatory adaptability, and demand creation. Because current S3 priorities are civilian-biased, the most effective approach would be to establish a dedicated Defense and Security Mission (orchestrated by a DARPA-style agency), deploy experimental sandboxes, and integrate dual-use technologies as a horizontal priority across all sectors.

Deep Tech: Deep tech startups suffer from undercapitalized early-stage grants and are forced to compete against more standard and rapid solutions for the same support measures. A dedicated "Deep Tech Highway" is needed, featuring higher grant ceilings (€100k–€500k), stricter criteria (TRL 3+), and, possibly, direct institutionalized linkages to European Innovation Council (EIC) accelerator instruments.

Artificial Intelligence: Currently treated as a narrow vertical sub-sector, AI adoption is "broad but shallow". AI should be repositioned as a horizontal mission applied across advanced manufacturing, healthcare, and defence, supported by sovereign data infrastructure to reduce reliance on external providers.

To achieve an economic breakthrough, S3 must shift from passive thematic funding allocation to the active orchestration of innovation pipelines. This requires moving from top-down administration to ecosystem coordination, balancing R&D supply with market demand instruments. Six core principles outline this S3 2.0 transformation:

1. Mission-Driven Innovation Pipelines: Create sequential support pipelines linking early-stage R&D to market acceleration in ≤12-week funding cycles. Establish "green channels" so successful pilots (e.g., reaching TRL 6) automatically qualify for scale-up financing based on milestones, mimicking venture capital logic.

2. System Orchestration Over Administration: Assign a dedicated pipeline owner (agent) for each mission to coordinate cross-ministerial budgets. Transition to portfolio management, accepting failure as a learning cost and implementing strict rules to terminate underperforming projects early.

3. Experimental Policy via Demand and Testing Environments: Utilize the state as a market creator by mandating quotas for Public Procurement of Innovation (PPI) and Pre-Commercial Procurement (PCP) in strategic sectors. Establish safe regulatory and physical environments, including "hard" sandboxes (drone/cyber ranges) and "soft" sandboxes (AI/health data).

4. International Competitiveness as a Quality Filter: Automatically finance national projects that meet high EU evaluation thresholds (e.g., EIC Accelerator) but missed European funding. Shift from general networking support to professional "engineering" of international R&D portfolios.

5. Diffusion and Absorptive Capacity: Deploy technology extension services and upgrading vouchers for SMEs in the CWL region, tied directly to productivity metrics. Align lifelong learning, competency development, and industrial PhD programs directly with S3 missions.

6. Balanced Scorecard Evaluation: Replace compliance-heavy metrics with outcome-oriented scorecards (commercialization, IP, private investment, export value), utilizing automated data from corporate reporting systems to reduce bureaucratic burdens.

Based on readiness for change, three development scenarios are proposed:

Scenario 1: S3 Thematic Continuity ("Status Quo Plus"): Maintains current themes while slightly accelerating processes. It guarantees administrative stability but incurs high opportunity costs, ensuring structural transformation remains unachieved.

Scenario 2: Mission-Oriented S3 Development ("Radical Transformation"): Systematically transitions to innovation pipeline management and ecosystem orchestration via demand/supply integration. This scenario offers the highest probability for a true innovation breakthrough and strategic technological accumulation.

Scenario 3: Two-Speed S3 ("Compromise"): Applies rapid mission-oriented governance solely to Defense, Security, and Resilience due to geopolitical urgency, while leaving the rest of the economy in the legacy model.

Lithuania possesses the technological talent, industrial base, and foundational policy frameworks necessary to become a strong innovator. The core challenge is no longer a lack of ideas or funding, but a profound deficit of connected innovation trajectories built on continuous value streams. Transitioning the Smart Specialization strategy into a mission-oriented model with active ecosystem orchestration is the essential prerequisite for transforming the Lithuanian economy, ensuring long-term resilience, defence capabilities, and sustained prosperity.

Methodological note: The assessment utilized a bottom-up, mixed-methods methodology—combining quantitative data to describe patterns and trends with qualitative insights from focus groups, interviews, and surveys to interpret causality and systemic dynamics. To ensure analytical robustness and reduce single-source bias, the evaluation relied heavily on triangulation and synthesis, systematically cross-checking convergence and divergence across evidence. While this approach faced methodological limitations such as non-random qualitative sampling, uneven firm-level data availability, and restricted visibility into private co-investments, these challenges were carefully mitigated through purposeful sampling across sectors and governance levels, thematic saturation, cross-validation, and the transparent reporting of assumptions and data gaps. The full methodological and empirical reports are provided in Annex 1,2,3,4,5 and 6.

II. STRATEGIC EVALUATION OF LITHUANIA'S NATIONAL INNOVATION ECOSYSTEM

A. OVERALL PERFORMANCE OF THE S3 SYSTEM

To address comments requesting clarity on Lithuania's performance, this section now begins with a concise overview of the Lithuanian innovation system using key indicators (BERD, patents, EIS proxies, export complexity, productivity) drawn from Annex 1. Lithuania performs at approximately 92% of the EU average (EIS), with strong R&D activity concentrated in the Capital Region and incremental innovation dominating in Central and Western Lithuania. Business R&D expenditure (BERD) remains uneven, with 72% concentrated in Vilnius, while non-R&D innovation expenditures are higher in industrial regions.

INNOVATION AND ECONOMIC OUTCOMES LINKED TO S3

Across all evidence sources, S3 is consistently associated with **positive innovation outputs**, particularly in R&D, prototype development, and incremental product and process improvements (Annex 2). Focus group discussions and interviews confirm that S3 funding has enabled firms and research organisations **to undertake projects that would otherwise be considered too risky or long-term** (Annex 3, Annex 5), especially in high-tech domains such as ICT, health technologies, and defence-related innovation. Survey respondents similarly emphasised the role of S3-aligned grants in **sustaining innovation efforts and maintaining competitiveness** (Annex 4). However, the translation of these innovation outputs into systemic economic outcomes-such as productivity gains, export growth, or structural upgrading of value chains-remains uneven, suggesting that **positive project-level results do not consistently scale into broader economic transformation** (Annex 2). Also, the association between positive R&D figures or patent filings and innovation may not be driven by S3 funding. To confirm that would require a more rigorous econometric assessment, including **counterfactual analysis with control samples**.

ALIGNMENT BETWEEN STRATEGIC OBJECTIVES AND FUNDING ALLOCATION

The combined evidence indicates a **partial alignment** between the stated S3 objectives and the actual funding allocation. Focus groups and interviews indicate a strong strategic prioritisation of innovation, emerging technologies, and R&D-intensive activities, as reflected in funding preferences for **research, prototyping, and early-stage development**. Survey results confirm that stakeholders broadly recognise this alignment with S3 priorities. At the same time, both qualitative and quantitative data reveal **gaps in funding coverage for downstream phases**-such as **scale-up, market access, and internationalisation** (Annex 2, Annex 3) - creating perceived discontinuities between strategic intent and implementation. As a result, while funding allocation aligns well with **upstream** innovation objectives, it is less well matched with goals related to economic **impact, diffusion**, and long-term competitiveness. (For quantitative indicators and project-level breakdown, see Annex 2).

STRONG PERFORMANCE AREAS VERSUS WEAK TRANSLATION INTO STRUCTURAL CHANGE

A recurrent finding across all sources is the contrast between **strong performance in early innovation stages** and weak translation into structural change. Firms succeed in developing prototypes and validated concepts but struggle to progress further due to missing follow-up instruments and fragmented responsibilities (Annex 2). Focus groups (Annex 3) highlight effective performance in research excellence, technological experimentation, and pilot initiatives, particularly in ICT and life-science-related fields. Interviews (Annex 5) reinforce this picture, noting that firms often succeed in developing prototypes and validated concepts but struggle to progress further due to **the absence of follow-up instruments and fragmented responsibilities**. Survey responses (Annex 4) corroborate these insights by pointing to persistent obstacles related to administrative burden, coordination, and **limited access to growth-stage financing**. Consequently, despite pockets of technological strength, **structural effects**-such as upgraded industrial capabilities, stronger domestic value chains, or sustained scaling of innovative firms-**remain limited**.

EVIDENCE OF UPSTREAM BIAS IN THE S3 SYSTEM

Taken together, the evidence indicates **an upstream bias** in the S3 implementation framework. Focus group (Annex 3) participants explicitly refer to **fragmentation and weak continuity** from basic research to market uptake, while interviewees (Annex 5) describe a system **dominated by grants for pilots and R&D**, with insufficient mechanisms for commercial follow-through. Survey data (Annex 4) reinforce this finding, as respondents consistently rate administrative complexity, coordination failures, and limited predictability as major barriers to innovation impact. This upstream orientation favours knowledge generation and early experimentation but constrains diffusion, adoption, and scaling, particularly for firms outside core high-tech sectors. As a result, the S3 system tends to perform **better in supporting innovation inputs than in delivering transformative, economy-wide outcomes**.

B. MACROECONOMIC TRAJECTORY: THE "1% TRAP" AND PUBLIC INVESTMENT DYNAMICS

In the transition between the 2014–2020 and 2021–2027 programming periods, macroeconomic indicators such as Gross Domestic Expenditure on R&D (GERD) and Government Budget Allocations for R&D (GBARD) have emerged as the primary pulse of Lithuania’s commitment to a knowledge-based economy. This period represents a high-stakes structural adjustment as the nation attempts to move from a model of capital deepening-characterized by the acquisition of machinery-to one based on genuine knowledge creation and high-tier innovation. While the state has significantly increased its fiscal pulse, the broader challenge remains whether this capital is successfully catalyzing a sustainable private-sector foundation or merely maintaining a public-sector-led "innovation facade."

Table 1. GERD/BERD/GBARD Synthesis: A Comparative Trajectory

Indicator	2014 Baseline	2024	Growth (2014–2024)

GBARD per Capita (€)	€42.7	€126.9	+197%
GBARD as of GDP	0.34	0.46	+12 p
BERD as of GDP	0.32	0.44	+12 p
GERD as % of GDP	1.02%	1.03%	+0.01 pp

THE FINANCIAL PARADOX ANALYSIS

Lithuania faces a profound "financial paradox": GBARD per capita has surged by 197%, one of the highest growth rates in the EU, yet the aggregate R&D intensity (GERD) remains trapped near the 1.0–1.1% threshold. This stagnation is driven by two factors:

1. **The Denominator Effect:** Rapid nominal GDP growth, fueled by high inflation in 2022–2023, has diluted the impact of increased R&D spending when expressed as a percentage of total output. The increase of GBARD mainly was able to catch up with the macroeconomic change, however was not able to reach a structural change towards 1 % of GDP.

2. **Stagnant structural configuration:** Public funding, often directed toward researcher salaries and national research programs (including R&D in Business), has failed to "crowd-in" private capital at a higher level towards research ecosystem. The efforts to achieve 3 % GERD (1% GBARD+2% BERD) has been stagnant as business R&D investments were rather following government funding pattern over the period.

   This failure to break the "1% Trap" at a macroeconomic level necessitates a granular evaluation of how public capital is deployed-specifically, the efficiency of the fiscal and direct support mechanisms that dictate Business Enterprise R&D (BERD) behavior.

C. THE BERD POLICY MIX: DIRECT FUNDING VS. FISCAL INCENTIVES

The strategic balance between direct state intervention (grants) and market-driven fiscal levers is the core determinant of the Business Enterprise R&D (BERD) landscape. While direct funding is essential for high-risk, "frontier" research, fiscal incentives are intended to lower the Effective Average Tax Rate (EATR) for established industries, encouraging them to scale their R&D operations. Lithuania's current mix, however, reveals a systemic misalignment between these two levers, particularly regarding how they serve the differing needs of the industrial base.

TAX INCENTIVE ARCHITECTURE

The cornerstone of Lithuania’s fiscal support is a **300% volume-based super-deduction** model, allowing firms to deduct their eligible R&D expenditures from taxable income. While nominally generous, this credit is **non-refundable**. This creates a "liquidity trap" for pre-profit entities-typically high-growth start-ups and

deep-tech firms-who cannot monetize these gains. These firms are forced to carry deductions forward, which provides no relief for the urgent cash flow requirements necessary to survive the early development stages.

Table 2. Comparative Analysis of Support Types (% of GDP) (OECD, Tax Incentives Data Base)

Year	Direct Government Funding	Tax Incentive Support (GTARD)	Total Business Support
2015	0.024%	0.024%	0.048%
2019	0.026%	0.026%	0.052%
2021	0.037%	0.026%	0.063%
2022	0.051%	0.051%	0.102%

COMPANY SIZE ASYMMETRY AND THE "DUAL ECONOMY"

The current policy mix has inadvertently fostered a "Dual Economy." Large Enterprises (LEs), with stable profits and sophisticated tax departments, utilize the 300% super-deduction with high efficiency, often capturing the bulk of GTARD volume. Conversely, Micro and Small Enterprises (SMEs) are effectively "leaving money on the table." These firms are frequently pre-profit or have low tax liabilities, making the super-deduction irrelevant. Consequently, SMEs remain critically dependent on direct grants, which are subject to volatile EU programming cycles and high administrative burdens, preventing them from achieving the scale necessary for international competitiveness.

The financial inputs and policy levers discussed above find their ultimate expression in the performance of the Smart Specialisation Strategy (S3) priority sectors, which are designed to lead the nation's structural transformation.

D. STRATEGIC OUTCOMES: IMPLEMENTATION BENEFITS FOR TARGET GROUPS

The implementation of S3 priorities-Health Technologies, Advanced Industrial Processes, and ICT-translates abstract investment goals into micro- and meso-level economic benefits. By 2024, the consolidation of these priorities into high-potential domains has begun to yield measurable returns in sector vitality and export reach, demonstrating that the "Entrepreneurial Discovery Process" (EDP) is maturing.

Key Performance Indicators (KPIs) Breakdown (2024):

- **Value Added (BPV):** S3 sectors generated over **5,26 billion EUR**, accounting for **13.1%** of national BPV.
- **Commercial Vitality:** Sector turnover reached **14.6 billion EUR**, supported by **103,000 employees** across 11.9 thousand companies.
- **Export Performance:** S3 domains have become the primary engine of trade, with Lithuanian-origin goods (led by lasers and photonics) generating **6.2 billion EUR** (a 10% increase) and services (led by FinTech and ICT) reaching **3 billion EUR** (a 20% increase).

PRODUCTIVITY AND INVESTMENT SHIFTS

There is a clear structural pivot as material investments in traditional machinery are increasingly superseded by investments in digital and intangible assets. This transition has propelled S3 productivity to **46.4 thousand EUR per employee**. While traditional manufacturing remains significant, the growth of high-value niches like gene editing (Life Sciences) and AI signifies a successful move toward a more sophisticated economic profile.

As these S3 sectors mature, it is imperative to analyze their growth relative to the total economy to determine if a genuine "decoupling" from low-value production is occurring.

E. COMPARATIVE ECONOMIC PROGRESS: S3 SECTORS VS. THE TOTAL ECONOMY

S3 serves as a "structural adjustment" tool, intended to shift the national economy toward high-value-added production and decouple growth from low-cost labor. Data confirms that S3-aligned sectors are indeed outpacing the general economy, though this progress is unevenly distributed across the firm size spectrum.

GROWTH DIFFERENTIAL ANALYSIS

In 2014, S3 priorities represented 10.2% of national BPV; by 2024, this share reached 13.2%. This indicates a successful structural shift, with sectors like ICT and Life Sciences (specifically Thermo Fisher Scientific Baltics and photonics firms) growing at rates that significantly exceed traditional manufacturing. The ICT sector has been particularly bolstered by the influx of international professionals, accelerating its role as an economic driver.

THE "MISSING MIDDLE" EVALUATION

Despite these successes, medium-sized enterprises (50–249 employees) are struggling within the "Valley of Death." While micro-enterprises exhibit high entrepreneurial activity and large firms maintain stability, medium firms often lack the capital to transition from prototype to industrial-scale production. This "Missing Middle" remains a structural bottleneck; these firms are too large for micro-grants but lack the internal reserves or credit access (due to limited collateral for intangible assets) to compete with multinational incumbents.

Sustaining this structural growth is ultimately dependent on the availability and mobility of high-tier human capital, which serves as the "fuel" for these innovation engines.

F. HUMAN CAPITAL AND COMPETENCY ANALYSIS: SUPPLY, SHORTAGES, AND MOBILITY

The "Knowledge Economy" mandate is entirely reliant on the density of researchers and high-tech specialists. Lithuania’s human capital strategy in the S3 context focuses on ensuring a supply of labor that can sustain the high-growth trajectories of the Life Sciences and ICT domains.

Labor Market Metrics:

- **Researchers in Business:** This segment grew by **8.7%** in 2023, reflecting a strengthening of the private-sector research base.
- **High-Tech Employment:** Despite growth, Lithuania's employment share in high-tech remains at **16.9%**, less than half the EU average of 38.1%, indicating a persistent "base" of low-to-medium tech employment.

DIGITAL SKILLS AND SPECIALISTS

The relocation of thousands of ICT professionals (notably from Belarus) provided a critical supply-side boost in 2020. Furthermore, general digital competency is a comparative strength: **93.9%** of the population possesses above-basic digital skills (indexed to the EU average), providing a fertile ground for digital transformation.

JOB MOBILITY EXCELLENCE

Lithuania ranks **1st in the EU** for "Job-to-job mobility of Human Resources in Science and Technology (HRST)." This high mobility is a vital driver of knowledge diffusion, as specialists move between firms and academia, facilitating the transfer of implicit knowledge and best practices across the ecosystem.

While Lithuania excels in producing and moving high-tier talent, a significant "Commercialization Gap" remains in converting this intellectual energy into protected market value.

G. S3 EFFICIENCY AND VALUE CREATION: INNOVATION SALES AND INTELLECTUAL PROPERTY

The efficiency of an innovation ecosystem is measured by its ability to bridge the distance between scientific research and market-ready technology. Lithuania exhibits a "Commercialization Gap" characterized by high scientific output that fails to manifest as proprietary technology.

THE "PATENT PARADOX"

Lithuania suffers from a contrast between academic excellence and industrial protection:

1. **High Scientific Volume:** Success in public-private co-publications (+31.7 points since 2018), indicating that academia and business sector has managed to co-operate in knowledge production activities, demonstrating first results of joint research projects.
2. **Stagnant Intellectual Property:** PCT patent applications remain critically low, fluctuating between 0.4 and 0.5 per billion GDP, placing Lithuania at the bottom of EU rankings, indicating that the collaborative work so far fails to convert in intellectual property for innovation development in firms. This indicates also the weakness of technology transfer systems, and, possibly, absorptive capacity of firms.

SALES FROM INNOVATION

A concerning decline is visible in the indicator for "Sales of new-to-market/firm innovations," which has dropped 42.5 points since 2018. This suggests that while firms are engaging in innovation activities, they are struggling to convert these

efforts into sustained market share or genuine market novelties. Much of the innovation expenditure remains focused on "non-R&D" activities (ranked 2nd in the EU), such as purchasing software, rather than creating original IP.

H. SYNERGY AND COLLABORATION: THE "TRIPLE HELIX" IN PRACTICE

Smart specialisation requires a functional synergy between firms, research institutions, and the state. Without these linkages, innovation remains siloed, and the ecosystem fails to reach the global "Reference Site" status required for S3 success.

COLLABORATIVE DYNAMICS

While Lithuania shows high performance in "Innovative SMEs collaborating with others," the metric has seen recent volatility. However, **public-private co-publications** (currently 73.6% of the EU average) have increased significantly since 2018. The creation of **Digital Innovation Hubs (DIHs)** is a strategic attempt to consolidate fragmented clusters into higher-functioning ecosystems.

S3 PRIORITY DEEP-DIVE

- **Lasers and Biotech:** These sectors represent the "gold standard" of the Triple Helix, maintaining deep ties with Vilnius University and utilizing co-creation grants to remain globally competitive.
- **Traditional Manufacturing:** Linkages remain fragmented. Innovation is often limited to "acquiring technology" rather than collaborative "creating of technology," leaving these firms vulnerable to global price fluctuations.

THE FINANCIAL PARADOX AND DATA ASYMMETRY

The fundamental challenge within Lithuania's innovation landscape is the inability of massive public funding increases to "crowd-in" private BERD proportionately. While the state has increased its R&D budget (GBARD) by nearly 200% per capita, the private sector has not matched this intensity, leading to the "1% Trap." This failure is rooted in a "Dual Economy" where data asymmetries hide a growing divide. Large, profitable incumbents-the "Tax-Optimized" sector-use the 300% tax super-deduction to lower their Effective Average Tax Rate (EATR). However, because the incentive is volume-based rather than incremental, much of this support results in "deadweight loss," where the state subsidizes R&D that would have occurred regardless.

Conversely, the "Grant-Dependent" sector, comprised of innovative, pre-profit SMEs and deep-tech start-ups, finds the tax incentive irrelevant due to its non-refundable nature. These firms face a persistent "liquidity trap," forced to rely on the volatile and administratively burdensome cycles of EU structural grants. Without the ability to monetize tax credits, these high-potential firms struggle to survive the "Valley of Death." The result is a stagnant national R&D intensity, as the firms most likely to produce disruptive S3 breakthroughs are starved of predictable, non-dilutive capital, while mature firms optimize tax liabilities without significantly expanding their R&D horizons.

EFFICIENCY AND "THE 1% TRAP"

Breaking the 1.1% R&D intensity ceiling requires a radical shift from "capital deepening" to "knowledge creation." Currently, a significant portion of what is classified as innovation expenditure is actually "non-R&D" investment-primarily the acquisition of external machinery and software. While this improves baseline productivity, it does not create the proprietary IP necessary for high-tech leadership. This is most evident in the "Patent Paradox": Lithuania performs well in scientific co-publications but fails in PCT patent applications, which remain stagnant at 0.4 per billion GDP. This suggests that the ecosystem is efficient at generating knowledge but inefficient at capturing and protecting the resulting value.

Furthermore, the administrative environment remains a bottleneck. For instance, the average duration for **Mutual Agreement Procedure (MAP) cases is 31.5 months**, significantly exceeding the 24-month OECD target. This regulatory lag, combined with a fear of tax audits regarding R&D expense classification, discourages firms from utilizing available incentives. Without addressing these "soft" infrastructure issues-improving administrative clarity and reducing the time-to-resolution for tax and IP disputes-the R&D intensity will likely remain trapped below the 1.1% threshold. The focus must shift from the volume of funding to the velocity of commercialization and the legal protection of the resulting assets.

REGULATORY ADAPTATION (2026 REFORMS)

The landscape will undergo significant transformation starting January 1, 2026. The standard Corporate Income Tax (CIT) will increase from 16% to 17%, while the reduced rate for companies with revenue under €300,000 will rise from 6% to 7%. While this increase technically enhances the value of the 300% R&D super-deduction, it also increases the overall cost of doing business. Crucially, the reform includes an extension of the 0% CIT rate for new companies from 1 year to 2 years, a vital support measure for the start-up ecosystem.

However, new levies intended for the National Defence Fund will add complexity. A 10% levy on non-life insurance premiums and a 0.2% surcharge on commercial property-which applies to all properties owned by legal entities and commercial properties owned by individuals-will increase the overhead for industrial stakeholders. The introduction of the "Immediate Depreciation Incentive," allowing for the full deduction of acquisition costs for machinery and computer hardware in the first year, is a positive move toward capital deepening. However, these broad investment incentives may inadvertently encourage firms to continue purchasing external technology rather than investing in the high-risk, internal R&D required for true S3-led structural transformation. Maintaining the focus on R&D-specific measures amidst these broader shifts is the primary challenge for the 2026–2030 strategic period.

III. REGIONAL DIMENSION OF SMART SPECIALISATION

A. REGIONAL INNOVATION SYSTEM PERFORMANCE OVERVIEW

Analysing Lithuania through the regional lens is crucial because the national average often masks a profound "innovation duality." In the 2021-2025 cycle, the divide between the Capital Region (Sostinės regionas) and Central and Western Lithuania (Vidurio ir vakarų Lietuvos regionas) has reached **a critical turning point**. To establish the state of the art, EU Regional Innovation Scoreboard (RIS) indicators were used.

While the national Lithuanian performance is around **92% of the EU average** (EIS), the regional breakdown reveals two different innovation and development "speeds." The Capital Region is on the edge to convert in to the Strong Innovator Cathegory, and now competes in Moderate Innovator + group. The Central and Western (VVL) region, while improving, remains stuck in a "production-driven" rather than "innovation-driven" cycle. The VVL region currently performs at roughly **80% of the EU average** (Emerging Innovator+) and faces a distinct challenge: its firms are world-class at using technology but lag in owning the underlying Intellectual Property. By focusing on "Smart Export" and "Hidden Champions," the region aims to advance up the value chain without sacrificing its competitive edge in manufacturing.

Table 3. Regional Classification and Dynamics (2021–2025)

Region	**RIS 2025 Category**	**Performance vs. EU Avg**	**5-Year Trend**
Capital region (Sostinės)	Moderate Innovator	~112%	High growth (+14%)
Central & Western Lithuania	Emerging Innovator	~79%	Steady growth (+9%)

Further analysis is based on the RIS 2025 indicator groups, which reveal detailed divergent points between the Capital and Central & Western Lithuania regions.

The analysis across core indicator categories reveals significant regional differences as follows:

A. Framework Conditions (Talent & Digitalization)

- Capital Region (Sostinės regionas): Ranks **in the top 10% of EU regions** for **Tertiary Education attainment**. It is a "talent magnet," absorbing nearly **80%** of the country's highly skilled inbound mobility (Annex 1).
- Central & Western (VVL): While tertiary education is high (above EU average), there is a significant **"brain drain" to the capital**. However, this region **leads in Lifelong Learning** participation among the industrial workforce, driven by retraining programs, delivered by several universities of Kaunas and Klaipėda (Annex 3).

B. Investments (R&D and Finance)

- Business R&D (BERD): A massive gap exists. Roughly **72% of all private R&D expenditure is concentrated in the Capital** Region (Lasers, Biotech, ICT), while non-R&D innovation expenditures dominate in Central and Western Lithuania, reflecting its focus on industrial modernization (Annex 1).
- **Non-R&D Innovation Expenditures**: This is the only indicator where Central and Western Lithuania often **outperforms the Capital**. This reflects the region's focus on industrial modernization-buying new CNC machines, robotic arms, and software for furniture, textile, and engineering factories (Kaunas/Klaipėda/Šiauliai/ Panevėžys).

C. Innovation Activities (SMEs and IP)

- Product/Process Innovation: SMEs in the **Central and Western region are very active in "Process Innovation**" (making production more efficient).
- Intellectual Property (Patents/Trademarks): **The Capital Region dominates PCT Patent applications** (mostly in life sciences and physical sciences/lasers). The Western region relies more on Design Applications, reflecting its furniture and manufacturing base.

D. Impacts (Employment and Sales)

- Employment in Knowledge-Intensive Activities: **Sostinės is at 145% of the EU average**.
- Sales of Innovative Products: Central and Western Lithuania shows high performance here, as their modernized factories export **"new-to-market" furniture and engineering industry products of high value added** to Scandinavia, Germany, and also global markets.

B. CORE REGIONAL DIFFERENCES: STI AND DUI INNOVATION REGIMES

The Innovation Divide of Lithuania comes from a different innovation modes, particularly the mode focused on scientific and technologically-based innovation (STI) dominating the Capital Region vs. the mode based on learning-by-doing, by-using, and by-interacting (DUI), dominating Central and West Lithuania. Vilnius Capital region is ready to join the European "Innovation Leaders," but its growth is increasingly constrained by the lack of deep-tech manufacturing capacity. Conversely, the rest of the country has the manufacturing capacity but lacks the R&D depth. While the Mid-West focuses on industrial modernization, the Capital Region's mandate is to drive the frontier of deep-tech and international IP creation.

Table 4. Core regional differences: the "Dual speed" economy of Lithuania

Feature	Capital (Vilnius)	Central & Western Lithuania
Economic Logic	Knowledge-Economy: Focus on IP, Services, and VC.	Process efficiency: Focus on Modern Manufacturing Productivity

Innovation Type	Disruptive: New apps, new biotechnologies, new laser tech.	Incremental: High productivity assembly lines, better logistics.
Growth Engine	Startups & International hubs: (Vinted, Nord Security).	Industrial Clusters: (Free Economic Zones across main cities, Klaipėda Port).

Following the analysis of regional differences, the Capital and Central West region faces different however complementary challenges:

For the Capital Region (Sostinės regionas):

- Addressing the deficiency in specialized ICT competencies: Focuses on bridging the high-level skills gap in advanced software engineering, AI architecture, and digital product management required for global scaling.
- Development of high-value-added original intellectual property (IP) assets: Prioritizing the creation of international patents and proprietary technologies to transition from a service-oriented model to a product-led innovation economy.
- Establishment and advancement of a technology cluster of European significance: Leveraging the existing high-tech ecosystem (e.g., life sciences, lasers, and fintech) to develop a world-class hub that attracts pan-European talent and investment.
- Catalyzing the growth phase of "Hidden Champions": Identifying high-potential, specialized SMEs within the regional cluster and providing the strategic support necessary to accelerate their transition into global market leaders.
- Transitioning into the "Innovation Leaders" regional category: Implementing structural reforms and investment strategies aimed at surpassing the 125% EU innovation average threshold to join the top tier of European regions.
- Demonstrating national leadership and fostering cross-regional networking: Serving as the national "Innovation Locomotive" by creating knowledge-transfer synergies and collaborative value chains with the Central and Western Lithuania region.

That means, that in the 2026/2027 cycle and onwards, the transition to the "Innovation Leaders" group is the primary KPI for the Capital region. This requires the region to move beyond being a local hub and become a "European Significance" cluster, particularly in deep-tech fields where **international patents are the primary currency of success**.

At the same time, the Central and Western Lithuania region (VVL), holds a specific status as an industrial powerhouse **transitioning toward Industry 4.0**. It is characterized by high non-R&D innovation expenditure, i.e. innovation adoption mode by acquiring advanced machinery, equipment, and digital solutions, and a focus on process efficiency within traditional manufacturing sectors. To maintain a specific direction towards the Innovation Challenges for Central & Western Lithuania (VVL) are as follows:

- Deficit of technical and industrial innovation competencies: Refers to the specific skills gap in managing advanced manufacturing technologies and digital industrial transitions.

- Scarcity of original proprietary products and IP: A critical lack of regional-born patents, trademarks, and integrated design/creative solutions, leading to a dependency on subcontracting models.
- Investment in innovation-driven operational efficiency: The strategic necessity to pivot from low-cost labor to high-productivity, automated processes.
- Dominance of non-R&D based innovation expenditures: A regional trend where capital is primarily allocated to the acquisition of machinery and hardware rather than internal Research and Experimental Development (R&D).

This leads for the specific strategic objectives for regional transformation:

- Strengthening international and inter-regional value chain integration: Enhancing the region's capacity **to participate in global markets and collaborate with the R&D hubs of the Capital Region**.
- Revitalizing traditional sector exports through creative-industrial integration: Driving the competitiveness of furniture, textiles, and engineering by embedding original creative industry solutions into manufacturing.
- Promotion of "Smart Export" and high-value niche solutions: Moving away from volume-based competition **toward specialized, high-added-value niche products**.
- Incentivization of non-formal competency acquisition frameworks: Supporting workforce upskilling through strategic mentorship and lifelong learning to close the digital divide.
- Identification and scaling of "Hidden Champions": Detecting specialized, highly successful regional SMEs (Hidden Champions) and providing the catalytic support needed to transform them into global industry leaders.

In sum, the strategic move to be implemented under Smart specialisation concept is to boost the overall national rank, Lithuania must **focus on specific regional strengths and facilitate interregional knowledge transfer**. Specifically, connecting Vilnius-based AI and deep tech R&D with Kaunas and Central - West region-based engineering and manufacturing capabilities, and Klaipėda-based maritime logistics. The successful strategy would lead both regions to higher performance rans, and establish Lithuania in the strong innovators category at the EIS level, while moving capital region towards Strong innovators, and Central - West Lithuania towards a moderate innovators with a strong and modern industrial base.

This strategy targets three specific welfare-enhancing mechanisms:

1. **Escaping the "Low-Cost Labor" Trap**

Currently, the Central and Western (VVL) region remains "production-driven", relying on an "efficiency-economy" model. While these industries are modernizing, they often depend on a "low-cost labour" advantage. This places a ceiling on wage growth, as competing on production volume forces continued cost suppression.

The Welfare Shift: By pivoting to "Smart Export" and "high-value niche solutions", the economy moves away from volume-based competition. This transition to "high-productivity" processes is the primary economic driver that enables sustainable increases in worker wages without losing market competitiveness.

2. **Capturing Wealth Through Ownership (IP)**

A key structural weakness identified is that while Lithuanian firms are world-class at *using* technology, they lag in *owning* the underlying Intellectual Property (IP). This results in a "dependency on subcontracting models", where the highest profit margins-and thus the highest potential for tax revenue and salary growth-are captured by foreign clients who own the product designs.

The Welfare Shift: The focus on "high-value-added original intellectual property" and "regional-born patents" is designed to retain a larger share of the value chain within Lithuania. Transitioning from a service/assembly model to a product-led economy allows Lithuanian companies to dictate prices globally, fuelling higher domestic wealth retention.

3. **Reducing Regional Inequality**

The national average currently masks a profound divide: the Capital Region has decoupled from the rest of the country, performing at 112% of the EU average, while the VVL region lags at roughly 80%. Without intervention, this "dual-speed" economy risks creating a permanent wealth gap between Vilnius and the rest of the country.

The Welfare Shift: The strategy explicitly links "Vilnius-based AI and deep tech R&D" with "Central-West... manufacturing capabilities". This interregional knowledge transfer is intended to ensure that the high-growth potential of the capital lifts the industrial regions, spreading economic benefits and high-quality employment opportunities across the entire national territory.

CONCLUSION

The goal of reaching the Top 20 is not merely a statistical exercise; it is a proxy for a successful structural transformation. It signifies a shift from an economy that *assembles* value to one that *creates* it, directly enabling the higher incomes and robust social welfare systems characteristic of the world's leading innovation economies.

To achieve this the following chapter aims to address on how the S3 strategy supports these ambitious goals.

C. THE ROLE OF SMART SPECIALISATION S3 STRATEGY IN REGIONAL INNOVATION

In the 2021–2027 programming period, Lithuania’s Smart Specialization (S3) Strategy was designed to move the country from an "adopter" of technology to a "creator." The strategy identifies three core priority areas and 15 thematic fields. The critical challenge for further implementation of the S3 concept is that while the priorities are national, the regional capacities to execute them are highly unequal.

The 2021–2027 Smart Specialization (S3) Strategy in Lithuania is a legally binding framework that guides all European Regional Development Fund (ERDF) R&I investments. The evaluation of the "Strategic Fit" by mapping smart specialisation categories against the regional economic realities of the Capital Region (Sostinės regionas) and Central and Western Lithuania (Vidurio ir Vakarų Lietuvos Regionas VVL) has been performed by using EU Regional Innovation Scoreboard, Smart Specialisation Funding allocation for 2021-2027 at the interim across the regions and specific Smart Specialisation thematic topics, and also qualitative insights of project level analysis, focus groups, interviews and survey. (See Annex 2 for regional funding allocation tables and Annex 3 for qualitative coding).

The funding landscape for Lithuania's Smart Specialization (S3) 2021–2027 is shaped by a significant structural tension: the money follows the regional development gap, while the innovation potential follows the capital's talent.

Due to EU Cohesion Policy rules, Lithuania is divided into two distinct socio-economic regions. This division dictates a massive disparity in S3 funding intensity:

- Central and Western Lithuania (VVL): Categorized as a moderate innovator, i.e. "Less Developed Region", it receives approximately 74% to 88% of the total innovation and business support funds.
- Capital Region (Sostinės): Categorized as a Strong Innovator, and a "More Developed Region." It receives the remaining 12% to 26%, despite housing 54% of innovative enterprises and 75% of the country's higher education and research capacity (in terms of the number of higher education and research institutions, researchers employed, and higher education participants).

S3 PRIORITIES & REGIONAL STRENGTH MAPPING

The following table uses the categories approved by the Ministry of Economy and Innovation for the 2021–2027 period S3 concept implementation and qualitatively measured their strategic fit based on the focus groups discussions, interviews, and survey results.

Table 5. S3 Priorities & Regional Strength Mapping.

S3 R&D&I Priority	Thematic Fields	Capital Region (Sostinės) Fit	Central & Western Region (VVL) Fit
Health technologies and biotechnologies	1. Molecular technologies for medicine and biopharmaceutics 2. Advanced applied technologies for personal and public health 3. Advanced medical engineering for early diagnosis and treatment 4. Safe food and sustainable agrobiological resources	Strongest: Home to the Life Sciences Center and biotech/pharma LSEs, including international R&D hubs. 80%+ of sectoral R&D is performed within the region, as well as the human capital accumulation is strongest.	Emerging: Kaunas (LSMU) leads in applied health research, whereas KTU (Kaunas university of Technology) leads Med Tech innovation based on engineering and computer science, including accelerated speed of AI based applications for health tech, thus contributing to Advanced medical engineering for early diagnosis and treatment VVL also dominates in "Safe food" (Agri-food) innovation due its regional coverage, agricultural intensity

			and also industrial nature.
New production processes, materials and technologies	1. Photonic and laser technologies 2. Advanced materials and constructions 3. Flexible product development, production and process management technologies 4. Strengthening energy efficiency and smart energy solution 5. Use of renewable energy sources	Mixed: Dominates in Lasers (R&D level). Weak in large-scale manufacturing	Strongest: The "Industrial Heart" of the country, Kaunas / Šiauliai. / Panevėžys / Klaipėda excel in Flexible production processes and Materials, and forms the backbone of manufacturing driven exports, and also builds critical ties with EU industrial networks.
Information and communication technologies (ICT)	1. AI, big and distributed data, multidisciplinary analysis, processing and implementation 2. The Internet of Things (IoT) 3. Cyber security 4. Financial technologies and blockchains 5. Audiovisual media, design technologies and social innovation 6. Smart transport systems	Excellent: 90% of FinTech and ICT specialists are based in Vilnius. The Capital region Leads in AI and Cybersecurity.	Moderate: Focuses on IoT for industry, digitalisation and robotics, and Smart transport systems (Klaipėda Port & logistics across different cities). The promising and emerging area stands at the cross section of AI and MedTech.

CROSS-REGIONAL STRATEGY "FIT" AND STRUCTURAL ALIGNMENT

A. The "Health Tech & Biotech" Priority (Sostinės Dominance)

Funding in this area is highly concentrated in the **Capital Region**. Even with smaller EU ERDF quotas, the region compensates through **Horizon Europe** (where Lithuania has a ca 16-17 % success rate) and private Venture Capital investments for deep tech high value-added innovation and entrepreneurial

growth across STEP technologies or so called "Frontier" sector. The lack of EU R&I funding forces these companies to seek global private equity earlier in the development stages, which **accelerates their internationalization, and, in many cases also relocation towards European start up hubs** (Berlin, Paris, or USA locations).

B. "New Production Processes" (VVL's Industrial Opportunity)

This is where the ERDF funding is the most impactful. It perfectly targets the modernization of the manufacturing industry, with the heavy focus on furniture, engineering industries, and food-tech in Kaunas and Klaipėda cities, with less absorption in Šiauliai and Panevėžys (4th and 5th largest cities in Lithuania). However, there is a risk of "**Low-Complexity Innovation.",** which leads to productivity increase, but has a lesser impact on value added and product complexity in exports. Because the funding is high enough but the R&D base and ecosystems in VVL is thinner, many companies use these funds t**o buy *existing* technology (Non-R&D) rather than *inventing* new production methods.**

C. "ICT & Creative Society" (The Digital Bridge)

With **€127.7M for digitization**, this is the "connective tissue" of the S3 strategy implementation. It leverages the Capital region's software expertise to solve the Mid-West's productivity problems. We are seeing a 2025 trend where Vilnius-based AI startups are receiving "VVL-designated" funds by opening branches in Kaunas or Klaipėda to modernize regional logistics and manufacturing, which is further accelerated by targeted Innovation Agency measures to support AI in business, and specifically - digitalisation in manufacturing (ca 10 mio Eur in total).

In conclusion, the 2021–2027 S3 funding model aims to achieve a target of social cohesion (reducing regional inequality) but also forms a strategic challenge of fragmenting R&D resources heavily needed for the frontier of deep tech development. To succeed within the interim period, the Smart Specialisation Concept implementation strategy must ensure that the Sostinės region becomes R&D Deep tech innovation lead while the VVL region becomes the advanced manufacturing hub for the country. The current interim review (2025) suggests that the most successful projects are those that involve inter-regional collaboration and clusters-where a Capital region strength in ICT and AI is leveraged to upgrade technologies in VVL region.

Table 6. Summary of Funding Effectiveness

Indicator	Sostinės Region (Vilnius)	Central & Western (VVL)
Funding Intensity	Low (Efficiency-driven)	High (Cohesion-driven)
Primary Goal	Global Leadership in Deep Tech	Regional Industrial Transformation
Weakest Link	High cost of talent and space	Industry 4.0 Technology adoption rates (e.g., automation, digitalization in manufacturing), Standardization,

		shortage of engineering talent, Process innovation and productivity, Collaborative R&D and open-source contributions
2030 Target	Top 15 EU Regional Innovation Index	Breakout into "Moderate - Strong Innovator" group

The S3 strategy to succeed needs to become a masterpiece of "Regional Complementarity." It uses the **Capital** region to generate the **"What"** (the IP and software) and the **VVL region** to handle the **"How"** (the manufacturing and physical scale).

What this means for S3 delivery? Lithuania's dual-speed pattern is not a constraint but a design variable. S3 performance improves when Capital-anchored frontier capabilities (AI, photonics, life sciences) are deliberately coupled to VVL's manufacturing & logistics base through stage-gated pipelines, joint testing, and procurement-anchored deployments. Today's gaps-IP creation in VVL, scale-up & certification bottlenecks, and thin diffusion instruments-translate into missed productivity and export complexity. **The policy implication is direct:** mission pipelines must be **inter-regional by design**, with **funding continuity**, **test/sandbox capacity in regions**, and **diffusion services** that raise absorptive capacity across the SME base.

IV. QUALITATIVE INSIGHTS FROM STAKEHOLDERS

To understand the impact of the Smart Specialisation Strategy (S3), we must look beyond the balance sheets and enter the lived experience of Lithuania's innovators. This chapter synthesises a multi-modal research effort encompassing **893 project analyses** (Annex 2) , focus groups with **60+ specialists** (Annex 3), a survey of **93 stakeholders** (Annex 4), and **20 in-depth interviews** (Annex 5). Together, these voices tell the story of an **"Innovation Odyssey"**-a journey that begins with high-octane research but frequently stalls in a fragmented institutional landscape.

The story begins with the "**Spark**"-a surge of R&D activity supported by generous product-innovation grants. However, as the journey progresses, innovators enter a "**Fog**" of administrative fragmentation, often referred to as the "**9 Nannies" problem**, where no single institution owns the end-to-end technology pipeline. The final stage of this odyssey is frequently the "**Obstacle**"-a scaling bottleneck where 70.6% of funding is concentrated in the prototype phase, leaving only 1.2% for the industrialisation and digitisation needed to reach the market

A. FOCUS ON BEHAVIOURAL PATTERNS (THE "HOW")

Stakeholder feedback indicates that the current system incentivises specific behaviours that, while successful in meeting grant requirements, often fail to produce market-ready companies. Instead of a continuous climb toward commercialisation, firms experience a series of disconnected "popcorn" events.

THE "ONE-OFF" PROJECT MENTALITY

Quantitative analysis of the S3 portfolio confirms that firms treat grants as standalone inputs rather than milestones in a long-term trajectory.

- **Prototype-Centric Funding:** A dominant **70.6% of S3 funding** is spent on "Innovative Product Development". However, scale-up enablers like **digitisation (1.2%)** and **energy efficiency (1.2%)** are virtually ignored.
- **The "Popcorn Stage":** Business voices describe the early stage of innovation as a "popcorn stage" where companies are registered based on "green ideas" just to receive initial grants, without a clear path to follow.
- **Hunting for Grants:** Because there is no "end-to-end monetary guidance," firms finish a project and then spend months "hunting" for the next available call, causing development to stall or reset entirely.

THE TRL STALL: FRUSTRATION IN THE "VALLEY OF DEATH"

The most pervasive pattern is the **TRL Stall**, where technologies successfully reach **Technical Readiness Level (TRL) 6** (functional prototype) but find the path to **TRL 9** (market deployment) blocked by a lack of follow-up support.

- **"Created and Goodbye":** A voice from the ICT sector summarizes the pattern: *"We created a prototype and goodbye... we are in that valley of death where there is a prototype but no product"*.
- **The Re-application Burden:** When a pilot ends, firms must re-apply to entirely different schemes with different rules. This often involves a **1.5 to 2-year wait** for funding, while the technology cycle-particularly in AI-may only last 3 to 6 months.
- **Administrative Friction:** 46.25% of survey respondents identified the **administrative load** as a major barrier, with business leaders noting that *"it's more work to get the money than to finish the project"*.

B. CAPTURE INSTITUTIONAL "FRICTION" (THE USER JOURNEY)

The institutional experience of the S3 framework is frequently described by stakeholders as a journey through a fragmented landscape where administrative logic often overrides technological and market realities. This friction manifests as a "navigation overload" for firms and a rigid, "Excel-driven" evaluation process that discourages high-potential entrepreneurs.

NAVIGATION OVERLOAD: THE "9 NANNIES" PROBLEM

Stakeholders across all sectors report a profound lack of coordination between the various bodies governing innovation. While formal charts show a structured division of labour, the practical experience is one of institutional silos.

- **The Pipeline Without an Owner:** Participants describe the system as having **"9 nannies, but the child is headless"** (9 auklės, vaikas be galvos), referring to the scattered responsibilities across the Ministry of

Economy and Innovation (EIMIN), the Ministry of Education, Science and Sports (ŠMSM), and the Ministry of National Defence (KAM).

- **Disconnected Ministerial Vectors:** There is no single "innovation owner" to shepherd a technology from research to procurement. A business voice noted, *"Ministries don't work together... there is no end-to-end monetary guidance of a company's life cycle"*.
- **Institutional Overlap:** The creation of new structures has led to overlapping functions between the Innovation Agency, science and technology parks, and various "hubs," causing confusion for firms trying to identify the correct entry point for support.

THE "EXCEL-DRIVEN" REALITY VS. DEEP-TECH AMBITION

The evaluation of S3 projects is widely criticised for relying on formalistic checklists and statistical data rather than a qualitative assessment of a project's team, business model, or disruptive potential.

- **Metric Misalignment:** Evaluators are perceived as being **"Excel-based"**, often failing to see the actual team or the market logic behind a proposal. This is particularly damaging for **deep-tech entrepreneurs** whose value lies in intellectual property and complex engineering rather than immediate revenue or high employee counts.
- **The "Publication" Trap:** A major point of friction exists between the scientific and business communities. Science remains "extremely dependent on publications" to secure funding, a metric that stakeholders in the **Defence** and **Manufacturing** sectors call irrelevant for their needs. One scientist remarked: *"If the majority of scientists focus on startup creation... we stall with publications, on which our funding depends"*.
- **Subjectivity and Patronage:** Qualitative feedback from surveys highlights a perceived deterioration in expert quality, with reports of subjective "like/dislike" judgments and signs of patronage during the evaluation phase.

C. HIGHLIGHT SUB-SECTORAL NUANCES (THE "NUANCE" GAP)

While quantitative benchmarks provide a high-level view of progress, qualitative evidence reveals that a "one-size-fits-all" approach to S3 policy fails to account for the vastly different innovation rhythms within the thematic pillars. Stakeholders highlight a significant "nuance gap" where broad sectoral labels-such as "Health" or "Manufacturing"-mask internal divisions between frontier research and traditional industrial activities.

BEYOND HIGH-LEVEL PRIORITIES: THE HEALTH AND AGRI-FOOD SPLIT

The "Health" thematic pillar illustrates the danger of over-aggregation. Stakeholders point out that while the pillar is theoretically high-tech, it is internally bifurcated between **High-R&D Biotech** and **Medium-Low R&D Agri-food**.

- **Divergent R&D Rhythms:** Molecular technologies and bio-pharmaceutical projects (high R&D intensity) require long-term, high-risk investment. In contrast, the "Safe Food and Sustainable Agrobiological Resources" sub-sector often focuses on medium-low intensity process improvements.
- **The Regulatory Paradox:** Scientific voices in health express that while they have strong product focus (~71%), they are often blocked by data silos. A voice from the science community noted: *"Hospitals are 'hugging'*

the data... bioethics and requirements are a barrier... we need leadership for health data".

- **Business Model Mismatch:** Some sub-sectors, such as audiovisual media (ICT), are frequently lower in R&D intensity than their high-tech labels suggest, yet they compete for the same S3 funds as deep-tech firms.

THE DUAL-SPEED REALITY: STI VS. DUI MODES

A "dual-speed" economy is emerging, defined by the friction between the **Scientific-Technological-Innovation (STI)** mode, dominant in the Capital, and the **Doing-Using-Interacting (DUI)** mode, common in industrial regions.

- **The Capital's STI Mode:** The Vilnius and Kaunas regions concentrate **43% and 30% of respondents** respectively, hosting the majority of frontier R&D, biotech, and ICT firms. These firms focus on "inventing IP" and high-TRL prototypes, yet they suffer from a lack of scale-up enablers to reach the market.
- **Industrial DUI Mode:** In Central and Western Lithuania, innovation often takes a DUI form-**"buying machinery"** to increase productivity rather than "inventing IP". In the Manufacturing sector, only ~53% of activity is product-focused, while ~23% is dedicated to export expansion and process efficiency.
- **The Efficiency Trap:** Business voices in manufacturing argue that for them, innovation is about **output and profit** rather than scientific "Excel-driven" metrics. One business leader stated: *"Companies don't need numbers... they need to earn money. The status of an innovative company is so complicated that companies don't want to get into that mess"*.

REGIONAL DIFFERENCES AND SECTORAL STRENGTHS

Stakeholders argue that S3 priorities should be **sectoral rather than regional**, as the current "two-region" (Capital vs. VVL) statistical split discriminates against specific regional clusters.

- **Regional Specialisation:** Regions have identified unique strengths-such as **Agro-tech, Blue-tech (jūrinė ekonomika), and Energy-tech**-that do not always fit into the horizontal R&D requirements of national calls.
- **The Capacity Gap:** There is a consensus that Lithuania is "too small" for every region to have its own priority. A stakeholder remarked: *"We are too small for every region to have its own priority..."*.
- **Digital Duality:** Survey data confirms that while **18% of processes are fully digitised** nationally, the depth of this digitisation is uneven. ICT is extremely product-heavy (~89%) but invests almost nothing (~0.9%) in digitising the very platforms it creates, risking a "prototype-to-platform" transition failure

D. DOCUMENTING THE "ABSORPTIVE CAPACITY" CRISIS

The qualitative evidence highlights a critical **"absorptive capacity" crisis** within Lithuanian firms, where the bottleneck is not merely the external supply of talent, but the internal ability of organisations to "digest" and implement complex R&D outputs. While the state focuses on financing the "spark" of innovation, the lack of internal **innovation management** and **hybrid technical skills** prevents these sparks from becoming sustainable industrial fires.

MANAGEMENT GAPS: THE BARRIER TO COLLABORATION

Stakeholders report that a significant portion of the traditional manufacturing sector lacks the foundational **innovation management skills** required to even initiate, let alone sustain, a collaborative R&D project. This deficit limits the diffusion of S3 outputs beyond a small circle of "frontier" firms.

- **The Initiation Hurdle:** Many companies struggle with the "raiting" or justifying of an innovative status because the administrative and management requirements are perceived as a "mess" that interferes with daily earning.
- **The "Hard" vs "Soft" Skill Divide:** A recurring theme in expert interviews is the mismatch in expectations: **business** lacks the "hard" technical competencies to manage R&D, while **science** lacks the "soft" management skills to commercialise products.
- **Voices from Business:** One manufacturing leader remarked, *"Traditional factories need high-competence employees just to understand what they are buying... we need to help them move from buying a machine to managing an innovation process"*.
- **Sectoral Pattern (Manufacturing):** In the manufacturing portfolio, while 53% of projects focus on product development, investment in **skills development** remains modest at roughly 3.9%, leaving a gap in the management expertise needed for regulatory compliance and international sales.

THE HYBRID SKILLS SHORTAGE: BEYOND GENERIC TRAINING

The research identifies a severe shortage of **"hybrid" professionals**-individuals who possess both deep technical expertise (such as AI or Data Science) and specific domain knowledge (such as Medicine or Tactical Defense).

- **The AI "Catch-up":** In the ICT sector, stakeholders note that while generic AI training is available, there is a total absence of **specific competencies** required for industrial application. One participant observed, *"In the field of AI, there is a chase... people don't know the specific possibilities... all training is of a general nature"*.
- **Health and MedTech:** There is an acute demand for specialists combining **medical and mathematical knowledge** to apply AI in life sciences. Currently, the system produces "pure" doctors or "pure" mathematicians, but the "Med-Math" hybrid required for S3 success is missing.
- **Defense and Security:** The defense sector reports a lack of professionals who understand both the **Technical Readiness Levels (TRL)** and the specific operational needs of military procurement. Voices from the sector suggest that without people who can bridge the gap between a "lab prototype" and a "battlefield product," innovations remain stuck in a "testing desert".

REGIONAL DIFFERENCES: THE "TALENT TRIANGLE"

The capacity crisis is geographically lopsided, with a "dual-speed" reality between the urban hubs and the broader regions.

- **Geographic Concentration:** Approximately **73% of survey respondents** are concentrated in the Vilnius and Kaunas regions, which also host the vast majority of the country's PhD-level researchers.
- **The Regional Vacuum:** Outside the "talent triangle" of Vilnius, Kaunas, and Klaipėda, the shortage of high-competence employees is described as

a "red book" (endangered) issue. Stakeholders note that regions like **Alytus, Šiauliai, and Panevėžys** possess strong manufacturing bases but lack the internal "intellectual resources" to move from incremental upgrades to original IP creation.

- **Voice from Science:** *"the talent pool is concentrated in three cities... Pakruojis or Lazdijai cannot become centers if they don't have the people to manage the innovation"*

E. CONCLUSION

Lithuania's Smart Specialisation Strategy (S3) effectively serves as a **product-innovation catalyst**, yet it faces a significant "broken pipeline" where research prototypes fail to scale into market-ready industrial solutions. While the majority of funding (70.6%) is directed toward **innovative product development**, critical scale-up enablers such as digitisation and energy efficiency each receive only 1.2% of the budget, creating a "valley of death" for emerging technologies.

STRATEGIC OVERVIEW OF INNOVATION ACTORS

The current ecosystem is characterised by a **high input, low output** paradox. Businesses are burdened by slow administrative cycles (1.5–2 years to receive funding) and "navigation overload" caused by fragmented governance. Meanwhile, the scientific community remains tethered to academic metrics like **scientific publications**, which stakeholders identify as a barrier to the practical commercialisation and valorisation of research.

Table 7. Summary Table: Patterns and Challenges in Business Sectors and Science

Sector / Group	Strategic Innovation Patterns	Key Challenges & Voices
Manufacturing	Balanced mix of product development (53%) and export expansion (23%).	Low investment in process upgrades and skills (3.9%) threatens long-term cost competitiveness.
ICT	Extremely R&D-driven (89%); focuses heavily on frontier software and AI prototypes.	Negligible investment in digitisation (0.9%) and scaling; risks failing the "prototype-to-platform" transition.
Health & Biotech	Intense focus on product creation (71%) with emerging digital health models (13.7% e-commerce).	Regulatory hurdles and data silos ("hospitals hugging data") slow the path from lab to clinic.
Science & Academia	High involvement in policy but oriented toward knowledge generation and publications.	Criticised for a failure to commercialise; scientists remain "publication dependent" rather than product-oriented.

SYSTEMIC BARRIERS TO SUCCESS

- **The Scale-up Gap:** The current funding logic is "pilot-heavy but scale-light," meaning companies can build a prototype but lack the **"end-to-end monetary guidance"** to reach industrial production.
- **Institutional Friction:** Known as the **"9 Nannies" problem**, the lack of coordination between ministries (Economy, Education, Defense) causes innovators to lose momentum while re-applying for disconnected grants.
- **Competency Deficits:** There is a severe shortage of **hybrid professionals** who understand both technical domains (like AI) and sectoral needs (like regulatory compliance or international sales).

FUTURE OUTLOOK (2028–2034)

Stakeholders suggest a radical shift toward **mission-oriented pipelines** and "test-bed" infrastructure. The top priorities identified for the next cycle include **Artificial Intelligence (71%)**, **Defence and Security (61%)**, and **Advanced Manufacturing (61%)**. Participants call for a **"Fast-Track" mechanism** (e.g., 6-week sprints) to better align administrative speed with technological evolution.

V. SPECIAL FOCUS AREAS: DEEP TECH, ARTIFICIAL INTELLIGENCE AND DEFENCE / DUAL USE TECHNOLOGIES

This section overviews the strategic context, strengths and weaknesses, and potential strategic direction across three areas: deep tech, artificial intelligence, and defence. The section is based on extensive analyses of the areas reported in annexes Annex 7, Annex 8, and Annex 9. These three areas are chosen due to increasing importance in technology upgrading (deep tech), generic soci-economic relevance (AI) and recent significance pushed by global geopolitics and the War in Ukraine, in particular (defence).

A. DEEP TECH STARTUPS DEVELOPMENT

STRATEGIC CONTEXT: FROM PHYSICAL INFRASTRUCTURE TO CAPABILITY UTILISATION

Lithuania's deep tech ecosystem is currently navigating a critical transition phase. The previous programming period (2014–2020) was defined by an "infrastructure-building" mandate, resulting in the successful establishment of five integrated "Science, Studies, and Business Valleys," such as the *Saulėtekis* (Sunrise) Valley for photonics and the *Santara* Valley for life sciences. These physical clusters now serve as the foundational hardware for the current ecosystem.

For the 2021–2027 period, the strategic focus has shifted from capacity building to "mission-oriented" capability utilisation. The objective is to leverage existing high-value R&D assets to foster "Deep Tech" enterprises-ventures built on substantial scientific or engineering breakthroughs requiring long-term R&D and significant capital intensity. The current Smart Specialisation (S3) strategy explicitly prioritises domains that map directly to deep tech: **Health Technologies** (molecular medicine), **New Production Processes** (photonics and space), and **ICT** (AI and cybersecurity).

A granular analysis of funding data reveals that the most resilient deep tech startups in Lithuania-such as *Atrandi Biosciences*, *Oxipit*, and *Blackswan Space*-have adopted a "Mixed Funding" model. These companies systematically layer national structural funds with early-stage Venture Capital (VC) to bridge the financial gaps between laboratory validation and market readiness.

STRENGTHS AND WEAKNESSES OF THE DEEP TECH ECOSYSTEM

Strengths: The "Mixed Funding" Nexus and Infrastructure:

- **Effective De-Risking via National Instruments:** The *Eksperimentas* funding instrument has proven highly effective as a bridge for Technology Readiness Levels (TRL) 4–7. By subsidising the high technical risks associated with hardware and biotech R&D, it incentivises private VCs (such as Practica Capital) to invest in capital-intensive projects they might otherwise view as too risky.
- **World-Class Physical Assets:** The "Valley" system provides essential hard infrastructure that early-stage deep tech companies cannot afford on their own. For example, *Sunrise Valley* provides access to cleanrooms and optical labs for photonics, while *Santara Valley* offers proximity to clinical validation for MedTech.
- **Emerging International Momentum:** After years of underperformance, Lithuanian deep tech is beginning to integrate into high-level European value chains. Success cases like *Sentante* securing European Innovation Council (EIC) funding signal that the ecosystem is maturing enough to compete for elite EU-level resources.

Weaknesses: Low Density and "Signal-to-Noise" Issues:

- **Low Concentration in Funding Streams:** Despite generating the highest long-term Enterprise Value (EV), deep tech companies represent a minority of recipients of national innovation grants. Analysis suggests they comprise only ~5% of early-stage *Inostartas* grants and ~25% of R&D-heavy *Eksperimentas* grants. The majority of funding is absorbed by "soft" innovation projects (e.g., e-commerce, process digitisation) with lower strategic moats.
- **Inadequate Early-Stage Grant Sizing:** The *Inostartas* instrument, designed to kick-start innovation, has a low grant cap (typically <€50k). While sufficient for digital platforms, this amount is inadequate for the high capital expenditure (CapEx) requirements of biotech or hardware ventures, failing to serve as a true "pre-seed" catalyst for deep tech.
- **Uneven Regional Distribution:** Deep tech activity is heavily concentrated in the Capital Region (Vilnius), particularly in Life Sciences and Photonics. Other valleys, such as the *Nemunas Valley* (Agro-food) and *the Marine Valley (Klaipėda), have lower VC-backed startup densities and rely more on incremental industrial innovation than o*n disruptive scientific breakthroughs.

Systemic Challenges:

1. **The "Liquidity Trap" and Capital Gaps:** While national instruments effectively bridge the middle TRLs, a broader funding gap remains for scaling technologies beyond the prototype stage. Deep tech startups face a

"liquidity trap" in which tax incentives are ineffective because companies are pre-profit, and grant cycles are often too slow or sporadic to sustain momentum. There is a lack of patient capital and specific industrialisation support to move from prototype to mass production.

2. **The "Dual-Use" Grey Area**: Startups emerging in the Space and Defence sectors operate in a strategic "grey area." While their technologies are critical for national security (e.g., autonomous satellite navigation, laser communications), they often fall outside standard S3 civilian priorities. Because defence is not an explicit S3 priority, these high-potential startups often cannot access structural funds designed for "civilian" economic growth, despite their high strategic relevance.
3. **Regulatory and Testing Bottlenecks:** The ecosystem lacks formalised regulatory sandboxes and testing grounds for high-risk applications. This is particularly acute for dual-use technologies and AI-driven MedTech. Without "hard" sandboxes (e.g., drone ranges) or "soft" sandboxes (e.g., health data access), startups cannot validate their technologies domestically, forcing them to test abroad or delaying market entry.
4. **Misaligned Evaluation Metrics:** Current evaluation criteria for S3 funding often favour volume over leverage. Success is frequently measured by the number of beneficiaries rather than the amount of private capital leveraged or the creation of intellectual property. This creates an incentive structure that favours funding many low-risk, low-impact projects rather than a few high-risk, high-reward deep-tech ventures.

Strategic Directions:

To maximise the impact of the 2021–2027 financial period, the S3 strategy requires a shift in the logic for identifying, funding, and scaling deep tech.

1. **Strategic Differentiation of Support Mechanisms**: The policy framework must move away from a "one-size-fits-all" approach to innovation funding. Deep tech ventures operate on fundamentally different timelines and capital structures than digital SMEs. Future strategy should focus on creating distinct operational tracks for high-risk, science-based ventures. This involves decoupling the funding logic for "soft" digital innovation from that for "hard" scientific innovation, ensuring that capital-intensive projects do not compete for the same limited resources as low-risk digital platforms.
2. **Integration into European Value Chains as a Primary Objective:** National funding should be explicitly positioned as a stepping stone to European sovereignty. The strategic goal should shift from merely "supporting local R&D" to "preparing for EU-level scaling." This entails aligning national instruments directly with European Innovation Council (EIC) and Horizon Europe standards, ensuring that companies graduating from national programs are technically and commercially ready to secure larger pan-European investment.
3. **Expansion of Strategic Innovation Definitions:** The definition of S3 priorities must evolve to reflect geopolitical realities. The distinction between "civilian" and "defence" technology is increasingly blurred in deep tech (e.g., in photonics, space, and AI). Strategic direction should focus on formally recognising "dual-use" potential as a valid criterion for structural funding, thereby unlocking resources for technologies that serve both economic growth and national security resilience.

4. **Recalibration of Success Metrics toward Leverage and Sovereignty:** The monitoring logic of S3 should transition from "volume-based" indicators (number of grants) to "value-based" indicators. Strategic success in deep tech should be defined by public funds' ability to "crowd in" private venture capital and generate sovereign intellectual property. Future policy direction should prioritise the leverage ratio of private-to-public investment as the primary measure of ecosystem health, incentivising the creation of companies that can survive and scale independently of state support.

B. Artificial intelligence

STRATEGIC CONTEXT: FROM SUB-SECTOR TO HORIZONTAL ENABLER

A sharp contrast between high strategic ambition and low diffusion defines the current landscape of Artificial Intelligence (AI) in Lithuania. While the nation shows robust foundational digital literacy, **actual enterprise uptake of AI reached only 8.8% in 2024,** far below the EU's 2030 target of 75%. This gap indicates that AI cannot be treated merely as a vertical sub-field of ICT; it has matured into a horizontal, general-purpose technology essential for national resilience and productivity across manufacturing, health, and defence.

A primary driver for a separate strategic focus is the mismatch between administrative cycles and technological speed. Traditional public sector funding cycles take 1.5 to 2 years, whereas AI development cycles occur in 3 to 6-month sprints. Without a dedicated track, the current bureaucratic pace renders AI projects obsolete before deployment. Consequently, the strategic context is shifting toward a "mission-oriented" approach defined as "AI-powered productivity and resilience," aimed at integrating AI into the core of the State Progress Strategy "Lithuania 2050" to secure technological sovereignty.

STRENGTHS AND WEAKNESSES OF THE AI ECOSYSTEM

Strengths: Foundational Literacy and Niche Leadership:

- **High Digital Competence:** Lithuania maintains a strong skills baseline, with 93.9% of the population possessing above-basic digital skills, providing a fertile ground for digital transformation.
- **Established Tech Hubs:** The nation leverages global leadership in FinTech and Cybersecurity, alongside a world-class photonics sector, positioning it as a niche player in the AI hardware and semiconductor value chains.
- **Dynamic Startup Activity:** While Vilnius remains the primary R&D hub, the ecosystem is expanding. AI startups are increasingly establishing branches in industrial regions (Central and Western Lithuania) to access structural funds, creating organic links between digital innovation and industrial manufacturing.

Weaknesses: The Diffusion and Infrastructure Gap:

- **Extremely Low Enterprise Adoption:** Despite high digital literacy, SMEs lack the AI-ready data infrastructures necessary for integration. The current adoption rate lags significantly behind frontrunners like Denmark (27.6%), highlighting a failure to translate individual skills into organisational capabilities.

- **Regulatory and Testing Voids:** There are currently no sovereign AI testbeds or established regulatory sandboxes for high-risk business applications. This leaves firms in a "regulatory vacuum" regarding the EU AI Act, increasing compliance friction and discouraging investment.
- **Fragmented Governance:** Digital policy has historically been split across multiple ministries without a single "orchestrator." This leads to "navigation overload" for firms and to inconsistent coordination that fails to keep pace with the AI market's tempo.

Systemic Challenges:

1. **The Infrastructure Deficit:** A critical bottleneck is the absence of dedicated, state-funded high-performance computing (HPC) and data infrastructure for training large-scale models. The ecosystem currently relies on university-managed clusters, which are insufficient for large-scale industrial or defence needs. The lack of sovereign cloud facilities and edge nodes hinders the development of low-latency applications required for Industry 4.0 and autonomous systems.
2. **The "Hybrid" Skills Crisis and European Paradox:** Lithuania faces an acute shortage of specialised "hybrid" profiles that combine AI expertise with domain knowledge (e.g., Medicine + Math + AI). Furthermore, the ecosystem suffers from the "European Paradox": universities produce high-impact scientific research, but there is a structural failure to translate this knowledge into commercial patents and market-ready business solutions.
3. **Regulatory Friction and Data Access:** Access to high-quality public datasets is hampered by fragmented data collection practices and legal uncertainty regarding data repurposing. The absence of a unified data architecture for combined civil-military use, coupled with unclear ethical frameworks, creates high barriers for startups attempting to develop trustworthy, compliant AI solutions.
4. **The "Valley of Death" in Funding:** The funding landscape lacks a continuous pipeline to support AI technologies from TRL 4 to TRL 9. Many prototypes stall because firms cannot access follow-on capital for scaling after initial seed rounds. Additionally, demand-side tools are underutilised; public procurement processes are too slow to act as a catalyst for early adoption, preventing the public sector from serving as a "first buyer" to de-risk innovation.

Strategic Directions:

To achieve the 2030 Digital Decade targets, the S3 strategy requires a fundamental reconfiguration of how AI is governed, funded, and deployed.

1. **Transition to Mission-Oriented Horizontal Integration:** Strategic policy must stop treating AI as a standalone vertical and instead embed it as a horizontal layer across all S3 priorities (Health, Manufacturing, Defence). The strategic direction involves defining specific missions-such as "AI for Industrial Productivity" or "AI for Battlefield Resilience"-to align fragmented resources toward solving systemic national challenges. This ensures that AI investment is purposeful and directly supports critical sectors like biotechnologies and climate neutrality.
2. **Regional Complementarity (Hub-and-Node Logic)**: The strategy should formalise a "Hub-and-Node" model to bridge the "dual-speed" economy. Vilnius (the capital) should focus on high-level R&D, cybersecurity, and algorithms, while Central and Western Lithuania

(Kaunas/Klaipėda) should serve as "Industrial Nodes" for application and adoption. This direction explicitly links scientific excellence in the capital with industrial capacity in the regions (e.g., AI for maritime logistics in Klaipėda), ensuring that digital innovation drives physical productivity.

3. **Establishing Technological Sovereignty in Infrastructure:** Policy must shift from reliance on academic infrastructure to the development of national sovereign assets. Strategic direction involves direct state investment in compute power (HPC), sovereign clouds, and data trusts. This move is essential to reduce reliance on external providers and ensure that Lithuania has the hard infrastructure needed to train and run sensitive AI models for government and industry.
4. **Activation of Demand-Side Instruments:** Future strategy should prioritise the creation of markets through the state. Instead of relying solely on supply-side grants, the government must utilise strategic public procurement to act as a "Launch Customer" for AI solutions. This direction involves retooling procurement processes to be faster and risk-tolerant, thereby providing the commercial traction startups need to scale globally while modernising the public sector.

C. DEFENCE AND CAPABILITY BUILDING

STRATEGIC CONTEXT: THE ALIGNMENT GAP BETWEEN ECONOMIC POTENTIAL AND NATIONAL SECURITY

The current strategic landscape of Lithuania's defence innovation is defined by a fundamental disconnect between the nation's geopolitical necessities and its innovation policy architecture. The 2021–2027 Smart Specialisation (S3) Strategy was formulated primarily based on economic potential, focusing on civilian domains such as "healthy ageing" and general digitalisation. Consequently, defence is not an explicit priority within the current S3 framework. This has created a structural gap in which national security needs-specifically the shift from deterrence to active defence and societal resilience-are not adequately supported by the country's primary R&D funding mechanisms.

The ecosystem operates within a "vicious circle" that stifles indigenous capability development. The military typically purchases "off-the-shelf" foreign products because local R&D has not reached the necessary prototype maturity. Conversely, local businesses and research institutions cannot justify the high risks of investing in defence-specific R&D without guaranteed state procurement or clear funding pathways. As a result, research often remains "bottom-up," fragmented across ministries and academia, and disconnected from specific military operational needs.

STRENGTHS AND WEAKNESSES OF THE DEFENCE ECOSYSTEM

Strengths: A Robust High-Tech Foundation:

- **World-Class Scientific Base:** Lithuania possesses a globally competitive scientific foundation in **photonics (lasers), semiconductors, and biotechnology**. These domains hold immense dual-use potential, particularly for high-tech weaponry involving target designation, secure optical communications, and advanced sensors.
- **Strong ICT and Cyber Capabilities:** The existing S3 priority on ICT aligns well with modern defence requirements. The nation's mature FinTech and

cyber ecosystem provides a ready-made foundation for developing cyber defence, AI-driven situational awareness, and protection for critical infrastructure.

- **Export-Oriented Engineering:** The engineering industry generates approximately 22–25% of national exports, demonstrating a strong capacity to integrate into global supply chains as high-quality manufacturers.

Weaknesses: The "Hard Power" and OEM Deficit:

- **The Sub-Contractor Trap:** The manufacturing sector is largely defined by subcontracting rather than the production of complete weapon systems (Original Equipment Manufacturer, OEM). The industry lacks the independent capacity to mass-produce critical kinetic assets, such as ammunition or drones.
- **The "Hard Power" Gap:** Because S3 priorities are skewed toward civilian applications, "hard" defence technologies-specifically **missile propulsion, energetics (explosives), and internal ballistics**-remain "orphan areas." These critical domains receive no structural funding because they lack immediate civilian-market applications.
- **Misalignment of Health Priorities:** While Lithuania has a strong biotechnology infrastructure, the S3 focus is on lifestyle diseases. There is a lack of translation into **tactical field medicine**, regenerative medicine for blast injuries, or CBRN (chemical, biological, radiological, nuclear) countermeasures.

Systemic Challenges:

1. **Infrastructure Deficit: The Lack of "Sandboxes":** A primary bottleneck for rapid prototyping is the absence of specialised testing infrastructure. Lithuania lacks "hard" sandboxes-physical ranges and legal frameworks designated for testing **integrated air defence, electronic warfare (EW), and autonomous drone swarms**. Without these facilities, businesses face significant bureaucratic hurdles to test military-grade technology domestically, slowing the feedback loop between developers and military end users.
2. **Bureaucratic Rigidity and Procurement Cycles:** The speed of innovation in modern warfare (e.g., drone evolution cycles of 3–6 months) clashes with public procurement and funding cycles that can take years. The system lacks a **"fast-track" procurement mechanism**, preventing the Ministry of National Defence from acting as a "Launch Customer" to de-risk local innovation. This rigidity forces reliance on foreign suppliers and stalls local prototypes at the demonstration stage.
3. **Fragmentation of Governance:** The defence innovation ecosystem is fragmented across the Ministry of Economy (civil innovation), the Ministry of Defence, and the Ministry of Education. There is no unified architecture or "umbrella" organisation to integrate the "Quadruple Helix" (Government, Industry, Academia, Society). This leads to overlapping mandates and a failure to translate specific military operational needs into scientific challenges that the academic and business sectors can address.
4. **The "Soft Power" Void:** While hardware is emphasised, the S3 framework lacks a focus on "soft" defence capabilities. There is no specific social science priority within S3 dedicated to **cognitive warfare resistance,**

psychological defence, or counter-disinformation. This leaves a gap in societal resilience against hybrid threats, as the boundary between peace and war blurs.

Strategic Directions:

To align the S3 framework with national security targets, the strategy requires a fundamental pivot from civilian-only economic goals to a dual-use capability-building model.

1. **Formal Integration of "Dual-Use" as a Horizontal Priority:** Strategic policy must explicitly designate **"Dual-Use Technology"** as a horizontal priority across all thematic areas. This involves mandating that state-funded R&D projects evaluate their potential applicability to national defence, thereby unlocking structural funds for innovations in photonics, AI, and materials that currently fall into the "grey area" between civil and military funding.
2. **Creation of a Dedicated "Hard Power" R&D Track:** Recognising that civilian S3 priorities will never naturally cover lethal technologies, a ring-fenced **National Defence Research Program** is required. This track would specifically fund "orphan" areas such as **energetics, ballistics, and missile propulsion**, ensuring that the nation develops the industrial capacity for ammunition independence and kinetic platforms.
3. **Establishment of a "Launch Customer" Mechanism:** The Ministry of National Defence must transition from a passive buyer to an active **"First Buyer."** This requires creating a fast-track procurement mechanism that automatically qualifies successful R&D projects that reach the prototype stage (TRL 6–7) for pilot procurement. This ensures that local manufacturing capabilities are scaled "for the front, not the warehouse".
4. **Transition to a "Testing State" with Specialised Sandboxes:** Policy must support the creation of physical and regulatory **"MilTech Sandboxes."** The strategic goal is to establish designated zones where businesses can rapidly test electronic warfare systems and autonomous swarms without the bureaucratic delays of peacetime. This infrastructure is essential to position Lithuania as a regional hub for testing integrated air defence and dual-use AI solutions.

VI. THE MAIN CHALLENGES IN THE IMPLEMENTATION OF THE CONCEPT

Lithuania faces several systemic challenges in the design and implementation of its Smart Specialisation (S3) policy, including administrative rigidity and deep-seated talent gaps. According to the survey and focus groups, the following are the primary hurdles:

1. Excessive Bureaucracy and Slow Operational Speed

The most frequently cited challenge across all sectors (Defence, Health, Manufacturing, and ICT) is excessive bureaucracy and a lack of flexibility.

- It currently takes between **1.5 and 2 years to move from an initial idea to receiving funding**, a cycle that is far too slow for fast-moving technologies like AI or defence that **have 3–6 months cycles**

- Existing procedures are often described as formalistic, relying on r**igid checklists rather than outcome-driven or qualitative assessments**. Stakeholders refer to it as "Excel-Driven" Evaluations. The proposal for fast-track mechanisms (≤12-month decision cycles) is a necessary but "institutionally stretched" goal that will require a **radical shift from "Excel-driven" checklists to qualitative, team-based evaluations.**
- **Administrative burden**. For many companies, especially SMEs, the bureaucratic costs of applying for and managing grants often exceed the financial benefit.

A tension between EU cohesion constraints (which favour compliance and slow audit trails) and the need for rapid experimentation is palpable. Lithuania needs to establish a faster, flexible alternative to standard EU cohesion instruments.

Participants require a much clearer, **operational-level understanding of the pipeline logic**. This should include a much sharper, explicit TRL progression (TRL6 to TRL9), staged financing with **speed options (6-week sprints, 9–12 months pilots), clear transition criteria between stages**, recognition that one follow-up is often insufficient for complex technologies, and acknowledgement of cash-flow constraints (advance payments, wage coverage). This transforms a general idea into a time-staged innovation journey, which is conceptually closer to mission/portfolio logic than to classic S3. From this perspective, the real policy failure is not "lack of money" but **broken temporal sequencing**.

Interviewers also expressed a strong preference **for testing on the market** over "supporting dying products. This suggests that policy should optimise learning speed rather than success rates. This is fully aligned with experimentalist/TIP governance and was not previously explicit.

2. **Fragmented Governance and "Orchestration" Gaps**

The focus groups and survey suggest that Lithuania's current capacity is configured for **administration/compliance**, not the orchestration required by a mission-oriented S3 policy. A critical weakness is **the lack of a single "system orchestrator" or lead institution with the authority to manage the entire innovation pipeline.**

- **Coordination** between the Ministry of Economy and Innovation, the Ministry of Education Science and Sport, the Research Council of Lithuania, and the Innovation Agency is often fragmented. These ministerial silos hinder efforts to design a portfolio of instruments tailored to specific niches.
- Stakeholders describe **a "9 nannies, headless child"** scenario where overlapping intermediaries (clusters, agencies, and parks) create confusion for firms trying to navigate the system. This **'navigation overload'** costs time and administrative resources for firms to find their way through the maze of organisations. The recommendation to establish a National Innovation Council (NIC) with decision-making power is essential to move beyond "symbolic coordination.
- **Operational Readiness**: While Lithuania can administer programs, it currently **lacks the portfolio management skills to run end-to-end pipelines** that transition projects from TRL 4 to TRL 9.

Overall, the bindingconstraint is not a lack of instruments but **a lack of authority to orchestrate.** This directly affects the feasibility of the proposed policy mix.

3. **The "Valley of Death" and Lack of Funding Continuity**

Lithuania struggles with disrupted temporal sequencing, in which **projects often stall after the prototype phase**.

- Funding is often allocated through **one-off, fragmented calls** rather than a multi-stage, end-to-end pipeline that supports a project from discovery to market scaling. In brief, the instruments are **disconnected;** therefore, the effects are marginal, as there are no synergies among them.
- While there is support for early-stage research, there is a **distinct lack of growth finance,** patient capital, and mechanisms to help firms reach export-level production. Instruments are **pilot-heavy but scale-light**, resulting in intermediate technological products that rarely reach markets.

4. **Severe Skills and Talent Shortages**

A systemic "talent drain" and a shortage of interdisciplinary professionals are major constraints to implementing advanced S3 priorities.

- There is an acute **lack of professionals with hybrid skills**, such as med-math-AI profiles for life sciences or data analysts capable of working with industrial robotics.
- Students frequently exit universities early to enter the workforce **before acquiring fundamental skills in mathematics and statistics**, leading to a weak long-term talent pipeline.

5. **Static Priorities vs. Rapid Technological Change**

The survey and focus groups indicate that **current S3 priorities are often outdated or misaligned with emerging trends**, including Agentic AI, quantum technologies, and gene therapy.

- "**Fast-Track" Mechanisms are lacking.** There is currently no effective mechanism for dynamically adjusting priorities between the standard seven-year programming cycles.
- **Supply-Side Bias**: The policy mix remains heavy on R&D funding (supply) but is weak on demand-side instruments, such as public procurement for innovation (PPI), which are necessary to create initial markets for new solutions.

6. **Regulatory and Infrastructure Bottlenecks**

In highly regulated sectors, the legal framework itself becomes a barrier.

- Sectors like health and defence face significant delays due to **a lack of regulatory sandboxes or clinical trial infrastructure**, which prevents technologies from being tested and certified domestically.
- **Infrastructure Gaps:** There is a lack of specialised testing grounds, such as drone ranges for the defence sector or AI/data test environments for ICT.

7. **Evaluation Misfit**

Finally, the current monitoring system relies on indicators that do not capture the true value of innovation.

- **Publication Focus:** Evaluations often prioritise scientific publications over commercialisation, license revenue, or TRL (Technology Readiness Level) progression.
- **Inappropriate Benchmarks**: Standard OECD indicators are sometimes deemed inappropriate for a country of Lithuania's scale, particularly in areas like the volume of clinical trials.

8. Unbalanced policy focus: frontier technologies vs diffusion capacity

Lithuania's policy mix is strong in frontier areas (STEP) but weak in diffusion: technology extension services; digital/green upgrading vouchers tied to measurable adoption; management capability; and industrial engineering support. It is essential to acknowledge the limitations of currently **a strong policy focus on the technology frontier** and to consider Lithuania's actual diffusion capacity. Lithuania's R&D intensity (GERD) is approximately 1%, and the system suffers from an **"outputs lag inputs" pattern**. While focusing on STEP technologies (AI, Quantum, Biotech) is strategic, there is a risk that this focus remains 'only talk' without institutional substance unless it is tied to anchor organisations and funded test infrastructure. Interviewers expressed warnings about **the over-expansion of STEP priorities.** The proposed STEP list is plausible, but the selection criteria (capabilities, anchors, complementarities, security logic) would need to be specified. If not, **the risk of symbolic priority-setting remains.**

A broad "STEP technologies" repositioning can become performative unless Lithuania picks a **small number of domains tightly tied to existing capabilities and anchor organisations**, and unless **the "test infrastructure" is truly funded and governed.**

Focus groups indicated **significant gaps in interdisciplinary skills**. There is an acute shortage of specialised talent, such as med-math-AI profiles and data analysts capable of working with industrial robotics. Consequently, the recommendation for a National Competence Agenda and industry doctorates is critical to ensure that technological development is not stalled by a lack of "absorptive capacity" in firms. Given Lithuania's economic structure, in which productivity gains depend heavily on adoption rather than frontier innovation, a much stronger focus on adoption and assimilation would be required.

9. Limited fiscal space for New Industrial Policy

Lithuania operates on a **small domestic budget and relies heavily on EU cohesion funds**, making fiscal efficiency paramount. Yet this results in **fragmented and limited support**. For example, deep-tech projects currently face a 150,000 Euro cap, which is considered insufficient for clinical trials or high-risk defence R&D. Fiscal efficiency would require **funding of high-value projects with a higher probability of market success**.

Currently, **the policy mix is "supply-side heavy.** To maximise fiscal impact, the state must transition to **Public Procurement for Innovation (PPI),** acting as a "first buyer" to create initial markets for new technologies without relying solely on grant funding. Cross-reference Annex 1 for how these challenges map to evaluation questions.

VII. A COMPARATIVE ANALYSIS OF SELECTED CENTRAL AND EASTERN EUROPEAN COUNTRIES

A. CEE APPROACH: SMART SPECIALISATION AS A CATALYST FOR REGIONAL TRANSFORMATION

Within the European Union, Smart Specialisation Strategies (S3) have become a cornerstone of innovation-led growth and a critical instrument for enhancing regional competitiveness. For member states in Central and Eastern Europe (CEE), this policy framework holds particular significance as they navigate the complexities of post-socialist economic transformation and the persistent challenges of technological upgrading. S3 offers a structured, place-based approach to move beyond being production hubs within multinational value chains towards developing robust, indigenous innovation ecosystems capable of driving sustainable economic development. At the heart of S3 regional strategies across all EU regions is a commitment to **place-based innovation**, recognizing that each region possesses a unique set of assets, capabilities, and challenges. The framework encourages regions to concentrate resources on a limited number of priority areas where they have the greatest potential for excellence. Central to this process is the **Entrepreneurial Discovery Process (EDP)**, a bottom-up approach that involves continuous engagement with a broad range of stakeholders-including businesses, research institutions, public authorities, and civil society-to identify promising areas for specialisation and uncover systemic bottlenecks. EU-level analysis of S3 strategies for the 2021-2027 period reveals four primary approaches to prioritisation:

- **Sectoral/Technological Priorities:** A focus on specific, often established, industries (e.g., agri-food, automotive) or key enabling technologies (e.g., materials, ICT) to strengthen existing value chains. This approach is found in 74% of strategies.
- **Societal Challenge Priorities:** A multi-sectoral approach aimed at addressing broad societal issues such as public health, sustainable mobility, or secure societies, often aligning with the themes of EU research framework programmes. This is a feature in 79% of strategies.
- **Multi-Sectoral Transformations:** Priorities explicitly targeting the green and digital transitions, which cut across numerous economic sectors and aim to modernize the industrial base.
- **Innovation Ecosystem Improvement:** A horizontal approach focused on strengthening the underlying conditions for innovation, such as skills development, public-private collaboration, and access to finance.

In practice, these approaches are rarely mutually exclusive. An overwhelming majority of strategies (88%) adopt a hybrid model, most commonly combining sectoral/technological priorities with broader societal challenges and transformational goals.

The selected countries for this report cover Smart Specialisation Strategies in the **Czech Republic, Estonia, Lithuania,** and **Slovenia**. The analysis focuses on the 2021-2027 programming period, with an emphasis on developments, documents, and data available up to 2025. By examining the distinct approaches of these CEE peers, this analysis aims to identify effective practices and derive actionable insights for Lithuania's S3 strategy learning. The country choice was made based on the similarity of country size and historical evolutionary contexts braking from

post-soviet economy patterns, and similar development patterns and challenges to be addressed with smart specialisation strategies.

The section is structured to guide the reader from the general to the specific. It begins by outlining the overarching EU framework for S3, establishing a common baseline for comparison. It then proceeds with a comparative analysis of the national strategies of the four selected countries, followed by a deeper dive into the specific implementation mechanisms and performance indicators where data is available. The analysis concludes by synthesizing these findings to provide strategic lessons specifically tailored for enhancing Lithuania's S3 implementation. To ground this analysis, it is necessary to first establish the foundational principles of the EU's Smart Specialisation framework.

COMPARATIVE POLICY FORMULATION LOGIC AND GOVERNANCE MODELS

The operational governance of S3 varies significantly across the EU, reflecting the diverse administrative structures of selected comparative states. Three primary models have emerged:

- **Primarily National-Level Strategies:** A centralized model where the S3 is formulated and managed by the national government (e.g., Estonia, Lithuania, Slovenia).
- **Primarily Regional-Level Strategies:** A decentralized model where regional authorities have primary responsibility for their S3 (e.g., large advance countries, like Germany, France).
- **Mixed National/Regional Models:** A hybrid approach combining national oversight and strategic direction with tailored implementation at the regional level (e.g., Czech Republic, Poland).

The choice of governance models varies across regions, and the selected comparative countries apply slightly different approaches to governance that result in differences of strategy dynamics and focus as later section demonstrates.

This section comparatively assesses the Smart Specialisation frameworks of the Czech Republic, Estonia, Lithuania, and Slovenia against the EU-level principles outlined previously. The analysis focuses on revealing the distinct choices each country has made regarding its governance structure, thematic priorities, and overall implementation logic, providing a high-level overview of their strategic orientations.

The governance model chosen by a member state significantly influences how S3 priorities are defined and implemented. Among the four countries analysed, a clear preference for centralized, national-level strategies is evident, with the Czech Republic being the notable exception. The 2021–2027 period marks a shift from "identifying" priorities (2014–2020) to "entrepreneurial discovery" and specific value-chain integration.

Table 8. Policy Formulation Logic and S3 Focus (2021–2027)

Feature	Lithuania	Estonia	Slovenia	Czech Republic

Strategic Logic	**Scientific Push:** Strong emphasis on commercializing academic research (biotech/lasers/health tech), and at the same time **industrial pull** from vitally important industry sectors such as advanced manufacturing and ICT.	**Digital Pull:** Focus on "smart" application of digital tech in traditional resources and society.	**Cluster Governance:** Focus on Industry 4.0 and integrating SMEs into Global Value Chains via SRIPs.	**Polycentric:** Distinct strategies for the Prague R&D hub vs. industrial regions (Moravia, etc.).
Governance logic	Centralized strategy formulation and implementation process managed at the national level.	A centralized strategy formulation process, with implementation driven by national bodies through targeted, thematic action plans.	Centralized strategy formulation and implementation process managed at the national level.	Combines national oversight with regional implementation, allowing for tailored approaches to address specific regional capabilities and challenges.
Governance structure	Top-down selection with "Innovation Agencies" executing.	Agile, ministry-led (MKM), with strong private sector consultation.	SRIPs (Partnerships: The quadruple helix is institutionalized into formal legal entities.	National RIS3 coordinates, but strong *Regional Innovation Platforms* drive local EDP.
Key Priorities (2021-27)	1.Health Technologies & Bio 2. New Production Processes & Materials 3. ICT & Inclusive Society	1.Digital Solutions 2.Health Technologies 3.Valorization of Local Resources 4.Smart Energy	"S5" Strategy: 1.Smart Cities & Communities 2.Smart Industry 4.0 3.Transition to Circular Economy	1.Advanced Materials & Engineering 2.Digitalization & AI 3. Green Tech & Bioeconomy

	5.Viable Society & Culture	4. Cultural & Creative Industries

Regardless of the model, effective stakeholder engagement is paramount. However, analysis reveals a consistent hierarchy of involvement. Public authorities (75-84%) and academia (48-74%) are the most dominant actors across all phases of the S3 policy cycle. In contrast, the business community, particularly SMEs, and civil society organizations remain comparatively peripheral, indicating a persistent gap between the ideal of co-ownership and its practical implementation. Therefore, this report later will give a special attention to the analysis of stakeholder engagement in shaping Lithuanian Smart Specialisation Strategy, and Implementation.

The 2021–2027 programming period (active 2021–2025) marks a divergence in how these four nations approach innovation. While all use the same EU nomenclature (S3), the underlying logic differs significantly.

Table 9. Comparative Policy Formulation S3 Logic on selected CEE countries (2021–2025)

Feature	**Lithuania**	**Estonia**	**Slovenia**	**Czech Republic**
Strategy Name	**Smart Specialization Concept 2021-2027**	**RDIE Strategy 2021–2035** ("TAIE")	**Sustainable Smart Specialisation (S5)**	**National RIS3 Strategy 2021–2027**
Core Logic	**"Mission-Oriented"** Moving from fragmented priorities to solving societal challenges (Health, Advanced and Green, Digital).	**"Smart State as a Platform"** Merging public digital governance with private sector innovation.	**"Cluster Governance"** Devolving strategy management to industry-led Strategic Research & Innovation Partnerships (SRIPs).	**"Industrial Upgrading"** Defensive strategy to protect the massive manufacturing base via Key Enabling Technologies (KETs).
Key Shift (2021-2025)	**Consolidation:** Merging agencies into the **Innovation Agency Lithuania** to reduce fragmentation.	**Integration:** Merging "Science" and "Entrepreneurship" strategies into one document (RDIE) to break silos.	**Sustainability:** Transitioning from S4 to **S5**, strictly linking R&D funding to the Circular Economy.	**Regionalization:** Empowering regional RIS3 managers (e.g., South Moravia) to tailor national goals to local industry.

While sharing a common CEE context, the Czech Republic and Estonia demonstrate a fundamental strategic choice between diversification and specialisation. The analysis reveals a contrast between Czechia's broad "portfolio approach," hedging bets across multiple societal challenges, versus Estonia's "high-stakes venture approach," concentrating resources on a single, high-potential ecosystem. The Czech Republic's National RIS3 Strategy is oriented around "Grand Societal Challenges" (GSCs), linking research and innovation activities to pressing national and global issues such as environmental degradation, demographic change, and digital transformation. This broad framework is operationalized through specific "missions" designed to mobilize a wide range of actors. A key example is the mission of "Making the economy more material, energy and emissions efficient," which is broken down into strategic objectives like Decarbonisation, Decentralisation, and Circularity. This approach connects high-level societal goals with concrete R&D&I themes in areas like low-emission technologies and smart energy grids.

In contrast, Estonia's strategy is sharply focused on a high-potential domain: developing a world-class "deep-tech startup ecosystem." Rather than addressing a wide array of societal challenges, the Estonian action plan concentrates resources and policy attention on creating an environment that fosters R&D intensive entrepreneurship. A central pillar of this strategy is the "New Nordic Tech Valley" concept, a key initiative for interregional collaboration. This initiative explicitly includes Latvia and Lithuania and aims to deepen cooperation with Nordic partners, positioning the entire region as a unified deep-tech hub to overcome shared bottlenecks and attract global talent and investment.

Complementing this dichotomy, Slovenia and Lithuania introduce two alternative strategic archetypes: "Institutionalized Integration" and "Scientific Transformation."

Slovenia's strategic focus distinguishes itself through a "Governance-First" model, primarily aimed at deep industrial upgrading rather than broad societal challenges (Czechia) or new venture creation (Estonia). The Slovenian S4 (and subsequent S5) strategy is characterized by the institutionalization of the "entrepreneurial discovery process" through Strategic Research and Innovation Partnerships (SRIPs). Unlike the Czech "missions" which are state-guided targets, Slovenian SRIPs are autonomous, quadruple-helix legal entities that manage the transition of the country's established manufacturing base toward Industry 4.0. The strategic logic here is not to create new sectors from scratch, but to act as a "Specialized Supplier" to the German - Austrian industrial core. Consequently, Slovenia's strategy is heavily weighted toward Smart Factories and Materials, focusing on integrating SMEs into specific segments of Global Value Chains (GVCs). Success is measured less by the number of startups (as in Estonia) and more by the density of robotic integration and value-added per employee in traditional manufacturing sectors.

Lithuania, conversely, adopts a "R&D and Innovation Transformation" strategy, attempting to bridge a distinct structural gap: the disconnect between world-class scientific niches and a traditional economy. Unlike Estonia's digital-horizontal focus, Lithuania's strategy is built around vertical "Scientific Push" domains where it holds global leadership, specifically biotechnologies, distinct areas of health tech, lasers, and photonics. The distinct feature of the Lithuanian 2021–2027 roadmap is the shift toward Mission-Oriented Programs that are more narrowly defined than the Czech GSCs. Lithuania's strategy seeks to force "cross-pollination"-using high-tech niches to modernize mid- low-tech sectors (e.g., applying photonics to traditional furniture manufacturing or AI to logistics). While

Estonia relies on the agility of startups, Lithuania's strategic focus relies on state-mediated "Consortia," utilizing heavy ERDF investment to de-risk the commercialization of academic R&D. This creates a "dual-speed" strategic focus: maintaining global excellence in high-tech niches while simultaneously using those niches as engines to pull the rest of the economy out of the middle-income trap.

B. COMPARATIVE ANALYSIS OF NATIONAL S3 APPROACHES FROM THE TRANSFORMATIVE INNOVATION POLICY PERSPECTIVE

The following comparative analysis evaluates the implementation of transformative innovation policy (TIP) across Lithuania, Estonia, Slovenia, and the Czech Republic. It synthesizes key dimensions of their respective strategies, highlighting the structural challenges addressed, the mechanisms employed, and the divergent outcomes in governance and economic impact.

COMPARATIVE ANALYSIS OF TIP DIMENSIONS

Strategic Challenges and Mechanisms The four nations have adopted distinct strategic postures to address the "middle-income" or "innovation transition" traps. Lithuania and Estonia have oriented their mechanisms toward technological scaling and ecosystem modernization. Lithuania has pursued a centralized agency model (Innovation Agency Lithuania) to overcome fragmentation and scale high-value sectors like biotechnologies and lasers, and at the same time aimed to close the gap of regional development. Estonia, conversely, has integrated its TIP into a long-term sociotechnical framework, the **RDIE Strategy 2021-2035**, focusing specifically on "deep tech" to transition from a digital administrative state to a creator of complex, knowledge-intensive value.

In contrast, Slovenia and the Czech Republic emphasize governance innovations to manage industrial transition. Slovenia utilizes **Strategic Research and Innovation Partnerships (SRIPs)** as institutionalized intermediaries to manage the transition from implementation to design-based capabilities. The Czech Republic attempts to bridge massive regional disparities by piloting **mission-oriented policies (MOIP)** and relying on strong regional innovation centres, most notably in South Moravia, to drive bottom-up structural change.

Success Factors and Institutional Divergence Success factors vary by the maturity of the local ecosystem. Estonia and Lithuania leverage agile capital and digital infrastructure; Lithuania boasts the highest growth in the EU innovation index (2023–2024), driven by a surge in venture capital (137.6% of the EU average) and high tertiary education attainment. Estonia's success is rooted in stability and digital maturity, providing a "unicorn" culture that attracts foreign talent and investment.

Slovenia and the Czech Republic derive success from stakeholder coordination. Slovenia's SRIPs have achieved exceptional inclusion, involving 79% SMEs in the discovery process, which correlates with the country's high performance in public-private co-publications. The Czech Republic's success is highly asymmetric; while national coordination struggles, the South Moravia region serves as a European

"showcase" for the Entrepreneurial Discovery Process (EDP) due to the sustained trust-building of its regional intermediary, JIC.

Limitations and Governance Gaps A shared weakness across all four nations is the difficulty in sustaining the **Entrepreneurial Discovery Process (EDP)** beyond the design phase. In Lithuania, the EDP often discontinues during implementation, resulting in a "tick-the-box" exercise that fails to foster deep collaboration, evidenced by a 34% drop in innovative SME collaboration. Slovenia faces a "collective action" failure where successful pilot partnerships fail to scale to the macro level due to inconsistent political support and declining business R&D expenditure. The Czech Republic suffers from institutional fragmentation across ministries and significant regional divergence, where lagging regions like Ústecký lack the absorptive capacity to utilize transformative funds effectively. Estonia, despite its digital leadership, faces a critical skills shortage in deep tech and struggles to translate innovation activity into knowledge-intensive exports.

Table 10. Key Dimensions of EU Regional Transformative Innovation Policy (TIP) Implementation

Category	Lithuania	Estonia	Slovenia	Czech Republic
Key TIP Challenge Addressed	**Scaling and Systemic Integration:** Addressing the fragmentation of funding and bridging the gap between scientific outputs and industrial application to maintain high growth momentum. **Focus:** Transitioning from broad priorities to focused high-value sectors (Bio/Materials /ICT and supporting upgrading in manufacturing towards industry 4.0).	**"Deep Tech" & Societal Transition:** Moving beyond basic digitization ("e-state") to managing emerging technologies for broader societal change and overcoming the "middle-income trap" through deep-tech value creation. **Focus:** Shortage of deep-tech skills and turning innovation into exports.	**Innovation Transition Trap:** Overcoming the stagnation where firms struggle to transition from implementation capabilities to design-based capabilities. **Focus:** Moving from S4 to S5 (Sustainable Smart Specialisation) to drive the green transition.	**Structural Transformation & Disparities:** Addressing the "low value-added trap" (chronic subcontractor position) and bridging the massive gap between leading regions (South Moravia) and lagging regions (Ústecký). **Focus:** Piloting mission-oriented policies (MOIP).

Core Innovation / Mechanism for TIP	**Centralized Agency Model:** Establishment of the **Innovation Agency Lithuania** as a central hub to manage the ecosystem and export promotion. **Strategic Priorities:** Three targeted priorities: Health/Bio, Advanced Materials/Energy, and ICT/FinTech.	**Long-term Strategy & Deep Tech: RDIE Strategy 2021-2035** providing a 15-year framework for structural change. **Deep Tech Action Plan:** A specific roadmap to establish the country as a deep-tech hub.	**Strategic Research and Innovation Partnerships (SRIPs):** Long-term partnerships acting as the institutional core of the Entrepreneurial Discovery Process (EDP), coordinating R&D and value chains. **S5 Strategy:** Explicit integration of the "Green Transition" as a central pillar.	**Mission-Oriented Pilots & NIPs:** Introduction of **S3 Missions** (e.g., Energy Efficiency, Security) alongside National Innovation Platforms (NIPs) to direct R&D. **Regional Intermediaries:** Strong regional innovation centres (e.g., **JIC** in South Moravia) driving bottom-up strategy.
Key Success Factors	**Venture Capital & Agility:** Strong growth in venture capital expenditures (137.6% of EU average) and high agility in policy reform. **Human Capital:** Highest share of population with tertiary education in the EU and high job-to-job mobility in HRST.	**Digital Ecosystem & Stability:** A mature digital society and "unicorn" startup culture that provides a testbed for new technologies. **Strategic Continuity:** The RDIE strategy creates stability beyond electoral cycles, unlike many non-EU peers.	**SME Engagement & Collaboration:** SRIPs successfully engaged a broad base (79% SMEs), preventing capture by large incumbents. **Research Linkages:** Top performer in public-private co-publications (245% of EU average).	**Regional Leadership (South Moravia):** Sustained bottom-up leadership and trust-building by intermediaries (JIC) created a European "showcase" for successful EDP. **Mission Framing:** Successful piloting of missions to create cross-ministerial consensus.

Key Limitations / Challenges	**Discontinuous EDP:** The Entrepreneurial Discovery Process often failed to extend into the implementation phase, becoming a "tick-the-box" exercise. **Declining Collaboration:** Significant drop in innovative SMEs collaborating with others (-34%) and product innovation rates.	**Skills & Scaling:** Critical shortage of high-level specialists in deep tech/AI. **Impact Gap:** Difficulty translating high innovation activity into sales of new-to-market products and knowledge-intensive exports.	**Lack of Collective Action:** Pilot successes in SRIPs failed to scale to the macro level due to inconsistent government support and lack of "collective action". **Declining Investment:** Significant drop in business sector R&D expenditure since 2017.	**Institutional Fragmentation:** Innovation policy governance is split among multiple ministries, hindering effective knowledge transfer. **Regional Divergence:** While South Moravia thrives, regions like Ústecký struggle with institutional inertia and rely on exogenous (EU) funds.
Alignment with TIP Principles	**Directionality:** Medium (Clear priorities but broad). **Inclusion:** Low (EDP not continuous/deep). **Reflexivity:** Low (Monitoring exists but learning loops weak). **Experimentation:** Medium.	**Directionality:** High (Strong digital/deep-tech focus). **Inclusion:** Medium (Strong in startup/public sector, less in traditional industry). **Reflexivity:** Medium. **Experimentation:** Medium (Sandboxes mentioned, heavily startup-reliant).	**Directionality:** Medium (Green transition focus in S5). **Inclusion:** Low/Medium (High SME count but challenged by political cycles). **Reflexivity:** Low. **Experimentation:** Medium (SRIPs as pilots).	**Directionality:** Medium/High (Missions provide strong direction). **Inclusion:** Medium (Varies: High in S. Moravia, Low in others). **Reflexivity:** Medium (Mission Road mapping introduced). **Experimentation:** Medium (Missions are experimental pilots).

The following analytical overview evaluates the implementation of Transformative Innovation Policy (TIP) across Lithuania, Estonia, Slovenia, and the Czech Republic. It synthesizes the structural strengths and weaknesses of each nation's

approach to moving beyond traditional R&D support toward systemic, societal transformation:

1. Governance Models

Centralization vs. Distributed Agency A divergence in governance defines these nations' ability to implement TIP. Lithuania and Estonia have opted for centralized stability. Lithuania's Innovation Agency and Estonia's 15-year RDIE strategy provide clear directionality, allowing them to move quickly in high-growth sectors like Fintech and Deep Tech. In contrast, Slovenia and the Czech Republic rely on distributed intermediaries. Slovenia's SRIPs act as long-term institutional anchors that outlast political cycles, while the Czech model relies on strong regional innovation centres (like JIC) to compensate for national-level fragmentation.

2. The "Transition Trap" Challenge

Both Slovenia and the Czech Republic face a specific "innovation transition trap." They have mastered the absorption of foreign technologies (implementation capabilities) but struggle to generate endogenous, design-based innovations. Slovenia's high rate of public-private co-publications suggests strong knowledge flow, yet business R&D spending is declining, indicating that scientific cooperation is not translating into private-sector investment at scale.

3. The Continuity of the Entrepreneurial Discovery Process (EDP)

The most critical differentiator is the continuity of the EDP. In Lithuania, EDP is often a "tick-the-box" exercise performed during strategy design but abandoned during implementation, leading to a disconnect between policy and market needs. This finding is later supported by the stakeholders' interview and focus group analysis (see Section IV). Conversely, Slovenia has successfully continuous EDP through its SRIPs, which maintain stakeholder engagement throughout the policy cycle.

Table 11. Country-Specific Strengths and Weaknesses in TIP.

Country	Strengths	Weaknesses
Lithuania	**Agility & Capital:** Rapid policy adaptability and strong venture capital availability facilitate fast growth in high-tech sectors. **Centralization:** The Innovation Agency provides a coherent single point of contact for ecosystem management.	**Discontinuous Governance:** The EDP is not continuous; stakeholder engagement often ceases after strategy design. **Collaboration Deficit:** A sharp decline in SME collaboration indicates a lack of trust and cooperative culture. Regionality despite small size: VC investments explicitly cover Capital Region with much less attention to Central and West Region.

Estonia	**Strategic Horizon:** The 15-year RDIE strategy offers policy stability rarely seen in the region. **Deep Tech Focus:** A clear pivot from general digitalization to "deep tech" addresses the complexity gap in value creation.	**Talent Bottlenecks:** Severe shortages in high-level engineering and deep-tech skills. **Impact Gap:** High innovation activity has not yet fully translated into corresponding high-value export sales.
Slovenia	**Inclusive Governance:** SRIPs successfully institutionalized the "quadruple helix," preventing capture by large incumbents and engaging SMEs. **Research Linkages:** Exceptionally strong public-private research co-publications.	**Implementation Fatigue:** Successful pilots fail to scale due to fluctuating political commitment. **Declining Investment:** Business sector R&D expenditure has dropped significantly, undermining the "S5" strategy.
Czech Republic	**Regional Leadership:** South Moravia (JIC) demonstrates how bottom-up agency can drive transformation even without strong national direction. **Mission Orientation:** Early adoption of missions helps align fragmented ministries toward common goals.	**Regional Inequality:** Deep polarization between leading regions and lagging regions (Ústecký) which rely passively on exogenous subsidies. **Fragmentation:** Governance is split across multiple ministries, hindering knowledge transfer reforms.

C. RECOMMENDATIONS AND LEARNING LESSONS FOR LITHUANIA FROM TIP ANALYSIS

Lithuania's primary TIP challenge is ensuring that its rapid growth and capital availability translate into sustained industrial collaboration and structural transformation. It can draw specific lessons from its peers to address the discontinuity of its Entrepreneurial Discovery Process (EDP) and the decline in SME collaboration.

1. From Slovenia: Institutionalizing Continuous Collaboration (The SRIP Model)

- **Lesson:** Lithuania’s EDP often halts at the implementation stage. Slovenia’s **Strategic Research and Innovation Partnerships (SRIPs)** operate as permanent, long-term governance bodies that manage R&D, human resources, and internationalization continuously, rather than just during strategy design.
- **Recommendation:** Lithuania should transition from ad-hoc EDP consultations to establishing permanent **Thematic Competence Centres** or partnerships like SRIPs. These bodies should be empowered to manage specific portions of the Innovation Agency’s portfolio, ensuring that stakeholders remain engaged in the *delivery* of policy, not just its design.

This would directly address the 34% drop in SME collaboration by institutionalizing trust.

2. From Estonia: Long-term Strategic Directionality (Deep Tech)

- **Lesson:** Estonia avoids policy volatility through its 15-year **RDIE Strategy (2021-2035)** and specific "Deep Tech" action plans that signal long-term commitment to the market. Lithuania's policy is agile but risks being reactive.
- **Recommendation:** Lithuania should adopt a longer-term strategic framework that extends beyond the standard EU 7-year programming cycle. Specifically, it should emulate Estonia's **Deep Tech Action Plan** to provide a clear roadmap for moving from fintech/software into complex hardware and biotechnologies, areas where Lithuania already has nascent strengths (lasers, bio) but needs ecosystem stability to scale.

3. From the Czech Republic: Strengthening Regional Intermediaries (The JIC Model)

- **Lesson:** The Czech experience demonstrates that national fragmentation can be overcome by strong, autonomous regional intermediaries. The **South Moravian Innovation Centre (JIC)** succeeds because it acts as a neutral broker between universities, government, and business, fostering a "creative co-design" culture.
- **Recommendation:** While Lithuania is centralized, it should decentralize the *animation* of its ecosystem. It should invest in empowering regional innovation valleys (e.g., in Kaunas or Klaipėda) to operate with the autonomy of the JIC. These intermediaries should focus on **"soft" ecosystem building**-trust, networking, and absorptive capacity-rather than just distributing grants, to counter the "tick-the-box" culture of current stakeholder engagement.

VIII. STRATEGIC SHIFT TOWARDS NEW POLICY INSTRUMENTS MENU (TOOLBOX)

The assessment of Lithuania's Smart Specialisation (S3) policy shows that there is a need for a structural shift **from "thematic grant allocation" toward a "mission-oriented innovation pipeline"** (sections I-VI). The shift should be reflected in the reformed portfolio of policy instruments and in the institutional setup i.e. regulatory and organisational network that designs and implements policies. In continuation, we elaborate the extensive range of relevant policy instruments the final choice of which will depend on the overall approach taken, given the institutional capacities.

We classify all potential instruments into seven systemic categories:

1. **Innovation pipeline & funding continuity**

The current policy mix is "frontier-leaning" (focusing on high-tech startups) but weak on diffusion instruments. While pilot support exists, Lithuania **lacks a growth finance stack, including patient capital, revenue-based finance, and export-linked scale-up facilities**. Without these, projects often stall after the demonstration phase, a phenomenon known as the "valley of death". This

category **addresses the "valley of death"** by ensuring projects do not stall after the prototype phase.

- **National Pilot Innovation Financing:** Creating a fast, flexible national program for pilot R&D projects that **is simpler and faster than standard EU fund instruments**. The aim is to bypass the slow cycles of EU cohesion funds (often 1.5–2 years) through a simpler, flexible national program for rapid experimentation and testing.

In operational terms, a fast-track instrument would differ from standard cohesion-funded schemes along four dimensions: (i) **rolling or quarterly calls** instead of fixed annual calls; (ii) qualitative, expert-based evaluation with **small panels and no ranking lists**; (iii) decision timelines of **no more than 12 weeks from submission to contract**; and (iv) simplified contracting with **milestone-based payments** rather than ex-ante cost verification. These features are necessary to ensure compatibility with fast-moving technologies and do not imply higher fiscal risk if combined with clear exit rules:

- **Establish follow up from pilot to Scale Continuity Window:** Implementing a "graduation logic" where successful pilots receive **automatic follow-up funding** windows to move into the growth and development phase. Scale-up finance and late-stage commercialisation should include the growth finance stack (**co-investment funds, patient capital, revenue-based finance, export-linked scale-up facilities**). Without it, "pilot to scale" can still stall.
- **Portfolio Management:** Adopting a **portfolio logic** with defined stage-gates, multi-stage follow-on rounds, and the **explicit acceptance of failure**.

Pipeline continuity does not imply automatic funding. **Progression between stages should be conditional on clearly defined criteria**, including TRL advancement, user validation, regulatory readiness, and co-financing capacity. Given the complexity of many technologies, especially in defence and health, more than one follow-up round may be required. Explicit stage-gates reduce both fiscal risk and political discretion while preserving learning.

2. Internationalisation-by-design

For the purposes of this report, internationalisation refers to activities that demonstrably increase firms' ability to compete in international innovation and product markets. Eligible activities would therefore include consortium formation, regulatory and IP preparation for EU markets, participation in international testing and certification environments, and structured market-entry support. Generic networking, study visits, or loosely defined cooperation should not be eligible.

These measures aim to move Lithuania up the global competition ladder by benchmarking against international standards.

- **Seal of Excellence Co-financing: Automatically provides national funding for high-quality projects that passed European evaluation thresholds but lacked central EU budget**. This is considered highly effective because it leverages the high-quality evaluation already performed at the EU level. It allows Lithuania to fund projects that have already passed international competition filters, moving the country up the "competition ladder" with minimal administrative overhead. Seal of Excellence co-financing and proposal support are highly plausible and often offer high

leverage for smaller innovation systems seeking to "move up the competition ladder."

- **"Small Horizon Lithuania":** This proposed fund would target **high-risk, early-stage project**s -such as clinical trials and deep-tech pilots-**that currently face restrictive funding caps** (e.g., the current €150,000 limit for deep tech).

- **Internationality Fund:** A targeted fund **to build international collaboration capacity, partner searches, and market access**. The aim is for internationalisation to no longer be a parallel strand but to be **partially embedded in the pilot/continuity scheme** (e.g., allocating ~20% of pilot funding to projects with a clear EU/international trajectory). This is an improvement: it strengthens pipeline coherence and avoids treating "international cooperation" as an add-on.
- **High-end Proposal Support:** Professional bid-writing and consulting services to improve success rates in Horizon Europe calls.

3. Ecosystem intermediaries & clusters

In this report, accelerators are understood not as generic start-up programmes, but as specialised intermediaries performing clearly defined functions, such as regulatory navigation, investor readiness, procurement access, or TRL maturation. Accelerators should not duplicate grant schemes but complement them by **preparing firms for scaling and deployment**.

The focus here is on moving intermediaries **from "project administrators" to "active architects" of the ecosystem**. This aim is not trivial, as the interviewers expressed scepticism about clusters as "salary channels" and doubts about platforms.

Cluster and accelerator support should be provided through **time-bound performance contracts** rather than entitlement funding. Performance criteria may include **joint projects mobilised, SME upgrading outcomes, private co-funding leveraged, and international partnerships established.** Contracts should include sunset clauses and competitive re-selection to mitigate rent-seeking risks.

- **Sectoral Accelerators:** Dedicated accelerators for Life Sciences, ICT, and Defence are proposed to provide specialised mentoring, regulatory navigation, and investor readiness tailored to those specific domains. However, cluster/accelerator scaling is easy to overdo: if selection is not competitive and performance-based, the outcome will be funding without improving firm outcomes. Hence, **time-bound performance contracts** are key to their implementation.
- **Performance-Based Cluster Contracts:** Funding clusters and associations via time-bound performance contracts linked to joint projects, SME upgrading, and private co-funding. As with sectoral; accelerators without performance contracts, sunset clauses, or competitive selection logic, clusters will not work.
- **A DARPA-style "Mission Agency":** For the defence sector, a small, autonomous agency using high-calibre Program Managers with delegated authority is proposed (see further about defence programs). This would

enable rapid, milestone-based contracting (decisions in weeks or months rather than years) to match the pace of technological change.

- **Applied Technology Centres (ATCs):** Modelled after UK Catapults or German Fraunhofer institutes, these centres would **provide SMEs with access to shared pilot lines and testbeds (TRL 5–8)** that they cannot afford to build independently.
- **Triple Helix Platform:** A permanent Triple Helix platform is **only justified if it has defined decision rights,** such as input into mission selection, pipeline design, or instrument sequencing. Without such authority, the platform risks becoming a procedural forum without strategic impact.

4. Governance, evaluation & monitoring

There is currently no single "owner" of the innovation pipeline, and overlapping intermediaries create confusion for firms. This category proposes a shift **from compliance-based monitoring to a "learning system" focused on impact**.

- **Evaluation Reform:** Moving to a **multi-expert, two-tier evaluation system** that uses **EU-level quality filters and qualitative impact assessments**. Evaluation reform (multi-expert, outcome orientation, EU filters) is realistic institutionally if implemented incrementally and linked to administrative data.
- **Outcome-Oriented Monitoring:** Tracking real-world indicators such as **commercialisation, exports, license revenue, and clinical trials**. Outcome indicators should be applied selectively and temporally. For early-stage pilots, learning and TRL progression are appropriate, while commercial revenues or exports should only be expected at later stages. To avoid perverse incentives, outcome monitoring should rely primarily on administrative data sources (tax, export, IP, procurement) rather than self-reporting.
- **System Orchestration:** Appointing **a single "owner" of the innovation pipeline with authority to manage the sequence of instruments across ministries**. At this stage the report cannot define **who ultimately should orchestrates the system**. This can be one or several organisations. We expect system orchestrators **to vary across sectors** and depend on the availability of competent coordinators.
- **Policy mixes**: Key to successful orchestration of innovation ecosystem is the capacity to mobilise a **variety of policy instruments**, not only innovation grants.

5. Human capital & skills alignment

Recommendations focus on aligning the education pipeline with strategic technology needs.

- **S3-Linked Skills Policy:** Explicitly linking study places, VET, and retraining to S3 priorities like AI, robotics, and med-tech.

Linking S3 priorities to skills policy requires moving beyond general alignment toward concrete delivery mechanisms. This can be achieved through a combination of indicative **funding formulas for study places and training programmes**, periodic skills foresight exercises linked to S3 missions, and **structured employer co-design obligations in curricula development**.

Micro-credentials and modular training programmes can provide flexibility, allowing rapid adjustment of skills supply in response to technological change without relying solely on long-cycle degree programmes.

- **Paid Innovation Internships:** Co-funding internships in innovative firms to strengthen their internal "absorptive capacity".

The proposed innovation internship scheme should be co-funded, with public support covering part of the wage cost and firms providing supervision and complementary training. Participation should be **limited to firms engaged in S3-relevant activities and selected through competitive calls to ensure additionality**. Quality assurance can be ensured through **minimum supervision standards, defined learning outcomes, and light monitoring** by the administering agency. To achieve scale without excessive administrative burden, the scheme should prioritise **standardised contracts and batch intakes** rather than bespoke arrangements

Both skills alignment and paid internships are realistic and aligned with Lithuania's growing ICT/service strengths.

6. Demand-side & market creation

Lithuania currently lacks robust mechanisms like Public Procurement for Innovation (PPI) and Pre-commercial Procurement (PCP). These instruments are vital for creating "lead markets" in which the state acts as the first buyer, providing the initial demand needed for new solutions to scale. These demand-side policy instruments are a "crucial missing piece" to move pilots toward market uptake.

- **Innovation Procurement:** Implementing Public Procurement for Innovation (PPI) and Pre-commercial Procurement (PCP).
- **Challenge-Driven Missions:** Using the state as a "first buyer" to create lead markets for new solutions.

7. Technology upgrading, diffusion and absorptive capacity

The downstream technology upgrading is neglected focus of Lithuanian S3. The next planning period needs to correct this imbalance through two possible measures:

- **Technology diffusion/upgrading for the broad SME base** (**technology extension services, digital/green upgrading vouchers tied to measurable adoption, management capability, and industrial engineering support**)
- **FDI–domestic linkages / value-chain anchoring**: **supplier development, anchor-firm programmes, upgrading agreements**, '**spillover governance'** i.e. enhancing indirect linkages with foreign firms and their local suppliers.

8. Regulatory support & sandboxes

Stakeholders proposed Lithuania as a "**testing state".** If considered, this would implicitly reframe S3 as state-enabled experimentation under regulatory oversight, not just as innovation funding. This is a qualitative shift toward a TIP-style view of the state as *enabler of experimentation*.

For high-stakes sectors like Health and Defence, **"regulatory closure"** is a primary bottleneck. Lithuania lacks formalised "hard" sandboxes (physical testing ranges in defence, cyber and living labs) and "soft" sandboxes (data environments) that help firms navigate complex certification and standards. To resolve "regulatory closure" in sensitive sectors, the Ministry would need to establish **dedicated legal experimentation zones**.

- **Hard and Soft Sandboxes:** Establishing physical test ranges for defence and "soft" data sandboxes for health data access.
- **Regulatory Competence Nodes:** Creating units that help firms navigate certification and compliance for MedTech and cybersecurity.

9. Territorial/regional dimension

The qualitative inputs for the report (focus groups and surveys) have provided a very limited picture of regional delivery capacities. Regions appear mainly as *contexts*, not as actors with differentiated delivery capacity. Yet, territorial/regional dimension with instruments for regional delivery capacity or differentiated regional mixes would be essential. This matters because S3 is place-based; otherwise, coordination becomes purely national, and Capital centred despite the policy efforts to channel the incentives towards the Centra-West Lithuania Region. Regional implementation capabilities need to be strengthened, and a good example of "de coupling" innovation from the Capita region is demonstarted in a case of Chech Republic (see section VIII of this report).

IX. ASSESSMENT OF THE PROPOSED POLICY MIX

The proposed policy mix represents a credible **move toward a TIP-like, system-building S3** as it includes: pipeline continuity, international competitiveness filters, intermediaries, and governance learning. This potential policy portfolio stands in contrast to the survey and focus groups, which have demonstrated **a supply-side-heavy, frontier-leaning (STEP) profile** of policy support, with **missing demand-side and diffusion/scale instruments** (see annexes).

Demand and diffusion instruments are often decisive for a mid-level innovation system with modest R&D intensity and uneven innovation outputs. Yet the focus group members and survey respondents were largely representatives of public research organisations and thus **heavily skewed towards R&D activities**. We have tried to address this gap by strengthening the demand side of the policy mix.

Overall, the proposed potential policy mix is comprehensive and balanced. However, the main risk is **poor governance**. If governance is not tightened (decision rights, performance contracting, data backbone), the mix could **add "more instruments" without changing behaviour.**

THE INSTITUTIONAL CAPACITY: THE KEY CRITERION FOR CHOOSING POLICY MIX

As highlighted in section VIII the proposed measures represent a menu of options, not the final list of recommendations. The key criterion for prioritisation is the

government's **institutional capacity to design and implement the measures**, which varies significantly across measures.

Lithuania has functioning innovation governance bodies and strategies, but our proposed shift demands significantly **stronger "orchestration capacity"**: **cross-instrument sequencing, portfolio management, and learning loops**. Lithuania can administer programmes, but the proposed mix requires orchestration capacity, not just management.

To implement this mix well, the minimum capacity upgrades would be:

1. **Portfolio governance (one owner of the pipeline)**: A lead institution that can manage the pilot to scale pipeline across instruments, with authority to stop/adjust measures based on evidence.
2. **Intermediary contracting with performance criteria**: Clusters/accelerators funded via time-bound performance contracts (international projects mobilised, firms upgraded, private co-funding, export outcomes), not entitlement funding.
3. **Data backbone for evaluation**: Administrative data linkage (tax, exports, IP, grants, procurement) to track outcomes with low burden-so "outcome monitoring" is real, not paperwork.
4. **Internationalisation services capability**: Professional bid-writing and consortium-building support (not generic training), aligned with the Seal-of-Excellence pipeline.
5. **Regulatory/standards support capacity** (esp. MedTech/defence/cyber): Dedicated competence units or funded partners that help firms navigate certification, security requirements, clinical validation, etc.

"DEFENCE AND DUAL-USE TECHNOLOGIES" AS A STRESS TEST OF THE INNOVATION SYSTEM

Unexpectedly defence has recently become a major R&D and innovation priority, underscoring the need for a flexible allocation system capable of adapting to new technological and geopolitical challenges. In this respect, Lithuania remains in the early stages of developing its defence innovation ecosystem.

Dual-use technologies expose **the structural limits** of Lithuania's current Smart Specialisation model more clearly than any other domain. Their development requires rapid decision-making, testing infrastructure, regulatory flexibility, procurement-based scaling, and close civil–military coordination. As such, dual-use technologies **should not be treated as an additional S3 priority, but as a system-level stress test guiding reforms in governance, pipeline continuity, and demand-side innovation policy**. In that respect, dual use works best as the hardest case that forces system reform.

Lithuania's defence sector faces a significant gap in specialised infrastructure, which is considered a primary barrier to integrating military needs with research and development. To implement an effective Smart Specialisation (S3) policy, the survey and focus groups have identified several specific policy areas which are essential to defence and dual use areas. These are: **Specialised Testing Ranges and Grounds, Hard Sandboxes and AI Test Environments, Applied Technology Centres (ATCs), Direct Procurement and "First Buyer"**

Infrastructure. Hence, the proclaiming defence as priority area but without reforming the system in all these dimensions would be formal recognition without much real change.

X. FUTURE PATHWAYS AND SCENARIOS FOR S3 DEVELOPMENT

Lithuania's Smart Specialisation Strategy (S3) has reached the limits of incremental adjustment. The interim evaluation identifies a persistent structural pattern: **high absorption**, **strong performance in upstream technological activities**, but **weak translation into scaling, diffusion and structural upgrading**. Improving administrative efficiency alone will not bridge this gap. The next phase (2028–2034) must therefore make an explicit strategic choice about the direction, ambition and institutional configuration of S3.

Three scenarios provide alternative pathways. They differ in terms of (a) **ambition in system transformation**, (b) **demand-side and market-creating instruments**, (c) **governance and orchestration capacity**, and (d) **alignment with emerging EU industrial and security policy frameworks**. These scenarios are not symmetrical: Scenario 1 is a lower-risk and lower-return equilibrium; Scenario 2 is an ambitious but institutionally demanding transformation; Scenario 3 is a politically and institutionally feasible compromise that could serve as a stepping stone toward Scenario 2.

We assume that the **EU external context** is **constant** across all 3 scenarios (shift to accountability / performance but unclear metrics; STEP and cohesion constraints remain; no major geopolitical shock scenario).

SCENARIO 1: CONTINUITY (THE "STATUS QUO PLUS" BASELINE): *MAINTAINING THE CURRENT DIRECTION WITH MARGINAL EFFICIENCY IMPROVEMENTS.*

Description of System Performance: This scenario assumes that the political and institutional will for deep structural reform is low. The system retains its "supply-side heavy" character, focusing primarily on R&D inputs rather than economic outputs. The "innovation duality" persists: the Capital region continues to rely on private/international funding to grow, while Central and Western Lithuania remains dependent on cohesion funds for industrial modernization without generating significant original IP. The system continues to exhibit high absorption of funds but low transformation.

Measures Implemented:

- **Dominant Instrument:** Thematic grant allocation remains the primary mechanism.
- **Incremental Tweaks:** Adjustments are made to call criteria and monitoring checklists to reduce some administrative burden, but the underlying "Excel-driven" evaluation logic remains.

- **Upstream Focus: :** Funding remains concentrated on early-stage research (TRL 1–4) and pilots, with no automatic follow-up for scaling.
- **Limited Orchestration:** Governance remains fragmented across multiple agencies ("9 nannies, headless child" scenario) without a central orchestrator.
- **Exclusion of New Tools:** Demand-side instruments (Public Procurement for Innovation), regulatory sandboxes, and dedicated scale-up finance are largely omitted or implemented only as small, isolated pilots.

Short-term vs. Long-term Effects:

- **Short-term:** High stability and predictability for existing beneficiaries (universities, established grant recipients). High compliance rates and successful "financial absorption" of EU funds.
- **Long-term:** The "valley of death" between pilots and the market remains unbridged[10]. The gap between the Capital region and the rest of the country widens as the regions fail to integrate value chains. The system fails to adapt to fast-moving security needs (Dual-Use), rendering S3 irrelevant for defence innovation.

Overall narrative: Continuity protects stability but locks Lithuania into a **mid-level innovation equilibrium**: good performers in early-stage innovation, weak in scaling & diffusion, with persistent duality and no mission capability

SCENARIO 2: RADICAL TRANSFORMATION (THE "MISSION-ORIENTED" MODEL): A SYSTEMIC SHIFT TO AN INNOVATION PIPELINE DRIVEN BY EU-LEVEL POLICIES (STEP) AND STRONG ORCHESTRATION.

Description of System Performance: The system shifts from "funding projects" to "managing portfolios"13. It operates on a "high-trust, high-accountability" model where speed is a strategic variable14. The "Innovation Duality" is actively managed by linking Capital region deep-tech R&D with Central-West manufacturing capabilities15. The system uses the Defence/Dual-use sector as a "stress test" to force regulatory flexibility and rapid decision-making.

Measures Implemented:

- **Pipeline Logic:** Replacement of one-off calls with multi-stage pipelines (Pilot to Demonstration to Scale-up) where success triggers automatic follow-up funding windows.
- **Orchestration:** Establishment of a "system orchestrator" or Mission Agency with the authority to sequence instruments across ministries.
- **Demand-Side Instruments:** Aggressive use of Public Procurement for Innovation (PPI) and Pre-commercial Procurement (PCP) to create "lead markets," particularly in health and defense.

- **Absorptive Capacity:** Massive investment in "diffusion" instruments: technology extension services, industrial internships, and management upgrading vouchers for the broad SME base.
- **EU Filters:** "Seal of Excellence" is used to automatically fund projects that pass EU evaluation thresholds, using international competition as a quality filter.
- **Regulatory Sandboxes:** Creation of "hard" (test ranges) and "soft" (data/certification) sandboxes to remove bottlenecks for market entry.

Short-term vs. Long-term Effects:

- **Short-term:** Institutional friction as agencies adapt to new roles (orchestrator vs. administrator). A potential drop in the *number* of funded projects as criteria shift from "eligibility" to "potential impact" and excellence.
- **Long-term:** Structural economic change. Emergence of globally competitive "Hidden Champions" in manufacturing and deep-tech. The Central-West region successfully pivots to high-value manufacturing. Lithuania moves up the value chain by creating original IP rather than just adopting technology.

Narrative: Radical Transformation positions Lithuania as a **mission-capable, EU-aligned innovation state**, with real diffusion and security relevance. It trades absorption for learning and competitiveness.

SCENARIO 3: COMPROMISE (THE "HALFWAY HOUSE"): PRESERVING NATIONAL AUTONOMY WITH SELECTIVE CHANGES, PRIMARILY FOCUSED ON DEFENCE.

Description of System Performance: This scenario represents a "dual-speed" policy environment. The government formally adopts "missions," but lacks the political capital to overhaul the entire governance structure. The system performs well in high-priority "strategic pockets" (specifically Defence/Dual-Use) where new rules are applied, but the rest of the economy (traditional manufacturing, general ICT) continues under the old "grant allocation" regime. Orchestration is piecemeal-effective in specific verticals but absent horizontally.

Measures Implemented:

- **Selective Missions:** 2–3 missions are announced, but real resources and new governance are only fully deployed for the Defence/Security mission.
- **Hybrid Funding:** The Defence sector gets a "DARPA-style" agency with fast-track authority and procurement power, while other sectors rely on standard, slower EU structural fund procedures.
- **Partial Pipeline:** "Follow-up" funding instruments are introduced but remain disconnected from initial R&D grants for most sectors, maintaining the "valley of death" for non-strategic areas.

- **Symbolic Diffusion:** Some uptake of skills/internship programs, but without the scale required to shift the absorptive capacity of the Central-West region significantly.

Short-term vs. Long-term Effects:

- **Short-term:** Confusion among stakeholders regarding "which rules apply" (the fast strategic track vs. the slow standard track). Some immediate successes in defence prototyping due to focused attention.
- **Long-term:** Uneven development. The defence and security sector may modernize and internationalize, but the broader SME base lags. The risk of "symbolic priority-setting" is high, where missions are declared but not funded or governed with sufficient authority to achieve structural impact. Regional inequality may persist as coordination remains national rather than place based.

Narrative: Compromise prevents policy failure and political risk but also prevents major transformation. It creates a **dual innovation regime**: one mission-capable (defence) and one static (rest of S3).

In the report, defence/dual use is explicitly framed as the *system stress test* that reveals whether Lithuania can do missions, speed, procurement, and regulatory flexibility. In Scenario 1, defence confirms that the system is not mission-ready; it remains mostly symbolic as a priority. In Scenario 2, defence is not just another priority but the primary driver of institutional learning and a proof-of-concept of mission governance. In S3, defence becomes a wedge: can demonstrate what is possible but also risks creating a dual regime (reformed defence vs unreformed rest of S3.

Table 12. Summary of Scenario Dynamics

Feature	Scenario 1: Continuity	Scenario 3: Compromise	Scenario 2: Transformation
Primary Logic	Thematic Grant Allocation	Mixed / Selective Missions	Innovation Pipeline
Governance	Fragmented / Admin-heavy	Piecemeal Orchestration	Strong System Orchestrator
Key Instrument	R&D Grants (Upstream)	Grants + Defence Procurement	Pipeline + PPI + Sandboxes
Risk	Absorption without transformation	Symbolic coordination	Institutional overstretch
Regional Impact	Increasing divergence	Status Quo	Integration (Capital R&D + West Mfg.)

The strategic choice for Lithuania is between maintaining a stable but low-transformation equilibrium (Scenario 1), attempting an ambitious full-scale transformation aligned with emerging EU industrial and security frameworks (Scenario 2), or pursuing a defence-led transition strategy (Scenario 3). Based on the evidence of system bottlenecks, EU contextual shifts, and institutional starting conditions, **Scenario 2 should be the long-term target, while Scenario 3**

represents a credible transitional pathway. Scenario 1 entails the greatest long-run opportunity cost and should be avoided beyond short-term stabilisation.

RISK SCENARIO: WHAT HAPPENS IF THE ADDED MEASURES ARE *NOT* INCLUDED?

Scenario 1 assumes continuity, with very limited or no deployment of new instruments, and no change in the governance model. Below, we outline systemic risks that would **arise if the revised S3 does not include demand-side instruments, regulatory sandboxes, scale-up logic, diffusion measures, and orchestration capacity**.

Table 13. Summary of Potential Systemic Challenges and Responses

	Risk	Likely consequences	Early warning signals	Mitigation
Innovation without markets (Demand-side gap)	S3 funds pilots and R&D but does not create demand or lead markets.	• Prototypes fail to reach customers • Firms remain grant-dependent • Weak export references	• Low innovation procurement uptake • A few first customers in the public sector • Low commercial revenues from S3 projects	Introduce innovation procurement (PPI/PCP), challenge-driven missions, and procurement-linked scaling.
Regulatory bottlenecks block deployment (No sandboxes)	Regulation, data access, and certification prevent deployment in health, defence, and AI.	• Long time-to-market • Low participation of regulated sectors • Underused test infrastructure	• Repeated project delays due to regulations • Firms testing abroad • Low utilisation of labs and facilities	Establish formal regulatory and data sandboxes with clear access rules and fees.
Pilot-heavy, scale-light innovation system	Projects stop after pilots or one follow-up round.	• Few scale-ups • Loss of complex, capital-intensive technologies • Weak productivity impact	• High number of early-stage projects • Low number of firms reaching TRL 8–9 • Frequent project discontinuation	Introduce multi-stage follow-on funding, portfolio management, and explicit exit rules.

Limited spillovers and diffusion	S3 benefits a narrow group of start-ups but not the broader economy.	• Weak productivity growth • Growing regional and sectoral gaps • Low political support for S3	• Innovation concentrated in a few firms • Low SME technology adoption • Limited regional impact	Add diffusion instruments: SME upgrading, technology extension, and adoption-focused missions.
Fragmented governance and weak coordination	No single body orchestrates the innovation pipeline.	• Overlapping instruments • Confusing system for firms • Limited policy learning	• Duplication of programmes • Conflicting guidance to firms • Frequent strategy revisions	Appoint a single S3 system orchestrator with authority across the full pipeline.

If unmitigated, we may expect high absorption of cohesion funds, but low transformation. Also, we may expect improved administration and project numbers, but no durable change in innovation outcomes, scale-ups, or productivity. Without these mitigating measures, **S3 risks repeating the previous cycle's pattern: successful funding execution without structural impact**. The revised S3 will likely remain an improved but still fundamentally supply-side, project-based strategy. The absence of demand-side instruments, regulatory experimentation, scale-up logic, and orchestration capacity would prevent the policy mix from generating sustained market uptake, productivity growth, or structural transformation. In such a scenario, **S3 risks repeating the pattern of "absorption without transformation" observed in previous programming periods**.

XI. STRATEGIC ACTION PLAN: POLICY PRINCIPLES AND RECOMMENDATIONS

Chapter VIII outlined the comprehensive "policy mix"-the full menu of instruments available to modern innovation systems. However, implementing all available tools indiscriminately would lead to fragmentation and administrative overload. To transition from the current "Thematic Grant Allocation" model to the proposed "Mission-Oriented Innovation Pipeline" (as outlined in **Klaida! Nerastas nuorodos šaltinis.**), specific decision rules are required to select and prioritize these instruments.

This section establishes the Six Guiding Principles that serve as the strategic filter. These principles determine which instruments from Chapter VIII are selected for implementation in the recommendations below.

A. GUIDING PRINCIPLES FOR THE NEXT PHASE (2028–2034)

The interim evaluation shows that Lithuania's Smart Specialisation Strategy (S3) has reached **the limits of a project-based, supply-side approach**. Given constrained fiscal space, accelerating technological change, and heightened security pressures, the next phase of S3 requires explicit **principles to guide prioritisation, sequencing, and governance choices**. The following principles translate the evaluation diagnosis into operational decision rules. They dictate that every selected recommendation must address a specific systemic failure identified in the assessment (e.g., broken sequencing, slow speed, or weak demand)

PRINCIPLE 1: PIPELINE OVER PROJECTS (CONTINUITY)

S3 interventions should be assessed by their **ability to move technologies along a clearly defined innovation pipeline** (from prototype to deployment), **rather than by the number of funded projects or research outputs.** Broken temporal sequencing is a central cause of weak transformation effects.

The Rule: Interventions must be assessed by their ability to move technologies along a continuous path (from prototype to deployment), not by the number of individual projects funded.

This principle forces the selection of **"Pilot → Scale Continuity Windows"** and **"Multi-stage Funding"** from the Chapter IX menu, rejecting one-off, disconnected grant calls

PRINCIPLE 2: SELECTIVITY UNDER CONSTRAINT (CRITICAL MASS)

Lithuania cannot pursue broad priority expansion without diluting impact. Strategic selectivity-**fewer, deeper, capability-anchored domains**-is necessary to avoid symbolic priority-setting and to concentrate limited institutional and fiscal capacity.

The Rule: Lithuania lacks the resources to support broad diffusion across all sectors; resources must be concentrated on a limited number of high-potential domains.

This requires narrowing the focus to **2–3 Mission Domains (STEP technologies)** and specific **Sectoral Annexes** rather than broad horizontal support

PRINCIPLE 3: SPEED AS A STRATEGIC VARIABLE (AGILITY)

In fast-moving domains such as AI, cyber and defence, **time-to-decision is as critical as funding volume**. Instruments unable to operate within 6–12-month cycles are structurally incompatible with these technologies.

The Rule: Time-to-decision must match technological cycles (3–6 months for AI/Defense). Instruments taking >12 months are structurally incompatible with S3 priorities.

This prioritizes **"Fast-Track National Pilot Funds"** and **"Milestone-based Declarations"** over complex structural fund procedures

PRINCIPLE 4: INTERNATIONAL COMPETITION AS A QUALITY FILTER (EXCELLENCE)

Where feasible, EU-level competition and evaluation mechanisms should be used as quality filters, **allowing national policy to focus on scaling, adaptation, diffusion, and regulatory enablement** rather than duplicating selection processes.

The Rule: National capacity should not duplicate selection processes where EU-level evaluation already exists.

This selects **"Seal of Excellence Co-financing"** and **"Internationality Funds"** to leverage Horizon Europe standards

PRINCIPLE 5: DEMAND, REGULATION, AND TESTING AS INNOVATION INSTRUMENTS (MARKET CREATION)

Public procurement, regulatory sandboxes, and testing infrastructure are core components of innovation policy, not complements to R&D funding. **Market formation and regulatory closure** are decisive bottlenecks in several S3 domains.

The Rule: Public procurement and regulatory environments are core innovation tools, not just external conditions.

This dictates the inclusion of **"Public Procurement for Innovation (PPI)"** and **"Regulatory Sandboxes"** (Hard/Soft) as central measures, rather than peripheral pilots

PRINCIPLE 6: ORCHESTRATION OVER ADMINISTRATION (GOVERNANCE)

The effectiveness of S3 depends less on adding instruments than on **who has the authority to sequence them.** Portfolio management, learning, and exit decisions require **explicit orchestration capacity** beyond programme administration.

The Rule: The effectiveness of S3 depends on *who* has the authority to sequence instruments across ministries.

This necessitates the selection of the **"National Innovation Council"** and **"Mission Agency"** models over standard program administration.

These principles provide the framework for evaluating alternative strategic scenarios for S3's future development.

B. FROM PRINCIPLES TO RECOMMENDATIONS

Based on these six principles, the following recommendations operationalize the strategic shift. Each recommendation below is the direct application of a principle to the instrument menu.

Implementing all available tools indiscriminately would lead to fragmentation and administrative overload. To transition from the current "Thematic Grant Allocation" model to the proposed "Mission-Oriented Innovation Pipeline" (as outlined in **Klaida! Nerastas nuorodos šaltinis.**), specific decision rules are required to select and prioritize these instruments.

Based on the interim evaluation, Lithuania should pursue a selective mission-oriented S3 model, concentrating resources on a limited number of domains where existing capabilities, EU relevance, and strategic urgency coincide. The objective is not to expand the policy mix, but to reconfigure it around end-to-end innovation pipelines supported by strong orchestration capacity.

DETAILED RECOMMENDATIONS AND DELIVERY MECHANISMS

1. Establish mission-based innovation pipelines (core reform)

Recommendation 1.1 - Establish 2–3 missions-based on pipeline logic

Missions should be selected based on existing capability bases, relevance to EU strategic agendas (STEP, defence, green/digital), and feasibility within Lithuanian institutional capacity. Defence/dual-use technologies should be treated as one anchor mission, not as a standalone sector.

S3 interventions must be assessed by their ability to move technologies from prototype to deployment, not by the number of projects funded. The current "broken temporal sequencing" must be replaced by continuous support.

Delivery instrument:

- **National Pilot Innovation Financing:** Implement a fast-track national program with **rolling calls** (quarterly) and decision timelines of **≤12 weeks** to match the speed of AI and defence innovation cycles.

Recommendation 1.2 - Introduce explicit pilot - scale pipelines link

Replace one-off project calls with multi-stage pipelines: TRL 4–6 (pilot, validation), TRL 6–8 (demonstration, regulatory testing), TRL 8–9 (deployment, procurement, export). Successful projects should have automatic access to follow-up windows, conditional on milestones.

Delivery Instrument:

- **Pilot-to-Scale Continuity Window:** Introduce a "graduation logic" where successful pilots (validated at TRL 6) receive **automatic eligibility** for follow-up growth finance, conditional on meeting milestones. This eliminates the need to re-apply to disconnected instruments

1. **Create dedicated orchestration capacity**

A critical risk for the new S3 cycle is **'isomorphic mimicry'**-the tendency to copy 'best practice' institutions from advanced economies without possessing the underlying **Technical, Operational, and Political (TOP) capacities** required to make them function. The complex 'mission-oriented' interventions proposed in this strategy require a level of **'embedded autonomy'**-the ability of the state to coordinate with the private sector without being captured by it-that is currently underdeveloped in Lithuania. Consequently, the strategy should not aim solely for 'best practice' but for **'best match'** policies that align ambitious goals with existing implementation realities. This justifies the recommendation for a dedicated **'System Orchestrator'** with delegated authority, as fragmented ministries lack the specific TOP capabilities required to manage complex innovation portfolios

Recommendation 2.1 - Assign a single pipeline owner per mission

Effective S3 requires "orchestration over administration." A single body must have the authority to sequence instruments across ministries and manage portfolios. Each mission requires one institution with authority to: sequence instruments, stop underperforming projects, manage trade-offs between speed and risk. Administration without decision authority is insufficient.

Delivery Instruments (from Chapter VIII):

- **National Innovation Council (NIC):** A high-level body to set dynamic missions and ensure cross-ministerial alignment.
- **Mission Agency (DARPA-style):** Specifically for the **Defence and Dual-Use** mission, establish a unit with delegated authority to use **Program Managers** who can actively manage portfolios and stop underperforming projects.
- **Performance-Based Intermediary Contracts:** Shift clusters and accelerators from entitlement funding to time-bound contracts linked to specific outcomes (e.g., international projects mobilized).

Recommendation 2.2 - Move from programme management to portfolio management

Accept failure as part of learning. Evaluate portfolios, not individual projects. Introduce explicit exit rules.

This recommendation is designed to be operationalized through a **governance shift** applied to specific *new* proposed instruments. Portfolio management is defined not as a funding call, but as a management logic where a "system orchestrator" manages a collection of projects, accepting that some will fail while others graduate to the next stag

Portfolio managers should be given "delegated authority" to manage the portfolio, meaning they can terminate underperforming projects early (exit rules) and reallocate resources to successful ones, shifting the focus from administrative

compliance to aggregate portfolio success. This system introduces **"Stage-Gates"** (explicit exit rules). Projects are funded for a pilot phase (e.g., TRL 4–6); only those meeting specific milestones "graduate" to the **"Pilot-to-Scale Continuity Window"**

2. Rebalance the policy mix toward demand and deployment

Recommendation 3.1 - Use public procurement as a scale-up instrument

The state must transition from a passive funder of R&D to a "First Buyer" and enabler of experimentation. Supply-side grants alone cannot create markets for deep-tech. Measures should expand Public Procurement for Innovation (PPI) and Pre-Commercial Procurement (PCP). In defence and health, the state should act as **first buyer**, not only funder.

Delivery Instrument:

- **Public Procurement for Innovation (PPI):** Mandate that a percentage of the S3 budget be used for **Pre-Commercial Procurement (PCP)**, particularly in the Health and Defence sectors, to act as a launch customer for local innovations.

Recommendation 3.2 - Establish regulatory and testing sandboxes

Combine "hard" infrastructure (ranges, testbeds, pilot lines) with "soft" sandboxes (data access, certification pathways). This is particularly critical for dual-use, health, cyber, and AI.

Delivery instrument:

- **"Hard" and "Soft" Sandboxes:** Establish physical **testing ranges** (e.g., for drones) and **data sandboxes** (e.g., for health data) to resolve the "regulatory closure" that currently blocks market entry.

3. Integrate international competition by design

National funding should not be a refuge for projects that cannot compete globally. EU-level evaluation should be used as a primary quality filter. Recommendation

Recommendation 4.1 - Systematically use EU evaluation filters

Expand Seal of Excellence co-financing. Align national pilot funding with Horizon/EIC trajectories. National funding should complement, not substitute, EU competition.

Delivery Instruments:

- **Seal of Excellence Co-financing:** Automatically fund projects that have passed the rigorous Horizon Europe evaluation threshold but missed EU funding. This moves Lithuania up the "competition ladder" with minimal administrative overhead.

- **Internationality Fund:** A targeted fund embedded in the pipeline to support consortium building and partner search, ensuring that internationalization is a design feature, not an afterthought.

Recommendation 4.2 Integrate FDI and innovation policy

While Lithuania has successfully attracted foreign direct investment (FDI), there is a risk of a **'modularity trap'**, where local firms remain stuck in low-value-added segments of Global Value Chains (GVCs). The new S3 strategy must transition from a passive 'openness' model to an active **'GVC-oriented industrial innovation policy'**. This implies that R&D policy and FDI policy can no longer be treated separately; they must be coupled to ensure that foreign capital serves as a lever for building local **technological accumulation** rather than substituting for it,. Instruments must explicitly target the **'coupling' of endogenous R&D efforts with imported embodied knowledge**, supporting local suppliers to meet the technical standards required to enter the value chains of multinational 'integrators'

Recommendation 4.3 - Professionalise internationalisation support

Move from generic training to: consortium-building, regulatory/IP support, proposal engineering.

Delivery instrument:

- A program to **finance high-level consultations and professional bid-writing services** for Horizon Europe and EIC applications. This support is aimed at firms and clusters that have a viable technology but lack the niche expertise to navigate complex EU bureaucratic requirements

4. Strengthen diffusion and absorptive capacity

The assessment confirms that Lithuania's innovation policy has historically suffered from an 'upstream bias,' focusing disproportionately on formal R&D while neglecting the **'doing-using-interacting' (DUI)** modes of innovation that drive productivity in less developed regions. Evidence suggests that in economies operating behind the technology frontier, growth is not primarily driven by R&D intensity alone, but by **production capability, engineering excellence, and management quality (DEMP)**. Therefore, the S3 policy mix must embrace a **'broad notion of innovation'** that supports not just the creation of new knowledge, but the absorption and adaptation of imported technologies. To avoid the 'innovation paradox'-where high R&D investment does not yield economic returns-Lithuania must balance its support for frontier R&D with explicit instruments for **technology upgrading and process engineering**, particularly in the manufacturing-heavy Central and Western regions

To address the "dual-speed economy" (Capital vs. VVL), policy must support not just the top 5% of frontier innovators, but the technological upgrading of the broader manufacturing base.

Recommendation 5.1 - Introduce diffusion instruments for SMEs

Technology extension services, Digital/green upgrading vouchers linked to adoption outcomes, Industrial engineering and management capability support.

Delivery Instruments (from Chapter VIII):

- **Technology Extension Services:** Deploy advisory services to help traditional SMEs adopt mature technologies (Industry 4.0, digitization).
- **Upgrading Vouchers:** Introduce vouchers tied to **measurable adoption outcomes** (not just equipment purchase) to drive productivity in the Central and Western regions.

Recommendation 5.2 - Link skills policy to missions

The "talent drain" and lack of hybrid skills (e.g., Med-Math-AI) are binding constraints. Competence development must be demand-led.

Industry doctorates, paid innovation internships, and mission-linked forecasting of skills demand.

Delivery Instruments (from Chapter VIII):

- **S3-Linked Skills Policy:** Use funding formulas to align study places and VET modules specifically with S3 priorities (AI, Robotics, Life Sciences).
- **Paid Innovation Internships:** Co-finance internships in innovative firms to build "absorptive capacity" and retain talent within the domestic ecosystem.

5. Reform evaluation and monitoring

The current evaluation system is described as "formalistic" and "Excel-driven," focusing on administrative compliance (e.g., number of events, hours logged) and scientific outputs (publications) rather than economic impact. The reform must shift the logic from **verification** to **valorisation**. Success should be defined by **TRL progression** (moving from lab to market) and the **leverage of private capital**, not just the absorption of public funds.

Recommendation 6.1 - Shift from compliance to learning

Track: TRL progression, commercialisation, exports, procurement uptake. Use administrative data to minimise reporting burden.

Delivery Instruments:

- **Multi-Expert and International Panels:** Replace single-expert reviews with **consensus panels** (comprising both business and scientific experts, including international evaluators for high-value calls). This reduces bias and ensures market potential is assessed alongside technical feasibility.
- **The "Valorisation Dashboard" (Outcome-Oriented Monitoring):** Implement a new set of KPIs that track **commercialisation outcomes** rather than inputs. Key indicators must include:

- **TRL Transition:** The movement of a technology from e.g., TRL 4 (validation) to TRL 7 (demonstration).
- **Economic Impact:** License revenue generated, volume of R&D services sold, and high-value exports.
- **leverage Ratio:** The amount of private co-investment attracted per Euro of public grant.

- **Portfolio Management Logic:** Empower the system orchestrator (e.g., NIC or Mission Agency) to evaluate **portfolios of projects** rather than single projects. This allows for the **explicit acceptance of failure** in high-risk ventures (e.g., 50% failure rate in deep tech) without triggering audit penalties, provided the portfolio as a whole delivers result.
- **Learning networks**. The shift to a mission-oriented S3 requires experimentation, yet Lithuania's public administration operates under a strict compliance culture that penalizes failure. To reconcile the **experimental nature of innovation policy** with the accountability requirements of public funds, the governance model must move beyond standard auditing. It is recommended to establish **'Learning Networks' (LN)** as a formal governance mechanism. Unlike static committees, LNs operate on principles of **'action learning'**, bringing together policymakers, implementing agencies, and beneficiaries to solve implementation problems in real-time. This approach allows for the rapid feedback loops necessary for **'experimentalist governance'**, ensuring that the proposed regulatory sandboxes and pilot pipelines can adapt to unforeseen technological challenges without triggering bureaucratic paralysis

RISK OF NON-IMPLEMENTATION

If these specific instruments are not adopted-particularly the **Demand-Side tools** and **Orchestration capacity**-the revised S3 strategy faces the high probability of a **"High Absorption, Low Transformation"** outcome (Scenario 1). Without these mechanisms, the system will continue to fund prototypes that fail to reach the market, reproducing the "innovation paradox" observed in previous cycles.

Under Scenario 3, success depends less on adding instruments and more on orchestrating a limited number of pipelines well. Without **explicit sequencing, demand-side tools, and governance authority**, even a well-designed policy mix will reproduce "absorption without transformation".

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ANNEXES

ANNEX 1. MAPPING OF EVALUATION QUESTIONS TO REPORT FINDINGS

Questions	Answer in report	Responses from report findings
1. To evaluate the progress of the implementation of the Concept by identifying the progress of the planned activities and shortcomings. To evaluate the priorities and topics of R&D&D, the effectiveness and appropriateness of the organization of the monitoring and evaluation system and the process of finding entrepreneurial opportunities (hereinafter referred to as the VGPP).		
1.1. What are the results and benefits of the implementation of the Concept for the direct target groups?	II, IV, Annex 2	S3 funding enabled firms and research institutions to undertake high-risk R&D and prototype development that would otherwise be infeasible. Benefits include new product creation (ICT, biotech), export readiness, and digitalisation upgrades. However, these gains are project-level, not systemic: scaling and market uptake remain weak due to missing continuity instruments and demand-side pull.
1.2. What is the progress of the economic sectors corresponding to the R&D priorities compared to the Lithuanian economy as a whole?	II, VI	S3-aligned sectors are outpacing the general economy, with their share of national BPV rising from 10.2% in 2014 to 13.2% in 2024. While sectors like ICT and life sciences show strong R&D outputs, economy-wide impacts such as productivity growth and export complexity still lag behind EU peers
1.3. What competences are lacking in R&D&I priorities? How to ensure the necessary competencies?	VI, VIII, XI	There are acute shortages in AI, robotics, cybersecurity, and "hybrid" profiles combining medical and data expertise. Ensuring these requires industry doctorates, paid innovation internships, and mission-linked curricula co-designed with employers to increase firm-level absorptive capacity

1.4. What are the main challenges in the context of the implementation of the Concept?	VI	Key systemic bottlenecks: (i) Slow funding cycles (1.5–2 years vs tech cycles of 3–6 months); (ii) Fragmented governance (no pipeline owner); (iii) Pilot-heavy, scale-light logic; (iv) Regulatory bottlenecks (no sandboxes/testbeds); (v) Weak diffusion instruments; (vi) Fiscal constraints (deep-tech caps too low). These create a "valley of death" between prototypes and markets.
1.5. How effectively does the Concept promote science, technology and innovation and has it created added value (what?) for the private and public sectors?	IV, IX	Added value is clear at project level: prototypes, incremental process upgrades, and export support. Public sector benefits from research excellence and EU absorption. But systemic value-structural transformation, productivity gains-is limited. Without pipeline continuity and demand-side tools, Lithuania risks repeating "absorption without transformation."
1.6. How does the Concept promote cooperation between business, science and higher education institutions and the public sector? What additional measures could be used to make cooperation more effective?	IV, VIII	Current cooperation is often formalistic, with clusters and working groups existing but lacking decision-making authority. Effectiveness could be improved through performance-based cluster contracts and a Triple Helix platform empowered to influence instrument sequencing.
1.7. Which are the current R&D priorities and their topics that have become less relevant? What new R&D priorities and topics are taking on / are likely to become more and more important, have a strong potential for science, business, and cooperation.	**Klaida! Nerastas nuorodos šaltinis.**, V	Some existing S3 priorities have become less relevant due to limited technological or market traction (e.g., broad e-commerce development, generic process optimisation, and themes lacking clear innovation content). In contrast, new and increasingly important areas include AI and data-driven technologies, cybersecurity, advanced and green manufacturing, biotechnology/med-tech, marine technology, and defence/dual-use

		innovation. These new themes show strong scientific and industrial potential in Lithuania and align with emerging EU priorities and STEP technologies.
1.8. How do the R&D&I priorities/themes relate to the European Strategic Technology Platform (STEP)? To what extent do the existing R&D priorities/themes correspond to the themes of critical and emerging strategic technologies as set out in point 2 of the European Commission Communication C/2024/3209 of 13 May 2024 entitled 'Guidelines on certain provisions of Regulation (EU) 2024/795 establishing the European Strategic Technology Platform (STEP)' (hereinafter referred to as the Guidelines)? What is Lithuania's potential to develop and/or produce technologies that would meet at least one of the conditions for critical technologies set out in point 3 of the Guidelines? Should Lithuania align the R&D priorities/topics and requirements regarding compliance with the established R&D priorities/themes with the requirements set by the EC for the development of critical technologies[1]?	V, VII	Lithuania’s S3 priorities partially align with STEP (digital, biotech, clean tech). Potential exists in AI, photonics, and advanced materials, but success depends on test infrastructure, regulatory flexibility, and mission orchestration. Without these, STEP alignment risks being symbolic.

[1] Explanation: The aim of the European Strategic Technology Platform (STEP) is to support the production of critical technologies in three sectors related to the green and digital transitions: digital technologies and deep tech innovation, clean and resource-efficient technologies, and biotechnology. The STEP is set out in Regulation

2. To carry out a comparative analysis of the priorities and themes of the Concept and R&D with at least three EU countries/regions close to the level of development of the Lithuanian economy and possible opportunities for cooperation, distinguishing the strengths of the analyzed countries/regions S3, the applied S3 policy-making methods that could be applied to improve the Concept.		
2.1. What are the similarities and differences between the measures and initiatives of the countries analysed in the implementation of the Concepts?	VII	Estonia: deep-tech focus, long-term RDIE strategy (15 years). Slovenia: SRIPs institutionalize EDP and cluster governance. Czechia: polycentric model with strong regional intermediaries (JIC). Lithuania shares centralization with EE/SI but lacks continuous EDP and orchestration capacity.
2.2. Lithuania's good practice in comparison with other countries, *vice versa* (the principle of formulation of R&D priorities and themes (e.g., problem formulation method, technology development pathway). Technology Roadmapping, vertical R&D priority approach); implementation and selection of funding instruments).	VII	Lithuania shows agility in venture capital growth, while Slovenia excels in institutionalised Triple Helix cooperation (SRIPs). Lithuania should emulate Estonia's 15-year strategic stability and the Czech model of empowering regional innovation centres like JIC to build bottom-up trust
2.3. What joint initiatives can be carried out with other EU countries, taking into account the coherence of R&D priorities? Proposals for measures and/or initiatives applicable to Lithuania for the implementation of the Concept, in accordance with the current practice of other countries.	VII, VIII	Baltic-Nordic deep-tech corridors, shared defence sandboxes, and joint Horizon Europe bids via an Internationality Fund. These initiatives leverage regional complementarities and EU networks for scale.

(EU) 2024/795 of the European Parliament and of the Council of 29 February 2024 establishing the European Strategic Technology Platform (STEP) and amending Directive 2003/87/EC and Regulations (EU) 2021/1058, (EU) 2021/1056, (EU) 2021/1057, (EU) No 1303/2013, (EU) No 223/2014, (EU) 2021/1060, (EU) 2021/523, (EU) 2021/695, (EU) 2021/697 and (EU) 2021/241, as detailed in the Guidelines.

2.4. How could the Concept facilitate cooperation with research and innovation (R&D) centres and companies in other EU countries?	VIII	Facilitation requires introducing "Seal of Excellence" co-financing and structured consortium-building services. Embedding internationalisation requirements into pilot funding (e.g., a 20% budget allocation for projects with EU trajectories) would incentivise cross-border collaboration
2.5. How does the Concept promote the involvement of businesses and higher education institutions in international R&I consortia and joint initiatives with EU partners?	VIII	The system should shift from providing generic training to professionalising proposal engineering and bid-writing support. This includes financing high-level consultations to help firms navigate complex EU requirements and integrate into global value chains
2.6. How could the Concept better contribute to the objectives of the strategic documents implementing EU policies (e.g. the Green Deal, Digital Europe)?	V, VIII	Implementing demand-side instruments like Public Procurement for Innovation (PPI) and creating regulatory sandboxes would directly support Green Deal and Digital Europe targets. Defence dual-use priorities further support EU strategic autonomy
2.7. How could the GPP be improved? For example, by applying certain technology insights techniques? If a need is identified, indicate what actions need to be taken in order to institutionalize such improvements.	VIII	The Entrepreneurial Discovery Process (EDP) must move beyond the design phase by appointing mission owners with decision rights. Adopting a portfolio management logic with real-time learning loops would replace current "tick-the-box" consultations
3. To submit proposals to the Ministry regarding the possible elimination of the identified deficiencies or improvement of the implementation of the Concept and/or R&D priorities and themes.		

3.1. What are the essential proposals for the possible elimination of the identified deficiencies or the implementation of the Concept and/or R&D priorities – to submit proposals for the improvement of the implementation of each direction of the Concept according to individual R&D priorities, if differences have been observed. For example, how can the formulation of R&D priorities (technology-related priorities, mission-based/challenge-oriented priorities, or another model, combination of models) be improved? Formation and implementation of financing instruments? Project selection? Improving the GPPP (strengthening ecosystem cooperation)?	V, VIII, X, XI	The core proposal is a shift to an "Innovation Pipeline" model: (i) establishing 2–3 mission-based pipelines, (ii) creating dedicated orchestration capacity (NIC), (iii) rebalancing the policy mix toward demand-side tools (PPI), and (iv) establishing regulatory sandboxes.

ANNEX 2. QUALITATIVE ANALYSIS OF S3 FUNDED PROJECTS

This annex provides supplementary materials, data, and additional information to support the main analysis presented in the primary document. The contents herein are intended to enhance the transparency and validity of the analytical process, offering further context, detailed breakdowns, and supporting evidence.

ABOUT RESEARCH METHOD

Apimtis	893 turintys pakankamai informacijos projektai iš 1698
Suinteresuotos šalys	Įmonės, gavusios S3 finansinę paramą
Interesas	• S3 paramos rezultatų vertinimas • S3 paramos gavėjams taikomų kriterijų patikslinimas • S3 poveikis skirtingo dydžio įmonėms
Data	Spalis - Gruodis
Analizė	Metodologinė horizontali ir vertikali kokybinė analizė
Kokybė užtikrinimas	• Rizikos valdymas • Atsakymai lyginami su interviu, apklausomis, literatūra (strategijomis, ankstesnėmis sumanios specializacijos hatakikomis' ir pasaulinių tyrimų rezultatais). • Tikslinė imtis yra finansavimą gavusių projektų sąrašas. • Europos chartijos ir mokslininkų etikos taisyklių laikymasis

DATA SOURCES AND METHODOLOGY

This section outlines the data sources utilized in the analysis, including publicly available data and data provided by Innovation Agency. It also details the methodology applied, such as statistical techniques, modelling approaches, or qualitative frameworks.

The total of 1698 Projects with the financing status labeled as ‘Įgyvendinama sutartis’, ‘Baigta sutartis’, and ‘Baigta įgyvendinti’ in the S3 Projektų suvestinė spreadsheet were reviewed and analysed by project goals, then verified via https://www.esinvesticijos.lt. Projects were reviewed and grouped by goal type. The following table below presents data organized by MTEPI tematika and project goal and showing the amount of financing granted by Innovation Agency during 2023 to 2025. Data Sources: https://www.esinvesticijos.lt and the S3 Projektų suvestinė, covering projects seeking or receiving financing in 2023–2025.

A qualitative firm-level analysis was undertaken for a purposive sample of S3-funded companies, selected to reflect variation in sector, firm size, funding intensity, and stage in the innovation cycle. Firms were assessed based on their development stage (R&D, prototyping, scale-up, market entry) and the perceived

contribution of S3 support to technological progress and business outcomes. To address comments on missing data justification, coding tables, thematic matrices, and case summaries that substantiate all claims made in Chapters IV, and IV are included.

The analysis examined the perceived impact of S3 funding, distinguishing between support for early-stage experimentation and its ability to enable scaling, certification, and market access. Attention was paid to barriers beyond funding, including skills shortages, regulatory and certification requirements, access to international markets, and integration into value chains. Clear differences emerged between high-tech firms (facing scale-up and internationalisation constraints) and engineering/manufacturing firms (more affected by incremental innovation limits, capital intensity, and workforce availability).

SUPPLEMENTARY TABLES AND FIGURES

Table 14. Distribution of S3-Funded Projects and Financial Allocations by MTEPI Thematic Area and Project Goal (2023–2025)

MTEPI tematika	Projekto tikslas										
	Atliekų žaliavų panaudojimo optimizavimas	*Skaitmenizavimas*	*Inotyvaus produkto kurimas*	*Atsigavimas po patirto nuosmukio*	*Eksporto plėtra*	*Duomenys nerasti 'esinvesticijos.lt'*	*Internetinės prekybos vystymas*	*Darbuotojų įgūdžių ugdymas*	*Energijos sąnaudų optimizacija*	*Nepateikti duomenys*	*Grand Total*
1. Sveikatos technologijos ir biotechnologijos	77968		26571287.13		3946311.09	1401827.33	5089943.27	138132.72			37225469.54
1.1. Molekulinės technologijos medicinai ir biofarmacijai			2413342.8		208685.37	1401827.33	472149.15				4496004.65
1.2. Pažangios taikomosios technologijos asmens ir visuomenės sveikatai			15147332.77		1414337.58		1688801.15	138132.72			18388604.22
1.3. Pažangi medicinos inžinerija ankstyvai diagnostikai ir gydymui			6608114.96				651111.35				7259226.31
1.4. Saugus maistas ir tvarūs agrobiologiniai ištekliai	77968		2402496.6		2323288.14		2277881.62				7081634.36
2. Nauji gamybos procesai, medžiagos ir technologijos	5165111.05	1581087.79	40073550.3		17283836.5	24000	3447360.63	5729305.426	2215580.76		75519832.46
2.1. Fotonika ir lazerinės technologijos			6175552.54		1160694.71			54265.45			7390512.7
2.2. Pažangiosios medžiagos ir konstrukcijos	1922018.39	179000	10912671.18		2602748.64	6000	689875.63	541773.94	488293.88		17342381.66
2.3. Lanksčios produktų kūrimo, gamybos ir procesų valdymo, dizaino technologijos	2197821.27	1238127.28	13837592.81		12576212.46	18000	1472671.97	5045691.776	1233803.76		37619921.33
2.4. Energijos vartojimo efektyvumas, išmanumas		163960.51	5121523.96		924199.47		1284813.03	87574.26	493483.12		8075554.35
2.5. Atsinaujinantys energijos ištekliai	1045271.39		4026209.81		19981.22						5091462.42
3. Informacinės ir ryšių technologijos		664224.11	62413241.97		4155567.12		1607065.63	1302926.02			70143024.85
3.1. Dirbtinis intelektas, didieji ir paskirstytieji duomenys, įvairiarūšė analizė, apdorojimas ir diegimas		464315.44	41731484.16		3480213.46		1028428.75	1083151.49			47787593.3
3.2. Daiktų internetas		12000	7226100.75				116725.2				7354825.95
3.3. Kibernetinis saugumas		28559.42	4072039.85				49755	132015.27			4282369.54
3.4. Finansinės technologijos ir blokų grandinės			2162552.38		39926.77		25000				2227479.15
3.5. Audiovizualinių medijų technologijos ir socialinės inovacijos		159349.25	1112444.18		379026.5		290704.76	26234.26			1967758.95
3.6. Išmaniosios transporto sistemos			6108620.65		256400.39		96451.92	61525			6522997.96
netaikoma		2188487.46			3814780.84		8525390.48				14528658.78
visi			3068496.25					171340.7			3239836.95
Tematika nepateikta (duomenų langeliai tušti S3 projektų suvestinėje)		137957.07	782707.06	2493520.85	175938325.3		519523	12863193.77	75090296.3	468482345.9	736307869.2
Grand Total	5243079.05	4571756.43	132909282.7	2493520.85	205138820.8	1425827.33	19189283	20204898.64	77305877.06	468482345.9	**936964691.8**

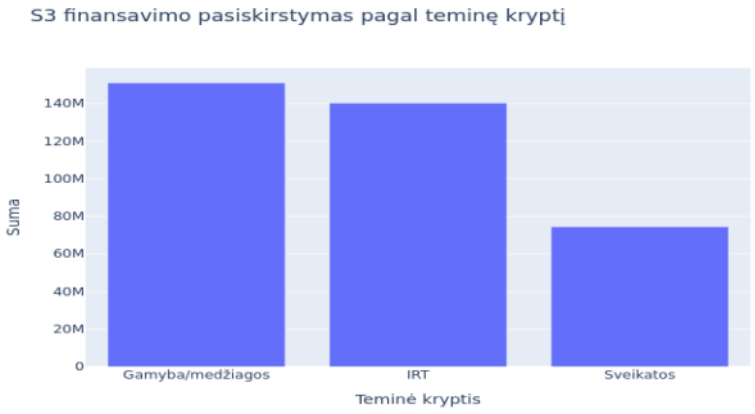
Each Project goal was mapped to a typical stage in the firm innovation journey and then examined portfolio shares to read where companies sit.

Table 15. Mapping of Project Goals to Likely Innovation Type and Portfolio Significance

Project Goal	Likely innovation-cycle position	Summary
Inotyvaus produkto kūrimas	R&D / prototype development	Dominant (~70.6%) → the portfolio mainly funds new product development.
Internetinės prekybos vystymas	Market entry / commercialisation	Non-trivial (~5.5%), esp. in Health (~13.7%).
Eksporto plėtra	Internationalisation / scale-out	Meaningful (~13.9%), especially in Manufacturing (~22.9%)
Darbuotojų įgūdžių ugdymas	Capability building (scale-up enabler)	Moderate (~3.9% overall)
Skaitmenizavimas	Scale-up / process maturation	Low (~1.2% overall; ~0.9% within IRT).
Energijos sąnaudų optimizacija	Operations efficiency (production)	Low (~1.2%), concentrated in Manufacturing.
Atliekų žaliavų panaudojimo optimizavimas	Process innovation (production)	Smaller (~2.9%), mostly Manufacturing.

Funding split by project goal

Funding split by thematic pillar



Interpretation: Most S3-funded firms are in R&D → early market preparation. A smaller share uses S3 to scale operations (digitization/energy) or build organizational capabilities (skills), which can constrain diffusion when R&D outputs move toward production and international sales.

PILLAR-LEVEL INSIGHTS

- Manufacturing (~41%): Dual role-product development (~53%) and exports (~23%), with minor investments in skills and efficiency.
- ICT (~38%): Highly R&D-driven (~89%), underfunded in industrialization and sales scaling.
- Health (~20%): Strong product creation (~71%) with notable e-commerce (~13.7%) and exports (~10.6%), suggesting digital health models.

KEY FINDINGS

- S3 acts primarily as a product-innovation catalyst (majority of funding to innovative product development).
- Relatively low funding for scale-up enablers (digitization (~1.2%) and energy efficiency (~1.2%)
- risks bottlenecks in process scaling, quality assurance, and cost competitiveness.
- Market-entry and exports are present but secondary compared to R&D.
- Skills development (~3.9%) is modest, especially in ICT (~1.9%), creating gaps in regulatory, production, and international sales expertise.
- Health/Biotech: Strong product focus (~71%) but regulatory timelines may slow diffusion.
- Manufacturing: Balanced mix, yet low process upgrades threaten competitiveness.
- ICT: Extremely product-heavy (~89%) with negligible digitization (~0.9%), risking prototype-to-platform transition.
- Data gaps (e.g., missing field e.g., "Nepateikti duomenys") reduce portfolio visibility and learning.

RECOMMENDATIONS

- Increase funding for innovative product development-prioritize projects with clear technological novelty and a credible scale pathway.
- Stop funding internet sales (e-commerce set-up and marketing) under S3; this is a business model execution activity, not an innovation objective
- Exclude generic business support (general marketing, routine operations aid) from S3 funding; channel such needs to non-innovation programs.
- Rebalance the pipeline toward scale-up: targeted calls for digitization, process automation and energy efficiency; expand skills development for production, regulatory and international sales.
- Link commercialization and export support to innovation outcomes (e.g., launch of a newly developed product in target markets).
- Tighten data standards to reduce "missing data" entries and enable better steering of the portfolio.

ADDITIONAL COMMENTARY AND OBSERVATIONS

Due to a lack of available data, outcome or success analysis was not possible to assess. Summary distils the analysis of S3-funded projects by goal and by thematic pillar. The portfolio is product-innovation heavy, with comparatively low investment in scale-up enablers. Some activities-such as internet sales and generic business support-are not innovation and should be excluded from S3 scope.

ANNEX 3. FOKUS GRUPIŲ DISKUSIJŲ ATASKAITA

Focus groups were implemented as structured, theme-based discussions with experts from S3 priority areas (health, ICT, manufacturing/engineering) and an additional group dedicated to the emerging defence domain. Discussions followed a common analytical framework covering S3 priority formulation, reform–investment linkages, governance effectiveness, competence development, and future strategic positioning. To address the request for actionable insights, the findings from focus groups have been synthesized into specific recommendations for S3 improvement, presented in Chapters VII and Annex 8

The design ensured full coverage of S3 priorities, including cross-cutting issues such as internationalisation, defence-related dual-use technologies, and ecosystem coordination. Focus groups generated systemic, governance-related and experiential insights, revealing how S3 instruments operate in practice, how priorities are interpreted by actors, and where misalignments between strategy and implementation persist.

APIE TYRIMO METODĄ

Apimtis	4 grupės, viso 60+ žmonių
Dalyviai	Atstovai iš Sveikatos, IRT, Gamybos S3 darbo grupių, Gynybos sektoriaus atstovai iš Lietuvos ir užsienio
Interesas	A. Įgyvendinimo ir reformų mechanizmai B. Kompetencijos ir parama moksliniams tyrimams ir eksperimentinei plėtrai (MTEP) C. Veiksmai S3 strategijai patobulinti
Organizavimas	Tikslinės grupės
Trukmė	30min – 2val trukmės grupinės diskusijos
Data	Spalis - Lapkritis

Klausimai	Kokybiniai (atviri): • Nuomonių ir idėjų rinkimas • kurie formuluoja poziciją
Analizė	Lyginamoji, teminė turinio analizė, trianguliacija
Kokybės užtikrinimas	• Suinteresuotųjų šalių ekspertų dalyvavimas įgyvendinant S3 prioritetus • Rizikos valdymas • Atsakymai lyginami su apklausa, literatūra (strategijomis, ankstesnėmis sumanios specializacijos ataskaitomis ir pasaulinių tyrimų rezultatais). • Adresatų sąrašas nėra atsitiktinis, o tikslinis pavyzdys. • Europos chartijos ir mokslininkų etikos taisyklių laikymasis

UŽDUOTI KLAUSIMAI

1. Jūsų nuomone, kiek veiksmingi yra mechanizmai ar procesai, skirti koreguoti S3 prioritetus, siekiant reaguoti į besikeičiančius regioninius ir (arba) nacionalinius prioritetus ar naujas technologines bei tvarumo tendencijas?
2. Kaip vertinate esamų kompetencijų ir įgūdžių atitikimą S3 prioritetų poreikiams? Kokios spragos egzistuoja tarp sektoriaus poreikių ir švietimo/inovacijų politikos?
3. Kokios S3 reformos ar modeliai galėtų geriau integruoti Lietuvos regionus į ES inovacijų tinklus ir skatinti tarptautinį bendradarbiavimą?
4. Jei galėtumėte rekomenduoti vieną pagrindinį veiksmą būsimai S3 strategijai patobulinti, koks jis būtų? Kas S3 prioritetų srityse yra aktualiausia?

TYRIMO REZULTATAI

Kategorija	Pagrindinės įžvalgos	Segmentai	Citatos
1. MTEPI veiklos (moksliniai tyrimai ir eksperimentinė plėtra bei inovacijos)			

Proveržio technologijos ir jų vystymas (STEP – ypatingos svarbos strateginės technologijos)	- Sveikatos srityje – genų terapija, duomenų inovacijos, klinikiniai tyrimai; MISTI – elektronikos komponentai, oro gynybos sistemos. - Trūksta greito reagavimo mechanizmų technologijų proveržiui (AI, kvantinės technologijos, kibernetinis saugumas), ypač gynybos ir sveikatos srityse. - Lietuva atsilieka diegiant dirbtinį intelektą – mokymai bendriniai, nėra specifinių kompetencijų. - Dabartiniai prioritetai nepakankamai atnaujinami pagal technologines tendencijas; būtina įtraukti Agentic AI, kvantines technologijas, duomenų analitiką. - Investicijos turi būti nukreiptos ne tik į infrastruktūrą, bet ir į žmogiškuosius išteklius, kad būtų sukurtas poreikis naudotis technologijomis. - Reikia testavimo infrastruktūros proveržio technologijoms (pvz., oro gynybos sistemoms) ir end-to-end finansavimo modelio.	IRT, Gynyba, Sveikata	**Gynyba:** „We don't have a single testing range in Europe for integrated air defense… why not make the first real testing grounds?" **Gynyba:** „Why not make Lithuania the first country that rigs that silo and have end-to-end funding… maybe close the first emerging technology prime contractor in Europe?" **Sveikata:** „Dirbtinio intelekto srityje yra vijimasis, nes mes einam dešimt žingsnių atgal. Nes žmonės nežino dirbtinio intelekto galimybių. Visi mokymai yra bendrinio pobūdžio ir nėra specifiniai." **IRT:** „Sinergizuokime dirbtinį intelektą su kitomis technologijomis (kvantumo technologijas su duomenų analitika)." **IRT:** „Netiesioginė investicija į hardware, tai reiškiasi, kad reikalinga investicija į human resources šitoj vietoj į įmonės: tam kad joms būtų poreikis naudotis infrastruktūra ir kad tas naudojimasis sukurtų pridėtinę vertę." **IRT**: „Mes šiai dienai Lietuvoje kalbame apie dirbtinio intelekto agentus, o Europos komisija jau deda akcentą su Agentic AI, kai agentai jungiasi į visumą ir daro progresą. Europoje manoma, jog nepasieksime progreso, jei įmonės nenaudos didžiąja dalimi Agentic AI."

Startuoliai, veiklą plečiančios įmonės (scale-ups, grow-ups), atžalinės įmonės (spin-offs), valorizacija	- Startuoliai svarbūs, bet reikia stipresnio ryšio su stambiu verslu. - Reikia „mažojo horizonto" rizikingiems projektams ir klinikiniams tyrimams. - Trūksta akseleratorių, mentorių ir specializuotų investuotojų, kurie padėtų komercializuoti idėjas. - Reikia „vieno langelio" inovacijų platformos, kuri užtikrintų aiškų ciklą nuo idėjos iki finansavimo, testavimo ir mastelio didinimo. - Startuoliai susiduria su „mirties slėnio" problema – prototipai neperkelti į produktus dėl paramos trūkumo.	Sveikata, Gynyba, IRT	**Sveikata:** „Verslumo kompetencija yra labai svarbi manau, startuoliam ir spin-off'ams ir kas pretenduoja." **Sveikata:** „Vadybos mokslų ekosistemoje neturim normalus akseleratoriaus... reikia mentorių atitinkamų specializuotų investuotojų, kurie irgi specializuojasi ir padeda produktą įvesti." **Gynyba:** „We need one window and the one innovation clear and understandable so everybody knows: I have idea, coming here, puts everything on the table and there is a system to help – funding, testing, scaling." **Gynyba:** „„We need one window… a clear innovation loop for ideas, funding, testing, scaling." **IRT:** „Mes esame tam mirties slėny, ten kur yra prototipas ir kur yra produktas... Kas darosi su tais research and innovation match? Sukūrėme prototipą ir viso gero. Kuo jis pasibaigė? Eksplotacijos planu ir viskas... tai iš tikrųjų taip čia yra didžiausia problema kad tai įmonei ar tiems kurie sukūrė tą inovaciją ir reikia pagalbos kad tą inovaciją iš tos laboratorijos ištraukti ir padaryti produktą. Ir tai nėra vien tiktai IT yra daug įvairiausių dalykų kas yra kliūtis tame kelyje"

2. Verslumas (verslo plėtra ir inovacijų diegimas įmonėse)			
Bendradarbiavimas ir integracija į tarptautines vertės grandines (internacionalizacija)	- Trūksta sisteminio mokslo, verslo ir valstybės bendradarbiavimo – ypač gamybos ir sveikatos srityse. - Tarptautinis bendradarbiavimas yra kritiškai svarbus, tačiau nacionaliniai mechanizmai per silpni ir nepakankamai koordinuoti. - Reikia platformų, kurios užtikrintų „cross-border" projektus ir regioninį bendradarbiavimą (pvz., Baltijos šalys, Centrinė Europa). - Įmonėms būtini mechanizmai įsitraukti į tarptautines vertės grandines, surasti partnerius ir dalyvauti konsorciumuose. - Nacionalinis finansavimas turi papildyti tarptautinius instrumentus (pvz., Horizon), nes konkurencija juose labai didelė.	Gamyba, Gynyba	**Gamyba:** „Mechanizmai, kurie padėtų įsitraukti į tarptautines vertės grandines… surasti partnerius." **Gamyba:** „Nepritariu požiūriui, kad orientuotis tik į tarptautinius Horizon projektus, nes sunku konkuruoti su didžiosiomis korporacijomis. Gynybos temose bus dar sunkiau. Šiame finansavime didžiausius šansus turi tie, kurie savo projektuose turi didžiuosius žaidėjus. Be vidinio nacionalinio finansavimo labai daug bus prarasta." **Gynyba:** „I would like to see more cross-border policy making at least for the region… and also when it comes to innovation research." **Gynyba:** „I have a very strong interest in fostering international collaboration and cooperation… Lithuania brings some things to the table that could actually serve as R&D without that in-depth type I share and publish a lot and that could lead to leading Germany and Central Europe thinking and doing." **Gynyba:** „I would love to engage in projects with Czechs, with Polish… some were not far away from us and who can be our closest neighbors in crisis but we don't

			have anything. I think we should have, we must have.“
3. Kompetencijos			
Kompetencijos, kvalifikacijos kėlimas (upskiling), perkvalifikavimas (reskiling) sumanios specializacijos įgyvendinimui	- Universitetai nemoko kurti inovacijų, orientacija į publikacijas, o ne produktus. - Trūksta specialistų AI, kibernetinio saugumo, robotikos, duomenų analitikos srityse. - Reikia kompetencijų su medicininėmis ir matematinėmis žiniomis AI taikymui gyvybės moksluose. - Verslumo kompetencijos silpnos, ypač tarp tyrėjų; būtina įtraukti inovacijų ir verslumo mokymus į studijų programas. - Reikia švietimo sistemos reformos, kad studentai nepaliktų studijų neįgiję kritinių žinių (matematika, statistika). - Indikatoriai, kurie leistų pamatuoti ir įvertinti, kiek sukurtų mokslinių žinių pereina į komercializaciją. Europos Komisijos vadinama „valorizacija“.	IRT, Gamyba, Sveikata, Gynyba	**Gynyba:** „Our educational system does not teach students how to innovate… we just don’t teach them as an institution.“ **Gynyba:** „Scientists are extremely dependent on publications… not really true for defense needs.“ **Gynyba:** „We need to educate people on what TRL levels mean and how long it takes to go from idea to product.“ **Sveikata:** „Reikia specialistų su medicininėmis ir matematinėmis žiniomis, ne bendrinių, specifinių kompetencijų gyvybės mokslų srityje dirbtinio intelekto naudojimui – ruošti tokius specialistus ir tokias kompetencijas.“ **IRT:** „Galimybė įgyti visas reikiamas kompetencijas ir resursas, kur studijuoti, Lietuvoje yra. Problematika atsiranda, kai studentai nuo antro kurso išeina dirbti, ir tuomet tų žinių, kurios yra kritinės dirbant su dirbtiniu intelektu, t.y. matimetinių ir statistinių žinių, jie neįgyja. Tuomet versle yra skundžiamasi, kad sudentai yra nekompetetingi. Jeigu išeina iš studijų ir eina kurti internetinius puslapius, tai praktikoje reikiamų kompetencijų neįgyja. Plius matematikos mokytojai mokyklose

			yra raudonoje knygoje. Lygiai tas pats darosi su universitetais.“ **Gamyba:** „Inno-pažanga, Inno-branda, dirbtinis intelektas, universitete nėra žmonių ką įdėti į projektus, ta prasme dirbtinio intelekto žmonių nėra.“
4. Politikos įgyvendinimo kokybė			
Stebėsena ir rodikliai	- Dabartinės vertinimo metodikos orientuotos į „Excel“ ir statistinius rodiklius, ne į komandos kompetenciją ar verslo modelį. - Sveikatos srityje – OECD indikatoriai (klinikiniai tyrimai) nepritaikomi dėl mažos apimties – reikia alternatyvių KPI. - Siūloma naudoti patentus, licencijas, MTEP pajamas, naratyvinius rodiklius ir dinamiškus KPI, susietus su ekonominiu poveikiu. - Vertinimas turėtų būti orientuotas į pridėtinę vertę, eksportą ir inovacijų komercializaciją.	Gamyba, Sveikata	**Sveikata:** „Mūsų tos priemonės labai dažnai yra vertinamos nu labai ekselio pagrindu… nemato ekspertai dažnu atveju pačios komandos.“ **Sveikata:** „Licencinės sutartys turėtų būti įtrauktos į indikatorius, nes per jas yra generuojami pinigai. Indikatoriai turėtų būti siejami su generuojamomis pajamomis, patentais, licencijomis, MTEP užsakymais.“ **Sveikata:** „Number of clinical trials arba field trials indikatoriais, kurie šiai sričiai įvardinti OECD kaip specifiniai indikatoriai, kaip šalis mes per maža, kad šiuos indikatorius sektume.“ **Gamyba:** „Įmonėms skaičiukų nereikia įmonėms ką reikės uždirbti pinigus ir turėti pelną čia toks dabar gaunasi kad mūsų valdžiai reikia skaičiukų. Jeigu norime paskatinti ir verslą kažkokią duokim jiems morka, dabar inovatyvios įmonės statusas

			yra toks komplikuotas kad įmonės nenori lįsti į tą visą košę.“ **Gamyba**: „Susitarkime ko mes norim iš sumanios specializacijos...pavyzdys pridėtinė vertė ir eksportas.“
Įgyvendinimo mechanizmai	- Dabartiniai mechanizmai yra per daug biurokratiški, lėti, orientuoti į formalius rodiklius, o ne į realų poveikį. - Trūksta „fast track“ mechanizmo, kuris leistų greitai koreguoti prioritetus ir finansuoti proveržio technologijas. - Nėra tęstinumo projektams nuo idėjos iki rinkos – inovacijos stringa „mirties slėnyje“. - Finansavimas išskaidytas, giliosioms technologijoms skiriamos sumos yra nepakankamos. - Reikia platformų, kurios užtikrintų greitą komunikaciją, pasitikėjimą tarp mokslo, verslo ir valdžios, bei algoritmus, kurie spartintų procesus.	IRT, Gamyba, Gynyba, Sveikata	**Gynyba:** „We need to fund ourselves… grants take one and a half or two years… government perspective is missing.“ **Gynyba:** „We miss a lot of trust between scholars and government and the companies… building the trust is very important and I think government can help in that.“ **Gynyba:** „We need platforms to communicate openly… to speed up the process somehow… create the algorithm which is currently not existing or not working fluently.“ **Gynyba:** „Everything start to do for the real needs...” **Sveikata:** „Valstybė ir valstybinis sektorius irgi gali būti inovatyvus ir remtis darant sprendimus duomenimis ir panašiai… inovacijos ne tik yra mažų įmonių reikalas.“ **Sveikata:** „Verslas, mokslas ir technologijos jos kinta labai stipriai palyginus su politika, kuri dažniausiai yra atsiliekanti ir labai sunkiai keičiamas

dalykas. Reikalingas tam tikras mechanizmas, kuris leistų kvėpuoti tai išmaniai specializacijai…“

Sveikata: „Lietuva turi ieškoti tų nišų kur yra geri, taip siaurose nišose tai galėtų išnaudoti... Reikia sugalvoti kam parduoti ir turėti savo unique proposition.“

Sveikata: „tų naujų idėjų galbūt trūksta... iš tikrųjų pačias problemas formuojamas pagal iššūkius. Išsikeli, pasidarai iššūkį kaip tu sprendi, ir tada ateina tos inovacijos, ateina tie sprendėjai – nuo startuolių iki didelių įmonių, universitetų ir taip toliau.“

IRT: „Reikėtų mechanizmų, kurie skatintų abi puses bendradarbiauti. Tas finansavimas gali būti tiek nacionalinis, tiek tarptautinis.“

IRT: „Greitis yra labai svarbus ir greitas finansavimas tom mažytėm įmonėms nu jos neprakvėpuoja negali atsistoti po daug kalnelių jeigu kažkas kaip mentorius ne atsistoja greta ir neveda jų iki pabaigos.“

Gamyba: “labai sunku surasti vietą S3 pavadinimuose, reikėtų peržiūrėti sąrašą kad atitiktų šiuolaikinius technologijų pokyčius.“

Gamyba: „kaip per technologines kažkokias priemones įmonės būtų orientuotas ne sumažinti darbuotojus ar

			atvirkščiai padidinti darbuotojus bet padidinti našumą“ **Gamyba:** „‘Fast track’ mechanizmas įtraukiantis institucijas prioriteto koregavimui pagal keičiancias technologijas ir tendencijas.“
Politikos koordinavimas	- Fragmentuota sistema, trūksta koordinacijos tarp ministerijų (KAM, Ekonomikos, Švietimo). - Nėra bendros finansavimo linijos nuo idėjos iki produkto, todėl inovacijų ciklas nutrūksta. - Trūksta dialogo tarp politikos formuotojų ir inovacijų ekosistemos; biurokratija stabdo paramos įsisavinimą. - Reikia centralizuotos organizacijos („umbrella“), kuri sujungtų valstybines sritis (pvz., kariuomenę), startuolius ir verslą.	Gynyba, Gamyba, Sveikata	**Gynyba:** „Our system is fragmented… missing full communication from basic research to final procurement.“ **Gynyba:** „There is no end-to-end monetary guidance of a company’s life cycle… ministries don’t work together.“ **Gynyba:** „I would suggest that the Ministry of Defense will create an organization under them like a public company that will be an umbrella… where military people can meet startups, companies… give them some freedom and some money.“ **Sveikata:** „Trūksta informacijos ir bendradarbiavimo, ir dialogo su Ekonomikos ministerija… sudaroma biurokratija, kuri trukdo įsisavinti, aplikuoti, pasinaudoti lėšomis.“ **Sveikata:** „Šokinėjama nuo projekto prie projekto, nuo idėjos prie idėjos. Nėra tęstinumo.“ **Gamyba:** „Sureguliuojamas procesas, kad pagal tam tikras situacijas kažkuri institucija įgautų didesnę atsakomybę ir

	sprendimų priemimo teisę, taip sutrumpinant procesą“.

ANNEX 4. KIEKYBINĖS APKLAUSOS ATASKAITA

A structured survey of S3 stakeholders complemented qualitative findings with descriptive quantitative evidence. Respondents included public institutions responsible for S3 implementation, business and industry associations, clusters, enterprises, research institutions, innovation support organisations, and financial actors. Survey results have been integrated into systemic challenge analysis in Chapter VII and linked to proposed policy principles in Chapter XII.

The survey was used primarily as descriptive and triangulating evidence, capturing perceptions of obstacles, governance effectiveness, stakeholder involvement, investment continuity, and adequacy of support instruments. While not designed for causal inference, the survey results reinforced qualitative findings on persistent coordination challenges, uneven stakeholder engagement, and concerns about the long-term strategic continuity of S3 priorities.

APIE TYRIMO METODĄ

Apimtis	101 dalyvis
Suinteresuotos šalys	I. Institucijos, atsakingos už S3 įgyvendinimą, koordinavimą, ES struktūrinių fondų programavimą ir/arba TPTF įgyvendinimą II. Pramonės ir Verslo Asociacijos, Klasteriai ir kitos asocijuotos organizacijos III. Verslo įmonės IV. Mokslinių tyrimų institucijos V. Inovacijų paramos organizacijos (Mokslo ir technologijų parkai, verslo inkubatoriai, verslo akseleratoriai ir kt.) VI. Finansų organizacijos (ILTE, Bankai, Rizikos kapitalo fondai, Investicijų fondai ir kt.)
Interesas	A. Pagrindinė informacija, B. S3 koordinavimo mechanizmai, C. Įtraukus ir tęstinis suinteresuotųjų šalių dalyvavimas, D. Bendradarbiavimo vaidmuo, E. Inovacijų finansavimas S3 tematikose, F. ERPF investicijų sutelkimo priemonės S3 prioritetams, G. Inovacijų kryptys, poreikiai ir kompetencijų trūkumai H. Ekosistemos kliūtys S3 investicijoms ir įgyvendinimui I. S3 prioritetų formuluotė ir strateginis požiūris
Tiesioginė užklausa	Paramas gavusios įmonės ir organizacijos

Netiesioginė užklausa	Linkedin, ministerijos, regioninės agentūros, mokslinių tyrimų įstaigos, MVĮ, klasteriai, NVO
Trukmė	2 savaitės
Pradžia	Gruodžio 5d.
Klausimai	Kiekybiniai • surinkantys faktus (taip/ne, keli atsakymai, sąrašo pasirinkimai) • užfiksuojantys pozicijas ir požiūrius (vienas atsakymas, reitingas, matrica) • išmatuojantys nuomonės, suvokimo ar patirties intensyvumą (vertinimo skalės) Klausimai išskirti ir užduoti atitinkamoms suinteresuotoms šalims
Analizė	Statistinė (aprašomoji)
Kokybės užtikrinimas	• Rizikų valdymas • Pripažinti, moksliniai rezultatų analizės metodai • Atsakymai kryžmiškai palyginami su interviu, literatūra (strategijomis, ankstesnės sumanios specializacijos ataskaitomis ir pasauliniais tyrimų rezultatais). • Neatsitiktinė, o tikslinė imtis – adresatų sąrašas. • Laikymasis Europos chartijos ir tyrėjų etikos taisyklių.

TYRIMO REZULTATŲ APIBENDRINIMAS

This report presents data from a comprehensive survey of Lithuanian organisations regarding the national Smart Specialisation (S3) strategy. The findings illustrate the geographical and sectoral distribution of participants, primarily highlighting a high concentration of small and medium-sized enterprises in the Vilnius and Central-Western regions. The document assesses the digital maturity of these entities and evaluates the effectiveness of current innovation funding and policy coordination mechanisms. Respondents identify artificial intelligence, green energy, and defence technologies as critical priorities for future development through 2034. Furthermore, the analysis explores significant implementation barriers, such as administrative burdens and shortages of specialized talent, while emphasizing the necessity of international cooperation. Overall, the text provides a strategic overview of the innovation ecosystem and its evolving needs for the coming decade.

This analysis provides an overview of the survey results regarding Lithuania's Smart Specialisation (S3) concept, covering respondent demographics, digital maturity, current funding patterns, and future strategic priorities.

Respondent Profile and Digital Maturity

The survey respondents are primarily concentrated in the Vilnius (43%) and Kaunas (30%) regions. The participant base is dominated by business enterprises (63%), the majority of which are small and micro-sized (58%) with 1–49 employees.

Key sectors represented include:

- Manufacturing (C).
- Wholesale and retail trade (G).
- Professional, scientific, and technical activities (M).

Regarding digitalisation, most organisations are at a moderate to high level. Approximately 40% of respondents state that digitalisation is used in many of their processes, while 21% have it integrated into the majority of their operations. Only 5% report that most processes are still performed manually.

S3 Policy and Stakeholder Involvement

There is a notable gap in direct involvement in policy-making; 57% of institutions responsible for S3 implementation were not directly involved in preparing the 2021–2027 national S3 concept.

- Active Participants: Economic and innovation policy institutions are viewed as the most active in forming S3 policy. Research institutions and industry associations also show high levels of engagement.
- Stakeholder Representation: The Government and public sector are seen as the most widely represented groups in S3 processes, whereas civil society and small/medium enterprises (SMEs) are perceived to have lower levels of representation.

Current Funding and Innovation Topics

Organisations have primarily secured funding for innovations in Artificial Intelligence and the data economy (31%), Renewable energy (28%), and Advanced manufacturing technologies (26%).

The most significant funding sources contributing to these projects are:

- Internal (own) funds, which provided a high or very high contribution for nearly 47% of respondents.
- EU Structural Funds, cited as a major contributor by approximately 31%.
- National competitive R&D funding.

Future Priorities (2028–2034)

Looking ahead to the next S3 cycle, there is a clear consensus on shifting focus toward high-tech and security-related fields.

Priority Area	Support for Inclusion (Q26)
AI and Data Economy	71%
Defence and Security Technologies	61%

Advanced Manufacturing (Robotics, Lasers)	61%
Biotechnology and Health Innovations	55%
Green Energy and Storage	45%

The most important strategic goals for the future include economic and technological strengthening/modernisation and increasing integration into European value chains.

Barriers and Competency Needs

The successful implementation of innovation projects is currently hindered by several systemic "barriers":

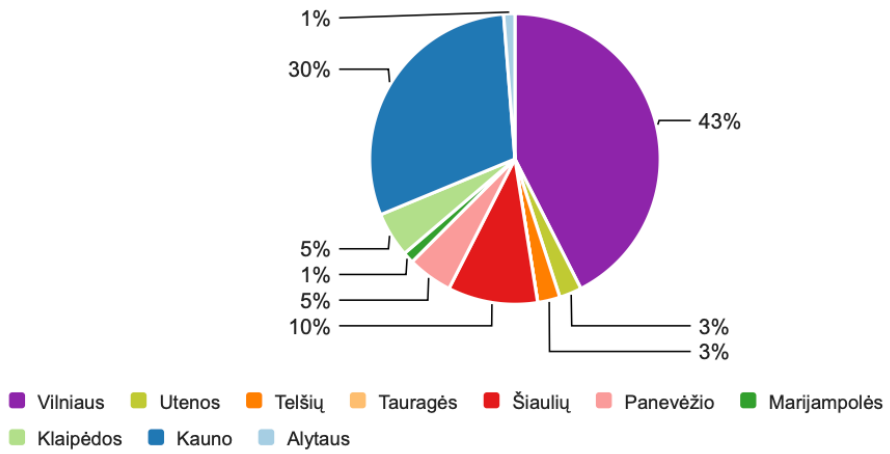
- Administrative Burden: 46.25% of respondents identified the high administrative load of innovation support as a major limiting factor.
- Funding Limitations: Limited public funding opportunities (41.25%) and difficulties in accessing private finance (35%) are significant hurdles.
- Competency Gaps: There is a high demand for Project Management (47.95%), Creativity and Innovation (46.58%), and Digital Competencies (38.36%) to drive future growth.

APKLAUSOS REZULTATAI

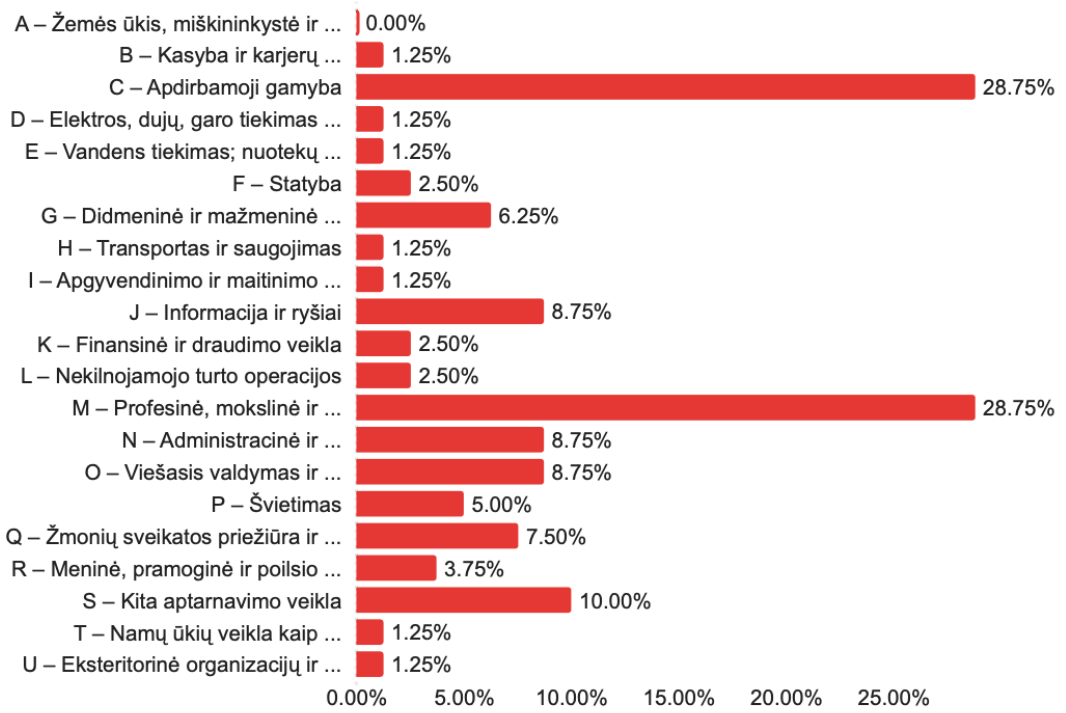
1

Apklausos rezultatai

Q1 - Pasirinkite Lietuvos apskritį, kurioje yra organizacijos pagrindinė buveinė.

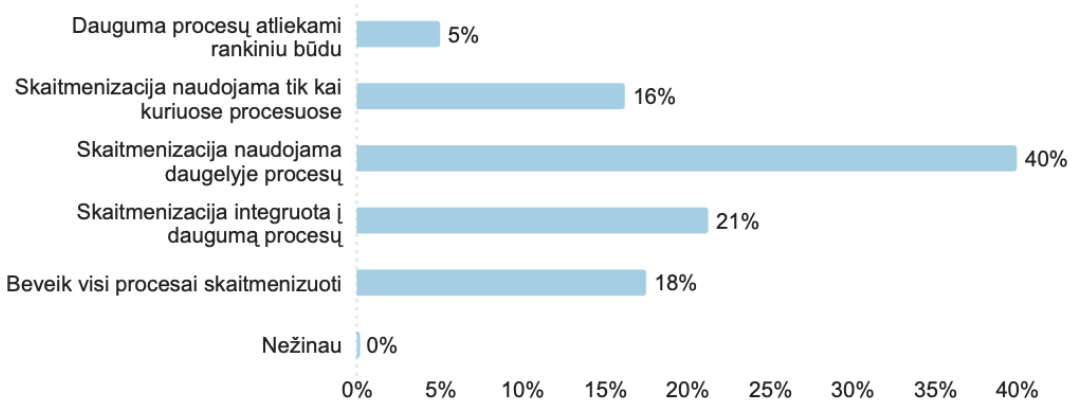


Q2 - Nurodykite Jūsų organizacijos veiklos kryptį (pagal EVRK). Pasirinkite visas Jums priskirtas kategorijas

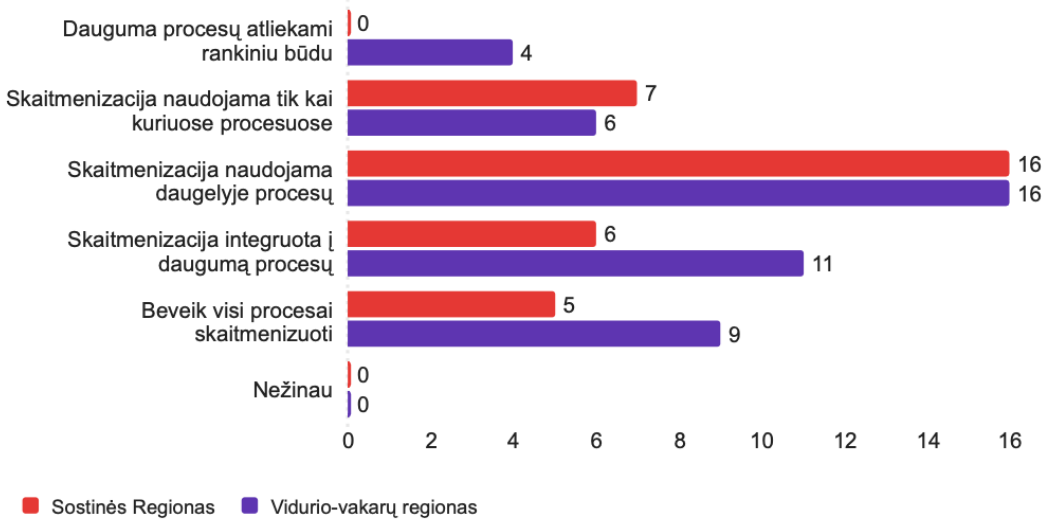


Q1 - Pasirinkite Lietuvos apskritį, kurioje yra organizacijos pagrindinė buveinė.

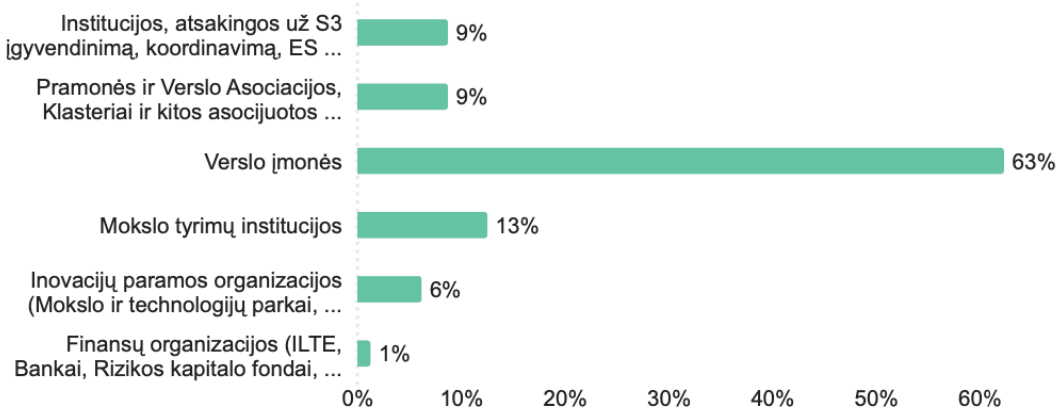
Q5 - Prašome įvertinti skaitmenizavimo lygį Jūsų įmonėje / organizacijoje? Žemas - technologijų įmonės/organizacijos veikloje beveik nenaudojate, Aukštas - IT lygio įmonė



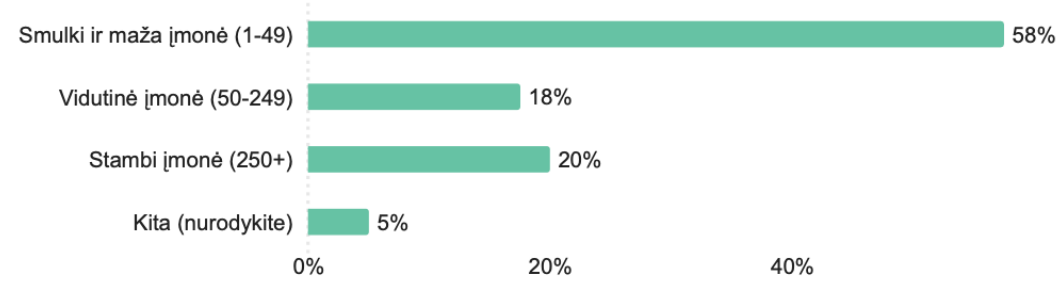
Q5 - Prašome įvertinti skaitmenizavimo lygį Jūsų įmonėje / organizacijoje? Žemas - technologijų įmonės/organizacijos veikloje beveik nenaudojate, Aukštas - IT lygio įmonė



Q6 - Prašau pasirinkti Jūsų organizacijos tipą, pagal vaidmenį inovacijų ekosistemoje:



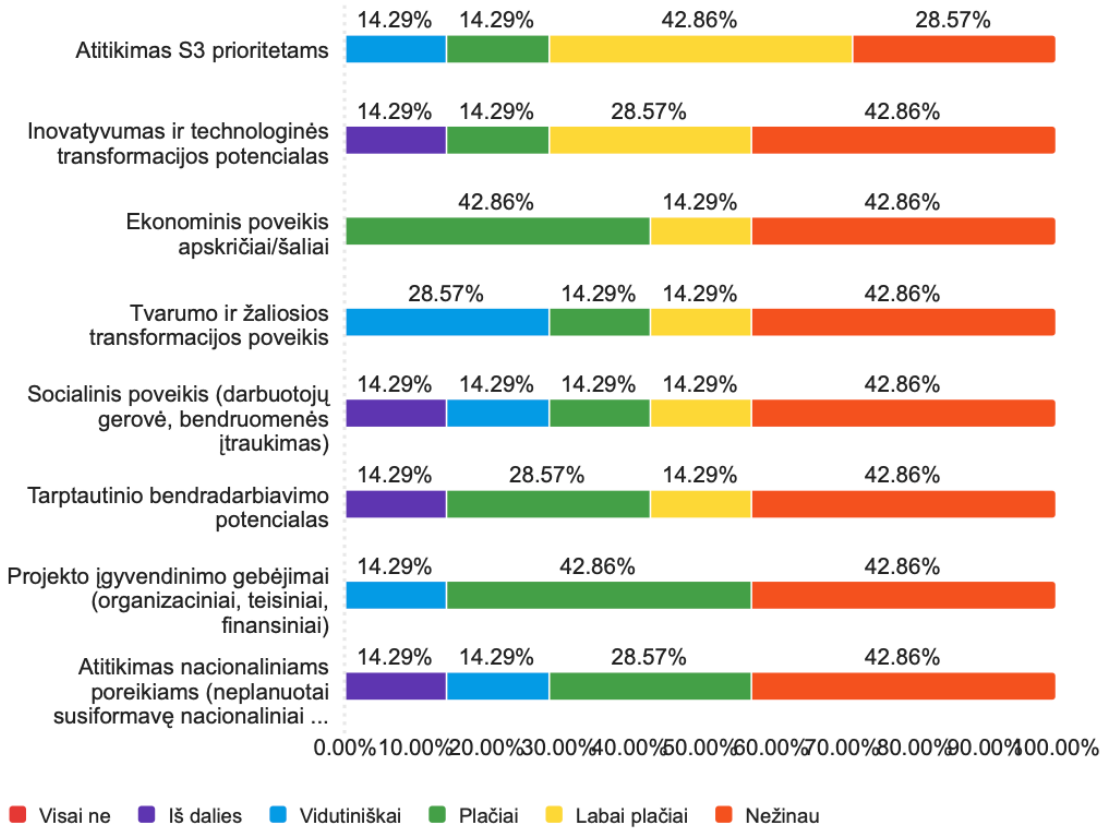
Q7 - Pasirinkite savo organizacijos dydį pagal darbuotojų skaičių:



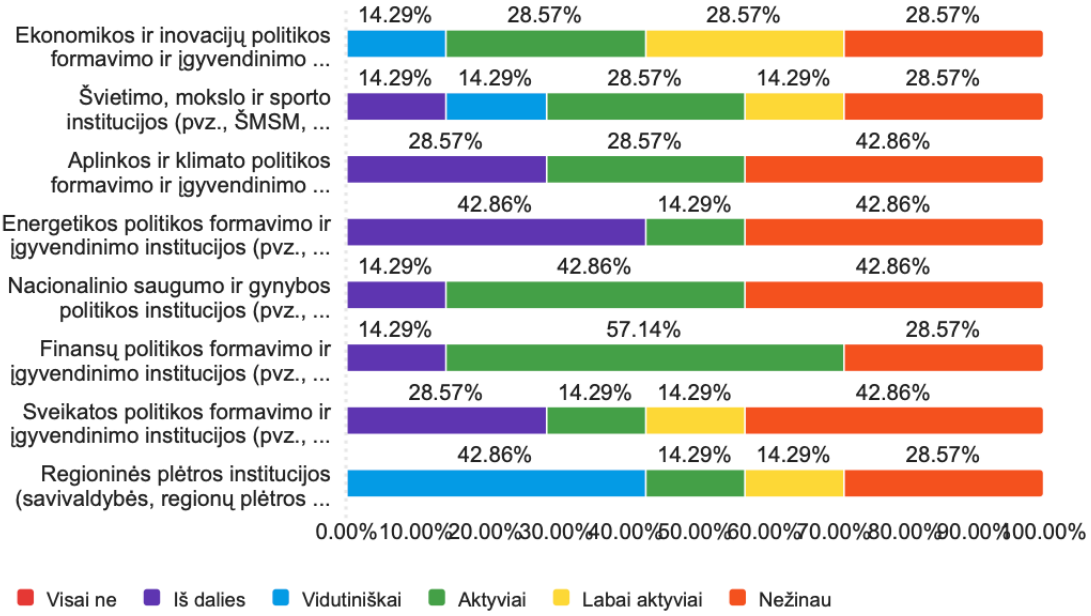
Šie klausimai atsakomi šios respondentų grupės: veikėjai - institucijos, atsakingos už S3 įgyvendinimą

Q8 - Ar Jūsų organizacija buvo įsitraukusi į nacionalinės Sumanios Specializacijos Koncepcijos (S3) 2021–2027 m. rengimą tiesiogiai, ar per asocijuotą struktūrą?

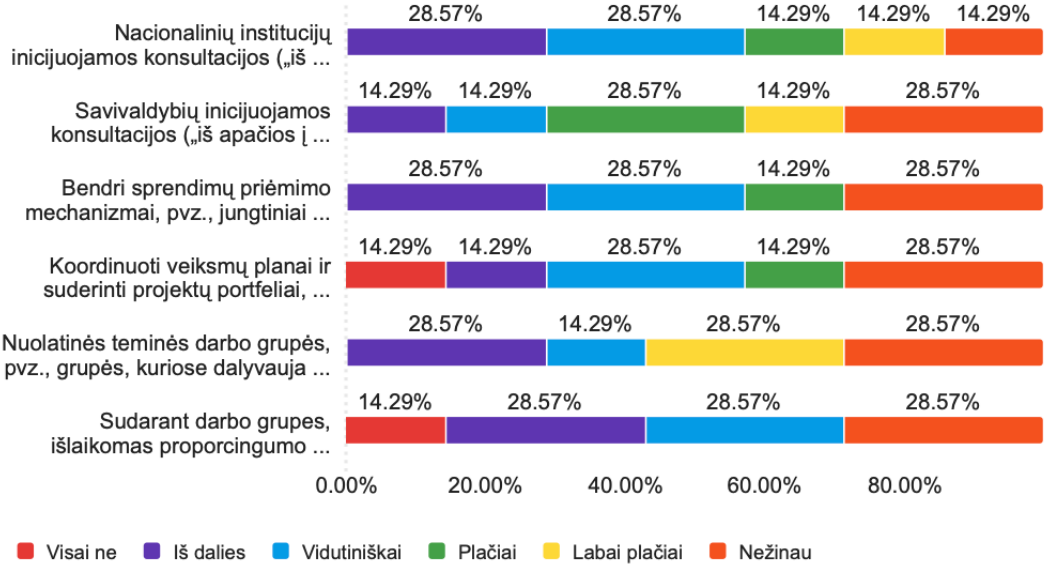
Q10 - Kokie kriterijai, Jūsų manymu, taikomi vertinant Inovacinių projektų finansavimo paraiškas S3 srityje?



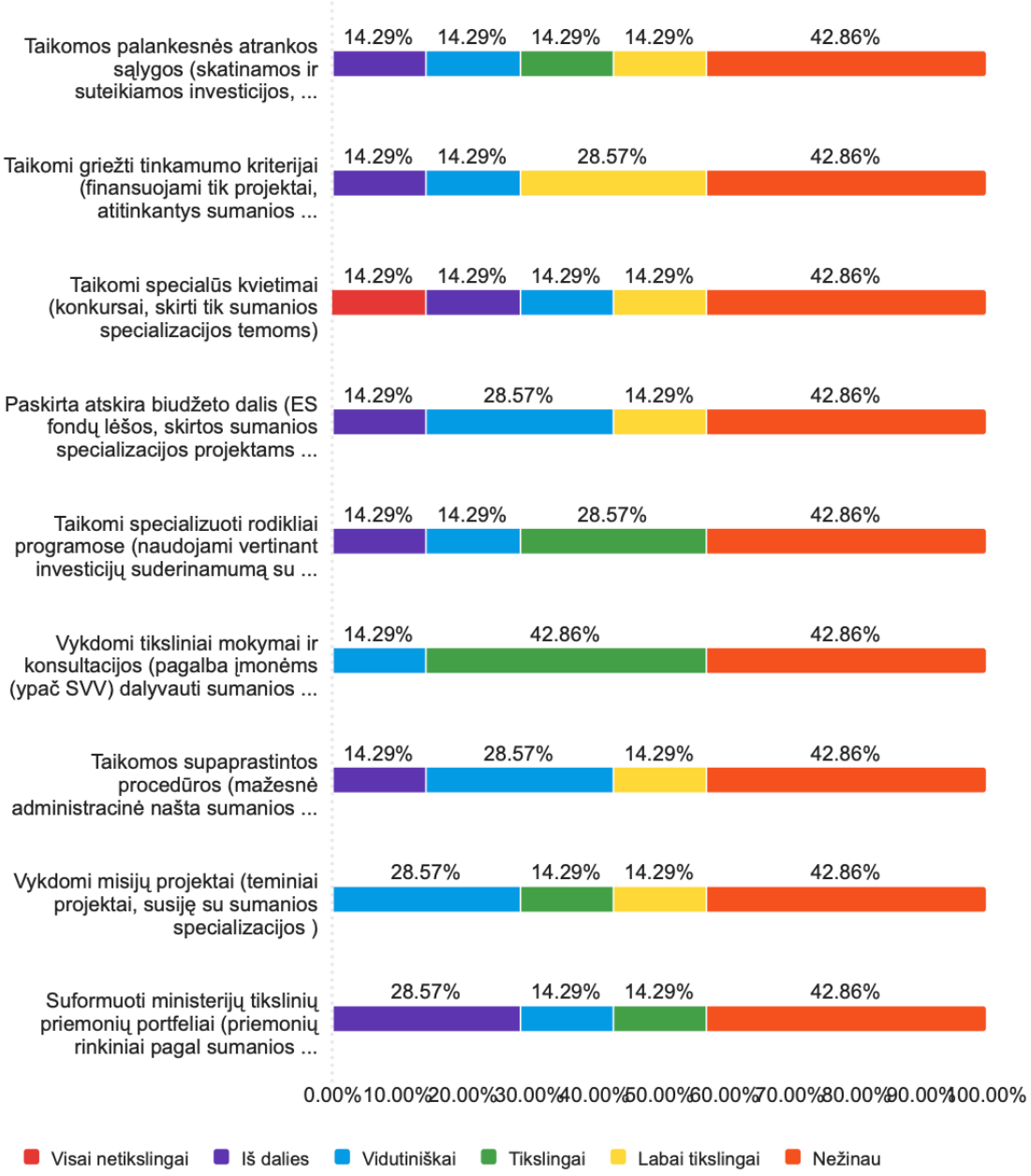
Q11 - Jūsų manymu, kiek, žemiau išvardintos, institucijų grupės dalyvauja formuojant S3 politiką, priimant sprendimus, bei suderinant įgyvendinimo veiksmus?



Q12 - Įvertinkite, kaip intensyviai taikomi politikos koordinavimo mechanizmai, skatinant bendradarbiavimą tarp nacionalinio, regioninio ir vietos lygmens institucijų, siekiant suderinti S3 prioritetus ir veiksmus?

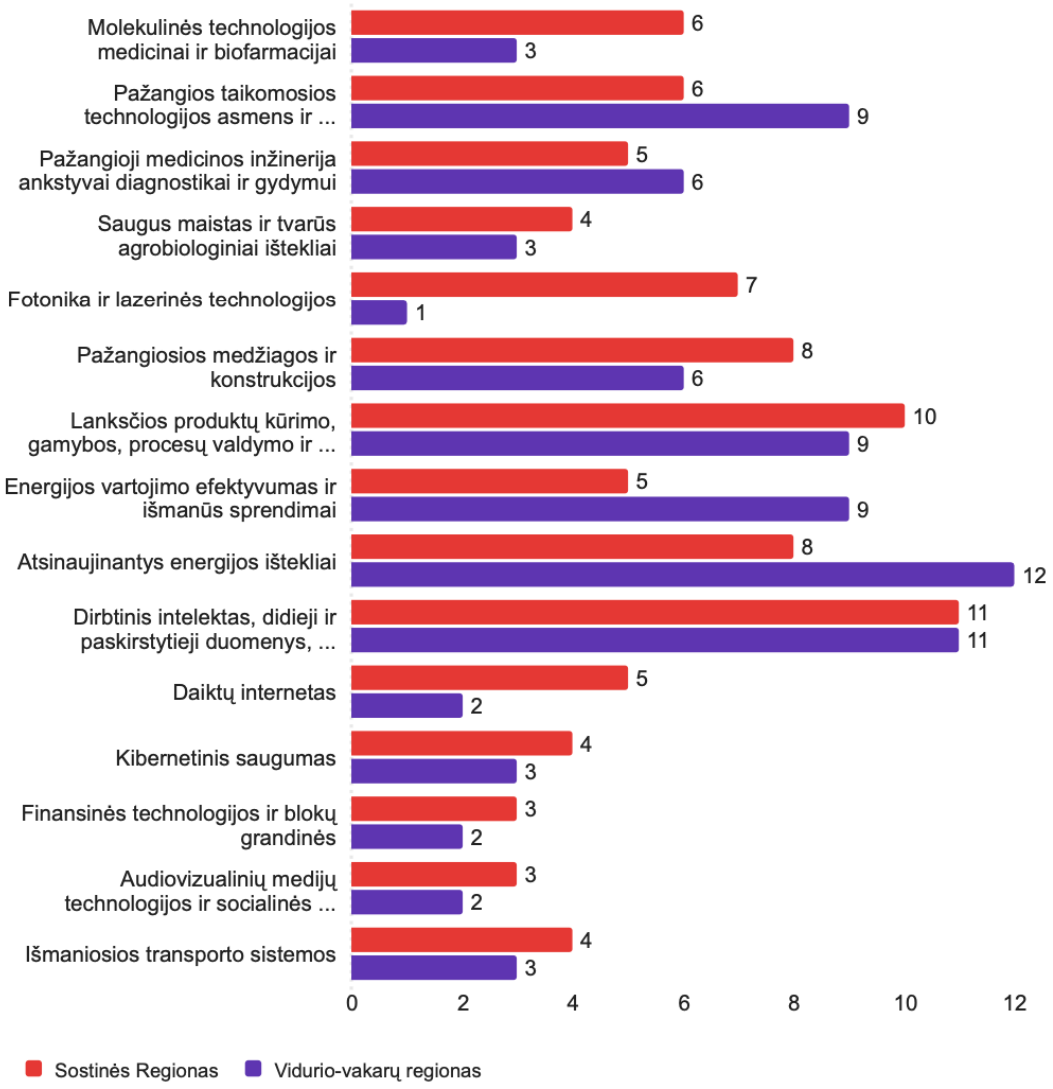


Q20 - Jūsų vertinimu, kaip tikslingai buvo taikomi kriterijai inovacijų finansavimui sumanios specializacijos kryptyse 2021–2025 m.?

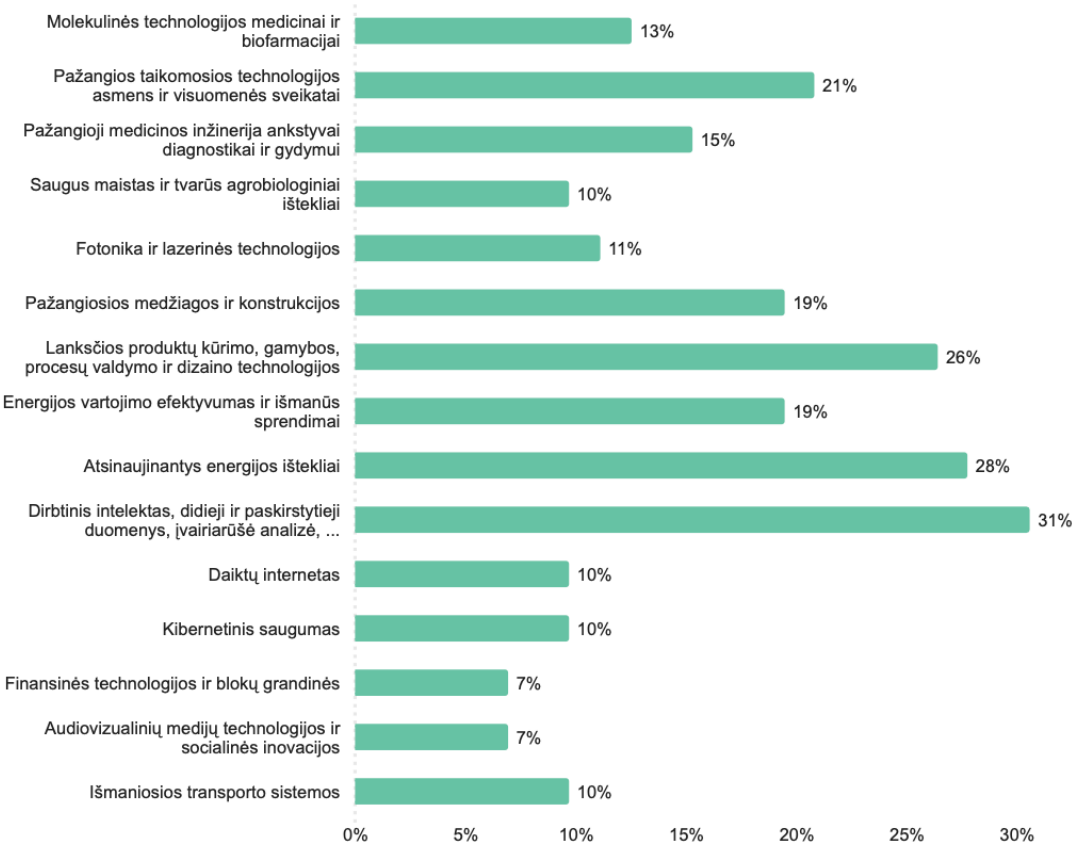


Šie klausimai atsakomi šios respondentų grupės: suinteresuotosios šalys

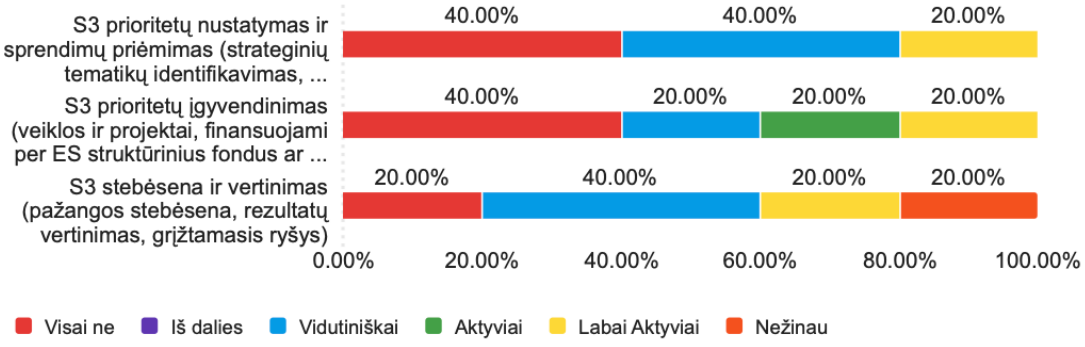
Q9 - Kuriose iš šių Sumanios Specializacijos Koncepcijoje nurodytų tematikų gavote vidinį/išorinį finansavimą inovacijoms vystyti? Pasirinkite visus Jums tinkamus variantus.



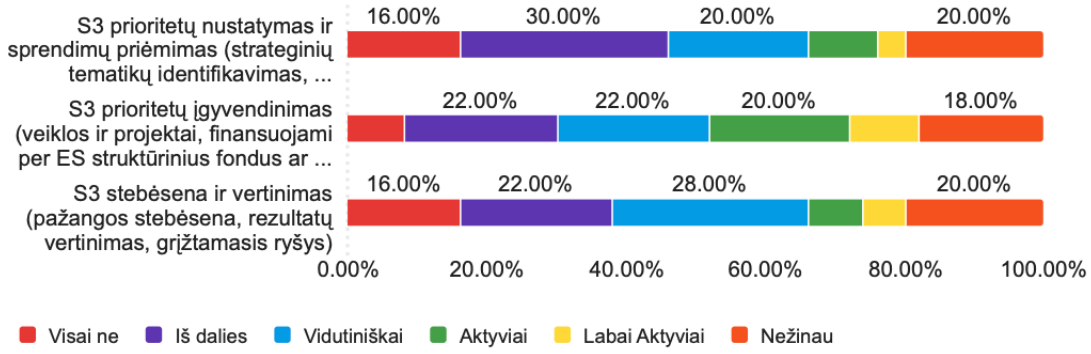
Q9 - Kuriose iš šių Sumanios Specializacijos Koncepcijoje nurodytų tematikų gavote vidinį/išorinį finansavimą inovacijoms vystyti? Pasirinkite visus Jums tinkamus variantus.



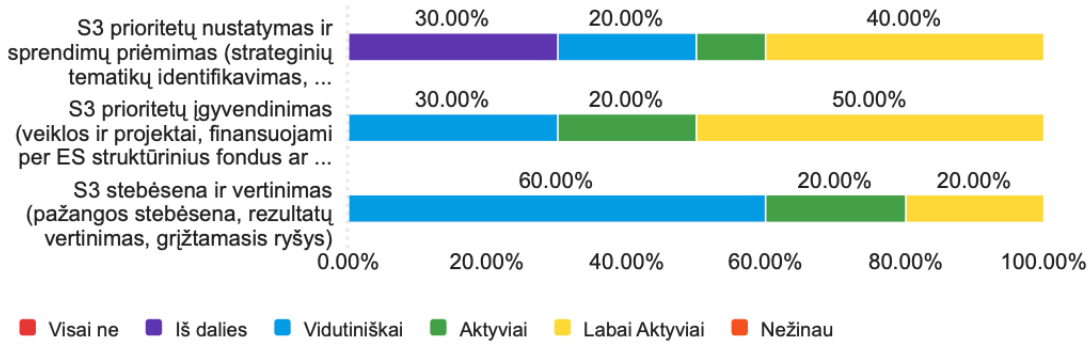
Q13 - Įvertinkite kiek aktyviai **Inovacijų paramos organizacijos (Mokslo ir technologijų parkai, verslo inkubatoriai, verslo akseleratoriai ir kt.)** dalyvauja inovacijų politikos (S3) formavime?



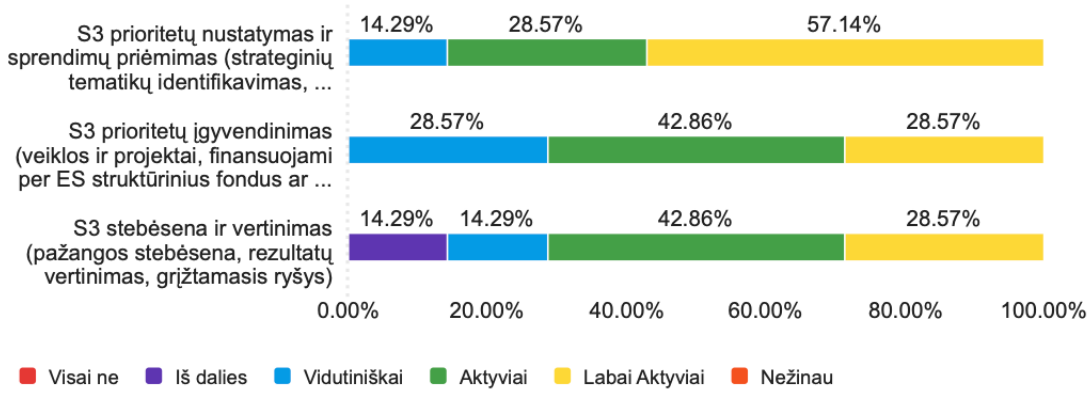
Q13 - Įvertinkite kiek aktyviai **Verslo įmonės** dalyvauja inovacijų politikos (S3) formavime?



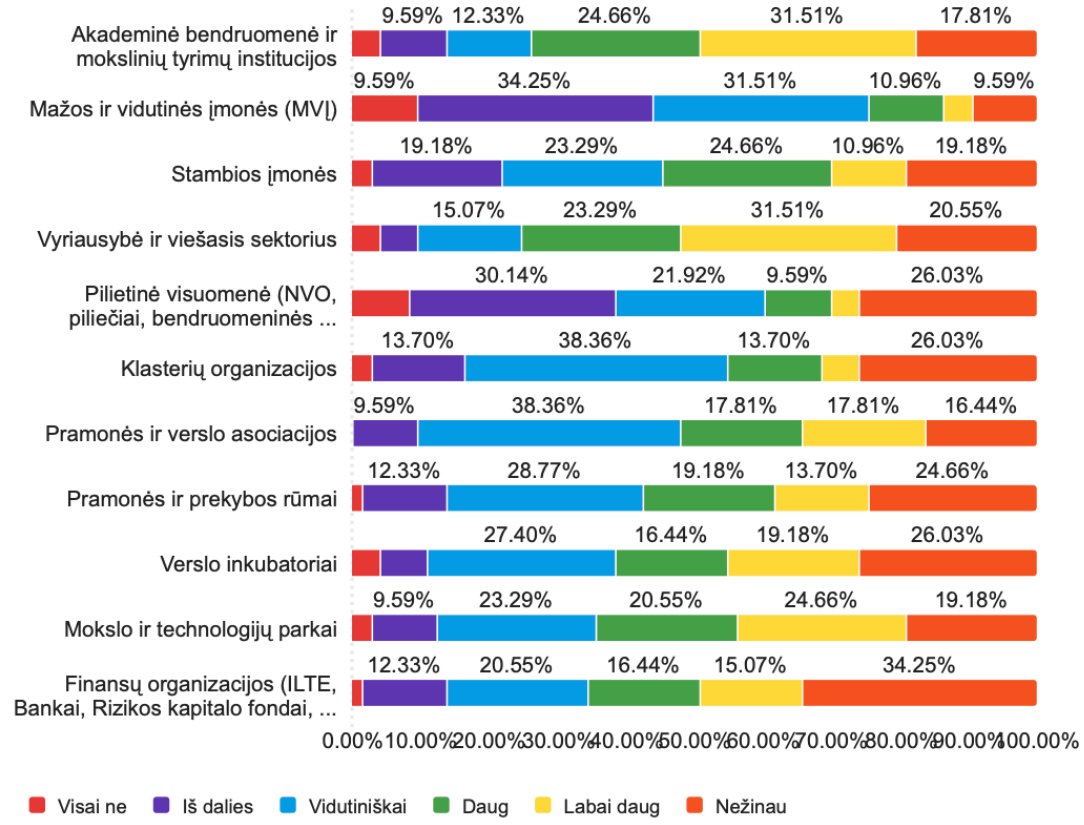
Q13 - Įvertinkite kiek aktyviai **Mokslo tyrimų institucijos** dalyvauja inovacijų politikos (S3) formavime?



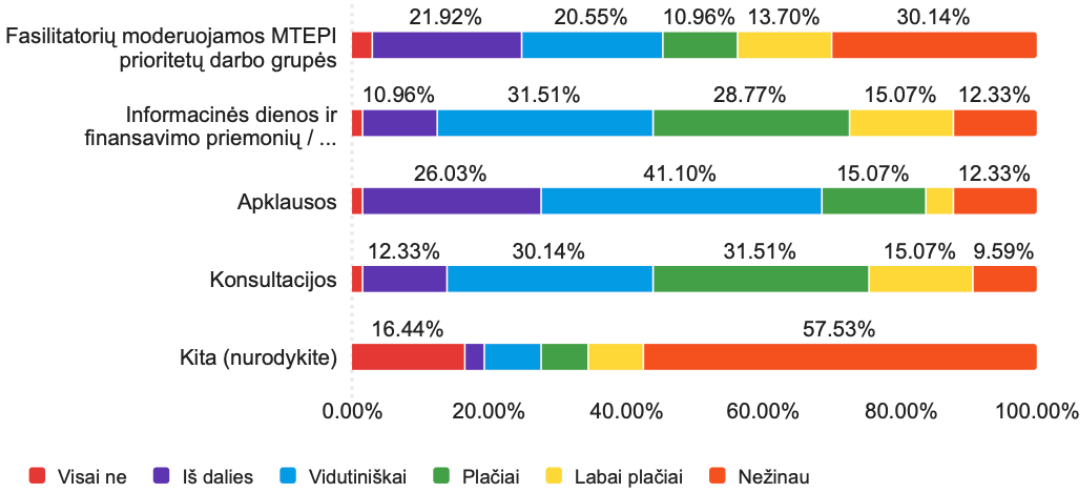
Q13 - Įvertinkite kiek aktyviai **Pramonės ir Verslo Asociacijos, Klasteriai ir kitos asocijuotos organizacijos** dalyvauja inovacijų politikos (S3) formavime?



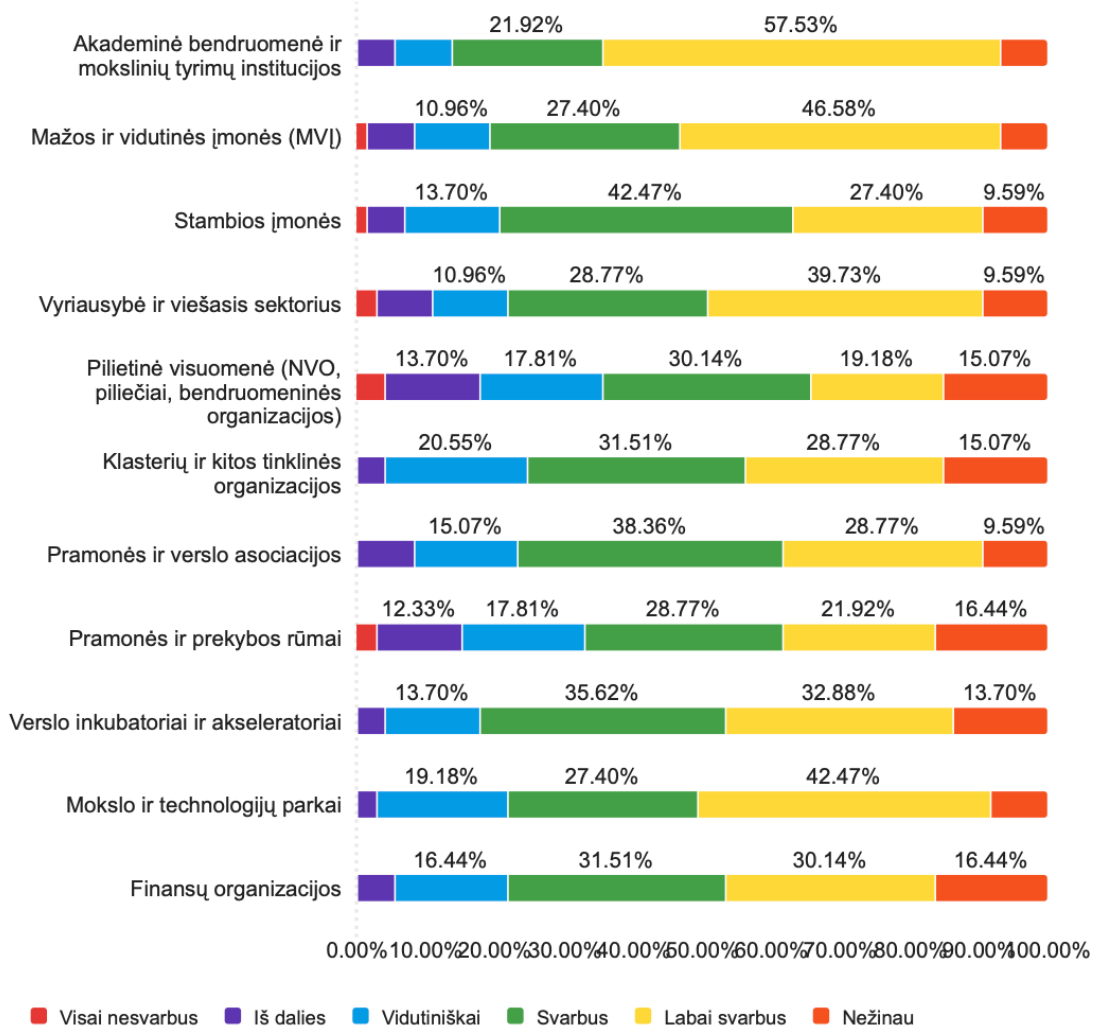
Q14 - Jūsų vertinimu, kaip plačiai atstovaujamos žemiau išvardintos suinteresuotosios grupės inovacijų politikos (S3) procesuose?



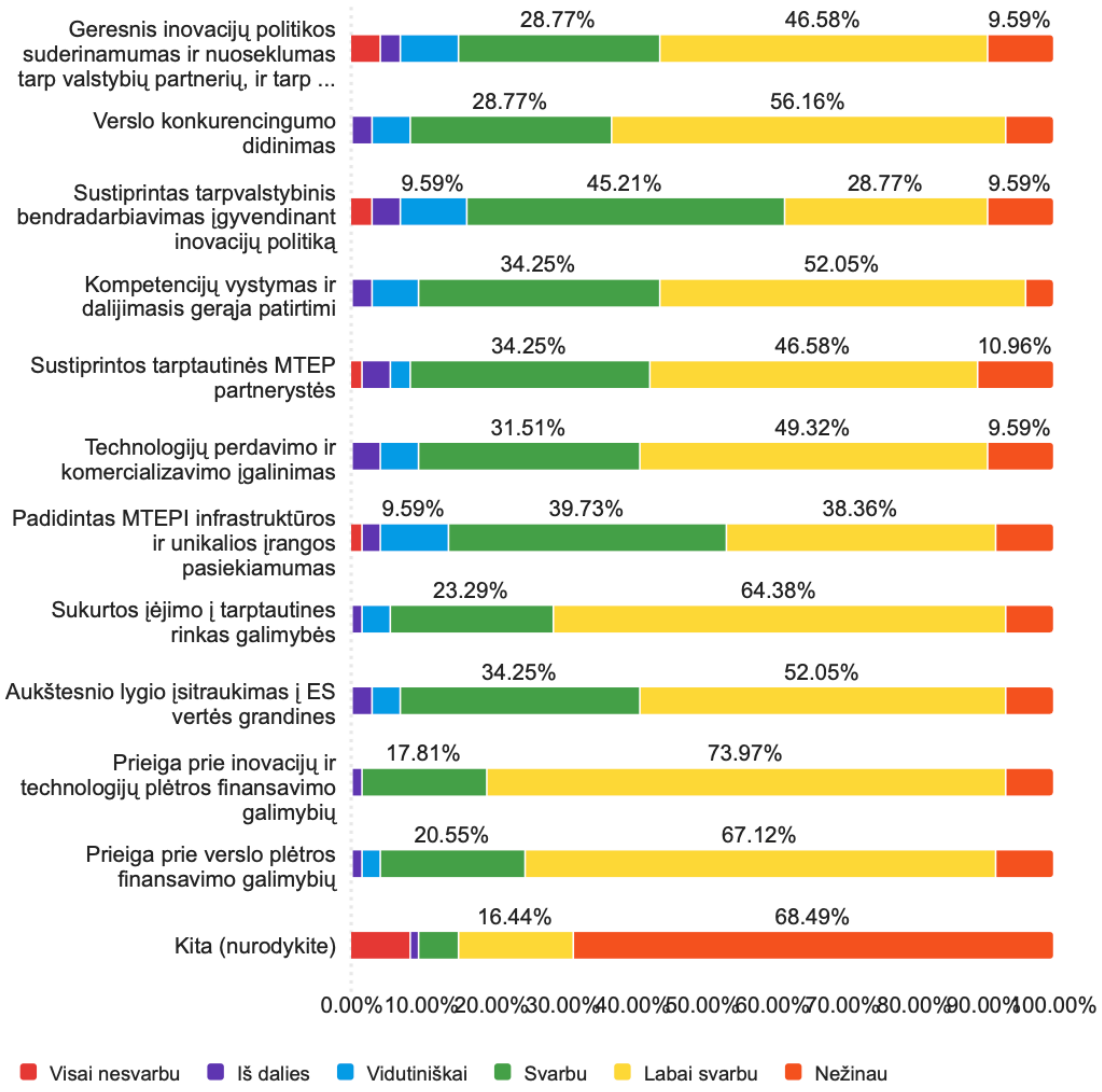
Q15 - Jūsų nuomone, kiek veiksmingi šie nuolatinio įsitraukimo instrumentai?



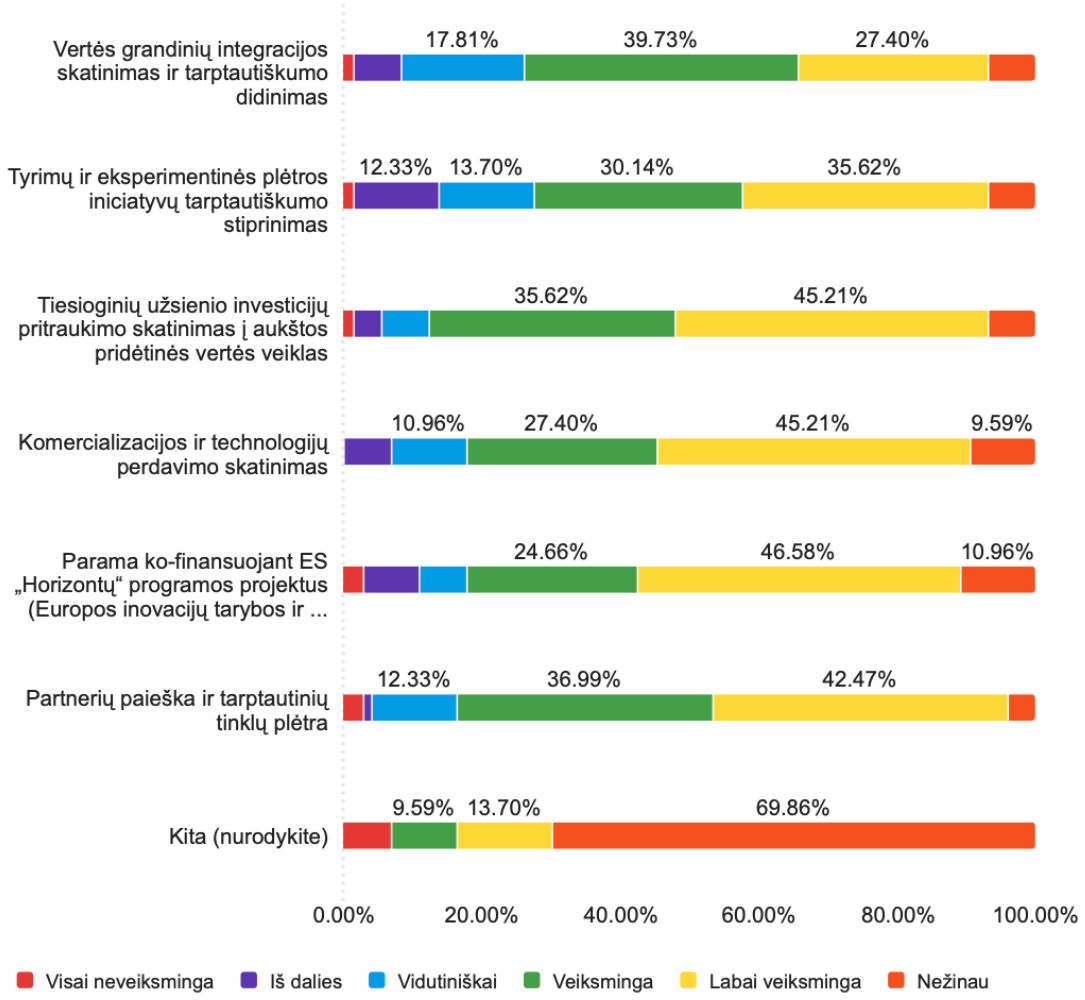
Q16 - Jūsų nuomone, kiek svarbus šių suinteresuotųjų grupių įsitraukimas vystant (atvirąsias) inovacines veiklas sumanios specializacijos tematikose?



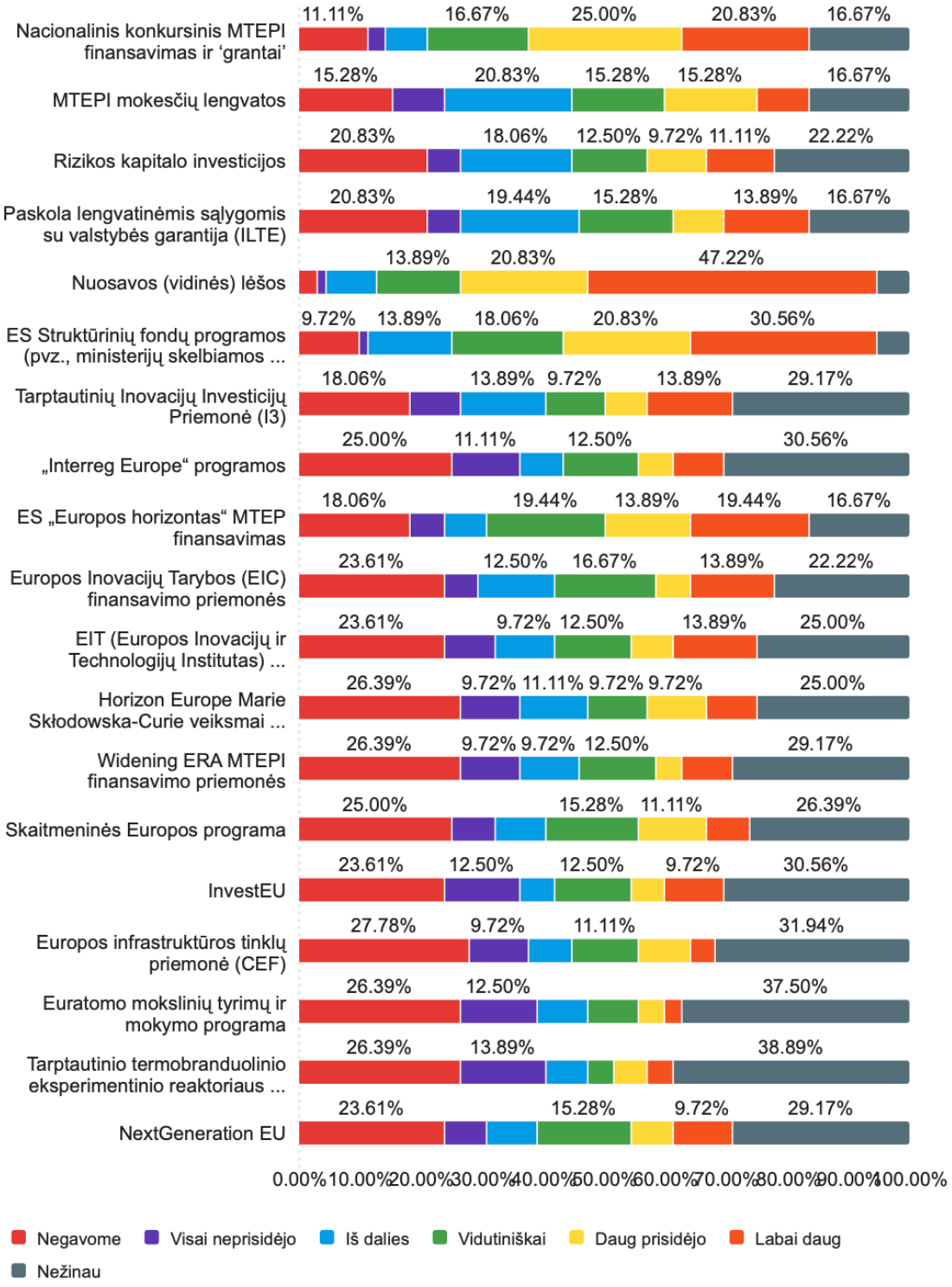
Q17 - Įvertinkite tarptautinio bendradarbiavimo svarbą siekiant sumanios specializacijos įgyvendinimo uždavinių?



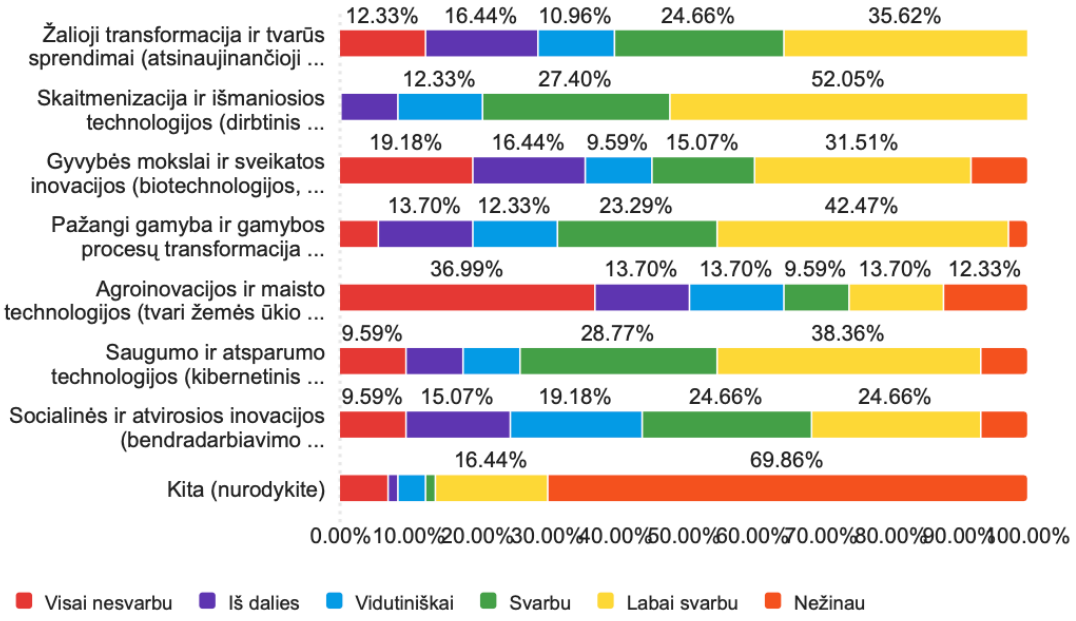
Q18 - Siekiant sustiprinti tarptautinį bendradarbiavimą ir integraciją į ES vertės grandines, Jūsų manymu, kiek veiksmingos būtų šios inovacijų skatinimo priemonės?



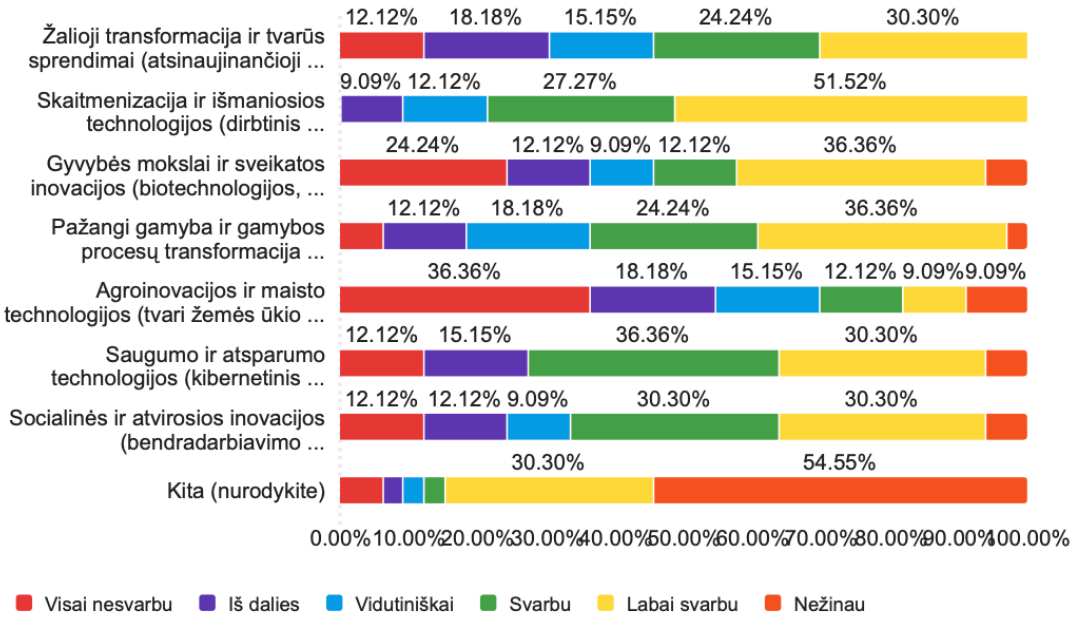
Q19 - Įvertinkite, kiek šie finansavimo šaltiniai prisidėjo siekiant įgyvendinti inovacijų projektus S3 tematikose.



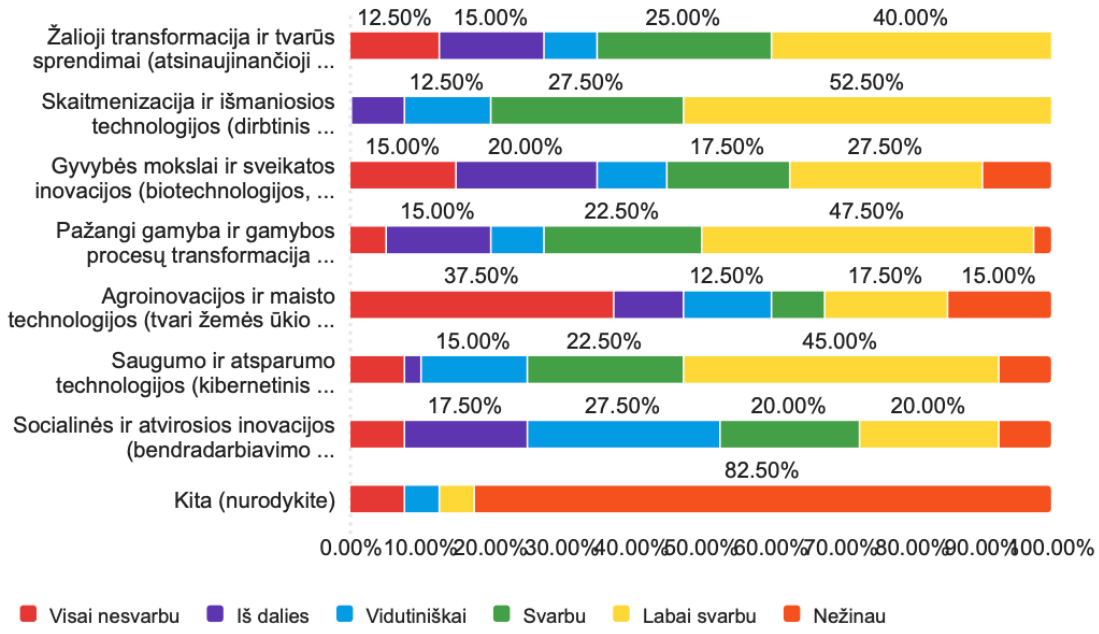
Q22 - Įvertinkite šių inovacijų krypčių svarbumą Jūsų organizacijai artimiausių 5 metų laikotarpyje.



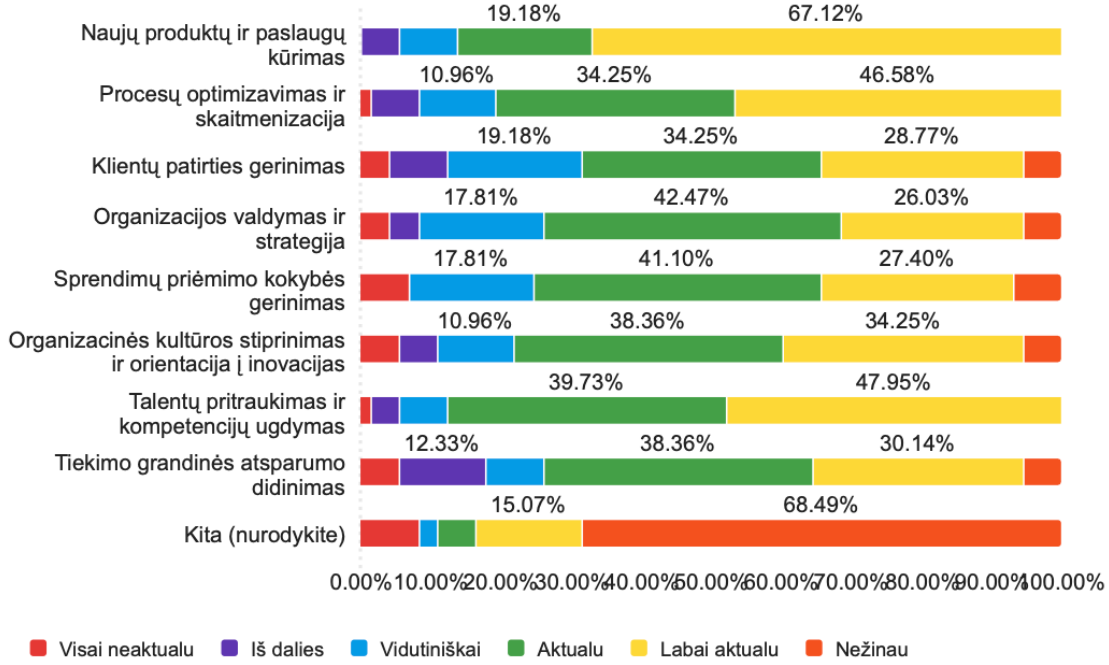
Q22 - **Sostinės regionas:** Įvertinkite šių inovacijų krypčių svarbumą Jūsų organizacijai artimiausių 5 metų laikotarpyje.



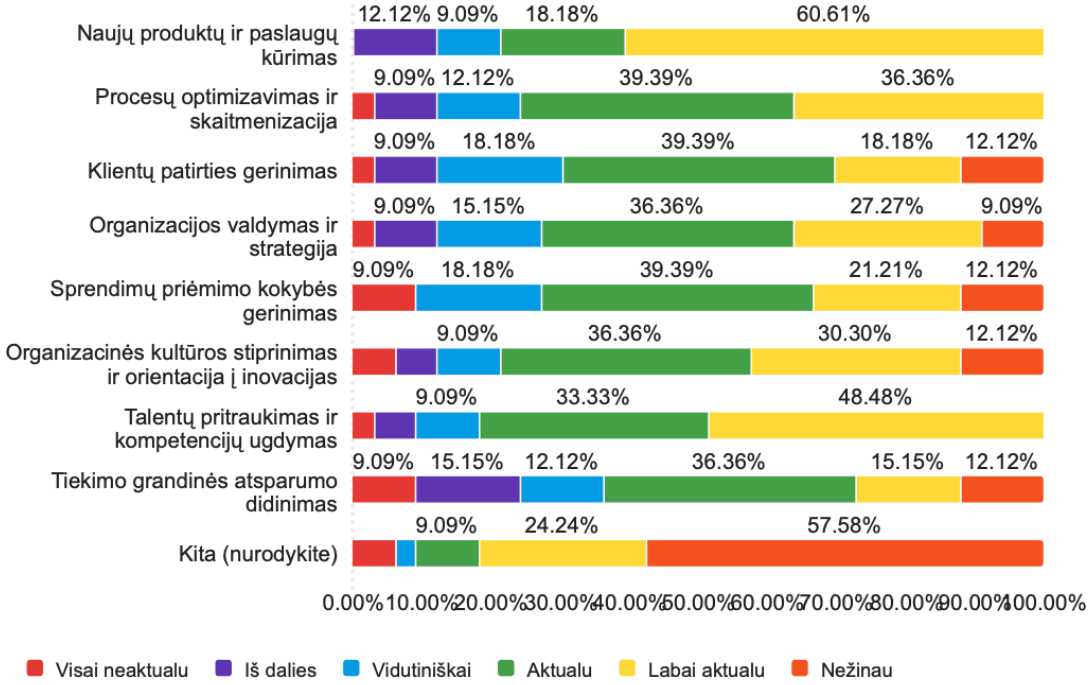
Q22 - **Vidurio-vakarų regionas:** Įvertinkite šių inovacijų krypčių svarbumą Jūsų organizacijai artimiausių 5 metų laikotarpyje.



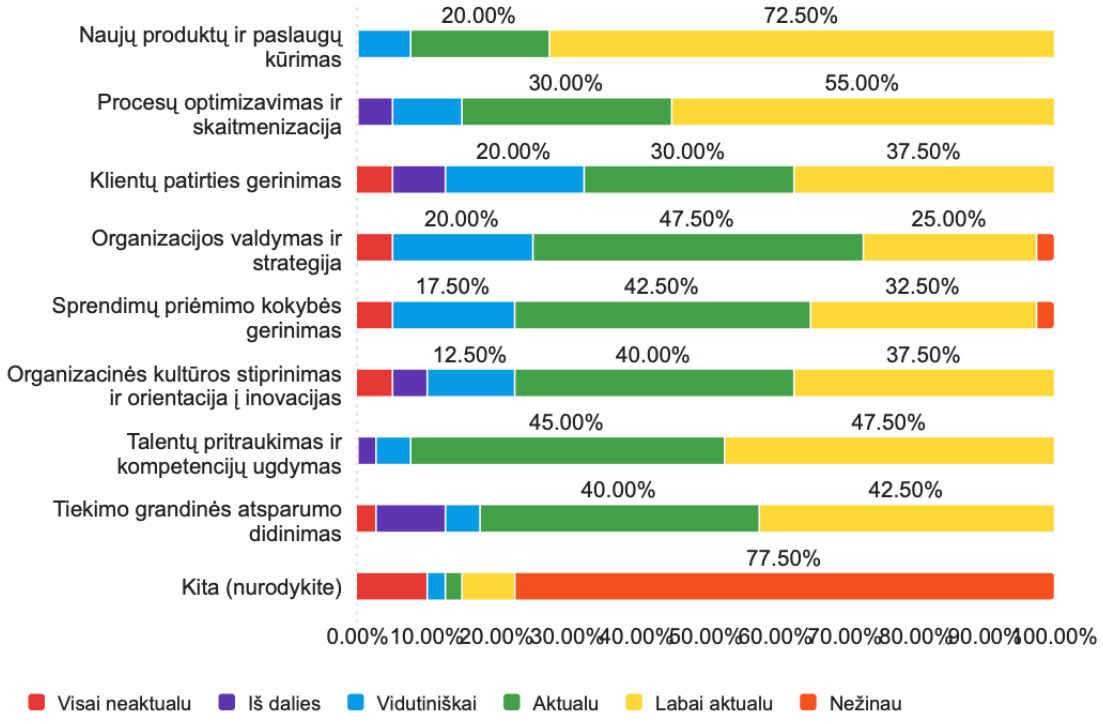
Q23 - Ivertinkite inovacinių veiklų aktualumą skirtingose Jūsų organizacijos veiklos srityse per ateinančius 5 metus, remiantis žemiau pateiktu sąrašu.



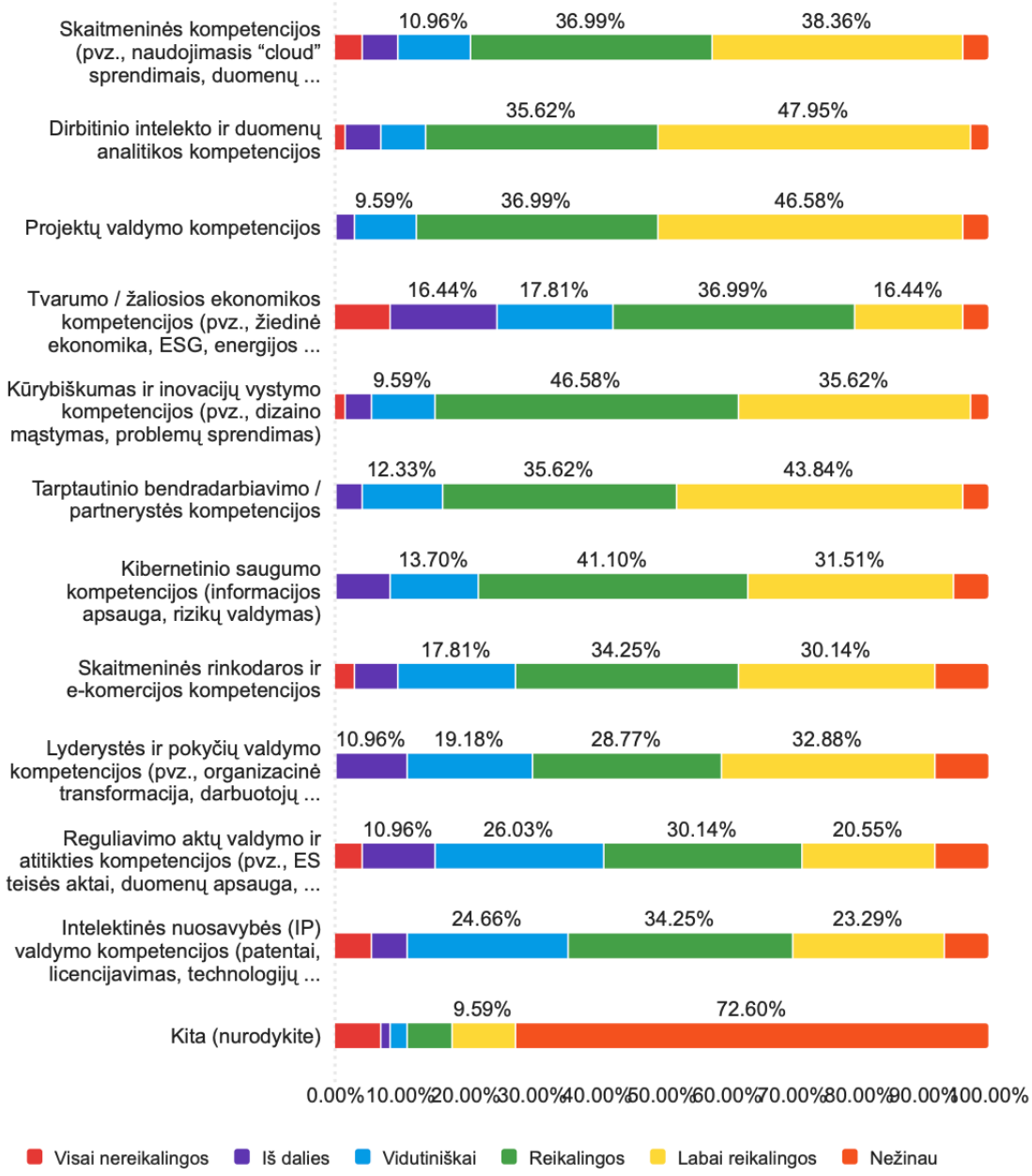
Q23 - **Sostinės regionas**: Ivertinkite inovacinių veiklų aktualumą skirtingose Jūsų organizacijos veiklos srityse per ateinančius 5 metus, remiantis žemiau pateiktu sąrašu.



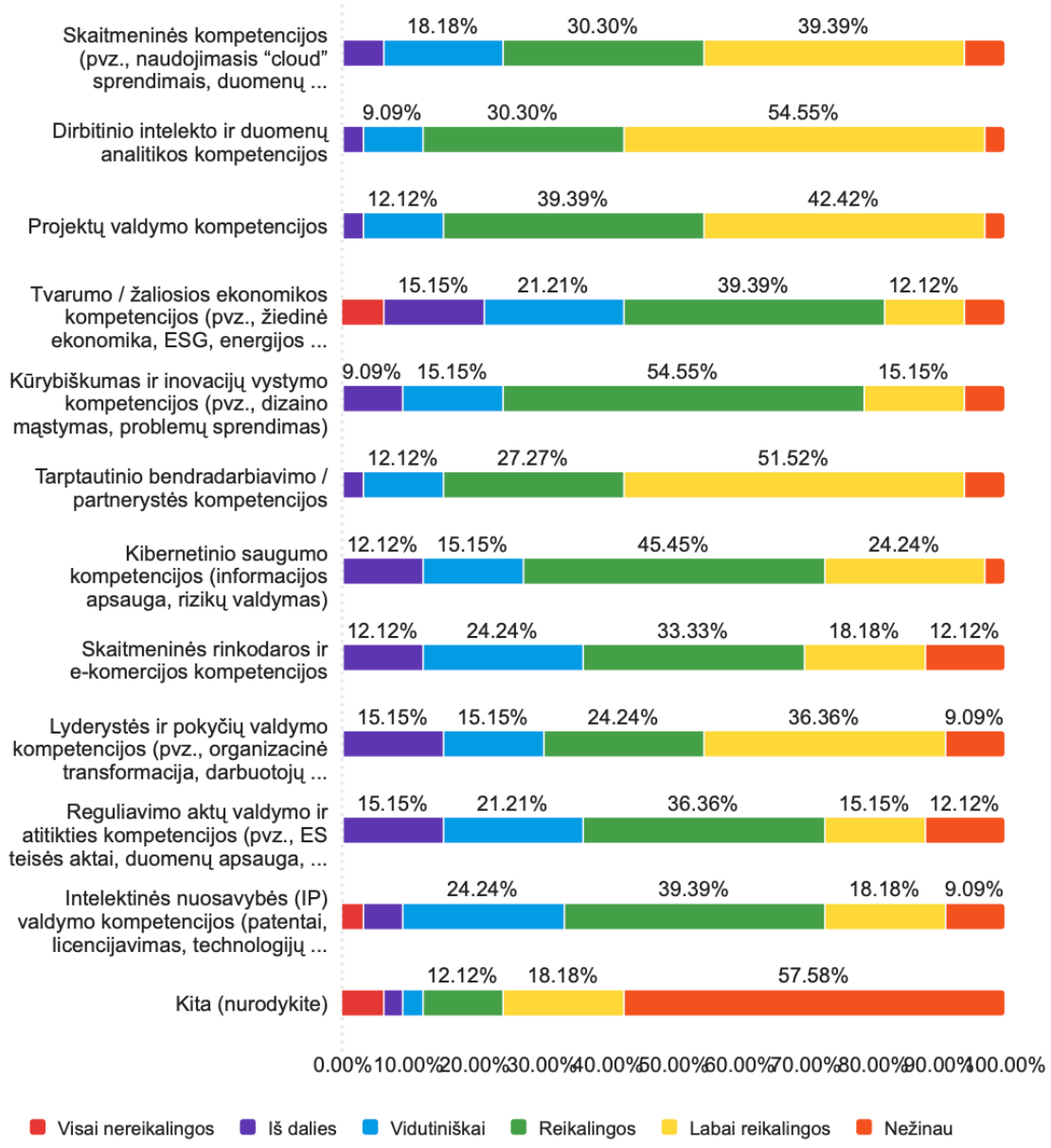
Q23 - **Vidurio-vakarų regionas**: Ivertinkite inovacinių veiklų aktualumą skirtingose Jūsų organizacijos veiklos srityse per ateinančius 5 metus, remiantis žemiau pateiktu sąrašu.



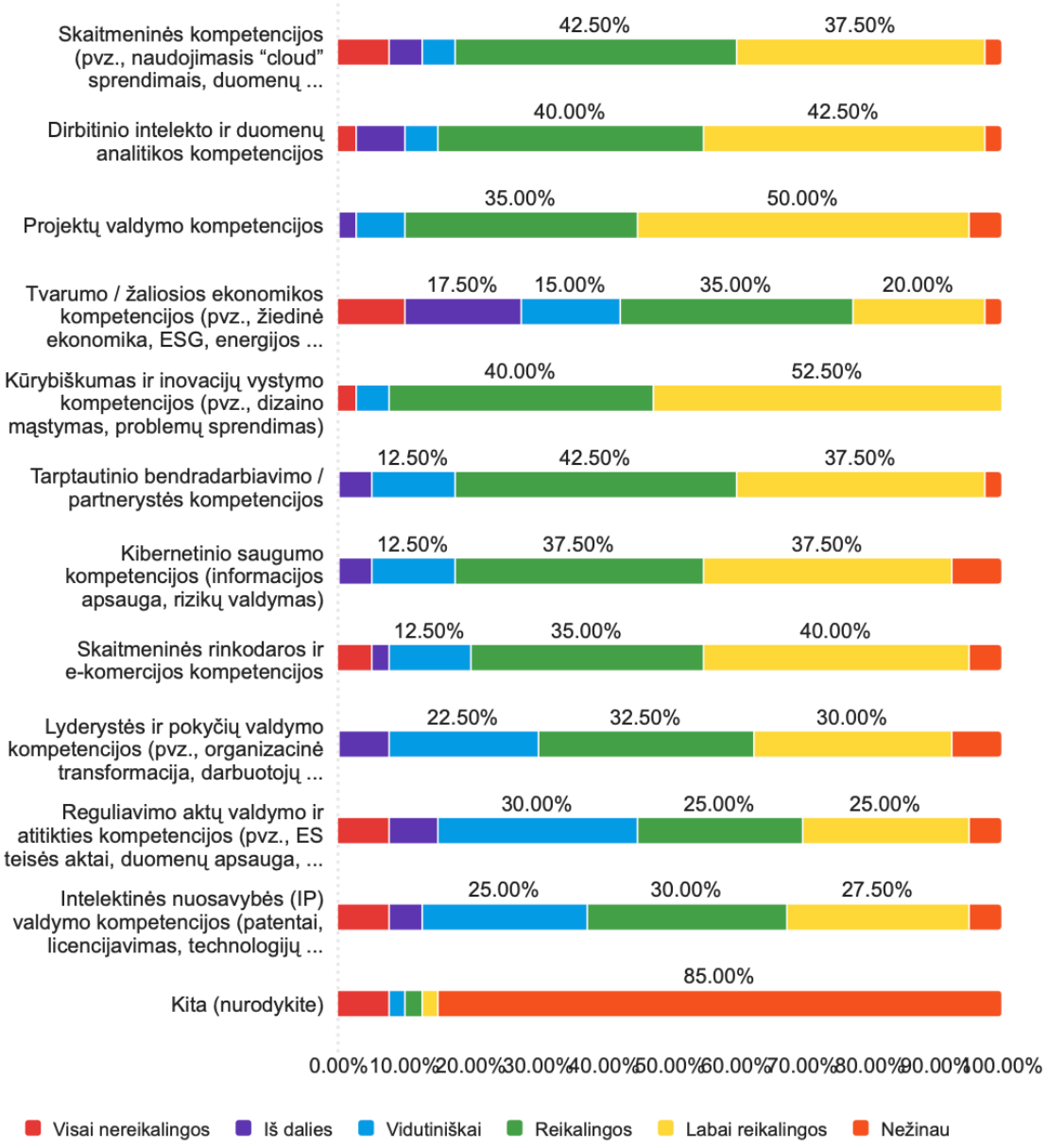
Q24 - Įvertinkite inovacinių kompetencijų poreikį Jūsų organizacijoje.



Q24 - **Sostinės regionas:** Įvertinkite inovacinių kompetencijų poreikį Jūsų organizacijoje.

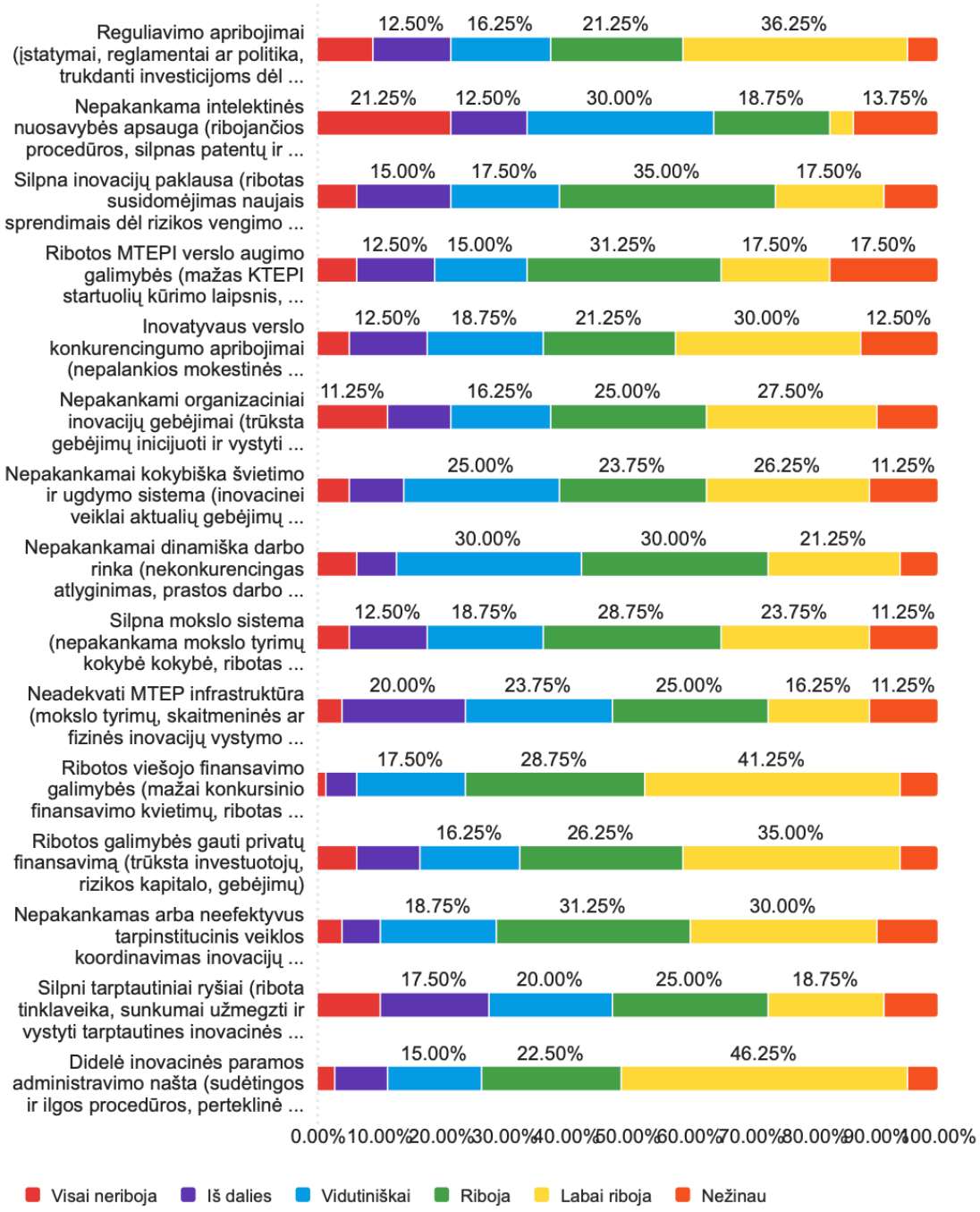


Q24 - **Vidurio-vakarų regionas:** Įvertinkite inovacinių kompetencijų poreikį Jūsų organizacijoje.

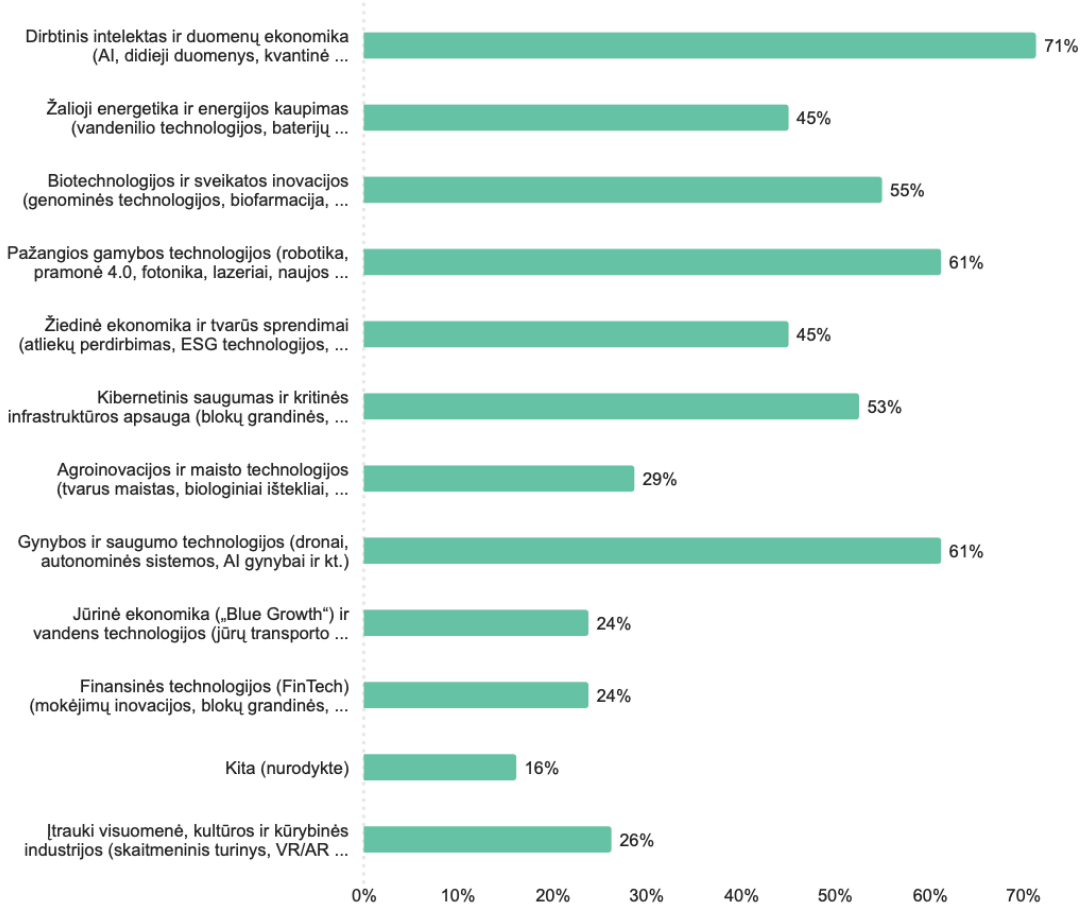


Šie klausimai atsakomi visų respondentų

Q25 - Įvertinkite pagrindines inovacinių projektų įgyvendinimo kliūtis, nurodant kiek žemiau išvardinti barjerai riboja sumanios specializacijos sričių plėtrą.

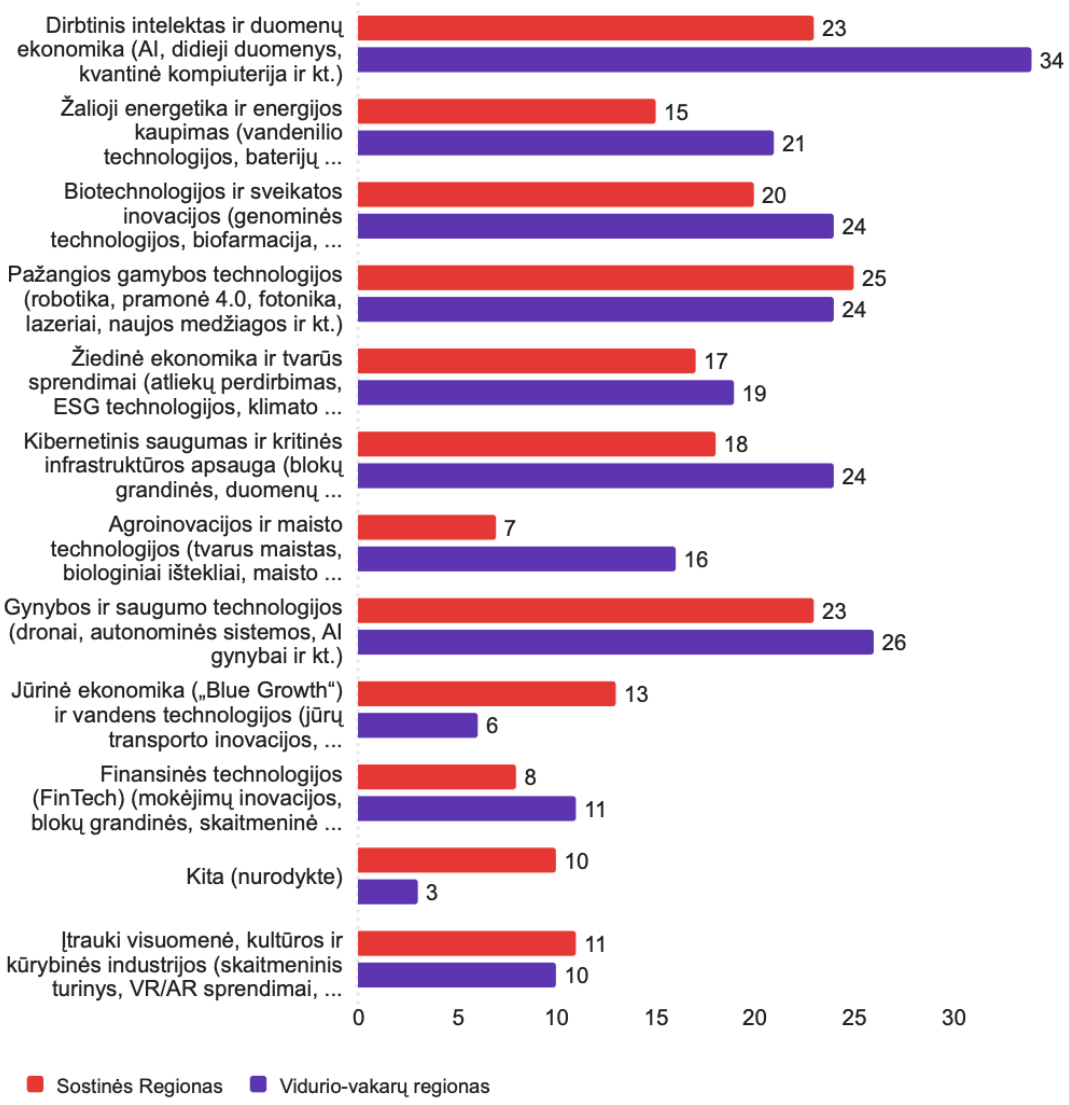


Q26 - Kokias naujas tematikas ar prioritetus siūlytumėte įtraukti į kitą S3 koncepciją (2028–2034 m.)?

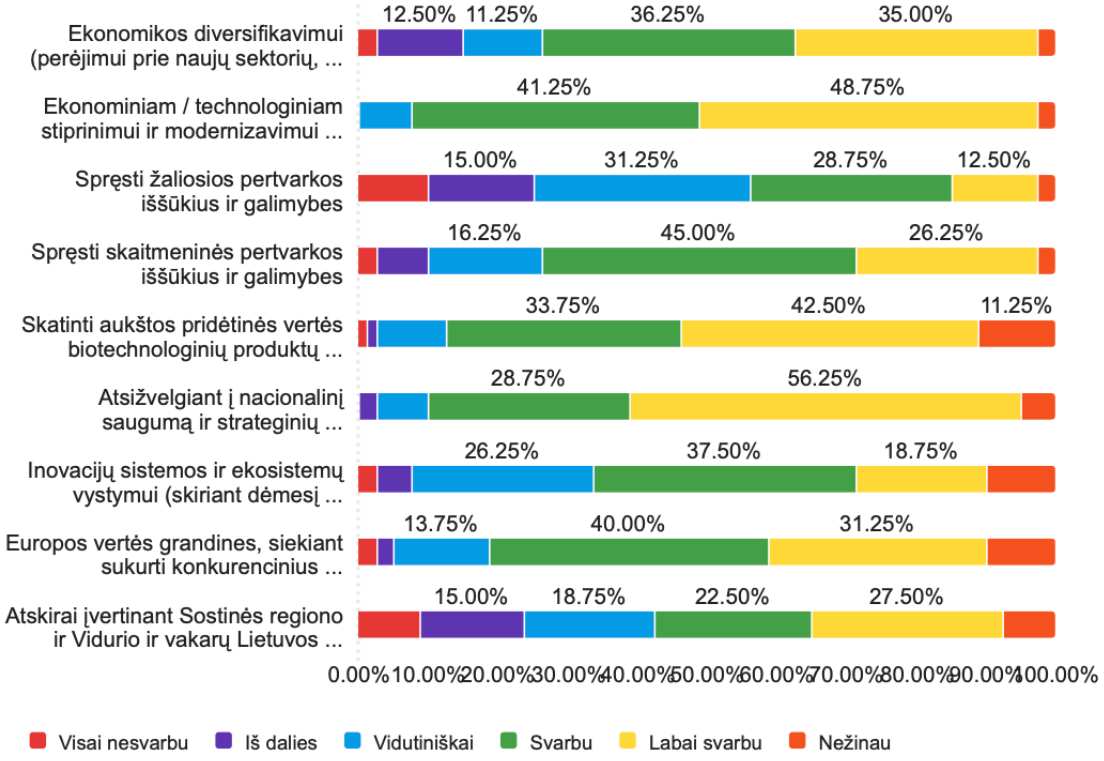


25

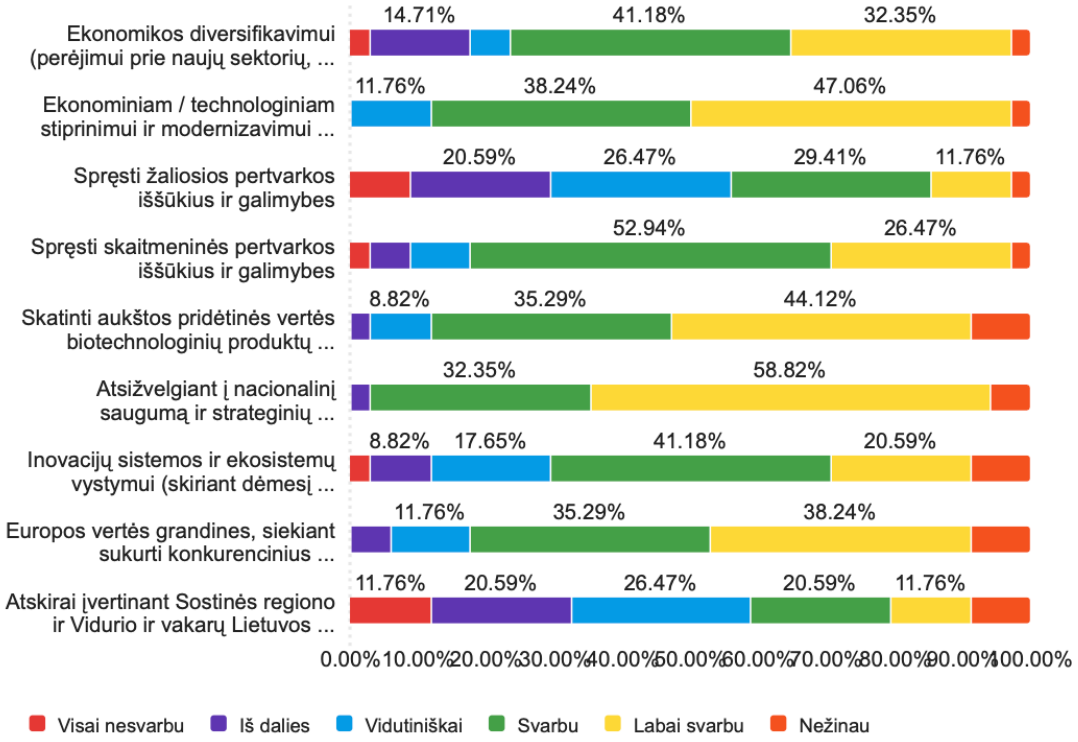
Q9 - Kuriose iš šių Sumanios Specializacijos Koncepcijoje nurodytų tematikų gavote vidinį/išorinį finansavimą inovacijoms vystyti? Pasirinkite visus Jums tinkamus variantus.



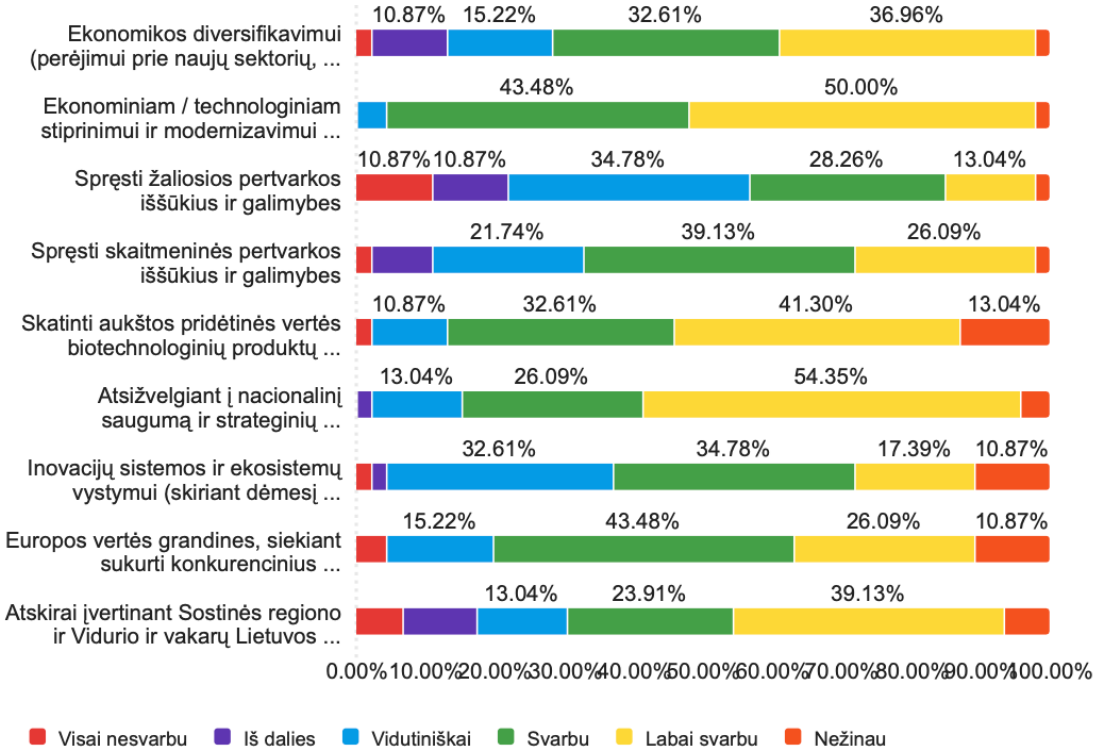
Q27 - Žvelgiant į ateitį ir formuojant 2028–2034 m. laikotarpio Sumanios specializacijos strategiją, Jūsų manymu, prioritetai turėtų būti suformuluoti ypatingą dėmesį skiriant šiems tikslams pasiekti:



Q27 - **Sostinės regionas:** Žvelgiant į ateitį ir formuojant 2028–2034 m. laikotarpio Sumanios specializacijos strategiją, Jūsų manymu, prioritetai turėtų būti suformuluoti ypatingą dėmesį skiriant šiems tikslams pasiekti:



Q27 - **Vidurio-vakarų regionas:** Žvelgiant į ateitį ir formuojant 2028–2034 m. laikotarpio Sumanios specializacijos strategiją, Jūsų manymu, prioritetai turėtų būti suformuluoti ypatingą dėmesį skiriant šiems tikslams pasiekti:



ATVIRŲ ATSAKYMŲ APIBENDRINIMAS

The open-ended responses from the survey provide a deeper, qualitative look into the challenges and aspirations of Lithuania's innovation ecosystem. The feedback highlights a desire for greater transparency, a shift towards bio-intelligent manufacturing, and a critical need to bridge the gap between academia and commerce.

Strategic Innovation and Future Priorities

Respondents suggested several high-tech and "disruptive" fields that should be integrated into the 2028–2034 S3 concept:

- Bio-intelligent and Bio-manufacturing: There is a strong call to move from Industry 4.0 to a bio-intelligent paradigm, merging biological systems with engineering and ICT. This includes "bio-manufacturing" as a sustainable alternative to the traditional chemical industry.
- Strategic Technologies: Specific mentions include quantum technologies for data architecture, space technologies, defence and security, and advanced transport systems.
- Next-Gen Manufacturing: Future manufacturing is envisioned as "servitisation", where companies transition from selling products to providing equipment services. This model supports circularity by allowing

manufacturers to retain ownership and recycle components at the end of their life cycle.

Systemic Barriers and Policy Critiques

A significant portion of the qualitative feedback focused on the flaws within the current R&D support system:

- Evaluation Subjectivity: Respondents expressed frustration with the deteriorating quality of experts evaluating R&D projects, citing subjective "like/dislike" judgments and signs of patronage or unfair activity.
- Bureaucratic Hurdles: There are calls to simplify the application process and remove rigid requirements, such as the mandatory 30% efficiency increase for companies to qualify for EU support.
- Public Knowledge Sharing: There is a strong sentiment that results from projects funded by taxpayers should be made public, ensuring knowledge is shared rather than remaining locked within a single private entity.

Human Capital and Ecosystem Development

The responses emphasise that technology alone is insufficient without the right people and collaborative structures:

- Youth Engagement: To ensure the future of the S3 strategy, there is a plea to involve pupils and students in national-level innovation projects to foster creativity from a young age.
- University-Business Gap: Universities are criticised for struggling to translate scientific progress into commercial products, often failing to help spin-offs cross the "valley of death". Respondents suggest universities should focus more on science commercialisation rather than internal competition.
- The Role of DIHs: Digital Innovation Hubs (DIHs) should evolve into circularity hubs. They are seen as essential for providing "test before invest" services, helping SMEs reduce the risk of digital transformation.

Involvement of the Diaspora and International Cooperation

To improve the strategy, respondents suggested learning from global leaders like Switzerland and more actively involving the Lithuanian diaspora (e.g., through Global Lithuanian Leaders). International cooperation is seen as vital, not just for funding, but for lobbying at the EU level and integrating into global value chains

KLAUSIMYNAS

Tikslinė suinteresuotųjų šalių apklausa

Inovacijų politikos (S3) įgyvendinimo vertinimas: suinteresuotųjų šalių apklausa

Kviečiame Jus dalyvauti apklausoje dėl inovacijų politikos įgyvendinimo vertinimo. Siekiame patikslinti Sumanios Specializacijos prioritetus, suprasti Sostinės ir Vidurio ir Vakarų regionų formavimosi skirtumus bei teikti rekomendacijas inovacijų finansavimo priemonių bei investicijų sutelkimo mechanizmų tobulinimui. Gauti rezultatai bus panaudoti Sumanios Specializacijos Koncepcijos (S3) 2021–2027 m. įgyvendinimo tarpiniam vertinimui.

Dalyvavimas apklausoje užtruks 15-30 min. Apklausa yra savanoriška ir anoniminė, vykdoma vadovaujantis Europos tyrėjų chartijos etikos reikalavimais, bei kitais susijusiais tyrimų etikos ir duomenų apsaugos standartais. Apklausos rezultatai tvarkomi anonimiškai, ir analizuojami tik aukščiau pateiktais tikslais.

Atkreipiame dėmesį, kad Jūsų atsakymai išsisaugo automatiškai, tad apklausos pildymą galite tęsti bet kuriuo metu. Jūsų atsakymų laukiame iki gruodžio 19 d.

Šioje apklausoje renkami demografiniai organizacijų duomenys (veiklos vieta, sritis, organizacijos tipas, dydis, darbuotojų sudėties kokybiniai parametrai) neleidžia jūsų identifikuoti kaip juridinio ar fizinio asmens.

Jei sutinkate dalyvauti, kviečiame tęsti apklausą, nes Jūsų nuomonė gali atverti naujas finansavimo galimybes inovacijoms Lietuvoje!

Kilus klausimams dėl apklausos pildymo, prašome kreiptis el.paštu i.ribikauske@inovacijuagentura.lt.

Dėkojame už Jūsų laiką ir įsitraukimą,

Inovacijų Agentūros ekspertų komanda.

Ar sutinkate dalyvauti tarpinio vertinimo apklausoje dėl Sumanios Specializacijos Koncepcijos (S3) įgyvendinimo?

- Taip, sutinku
- Ne, nesutinku

A: Pagrindinė informacija

1. Pasirinkite Lietuvos apskritį, kurioje yra organizacijos pagrindinė buveinė.
   - Alytaus
   - Kauno
   - Klaipėdos
   - Marijampolės
   - Panevėžio
   - Šiaulių
   - Tauragės
   - Telšių
   - Utenos
   - Vilniaus
2. Nurodykite Jūsų organizacijos veiklos kryptį (pagal EVRK). *Pasirinkite visas Jums priskirtas kategorijas*
   - **A** – Žemės ūkis, miškininkystė ir žuvininkystė
   - **B** – Kasyba ir karjerų eksploatavimas
   - **C** – Apdirbamoji gamyba
   - **D** – Elektros, dujų, garo tiekimas ir oro kondicionavimas
   - **E** – Vandens tiekimas; nuotekų valymas, atliekų tvarkymas ir taršos šalinimas
   - **F** – Statyba
   - **G** – Didmeninė ir mažmeninė prekyba; variklinių transporto priemonių ir motociklų remontas
   - **H** – Transportas ir saugojimas
   - **I** – Apgyvendinimo ir maitinimo paslaugų veikla
   - **J** – Informacija ir ryšiai
   - **K** – Finansinė ir draudimo veikla
   - **L** – Nekilnojamojo turto operacijos
   - **M** – Profesinė, mokslinė ir techninė veikla
   - **N** – Administracinė ir aptarnavimo veikla
   - **O** – Viešasis valdymas ir gynyba; privalomasis socialinis draudimas
   - **P** – Švietimas
   - **Q** – Žmonių sveikatos priežiūra ir socialinis darbas
   - **R** – Meninė, pramoginė ir poilsio veikla
   - **S** – Kita aptarnavimo veikla
   - **T** – Namų ūkių veikla kaip darbdavių; prekių ir paslaugų gamyba namų ūkių poreikiams
   - **U** – Eksteritorinė organizacijų ir įstaigų veikla
3. Prašome nurodyti apytikslį mokslo daktarų (Dr., PhD) dirbančių Jūsų įmonėje / organizacijoje skaičių.
4. Prašome nurodyti (apytiksliai), kokia Jūsų darbuotojų dalis proc. turi aukštąjį išsilavinimą.
5. Prašome įvertinti skaitmenizavimo lygį Jūsų įmonėje / organizacijoje?
   - Žemas - technologijų įmonės/organizacijos veikloje beveik nenaudojate, Aukštas - IT lygio įmonė
   - Dauguma procesų atliekami rankiniu būdu
   - Skaitmenizacija naudojama tik kai kuriuose procesuose
   - Skaitmenizacija naudojama daugelyje procesų
   - Skaitmenizacija integruota į daugumą procesų
   - Beveik visi procesai skaitmenizuoti
   - Nežinau
6. Prašau pasirinkti Jūsų organizacijos tipą, pagal vaidmenį inovacijų ekosistemoje:

I. Institucijos, atsakingos už S3 įgyvendinimą, koordinavimą, ES struktūrinių fondų programavimą ir/arba TPTF įgyvendinimą
II. Pramonės ir Verslo Asociacijos, Klasteriai ir kitos asocijuotos organizacijos
III. Verslo įmonės
IV. Mokslinių tyrimų institucijos
V. Inovacijų paramos organizacijos (Mokslo ir technologijų parkai, verslo inkubatoriai, verslo akseleratoriai ir kt.)
VI. Finansų organizacijos (ILTE, Bankai, Rizikos kapitalo fondai, Investicijų fondai ir kt.)

7. Pasirinkite savo organizacijos dydį pagal darbuotojų skaičių:
- Smulki ir maža įmonė (1-49)
- Vidutinė įmonė (50-249)
- Stambi įmonė (250+)
- Kita (nurodykite)

8. (I) Ar Jūsų organizacija buvo įsitraukusi į nacionalinės Sumanios Specializacijos Koncepcijos (S3) 2021–2027 m. rengimą tiesiogiai, ar per asocijuotą struktūrą?

- Taip
- Ne

9. Kuriose iš šių Sumanios Specializacijos Koncepcijoje nurodytų tematikų gavote vidinį/išorinį finansavimą inovacijoms vystyti? *Pasirinkite visus Jums tinkamus variantus*
- Molekulinės technologijos medicinai ir biofarmacijai
- Pažangios taikomosios technologijos asmens ir visuomenės sveikatai
- Pažangioji medicinos inžinerija ankstyvai diagnostikai ir gydymui
- Saugus maistas ir tvarūs agrobiologiniai ištekliai
- Fotonika ir lazerinės technologijos
- Pažangiosios medžiagos ir konstrukcijos
- Lanksčios produktų kūrimo, gamybos, procesų valdymo ir dizaino technologijos
- Energijos vartojimo efektyvumas ir išmanūs sprendimai
- Atsinaujinantys energijos ištekliai
- Dirbtinis intelektas, didieji ir paskirstytieji duomenys, įvairiarūšė analizė, apdorojimas ir diegimas
- Daiktų internetas
- Kibernetinis saugumas
- Finansinės technologijos ir blokų grandinės
- Audiovizualinių medijų technologijos ir socialinės inovacijos
- Išmaniosios transporto sistemos

B: S3 koordinavimo mechanizmai

Šio skyriaus tikslas – įvertinti inovacijų politikos įgyvendinimo mechanizmų efektyvumą, suderinamumą tarp skirtingo lygio politiką įgyvendinančių institucijų horizontaliame ir nacionaliniame bei regioniniame lygyje. Prašome kiekvieną teiginį įvertinti nuo 1 (visiškai nesutinku) iki 5 (visiškai sutinku). Jei teiginys Jums netaikytinas ar neturite informacijos, pasirinkite „Nežinau".

10. Kokie kriterijai, Jūsų manymu, taikomi vertinant Inovacinių projektų finansavimo paraiškas S3 srityje?

	Visai ne	Iš dalies	Vidutiniškai	Plačiai	Labai plačiai	Nežinau
Atitikimas S3 prioritetams						
Inovatyvumas ir technologinės transformacijos potencialas						
Ekonominis poveikis apskričiai/šaliai						
Tvarumo ir žaliosios transformacijos poveikis						
Socialinis poveikis (darbuotojų gerovė, bendruomenės įtraukimas)						
Tarptautinio bendradarbiavimo potencialas						
Projekto įgyvendinimo gebėjimai (organizaciniai, teisiniai, finansiniai)						
Atitikimas nacionaliniams poreikiams (neplanuotai susiformavę nacionaliniai prioritetai ir iššūkiai, kaip pvz. saugumas, COVID-19 atsakas ar pan.)						
Kita (nurodykite)						

11. Jūsų manymu, kiek, žemiau išvardintos, institucijų grupės dalyvauja formuojant S3 politiką, priimant sprendimus, bei suderinant įgyvendinimo veiksmus?

	Visai ne	Iš dalies	Vidutiniškai	Aktyviai	Labai aktyviai	Nežinau

Ekonomikos ir inovacijų politikos formavimo ir įgyvendinimo institucijos (pvz., ministerija, ir agentūros atsakingos už inovacijas ir verslo plėtrą)						
Švietimo, mokslo ir sporto institucijos (pvz., ŠMSM, Lietuvos Mokslo Taryba, Aukštojo mokslo ir tyrimų institucijos)						
Aplinkos ir klimato politikos formavimo ir įgyvendinimo institucijos (pvz., Aplinkos apsaugos, kitos susijusios ministerijos (Pvz., Žemės ūkio ministerija, agentūros, atsakingos už tvarumą ir žaliąją transformaciją visose ūkio ir visuomenės srityse						
Energetikos politikos formavimo ir įgyvendinimo institucijos (pvz., Energetikos ministerija, kitos suinteresuotos šalys)						
Nacionalinio saugumo ir gynybos politikos institucijos (pvz., Krašto apsaugos ministerija, agentūros atsakingos už						

strateginių technologijų plėtrą)						
Finansų politikos formavimo ir įgyvendinimo institucijos (pvz., Finansų ministerija, agentūros atsakingos už biudžeto planavimą ir investicijas)						
Sveikatos politikos formavimo ir įgyvendinimo institucijos (pvz., Sveikatos apsaugos ministerija, sveikatos inovacijų agentūros)						
Regioninės plėtros institucijos (savivaldybės, regionų plėtros tarybos)						
Kita (nurodykite)						

12. Įvertinkite, kaip intensyviai taikomi politikos koordinavimo mechanizmai, skatinant bendradarbiavimą tarp nacionalinio, regioninio ir vietos lygmens institucijų, siekiant suderinti S3 prioritetus ir veiksmus?

	Visai ne	Iš dalies	Vidutiniškai	Plačiai	Labai plačiai	Nežinau
Nacionalinių institucijų inicijuojamos konsultacijos („iš viršaus į apačią"), pvz., ministerijų ir agentūrų vykdomas koordinavimas, gairių teikimas regionams.						
Savivaldybių inicijuojamos konsultacijos („iš apačios į viršų"), pvz., regionų plėtros tarybų siūlymai, pastabos dėl nacionalinių S3						

dokumentų ir įgyvendinimo priemonių.						
Bendri sprendimų priėmimo mechanizmai, pvz., jungtiniai valdymo komitetai, tarpsektorinės darbo grupės, kuriose dalyvauja nacionalinio ir regioninio lygmens atstovai.						
Koordinuoti veiksmų planai ir suderinti projektų portfeliai, pvz., tarp nacionalinių ir regioninių institucijų suderinti veiksmų planai, projektų atranka pagal S3 prioritetus.						
Nuolatinės teminės darbo grupės, pvz., grupės, kuriose dalyvauja ministerijų, agentūrų ir regionų atstovai, vykdant stebėseną ir korekcijas.						
Sudarant darbo grupes, išlaikomas proporcingumo principas tarp Sostinės ir Vidurio ir Vakarų Lietuvos Regionų.						

C: (Suinteresuotos šalys) Įtraukus ir tęstinis suinteresuotųjų šalių dalyvavimas

Šio skyriaus tikslas - įvertinti, kaip nuosekliai ir reprezentatyviai įtraukiamos suinteresuotosios šalys inovacijų politikos cikle (nuo prioritetų nustatymo iki įgyvendinimo, stebėsenos ir vertinimo) bei kokie instrumentai padeda išlaikyti nuolatinį, kokybišką įsitraukimą. Prašome kiekvieną teiginį įvertinti nuo 1 (visiškai nesutinku) iki 5 (visiškai sutinku). Jei tai Jūsų organizacijai šiuo metu netaikoma ar neturite informacijos, pasirinkite „Nežinau".

13. Kiek aktyviai jūsų suinteresuotųjų šalių grupė dalyvauja inovacijų politikos (S3) formavime?

	Visai ne	Iš dalies	Vidutiniškai	Aktyviai	Labai aktyviai	Nežinau
S3 prioritetų nustatymas ir sprendimų priėmimas (strateginių tematikų identifikavimas, prioritetų tvirtinimas)						
S3 prioritetų įgyvendinimas (veiklos ir projektai, finansuojami per ES struktūrinius fondus ar kitus instrumentus)						
S3 stebėsena ir vertinimas (pažangos stebėsena, rezultatų vertinimas, grįžtamasis ryšys)						

14. Jūsų vertinimu, kaip plačiai atstovaujamos žemiau išvardintos suinteresuotosios grupės inovacijų politikos (S3) procesuose? *Čia vertinamas atstovavimas tiek įvairiomis formomis, tiek skirtinguose etapuose.*

	Visai ne	Iš dalies	Vidutiniškai	Daug	Labai daug	Nežinau
Akademinė bendruomenė ir mokslinių tyrimų institucijos						
Mažos ir vidutinės įmonės (MVĮ)						
Stambios įmonės						
Vyriausybė ir viešasis sektorius						
Pilietinė visuomenė (NVO, piliečiai,						

bendruomeninės organizacijos)						
Klasterių organizacijos						
Pramonės ir verslo asociacijos						
Pramonės ir prekybos rūmai						
Verslo inkubatoriai						
Mokslo ir technologijų parkai						
Finansų organizacijos (ILTE, Bankai, Rizikos kapitalo fondai, Investicijų fondai ir kt)						

15. Jūsų nuomone, kiek veiksmingi šie nuolatinio įsitraukimo instrumentai? *Čia vertinamas įsitraukimas tiek įvairiomis formomis, tiek skirtinguose etapuose.*

	Visai ne	Iš dalies	Vidutiniškai	Daug	Labai daug	Nežinau
Fasilitatorių moderuojamos MTEPI prioritetų darbo grupės						
Informacinės dienos ir finansavimo priemonių / kvietimų pristatymai						
Apklausos						
Konsultacijos						
Kita (nurodykite)						

D: Bendradarbiavimo vaidmuo

Šios dalies tikslas – įvertinti bendradarbiavimo pobūdį įgyvendinant Sumanios specializacijos koncepcijos (S3) prioritetų inovacines veiklas tarp suinteresuotųjų šalių. Prašome kiekvieną teiginį įvertinti nuo 1 (visiškai nesutinku) iki 5 (visiškai sutinku). Jei teiginys Jums netaikytinas ar neturite informacijos, pasirinkite „Nežinau".

16. Jūsų nuomone, kiek svarbus šių suinteresuotųjų grupių įsitraukimas vystant (atvirąsias) inovacines veiklas sumanios specializacijos tematikose?

	Visai ne	Iš dalies	Vidutiniškai	Svarbus	Labai svarbus	Nežinau
Akademinė bendruomenė ir mokslinių tyrimų institucijos						
Mažos ir vidutinės įmonės (MVĮ)						
Stambios įmonės						
Vyriausybė ir viešasis sektorius						
Pilietinė visuomenė (NVO, piliečiai, bendruomeninės organizacijos)						
Klasterių organizacijos						
Pramonės ir verslo asociacijos						
Pramonės ir prekybos rūmai						
Verslo inkubatoriai ir akseleratoriai						
Mokslo ir technologijų parkai						
Finansų organizacijos						

17. Įvertinkite tarptautinio bendradarbiavimo svarbą siekiant sumanios specializacijos įgyvendinimo uždavinių?

	Visai ne	Iš dalies	Vidutiniškai	Svarbu	Labai svarbu	Nežinau
Geresnis inovacijų politikos suderinamumas ir nuoseklumas tarp valstybių partnerių, ir tarp ES ir nacionalinių tikslų						

Verslo konkurencingumo didinimas						
Sustiprintas tarpvalstybinis bendradarbiavimas įgyvendinant inovacijų politiką						
Kompetencijų vystymas ir dalijimasis gerąja patirtimi						
Sustiprintos tarptautinės MTEP partnerystės						
Technologijų perdavimo ir komercializavimo įgalinimas						
Padidintas MTEPI infrastruktūros ir unikalios įrangos pasiekiamumas						
Sukurtos įėjimo į tarptautines rinkas galimybės						
Aukštesnio lygio įsitraukimas į ES vertės grandines						
Prieiga prie inovacijų ir technologijų plėtros finansavimo galimybių						
Prieiga prie verslo plėtros finansavimo galimybių						
Kita (nurodykite)						

18. Siekiant sustiprinti tarptautinį bendradarbiavimą ir integraciją į ES vertės grandines, Jūsų manymu, kiek veiksmingos būtų šios inovacijų skatinimo priemonės?

	Visai ne	Iš dalies	Vidutiniškai	Veiksminga	Labai veiksminga	Nežinau
Vertės grandinių integracijos skatinimas ir tarptautiškumo didinimas						
Tyrimų ir eksperimentinės plėtros iniciatyvų tarptautiškumo stiprinimas						
Tiesioginių užsienio investicijų pritraukimo skatinimas į aukštos pridėtinės vertės veiklas						
Komercializacijos ir technologijų perdavimo skatinimas						
Parama ko-finansuojant ES „Horizontų" programos projektus (Europos inovacijų tarybos ir Europos technologijų instituto)						
Partnerių paieška ir tarptautinių tinklų plėtra						
Kita (nurodykite)						

E: Inovacijų finansavimas S3 tematikose

Šio skyriaus tikslas – nustatyti skirtingų finansavimo šaltinių įtaką inovacijų vystymui. Prašome kiekvieną teiginį įvertinti nuo 1 (visiškai nesutinku) iki 5 (visiškai sutinku). Jei teiginys Jums netaikytinas ar neturite informacijos, pasirinkite „Nežinau".

19. Įvertinkite, kiek šie finansavimo šaltiniai prisidėjo siekiant įgyvendinti inovacijų projektus S3 tematikose?

	Visai ne	Iš dalies	Vidutiniškai	Daug	Labai daug	Nežinau
Nacionalinis konkursinis MTEPI finansavimas ir 'grantai'						
MTEPI mokesčių lengvatos						
Rizikos kapitalo investicijos						
Paskola lengvatinėmis sąlygomis su valstybės garantija (ILTE)						
Nuosavos (vidinės) lėšos						
ES Struktūrinių fondų programos (pvz., ministerijų skelbiamos priemonės)						
Tarptautinių Inovacijų Investicijų Priemonė (I3)						
„Interreg Europe" programos						
ES „Europos horizontas" MTEP finansavimas						
Europos Inovacijų Tarybos (EIC) finansavimo priemonės						
EIT (Europos Inovacijų ir Technologijų Institutas) finansavimo priemonės						

Horizon Europe Marie Skłodowska-Curie veiksmai (MSCA)						
Widening ERA MTEPI finansavimo priemonės						
Skaitmeninės Europos programa						
InvestEU						
Europos infrastruktūros tinklų priemonė (CEF)						
Euratomo mokslinių tyrimų ir mokymo programa						
Tarptautinio termobranduolinio eksperimentinio reaktoriaus (ITER) projektas						
NextGeneration EU						

F: ERPF investicijų sutelkimo priemonės S3 prioritetams

Šio skyriaus tikslas – įvertinti, kaip tikslingai nukreipiamas finansavimas sumanios specializacijos tikslams įgyvendinti. Prašome kiekvieną teiginį įvertinti nuo 1 (visiškai nesutinku) iki 5 (visiškai sutinku). Jei teiginys Jums netaikytinas ar neturite informacijos, pasirinkite „Nežinau".

20. Jūsų vertinimu, kaip tikslingai buvo taikomi kriterijai inovacijų finansavimui sumanios specializacijos kryptyse 2021–2025 m.?

	Visai ne	Iš dalies	Vidutiniškai	Tikslingai	Labai tikslingai	Nežinau
Taikomos palankesnės atrankos sąlygos (skatinamos ir suteikiamos investicijos, suderintos su sumanios specializacijos prioritetais)						
Taikomi griežti tinkamumo kriterijai (finansuojami tik projektai,						

atitinkantys sumanios specializacijos prioritetus)						
Taikomi specialūs kvietimai (konkursai, skirti tik sumanios specializacijos temoms)						
Paskirta atskira biudžeto dalis (ES fondų lėšos, skirtos sumanios specializacijos projektams pagal specifinius tikslus)						
Taikomi specializuoti rodikliai programose (naudojami vertinant investicijų suderinamumą su sumanios specializacijos)						
Vykdomi tiksliniai mokymai ir konsultacijos (pagalba įmonėms (ypač SVV) dalyvauti sumanios specializacijos iniciatyvose)						
Taikomos supaprastintos procedūros (mažesnė administracinė našta sumanios specializacijos projektams)						
Vykdomi misijų projektai (teminiai projektai, susiję su sumanios specializacijos)						

Suformuoti ministerijų tikslinių priemonių portfeliai (priemonių rinkiniai pagal sumanios specializacijos kryptis)						

21. Trumpai paaiškinkite / išplėskite savo atsakymus ir pateikite gerųjų ar blogųjų praktikų pavyzdžių.

G: Inovacijų kryptys, poreikiai ir kompetencijų trūkumai

Šio skyriaus tikslas – nustatyti, kaip Jūsų organizacija planuoja orientuoti inovacijas (skaitmenizaciją, žaliąją transformaciją, saugumą ir atsparumą) ir suformuotas prioritetines S3 tematikas vidutinės trukmės laikotarpyje (nuo 3 iki 5 metų). Prašome kiekvieną teiginį įvertinti nuo 1 (visiškai nesutinku) iki 5 (visiškai sutinku). Jei teiginys Jums netaikytinas ar neturite informacijos, pasirinkite „Nežinau".

22. Įvertinkite šių inovacijų krypčių svarbumą Jūsų organizacijai artimiausių 5 metų laikotarpyje.

	Visai nesvarbu	Iš dalies	Vidutiniškai	Svarbu	Labai Svarbu	Nežinau
Žalioji transformacija ir tvarūs sprendimai (atsinaujinančioji energetika, žiedinė ekonomika, klimatui neutralios technologijos)						
Skaitmenizacija ir išmaniosios technologijos (dirbtinis intelektas, automatizacija, duomenų analitika, kibernetinis saugumas)						
Gyvybės mokslai ir sveikatos inovacijos (biotechnologijos, farmaciniai sprendimai,						

skaitmeninė sveikata)						
Pažangioji pramonė ir gamybos transformacija (Pramonė 4.0, robotika, naujos medžiagos, technologijų integracija)						
Agroinovacijos ir maisto technologijos (tvari žemės ūkio gamyba, bioproduktai, maisto sauga)						
Saugumo ir atsparumo technologijos (kibernetinis saugumas, kritinės infrastruktūros apsauga, tiekimo grandinių atsparumas, gynybos inovacijos)						
Socialinės ir atvirosios inovacijos (bendradarbiavimo ekosistemos, partnerystės, inovacijų kultūra)						
Kita (nurodykite)						

23. Ivertinkite inovacinių veiklų aktualumą skirtingose Jūsų organizacijos veiklos srityse per ateinančius 5 metus, remiantis žemiau pateiktu sąrašu.

	Visai ne	Iš dalies	Vidutiniškai	Aktualu	Labai aktualu	Nežinau
Naujų produktų ir paslaugų kūrimas						
Procesų optimizavimas ir skaitmenizacija						

Klientų patirties gerinimas						
Organizacijos valdymas ir strategija						
Sprendimų priėmimo kokybės gerinimas						
Organizacinės kultūros stiprinimas ir orientacija į inovacijas						
Talentų pritraukimas ir kompetencijų ugdymas						
Tiekimo grandinės atsparumo didinimas						
Kita (nurodykite)						

24. Įvertinkite inovacinių kompetencijų poreikį Jūsų organizacijoje.

	Visai nereikia	Iš dalies	Vidutiniškai	Reikalingos	Labai reikalingos	Nežinau
Skaitmeninės kompetencijos (pvz., naudojimasis "cloud" sprendimais, duomenų bazėmis, skaitmenine komunikacija)						
DI ir duomenų analitikos kompetencijos						
Projektų valdymo kompetencijos						
Tvarumo / žaliosios ekonomikos kompetencijos (pvz., žiedinė						

ekonomika, ESG, energijos efektyvumas)						
Kūrybiškumas ir inovacijų kūrimo kompetencijos (pvz., dizaino mąstymas, problemų sprendimas)						
Tarptautinio bendradarbiavimo / partnerystės kompetencijos						
Kibernetinio saugumo kompetencijos (informacijos apsauga, rizikų valdymas)						
Skaitmeninės rinkodaros ir e-komercijos kompetencijos						
Lyderystės ir pokyčių valdymo kompetencijos (pvz., organizacinė transformacija, darbuotojų įtraukimas)						
Reguliavimo aktų valdymo ir atitikties kompetencijos (pvz., ES teisės aktai, duomenų apsauga, tvarumo standartai)						
Intelektinės nuosavybės (IP) valdymo kompetencijos (patentai, licencijavimas, technologijų						

komercializacija)						
Kita (nurodykite)						

H: Ekosistemos kliūtys S3 investicijoms ir įgyvendinimui

Šio skyriaus tikslas – nustatyti svarbiausias Jūsų inovacijų ekosistemos kliūtis, kurios riboja inovacijų investicijų planavimą ir įgyvendinimą. Prašome kiekvieną teiginį įvertinti nuo 1 (visiškai nesutinku) iki 5 (visiškai sutinku). Jei teiginys Jums netaikytinas ar neturite informacijos, pasirinkite „Nežinau".

25. Įvertinkite pagrindines inovacinių projektų įgyvendinimo kliūtis, nurodant kiek žemiau išvardinti barjerai riboja sumanios specializacijos sričių plėtrą.

	Visai neriboja	Iš dalies	Vidutiniškai	Riboja	Labai riboja	Nežinau
Reguliavimo apribojimai (įstatymai, reglamentai ar politika, trukdanti investicijoms dėl nelanksčių ar perteklinių reikalavimų)						
Nepakankama intelektinės nuosavybės apsauga (ribojančios procedūros, silpnas patentų ir licencijų gynimas)						
Silpna inovacijų paklausa (ribotas susidomėjimas naujais sprendimais dėl rizikos vengimo ar kultūrinių barjerų)						
Ribotos MTEPI verslo augimo galimybės (mažas KTEPI startuolių kūrimo laipsnis, ribotos „deep tech" startuolių galimybės)						
Inovatyvaus verslo konkurencingumo apribojimai (nepalankios mokestinės sąlygos						

ir / ar administravimas, silpnos paskatos verslo investicijoms į MTEPI)						
Nepakankami organizaciniai inovacijų gebėjimai (trūksta gebėjimų inicijuoti ir vystyti inovacijas)						
Nepakankamai kokybiška švietimo ir ugdymo sistema (inovacinei veiklai aktualių gebėjimų trūkumas, neatitikimas rinkos poreikiams)						
Nepakankamai dinamiška darbo rinka (nekonkurencingas atlyginimas, prastos darbo sąlygos, talentų nutekėjimas)						
Silpna mokslo sistema (nepakankama mokslo tyrimų kokybė kokybė, ribotas dėmesys technologijų perdavimui ir inovacinei veiklai)						
Neadekvati MTEP infrastruktūra (mokslo tyrimų, skaitmeninės ar fizinės inovacijų vystymo infrastruktūros trūkumas)						
Ribotos viešojo finansavimo galimybės (mažai konkursinio finansavimo kvietimų, ribotas						

finansavimas inovacijoms)						
Ribotos galimybės gauti privatų finansavimą (trūksta investuotojų, rizikos kapitalo, gebėjimų)						
Nepakankamas arba neefektyvus tarpinstitucinis veiklos koordinavimas inovacijų spartinimui (prastas koordinavimas, bendradarbiavimo stoka, krypties nebuvimas)						
Silpni tarptautiniai ryšiai (ribota tinklaveika, sunkumai užmegzti ir vystyti tarptautines inovacinės veiklos partnerystes)						
Didelė inovacinės paramos administravimo našta (sudėtingos ir ilgos procedūros, perteklinė biurokratija)						

I: S3 prioritetų formuluotė ir strateginis požiūris

Šio skyriaus tikslas – įvertinti 2021–2027 m. S3 prioritetų tematikų tinkamumą, pasiūlyti naujas tematikas kitam laikotarpiui ir nustatyti strateginius principus, kurie turėtų lemti S3 prioritetų formuluotes 2028–2034 m. Prašome kiekvieną teiginį įvertinti nuo 1 (visiškai nesutinku) iki 5 (visiškai sutinku). Jei teiginys Jums netaikytinas ar neturite informacijos, pasirinkite „Nežinau".

26. Kokias naujas tematikas ar prioritetus siūlytumėte įtraukti į kitą S3 koncepciją (2028–2034 m.)? *Pasirinkite visus Jums tinkamus variantus*

- Dirbtinis intelektas ir duomenų ekonomika (AI, didieji duomenys, kvantinė kompiuterija ir kt.)
- Žalioji energetika ir energijos kaupimas (vandenilio technologijos, baterijų inovacijos, energijos efektyvumas ir kt.)
- Biotechnologijos ir sveikatos inovacijos (genominės technologijos, biofarmacija, personalizuota medicina ir kt.)

- Pažangios gamybos technologijos (robotika, pramonė 4.0, fotonika, lazeriai, naujos medžiagos ir kt.)
- Žiedinė ekonomika ir tvarūs sprendimai (atliekų perdirbimas, ESG technologijos, klimato neutralumas ir kt.)
- Kibernetinis saugumas ir kritinės infrastruktūros apsauga (blokų grandinės, duomenų saugumas, atsparumas tiekimo grandinėms ir kt.)
- Agroinovacijos ir maisto technologijos (tvarus maistas, biologiniai ištekliai, maisto sauga ir kt.)
- Gynybos ir saugumo technologijos (dronai, autonominės sistemos, AI gynybai ir kt.)
- Jūrinė ekonomika („Blue Growth“) ir vandens technologijos (jūrų transporto inovacijos, vandenyno išteklių tvarus naudojimas ir kt.)
- Finansinės technologijos (FinTech) (mokėjimų inovacijos, blokų grandinės, skaitmeninė bankininkystė ir kt.)
- Įtrauki visuomenė, kultūros ir kūrybinės industrijos (skaitmeninis turinys, VR/AR sprendimai, dizaino inovacijos, kūrybinės platformos ir kt.)
- Kita (nurodykite)

27. Žvelgiant į ateitį ir formuojant 2028–2034 m. laikotarpio Sumanios specializacijos strategiją, Jūsų manymu, prioritetai turėtų būti suformuluoti ypatingą dėmesį skiriant šiems tikslams pasiekti:

	Visai ne	Iš dalies	Vidutiniškai	Svarbu	Labai svarbu	Nežinau
Ekonomikos diversifikavimui (perėjimui prie naujų sektorių, pramonės šakų, technologijų)						
Ekonominiam / technologiniam stiprinimui ir modernizavimui (esamų sektorių ir pramonės šakų efektyvumo didinimas)						
Spręsti žaliosios pertvarkos iššūkius ir galimybes						
Spręsti skaitmeninės pertvarkos iššūkius ir galimybes						
Skatinti aukštos pridėtinės vertės biotechnologinių produktų kūrimą ir eksportą						
Atsižvelgiant į nacionalinį saugumą						

ir strateginių technologijų plėtrą						
Inovacijų sistemos ir ekosistemų vystymui (skiriant dėmesį sisteminių sąveikų įgalinimui per inovatyvias švietimo ir ugdymo iniciatyvas, viešojo ir privataus sektorių bendradarbiavimo skatinimą, tarpinstitucinį koordinavimą ir kt.)						
Europos vertės grandines, siekiant sukurti konkurencinius pranašumus						
Atskirai įvertinant Sostinės regiono ir Vidurio ir vakarų Lietuvos regiono inovacinės raidos poreikius						

J. Pabaiga

28. Jei turite, prašome pasidalinti papildomomis pastabomis ar komentarais dėl Sumanios Specializacijos įgyvendinimo arba pasiūlymų, kaip būtų galima tobulinti šią strategiją ateityje.

Dėkojame, kad skyrėte laiko!

Tarpinio vertinimo ataskaita bus skelbiama viešai, joje galėsite susipažinti ir su apibendrintais tyrimo rezultatais.

ANNEX 5. VYSTOMOJO INTERVIU ATASKAITA

In-depth developmental interviews were conducted with a broad range of stakeholder groups, including ministry officials, implementing agencies, innovation support organisations, research institutions, large firms, and innovation-active businesses. Interviews focused on governance arrangements, coordination mechanisms, policy coherence, and implementation capacity. Interview insights have been explicitly linked to governance reform proposals in Chapter VIII and the orchestration recommendations in Chapter XII

Their primary role was to identify system-level bottlenecks affecting S3 performance, including fragmented responsibilities, limited continuity of priorities, misalignment between funding instruments, and constraints in linking research, industrial capabilities, and markets. Interviews also served to contextualise and interpret findings emerging from focus groups and surveys.

APIE TYRIMO METODĄ

Apimtis	20 dalyvių
Suinteresuotos šalys	ministerijų pareigūnai, agentūrų darbuotojai, Inovacijų paramos organizacijų vadovai, mokslininkai, stambaus verslo atstovai
Įmonės ir organizacijos	Saulėtekio slėnio mokslo ir technologijų parkas, Technologijų ir inovacijų paramos verslui asociacijos, Klaipėdos Mokslo ir Technologijų Parkas, Kibernetinio saugumo ekspertų asociacija, Žinių ekonomikos forumas, Lietuvos inžinerinės pramonės asociacijos (LINPRA), Dirbtinio intelekto asociacija, KTU, LSMU, KU, EIMIN, VRM, Inovacijų Agentūra, ŠMSM, Science for brain, Novartis, Femtika, AgriFood Lithuania DIH, Ligence.
Interesas	• MTEPI veiklos (moksliniai tyrimai, eksperimentinė plėtra ir inovacijos) • Verslumas (verslo plėtra ir inovacijų diegimas įmonėse) • Kompetencijos • Politikos įgyvendinimo kokybė
Organizavimas	Tikslinės auditorijos gilinamieji interviu
Trukmė	1-1.5val truksmės individualūs pokalbiai
Data	Lapkričio - Gruodžio
Klausimai	Kokybiniai (atviri):

- patikslinantys apklausos rezultatus
- surenkantys pavyzdžius ir idėjas
- formuluojantys nuomonę

Analizė	Lyginamoji, tematinė turinio analizė, trianguliacija
Kokybės užtikrinimas	• "Inter-coder" susitarimas • Ekspertų atrankos kriterijai • Rizikų valdymas • Atsakymai kryžmiškai palyginami su apklausa, literatūra (strategijomis, ankstesnės sumanios specializacijos ataskaitomis ir pasauliniais tyrimų rezultatais). • Neatsitiktinė, o tikslinė imtis – adresatų sąrašas. • Laikymasis Europos chartijos ir tyrėjų etikos taisyklių

INTERVIU GAIRĖS

S3 Tarpinis Pažangos Vertinimas

TIKSLAS

Įvertinti ir koreguoti S3 įgyvendinimo rekomendacijas, remiantis perspektyvomis ir praktika.

PERSPEKTYVOS

1. **MTEPI veiklos (moksliniai tyrimai, eksperimentinė plėtra ir inovacijos)**
   a. Proveržio technologijos ir jų vystymas
   b. Startuoliai
2. **Verslumas (verslo plėtra ir inovacijų diegimas įmonėse)**
   Bendradarbiavimas ir integracija į tarptautines vertės grandines
3. **Kompetencijos**
   Sumanios Specializacijos įgyvendinimui
4. **Politikos įgyvendinimo kokybė**
   a. Stebėsena ir rodikliai
   b. Įgyvendinimo mechanizmai
   c. Politikos koordinavimas

Pirminės diskusinės rekomendacijos S3 įgyvendinimui

1. **Nacionalinė pilotinių inovacijų finansavimo ir tęstinumo schema**
   Sukurti nacionalinį mechanizmą pilotiniams projektams ir jų tęstinumui, kuris būtų lankstesnis už ES finansavimą ir leistų išauginti sėkmingus projektus: *1) Specialus nacionalinis finansavimas pilotiniams tyrimams, 2) Tęstinumas po pilotinio etapo, 3) Tarptautiškumo ir tarptautinių projektų fondo elementas.*
2. **Integracija į Europos programas ir tarptautinį bendradarbiavimą**
   Padidinti Lietuvos inovatyvių įmonių dalyvavimą ES programose („Horizon Europe“ ir kt.) ir sistemingai tam pritaikyti nacionalinius instrumentus: *1) „Seal of Excellence“ ir nacionalinis ko-finansavimas, 2) Aukšto lygio konsultacijų finansavimas, 3) Tarptautinio bendradarbiavimo fondas, 4) Dalyvavimas ES schemose.*
3. **Klasterių, tinklų ir sektorinių akseleratorių politika**
   Stiprinti klasterius, asociacijas ir sektorinius akseleratorius kaip pagrindinius „tarpininkus“, jungiančius inovatyvias įmones su S3, ES programomis ir tarptautinėmis vertės grandinėmis: *1) Klasterių ir asociacijų kaip tarpininkų stiprinimas, 2) Finansavimas per klasterius ir tinklus, 3) Sektoriniai akseleratoriai.*
4. **Vertinimo ir stebėsenos reformavimas**
   Perorientuoti vertinimo ir stebėsenos sistemą taip, kad ji būtų skaidresnė, mažiau šališka ir labiau orientuota į inovacijų poveikį: *1) Skaidrumas ir šališkumo mažinimas, 2) Nauji rodikliai ir duomenų šaltiniai.*
5. **Kompetencijų ugdymas, susietas su S3 prioritetais**
   Tikslingai ugdyti įgūdžius ir kompetencijas tose srityse, kurias S3 nusako kaip prioritetines, kartu įtraukiant verslą: *1) Apmokamos praktikos ir verslo įtraukimas, 2) Specializuoti kursai.*
6. **„Triple Helix“ ir inovacijų ekosistemų valdymas**
   Instituciškai sutvirtinti verslo, akademijos ir politikos sąveiką, kad inovacijų politika taptų gyva ekosistema: *1) Praktiniai bendradarbiavimo mechanizmai, 2) Skaidri ir nuosekli komunikacija.*
7. **STEP technologijų ir sektorinių modulių plėtra**
   Sutelkti išteklius į kelias aiškiai įvardintas pažangias technologijas ir užtikrinti, kad visos aukščiau minėtos priemonės (pilotai, akseleratoriai, kompetencijos, klasteriai) jas prioritetizuotų: *1) Prioritetinių STEP sričių išskyrimas, 2) Sektoriniai moduliai, 3) Testavimo infrastruktūra.*

Inovacijų agentūra

Projekto tikslai:
- *Įvertinti Sumaniosios specializacijos koncepcijos įgyvendinimo pažangą.*
- *Nustatyti MTEPI prioritetų privalumus/trūkumus ir pateikti siūlymus tobulinimui.*

VYSTOMOJO INTERVIU TYRIMO REZULTATAI

Nr.	Pavadinimas	Rekomendacija	Pastebėjimai	Citatos
1.	**Nacionalinė pilotinių inovacijų finansavimo ir tęstinumo schema**	Specialus nacionalinis finansavimas pilotams 1. Sukurti nacionalinę programą pilotiniams MTEP ir inovacijų projektams, kuri: ○ nėra tiesiog ES fondų kopija; ○ turi paprastesnes taisykles, trumpesnius terminus. ○ leidžia išbandyti naujus modelius, technologijas, partnerystes. 2. Ši programa veikia kaip „bandymų poligonas“ prieš einant į didesnes ES schemas (Horizon, Eurostars, IPCEI ir pan.).	• Lietuva gali tapti testavimo valstybe. Data sandbox galėtų pritraukti užsienio įmones norinčias išsitestuoti produktus pagal dvigubą „sandbox“modelį: kietasis poligonas (dronai, kibernetinis „range “, klinikinės „living labs “) + minkštasis „Health Data Sandbox“per Valstybės duomenų agentūrą su aiškiu mokesčiu ir anonimizavimo procedūromis. • Aiškus vizualizuotas procesas, kuris apima pilotinį ir tęstinį finansavimą (pilotas → follow-up → komercija). Kur pateikiami finansavimo mechanizmai, kriterijai,	„…Valstybės duomenų agentūra… paleido platformą… kur gali bet kas aplikuoti ir gauti sveikatos duomenis… Turi standartizuotą kelią… už tam tikrą mokestį.“ „…geriau… finansuoti įrankio išbandymą… praktiškai… negu palaikyti kažkokį merdėjančių produktų finansavimą…“ „…pirmą mokėjimą gauni ~20 %, o likutis ateina projekto gale… Labai jaunoms įmonėms dėl to nepavyksta dalyvauti…“ „…ne dviejų metų procesą… o iškart tikrintis rinkoje… geriau finansuoti praktinį išbandymą…“ „…yra krūva reikalavimų… bioetika, duomenų sauga… būtina centralizuota lyderystė ir aiškūs valstybės prioritetai…“ „...turime ... defence ... tai apima tiek testavimą, tiek prototipavimą, taip pat skirta ir sandboxui… turėjome dirbtinio intelekto sandbox… šios priemonės jau yra nacionalinės plotų schemos pagrindas.“ „…dabar turime labai daug skirtingų priemonių ir neturim vienos tokios tęstinės,

	Tęstinumas po pilotinio etapo 3. Nacionalinėje ir ES priemonių logikoje įvesti „follow-up“liniją sėkmingiems pilotams: ○ atviri kvietimai būtent pilotų plėtrai; ○ galimybė automatizuotai pereiti į kitą finansavimo etapą (jei pasiekti rodikliai).	koordinuojančios institucijos. • Užtikrinama, kad proceso grandinė yra periodinė, nenutrūkstama, kad įmonės galėtų planuotis etapus ir finansavimo mechanizmus. • Integruoti finansavimo mechanizmai turėtų leisti įmonėms pačioms nuspręsti technologijų vystymo greitį ir perėjimą į kitus vystymo etapus. Pvz. Sprintiniai (6sav) • Gynyba ir Sveikata yra uždariausi ir labiausiai reglamentuoti sektoriai, kuriems reikia išorinės pagalbos, bet įsileisti ir duomenimis ar testavimo bazėmis pasidalinti yra per daug sudėtinga. Reikėtų procesų, kurie palengvintų bendradarbiavimą ir suteiktų testavimui sandbox.	kur mes augintume nuo pradžios iki pat pabaigos (komercializavimo).“ „…verslui reikia padėti judėti nuo TRL… iki TRL9, kad būtų aiškus užtikrintas kelias ir finansavimo priemonės…“ „…turime Inovacijų agentūrą, … TechHub/akseleratorius, GovTech Lab, MilTech sandbox… technologijų parkus… ‘vienas pagrindinis parkas’, kuris koordinuotų visus kitus…“ „…turėtų ateiti įsipareigojimai ir pasiekti tam tikrą lygmenį per laikotarpį… priklausomai nuo intensyvumo turėtų tam tikri KPI būti numatomi.“ „…tai yra vientisa grandinėje ir kad jau teikiant paraišką būtų matytųsi, kaip toliau…“ „…tas tęstinumas po pilotinio iš karto reikia… kad jis privalomas… kad negali būti sugalvojom… įsisavinti bus pinigai ir tuo pasibaigs.“ „…ką pasigendu – tų klasterių organizacijų įsijungimą į tarptautinius tinklus…“ „…turėtų būt kažkokie milestone’ai… priklausomai nuo to, kokio pobūdžio produktas… turi būti pradėtos derybos… konkretūs žingsniai… kad būtų aišku, kad bus einama į antrą etapą.“

	• Išryškinti veikėjus ir organizacijas, kurios atsakingos už vystymą skirtinguose etapuose, suteikiant jiems daugiau atsakomybių ir išryškinant veiklos sritis (kas už ką atsakingi, kad veiklos nepersidengtų) pvz akseleratoriai, spiečiai, hubai, inovacijų agentūra, mokslo parkai. Tai padėtų įmonėms susiorientuoti vystymo procese. • Finansinės Priemonės turėtų atliepti problematikas, su kuriomis susiduria įmonės skirtinguose TRL etapuose. • Aiškiai įvardinti kriterijus perėjimui iš vieno finansavimo etapo į sekantį, taip užtikrinant skaidrumą, nuoseklumą, skaidrumą.	„…paruoštų duomenų paketų centrų neturime… reikėtų prioritetų sveikatos duomenims ir lyderystės… ligoninės 'apsikabinusios' duomenis… bioetika ir reikalavimai…" „…dėl finansų ir jaunų (aukštos pridėtinės vertės) startuolių: labai ankstyvos stadijos – gepas; reikėtų valstybės finansavimo ankstyvoms komandoms… Co-investicinis fondas tikrai labai ankstyvoje stadijoje investuoja…" „…follow-up fondai daro (vieną) follow-up… vienos investicijos dažniausiai neužtenka, ypač sudėtingoms technologijoms." „…idėja gera… specialus finansavimas pilotiniams tyrimams… bet jeigu nebus skaidrumo – tęstinumo po piloto nebus." „…rekomendacija turi būti labai aiški: procedūra, kas vertina… vertinti turėtų nemaža dalimi pats verslas." „…finansavimas turi būti susietas su rezultatu… kaskadinis: prototipas → komercializavimas → bonusai." „…komercializavimo kriterijai: eksportas, gamybos apimtis, našumas, pridėtinė vertė… pajamos/eksportas." „…projektuose turi būti prisiimama rizika; '50 % broko' toleruoti negalima… jei nepasiteisino, dalį pinigų gauni, bet atsakomybė už rezultatą privaloma."

„…su DI technologijomis… produkto ciklas 3 mėn.–pusmetis… reik greitų (9–12 mėn.) pilotinių sprendimų…“

„…šešių savaičių režimas… idėja → 1,5 mėn. sprintas → sprendimas dėl tęsimo… greitumas prieš europines programas.“

„…reikia aiškių kriterijų (naujumas, kokybė, poveikis) ir ne vieno eksperto vertinimo, kad atrinktume geriausias idėjas.“

„…tikslinės DI smėliadėžės… fintech smėliadėžės pavyzdys… galėtų būti sveikatos, dvigubos paskirties ar DI smėliadėžės, pritraukiant užsienio žaidėjus.“

„…lankstumas… daugiau būdų gauti finansavimą… realių idėjų atranka… skaidrumas (kvietimai ‘per 30 d.’ – problema).“

„…kvietimai turi būti fokusuoti į realių problemų sprendimą… rinkos pritaikomumas ne tik vienam atvejui.“

„…geriau finansuoti įrankio išbandymą rinkoje, net mokėti partneriams už praktinį testą, negu merdėjančio produkto finansavimą…“

„…dabar dažnai finansuojamas 2 metų procesas, kurį galima pasitikrinti per mėnesį.“

„…sveikatos sektorius neveikia laisvoje rinkoje; labai reguliuotas… reikia paruoštų žmonių/procesų…“

„…reiktų atskirti fiziniai… poligonai… ir minkštieji sandboxai… kibernetinis saugumas… testuoti realius srautus nacionaliniu lygiu… to tikrai labai reikėtų.“

„…aukštosios mokyklos… specialistai… būtų pripažinti… sudaromos galimybės prieiti prie tam tikrų duomenų… duomenys kartais labai svarbi valiuta…“

„…įtraukti nacionalinius vienetus, pavyzdžiui, kariuomenę… dronams reikia reikalų… susitarimus tarp valstybinių organizacijų… kad vieni kitus pripažintume…“

„…siunčiam signalus… Nacionalinis kibernetinio saugumo centras… planuoja kitais metais… bet turi išteklių ir žmonių problemą… anonimizuoti duomenis… reikia sugalvoti procesą, kaip tai daryti…“

„…kurti ne šiaip mobilias programėles… o konceptualiai naujus produktus… remtis pusiau realiais duomenimis…“

„…abiejų institucijų žmonės turėtų būti finansuojami… paskatintų labiau atsiverti… skirti daugiau laiko… padaryti kokybiškesnį produktą.“

„…vieno langelio principas… viena skaitmeninė platforma… kur teiki paraiškas, vyksta vertinimas…“

„…biudžetas turi būti dinamiškas… atsiskaitymas ne per biudžeto eilutes, o per pasiektus rezultatus…“

„…dirbtinio intelekto ‘sandboxai’… sprendimai turėtų praeiti sertifikavimą ES…“

„…kvietimai neturi priešinti verslo ir mokslo… bendra biudžeto dalis…“

„…statistika: 1 iš 10 atžalinių įmonių išgyvena…“

„Lietuvoje mes turime labai mažai demonstracinių pilotinių projektų… dažniausiai [Horizonto] projekto rėmuose… smulkus vidutinis verslas gauna paramą realiai išbandyti naujas technologijas, jas įsidiegti…“

„…nebūtinai startuolis, bet SMV gauna paramą… ir paskui nusprendžia, ar verta investuoti… Nes inovacijos yra skirtingų lygmenų… įmonės, šalies, regiono, pasaulio.“

„…gyvosios laboratorijos… yra atskiras europinis tinklas… svarbu, kad kurdami kažką naujo pagalvotume, kaip sujungti su jau egzistuojančiais tinklais.“

„…Inovacijų agentūra dabar su ta pilot do… idėja neblogas variantas – gali veikti.“

„…vientisumas, tęstinumas… žinojimas, kad yra visa vertės grandinė… lėšos skiriamos visoms stadijoms… per vieną vientisą programą…“

„…dabar… paraiškos būna iki TRL6… o kas toliau? Metus–pusantrų pereiti… įmonės nežino, ką daryti, vėl „medžioja“… vystymas stoja, jeigu nėra lėšų…“

„…suskirstome fazėm – tarkim yra keturios fazės… trečioj fazėj gali ateiti investuotojas…“

„…parkai galėtų būti žinių/kompetencijų centrai… Inovacijų agentūra daug prisiėmė – dubliuojam ir konkuruojam; jie vis tiek grįžta prie parkų ar privačių iniciatyvų…“

„…TRL lygiai – nuo 7–8 jau turėtų atsirasti investuotojai… tęstinumą palaikytų specialūs fondai su valstybės parama ir profesionaliais valdytojais.“

„…fazės… po kiekvieno etapo – teigiami rezultatai → keliamasi į kitą… investuotojo lyderystė TRL7–8…“

“ „Būti geografinėje vietoje ir būti regioninės politikos dalimi – skirtingi tikslai.“

„Mūsų priemonės yra fragmentuotos… nėra bendro principo ‘nuo idėjos iki galutinio produkto’.“

„Instrumentas gali būti tiek valstybės biudžeto… po to jau tikrai nėra sudėtinga pridėti ir struktūrines lėšas…“

„Visa sistema fragmentuota, procesas nevyksta – net etapais susidėlioti nesuprasi kur kas.“

„Biudžetas biudžetuojamas vieniems metams… reikia keisti Biudžeto sandaros įstatymą, kad galėtume biudžetą perkelinėti metams ir užtikrinti tęstinumą.“

„Sveikatos klinikiniai tyrimai Lietuvoje stringa, nes nėra užtikrinimo dėl kompensavimo… šalys įsipareigoja, mes – ne.“

„Yra daug institucijų… veiklos persidengia… Inovacijų agentūra galėtų būti ekspertinis ‘pool’as’, parkai – dirbti su ekosistema.“

„Spiečiai, parkai, LEZ, asociacijos – turi veikti ‘keturkampiu’, o ne ‘kiekvienas sau’.“

„Etapiškumą išdėstyčiau… nuo antro iki penkto, penkto–septinto, septinto–devinto TRL… ir žinotum, kad gali tęsti toliau.“

„Labiau ‘problemų sprendimas’ ir ekspertinis vertinimas, o ne ‘varnelės’ - keli ekspertai kaip Horizonte.“

„Mums reikia partnerių, nes valstybės institucijos jos niekada nenori labai pripažinti kompanijų rezultatų kaip patikimų.“

„Kartais būna… daugiausiai darbo gaut tų pinigų, o tada jau nustumti viską iki finišo. Tada, kaip ir nebeaišku, kas toliau.“

„Tam, kad iš proto’o padaryti produktą, tai dar dažnai reikia metų, kartais trijų, o pinigų jau tam niekas nebeduoda.“

„Taip pritarčiau, kad tęstinumo schema visai ir gerai būtų.“

„...visas daugiau dėmesys yra hakatonas. Idėja… tokia popkorno stadija… pirminės konsultacijos ir jau turi būti privaloma tvarka įregistruotas įmonę.“

„Įmonių registruota negali būti žalios idėjos pagrindu.“

„Kažkoks turi būti vientisas, normalus finansavimo šaltinis… kad galima būtų auginti technologiją, ir tik tada registruoti įmonę.“

„Turi būti vertinamas natūralus įmonės subrendimas… išvystyta įmonė, išsilaikiusi rinkoje, subrandinusi produktą.“

„Pagal įmonės poreikį, o ne pagal surašytus rezultatus… vieniems reikia konsultacijų, kitam prototipo, trečiam tarptautinio eksperto.“

„Parkas inkubavimo ir akceleravimo programos nėra gavęs finansavimo… visiškai kaip UAB, dirbk kaip išmanai.“

„Prikurta naujų struktūrų… jie gavo finansavimą, yra įsipynę į ekosistemą… parkas neturi lėšų vykdyti.“

„…trūksta tiek erdvės, tarkim, testuotis dronus ar kažkokias naujas technologijas, kad lygiai taip pat ir trūksta priėjimo prie tam tikrų duomenų… sveikatos sektoriui… uždarumas tam tikrų sektorių… kad Lietuva galėtų tapti pilotine valstybe… tai būtų… būdas pritraukti tarptautines įmones.“

„…su sveikata ar gynyba, jie sako, kad mes norėtume, bet mes negalim… jų sektoriai labai uždari ir reikia labai daug dėmesio ir laiko duomenų sutvarkymui… neturime žmonių, finansų ir laiko… todėl viskas įstringa… galbūt smėliadėžės… finansų sektoriuje… pritraukė ‘Revolut’… tai veikia.“

„…mes taip pat kalbame ir apie follow-up finansavimo galimybes, nes šiuo metu didesnis dėmesys skiriamas startuolių steigimui, negu jų ugdymui ir vystymui…“

„…vadinamasis ‘mirties slėnis’… neturime gerų instrumentų žinioms paaugti iki technologinių sprendimų, kur reikalingas išbandymas gamybinėmis sąlygomis…“

„…tai tikrai turėtų būti mažinami pinigai, greitai besisukantys… mažų grantų… bet kad jos užtikrintų patikimumą…“

„…reikia galvoti apie patrauklias schemas, kad verslas galėtų nusipirkti demonstravimo

paslaugas… bet kad tai nebūtų veiklų imitavimas…“

„…man patiko idėja kurti verslo inkubatorių technologijoms sveikatos srityje… prieiga prie bazinės laboratorinės įrangos… gyventų mentoriai…“

„…pakelti technologinės parengties lygius į 5–7… tam reikia instrumentų…“

„…schema yra nelanksti… nėra net… investicijų kultūros… viskas sufokusuota į greitą uždarbį… o ypač pačios kiečiausios inovacijos, kurios keičia pasaulį, jos ateina iš giliausio aukščiausio mokslo…“

„…versle mokslo metodas… esi absoliučioj neapibrėžty – hipotezė, greitas atmetimas (užmušti zombį)… kuo anksčiau… garbingiau…“

„…korporacijos… turi savo vidinius akseleratorius… kiekvieną etapą finansuoja… mūsų akseleratoriai… jaunimėlis priima idėjas… o po to atsiduria gatvėje ieškoti pinigų.“

„…mokslinis metodas… trumpi langai laike… greitas hipotezių atmetimas…“

„…Lietuvoje biudžeto sudarymas… labiausiai orientuojamas tik į metus į priekį… tai… persikelia į mikro priemones… ilgalaikės priemonės dažnu atveju arba neturi užtikrinto finansavimo, arba joms neskiriamas prioritetas.“

„...nors ir sritis paskelbiama prioritetine, jam neskiriama prioritetinis finansavimas, nes jis išbarstomas ir kitoms sritims... jeigu prioritetas, jam negali trūkti pinigų...“

„...turi būti... atviras pasakymas, skaidrumas...“

„...proceso tarpiniai rodikliai gali... didinti paskatas sekti progresą... jie turi būti taiklūs... procesai nėra greiti.“

„...kas tie matuos... kaip tarpininkų kokybinę veiklą pamatuoti? Susitikimų skaičiai – nelabai...“

„...follow-up finansavimo galimybės... startuoliams... yra labai svarbios ir reikalingos, nes... daugiau nei 80 % startuolių lieka pradiniame lygmenyje dėl finansavimo trūkumo... norint gauti didesnes finansavimo galimybes, kad projektas nesibaigtų demonstracinėje stadijoje... reikia pereiti labai daug etapų...“

„...turime išlaikyti balansą tarp inovacijų... ir publikacijų. Jeigu didžioji dalis mokslininkų orientuosis į startuolių kūrimą ir patentavimą, stringame su publikacijomis, nuo kurių priklauso finansavimas.“

„Nėra infrastruktūros pilotiniam testavimui. Iš esmės tai laboratorinėmis sąlygomis... arba ieškomas papildomas finansavimas, kad būtų galima judėti į priekį.“

				„…sukurta nesankcionuotų laivų Baltijos jūroje stebėjimo sistema… Duomenys imami iš ESA (laisvai prieinami) ir atsinaujina 1–2 k./sav., todėl tiesioginio stebėjimo negalima – ne dėl modelio, o dėl duomenų trūkumo. Su KAM ir Karinėmis jūrų pajėgomis diskutuojame, bet visur kyla duomenų saugumo/prieinamumo klausimai.“ „…nevadinu to ekosistema… tai pavieniai atvejai (pvz., leido Kuršių mariose dirbtinai išpilti naftos dėmę ir ją surinkti)… Ekosistema būtų nuolatos veikiantis aparatas.“ „Daugiau iniciatyvos ir supratimo iš verslo/pramonės pusės, kad mokslas jiems gali būti naudingas.“
2.	**Integracija į Europos programas ir tarptautinį bendradarbiavimą**	„Seal of Excellence“ ir nacionalinis kofinansavimas 1. Įsteigti nacionalinę priemonę, kuri kofinansuoja projektus, gavusius „Seal of Excellence“, bet negavusius ES finansavimo. 2. Tai mažina švaistymąsi geromis idėjomis ir motyvuoja teikti paraiškas.	• Kriterijai, kaip „Seal of excellence“ sumažintų paraiškų tiekėjų skaičių, Lietuvoje tokių mažai. • Finansavimo priemonės galėtų būti skirta narystės mokesčiams, kaina gali siekti iki 10k, ir kai kuriems yra sudėtinga tokią sumą padengti, o tinklaveika suteikia didžiausią naudą įsitraukimui į	„…kofinansavimas tiems, kas gautų aukštą įvertinimą Europoje… tai būtų greičiausias būdas didinti dalyvavimą ES programose.“ „…tarptautiškumo fondas padėtų formuotis konsorciumams ir skatintų MTP mobilumą…“ „…nukreiptume tikslingiau esamas lėšas… didelę įtaką darytų integracijai į ES programas.“ „…geriausiai patvirtintų (t. y. rodytų poveikį) – pateiktų paraiškų skaičiaus didėjimas ir gerai įvertintos paraiškos; sėkmingų paraiškų skaičių riboja veiksniai, nepriklausantys nuo kokybės.“

	Aukšto lygio konsultacijų finansavimas 3. Kurti programą, kuri kompensuoja dalį ekspertinių konsultacijų: paraiškų „Horizon Europe“, EIC, Eurostars ir pan. rengimui. 4. Tai galima daryti per Inovacijų agentūrą / asociacijas / klasterius. Tarptautinio bendradarbiavimo fondas 5. Įsteigti atskirą potekstę fonduose (ar atskirą priemonę), skirtą tarptautinio bendradarbiavimo gebėjimų stiprinimui: ○ partnerių paieškai, konsorciumų kūrimui; ○ dalyvavimui ES tinkluose,	tarptautinius projektus. • Kofinansavimas galėtų dengti darbo užmokesčio kainos dalį, nes čia yra didžiausios išlaidos dalyvaujant ko-finansavimo schemose. • Pagalba įmonėms įeiti į tarptautines vertės grandines turi būti suteikiama atsakingų proceso dalyvių (pvz, asociacijų, parkų), reikėtų plačiau dalintis tarptautinio įsitraukimo galimybėmis. • Tarptautinio finansavimo priemonės turėtų atliepti įmonės brandos poreikius, Gali būti tiesiogiai susiję su etapiniu procesu veiklos augimui, aprašytu aukščiau. • Fast-track galimybės, pridedant papildomus balus paraiškų	„…viena narystė kainuoja apie dešimt tūkstančių… tai yra daug, bet vertė didžiulė…“ „…mūsų projektai atsirado dėl dalyvavimo tarptautiniuose tinkluose… atveria galimybes startuoliams dirbti su tarptautinėmis korporacijomis…“ „…kas gavosi – gavosi atskiras pulsas… vienos taisyklės EK, kitos Lietuvoje… siaubingai sunku…“ „…jaunoms įmonėms dažnai neįmanoma prisidėti (trūksta lėšų)… pirmas mokėjimas ~20 %, likę projekto gale – todėl jos neįsitraukia.“ „…ankstyviems startuoliams turėtų būti 100 % intensyvumas; brandesnėms – 70/30 ir pan., jei prioritetinės tematikos.“ „…aukšto lygio konsultacijų finansavimas (užsienio ekspertai) - veiksminga… Seal of Excellence/kofinansavimas – atsargiai… proveržio nesitikime.“ „…‘misijos’/išvykos: jų yra, bet rezultatas ‘šiaip sau’.“ „…kofinansavimas (darbo užmokestis kaip didžiausia išlaidų dalis) – veiksminga; narystės mokesčiai/konsultacijos – ne esminis akcentas.“

	misijose, klasteriuose. 6. Galima įtvirtinti siekį, kad ~20 % programos lėšų (pvz. tam tikroje priemonėje) būtų skirta projektams su tarptautiniais partneriais. Derybos dėl dalyvavimo ES schemose 7. Nacionaliniu lygiu planingai derėtis dėl Lietuvos įtraukimo į dar nepasiekiamas schemas (EIT „KIC“, IPCEI, gynybos iniciatyvas ir pan.) – tai dalis S3 koordinavimo tarybos mandato.	vertinime tiems, kad gavo tarptautinį pripažinimą, pvz seal of excellence. • Svarbūs aspektai įgyvendinimui: - seal of excellence paraiškos yra suskurtos jau su tarptautiniais partneriais, tai reikėtų apibrėžti kaip finansavimas būtų teikiamas kai tarptautiniai partneriai nacionalinio finansavimo gauti negali, tai gali atsiliepti projekto formatui. • Lietuva yra patraukli partnerė ES projektams, tačiau reikia pritraukti galimybes dalyvavimui nacionaliniu mastu. • Aukšto lygio konsultacijų finansavimas neturėtų būti priskirtas koordinuoti vienai organizacijai, bei su	„…EU kokybės filtrai (‘Seal of Excellence’) kaip stebėsenos elementas, o ne būtinas kriterijus pradžioje.“ „…DI startuoliams europinės projektinės veiklos dažnai per lėtos; prioritetas – pardavimai/konferencijos/šalies stendai, tiesioginiai kontraktai.“ „…narystė tarptautinėse asociacijose dažnai nebrangi ir padeda prisijungti prie konsorciumų/išmokti paraiškų rengimo.“ „…DU padengimas – dažniausiai didžiausia išlaidų dalis.“ „…kai teikiame projektus su intensyvumu fifty… reikia užsitikrinti kitą 50 %… viešosios/valstybinės įstaigos neturi šansų be papildomo finansavimo…“ „…sukurti produktą, kur būtų galima laimėjus projektą kofinansuoti darbuotojų atlyginimus… ne techninės dalies pirkimą…“ „…jei įtrauktume ES lygio kokybės filtrus…tada Lietuvoje bus mažai tokių žmonių… verta įtraukti ekspertus ne vien mokslininkus… ir iš verslo.“ „…jeigu norim padaryt patraukliau ES – reikalaukime mažesnio kofinansavimo… Lietuva turi būti laiptelis pasiruošimui į tarptautinę rinką.“

		konkrečiu numatytu rodikliu numatančiu būsimų paraiškų skaičių. Tai turėtų būti susieta su anksčiau aprašytu veiklos brandos procesu. Galima siūlyti kofinansavimą paraiškų rengimui, kad galima būtų įpirkti tarptautinius sėkmingus konsultatus.	„…ekspertų klubuose – nešališkumo deklaracijos… tikrinimas per Registrų centrą…“ „…paraiškos būtų anglų kalba… vertintų ir užsienietis… lengva palyginti, kaip vertina Lietuva vs. užsienis.“ „Manau, kad tokio fondo tarptautiniam bendradarbiavimui reikia… buvo priemonės – stojimo į organizacijas mokesčiai, konsultacijos, bet tinklaveika yra numeris vienas, kad pakliūtum į tarptautinius projektus.“ „…skatinti lietuvius vykti į tarptautinius renginius, juose aktyviai dalyvauti… klasteriai/asociacijos parveža žinias ir dalinasi su nariais…“ „…tie, kurie gauna Seal of Excellence, galėtų būti tramplynas į nacionalinę paramą – su papildomais balais.“ „…įtakingesnėse tarptautinėse organizacijose dalyvavimas kainuoja… nėra taip, kad nemokamai prisijungi ir dalyvauji.“ „…Seal of Excellence – Horizon paraiška su tarptautiniais partneriais; nacionalinė parama skiriama nacionaliniam pareiškėjui. Kaip su partneriais?… Eureka analogija: ne visos šalys gauna → projekto formatas griūva.“ „…konsultantai paraiškoms – 10–15 tūkst. € (pvz., Civitta/SVITA)… priemonė padėtų

susimažinti kaštus tiems, kurie ir taip rašo paraiškas.“

„…kai intensyvumas <70%, mums (viešoji įstaiga) jau labai sunku… 70% – dugnas…“

„…į konsorciumus įsijungti nėra bėda, jei turi idėją/kompetenciją; problema – žmogiškojo/technologinio kapitalo kiekis LT…“

„…nacionalinė parama – nacionaliniam pareiškėjui; partnerių finansavimas kitose šalyse – asinchroniškas; rizika, kad ne visi gaus → bendras projektas byra.“

„Kodėl Horizon nedalyvauja regioninės įmonės? Nes jie nežino… ir trūksta kompetencijos parengti paraišką.”

„Turime per nacionalines priemones skatinti įsitraukimą į tarptautines programas… didesni pokyčiai reikalingi nacionalinėse priemonėse.“

„Asociacijos/klasteriai turi spręsti ekosistemos poreikius, o savivalda – inovatyvius pirkimus regiono problemoms.“

„EIC Accelerator… ankstyvoj stadijoj plačiau, bet inovacijų programa turi būti siauresnė; etapai svarbūs.“

„Pereiti ‘tiesiai’ į etapą - kaip EIC: jei turi nacionalinį patvirtinimą, suteikti ‘optional’ supaprastinimą.“

„Horizonte ekspertinis vertinimas… priemonės angliškai… daugiau ekspertų, mažiau teismų-atsiranda patrauklumas ir aiškumas.“

„Horizon konsultacijas – per ‘NCP’ tinklą, ne atiduoti vienai organizacijai; vengti ‘paraiškų skaičiaus’ rodiklių.“

„Mes esam pakviesti turbūt 5–10 kartų dalyvauti tarptautiniuose konsorciumuose… bet Lietuvoje finansuojamos tik mokslinės institucijos.“

„Kai kuriais atvejais įmonėms yra uždaryti finansavimo keliai… galėtų būti kažkoks kofinansavimas, jeigu įmonė patikima.“

„Verslo misijos – viskas ten labai gerai veikia… įmonės, kurios gali, tuo sėkmingai naudojasi.“

„Tarptautiniai tinklai turi nario mokestį… trys tūkstančiai, šeši tūkstančiai, yra buvę ir dešimt tūkstančių.“

„Visur yra kofinansavimas… gali rinktis, kiek gali apyvartines lėšas skirti.“

„Tai reikalinga… mes nesame universitetas, negauname 100 % finansavimo.“

„Visada reikia derintis prie europinių, bet… Lietuvoje trūksta infrastruktūros… universitetai nesiekia europinio lygmens.“

„…padarėm struktūrinės paramos lėšų perkėlimą į Europos horizontą… perkelta

12,5 mln… finansuoti Seal of Excellence projektai – penkių įmonių projektai įgyvendinami kaip ‘Horizon’ projektai, bet pinigai – mūsų.“

„…labai svarbi jų tinklaveika… kad įmonės (per asociacijas) įeitų į tarptautines organizacijas, kurios formuoja ‘Horizon’ politiką… EIMIN remia parodas, bet mes sakom, kad parodos – viena, o tarptautinė tinklaveika – kita.“

„…daug schemų reikalauja nacionalinio kofinansavimo, o įmonės jo neranda – tada neina į pagrindinį projektą…“

„…labiau turi prasmę finansuoti projektus, kurie dalyvavo tarptautinėse programose… EIMIN sako ‘Horizontas – ne mūsų reikalas’, bet… reikia skirti finansavimą.“

„…kas pasiteisina – investavimas į žinias ir kompetencijas… kartais reikia paslaugų nusipirkti…“

„…profesionalus lobizmas… jie rašys paraišką ir prisiims atsakomybę… tikimybė laimėti didesnė… mokinti visus patiems rašyti – kvailiausia… reikia Lietuvoj turėti patikimus rašytojus…“

„…ar tu eidamas pas partnerius sugebi būti pamiltas – atneši jiems galimybes uždirbti, pagreitinti apyvartą… visi žiūri, ką tu atnešei…“

„Amerikoj tarptautiškumo sąvokos nėra… problema ne ‘tarptautiškumas’, o vertė partneriui.“

„…sumokėti keturženkles ir didesnes sumas profesionaliems paraiškų rašytojams…“

„Pirmoji mintis… skepsis dėl darbo užmokesčio padengimo… laikina priemonė gali tapti ne laikina… jei nutrūks – ar gavėjas pasirengęs pats padengti?… būtų subsidija tam sektoriui.“

„…dėl naryščių… galėtų būti priemonė… bet tikimės rezultatų, kurie grindžia dalyvavimą toje narystėje.“

„…kompetencijoms skiriamos lėšos… yra nišinių brangių specializacijų, kur kodėl gi ne… bet jungti prie trumpalaikio pobūdžio priemonių… kad netaptų pripratimas.“

„Lietuvos mokslo taryba finansuoja Lietuvos įmonių ir MTEP institucijų dalyvavimą tarptautiniuose tinkluose (nuo 2023–2024 m.)… Reikėtų žiūrėti, kad nesidubliuotų su LMT NCP ir jų finansavimu.“

„…sunku suvaldyti, kad dalyvavimas tarptautiniame tinkle nebūtų vien dėl dalyvavimo, o kurtų pridėtinę vertę.“

„…5–6 tinkluose dalyvavimas finansuojamas LMT… finansiškai gera parama institucijai, nes mokesčiai auga, o turime galimybę gauti kompensaciją.“

				„…pavyko išlaikyti kai kuriuos podoktorantus… tačiau dažnai po 2 metų jie išvyksta; reikalinga papildoma finansavimo schema… galimas verslo prisidėjimo modelis (pvz., per mokestinę sistemą).“
3.	**Klasterių, tinklų ir sektorinių akseleratorių politika**	Klasterių ir asociacijų kaip tarpininkų stiprinimas 1) Skirti tikslinį finansavimą klasterių ir asociacijų veiklai, suteikiant jiems aiškų mandatą: a) jungti įmones į ES vertės grandines; b) organizuoti bendras paraiškas į ES programas; c) teikti nariams ekspertinę pagalbą. Finansavimas per klasterius ir tinklus 2) Priemonėse numatyti modelius, kur: a) paraiškas teikia konsorciumai per klasterius;	• Klasteriai, spiečiai ir asociacijos yra labai reikalingi, tačiau jų veiklos persipina ir dėl to rezultatų nepasiekia, kokius galėtų. Jos yra esminės kuriant bendradarbiavimą sektoriuose ir tarp sektorių. Reikia apibrėžti šių darinių veiklos sritis. • Trūksta koordinatoriaus, kuris užtikrina šių darinių veiklos įgyvendinimą, priskiria funkcijas, skatina bendradarbiavimą ir skirsto finansavimą. Tai galėtų daryti Inovacijų Agentūra. (9 auklės, vaikas be galvos) • Pvz. parkai gali būti regioniniai kompetencijų centrai	„…klasterių priemonė anksčiau nebuvo labai sėkminga… dabar turime ir sėkmės istorijų… klasterių tinklo stiprinimas svarbu… bet jie turėtų stiprinti tarpininko / sistemos koordinatoriaus vaidmenį…“ „…iš tematinės pusės girdėjau - užsiminėt mediciną pirmu numeriu…“ „…narystės brangios, bet be jų neįmanoma… labai didelės galimybės startuoliams…“ „…didelė dalis klasterių nori įsisavinti pinigus; yra ir gerų, bet finansavimas per klasterius – ‘dar vienas kanalas algoms’…“ „…vaučeriai/inočekiai – nedidelis (keliasdešimt tūkst.) finansavimas konsultacijoms – tarpinis variantas.“ „…jei inovaciniai kvietimai – administruoti turėtų Inovacijų agentūra; regionuose galima įtraukti parkus, bet reikia patyrusių koordinatorių ir centralizuoto koordinavimo.“ „…ne mėtyti pinigų ‘be konkurso’; įvertinti realų poreikį; kvietimai specifiniai regiono problemoms (pvz., jūrinės technologijos pajūryje).“

	b) prioritetas teikiamas projektams, kuriuos koordinuoja tarpininkų organizacijos – klasteriai, asociacijos, mokslo ir technologijų parkai. Sektoriniai akseleratoriai (sveikata, MedTech, IRT ir kt.) 3) Įkurti / sustiprinti teminius akseleratorius: sveikatos, MedTech, IRT, AI, kibernetinio saugumo ir pan. 4) Akseleratoriai tampa entry point inovatyvioms įmonėms: a) pagalba pilotams, b) ryšys su klasteriais,	(su platesniu mandatu), o klasteriams reikia aiškios paramos priemonės. • **S3 finansavimas turėtų būti sektorinis, o ne regioninis, užtikrinant, kad S3 prioritetuose yra numatomos regionų sektorinės stiprybės. Siūlomi S3 prioritetai: Gynyba, Sevikata, Regionai (pvz, Cleantech, kur būtų numatoma blue tech, green tech, agro tech, energy tech ir pan.)** • Regioninė politika turėtų būti atliepiama fokusuojantis į sektorius ir regionų stiprybes tam tikruose sektoriuose ir S3 prioritetuose. Regionai yra apsibrėžę savo sektorines stiprybes specializacijos	„…regionuose trūksta kompetencijų; efektyviau – horizontali (sektorinė) programatika, o ne teritorinis pjūvis.“ „…IA galėtų būti finansų skirstytoja per tikslines konkursines programas; regioninis akseleravimas dažnai nesulaukia pakankamos kokybės/kiekio.“ „…stiprinimas per asociacijas ir klasterius yra geras… tik per projektų atrankos ir vertinimo mechanizmus reikia įvertinti taikymą…“ „…didžiųjų miestų regionų problema – randa būdą apeiti… vietoj fiktyvių būstinių vertinti realų darbą regionuose: veikla, darbo vietos…“ „Esu super skeptiškas… nematau pridėtinės vertės nei vieno klasterio/tinklo… dažnai – ‘diskusijų klubai’… interesų konfliktai.“ „…kas tas administratorius… klasteriai yra vienas iš pretendentų… kaskadinis finansavimas, akseleravimo programos… klasteriuose glūdi žinių paketas…“ „…šiandien neturim klasterių politikos nei Lietuvoje, nei ES… EMĮM klasterių rekomendacijos neatnaujintos… darbo grupė neatnaujinta.“ „…kaskadinis finansavimas supaprastina procedūras verslui – klasteris prisiima biurokratinę naštą, o įmonė vykdo veiklas ir monitoringą.“

	c) kelias į tarptautines programas.	strategijose, tad į jas ir reikia atsižvelgti, norint auginti regionus. • Statistiniai 2 regionai neveikia, nes diskriminuoja regionų priemiesčius, stiprindami didžiuosius miestus. Finansavimas nukreiptas į konkrečius regionus Lietuvoje nėra tikslingas, nes yra per didelė MTEPI atskirtis, ir valstybė negalės stabiliai augti. Todėl siūloma skirstyti S3 finansavimą pagal sektorius.	„…Digital Rocket LT klasteris – „vaikas be tėvų"; kaskart kitas koordinatorius; reikia perdaryti strategiją, kasmėnesiniai susitikimai… yra stiprių klasterių, dedančių lėšas… reikalinga klasterių paramos priemonė." „…parkai galėtų būti regioniniai žinių/kompetencijų centrai; IA daug ką dubliuoja su parkais → neefektyvu; parkams galima suteikti mandatą (pvz., inovatyvios įmonės statuso vertinimas)…" „…parkams – mandatas prižiūrėti regioną (Suomijos modelio analogija: atskirti infrastruktūros valdymą nuo paslaugų/rodiklių)…" „…MedTech akseleratorius – pritaikyta programa, rezultatai neblogi; svarbu, kad demo day ir investuotojų dalyvavimas generuotų investicijas (ne „akceleravimas dėl akceleravimo"). „Mes esame per maži, kad kiekvienas regionas turėtų savo prioritetą." „Nesvarbu, kur klasteris bus bazuojamas… svarbu sutraukti tos srities įmones." „Daug veiklų persidengia… agentūra – ekspertinis 'pool'as', parkai – dirba su ekosistema; reikia aiškios vizijos." „Skėtis – Inovacijų agentūra (ekspertų pulas + kvietimai ekosistemai), parkai/klasteriai – įgyvendinimas."

„Spiečius = regiono verslo ir inovacijų centras, žinantis verslą/poreikius; parkai – ‘hostai’ akseleracijai; keturkampis su LEZ/asociacijomis.“

„Regioniškumas sunkiai veikia… geriau per sritis (sveikata/biotech, IT – horizontaliai, gamyba plačiau).“

„Sektorinė analizė: Alytus/Šiauliai/Panevėžys… kur yra pramonė, ten ‘kas su kuo’ bendradarbiauja.“

„Sostinė vs ‘visa kita Lietuva’ kaip praktinis regioninis pjūvis; savivaldybių regioniškumo nenustatysi.“

„Lietuva per maža, kad čia padarytum kažkokius regioninius dalykus.“

„Visi intelektualiniai ištekliai koncentruoti Vilniuje, Kaune, Klaipėdoje… nelabai yra ko Pakruojy ar Lazdijuose.“

„Žinoma, kad [regioninis finansų skirstymas] nėra tas… niekas sveikai mąstantis tam nepritars.“

„Klasteriai… apjungia, bet ne visus… nukreipti tarsi į viską ir kartu į nieką.“

„Sektorinis akseleravimas apskritai būtų gera mintis.“

„Didžiausios galimybės yra ten, kur žmonės nelabai supranta apie lazerius – pavyzdžiui, biotechnologijose.“

„Parkas inkubavimo nei akceleravimo programos nėra gavęs finansavimo jokio.“

„Prikurta naujų struktūrų… jie gavo finansavimą… parkas negali lygiagrečiai vykdyti.“

„Pirmą kartą pamatau dokumentuose įrašytą mėlynąją ekonomiką… svarbi jūrinė ekonomika, daug metų kalbama, bet vis išbraukiama.“

„…paskirstymas kvotomis pagal sektorius neduoda laisvės proveržiams… mums niekas neleis atsisakyti regionų…“

„…akseleratorius baigiasi sėkme… talentas ir pinigai… pas mus – po akseleratoriaus eini į gatvę ieškoti pinigų.“

„Man asmeniškai jokių nereikia koordinatorių. Jokios nereikia politikos. Kuo toliau politikai nuo manęs tuo man geriau…“

„…per klasterius gali būti efektyviausias kelias… bet nerekomenduočiau visko eiti per klasterius… pasirinkti nišines sritis, liūto dalį skiriant joms, paliekant kitas sritys, kad nerimtų.“

„Eiti per klasterius/sektorius – gera mintis. Jūrinis sektorius sustiprintų visą Klaipėdos regioną… Kalbant apie jūrinį sektorį, nepamiršti gynybos, nes šiandien tai tiesiogiai susiję.“

				„Darinių yra per daug… jų veiklos persidengia… norėtųsi, kad išsigrynintų funkcijas; yra ir labai uždarų, formalių darinių… Pavyzdys – Klaipėdos regiono asociacija ir Klaipėdos regiono plėtros taryba – daug besidubliuojančių veiklų.“
4.	**Vertinimo ir stebėsenos reformavimas**	Skaidrumas ir šališkumo mažinimas 1. Pereiti nuo vieno eksperto vertinimo prie kelių ekspertų arba dviejų pakopų vertinimo: ○ nacionalinis + ES lygio filtras (pvz. „Seal of Excellence“ naudojimas kaip kokybės ženklas). 2. Aiškiai skelbti vertinimo kriterijus ir sprendimų logiką. Nauji rodikliai ir duomenų šaltiniai 3. Kurti stebėsenos sistemą, kuri remtųsi ne tik projekto ataskaitomis, bet ir:	• Paraiškos turėtų būti anglų kalba, kad galėtume pritraukti didesnį vertintojų kiekį (ty tarptautinius ekspertus) • Turi būti bent 2 ekspertai vertinantys paraišką, kurių kompetencija atitinka paraiškos kompetencijų lygį. • Dvipakopė sistema gali per daug ištęsti procesus. • Verslo atstovai turėtų būti įtraukiami į vertintojų pool. • Turi būti aiškūs ir mažiau interpretacijų teikiantys paraiškos rašymo ir vertinimo kriterijai. • Siūloma įtraukti saugiklius, kurie užtikrintų, jog	„…neturėtų būti vertinama paraiška tik vieno eksperto… tikslas – suvienodinti reikalavimą, kad vertinimus atliktų bent du ekspertai…“ „…peržiūrėti teisinį reglamentavimą MTEP priemonių… sudaryta darbo grupė… sumažinti administracinę naštą; dėl vertinimo – stipresnis pagrindimas, nes 90% skundų patenkinami.“ „…inovacijos neatskiriamos nuo nesėkmės… jei įmonėms uždėtume baudų riziką už nepasiektą komercializaciją, tai mažintų inovacijų skaičių – tam nepritarčiau.“ „…į Vyriausybę pateiktas Technologijų ir inovacijų įstatymo pakeitimas – dvi papildomos IA funkcijos dėl MTEP veiklų vertinimo pelno mokesčio lengvatai ir MTEP įmonės statuso suteikimo… tikimasi įsigaliojimo 2026-01-01.“ „…vienas ekspertas tikrai nėra gerai… turi būti koordinavimas… kad ekspertai nesiprieštarautų…“

	○ FDI duomenų bazėmis, ○ tarptautiniais patentų, publikacijų registrais, ○ viešai prieinamais internetiniais šaltiniais (pvz. įmonių duomenimis, produktų export data). Perėjimas nuo publikacijų prie komercializacijos ir poveikio **4. Rodiklių rinkinyje stiprinti:** ○ **produktų, prototipų, licencijų, klinikinių tyrimų, eksporto, investicijų rodiklius;** ○ **naratyvinius rodiklius (case studies),**	paraiškų nerašė ar nevertino AI. • ES lygio filtrai galėtų suteikti papildomų balų ar fast-track • Publikacijos neapibrėžia mokslo įstaigų veiklos. Šiuolaikinės įmonės, mokslas fokusuojasi į komercializaciją, licenzijas ir pan. • Siūloma įtraukti ne tik galutinius rezultatus vertinimui bet ir procesą siekiant rezultatų, pvz paraiškas patentams. • Sliūloma patiems paraiškų teikėjams apsibrėžti rezultatus. • Esant skaidriai finansavimo schemai ir vertinimui, atlaisvinti rezultatų įgyvendinimą, paliekant atsakomybę įvertinti rezultatyvumą ekspertui/vertintojui. • Siūlomi paraiškų vertinimo kriterijai: naujumas, kokybė,	„…ekspertai vienas prieštarauja kitam… ekspertas rašo ‘netinkama’, nors taisyklėse tinkama… kaip koordinatoriai praleidžia?“ „Publikacijos reikalingos mokslo institucijom; verslui absoliučiai nereikia.“ „…su patentais – ne viskam reikia patentų… brangu, sudėtinga… priklauso nuo produkto.“ „…verslo atstovų tarp vertintojų daugiau; kitaip ‘niekas nepasikeis’.“ „…finansavimas susietas su rezultatu… komercializacija, našumo prieaugis, pajamos/eksportas – pamatuojami kriterijai.“ „…kokybės filtrai (komercializacija, eksporto licencijos, klinikiniai tyrimai, patentai) – naudingas dalykas, jei derinami su priemonės logika.“ „…SoE pradžioje geriau stebėsenai, o ne eligibility.“ „…vietoje ‘kiek startuolių’ – komercializacija, eksportas, licencijos, klinikiniai, sertifikavimas… diferencijuoti pagal etapą.“ „…su vienodinimu atsargiai – klinikiniai brangūs; jei skiriama 50 tūkst. – klinikiniai ‘bus nulis’; jei ~2,5 mln. – tada taip.“ „…reikia kriterijų (naujumas, kokybė, poveikis) ir ne vieno eksperto.“

	kurie fiksuoja realų poveikį ekosistemai.	poveikis, našumo prieaugis. • Neakcentuoti naujų produktų vystymo ar naujų startuolių steigimo, ar dalyvių skaičiaus renginiuose. Šie kiekybiniai rodikliai sėkmės neapibrėžia. • Siūlyta Lietuvos rodiklių su užsienio rodikliais negretinti, nes mes per maži kai kuriuos jų pasiekti.	„…benchmark'ai/nepriklausomas testavimas prieš pirkimą padeda objektyviai palyginti sprendimus ir pakelti kokybę (ypač DI paslaugoms)." „…patirties/'legacy' reikalavimai sąlygose išstumia naujus geresnius sprendimus; benchmark logika tai aplenkia." „…Lietuvoje veikianti sistema… bloga… jeigu nėra publikacijos – rezultatas neįskaitomas…" „…vietoj straipsnių – licencijos, parduodami sprendiniai, klientų skaičius Lietuvoje/užsienyje…" „…turiu nusivylimą ekspertiniais vertinimais… atsakymai neadekvatūs… kartais neskaityta ar nesuprasta…" „…paraiškos dabar 90 % rašomos su AI… reikia daugiau etapiškumo (idėja, demonstravimas, prototipas)… kad tai nėra roboto rašyti dalykai…" „…kaip Europos Komisijoje: keli etapai, pristatome, aiškinam… vienas žmogus agreguoja…" „…vieno langelio principas… aiškios taisyklės…" „Dviejų lygių ekspertavimas nesutrumpins vertinimo." „Paraiškos anglų kalba; įtraukti užsienio ekspertą."

„…bent du ekspertai (‘keturios akys’) – seniai reikėjo… vieno eksperto vertinimas labai subjektyvus… Europoje minimum trys ekspertai prie paraiškos.“

„…seniai reikėjo papildomų stebėsenos rodiklių… ‘kiek startuolių sukurta’ – nepakanka; svarbu komercializacijos modeliai, rinkos, plėtros analizės…“

„…koncentruotis į produkto/paslaugos/proceso vystymą, o ne vien straipsnių rašymą… industrinė doktorantūra galėtų būti logiška vieta straipsniams ir taikomiems tyrimams.“

„…jei milijoninės paraiškos vertina tik vienas – turėtų būti bent du. Mažų projektų lygyje: jei nuokrypis >15%, samdomas trečias ekspertas.“

„…įvedant papildomus etapus ir kartu sakant „mažinam naštą“ – reikia rinktis: arba daugiau pakopų, arba mažiau naštos.“

„…dabartinės priemonės – „naujoviški kriterijai“, sudėtinga; pavyzdys: balionų konkursas – kriterijai eliminuoja jaunas įmones.“

„…kai kuriems verslams neapsimoka patentuoti (atskleidžia know-how); kartais patentas – tik investuotojams, realios naudos mažai.“

„Ekonominiai rodikliai su išvestiniais rodikliais – nelogiška.“

„Vidutinė temperatūra kambaryje nieko nerodo.“

„Priemonės angliškai; vertinimas per kelis ekspertus kaip Horizonte; mažiau ‘teismų’.“

„Du ekspertai, jei nesutampa – trečias (‘extra’ atvejais).“

„Nuo ‘varnelių’ prie ‘poveikio’ ir ekspertų… ‘paraiškų skaičius’ – nieko nesako.“

„Optional supaprastinimas ‘tiesiai’ į etapą, jei turi atitinkamą patvirtinimą.“

„Makro rodikliai (patentai, klinikiniai tyrimai, eksporto licencijos) – svarbūs, bet fragmentuoti; reikia duomenų ‘ežero’.“

„Galima ‘palengvinimas’: priduota patentinė paraiška, ne laukti patento.“

„Leisti patiems rinktis rodiklius/etapus, ekspertas peržiūri; ne ‘per metus privaloma’.“

„Ekspertinis vertinimas ir ‘poveikis’ vietoj ‘varnelių’.“

„Renginyje dalyvavusių skaičius… paramą gavusių įmonių skaičius - ‘techniniai’ rodikliai, kurie nieko nekuria.“

„Pas mus visur viskas yra keturių akių… turi mažiausiai du žmonės viską peržiūrėti.“

„Visada yra duodama kitam žmogui peržiūrėti… bet tada viskas labai ilgai trunka.“

„Mums gal tos publikacijos ir tiek nereiktų… bet gydytojams tai vienintelis pasitenkinimas.“

„Svarbus idėja, jos įgyvendinimas ir rezultatai.“

„Kas gaus pinigus? Tas, kas raštingai moka užpildyti… Ar verslo idėja yra fantastinė ar nieko – ne taip svarbu.“

„Jeigu kažkoks investicinis fondas, angelai […] nusiteikęs dėt pinigus… tai reiškia, kad kažkas tiki, o ne tik užpildytos anketos.“

„Susitikt pasikalbėt su komanda… tikrai nebūtų bloga mintis, nes labai dažnai vien iš to matosi... „Jeigu ateina žmonės su papkėmis… nieko čia gero nebus.“

„…įmonės daug ko pergyvena, kad aš pažadėjau parduodu milijonus, o jeigu bus 1,8… tai yra 10 % mažiau… Komisija svarstys ir paprašys 10 % grąžint. Aš neturiu tų 10 %. …mano manymu, jei pasiekėm 4,5 mln. vietoj 6, tai yra fantastinė sėkmė, o kaip vertins agentūra – nežinau.“

„Rodikliai… veikia, bet yra įmonių, kurios prižada labai daug, o pusiaukelėj sužino, kad už tai atsiskaityti reikės ir dar yra rizika grąžinti… Verslas spaudžiamas įsipareigoti maksimum, kiek dar realu, bet ne tiek, kad po to tektų grąžinti.“

„Vien finansiniai rodikliai – neobjektyvūs. Mūsų produktas brangus… penki pardavimai

jau rodo „įspūdingą“ grąžą. O pigūs produktai (pvz., 9 tūkst. eurų lazeriai) turi parduoti labai daug, kad atrodytų taip pat. Nepalyginama.“

„Komercializacija – 50/50. Dažnai nepasiekiama per projekto laiką. Pardavimo ciklas pas mus 18–36 mėn. Nuo pirmo pasiūlymo iki staklių pastatymo praeina 2–3 metai. Įdėjus tai į stebėseną, po projekto dažnai atrodysim blogai, nors realus pardavimas bus vėliau.“

„Darbo vietų skaičius nėra tikslas – su automatizacija kai kurioms įmonėms reikia mažinti vietas. …Reikalavimas kurti naujas įmones – bene blogiausias: įsteigimas patampa projekto tikslu, formalus kriterijaus atitikimas, o vertė – neaiški.“

„Labai dažnai pinigus gauna tas, kas raštingai užpildo; ar verslo idėja gera – mažiau svarbu. …Gyvas pokalbis su komanda vertinime duotų daug – kitaip neatpažinsi, ar tai įsisavinimo projektas, ar tikra komercinė ambicija.“

„Registracija kuo daugiau skaičių… bet išgyvenamumas mažas… paskui nežino, kaip tą įmonę išregistruoti.“

„Verslo plano sukūrimas, komandos subūrimas, pirmieji pardavimai – tai yra vertinimai.“

„Technologijos išvystymo etapai ir verslo įmonės augimo etapai turi būti kartu.“

„Nėra tų ekspertų labai… gali sutapti, kad tas pats ekspertas rašo ir paraišką.“

„Patentai įmonei ne visada svarbūs… svarbus bendradarbiavimas.“

„Įtraukčiau bendradarbiavimo elementą… įmonė parko bendruomenės narys, matoma, stebima, gali gauti pagalbą.“

„…mokslininkas orientuotas į publikacijas… mes bandom atgręžti, kad jis gali būti vertinamas ir už bendrus projektus su verslu, paslaugas verslui…“

„…ar du vertintojai, ar trys, ar keturi – jei turi sveiko proto, pažiūrės tą patį… žiūri į asmenybę… ‘h-indeksas’, patikimumo istorija… kito metodo nėra.“

„…mane vertina, nes projektų ne ‘sumoviau’… padarau… aplinkui pilna idiotiškų paraiškų…“

„…tarpiniai rodikliai… didintų motyvaciją tęstinumui… ieškoti gilesnių rodiklių… kas po to įvyksta (pvz., po 3 metų)… ne vien ‘panaudoti finansavimą’ ir gražios ataskaitos.“

„…tipiniai: patentų skaičius, tyrėjų skaičius, publikacijų skaičius… pasižiūrėti kitus rodiklius, kurie artintų prie realaus poveikio…“

				„Publikacijos nėra vienintelis rodiklis… aktualu komercializacija, licencijos, klinikiniai, patentų paraiškos (nes patys patentai trunka, pvz., EPO – 2 metai)… Taip pat – startuoliai, pateiktų ES paraiškų skaičius.“ „Pirma reakcija – atmetimo (daug ataskaitų), bet vidinės sistemos šiuos duomenis jau renka, todėl pateikti galėtume.“ „Jei vietoje vieno eksperto – keli, turi būti nelyginis skaičius (1/3/5)… Dar nesame pasiruošę kokybiniam vertinimui – trūksta skaidrumo, egzistuoja subjektyvumas (tas pats LMT vertinimas skirtingais metais – skirtingas).“
5.	**Kompetencijų ugdymas, susietas su S3 prioritetais**	S3 ir švietimo sąsaja 1. Oficialiai susieti S3 prioritetines sritis su: ○ prioritetinių studijų vietų finansavimu; ○ doktorantūros kryptimis; ○ profesinio mokymo moduliais. Apmokamos praktikos ir verslo įtraukimas	• Pagrindinė silpnų regionų priežastis – kompetencijų ir žmogiškųjų išteklių trūkumas. • Užtikrinti finansavimą inovacijų diegimui, o ne vien kūrimui. • Kvietimų reikalavimai turėtų atitikti realybę, pvz priemonė studento praktikai universitete neturėtų reikalauti publikacijų kaip atrankos kriterijaus.	„…moduliai – tikriausiai paprasčiau ir greičiau… pridėtinė nauda greitesnė… reikėtų sąrašo, kur didžiausi trūkumai (pvz., eksportas, patentavimas).“ „…vyksta diskusijos su ŠMSM dėl taikomosios doktorantūros modulio… kaip paskatinti verslo įsitraukimą…“ „…studijų programos nespėja su pokyčiais… akreditacija trunka 2–3 m., pasaulis keičiasi greičiau…“ „Industrinė doktorantūra yra geras dalykas - jos tikrai reikia.“

	2. Sukurti ar plėsti priemones, kurios finansuoja apmokamas praktikas inovatyviose įmonėse, ypač S3 srityse. Specializuoti kursai be viso programų pertvarkymo 3. Leisti ir skatinti universitetus kartu su IRT asociacijomis ir įmonėmis kurti mikrokreditus / trumpus modulius (AI, duomenys, cyber, verslumas ir pan.), kuriuos studentai ar dirbantieji gali rinktis papildomai. 4. Taip išvengiama ilgo ir sunkiai įgyvendinamo „visos programos perrašymo“.	• Svarbu atskirti, kad universitetai ruošia aukštos kompetencijos darbuotojus, todėl į perkvalifikavimą ir žemesnio lygio darbuotojų kompetencijų ruošimą turėtų fokusuotis darbo biržos ar kolegijos. • Universitetai suteikia galimybę nusipirkti vieną modulį, darbuotojui upskillinti. Tą reikėtų skatinti • Knowhow įsisavinimas ir geriausios praktikos iš užsienio; kompensuoti aukštos klasės specialistų samdymą (ES / trečios šalys). • Verslams trūksta „kietųjų“ kompetencijų, todėl reikia aukštųjų mokyklų įsitraukimo, tuo tarpu mokslui trūksta „minkštųjų“ kompetencijų	„Praktikantus ima tik tuo atveju, kai žino, kad reikės… verslui praktikantas dažnai atrodo ‘vargas’… reikia paskatų.“ „…minkštos kompetencijos – lokaliai; technologinėms – aukštųjų mokyklų partnerystės vienareikšmiškai reikalingos.“ „…industrinė doktorantūra – veiksminga; apmokamos praktikos/stipendijos dažnai neveikia (nebūtinai skatina likti).“ „…užsienio talentų pritraukimas/išlaikymas – strategiškai svarbu; mechanizmai dar neveikia.“ „…apmokamos praktikos ir verslo įtraukimas – gerai (upskilling darbo vietose)… įmonės turėtų pačios nusipirkti paslaugą (konsultacijas/kursus).“ „…know-how įsisavinimas ir aukštos klasės specialistų (ES/trečios šalys) samdymo kaštų kompensavimas.“ „…praktikos modelis veikia (oficiali praktika → įdarbinimas)… kreditinių modulių su verslu idėja gali įklimpti biurokratijoje.“ „…industrinė doktorantūra – palankiai vertinu; LMT skiria papildomus balus; vyksta pilnu tempu.“ „…galima 100 % padengti Skaitmeninės Europos DI įgūdžių projektų kofinansavimą (likusius 50 %) – ‘šviesti visoje Lietuvoje’…“

	praktikos, ką galėtų suteikti verslai. • Kompetencijos turi būti susietos su diegiamomis technologijomis, o ne bendriniai. Pvz inovacijos gynyboje. • Verslams trūksta technologijų diegimo kompetencijų, kurias geriausiai galėtų užtikrinti doktorantai, todėl turėtų būti po 3 doktorantus kiekvienai iš 13 ES išskirtų STEP (39 doktorantai per metus, šiuo metu yra 20) • LMT turi kvietimus industrinėms doktorantūroms • Reikia nacionalinio skatinimo praktikoms.	„…per metus ~20 informatikos/inž. doktorantų; jei kiekvienai iš 13 STEP sričių po 3 – reikia ~39+/40–80 DI doktorantų per metus.“ „…praktikų poreikis auga; svarbu kokybės užtikrinimas ir karjeros tąsa.“ „…aukštoji mokykla neruošia studentų žemo lygio programavimo darbams… profesinės mokyklos/‘bootcampai’ gali ruošti…“ „…turime griežtus praktikos atrankos kriterijus… reikalavimus vadovui, temai… vakarų pavyzdys: daugiau praktikų…“ „…LMT darė produktą ‘profesinė praktika’ universiteto laboratorijoje… studento semestrinis darbas… gaudavo stipendiją, kad neitų į įmonę… bet atranka pagal antro kurso straipsnius – nerealistiška…“ „…doktorantas nori vykti į Japoniją… pritrūksta lėšų eksperimentui… reikėtų papildomų išteklių tarptautiškumui…“ „…laisvesnis biudžetas projektuose… įtraukti magistrantus (20 val./sav.)… sulaikyti talentus universitetuose…“ „…perkvalifikavimas ir naujų kompetencijų suteikimas turėtų būti prioritetas… pasaulis eina į skaitmeną…“ „…turime padvigubinti daktarų skaičių… industrinė doktorantūra – norvegiškas/vokiškas modelis (įmonės

darbuotojas, įmonės tema, 100 % valstybės finansavimas, taikomieji rezultatai).“

„…ar AI gali pakeisti praktikantus? – ne… modeliams reikia papildomų duomenų ir žmogaus… įmonėms reikia įrankių prisitraukti stiprius praktikantus (magistrai/doktorantai)…“

„…vyresnei kartai sunku prisitaikyti prie naujų įrankių… regionuose ypač reikia kompetencijų kėlimo… fabrikams reikia aukštos kompetencijos darbuotojų.“

„…buvo Užimtumo tarnybos programa – priimi žmogų iš kito sektoriaus, o valstybė kompensuoja dalį mokesčių tam, kad jį apmokytum…“

„…regionuose trūksta kompetencijų ir talentų pritraukimo… talentų pulas koncentruotas 3 miestuose.“

„…nacionalinė programa kompetencijoms – „nacionalinis Erasmus / Sparnai“; DI kompetencijos mokyklose – verslas pasirengęs kofinansuoti (pvz., „Švietimas #1“ iniciatyva).“

„Regionuose trūksta specialistų…“

Kamaitis: „Regionuose kompetencijas kelti per įmones ir jų darbuotojų mokymus… pradinio lygio daug, sudėtinga pereiti į pažengusį.“

„STEP kvietimas man patinka: yra kūrimui, diegimui ir mokymui – sudėtinis dalykas.“

„Kai diegiesi technologiją – atvažiuoja ‘vokiečiai’ ir apmoko darbuotojus.“

„Verslui reikia ‘hard’, susieti su diegiama technologija; dėl ‘soft’ mokslui – Paulius abejoja ‘trūkumo’ teiginiu.“

„Mokymai ‘susieti su tuo, ką diegiesi/atsinaujini’.“

„Industrinė doktorantūra – ‘tas geras, kurio trūksta’.“

„Kiek tie savarankiški mokymai turi prasmės… aš turiu abejonių.“

„Doktorantūrų mes nefinansuojam… nepas mus tokio dalyko nebūtų.“

„Paimam treinee… kai kuriuos pasiliekam nuolatiniams.“

„Doktorantūra… sprendimas veikia. Paruošia vieną kvalifikuotą specialistą per kelis metus.“

„Lazerių inžinierių programa kolegijose atsirado prieš metus – labai sėkminga. Finansavimas išnaudotas per 5 dienas.“

„Situacija su darbuotojais nėra gera… chemijos studentų – dvidešimt per metus.“

„Bet kokie kursai, paruošiantys žmogų iki praktinio lygio, verslui yra labai vertingi.“

„Reikia greitai įgauti žinias… nenueisi du tris metus mokytis… reikia greito persiorientavimo.“

„Reikėtų nuolatinių mokymų 1–2 kartus per metus… regionuose… platesnė auditorija.“

„Komercializavimo tematikų niekada nebuvo mokymų… esame finansavę iš savo lėšų.“

„…mums reikia, kad būtų žinių, ką komercialinti, ir kad tos žinios nenugultų į lentynas, o augtų į produktą.“

„…verslas turi diktuoti, kokių kompetencijų reikia… universitetas autonomiškas – verslas turi pasakyti, kokios žinios reikalingos šiandien…“

„…ar perkvalifikavimas efektyvus? Turbūt ne… žmogus nuo studijų metų turi būti parengtas mokytis kasdien… mano darbuotojai – buvę doktorantai… ateina iš pramonės, nes patys nespėja paskui kintančią aplinką…“

„…žodis mentorius… nuo Homero… norint ugdyti talentą – šalia turi būti mentorius, o ne ‘industrija, kuri suvaro auditoriją’…“

„…talento atrinkimas pirmiausia, paskui ugdymas… pasikalbėkite su muzikais ar Dailės akademija – ten yra metodikos, kaip atrinkti ir ugdyti.“

„…jeigu jie pabaigs programą, bet su tuo nieko nedarys – ar mes tikrai pasiekėm rezultatą?… matuoti, kiek po 3 metų jie

				veikia toje srityje, prisidėjo prie… patentų ir pan.“ „…Mokymosi visą gyvenimą centras jau dabar organizuoja papildomas studijas… būtų pasirengę kurti naujas programas (DI, duomenų analitika, robotika ir kt.) bendradarbiaujant su įmonėmis, kurioms reikia konkrečių kompetencijų.“ „…industrinės doktorantūros idėja teoriškai yra, bet Lietuvoje praktiškai neveikia… Tai galėtų būti pirmas žingsnis jaunam tyrėjui įsilieti į įmonę.“ „Atliepti – taip, bet neabsoliutinti S3 prioritetų; pvz., gynyba nėra S3 prioritetas, bet akivaizdžiai svarbi.“
6.	**„Triple Helix“ ir inovacijų ekosistemų valdymas**	~~Praktiniai bendradarbiavimo mechanizmai~~ ~~1. Skatinti bendrus projektus, praktikas, doktorantūros vietas „pramonėje“, bendrus akseleratorius ir klasterių veiklas.~~ ~~2. Į inovacijų priemones įrašyti kaip privalomą ar bent jau highly rewarded elementą – mokslo–verslo–~~	• Tai turėtų būti ne platforma, o procesas užtikrinantis lengvesnį bendradarbiavimą. • Įtraukiantis pagrindinius dalyvius (**savivaldą**, akseleratorius, spiečius ir t.t.) taip pat susietas su minėtu procesu, finansavimu ir dalyviais. Tai turėtų būti quadruple helix (kur ketvirtasis yra neapibrėžti dariniai	„…ar platformos kūrimas padėtų, nekomentuosiu – trūksta žinių; reikia svarstyti, ką jau turime ir kaip išnaudoti.“ „Man atrodo, mes šitą pratimą jau praėjom du kartus… buvo technologijų platformos, tada slėniai… aš skeptiškai žiūriu…“ „…bendruomenės/platformos (pvz., Sustain Live AI) – gerai; ekosistemos turi kurtis ir augti; svarbiausia dalyvių įsitraukimas.“ „…standartizuoti procedūras; pavyzdys – Valstybės duomenų agentūra ir antriniai sveikatos duomenys: aiškus kelias,

	~~viešojo sektoriaus partnerystes.~~ ~~Skaidri ir nuosekli komunikacija~~ 3. ~~Reguliarūs forumai, konsultacijos, „policy labs“, kuriuose Triple Helix dalyviai aptaria priemonių dizainą ir įgyvendinimą, o ne tik pateikiami „fait accompli“.~~	kaip spiečiai, tech parkai ir pan) • Už S3 įgyvendinimą regionuose paskirti dalyvį, kuris atneštų regioninį poreikį (iš apačios į viršų) • Lietuvoje helix neveiks sklandžiai dėl kultūrinio (sovietinio) palikimo ir pasitikėjimo trūkumo, dėl to reikia proceso, kuriančio pasitikėjimą.	mokestis, institucijos paruošia… principas geras.“ „…kultūrinis (sovietinis) palikimas; reikia valstybės prioritetų ir centralizuotų sprendimų; gydymo įstaigos turi gauti aiškią naudą už duomenų parengimą.“ „…turime fragmentaciją ir ‘nėra klausimo šeimininko’; reikia vieno atsakingo (pvz., skaitmenos/DI klausimams), kuris kurtų bendras gaires ir vengtų persidengimų.“ „…geriausiai veikia apačios… finansuoti tuos, kurie jau turi patirtį bendradarbiauti… vertinti ilgalaikius santykius su kariuomene, valstybės įstaigomis, verslais…“ „…reikia kažkaip sugalvoti netgi galbūt ir sugalvot procesą, principą, kaip tą galima būtų daryti, kad… tarpusavyje mes… galėtume vieni kitus pripažinti…“ „…mokslas, verslas ir viešas sektorius veikia tik nedideliame grupių skaičiuje. Reikia skatinti apačioj veikiančius, tie, kurie jau turi gerus veikiančius būdus… …kad nebūtų taip, kad vat aš čia šiandien sukūriau draugystę ir vat štai nuo šiandien mes visi draugausime.“ „…ES3 prioritetai sukurti pagal Triple Helix; Quadruple atsirado vėliau… ketvirtąjį

(visuomenę/lobistus) reikia edukuoti, bet poveikį pamatuoti sudėtinga…“

„…reikia rizikų valdymo plano, jei nuo 2028 m. sumažėtų ES pinigai…“

„…gyvosios laboratorijos… europinis tinklas… [LMT] atsivežė profesorių, dirbantį su strategija… sujungti su egzistuojančiais tinklais – turėsim didesnę vertę.“

„…Nacionalinė mokėjimo agentūra – Nr. 1 Europoje pagal skaitmenizavimo įrankius… statoma kaip pavyzdinė agentūra visoje Europoje.“

„…Triple gali riboti; reikia išplėsti – ketvirtas elementas (platforma/ekosistemos „orkestratorius“), kuri atstovauja ekosistemą atskirai nuo viešojo sektoriaus, verslo ir mokslo.“

„Baisu, kad tai nebūtų darbo grupės, kaip dabar yra.“

„Nėra regionų atstovų… jie sako, kad su jais niekas nesikalba.“

„Nėra skėtinės organizacijos, kuri atstovautų 10 regionų.“

„Viską pradėti nuo proceso… ‘Bottom-up’ ir aiškūs vaidmenys; dabar – pasitikėjimo stoka ir fragmentacija.“

„Spiečius – regiono inovacijų centras; parkai – ‘hostai’; agentūra – ekspertinis ‘pool’as’.“

„Pradiniame etape – savivaldybės + spiečius; pereiti į modelį, kur spiečius tampa regiono inovacijų lyderiu.“

„Pradiniame etape – savivaldybės + spiečius; pereiti į modelį, kur spiečius tampa regiono inovacijų lyderiu.“

„Universiteto pagrindinis produktas – viešos žinios. Verslas nori, kad dalykų būtų mažiau viešų.“

„Saulėtekio slėnis… buvo padeklamuotas, bet realiai ne iki galo suveikė.“

„Geriausiai veiktų viena vertės grandinė… universitetas –gamintojas – didelė pramonės įmonė.“

„Parkai ir yra tie mokslo–verslo bendradarbiavimo centrai… reikia duoti jiems gyvybės.“

„Inovacijų agentūra turi savo fondus, spiečiai finansuojami atskirai… parkas neturi finansavimo, bet prašo rezultatų.“

„…mokslo žinių ir technologijų perdavimo centrai – ‘brokeriai/tarpininkai’ tarp mokslo ir verslo… kultūrą reikia užsiauginti… tai nesusikuria per metus ar dvejus.“

„…pasitikėjimo kultūra be galo svarbi… žmonės bijo, kad idėjas gali ‘nukopijuoti’…“

„…problema nėra ‘triple’ ar ‘quadruple’… problema – kultūroje, aplinkoje,

				papročiuose, mąstyme… posovietinis iniciatyvos ir atsakomybės paralyžius…“ „…akademiškai viskas blizga… bet pasaulis kitas… reikia realistiškai pajusti silpnas vietas…“ „…padalinama tarp dviejų ministerijų (EIMIN ir ŠMSM)… kurios dar konkuruoja… kuri čia politikos sritis… buvo diskusija… kas reguliuos kompiuterius.“ „…jeigu norim vieno ir kito, tada skirkim atitinkamai ir toje ministerijoje… fokusą, ką pamatuosim…“ „…prieiga prie duomenų (saugumas, patikimumas)… verslo supratimo stoka (‘mums čia mokslo nereikia, pasidarysime paprasčiau’)… bendrafinansavimo intensyvumas verslui ne 100 % – atstumia įmones (ypač dideles).“ „…išsigryninti darinių funkcijas; stiprinti MTEPI tiltus per industrinę doktorantūrą / LLL programas kartu su įmonėmis.“
7.	**STEP technologijų ir sektorinių modulių plėtra**	Prioritetinių STEP sričių išskyrimas 1. Nacionaliniu dokumentu (S3, inovacijų politikos gairės) aiškiai įvardinti kelias prioritetines STEP kryptis: AI,	1. Jei bus susiaurinama atliepiant poreikius, pvz orientuojama į gynybos ir sveikatos technologijas, tai suteiks sąlygas didiesiems ir pasirengusiems dalyviams. Ir gali daryti įtaką	„…įvertinus geopolitinę situaciją – gynyba… sritys, kur Lietuva stipri: fotonika/lazeriai, biotechnologijos (įvertinti, kas tiksliau), dirbtinis intelektas.“ „…industrinės technologijos (kaip pramonės pagrindas) reikšmingesnės nei kultūra iš Ekonomikos ir inovacijų ministerijos perspektyvos.“

	kibernetinis saugumas, medtech, gynybos technologijos, prireikus – kvantinės technologijos ir robotika. Sektoriniai moduliai 2. Kiekvienai S3 priemonei (pilotai, akseleratoriai, kompetencijos, klasteriai) parengti sektorinius modulius: sveikata, gynyba, gamyba, IRT, kurie turi: ○ specialius reikalavimus; ○ rodiklius; ○ tinkamas reguliacines sąlygas (pvz. klinikiniai tyrimai). Testavimo infrastruktūra 3. Šias STEP sritis paremti testavimo, bandymų,	ekonominei/regioninei atskirčiai. - Galima pasitelkti strategiją Lietuvos auginimui pagal Europos/globalias kryptis, tokiu atveju reikėtų siaurinti tematikas išryškinant technologinį proveržį ir sostinės bei Kauno poreikius. 2. Kitu atveju, jei atliepsime Lietuvos stiprybes, padėsime augti valstybei tolygiau, sustiprinsime regionus ir tapsime unikaliais tam tikrose nišose. - Technologijos ir gynyba turėtų padengti S3 horizontaliai ir atsispindėti visuose prioritetuose. Tuo tarpu vertikalės turėtų atvaizduoti Lietuvos	„…yra sričių, kur lietuviai yra pionieriai… energetikos srityje - pasaulinis pripažinimas…“ „…svarbu, kad infrastruktūra nebūtų nenaudojama… turi būti srautas… turi būti open tarptautiniu mastu…“ „…mažai valstybei – kuo mažiau prioritetų; siūlyčiau 2–3: gynybos technologijos; gyvybės mokslai (MedTech/BioTech); gal lazeriai…“ „…jei išplėsime (pvz., jūrinės/agri-food) – neturime tiek pinigų; rizika, kad bus ‘pinigų įsisavinimas’ be proveržio.“ „…didžiausia ekonominė nauda – prekyba/fintech; taip pat biotech/medicina; gynyba/dvigubos paskirties…“ „…dėl prioritetų sąrašo: aplinkos kaita greita, tad geriau fiksuoti, bet peržiūrėti dažniau (pvz., kas 3 m.), o ne kas 5 m.“ „…ne sektoriai, o proveržio technologijos (pvz., biotech, lazeriai/šviesos, robotika, DI, kosmosas) – S3 turėtų remtis technologijomis; siaurinti ir fokusuoti.“ „…Lietuvai trys pagrindiniai: skaitmena, biotech (įskaitant agrifood), cleantech… skaitmena turėtų būti horizontali… investicijos į AI, kibernetiką, robotiką, net kvantą…“

	pilotingavimo infrastruktūra, kuria gali naudotis inovatyvios įmonės, startuoliai ir mokslininkai.	bendrąsias (e.g.fintech, biotech, dual-use) ir regionines stiprybes (e.g. agro-tech, blue-tech, energy tech). • Reikėtų įrankio, kuris padėtų pagal veiklos sritį atrasti vietą S3 prioritetuose. Šiu momentu įmonės savęs S3 prioritetuose nearnda.	„…Seimas patvirtino žemės ūkio ir maisto pramonės sektorių kaip prioritetinį nacionaliniam saugumui…“ „…dirbtinis intelektas, kibernetinis saugumas, gynybos technologijos, robotika, MedTech – svarbios… bet agrikultūra turėtų būti įtraukta kaip atskira kryptis, nes ‘vien AI’ ūkyje neveiks.“ „…Lietuva ES vertinama dėl aukštos maisto produktų kokybės… tam išlaikyti reikia robotizacijos, AI, naujų gamybos linijų.“ „…nacionaliniame lygmeny užtenka S3 strategijos; nereikia siaurinti. Jei yra poreikis – prioritetizaciją sureguliuoja kvietimai (t. y. kam išvis neduoti kvietimų).“ „…tai, ką kalbam, aktualu Vilniui, Kaunui, Klaipėdai; mažesniems regionams – mažai aktualu; regionuose trūksta kompetencijų ir talentų… parkams galima suteikti regiono mandato modelį (kaip Suomijoje).“ „Ne Švenčionys ir ne Skuodas… mes jų nepadarysim centrais.“ „Norime aukštųjų technologijų – turi būti dedamosios. Šiuo metu jų nėra.“ „Mes galime pastiprinti regionus, bet ne viską reikia regionalizuoti.“ „Jau kur yra inovacijos – siaurinti; bet ankstyvoj stadijoj – plačiau; etapų logika svarbi.“

„Jei siaurinsime į gynybą – didieji ‘išsisavins’; mažiesiems yra kitų veiklų/mentorių/grantų.“

„IT – horizontaliai; gamyba – plačiau per Lietuvą; sveikata/biotech – Vilnius/Kaunas.“

„Duomenų ‘ežeras’ vertinimui/rodikliams; aiškūs procesai ‘nuo gimimo’ iki ekosistemos.“

„Gal siaurint nereikia, reikia pasižiūrėti ar neatsirado naujų sričių.“

„Jeigu susiaurinsime per stipriai – rizika nepataikyti. Kai nežinai tiksliai, investuoji į daugiau krypčių.“

„Biotechnologijoms pinigų poreikis milžiniškas… o kai viskas skirstoma po truputį – niekas neišauga.“

„Lazeriai nebėra tokia naujiena… dabar prasideda juoda konkurencija su Kinija.“

„Lietuva neturi kito kelio kaip automatizacija, robotizacija ir DI, jei nori konkuruoti su Kinija ir JAV.“

„…paskirstymas kvotomis pagal sektorius neduoda laisvės… turime palikti šansą proveržiams… technologijos atsiranda greitai (pvz., dėl karo)… prioritetų siaurinimas gal ir turi prasmę, bet neuškirsti kelio naujoms technologijoms.“

„Viskas, kas apriboja laisvę… siaurinimas didina riziką… palikite akademinę ir

	pasirinkimo laisvę individui… nedarykit siaurų industrijų.“ „…kas siau rinama – turėtų būti išlaisvinamas individas… kitaip – prievarta, neprikabinta prie europinės / Lietuvos tradicijos.“ „…sektoriai, kurie turi potencialą didinti lietuviškos kilmės eksportą… žiūrėti į ekonomikos struktūrą… ne užsiiminėti ugnies ten, kur jos nereikia užkurti.“ „…liūto dalis – nišinėms sritims, bet palikti ir kitoms, kad nevirstų visiško židinio užgesinimu…“ „…jūrinis sektorius… paskatinimas visam Klaipėdos regionui… kartu nepamiršti gynybos sąsajos jūroje.“ „Neturėtų būti absoliutūs… kartais per daug stengiamės susiorientuoti ties prioritetais.“

ANNEX 6. QUANTITATIVE IMPLEMENTATION OUTCOMES (2025)

Based on the comparative data presented in the previous section, the quantitative performance profiles of the four nations reveal distinct structural "personalities" in their innovation ecosystems.

The following analysis details these profiles, interpreting the raw metrics through the lens of their respective Smart Specialization choices.

1. Slovenia: The "Hidden Champion" Profile

Slovenia displays the most mature industrial innovation profile among the four, closely mirroring the DACH (Germany-Austria-Switzerland) model.

- **Quantitative Signature:**
  - **R&D Intensity:** Leading the group with **2.1% of GDP**, surpassing the critical 2% threshold that often separates "innovation followers" from "innovation leaders."
  - **Business Dominance:** A striking **65% of R&D personnel** are employed in the business sector. This is the highest in the cohort and indicates that S3 priority domains (like Smart Factories) are being driven by industry needs rather than academic supply.
  - **High-Tech Exports:** At **21.5%**, Slovenia leads the group. This is not driven by a single giant (like a Nokia) but by a dense network of "hidden champion" suppliers deeply integrated into German automotive and pharmaceutical value chains.

S3 Implication: The high business R&D share validates the "SRIP" (Strategic Research and Innovation Partnerships) governance model. The data suggests that Slovenia's S3 is successfully forcing private co-investment, making it the most sustainable ecosystem of the four.

2. Czech Republic: The "Industrial Fortress" Profile

The Czech profile is that of a mass-manufacturing powerhouse successfully transitioning into higher value-added segments.

- **Quantitative Signature:**
  - **Export Volume vs. Value:** While it has a high share of high-tech exports (**19.8%**), the sheer *volume* of its manufacturing output is the defining feature.
  - **Productivity:** Standing at **81% of the EU average**, it faces a "middle-income trap" risk. The gap between its massive industrial output and its productivity suggests it is still performing labor-intensive tasks within high-tech sectors (e.g., assembling high-tech components rather than designing them).
  - **R&D Structure:** Similar to Slovenia, it has a healthy **60% business R&D personnel** share, driven largely by foreign multinational corporations (MNCs) establishing local engineering centers (e.g., Honeywell, Siemens, Skoda).

S3 Implication: The "National Centers of Competence" (NCCs) are vital here. The data reflects an economy where innovation happens on the factory floor. The challenge visible in the numbers is the need to decouple growth from physical material inputs (energy/labor efficiency).

3. Estonia: The "Digital Outlier" Profile

Estonia's quantitative profile is the most deceptive when looking at traditional industrial metrics, as its primary value creation is often intangible.

- **Quantitative Signature:**
  - **The "Goods" Gap:** Its high-tech *goods* export share (**~14.8%**) is lower than Slovenia or Czechia. However, this metric undercounts Estonia's actual performance because a significant portion of its deep-tech economy exports *services* (SaaS, FinTech, e-Residency), which do not appear in standard customs data for goods.
  - **R&D Efficiency:** With **1.8% of GDP** spent on R&D, it achieves disproportionately high visibility in the startup world ("Unicorn factory").
  - **Workforce:** It has a balanced researcher distribution (**~55% in business**), reflecting a "start-up" culture where PhDs are often founders rather than just employees of large industrial conglomerates.

S3 Implication: The "Deep-Tech" focus is working to shift the economy away from capital-intensive industry. The data suggests Estonia generates high value with fewer physical assets, justifying its "venture-style" S3 strategy.

4. Lithuania: The "Academic Transformation" Profile

Lithuania presents the most distinct structural imbalance in the group, highlighting the difficulty of converting scientific excellence into commercial mass.

- **Quantitative Signature:**
  - **The "Ivory Tower" Risk:** It is the only country in this cohort where a massive portion of R&D personnel (**>40%**) is still concentrated in the **Higher Education sector**, with the business sector lagging at **~45%**. This is a classic "European Paradox" signal: excellent science (Lasers/Biotech) that stays in the lab.
  - **Export Niche:** The **12.4%** high-tech export share is the lowest, yet specific sub-sectors (scientific lasers) hold global monopolies. This indicates a "barbell" economy: a small, world-class high-tech sector disconnected from a larger, lower-tech economy.
  - **R&D Spending:** At **1.1% of GDP**, it significantly trails the others. This low intensity combined with high academic concentration suggests that private companies are not yet investing heavily in R&D.

S3 Implication: The quantitative profile screams for the new "Mission-Oriented" approach. The previous strategy funded universities hoping business would follow; the numbers show this didn't happen at scale. The new 2021-2027 focus must

urgently incentivize *companies* to hire researchers, rather than just funding university labs.

Table 16. The analysis below synthesizes Eurostat and OECD data to measure the effectiveness of S3 choices.

Indicator (2023/24)	Lithuania	Estonia	Slovenia	Czech Republic
High-Tech Exports (% of total exports)	~12.4%	~14.8%	**21.5%**	**19.8%**
Dominate S3 Export Sector	Lasers, engineering manufacturing, Furniture, Chemicals (Biotech)	ICT Services	Modular Building Pharma, Electrical	Machinery Automotive, Electronics, Nanotech
Integration in Global Value Chains (GVC)	**Growing:** Strong backward linkages in furniture/ engineering.	**Niche:** High forward linkages in ICT services.	**High:** deeply integrated into German/Austrian automotive chains.	**Very High:** Central Europe's manufacturing hub.

Table 17. Comparative Innovation and R&D System Indicators for Lithuania, Estonia, Slovenia, and the Czech Republic

Indicator	Lithuania	Estonia	Slovenia	Czech Republic
Productivity (GDP per hour worked, EU=100)	78%	83%	84%	81%
Gross Domestic Expenditure on R&D (% GDP)	~1.1%	1.8%	**2.1%**	**2.0%**
R&D Personnel in Business Sector (%)	~45% (Lagging)	~55%	**65%**	**60%**
R&D Personnel in Higher Ed (%)	**High (>40%)**	Moderate	Low	Moderate

The following section expands the comparative analysis to include the **Value Added in Exports** indicator. This metric is critical for assessing the *quality* of S3 implementation, as it distinguishes between countries that merely "assemble" high-tech products (using imported parts) and those that "create" them (capturing the economic value of design and IP).

Value Added Analysis: The "Assembly Trap" vs. "Niche Value"

The **Domestic Value Added (DVA)** content of gross exports measures how much of the export revenue actually stays in the country as wages and profits, versus how much immediately leaves to pay for imported intermediate parts. This indicator reveals the hidden structural reality of the CEE innovation landscape.

- **Czech Republic & Slovenia (The Integration Paradox):** Both nations exhibit high *gross* export volumes in medium-high tech sectors (Automotive, Machinery). However, they have historically lower *Domestic Value Added shares* (typically 55–60%) compared to the EU average. This reflects their role as "advanced integrators" in German supply chains-they import expensive components (engines, electronics), assemble them, and re-export.
  - *S3 Implication:* Their S3 focus on **Industry 4.0** (Slovenia) and **Advanced Engineering** (Czechia) is specifically designed to solve this "Assembly Trap" by moving up the "Smile Curve"-shifting from pure assembly to R&D and design, where value capture is higher.
- **Estonia & Lithuania (The Niche Paradox):** These nations have lower *gross* export volumes but often achieve higher *Domestic Value Added ratios* in their priority sectors (65–70%+).
  - **Estonia:** Its S3 focus on **ICT & Digital Services** is a "pure value" play. Software exports have negligible imported material costs; nearly 100% of the export value is domestic labor and IP.
  - **Lithuania:** Its focus on **Lasers and Biotechnologies** operates similarly. A scientific laser sold for €50,000 consists of relatively cheap raw materials; the value lies almost entirely in the domestic engineering physics, resulting in extremely high DVA per unit.

Table 18. Domestic Value Added (DVA) and the Value Added in Manufacturing.

Metric	Slovenia	Czech Rep.	Estonia	Lithuania
Dominant R&D Actor	**Business (65%)**	Business (60%)	Startups/SMEs (55%)	**Universities (>40%)**
Econ. Complexity	Deep GVC Integration	High Volume Manufacturing	Intangible Services	Niche Scientific Products
High-Tech Exports (% of Total)	**21.5%**	**19.8%**	~14.8% (Goods only)	~12.4%
Domestic Value Added (DVA) Share	**Moderate (~58%)** *(High import content due to supply chain integration)*	**Low/Mod (~56%)** *(Heavily reliant on imported components)*	**High (~65%+)** *(Driven by service-heavy & resource sectors)*	**High (~63%+)** *(Driven by high-IP niches & agri-food)*

Productivity Driver	Process Innovation (Auto)	Scale & Efficiency	Digital Scalability	Scientific Novelty
S3 Strategic Goal	**Increase DVA** by owning the *design* of factory systems.	**Increase DVA** by shifting from *assembly* to *innovation*.	**Scale Volume** of high-DVA digital services globally.	**Commercialize Science** to create high-DVA manufacturing.

The **Domestic Value Added** highlights a crucial lesson for Lithuania:

- **Slovenia and Czechia** are fighting to *increase* their value capture within massive, established industries. They have the volume, but need the margin.
- **Lithuania** already has high margins (value capture) in its S3 niches , but lacks the *volume*.

Strategic Lesson: Lithuania's challenge is **not** to increase value-added per unit (which is already world-class in its niches), but to **scale the production volume** of these high-value sectors without diluting their quality. This requires distinct S3 instruments: not just R&D grants (which create value), but **industrialization grants** (capital for factories and equipment) to scale that value up.

ANNEX 7. SPECIAL FOCUS AREA: DEEP TECH START-UPS DEVELOPMENT

This policy analysis document presents an exhaustive evaluation of the Deep Tech startup ecosystem in Lithuania, synthesized for decision-makers overseeing the implementation of the National Smart Specialisation Strategy (S3). The report is grounded in a rigorous analysis of S3 policy documents from 2014 to 2027, national funding recipient lists, European project databases, and venture capital (VC) investment reports.

The Lithuanian innovation ecosystem has undergone a profound transformation over the past decade, evolving from an infrastructure-building phase (2014–2020) to a capability-utilization phase (2021–2027). The establishment of five integrated Science, Studies, and Business Valleys has successfully concentrated high-value R&D infrastructure, particularly in Vilnius and Kaunas. This infrastructure now serves as the launchpad for a specific cohort of "Deep Tech" enterprises-ventures founded on substantial scientific or engineering breakthroughs requiring long-term R&D and significant capital intensity.

Our analysis identifies a "Mixed Funding" success model as the primary driver of deep tech scalability in Lithuania. The most resilient startups-such as Atrandi Biosciences, Oxipit, and Blackswan Space-have systematically layered national structural funds (specifically the Inostartas and Eksperimentas instruments) with early-stage Venture Capital to bridge the "Valley of Death" between Technology Readiness Levels (TRL) 4 and 6.

However, a quantitative review of funding recipients reveals a stark disparity: while deep tech companies generate the highest long-term Enterprise Value (EV) and export potential, they represent a minority of total national funding recipients (estimated at roughly 5% of early-stage Inostartas grants and 25% of R&D-heavy Eksperimentas grants). The majority of funds are dispersed among "soft innovation" or digital transformation projects with lower barriers to entry and lower strategic moats.

This report provides a granular mapping of these dynamics, offering detailed data on key ecosystem players, a systematization of funding flows, and actionable recommendations to recalibrate the S3 strategy for the 2024–2027 period to prioritize high-complexity, high-return deep tech ventures.

A. The strategic framework: analysis of s3 documents (2014–2027)

The trajectory of Lithuania's deep tech policy is encoded in its Smart Specialisation Strategy (S3) documents. An analysis of these texts reveals a shift from broad capacity building to targeted thematic priorities designed to integrate Lithuania into global value chains.

The Foundational Phase: 2014–2020 S3 Strategy

The initial phase of Smart Specialisation in Lithuania was characterized by heavy investment in physical assets. The primary objective during this period was to correct the fragmentation of the research landscape. The S3 documents from this era prioritized the construction of "Valleys"-integrated hubs of science and business.

Policy instruments managed by the then-separate agencies (MITA for science-business links, LVPA for business support) were designed to encourage broad

participation. The documentation indicates a focus on "absorption capacity"-ensuring that EU Structural Funds were effectively utilized to upgrade laboratories and build open-access R&D centers. While "Deep Tech" was not explicitly termed as such, the priority areas established in 2014 (Energy, Health, Agro-innovation) laid the groundwork for current successes. The legacy of this period is the physical infrastructure that current startups now inhabit, such as the *Visoriai Information Technology Park* and the *Sunrise Valley* complex.

The Current Phase: 2021–2027 S3 Strategy

Approved on August 17, 2022, the updated S3 Strategy for 2021–2027 represents a maturation of policy intent. The analysis of the strategy documents reveals a pivot towards "mission-oriented" innovation, with a specific mandate to strengthen R&D capacities to develop *new technologies* rather than merely adopting existing ones.

The 2021–2027 strategy is structured around three core R&D&I priorities that map directly to deep tech domains:

1. **Health Technologies, Biotechnologies, and Safe Food:**
   - *Thematic Focus:* Molecular technologies for medicine and biopharmaceuticals; Advanced medical engineering for early diagnosis; Safe food and sustainable agro-resources.
   - *Deep Tech Relevance:* This priority explicitly targets the interface of biology and engineering, supporting the high-growth "Bio-economy" sector exemplified by companies like **Biomatter** and **Atrandi Biosciences**.
2. **New Production Processes, Materials, and Energy Efficiency:**
   - *Thematic Focus:* Photonic and laser technologies; Advanced materials and constructions; Flexible product development.
   - *Deep Tech Relevance:* This area is the policy anchor for Lithuania's world-class laser industry (Photonics) and the emerging Space Tech sector. It supports the transition from component manufacturing to complex system integration.
3. **ICT Technologies, Inclusive and Creative Society:**
   - *Thematic Focus:* Artificial Intelligence (AI), Big Data, Cyber Security, Fintech, and Blockchain.
   - *Deep Tech Relevance:* This priority distinguishes between general IT and "Deep" ICT, specifically highlighting AI and Cyber Security-areas where Lithuania has produced unicorns (Nord Security) and deep tech innovators (Oxipit, Cast AI).

Assessment of Instrument Alignment

The S3 documentation highlights a "policy mix" encompassing R&I promotion and human resource reinforcement. However, a critical gap remains in the *implementation* of these strategies for deep tech. The analysis of the "Interregional Innovation Investments (I3)" instrument suggests that while Lithuania is strong in early-stage R&D, it faces challenges in the "scaling" phase-connecting regional pilots to EU-wide value chains.

The *National Roadmap for Progress 2021–2030* further emphasizes the need to increase the country's competitiveness in global markets.[4] For deep tech, this implies a need for instruments that do not just fund "innovation" generally, but specifically subsidize the high technical and market risks associated with scientific commercialization.

B. Infrastructure mapping: science and business valleys & ecosystem players

The physical geography of Lithuania's deep tech ecosystem is defined by its five "Valleys." These are not merely administrative zones but integrated clusters of academic institutions, research institutes, and business incubators.

1. **Saulėtekis (Sunrise) Valley (Vilnius)**

- **Profile:** The epicenter of Lithuania's "hard tech" sciences, particularly physics and lasers.
- **Key Academic Stakeholders:** Vilnius University (VU), Vilnius Gediminas Technical University (VGTU), and the Center for Physical Sciences and Technology (FTMC).
- **Deep Tech Specialisation:** Laser technologies, photonics, semiconductors, and material science.
- **Key Ecosystem Player: Sunrise Valley Science and Technology Park**. This entity facilitates the commercialization of physics research. The presence of the **Laser Research Center** at VU is the gravitational center for companies like **Light Conversion** and **Ekspla**.
- **Significance:** This valley provides the cleanrooms and optical laboratories that allow startups like **Blackswan Space** and **Astrolight** to exist without incurring prohibitive capital expenditure (CapEx) in their earliest stages.

2. **Santara Valley (Vilnius)**

- **Profile:** The hub of Life Sciences, Medicine, and Biotechnology.
- **Key Academic Stakeholders:** Vilnius University Hospital Santaros Klinikos, the Innovative Medicine Centre, and the Nature Research Centre.
- **Deep Tech Specialisation:** Molecular medicine, biopharmacy, and informatics.
- **Key Ecosystem Player: Visoriai Information Technology Park (VITP)**. Located adjacent to the valley, VITP houses high-tech companies like **Brolis Sensor Technology** and acts as a bridge between the clinical/biological research in Santara and the engineering/software capabilities required for MedTech.
- **Significance:** This valley is the birthplace of the "Lithuanian Bio-revolution." The proximity to the hospital allows for clinical validation of deep tech innovations (e.g., **Ligence** or **Sentante**).

3. **Santaka Valley (Kaunas)**

- **Profile:** A multidisciplinary hub focusing on the convergence of engineering and health.
- **Key Academic Stakeholders:** Kaunas University of Technology (KTU), Lithuanian University of Health Sciences (LSMU), and the Lithuanian Energy Institute (LEI).
- **Deep Tech Specialisation:** Sustainable chemistry, mechatronics, biomedical engineering, and ICT.
- **Key Ecosystem Player: Kaunas Science and Technology Park (Tech-Park Kaunas)**. This park is critical for startups like **Rubedo Sistemos** and **Ligence**, providing mentorship and access to KTU's engineering talent.[3]

- **Significance:** Santaka is unique in its "engineering-first" approach to health, fostering startups that build medical *devices* and *robotics* rather than just pharmaceuticals.

4. **Nemunas Valley (Kaunas)**

- **Profile:** Focused on the modernization of the agricultural and food sectors.
- **Key Academic Stakeholders:** Vytautas Magnus University (Agriculture Academy), LSMU.
- **Deep Tech Specialisation:** Agrobiotechnology, bioenergy, and food safety.
- **Significance:** While less dense in "software/hardware" deep tech, this valley is critical for the "Innovative Food" S3 priority. However, the density of VC-backed startups here is lower compared to Santara/Saulėtekis.

5. **Marine Valley (Klaipėda)**

- **Profile:** Specialized in the blue economy and maritime technologies.
- **Key Academic Stakeholders:** Klaipėda University.
- **Significance:** Emerging focus on offshore energy and marine biotech, though currently a smaller contributor to the national deep tech startup count.

Key Ecosystem Intermediaries

Beyond the valleys, specific organizations act as the "software" running on this hardware:

- **Innovation Agency Lithuania:** The central executive body for S3 implementation. It administers the key funding calls (*Inostartas*, *Eksperimentas*).
- **Practica Capital:** The dominant early-stage VC firm in the region. Their investment thesis is tightly coupled with the output of the Valleys. They have invested in almost every major deep tech success story (Oxipit, Biomatter, PVcase, Sentante, Atrandi).
- **ScaleWolf:** A specialized accelerator/fund for defense and dual-use technologies, addressing the specific needs of photonics and drone startups.[13]
- **Baltic Sandbox Ventures:** Deep tech and dual-use focused VC, co-investing in space and defense.

Vilnius TechFusion: A cluster initiative that markets the convergence of the ICT, Laser, and Biotech sectors to international investors.

C. Funding Landscape Analysis: National and European Instruments

The viability of a deep tech startup in Lithuania depends on a "Capital Stack" that combines non-dilutive public grants with dilutive private equity.

National Funding Lists (Innovation Agency / LVPA / MITA)

An analysis of the historical and current funding calls reveals three primary instruments that serve as the lifeline for deep tech.

1. "Inostartas" (Innovation Start)

- **Purpose:** Funding for early-stage SMEs to develop new products or processes.
- **Role in Deep Tech:** Serves as the "Pre-Seed" round. It allows researchers to spin out of a university and form a legal entity.
- **Analysis of Recipients:** Reviewing the *Inostartas* beneficiary lists, we observe a high noise-to-signal ratio. The list includes many lifestyle businesses and simple digital platforms. However, future deep tech leaders like **Ligence** appear in these lists early in their lifecycle (e.g., receiving ~€34k and ~€46k grants in 2020/2021).
- **Constraint:** The grant size (typically <€50k) is insufficient for substantial deep tech R&D, serving only as an initial kick-starter.

2. "Eksperimentas" (Experiment)

- **Purpose:** Large-scale funding for Research and Experimental Development (R&D) activities.
- **Role in Deep Tech:** This is the most critical national instrument. It funds the TRL 4 to TRL 7 gap-the "Valley of Death."
- **Analysis of Recipients:** The beneficiary lists for *Eksperimentas* show much larger grant amounts (ranging from €200k to €1M+). Deep tech companies are prominent here. **Rubedo Sistemos** received €562k for robotic forklift development; **Oxipit** received €520k for AI research; **Biomatter** (via partner projects) leveraged over €1M in project value.
- **Strategic Importance:** This instrument de-risks the technology for private investors. VCs like Practica Capital often invest *after* or *in parallel* with an *Eksperimentas* grant, knowing the technical costs are subsidized.

3. "Intelektas" (Intellect)

- **Purpose:** Promotes joint science-business projects.
- **Role in Deep Tech:** Encourages startups to contract research to the Universities (Valleys). **Oxipit** utilized *Intelektas* (€565k grant) to collaborate on AI model development.

European Funding (Horizon Europe & EIC)

Lithuania is designated as a "Widening Country" in Horizon Europe, acknowledging the need to close the innovation gap with Western Europe.

- **Horizon Europe Collaborative Projects:** Lithuanian universities (VU, KTU) are frequent participants. However, direct SME participation as *coordinators* is lower. Startups often enter as partners in consortiums (e.g., **CasZyme** in Eurostars projects).
- **EIC Accelerator:** The European Innovation Council (EIC) Accelerator is the premier funding vehicle for high-risk deep tech.
  - *Performance:* Historically, Lithuanian success rates were low. However, recent data shows a breakthrough. **Sentante** (UAB "Inovatyvi medicina") was selected for the EIC Accelerator, receiving blended finance (Grant + Equity).
  - *New Opportunities:* The 2025 EIC Work Programme includes a "Pre-Accelerator" specifically for Widening Countries to help deep tech startups reach the TRL levels required for the full Accelerator. This directly addresses the S3 objective of internationalization.

D. Deep Tech Startup Identification by Sector

Based on the triangulation of S3 priority areas, VC investment reports (Dealroom, Practica Capital), and grant beneficiary lists, the following startups constitute the core of Lithuania's deep tech ecosystem.

1. Health, Biotech & Synthetic Biology (S3: Health Technologies)

This sector is the most mature, benefiting from the talent pool created by the "Fermentas" (now Thermo Fisher Scientific Baltics) legacy.

- **Atrandi Biosciences (formerly Droplet Genomics):**
  - *Technology:* High-throughput single-cell analysis platforms using semi-permeable capsule (SPC) technology.
  - *Deep Tech Character:* Combines microfluidics, hardware engineering, and molecular biology.
  - *Status:* The sector leader, recently raising a $25M Series A.
- **Biomatter (Biomatter Designs):**
  - *Technology:* Generative AI platform for de novo enzyme design.
  - *Deep Tech Character:* Intersection of Synthetic Biology and Artificial Intelligence (AlphaFold-style protein engineering).
  - *Status:* Raised €6.5M Seed to scale its "Intelligent Architecture" platform.
- **CasZyme:**
  - *Technology:* CRISPR-Cas gene-editing tools and nucleases.
  - *Deep Tech Character:* Fundamental genomic editing technology.
  - *Status:* Strategic partnerships (Integra Therapeutics) and Eurostars funding.
- **Sentante:**
  - *Technology:* Tele-operated robotic system for endovascular interventions.
  - *Deep Tech Character:* Medical robotics requiring extreme precision and regulatory clearance (Class IIb/III).
  - *Status:* EIC Fund beneficiary; €6M Seed round.
- **Ligence:**
  - *Technology:* AI-driven automated echocardiography analysis.
  - *Deep Tech Character:* Computer vision applied to dynamic medical imaging.
  - *Status:* Preparing for FDA clearance; Seed funded.

2. Advanced Manufacturing, Photonics & Space (S3: New Production Processes)

Lithuania’s laser industry is transitioning from component manufacturing to system integration and space applications.

- **Blackswan Space:**
  - *Technology:* "Mission Design Simulator" (MDS) and Vision-Based Navigation (VBN) for autonomous satellite maneuvers.
  - *Deep Tech Character:* Autonomous control systems for orbital mechanics; dual-use potential.
  - *Status:* Pre-seed funded by ScaleWolf; ESA contractor.
- **Astrolight:**
  - *Technology:* Free-space optical (laser) communication systems for satellites.
  - *Deep Tech Character:* Solves the "data bottleneck" in space using photonics (Lithuania's core competence).

- *Status:* Raised €2.8M Seed.

- **Rubedo Sistemos (Rubedos):**
  - *Technology:* Mobile robotics and computer vision for logistics and medical disinfection.
  - *Deep Tech Character:* Autonomous navigation in unstructured environments.
  - *Status:* Mature deep tech SME with extensive grant and private funding history.
- **Brolis Sensor Technology:**
  - *Technology:* Infrared laser sensor systems for defense and medical monitoring.
  - *Status:* Established player spin-out from the Brolis semiconductor group.

3. **ICT & Artificial Intelligence (S3: ICT & Inclusive Society)**

Distinguishing "Deep Tech AI" from general software is crucial. The selected companies rely on proprietary algorithmic breakthroughs.

- **Oxipit:**
  - *Technology:* Autonomous AI for chest X-ray reporting (ChestLink).
  - *Deep Tech Character:* The first autonomous AI medical imaging application CE-certified in the EU.
  - *Status:* Series A funded; high commercial traction in Europe and expanding to Asia/US.
- **Cast AI:**
  - *Technology:* AI-driven cloud cost optimization and management.
  - *Deep Tech Character:* Algorithmic resource management for Kubernetes clusters.
  - *Status:* High-growth scale-up.
- **PVcase:**
  - *Technology:* Solar park engineering and design automation.
  - *Deep Tech Character:* Physics-based terrain analysis and electrical engineering automation (CAD/CAE).
  - *Status:* Series B funded; global leader in its niche.

E. The Mixed-Funding Nexus: Detailed Data Analysis

The most robust indicator of deep tech health is the "Mixed Funding" phenotype-companies that successfully leverage National/EU grants to unlock private Venture Capital.

Detailed Data on Mixed-Funding Startups

Table 19. Deep Tech Startups with Mixed Funding Histories (National + EU + VC)

Company	Focus / S3 Area	Est. Year	Employees (Est.)	Export Orientation	Funding History (Public & Private Integration)
Atrandi Biosciences	Health / Biotech	2016	65+	High (Global Research Labs)	VC: $25M Series A (Lux, Vsquared, Practica); €4.5M Seed. Public: *Inostartas*; COVID Grant (€1.17M); LVPA Projects.
Biomatter	Health / Biotech (AI)	2018	~20-50	High (Global Pharma/Chem)	VC: €6.5M Seed (Inventure, UVC); €500k Pre-Seed. Public: LVPA R&D Grant 01.2.1-LVPA-K-856 (€1.18M).[20]
Oxipit	ICT / Health (AI)	2017	~50-100	High (EU/Global Hospitals)	VC: Series A (Practica, Taiwania, Coinvest). Public: *Eksperimentas* (€520k); *Intelektas* (€565k).
Ligence	Health / ICT (AI)	2019	~10-50	High (EU/US Clinics)	VC: €3M Seed (Simpact); €410k Pre-Seed. Public: *Inostartas* (~€80k total).
Sentante	Health / Robotics	2017	~20-50	High (Global Hospitals)	VC: €6M Seed (Practica, EIC Fund).

					Public: EIC Fund (Equity); ERDF Project (€2M).
Rubedo Sistemos	Manufacturing / Robotics	2009	~20-50	High (EU Logistics)	VC: Private equity/Bootstrapped.
					Public: *Eksperimentas* (€562k); COVID Response (€360k); *Intelektas* (€240k).
Blackswan Space	Space / Manufacturing	2019	~10-20	High (ESA, Defense)	VC: €760k Pre-Seed (ScaleWolf, Baltic Sandbox).
					Public: ESA Contracts; R&D Grants.
Astrolight	Space / Photonics	2019	~10-20	High (Sat Operators)	VC: €2.8M Seed (Balnord).
					Public: EU Funds project (€86k); CASSINI Support.
CasZyme	Health / Biotech	2017	~20-50	High (Global Research)	VC: Corporate Partnerships (Integra).
					Public: *Eurostars* Grant (€1M consortium); *Inostartas*.

The "Smart Money" Trajectory

The data reveals a consistent trajectory for these companies:

1. **Phase 1 (Formation):** Founding team (often academic) utilizes *Inostartas* (National) or university incubation to establish a legal entity and proof-of-concept (TRL 2-3).
2. **Phase 2 (Deep R&D):** The company secures a major *Eksperimentas* grant (National) or *Eurostars* (EU) to fund the heavy personnel costs of R&D (TRL 4-5).
3. **Phase 3 (Validation & Seed):** Leveraging the non-dilutive R&D funding, they raise a Seed round from regional VCs like Practica Capital or specialized funds like ScaleWolf.
4. **Phase 4 (Scaling):** With technical validation complete (TRL 6-7), they raise Series A from international deep tech investors (Lux Capital, Inventure, EIC Fund).

F. Quantitative Analysis: Deep Tech vs. Total Funding Recipients

To assess the efficiency of the S3 strategy, we calculated the percentage of deep tech startups versus total funding recipients in relevant sectors.

Methodology

We analyzed the beneficiary lists of key instruments (*Inostartas*, *Eksperimentas*, *Intelektas*) provided in the research material.[14] We categorized recipients as "Deep Tech" (based on the definition of substantial scientific/engineering risk) or "General Innovation" (digitalization, process improvement, e-commerce).

The "Inostartas" Ratio (Early Stage)

- **Total Recipients (Sample):** The *Inostartas* lists contain hundreds of entries. A detailed review of a representative sample page (Page 9, ~20 entries) reveals projects such as "Smart Bra", "Virtual Meeting Assistant", and "Ad Network Prototype".
- **Deep Tech Recipients:** In the same sample, **Ligence** is the primary identifiable deep tech entry.
- **Calculation:** 1 Deep Tech out of ~20 Innovation projects.
- **Percentage: ~5%**.
- **Insight:** The vast majority of early-stage innovation funding goes to "Soft Tech" or incremental product development. Deep tech is a small fraction of the funnel at the entry level.

The "Eksperimentas" Ratio (R&D Stage)

- **Total Recipients (Sample):** A review of the *Eksperimentas* project list (IDs 0002 to 0022) shows ~22 projects.
- **Deep Tech Recipients:** We identified **Rubedo Sistemos**, **UAB "Socneta" (Cast AI)**, **Medelcom**, **Nanodiagnostika**, and **Ligence** (via partner links) in this cohort.
- **Calculation:** ~5-6 Deep Tech companies out of 22 recipients.
- **Percentage: ~23-27%**.

- **Insight:** As the instrument becomes more R&D intensive, the concentration of deep tech increases significantly. *Eksperimentas* is the primary engine for deep tech public funding.

Table 20. Systematization of Deep Tech Funding by S3 Priority Area

S3 Priority Area	Key Startups	EU Funding Volume	VC Funding Volume (Est.)	Deep Tech % of Total S3 Grants (Est.)	Strategic Health
Health & Biotech	Atrandi, Biomatter, CasZyme, Sentante	High (Eurostars, EIC Fund, Horizon)	High (€40M+ recently)	~30%	Mature: Strong correlation between grants and VC success.
New Production Processes (Photonics/Space)	Blackswan, Astrolight, Rubedo	Moderate (ESA, CASSINI)	Moderate (€5M+)	~25%	Evolving: Strong industrial base transitioning to VC model.
ICT & AI (Deep)	Oxipit, Cast AI, Ligence	Low (mostly National R&D)	Very High (€100M+)	<10%	Polarized: High volume of non-deep recipients; Deep AI relies on private capital.
Agro-Food	(N/A in core deep tech list)	Low	Low	Low	Lagging: Innovation here remains largely incremental or industrial, not startup-driven.

Conclusions

1. **The "Mixed Funding" Success Model:** The analysis confirms that Lithuania's deep tech success stories are almost exclusively "Mixed Funding"

entities. The ability to layer *Inostartas* (formation), *Eksperimentas* (R&D), and Private VC (Scaling) is the defining characteristic of the ecosystem's winners (Atrandi, Oxipit).

2. **The "Valley of Death" Bridge:** The *Eksperimentas* instrument is functioning effectively as a bridge for TRL 4-6. Without this public subsidy for technical risk, it is unlikely that VCs like Practica Capital would have invested in capital-intensive hardware projects like Rubedo Sistemos or Sentante.
3. **Low Deep Tech Density:** Despite the high value of deep tech companies, they represent a small minority (~5-25%) of innovation grant recipients. A large portion of S3 funding is absorbed by lower-risk, lower-moat digital innovations.
4. **EIC Momentum:** After years of underperformance, Lithuanian deep tech is beginning to crack the EIC code (Sentante, participation in Eurostars). The "Widening" instruments in Horizon Europe are starting to pay dividends.

Recommendations for Adjusting the S3 Strategy (2024–2027)

To maximize the impact of the 2021–2027 financial period, decision-makers should consider the following adjustments:

1. **Create a "Deep Tech" Fast-Track within National Instruments**

- **Observation:** Deep tech startups compete for *Inostartas* with simple e-commerce apps. The cap (~€30k-50k) is too low for biotech/hardware.
- **Recommendation:** Establish a dedicated "Deep Tech Track" for *Inostartas* and *Eksperimentas* with significantly higher grant caps (e.g., €100k for pre-seed) but stricter eligibility criteria (PhD involvement, patentability, TRL 3+).

2. **Institutionalize the "EIC Bridge" Program**

- **Observation:** Excellent science often stalls after National grants end.
- **Recommendation:** The Innovation Agency should implement a mandatory "EIC Readiness" program for all *Eksperimentas* winners. This would provide specialized consultancy to funnel these de-risked national winners directly into the EIC Accelerator.

3. **Formalize "Dual-Use" and Space as S3 Priorities**

- **Observation:** Startups like **Blackswan Space** and **Astrolight** are emerging in the Defense/Space sector, driven by geopolitical needs.
- **Recommendation:** Explicitly integrate "Space Technologies and Dual-Use Applications" into the "New Production Processes" priority. This will unlock specialized structural funds for defense-adjacent deep tech, aligning with the ScaleWolf and Baltic Sandbox investment theses.

4. **Shift KPIs from "Volume" to "Leverage"**

- **Observation:** Success is often measured by the *number* of companies funded.
- **Recommendation:** Adopt "Private Capital Leverage" as the primary KPI for S3 instruments. The goal should be to maximize the amount of private VC raised per Euro of public grant distributed. Companies like **Atrandi Biosciences** (high leverage) should be the benchmark for S3 success.

ANNEX 8. SPECIAL FOCUS AREA: ARTIFICIAL INTELLIGENCE

Strategic Context: Why AI Requires a Separate Focus

The current landscape of artificial intelligence (AI) in Lithuania necessitates a dedicated and separate focus within the Smart Specialisation Strategy (S3) due to a significant gap between current adoption and future targets. According to the 2025 State of the Digital Decade findings, AI take-up among Lithuanian firms reached only 8.8% in 2024 (Table 21. Comparison of AI and Digital Indicators – Lithuania vs. Leading EU Peers (2024-2025)). This figure is not only far below the European Union's 2030 target of 75%, but it also lags the uptake of other foundational digital technologies, such as cloud computing. While Lithuania shows high ambition in its national roadmap, the slow pace of diffusion suggests that the 75% target will not be met without a transformative shift in the investment and adoption landscape.

Table 21. Comparison of AI and Digital Indicators – Lithuania vs. Leading EU Peers (2024-2025)

Indicator	Lithuania	EU Average	Frontrunners (Finland/ Denmark)	2030 Target
Enterprise AI Take-up	4.9% – 8.8%	8.0% – 13.5%	27.6% (Denmark)	75%
5G Coverage (Populated Areas)	98.9%	89.3%	~100% (FI/DK among leaders)	100%
SME Digital Intensity (Basic)	60.0%	57.7%	>90% (FI & DK achieved)	90%
Public Budget Intensity[2] (% GDP)	1.90%	1.14%	0.20% (FI) / 0.21% (DK)	1.14%

A primary driver for this separate focus is the acute shortage of specialized skills necessary to enable a thriving AI ecosystem. Lithuania faces severe gaps in the availability of AI engineers, robotics and data specialists, and cybersecurity-AI specialists, as the national ICT specialist employment rate of 4.9% remains far below the 10% target set for the 2030 Digital Decade. This shortage is part of a broader demographic challenge and a systemic "talent drain" that hinders advanced innovation across the country. Furthermore, there is a growing demand for "hybrid" cross-disciplinary profiles, such as those combining medicine, mathematics, and AI, which are essential for high-impact applications in sectors like healthcare. A structural bottleneck exists within the academic system; while European and Lithuanian universities excel at producing high-impact scientific research and publications, they frequently struggle to transform this knowledge into commercialised innovations and patents. This "European Paradox" signifies a need for policy interventions that push researchers to move beyond publication and towards market-ready business solutions.

[2] Public Budget Intensity (% GDP) is a macroeconomic indicator that measures the proportion of a country's total economic output (Gross Domestic Product) that is allocated through the state budget to a specific sector or policy area

The speed of the current administrative and financial system presents another critical mismatch with the requirements of the AI revolution. Traditional public sector processes can take between 1.5 and 2 years to move from an initial idea to a signed contract, a timeline that is fundamentally incompatible with the 3 to 6-month development cycles characteristic of AI innovation. Because the cost of fixing errors or adapting to new data increases tenfold at each stage of the product lifecycle, such delays can render AI projects obsolete before they are even deployed. To remain competitive, Lithuania must accelerate its innovation cycles and reduce the administrative burden that currently stifles start-ups and SMEs.

Governance and regulatory friction further complicate the environment for AI development. Historically, Lithuania's digital policy has been fragmented across various ministries without a single central orchestrator, leading to inconsistent coordination and a lack of transparency in funding criteria. Although a National Digital Agenda for 2026–2040 is being established to centralize governance, the current system still lacks robust testing environments and established AI sandboxes for business. This regulatory friction, compounded by an initial "ethical and legal vacuum," makes it difficult for companies to navigate the requirements of the EU AI Act and build the necessary trust with investors and consumers.

Ultimately, a separate focus is required because AI is no longer a mere sub-field of Information and Communication Technology (ICT); it has matured into a horizontal, general-purpose technology that acts as a foundational amplifier across all strategic sectors. In bioengineering, AI is accelerating drug discovery and the design of personalized medical treatments. In the realm of defence, it is a critical asset for real-time threat detection and autonomous operations, necessitating deep integration into national security frameworks. Within manufacturing, AI addresses low labor productivity through intelligent robotisation and process automation. Similarly, the Blue Economy is being reshaped by AI-driven maritime autonomous ship systems and logistics optimization in ports, while the agriculture sector relies on AI for precision irrigation, crop planning, and the development of climate-resilient varieties. By treating AI as a distinct strategic priority, Lithuania can better coordinate these cross-cutting applications to secure its technological sovereignty and long-term economic resilience.

A. Lithuania's Current AI Position: Strengths & Gaps

Lithuania occupies a distinctive position within the European digital landscape, characterised by high strategic ambition and robust infrastructural foundations, yet tempered by significant barriers to widespread technology diffusion. Currently classified as an economy with **"moderate foundations,"** the nation possesses the potential for substantial economic impact if it can successfully bridge the gap between its research excellence and commercial application. While the 2025 State of the Digital Decade report highlights Lithuania as a regional leader in mobile connectivity, the transition from being a "consumer" of technology to a global "innovator" in AI requires addressing several structural imbalances.

Core Strengths

Lithuania's AI ecosystem is underpinned by several competitive advantages that provide a launchpad for next-generation innovation:

- **Strong Digital Skills Base:** Lithuania maintains a very high level of digital literacy, with **93.9% of the population possessing above-basic digital skills**, and the nation shows the smallest disparity in digital skills across educational levels in the EU.

- **FinTech and Cybersecurity Hub:** The nation is a globally recognised **FinTech leader**, ranked 10th in the Global Fintech index with over 250 active companies. Cybersecurity is treated as a strategic national priority, reinforced by the full implementation of the 5G Toolbox.
- **Photonics and Semiconductor R&D:** Lithuania leverages its world-class **laser industry** to act as a vital niche player in the semiconductor and quantum computing value chains. The recent EUR 14 million agreement with Taiwan to establish a semiconductor plant and research centre underscores its intent to lead in **AI hardware components**.
- **Dynamic Startup Distribution:** While **Vilnius remains the primary hub** for AI and blockchain development, receiving EUR 15 million in dedicated RRF funding for 170 projects in 2024, the ecosystem is expanding. AI startups are increasingly opening branches in manufacturing-heavy regions, such as Central and Western Lithuania, to access S3 funding and support the digitisation of the industrial sector.

Systemic Weaknesses

Despite these advantages, the interim evaluation identifies several critical bottlenecks that prevent Lithuania from reaching its 2030 Digital Decade targets:

- **Extremely Low AI Adoption:** Only **8.8% of Lithuanian enterprises** have adopted AI technologies, a figure that is not only far below the EU target of 75% but also highlights that SMEs currently lack the **AI-ready data infrastructures** and digital awareness necessary for integration.
- **Lack of Testing and Regulatory Infrastructure:** There are currently **no sovereign or sectoral AI testbeds** or regulatory sandboxes for high-risk applications in health or defence. The planned AI sandbox for business is not scheduled for pilot activities until 2026, leaving firms in a regulatory "vacuum" as they attempt to align with the EU AI Act.
- **The "Valley of Death" for AI Prototypes:** While the startup ecosystem is vibrant, many **AI prototypes fail to scale** due to a lack of follow-up expansion capital and a missing pipeline for commercial deployment. Lithuania’s scale-up activity and access to private capital remain modest compared to Western European peers.
- **Fragmented Governance:** Historically, Lithuanian digital policy has been split across various ministries with **no single orchestrator**, resulting in "navigation overload" for firms trying to access support. This lack of centralised coordination has contributed to **slow decision cycles** that do not match the rapid pace of AI development.

To address these gaps, the Lithuanian government has moved to establish a **National Digital Agenda for 2026–2040**. This cross-cutting strategy aims to centralise governance and align funding to ensure that the nation’s technological strengths in lasers and photonics are directly translated into a competitive, sovereign AI economy.

B. AI as a Cross-Cutting Enabler of All S3 Priorities

Artificial Intelligence (AI) has matured into a foundational amplifier that acts as a horizontal enabler across all of Lithuania’s Smart Specialisation (S3) priorities. By automating routine tasks and generating high-level data-driven insights, AI allows for transformative shifts in productivity and resource management, moving the national economy from a consumer of technology to an innovator. The universal application of AI is now a strategic imperative for Lithuania's technological

sovereignty, bridging the gap between traditional industrial strengths and the requirements of a digital-first global market.

1. AI for Industry 4.0 & Manufacturing

In the realm of Industry 4.0, AI is a critical tool for enhancing quality assurance and operational efficiency through predictive maintenance, advanced robotics, and computer vision. Manufacturing remains the largest sector of the Lithuanian economy, generating over 20% of the national GDP, yet it is currently hindered by low levels of labour productivity. AI-driven robotisation and process automation are uniquely positioned to mitigate these challenges. The Central and Western Lithuania (VVL) region is particularly suited for these applications due to its strong industrial base; however, the interim evaluation shows that the region currently lacks sufficient AI adoption capacity, necessitating targeted public investment to help SMEs build the required data infrastructures.

2. AI for Health & Biotech

Healthcare and biotechnology S3 priorities are being revolutionised by AI applications in diagnostics, genomics, and clinical decision support. Lithuania is already an active participant in high-impact projects such as the AIDA initiative for early cancer prevention and the 1+ Million Genomes initiative, which leverages AI to foster personalised medicine. Digital twins of the human body are also being developed to accelerate drug discovery and clinical trials. Despite these advancements, progress is significantly constrained by an acute shortage of specialised skills, particularly for "hybrid" profiles that combine medicine, mathematics, and AI expertise.

3. AI for Defence & Dual-Use

AI represents a transformative force for national security, enabling autonomous systems, drone swarm coordination, and real-time situational awareness. Defence stakeholders have explicitly identified a critical need for "Agentic AI"-multistep reasoning systems capable of making context-aware decisions and initiating actions without constant human oversight. These multi-agent systems are essential for managing next generation cyberthreats and enhancing battlefield decision-making. Lithuania continues to connect its defence and digital innovation communities through initiatives like the EUDIS Hackathons to solve complex challenges such as subsea infrastructure protection and target recognition.

4. AI for Maritime & Blue Economy

The Blue Economy uses AI as a primary driver for the digital transformation of maritime transport and port activities. AI algorithms are employed for route optimisation and demand forecasting, which minimise delivery times and reduce operational costs for shipping giants. Advancements in maritime autonomous ship systems (MASS) and marine robotics are reducing human error and improving safety at sea. Additionally, digital twin technologies for ocean management and smart port infrastructures are being deployed to monitor emissions and improve cargo tracking through converged blockchain-AI solutions.

5. AI for Agriculture & Food Tech

In the agriculture and food technology sectors, AI is strategically vital for ensuring supply chain resilience and precision farming. Autonomous systems are used for robotic crop harvesting and soil analysis, while AI-powered irrigation systems can reduce water waste by up to 30%. In livestock farming, AI facilitates real-time disease diagnosis and monitoring of animal health. While not a core defence

research priority, the integration of digital and biotechnological AI tools in agriculture is essential for Lithuania to secure its food systems against geopolitical shocks and natural resource degradation.

C. System Bottlenecks Specific to AI

Infrastructure Gaps

A critical bottleneck in Lithuania's AI ecosystem is the absence of dedicated, state-funded compute and data infrastructures specifically designed for the large-scale training and testing of AI models. Currently, the Lithuanian government does not invest directly in high-performance computing (HPC) resources, leaving the nation dependent on university-managed clusters at Vilnius University and Kaunas University of Technology. This reliance on academic infrastructure limits the availability of sovereign cloud and edge facilities required to handle sensitive data, especially for high-demand industrial or defence applications. While a EUR 95 million reform is underway to expand state cloud ICT infrastructure towards a hybrid model, the current system remains fragmented across different ministries. Furthermore, while Lithuania is a frontrunner in mobile 5G coverage, persistent gaps in fibre and fixed Very High-Capacity Network (VHCN) deployment in rural regions continue to hinder the adoption of industrial AI solutions among SMEs. This infrastructure deficit is compounded by a lack of edge nodes, which are essential enablers for the low-latency processing required by future AI and internet of things (IoT) networks.

Regulation & Data Access

Lithuania's regulatory environment for AI is currently hampered by the absence of established sandboxes for high-risk business applications in sectors such as health, fintech, and defence. While the GovTech Lab successfully piloted an AI sandbox for 14 public institutions in 2024, a corresponding business sandbox is not scheduled for pilot activities until 2026, leaving firms in a regulatory vacuum as they attempt to align with the requirements of the EU AI Act. Access to high-quality public datasets remains a significant challenge due to fragmented data collection practices and the lack of a unified data architecture for combined civil-military use. Although a EUR 126 million reform is targeting public sector data management and the creation of a state "data lake," the legal and ethical frameworks for data repurposing and sharing remain unclear to many market participants. This uncertainty, coupled with procedural complexity, creates high regulatory friction that discourages SMEs from investing in data-driven innovation.

Skills & Human Capital

The Lithuanian labour market faces acute shortages of specialised human capital, specifically AI engineers, robotics experts, and cybersecurity-AI specialists. While ICT employment is growing, the current specialist employment rate of 4.9% is significantly below the 10% target set for the 2030 Digital Decade. There is an urgent need to develop new hybrid profiles that integrate AI expertise with sectoral knowledge in manufacturing, health, and logistics. A structural misalignment persists between the academic supply and S3 priorities; while Lithuanian universities are strong in producing high-impact scientific research and publications, they are frequently not commercialization-driven. This "European Paradox" results in a fragmented ecosystem where research is scattered across multiple organisations, making it difficult to attract top-tier international talent or translate scientific breakthroughs into market-ready patents.

Pipeline / Funding Gaps

A significant hurdle for Lithuanian AI innovation is the absence of a multi-stage funding pipeline capable of supporting technologies as they move from initial research to full market deployment (TRL 4–9). Many AI prototypes stall in the "valley of death" because firms cannot access the follow-on scaling funds required after the initial seed and angel rounds. Lithuania's access to private scale-up capital remains modest compared to Western European peers, and the domestic venture capital market is not yet deep enough to support the high upfront investment needs characteristic of core AI development. Additionally, demand-side tools, such as innovation-friendly public procurement, are currently missing or underutilised. Existing procurement processes are often too slow-taking up to two years from idea to contract-and need to be fine-tuned to accommodate the rapid three-to-six-month development cycles of small, innovative AI companies.

D. Proposed AI-Specific Measures

1. Establish an "AI Innovation Pipeline"

The current administrative and financial system in Lithuania, which can require up to two years to move from an initial idea to a signed contract, must be replaced by a structured AI Innovation Pipeline to match the rapid development cycles of the technology. Drawing from successful European deep-tech models, this pipeline should provide a multi-stage funding mechanism that supports technologies across all maturity levels, beginning with targeted pilots and testing at TRL 4–6 to bridge the initial gap between laboratory excellence and commercial viability. Intermediate stages at TRL 6–8 should leverage the planned 2026 AI business sandbox and expanded data access environments to ensure regulatory compliance and technical refinement before full market entry. Finally, the pipeline must conclude at TRL 8–9 with robust deployment supported by strategic public procurement in high-impact sectors like health, transport, and the maritime economy. By synchronising these stages, Lithuania can accelerate its innovation cycles and reduce the "valley of death" risks that currently cause promising prototypes to stall.

2. Create National AI Sandboxes

To mitigate regulatory friction and the perceived ethical vacuum, Lithuania must establish a network of National AI Sandboxes covering strategic S3 priorities. Building on the 2024 GovTech Lab pilot for 14 public institutions, these controlled environments should expand into clinical decision systems for health tech and autonomous targeting for dual-use defense applications. Sectoral sandboxes for smart port operations and autonomous logistics in the maritime sector, as well as precision farming in agriculture, are essential for testing innovative solutions under the supervision of competent authorities. These sandboxes will provide firms with specialised legal advice and high-performance testing infrastructure to ensure early alignment with the EU AI Act's risk categories, particularly for high-risk applications in fintech and anti-money laundering. Such initiatives will not only reduce up-front compliance costs for SMEs but also build the necessary trust among investors and consumers.

3. Build National Compute & Data Infrastructure

Lithuania's transition to a sovereign AI economy requires the urgent development of dedicated national compute and data infrastructure to provide the processing

power necessary for training large-scale models. While the current reliance on university-managed clusters at VU and KTU is insufficient for large-scale industrial needs, the nation should invest in sovereign cloud and hybrid cloud-edge nodes as part of its ongoing EUR 95 million state IT management reform. This infrastructure should be complemented by regional satellite clusters featuring shared GPU compute resources to ensure that start-ups have affordable access to the processing capacity required for fine-tuning and inference. Furthermore, establishing dedicated data trusts for the health, logistics, agriculture, and defense sectors will facilitate the secure exchange of high-quality, interoperable datasets necessary for developing trustworthy AI applications. These "data lakes" will support scientific research and promote digital innovations while ensuring strict compliance with GDPR and the Data Governance Act.

4. AI Competence Centres / Sectoral AI Labs

Following a regional hub-and-node logic, Lithuania should establish specialised AI Competence Centres to concentrate technical expertise and foster industrial synergies across the Vilnius–Kaunas–Klaipėda axis. A centre focused on manufacturing and industrial AI (Industry 4.0) should be anchored in the Kaunas and Panevėžys regions to address low labour productivity through predictive maintenance and robotics. The Vilnius hub is uniquely positioned to lead on health AI and AI cyber ranges, leveraging its high concentration of startups and research excellence at Vilnius University and Santaros Klinikos. Meanwhile, Klaipėda should host a dedicated lab for maritime logistics, smart ports, and autonomous ship systems to modernise the Blue Economy and improve the global competitiveness of the Port of Klaipėda. These centres will act as one-stop shops for SMEs, providing access to "AI Experience Centres" where solutions can be tested before investment.

5. AI Skills Acceleration Program

To close the acute talent gap and reach the 2030 target of 10% ICT specialists, a comprehensive AI Skills Acceleration Program must be implemented across all educational levels. This program should introduce microcredentials in machine learning operations (ML Ops), robotics, and ethics to facilitate rapid upskilling for 60,000 state officials and private sector workers. High-level expertise should be fostered through industry-sponsored doctorates and paid internships aligned with S3 priorities, creating a direct pipeline between academic research and commercial enterprise. Lithuania should also build on its existing success in relocation incentives to launch a specific AI talent attraction scheme aimed at the global research community and the national diaspora. By modernising university curricula to include applied skills in genomics and computational biology, Lithuania can build a resilient workforce ready for the hybrid roles of the future.

6. Introduce AI-Specific Public Procurement

Strategic public procurement should be leveraged as a powerful demand-side tool to turn Lithuania’s strong research outputs into viable businesses by positioning public institutions as lead buyers. Municipalities, the Ministry of National Defence, and the Port of Klaipėda must act as early adopters, purchasing AI-based solutions for autonomous logistics, drone swarm coordination, and cyber-physical protection. In the healthcare sector, dedicated procurement channels for AI-driven diagnostic tools and clinical decision support will accelerate the adoption of personalised medicine while providing startups with the commercial traction needed to scale globally. Reducing the bureaucratic complexity and time-to-contract within these processes will be vital to accommodating the rapid three-to-six-month innovation cycles characteristic of the AI industry.

7. AI Safety, Governance & Standards

Lithuania must establish clear AI safety and governance standards to ensure that all deployments are technically robust and aligned with European values. This includes creating formal certification pathways for AI embedded in medical devices and critical infrastructure, accompanied by rigorous testing for robustness, bias, and cybersecurity. The national regulatory framework requires an urgent update through the National Digital Agenda for 2026–2040 to align with the risk categories and compliance mechanisms defined by the EU AI Act. By promoting AI literacy as a new civic skill and setting high standards for transparency and accountability, the government can build the public trust necessary for the widespread social acceptance of autonomous systems. Furthermore, aligning with international standard-setting bodies like ISO and IEC will allow Lithuanian companies to compete confidently on the global stage as providers of trustworthy technology.

E. AI as a Mission-Oriented Horizontal Priority

To move beyond incremental progress, Lithuania is transitioning towards a mission-oriented approach that treats artificial intelligence not merely as a sub-sector of ICT, but as a **horizontal general-purpose technology** essential for national resilience. This shift is reflected in the upcoming **National Digital Agenda for 2026–2040**, which seeks to centralise governance and align funding to solve systemic societal challenges through high-impact technology. By integrating AI into the core of the State Progress Strategy "Lithuania 2050," the nation aims to foster a connected, sustainable, and well-balanced development model. This strategic evolution is grounded in a specific mission definition: **"AI-powered productivity and resilience" - applying artificial intelligence across manufacturing, health, security/defence, and logistical systems to increase national competitiveness and security**. Such a mission logic ensures that AI developments are purposeful, focusing on critical areas like **biotechnologies, climate neutrality, and autonomous defence systems** to secure Lithuania's technological sovereignty in an increasingly volatile global landscape.

How AI Strengthens Regional Complementarity

Lithuania's AI strategy employs a **hub-and-node logic** to bridge the "dual-speed" developmental gap between the capital and the rest of the country, fostering interregional innovation pipelines. The **Capital Region (Vilnius)** serves as the primary hub for high-level **AI R&D, cybersecurity, and startup acceleration**, supported by dedicated measures like the EUR 15 million RRF call for AI and blockchain developers. In contrast, the **Central and Western Region** is positioned as the primary site for **AI adoption in manufacturing and logistics**, leveraging its strong industrial base to address labor productivity gaps through robotics and automated workflows. Specifically, the **Klaipėda node** is emerging as a centre for **AI in maritime systems**, focusing on smart port operations, autonomous vessel navigation, and route optimisation to modernise the Blue Economy. By aligning these regional specialisations, Lithuania ensures that the scientific excellence of the capital is directly translated into industrial applications across the nation, creating a cohesive ecosystem that mitigates the risk of regional digital exclusion.

Table 22. Regional AI Specialisation Framework

Region	Strategic Role	Key AI Applications	Primary Objectives
Capital (Vilnius)	Innovation Hub	R&D, Cybersecurity, Fintech, Startups	Technological leadership, IP creation
Central/Western (Kaunas)	Industrial Node	Manufacturing AI, Sustainable Food, Health Tech	Productivity, process automation
Klaipėda	Maritime Node	Autonomous Shipping, Smart Ports, Marine Robotics	Blue Economy modernisation

ANNEX 9. SPECIAL FOCUS AREA: DEFENSE AND CAPABILITY BUILDING

A. The State of Defence Innovation and S3 Concept Alignment

1. Status of Defence Industry R&D and Manufacturing Capacities

Lithuania possesses a robust foundation for high-tech R&D, particularly in **lasers (photonics), semiconductors, and biotechnology**, which are globally competitive. However, the defence innovation ecosystem remains fragmented. While scientific potential exists across all European Defence Agency (EDA) capability areas-from materials to cyber defence-it is unevenly distributed.

- **R&D Status:** Research is often "bottom-up" and disconnected from specific military operational needs. Universities (e.g., VU, KTU, VILNIUS TECH) and institutes (FTMC, BPTI) have strong competencies in **optronics, sensors, and AI**, but specific defence applications (e.g., kinetic weaponry or advanced ballistics) are under-researched due to a lack of historical funding and strategic focus.
- **Manufacturing:** The engineering industry generates ~22-25% of exports, indicating a capacity to integrate into global supply chains. However, the capability to mass-produce critical defence assets (e.g., ammunition, drones) is limited. The industry is largely composed of sub-contractors rather than Original Equipment Manufacturers (OEMs) of complex weapon systems.

2. Targets, Challenges, and Opportunities for Development

The primary development targets are driven by the geopolitical necessity to move beyond deterrence toward active defence and societal resilience.

- **Targets:**
  - **Hard Power:** Development of **Unmanned Aerial Vehicles (UAVs)** and counter-UAV systems, **Missiles & Munitions** (loitering munitions), and **secure communications**.
  - **Soft Power:** Cognitive warfare resistance, societal resilience, and advanced simulation/training systems.
- **Challenges:** The current ecosystem suffers from a "vicious circle": the military buys "off-the-shelf" products rather than funding R&D, while business cannot develop products without R&D funding. Furthermore, strict procurement bureaucracy and a lack of testing infrastructure ("sandboxes") hinder rapid prototyping.
- **Opportunities:** Lithuania has the potential to become a testing ground for **dual-use technologies** (e.g., integrating lasers into air defence) and a hub for niche high-tech manufacturing (chips, optics).

3. Detailed Alignment Analysis: S3 Thematic Areas vs. Defence Targets

The 2021–2027 S3 strategy identifies three priorities: *Health Technologies and Biotechnologies*, *New Production Processes, Materials and Technologies*, and *ICT*. Crucially, **defence is not an explicit priority** in the S3 documentation, which was drafted based on economic potential rather than national security needs.

- **Priority 1: Health Technologies and Biotechnologies**
    - *Defence Alignment:* **CBRN & War Medicine.**
    - *Analysis:* Lithuania has strong infrastructure (biobanks, gene editing) applicable to **CBRN countermeasures** (detection of biological agents) and **regenerative medicine** for treating blast injuries.
    - *Shortcoming:* The current S3 focus is largely civilian (aging society, functional food). The specific need for "tactical medicine" (field care) is not emphasized in S3 themes.

- **Priority 2: New Production Processes, Materials, and Technologies**
    - *Defence Alignment:* **Kinetic Capabilities & Platforms.**
    - *Subarea: Photonics & Laser Technologies:* Highly aligned. Essential for **laser weaponry**, target designation, and secure optical communications.
    - *Subarea: Advanced Materials:* Aligned with **camouflage** (metamaterials), lightweight armour, and drone fuselages.
    - *Shortcoming:* **"Missiles & Munitions"** is the most critical defence gap but has the weakest alignment with S3. The strategy prioritizes general manufacturing efficiency rather than the specific energetics and ballistics required for ammunition production.

- **Priority 3: Information and Communication Technologies (ICT)**
    - *Defence Alignment:* **Cyber, AI & Command/Control.**
    - *Subarea: AI & Big Data:* Strong alignment with **autonomous systems** (drone swarms), situational awareness, and disinformation analysis.
    - *Subarea: Cyber Security:* Critical alignment. Cyber defence is essential for protecting critical infrastructure (energy, transport) and fits perfectly into the "dual-use" concept.
    - *Opportunity:* This priority offers the easiest path for "dual-use" integration, as cyber tools for banks or energy grids are directly applicable to defence.

4. Strategic Shortcomings and Adjustments

The main shortcoming is that the S3 priorities were set without input from the defence sector. Consequently, **"hard" defence technologies** (explosives, propulsion, weapon integration) are orphan areas within the national innovation strategy.

- **Adjustment Required:** The strategy must formally recognize **dual-use** potential as a horizontal priority. A specific "Defence Innovation Program" is needed to bridge the gap between academic research (TRL 1-4) and military procurement (TRL 9), funding the "valley of death" (TRL 4-7) for prototypes.

Table 23. Summary Table: Evaluation of S3 Strategy for Defence Development

Defence Industry Development Targets	Alignment with S3 Thematic Areas (2021-2027)	Challenges within Framework	Opportunities & Adjustment Areas
Unmanned Systems (UAVs/Drones) *(Development of autonomous swarms, guidance, and anti-drone tech)*	**High Alignment:** *ICT:* AI, IoT, & Big Data. *New Manufacturing:* Photonics (sensors) & Advanced Materials.	Lack of testing infrastructure (sandboxes) for rapid prototyping. S3 focuses on general robotics, not specifically on EW-resistant autonomy.	**Adjustment:** Explicitly include "autonomous defence systems" under ICT/Robotics. Create a "fast-track" for dual-use drone projects.
Missiles, Munitions & Energetics (Explosives, ballistics, kinetic platforms)	**Low Alignment:** Falls marginally under *Advanced Materials*, but energetics/explosives are not an S3 priority.	Major gap in S3. Financial instruments (e.g., structural funds) often exclude lethal weaponry R&D.	**Opportunity:** Create a dedicated **National Defence Research Program** to fund "hard" defence tech that S3 misses. Integrate local chemistry/materials science into explosives manufacturing.
Cyber Defence & AI (Critical infrastructure protection, post-quantum crypto)	**High Alignment:** *ICT:* Cyber security, AI, Fintech (blockchain).	Fragmented data sharing between civil/military sectors. Shortage of specialists in *defence-specific* cyber (e.g., OT security).	**Opportunity:** Leverage strong Fintech/Cyber ecosystem for defence. Establish **Security Operations Centres (SOCs)** as a shared civil-military asset.
Optronics & Lasers (Targeting, laser weapons, secure comms)	**Very High Alignment:** *New Manufacturing:* Photonics & Laser Technologies.	High TRL technology exists but is primarily export-oriented for civilian use. Transitioning to military specs requires certification support.	**Opportunity:** Position Lithuania as a **NATO centre of excellence** for laser weapons and optical communication.

CBRN & War Medicine (Bio-detection, trauma care, soldier performance)	**Moderate Alignment:** *Health Tech:* Molecular technologies & Advanced medical engineering.	S3 focuses on "healthy aging" and lifestyle, not trauma/field medicine. Lack of "tactical" focus in biotech R&D.	**Adjustment:** Redirect Biotech priority toward **biodefense (sensors)** and **regenerative medicine** for injury recovery.
Societal & Cognitive Resilience (Counter-disinformation, psychological defence)	**Moderate Alignment:** *ICT:* Social innovations & Media technologies.	"Soft power" is often underfunded in hardware-focused defence strategies. Lack of structured defence education.	**Opportunity:** Use the "Quadruple Helix" model (involving society) to fund research on **cognitive warfare** and disinformation resilience.

Conclusion: The S3 Strategy provides a solid *technological* base (Lasers, ICT, Biotech) but lacks a *functional* defence application mechanism. To address Lithuania's capability targets, the strategy must be adjusted to **explicitly prioritize dual-use technologies** and be supplemented by a dedicated **Defence R&D Program** to cover the "hard power" gaps (munitions, kinetic systems) that civilian-oriented S3 priorities naturally exclude.

B. Fucus area: Defense Innovation & Manufacturing within the S3 Framework

1. The Role of the Manufacturing Industry in Defence

The Lithuanian engineering and technology industry is a cornerstone of the national economy, generating approximately 22–25% of the country's exports. However, its current role in the defence ecosystem is largely defined by sub-contracting and component manufacturing rather than the production of complete weapon systems (Original Equipment Manufacturer - OEM).

- **Capacity vs. Capability:** While the industry can integrate into global supply chains, it lacks the capacity to mass-produce critical kinetic assets (e.g., ammunition, explosives, large-scale platforms) independently. The manufacturing sector faces a "vicious circle": the military purchases "off-the-shelf" foreign products because local R&D is not funded to the prototype stage, and local business does not invest in defence R&D without guaranteed procurement.
- **Industry 4.0 & Dual-Use:** The manufacturing sector's transition to "Industry 4.0" (robotics, automation, AI) is a key enabler for defence. Lithuania has strong niches in **lasers (photonics)** and **electronics**, which are critical for high-tech weaponry (targeting, guidance). However, the ability to scale production "for the front, not the warehouse" remains a significant bottleneck.

2. Status of R&D and Innovation

Lithuania possesses high scientific potential in specific Euro-Atlantic defence priority areas, particularly **photonics, semiconductors, and biotechnology**, yet this potential is unevenly distributed.

- **Fragmented Ecosystem:** The defence innovation ecosystem is fragmented across ministries, academia, and industry, lacking a unified architecture. Research often remains at low Technology Readiness Levels (TRL 1-4) without transitioning to prototyping (TRL 5-7) due to a lack of "pump-priming" funding.
- **The "Hard Power" Gap:** While soft power (societal resilience) and cyber capabilities are supported by existing academic structures, research into **"hard" defence technologies**-specifically missile propulsion, energetics (explosives), and kinetic platforms-is underdeveloped and often falls outside the scope of current S3 priorities.

3. Alignment of S3 Priorities with Defence Targets

The 2021–2027 S3 strategy focuses on three priorities: *Health Technologies*, *New Production Processes*, and *ICT*. These were selected based on economic potential, not national security. Consequently, defence is not an explicit priority, creating alignment gaps:

- **High Alignment: ICT** and **Lasers (New Production)** align well with cyber defence, drone swarms, and optical sensors.
- **Low Alignment: Missiles & Munitions**-identified as the highest priority for capability enhancement-has the weakest link to S3, as few civilian sectors require high-grade explosives or ballistics research.

4. Strategic Challenges and Opportunities

- **Challenge:** The current framework focuses on civilian "healthy aging" and general digitalization, missing specific military needs like tactical field medicine or electronic warfare resistance. Bureaucracy in procurement prevents rapid testing and iteration of prototypes.
- **Opportunity:** Lithuania can pivot its strong manufacturing base toward **dual-use technologies**. The engineering industry can leverage S3 funding for materials science and robotics to develop autonomous systems (ground/air) and secure supply chains for critical components (chips, optics).

Table 24. Summary Table: S3 Alignment with Defence Targets.

Smart Specialization Priority (2021-2027)	Specific Defence Industry Targets Covered	Shortcomings & Manufacturing Gaps	Opportunities & Adjustment Needed
1. Information and Communication Technologies (ICT) *(Sub-areas: AI,*	**Cyber Defence & Electronic Warfare:** Protection of critical infrastructure (IT/OT), post-quantum	**Fragmented Data Architecture:** Lack of unified security operations centres (SOCs)	**Adjustment:** Mandate **dual-use** criteria for ICT projects. Create "Sandboxes" for testing AI in cyber-warfare scenarios.

Cyber Security, Big Data)	cryptography. **Unmanned Systems (SW):** AI for drone swarms, autonomous decision-making, and situational awareness.	for civil-military cooperation. **Legacy Systems:** Difficulty integrating modern cyber defence into legacy critical infrastructure (rail, energy).	**Opportunity:** Establish Lithuania as a regional hub for **AI-driven cyber resilience** and secure tactical communication.
2. New Production Processes, Materials and Technologies (Sub-areas: Photonics, Advanced Materials, Industry 4.0)	**Optronics & Lasers:** Target designation, laser weapons, secure optical communications. **Kinetic Platforms (Air/Land):** Lightweight materials for drones, 3D printing for spare parts, robotics for logistics. **Energy:** Off-grid power generation for forward bases (solar/hydrogen).	**The "Hard Power" Gap:** S3 lacks focus on **energetics (explosives)** and propulsion (missiles), which are critical for ammunition independence. **Manufacturing Scale:** Industry is geared toward sub-contracting, not OEM mass production. High dependency on external supply chains for raw materials.	**Adjustment:** Create a dedicated **Defence R&D Program** to fund "orphan" areas like ballistics and explosives that S3 misses. **Opportunity:** Leverage the strong laser sector to develop **Counter-UAV (Directed Energy)** systems. Integrate local engineering firms into global ammo supply chains.
3. Health Technologies and Biotechnologies (Sub-areas: Molecular technologies, medical engineering)	**CBRN Defence:** Biosensors for detecting chemical/biological threats. **War Medicine:** Trauma care, regenerative medicine for blast injuries, soldier performance enhancement.	**Civilian Focus:** S3 prioritizes "healthy aging" and lifestyle diseases, ignoring acute **tactical/field medicine** needs. **Gap in Translation:** Strong basic research (biobanks) exists but isn't translated into deployable military medical solutions.	**Adjustment:** Redirect a portion of biotech funding specifically to **CBRN countermeasures** and acute trauma solutions. **Opportunity:** Utilize Lithuania's gene-editing and bio-sensor capabilities to create advanced **early-warning systems for biological threats**.

Cross-Cutting / Missing Areas	**Societal & Cognitive Resilience:** Counter-disinformation, psychological defence, "total defence" preparation.	**Soft Power Void:** "Soft" defence (psychological resilience) is underfunded in hardware-centric strategies. S3 lacks a specific social science priority for defence.	**Adjustment:** Integrate **social sciences** into defence R&D to address cognitive warfare. **Opportunity:** Use the **"Quadruple Helix"** model (Government-Industry-Academia-Society) to build a resilient society capable of resisting hybrid threats.

Conclusion & Recommendation: The current S3 provides a strong *technological* foundation (Lasers, AI) but fails to address the *functional* production needs of a wartime economy. To bridge this gap, the strategy must be adjusted to **explicitly prioritize dual-use manufacturing** and be supplemented by a separate **National Defence Research Program (in progress)**. This program must specifically fund the "hard power" elements (munitions, explosives, weapon integration) that the civilian-focused S3 naturally excludes, while ensuring the manufacturing industry is supported to move from prototyping to mass production.

Based on the comprehensive analysis of the 2021–2027 Smart Specialization Strategy (S3), the Feasibility Study on Defence Research, and stakeholder policy recommendations, here are **9 specific recommendations** for adjusting the S3 framework. These recommendations aim to bridge the gap between Lithuania's existing high-tech potential and the urgent, functional needs of the defence industry.

Recommendation 1. Formally Integration of "Dual-Use" as a Horizontal Priority

The current S3 priorities (*Health, New Production Processes, ICT*) are driven by economic potential rather than national security.

- **Recommendation:** Amend the S3 concept to explicitly designate **"Dual-Use Technology"** as a horizontal priority across all thematic areas. This adjustment would require all state-funded R&D projects within S3 to evaluate their potential applicability to national defence, thereby unlocking structural funds for defence-relevant innovations that currently fall into a "grey area" between civil and military funding.

Recommendation 2. Establish a Dedicated "National Defence Research Program" for Hard Power

The Feasibility Study identifies a critical gap in "hard power" domains-specifically **Missiles, Munitions, and Explosives (Energetics)**-which do not naturally align with civilian-market-driven S3 priorities.

- **Recommendation:** Create a separate, ring-fenced **National Defence Research Program** outside the standard S3 competition. This program must specifically fund the "orphan" areas of **energetics, internal ballistics, and propulsion**, which are essential for ammunition independence but lack immediate commercial civilian applications.

Recommendation 3. Pivot "New Production Processes" toward Industrial Defence Scaling

While Lithuania has strong prototyping capabilities, the industry struggles with the transition to mass production ("manufacturing for the front, not the warehouse").

- **Recommendation:** Adjust the *New Production Processes, Materials and Technologies* priority to specifically target **Defence Industry Scaling**. Funding should prioritize manufacturing innovations that allow for the high-speed, low-cost mass production of **drones (UAVs), loitering munitions, and electronic components**, moving beyond boutique prototyping to industrial-scale capabilities.

Recommendation 4. Create Regulatory and Physical "Defence Sandboxes"

A major bottleneck identified by stakeholders is the lack of testing infrastructure and bureaucratic hurdles for testing military-grade tech.

- **Recommendation:** Establish **"Mil Tech Sandboxes"** as a formal instrument within the S3 ecosystem. These would be designated zones (both physical ranges and regulatory frameworks) where businesses can rapidly test **electronic warfare (EW) systems, autonomous swarms, and cyber tools** without the usual peacetime bureaucratic delays, facilitating rapid feedback loops from the military to developers.

Recommendation 5. Reorient ICT Priorities to "Battlefield AI" and Cyber-Physical Systems

The current ICT priority focuses on general digitalization. However, the defence sector specifically needs AI for autonomous systems and protection of Operational Technology (OT).

- **Recommendation:** Refine the *ICT* priority themes to explicitly include **"Autonomous Defence Systems"** and **"Cyber-Physical Resilience."** Specific calls should focus on **AI for drone swarms**, **post-quantum cryptography**, and the protection of legacy critical infrastructure (energy, rail) against kinetic and cyber threats, rather than just general business digitalization.

Recommendation 6. Shift Health Biotech focus from "Aging" to "Tactical Medicine & CBRN"

The current S3 *Health Technologies* priority focuses on an aging society and functional food, missing acute military needs.

- **Recommendation:** Adjust the *Health Technologies and Biotechnologies* priority to include a dedicated sub-area for **"Tactical Medicine and CBRN Defence."** R&D funding should be directed toward **regenerative medicine for blast injuries**, advanced biosensors for detecting

chemical/biological threats, and technologies that enhance soldier physiological performance and recovery.

Recommendation 7. Implement a "Fast-Track" Procurement Mechanism for R&D

There is a "vicious circle" where the military buys off-the-shelf because local R&D isn't finished, and business won't finish R&D without orders.

- **Recommendation:** Integrate a **"Launch Customer" mechanism** into the S3 strategy. Successful S3 projects that reach TRL 6-7 (prototype) in defence areas should automatically qualify for a **fast-track procurement pilot** with the Ministry of National Defence, bridging the "Valley of Death" between scientific grants and military acquisition.

Recommendation 8. Establish a "Defence Innovation Office" to Institutionalize the Quadruple Helix

Coordination between the Ministry of Economy (civil innovation) and the Ministry of Defence is currently fragmented.

- **Recommendation:** Create a **Defence Innovation Office** (or similar coordinating body) to act as the "integrator" of the Quadruple Helix (Government, Industry, Academia, Society). This office would sit between ministries to translate specific military operational needs into S3 scientific challenges and oversee the execution of defence-specific innovation calls.

Recommendation 9. Fund "Cognitive Resilience" under Soft Power Initiatives

Lithuania faces hybrid threats where the boundary between peace and war is blurred, yet S3 lacks a focus on psychological defence.

- **Recommendation:** Reintroduce the priority of *Inclusive and Creative Society* (or equivalent social science themes under ICT priority of Media and Social Innovation) to fund research on **"Cognitive Warfare and Information Resilience."** This includes developing AI tools for disinformation detection, societal resilience modelling, and psychological defence strategies to counter hybrid threats.