THE COMPETITIVE EDGE: THE STATE OF AI INNOVATION IN CENTRAL & EASTERN EUROPE

THE RECURSIVE
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Google for Startups

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Our Authors

The Recursive is an independent community-born online tech media focused on the emerging innovation and startup ecosystems in CEE.

Etien Yovchev
Co-founder and Chief Growth Officer

Maria Antoanela Ionita
Deputy Editor

Zornitsa Stoilova
Editor-in-Chief

Venislav Atanasov
Head of Delivery

Eva Slonkova
Innovation Reporter V4 Countries

Ana-Maria Ilieva
Graphic and web designer

Bojan Stojkovski
Western Balkans Editor

Snezhana Simeonova
Innovation Journalist

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newsroom@therecursive.com

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Google for Startups is a startup program launched by Google in 2011, active in over 125 countries and providing hands-on support for aspiring entrepreneurs. Google's engagement encompasses three core areas—technology access, best practice learning, and community networking.

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Fiedler Capital is a new pre-seed-focused first check VC fund with a remote-first team that invests in selected CEE and Baltic markets. Their initial tickets range between $250,000 and $750,000.

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NTGR AI creates extraordinary business value for its customers by providing tailored AI solutions that rely on its team's 200+ years of combined experience. NTGR AI orchestrates industry-leading large language models to fit the specific use cases of its clients.

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Orange Romania is the mobile telecommunications market leader in Romania. The company is part of the Orange Group, one of the largest multinational corporations in the world with a strong leadership in innovation. Orange Romania implements different AI solutions to provide better customer service to its clients.

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KARDI AI

KARDI AI, a HealthTech startup based in the Czech Republic, with the mission of performing large-scale preventive screening and remote monitoring of cardiovascular disease. The startup was founded in 2022 by entrepreneur Stephen Burke and distinguished cardiologist doc. MD Tomáš Skála, Ph.D., FESC.

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Zaya AI is a new generation of diagnostic AI tools in pathological anatomy based on specialized data to reduce diagnostic time, laboratory costs, human error and to improve patient outcomes. Critical in helping pathologists diagnose more cases faster, they aim to develop into a true virtual AI pathology wizard that empowers pathology experts to remotely diagnose patients faster and more accurately.

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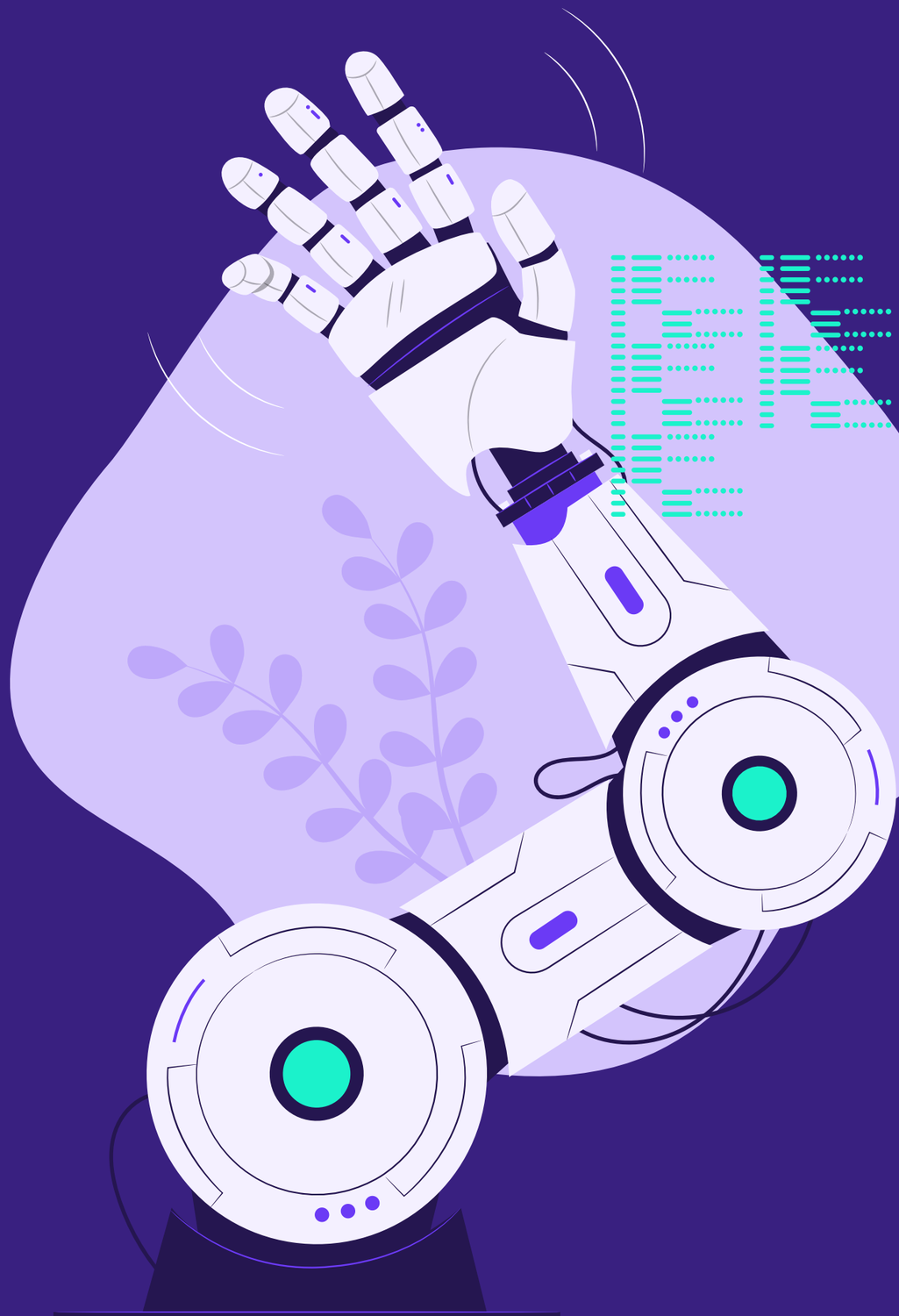
Introduction



Zornitsa Stoilova,
Editor-in-Chief at The Recursive

2023 will certainly go down in history as the year of AI.

Amazed by the sweeping success of large language models, the world woke up to a new reality that broadened our understanding of how this powerful technology can transform our businesses, our economies, and our lives.

As we unravel the ambiguity of how society can adapt to a change with such enormous magnitude and complexity, we can't help but see the opportunities that wait to be seized.

In the span of three years as an independent media covering the emerging innovation ecosystems of Central and Eastern Europe, we reported on the rise of multiple unicorns riding on the AI wave.

Their success stories planted the seeds of healthy ecosystems and drove premises for systemic growth.

They also triggered our curiosity to examine how AI innovation could contribute to the region's economic development and competitiveness amidst a challenging macroeconomic climate.

The Recursive CEE AI Report is the first of its kind extensive mapping of the AI innovation ecosystem in Central and Eastern Europe.

From showcasing the front-running AI product companies to exploring funding opportunities, growth potential, and talent pool available, and highlighting best practices from different countries, our purpose is to paint a picture of the current state of development of AI-first innovations in the region.

In the next pages, you will discover how AI is already engineering the biggest disruption in the healthcare industry.

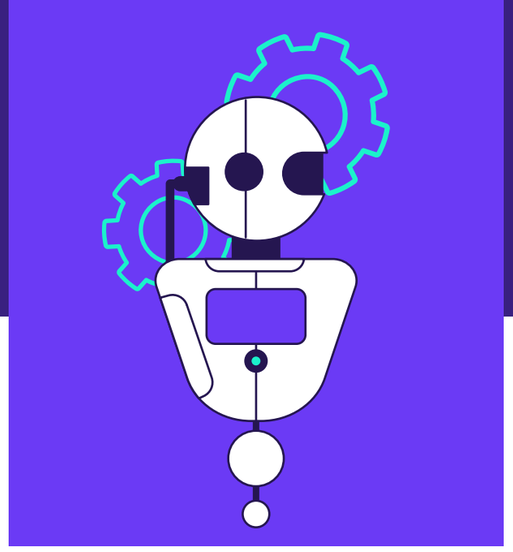
We uncover the industries that benefit the most from regional AI-powered innovation, display the AI trends and key players you should keep an eye on, and spotlight the AI-specific skills and talents of the regional tech workforce.

We review the availability of funding for AI startups in the region, including venture capital, government support, and other financing options. We also assess the R&D capabilities and the quality of education and training provided in AI-related fields. Last but not least, we look into how national and EU-wide governance could affect AI product and service companies stemming from the region.

Our key objective is to point out the strengths and opportunities CEE can leverage to improve its competitiveness on the global map, but we have also observed the bears on the road and potential threats that the region needs to mitigate to realize its full potential as an AI power hub.

Methodology

We analyzed over 1100+ AI startups, investors, and ecosystem builders from the region. In parallel, we conducted over 40 in-depth interviews with key stakeholders from the regional community to identify key trends and opportunities and surveyed 170+ companies.



Research Design

Our research aims to offer an extensive view of the AI innovation ecosystem in Central and Eastern Europe, underlining significant stakeholders while discerning the challenges and opportunities to amplify the region's global visibility.

As a starting point, we evaluated the relationships among the key players in the AI innovation ecosystem. This involves AI industry participants, investors, the supportive infrastructure (including ecosystem builders), and policy-makers.

We then undertook a methodical survey and conducted exhaustive interviews. The aim was to understand the impediments faced by key players in cultivating, funding, and bolstering AI research and commercial solutions. Concurrently, we identified potential trends that can be harnessed for rapid growth.

The insights were consolidated through a SWOT analysis, supplemented by comprehensive assessments of the funding landscape, talent reservoir, and supporting infrastructure for AI innovation in the region.

Geographical Scope

Our primary focus covered 12 countries, namely: Romania, Bulgaria, Greece, Western Balkans (comprising Serbia, North Macedonia, Montenegro, Bosnia and Herzegovina, Albania), Croatia, Slovakia, Hungary, Poland, and the Czech Republic. In specific contexts, Slovenia was also integrated into our analyses.

For the database of AI product companies and AI service companies, we selected companies with headquarters or with an important presence and added value for the business in Central and Eastern European countries.

Definitions and Assumptions

Industry players

AI-enabled companies, as defined in our research, are entities that focus on the development, deployment, and commercialization of artificial intelligence (AI) technologies. Such AI technologies include AI algorithms, machine learning, natural language processing, computer vision, and other cutting-edge technologies to create intelligent systems that can analyze data, learn from it, and make decisions or predictions autonomously.

In our research, we include both AI-based companies and companies with AI features. In the cases of companies with AI features, we tried to select those where AI is an important aspect of their value proposition

Investors

In the AI investor database, we included angel networks and funds, venture capital, private equity and growth capital, incubators and accelerators, and pan-European and national government funds. We selected investors based on whether they have specific focus on AI innovation or have AI investments in their portfolios.

Research Nature

Our methodology consists of both quantitative and qualitative techniques. We delved into numerical data sources, analyzing facets like the inception year of AI firms, their funding history, AI specializations, and industry niches. In the second part of the analysis, the survey and qualitative interviews with stakeholders, ranging from AI product developers to policy consultants, provided nuanced insights.

Our rationale behind this multifaceted approach was to juxtapose an overarching view of the ecosystem against intricate details, obtained only through in-depth discussions.

Data Collection

We based our analysis on three main sources:

- *Comprehensive databases of AI product and service companies, as well as AI investors from CEE; data spans up to August 8, 2023;*
- *The Recursive AI Survey 2023, our survey, conducted between May and July 2023;*
- *A series of 40 interviews with diverse stakeholders, conducted between May and September 2023.*

The databases were based on public sources, including The Recursive Database, LinkedIn, Crunchbase, The Recursive Survey, and third party technology reports.

For the survey, we targeted AI product company leaders, AI startup founders, AI service providers, AI investors, AI researchers, academics, and scientists, and AI ecosystem supporters such as NGOs. We ended up collecting 170 answers, out of which 110 responses from companies developing proprietary AI products.

For interviews, we targeted AI innovation ecosystem leaders such as founders of prolific AI companies from the region, renowned AI researchers and scientists, government representatives, and ecosystem builders, such as consultants, event organizers, and community platforms. We ended up conducting 40 interviews with representatives of these sectors.

Data Analysis

We used various techniques including a SWOT analysis framework, descriptive statistics, data visualization, and tools such as Excel and Chat-GPT 4.
For AI product companies, we looked at the years when AI companies in the region were founded, how much total funding they raised, what was their last funding round, what are their main AI specializations, and what are their main industries; we also looked at the countries in which they are based and the geographic markets they are targeting.

For AI investors, we looked at their portfolios, their targeted industries, markets, and stages of investment.

Outliers and Exclusions

For the precision of our analysis, especially concerning top AI specializations, we eliminated outliers in certain parts of the analysis, specifically companies with funding rounds larger than $100 million.

Limitations

While our study was extensive, it carried inherent limitations:

- *We excluded some countries from Central and Eastern Europe in our analysis by design, in order to provide an in-depth analysis; expanding the analysis beyond the 12 countries would have increased the complexity and time frame necessary for the analysis beyond our desired goals;*
- *We have included approximately 900 AI product companies in the analysis which we estimate at 70-80% of the total pool AI product companies in the region; so while the results are indicative of the ecosystem trends, they are not 100% representative;*
- *Given the limitations of our survey results, we tried to bridge the gaps with close to 40 interviews with experts from the region.*

This methodology serves as the foundation of our in-depth exploration of the AI innovation landscape in Central and Eastern Europe.

How AI Made in Central and Eastern Europe Could Change the World

Author: Maria-Antoanela Ionita

You don’t have to be in Silicon Valley to drive meaningful change. Imagine walking into a bustling tech hub in Athens, Greece, where young entrepreneurs are working on their latest AI-driven solutions. Walk, for instance, on the footprints of Causaly. As AI took the world by storm, the Greek startup pioneered one of its most tangible and demanding use cases, helping advance biomedical research at a more affordable cost and higher pace. While developing a new drug spans over a decade and takes extensive research and clinical trials, some unsolved diseases such as Parkinson’s Disease, lung cancer, or multiple sclerosis would greatly benefit from expediting this process. Leveraging AI, Causaly’s platform goes through existing literature and clinical trial documents at an unprecedented pace and helps map the correlations across vast amounts of scientific data. In turn, this helps medical professionals and innovators develop novel medicine faster. Today, Causaly serves 12 out of the top 20 global pharmaceutical companies and targets global markets after a $60 million Series B round in July 2023 (*1), which brought international investors on board.

Meanwhile, in Romania, .lumen empowers the blind with its solution (*2) based on AI, robotics, and neuroscience.There are 40 million blind people now and increasing to 100 million by 2050, yet mobility solutions for the blind have largely resumed to walking canes and guide dogs. .lumen aims to change the status quo by providing the features a guide dog brings in a scalable product, the .lumen glasses. These glasses use a sensory system to get information about the user’s environment, artificial intelligence to compute interaction paths to wanted objects, and a feedback system to transmit information to the user. Their impact-centered technology has not gone unnoticed, with the company winning countless awards and receiving funding worth €9.3 million from the European Union in 2021.

These aren’t just any solutions; they are tools for positive societal impact by tackling some of the world’s most pressing challenges. It doesn’t stop at healthcare. Solutions span social impact areas such as security and cybersecurity, defense, education, food and agriculture, and energy.

Alcatraz AI, for instance, is a company developing autonomous access control AI products with a global impact from Bulgaria. More specifically, the company, founded by a Bulgarian entrepreneur, has been developing its software from its base in Sofia (*3), while being headquartered in California, US. Alcatraz AI is a high-tech hardware-as-a-service startup that aims to provide more secure and frictionless access control with biometric authentication. After close to five years of R&D and multiple funding rounds, the company successfully took its high-security product to market, bringing in clients from Fortune 500, government agencies, and banks.

Co-founded by Bulgarian scientists, LatticeFlow is forging close collaborations with businesses for which AI holds paramount importance, particularly those in sectors where AI plays a mission-critical role. These encompass manufacturing, defense, and insurance. LatticeFlow has built a scalable platform (*4) to automatically diagnose and fix AI data and model issues. The company’s platform for robust AI models has been used by the US Army, Germany’s Federal Office for Information Security, Fortune 500 companies in the US and Europe such as Siemens, as well as world leaders in AI such as Intenseye and Voxel AI.

Overall, the AI ecosystem in Central and Eastern Europe has experienced a significant rise in the number of AI companies being founded from the mid-2010s onwards: around 80% of the companies mapped in this report were founded between 2015 and 2023 (*5). This rise in the number of startups peaked between 2018-2019 and was soon followed by commitments from the investment communities. Between 2021 and 2023, the AI product companies we tracked raised at least $4.2 billion.

Nevertheless, the availability and accessibility of funding remain a pain point for startups and scaleups in the region, as we will see later in the analysis. Challenges with securing funding, as well as opportunities to enter new markets and tap into international business talent, have incentivised many regionally-founded AI-powered companies to officially establish their headquarters in Western Europe or the United States. This follows the general trend: around one-fifth of the startups born in CEE, which have raised more than €1 million, move their headquarters abroad to top scaling destinations (*6).

An underlying trend to this headquarters migration is an increase in funding from international investors, who prefer the predictability and simplicity of legal frameworks in established markets. Many AI-building companies, including Causaly, Almotive, Infermedica, Gideon, Resistant AI, Alcatraz AI, FlowX.ai, UiPath, or EnduroSat, have attracted high-caliber international investors, proving the region's attractiveness. Such investors have often highlighted the region's increasing appeal as an investment destination, recognizing key strengths such as talented IT professionals at higher capital efficiencies *(see page 97 for more information on the funding landscape)*

Yet despite moving their headquarters abroad, founders tend to keep a strong presence in the region, as seen with the likes of Rossum, FintechOS, Payhawk, or FLOWX.AI. Hiring local talent and supporting fellow local entrepreneurs is paramount for the regional innovation ecosystem to reach the next stage.

Selection of regional companies with investments from international venture capital funds Source: **Crunchbase, 2023**

Company	Industry	AI Specialization	Country	Company Stage	Total Funding	International VCs
UiPath	Finance; Healthcare & Life Sciences; Public Sector; Manufacturing	RPA; Machine Learning; AI Hardware & Infrastructure	Romania	IPO	$ 2,000,000,000	Sequoia Capital,Accel, Tiger Global Management, Earlybird Venture Capital, Seedcamp
AiMotive	Automotive	Autonomous Systems & Vehicles, Computer Vision, Robotics	Hungary	Series C	$ 68,000,000	B Capital, Prime Capital, Inventure, Samsung Catalyst Fund, Bosch Ventures,
Payhawk	Finance	Predictive Analytics; Machine Learning	Bulgaria	Series B	$ 239,000,000	Lightspeed Venture Partners, Earlybird Venture Capital, Endeavor Catalyst
Causaly	Healthcare and Life Sciences	Natural Language Processing (NLP); Machine Learning; Deep Learning; Big Data Analytics	Greece	Series B	$ 93,000,000	Index Ventures, ICONIQ Growth
Alcatraz AI	Security and Cybersecurity	Computer Vision; Deep Learning; Machine Learning; AI Hardware & Infrastructure	Bulgaria	Series A	$ 45,000,000	Almaz Capital, Endeavor Catalyst, HCVC, Mucker Capital
Infermedica	Healthcare and Life Sciences	Machine Learning, Predictive Analytics	Poland	Series B	$ 45,000,000	Google for Startups, Heal Capital, Karma Ventures
FLOWX.AI	Finance	Machine Learning; Natural Language Processing (NLP); AI Hardware & Infrastructure	Romania	Series A	$ 43,000,000	Dawn Capital
Gideon	Logistics	Autonomous Systems & Vehicles, Machine Learning, Robotics, Computer Vision	Croatia	Series A	$ 38,000,000	Koch Disruptive Technologies, HCVC
Resistant AI	Security and Cybersecurity	Machine Learning	Czech Republic	Series A	$ 30,000,000	Google Ventures, Notion Capital, Seedcamp
EnduroSat	Aerospace	Machine Learning; Autonomous Systems & Vehicles	Bulgaria	Series A	$ 28,000,000	CEECAT Capital, Freigeist Capital

1. The Current State of the CEE AI Innovation Ecosystem: A SWOT Analysis

To continue developing a global story, the CEE AI innovation ecosystem will need to increase its competitive position by:

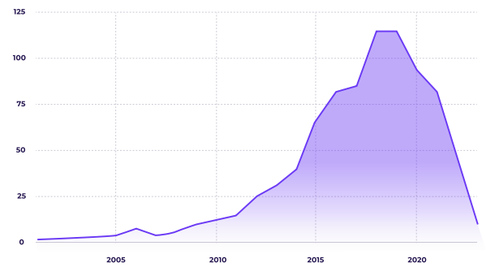
- Strategically leaning on its strengths, such as the contributions of the startup ecosystem, particularly in high-impact areas such as healthcare and security;
- Doubling down on the recent momentum in specialized AI research and education and strengthening collaborations between governments, academia, and industry in order to nurture AI talent and translate ideas into scalable solutions;
- Addressing imbalances in the market by Increasing funding opportunities, government support, and efforts to achieve harmonization among stakeholders regarding AI governance, research and development;
- And staying flexible and proactive about AI ethics to mitigate potential drawbacks from future AI regulation.

Source: The Recursive AI Innovation Ecosystem Analysis, 2023

1.1 Strengths of the CEE AI Innovation Ecosystem

1.1.1 Startup Boom

The number of AI Product Companies founded every year 2000-2023, YTD



Source: The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)

"The CEE region possesses a unique advantage in embracing emerging fields such as AI. This is due to the novelty of the subject, which levels the playing field among countries, regardless of their level of development. Interestingly, even within Western countries, not all have made swift advancements in these areas due to shared challenges, such as grappling with certain mental barriers that we too encounter. It's noteworthy that in some cases, we share a similar or comparable starting point. This, in essence, provides a promising opportunity for our region to make noteworthy strides."

***Lukas Palaj**, Director of Digitalization and AI Dept. at Ministry of Health, Slovakia*

Central and Eastern Europe is becoming a hotbed for AI innovation, particularly since the mid-2010s. A startup boom is particularly evident in the period between 2015 and 2023, when a staggering 694 AI product companies sprang to life (*7). That makes up 80% of all the AI companies we mapped in the region. The pandemic did not slow down this momentum, au contraire; a quarter of these ventures (230 companies) were founded between 2020 and 2023, in the midst of global uncertainty.

Now let's look at the capital powering these startups. By August 2023, the startup ecosystem had raised approximately $8.2 billion. In the past three years alone, AI product companies raised $4.2 billion. It is clear that investors are increasingly eyeing the CEE ecosystem, helping it grow at an unprecedented scale.

Nevertheless, the ecosystem is still in its early seeds. Out of the companies we mapped, more than a third (40%) had raised pre-seed and seed rounds, while only approximately 13% had later-stage funding. The median funding amount across stages is $1,000,000 million, indicating that while a few startups have received substantial funding, many are operating with less capital.

1.1.2 Unicorn Legacy

"(Back in 2016, ed.note) We hadn't seen any unicorns emerging from the region, and the venture capital environment wasn't as vibrant. But times have changed and in notable ways. The first stage was marked by pioneers like Telerik, followed by entities like Payhawk and UiPath joining the scene. Now, even the luminaries and investors from Silicon Valley are turning their attention towards our region. They've recognized two key advantages that the CEE region holds.

Firstly, the cost of running a business here is significantly lower compared to Silicon Valley or San Francisco – the cost factor is undeniable. However, what's even more significant is the exceptional talent pool and the high level of talent retention. The CEE region places a strong emphasis on loyalty, and this reflects in how individuals commit themselves to their companies and projects." - **Botty Dimanov, Ph.D., CEO & co-founder of Tenyks**

The rise of regionally-bred, AI-enabled unicorns like UiPath, Rimac Automobili, Infobip, and Payhawk had a transformative effect on the CEE innovation ecosystem. These unicorn companies serve as beacons of innovation and economic vitality, illustrating the massive potential for success in AI and related fields within the region. But their impact goes beyond their own balance sheets; they act as catalysts for a ripple effect that reverberates throughout the local tech communities.

One of the most immediate benefits is the heightened visibility and credibility these unicorns bring to the CEE region. They are living proof that world-class AI enterprises can originate from this part of the world. This visibility, in turn, attracts global investors, who are now more willing to back other startups in the region. Additionally, they serve as role models for aspiring entrepreneurs, inspiring a new generation of young people to explore the possibilities within AI and technology. This kind of inspiration is invaluable in cultivating homegrown talent and reducing brain drain—a challenge faced by the region that we will explore later on.

Another significant contribution is the creation of a robust network of AI experts and professionals who often become key stakeholders in the startup ecosystem (*8). Many of these individuals, enriched both in experience and capital, reinvest in the ecosystem as angel investors or as mentors to budding startups. Others take the entrepreneurial plunge again, applying their hard-won knowledge to new ventures. This cycle of success and reinvestment establishes a self-sustaining loop of innovation and growth, setting the stage for the CEE region to become competitive on a global scale

1.1.3 Robust AI Product Offering in Healthcare and Life Sciences

"The integration of AI holds the potential to alleviate the burden on healthcare professionals and nurses, ultimately facilitating their roles and enhancing their lives. A significant stride can be made by leveraging AI for clinical decision support, thereby tackling routine tasks that are part of their daily responsibilities. This is a pivotal aspect where AI's contribution is poised to be exceptionally beneficial. Equally crucial is the heightened patient safety that can be achieved through these tools. The provision of clinical decision support can offer valuable hints, advice, and even alerts, particularly for patients in critical conditions. This, in turn, fosters an environment where patient well-being is enhanced. In essence, two primary benefits emerge: a streamlining of medical tasks and the amplification of patient safety, both of which stand to be positively impacted by AI and modern technologies."

***Lukas Palaj**, Director of Digitalization and AI Dept. at Ministry of Health, Slovakia*

For companies developing artificial solutions in the region, global markets have a distinct glow. As these AI solutions tend to address global problems, startups are targeting Western Europe, US, Asia, and sometimes global markets from the early stages (*9).

The healthcare sector best illustrates this trend. The new wave of innovations, including generative AI, telemedicine, 3D printing, and wearable technology, are changing the accessibility and quality of healthcare in front of our eyes. Artificial intelligence and machine learning are best positioned to support healthcare specialists in streamlining medical tasks, enhancing data collection and analysis, and automating diagnosis and treatment planning, thus also improving clinical decision-making and ultimately patient safety.

"Even in economically well developed countries the waiting times are unacceptably long and the diagnostics are hard to access. We already see the growing tendencies of AI-assisted diagnostics using established imaging modalities such as x-ray, CT, and MRI. Some diagnostic methods, like ultrasound, have even become portable enough to be used remotely in some cases."
Georgi Kadrev, co-founder and CEO of Kelvin Health

CEE is making remarkable strides in AI-enabled solutions for the healthcare industry. According to our mapping, the largest proportion of AI product companies (150 companies, or 17% of total) are developing AI applications for the healthcare and life sciences sector. The industry tops the ranks across countries, including Bulgaria, Greece, Poland, Romania, and Croatia.

Applications range from improving diagnosis and therapy (Polish startup Caridomatics, Polish startup Infermedica, Czech startup Carebot, Bulgarian startup Kelvin Health), to speeding up medical data and processes management (Croatian startup Newton Technologies Adria, Polish startup Upmedic, Romanian startup OncoChain), supporting patient care (Croatian startup Mindsmiths), and powering biomedical research and drug development (Greek startups Causaly and Intelligencia).

"One of the areas that I consider promising is generative AI. Using generative models, we are able to verify how a proposed AI system will perform in non-standard situations, e.g., in atypical tumors. We can use them to minimize bias, predict appropriate therapies, and analyze potential problems. But deploying AI into standard clinical practice and tracking real-world evidence is fascinating in itself." **- Daniel Kvak, CEO of Carebot**

Investors have taken notice: Healthcare and Life Sciences is also one of the highest funded industries, third only to marketing finance when including outliers (with $3.1B), and first when excluding outliers (with $570M). The perspective of broad social impact and economic implications, coupled with the availability of data, has made AI-powered healthcare one of the top areas of investment.

Croatia, in particular, has been a frontrunner in CEE for leveraging AI to advance healthcare and medical solutions. These efforts have been spearheaded by AI4HEALTH, a non-profit consortium of experts in the field of AI, healthcare, and startups, which initiated the creation of a digital healthcare ecosystem (*10). As a result, AI solutions developed by startups are already adopted by Croatian healthcare institutions.

"During my tenure, our department has achieved several noteworthy milestones. We've successfully developed a series of impactful AI algorithm prototypes. These prototypes encompass a range of applications, including fraud detection and the estimation of oncological patient numbers across different diagnoses. Additionally, a compelling use case involves identifying misdiagnosed patients with oncological ailments. These prototypes exemplify the practicality of AI in diverse scenarios and underscore its utility." - **Lukas Palaj, Director of Digitalization and AI Department at Ministry of Health, Slovakia**

1.2 Weaknesses of the CEE AI Innovation Ecosystem

1.2.1 Finding and Attracting AI Talent

"The biggest challenge is keeping the talents in the region. Without talents willing to stay in the country instead of catching the first plane to the EU or USA after graduation, we have nothing, so no AI. One possible way to make the talents willing to stay at home countries is to help the growth of the startup ecosystem that would seed startups that can attract foreign money, and with viable ideas elaborated well enough with institutional help, this is possible. A network of AI professionals can only be helpful here."

Stojancho Tudjarski, *Head of Data Science at Innovation Dooel*

The challenge of finding and attracting top-tier talent in the AI field is a pressing concern for product companies, according to The Recursive 2023 AI Survey. A fifth of respondents (20%) rated the difficulty of this endeavor as high, while the average score across all answers is 8 out of 10, where 10 is extremely difficult. (9*)

This is not about a few isolated cases; it reflects a larger issue in the tech industry. The demand for specialized AI skills—such as machine learning, data analytics, and natural language processing—is outpacing the supply of qualified candidates. As a result, companies are finding themselves in a competitive war for talent, often going head-to-head with larger, more established firms that can offer higher salaries and more enticing benefits.

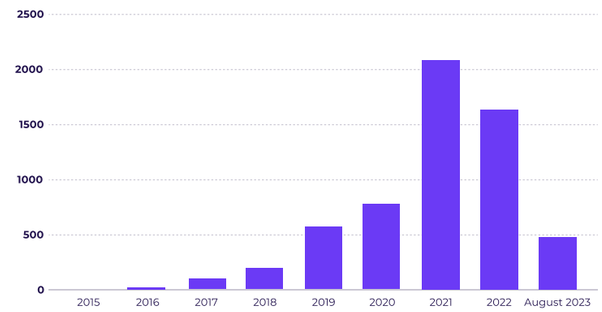
The main underlying reason is a general, massive trend of a brain drain from Eastern Europe towards Western countries, driven by a search for better educational opportunities, financial prospects, and healthcare and social services. The region traditionally holds a rich reservoir of technically skilled individuals, having a strong foundation in mathematics, computer science, and engineering - a strong foundation for AI skills. Yet the region is having difficulty in keeping this young talent from leaving abroad.

Moreover, a gap remains when it comes to specialized skills and hands-on experience with AI. Business and research institutions alike are looking not only for technical skills such as machine learning, natural language processing, and computer vision, but also for soft skills, including critical thinking, problem-solving, and effective communication. There is also a growing demand for professionals who can navigate the societal and ethical implications of AI, thus requiring interdisciplinary training. This means professionals require not only knowledge of advanced algorithms but also an understanding of AI ethics and a mix of communication and collaboration skills.

The current talent crunch is more than a hiring issue; it is an obstacle to innovation and growth. Addressing this talent gap is crucial for the long-term viability of these companies and for the AI industry as a whole.
It calls for a multi-faceted approach that includes advanced AI research institutions that can develop technological leaders, partnerships between academia and industry to prepare students for real-life settings, as well as company training programs and attractive packages that would prevent AI talent from choosing a competitive opportunity abroad. *(for more on the topic of AI talent in CEE, see page 137)*

1.2.2 Securing Funding

Value of Funding Rounds Tracked for CEE AI Product Companies, 2015 - August 2023 [$ Milion]



Source: The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)

For tech startups in Central and Eastern Europe, securing funding presents a recurring challenge, as highlighted by the majority (56.4%) of respondents in our survey dedicated to AI companies.

"The biggest challenge, in my view, is access to substantial and consistent funding. While there are startups and projects breaking ground, financial support, especially for early-stage ventures, isn't always as readily available as in more established tech hubs. This funding gap can sometimes hinder the transition of groundbreaking research into market-ready solutions. For the CEE to truly realize its potential in AI innovation, there needs to be a more robust financial infrastructure, one that supports startups, encourages risk-taking, and promotes the commercialization of AI technologies."

Dejan Mircetic, *Research Associate at the Institute for AI of Serbia*

One of the symptoms of a funding struggle is the imbalance between early-stage and later-stage financing. While there may be a surplus of capital available for startups at the start of their journey, securing funds for scaling and development becomes increasingly difficult. This uneven distribution of funds often leaves promising AI product companies in the lurch, hindering their growth potential and innovation.

When looking at CEE, we notice the biggest chunk of funding is going to pre-seed and seed-stage companies, with a few outliers. Meanwhile, a large percentage of companies have not raised their first round of investment yet. The outliers are important to note because they show that when companies do reach a certain maturity and product-market fit, they do find money in the market, from both regional and international investors.

So, what is blocking AI product companies from unlocking funding opportunities? According to ecosystem players, one challenge is the lack of preparedness among founders - especially when compared to Western counterparts - to navigate the intricacies of fundraising. Many aspiring entrepreneurs in the region do not excel at skills such as salesmanship and the ability to craft compelling pitches. These skills have not been the focus of school curricula throughout the years, leaving a big gap in the toolbox of entrepreneurs, which specialized degrees and startup programs are trying to fill going forward.

According to founders, investors themselves sometimes fall short in adequately assessing the potential of startups or embracing risk. A cautious approach and preference for tested-and-proven models and approaches can lead to missed opportunities and a hesitancy to support innovative ventures.

That said, we additionally observe a shortage of regional investors specialized in AI technologies – and deep tech in general, as well as investors targeting post-Series A rounds.

Addressing the issue of funding for regional AI startups seems to demand patience, as the ecosystem evolves and continues to produce success stories that can inspire both regional and international investors. It also depends on better collaboration between different ecosystem players to level the playing field for regional entrepreneurs who still lack the same level of opportunities as the West in shaping up their business skills and networking with peers and investors.
It is worth noting, however, that the tech funding gap between Eastern and Western counterparts has been closing in recent years, as new investors start to form within the region's boundaries, eyeing global-aiming ventures and attracting international funds on the way.

> "As money is flowing into CEE the gap is being filled quickly. We feel founders now start with similar opportunities as their colleagues in Western Europe. Perhaps the available AI solutions which are relatively easily accessible could level the field even further. The CEE region is known for the talent and the engineering mentality and background so while building an MVP in the early stages (the ones we invest in) of a startup this may well point even more towards the pure quality of the team and put less stress on the available funding. I would say that funding in the pre-seed stage still has a little way to go compared to Western Europe, but this gap is also shrinking."
> **Ivan Jurisic, partner at SQ Capital**

1.2. Technology Transfer

> "A significant challenge is the issue of tech transfer. This involves how companies collaborate with universities and the broader framework within which such collaborations occur. Establishing research and development centers that effectively support universities and companies requires a well-defined approach. While some companies are making strides in this direction, a comprehensive and established framework is lacking. This puts us at a notable disadvantage compared to other markets. Many other regions possess a structured ecosystem where university-industry partnerships thrive, fostering innovation and practical implementation. Addressing technological transfer complexities is no small task; it involves a lot of brain work and creating a solid framework." - **Ilia Krastev, Chairman of the Association for Innovation, Business Excellence, Services and Technology (AIBEST)**

15 years ago, AI mainly existed within the research and academic community. We have come a long way to understanding and employing the benefits of AI in a commercial context, in line with the global trend. Yet, while the symbiosis between science and industry is crucial for both sectors to thrive, technology transfer remains a central issue in Central and Eastern Europe, as pointed out again and again by the experts we have interviewed. There is a lot happening in the research and development area, but few projects are eventually commercialized. The challenge, then, lies not just in generating cutting-edge research, but also in translating it into tangible, scalable solutions that address real-world problems.

The main obstacle seems to be a lack of a comprehensive framework for collaboration between universities and industry. Although collaborations exist, they happen inconsistently and depend on the connections of certain professors, rather than as a strategic direction for universities. This puts the region at a disadvantage compared to markets where university-industry partnerships are more mature.

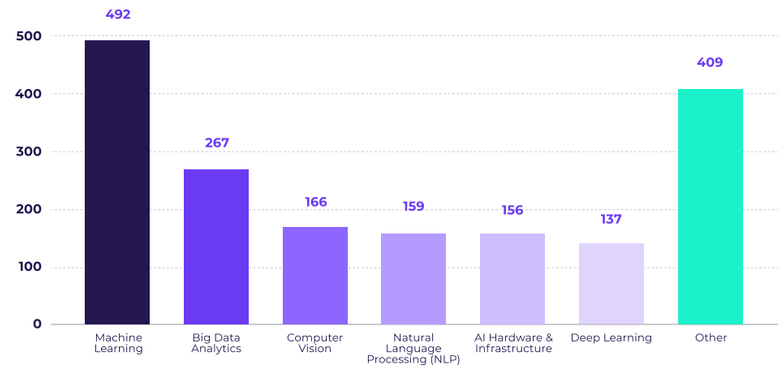
To bridge the research-commercialization gap, institutions such as INSAIT in Bulgaria set out to conduct world-class AI research in the region and train the next generation of graduate students and technology leaders. INSAIT serves as an incubator for innovative startups, drawing inspiration from the models of renowned institutions such as MIT and Stanford.

Overall, the region requires an approach that encourages collaboration between sectors and revises educational systems to produce talents capable of turning research into commercial products. Researchers also need support with typical obstacles that arise in the journey to commercialization, such as training on business operations and entrepreneurship, as well as early-stage funding opportunities.

1.3 Opportunities in the CEE AI Innovation Ecosystem

1.3.1 Promising AI Fields: From NLP and Computer Vision to Cybersecurity and Marketing

Top AI Specializations for AI Product Companies in CEE
[by number of Companies]



Source: The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)

As we have seen, the AI landscape in Central and Eastern Europe (CEE) is brimming with potential. Certain specializations and industries are standing out as particularly promising, according to regional founders and investors.

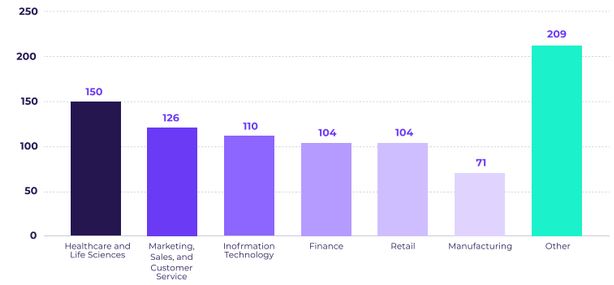
This convergence of company activity and investment theses suggests that computer vision and Natural Language Processing (NLP) are poised for significant growth amid the region's AI advancements.

NLP, powering everything from chatbots to virtual assistants and translation services, accounts for the fourth largest area of specialization among regional AI startups (159 companies). NLP technologies are also garnering investor interest: 81.2% of investors surveyed by The Recursive mentioned NLP as their targeted AI technology, second only to machine learning.

Computer Vision is another key area of promise, with numerous applications ranging from facial recognition to medical imaging, autonomous driving, and augmented reality. It is the third largest area of specialization among regional AI startups (166 companies).

More than half of investors mentioned computer vision as an area in which they will be scouting companies.

Top Industries for AI Product Companies in CEE
[by number of Companies]



Source: The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)

Among the companies already employing it we note Croatian startup Gideon, producing visual AI-based mobile robots, Bulgarian company Alcatraz AI, building facial authentication solutions, Greek company Augmenta (now part of Raven), using multispectral computer vision to achieve an accurate perception of the farming environment, and Croatian company Photomath (now part of Google), with an app that scans, solves, and explain handwritten math problems. Meanwhile, countries such as Bulgaria, have become a strategic destination in computer vision due to the INSAIT institute, attracting world-class scientists in the field such as legendary professor Luc Van Gool, Dr. Vauter van Hansbeck, and Dr. Danda Paudel (*11).

When it comes to key industries to keep an eye on, Cybersecurity is capturing the attention of investors, mentioned second only to Healthcare and Life sciences. As cyber threats become increasingly sophisticated, the demand for advanced, AI-driven security solutions is on the rise. In a region that has already shown success stories in cybersecurity, new applications of AI could lead to further breakthroughs in threat detection, secure data transmission, and identity verification, among other areas. In the Czech Republic, ELLIO Technology, for instance, uses a dynamic firewall list and a combination of machine learning and human intelligence to increase the efficiency and accuracy of the categorization of potential security incidents (*12).

The Marketing, Sales, and Customer Service industry is another hotspot for AI innovation in the region. 126 companies are developing AI applications for this sector. Conversational AI, in particular, has emerged as a powerful tool for marketing teams, elevating customer engagement and improving lead generation, with examples such as Polish startup VoiceLab and Czech startup Nettle.ai (*13). The marketing, Sales, and Customer Service industry is also one of the highest-funded industries, fifth when including outliers (with $1.5B), and third when excluding outliers (with $461M). Looking ahead, almost half of investors see it as one of the most promising areas for AI applications.

1.3.2 AI Education and Talent Development

> “While we might not be operating at full throttle just yet, the signs are promising. In the next year or two, I anticipate a robust influx of exceptional machine learning engineers. With a burgeoning AI startup scene and supportive educational initiatives, the foundation for a thriving AI specialization in Bulgaria is unmistakably taking shape.” - **Botty Dimanov, Ph.D., CEO & co-founder of Tenyks**

In a field as dynamic and complex as AI, cutting-edge knowledge and specialized skills are prerequisites for innovation. The extent to which the region will be able to accelerate its contribution to AI innovation at a global scale will largely depend on the abilities of its academic institutions to nurture AI talent.

So far, there has been a sizable gap between the industry’s talent needs and the capabilities of educational institutions to fulfill them. Throughout the region, universities have been confronted with a lack of comprehensive AI education strategies, digitalization levels, and limited resources. Our survey indicates that local industry players are dissatisfied with the availability and quality of educational institutions.

Nevertheless, the recent AI commercialization hype was bound to create a heightened interest in the field from stakeholders such as students lured by the prospects of the field, companies looking for fresh talent in universities, and governments wanting to stay competitive. This mix of factors has likely also triggered the recent boom we observed in research projects and college degrees specialized in artificial intelligence fields throughout the region.

In Romania, for instance, we tracked several new or upcoming programs at top universities throughout the country, including the Master’s Degree in Artificial Intelligence at the Politehnica University of Bucharest, the Master of Machine Learning at the University Politehnica Timisoara, and the upcoming Bachelor’s Degree, Artificial Intelligence, at the Faculty of Mathematics and Informatics of the Babes-Bolyai University.

Elsewhere in Bulgaria, the Association for Innovation, Business Excellence, Services, and Technology (AIBEST), which also aims to contribute to the advancement of AI in CEE, has launched an initiative in partnership with several schools whereby students can delve into the realm of AI and its potential applications.

Further on, as pointed out before, academia will need to nurture individuals who can bridge theory and application. To that end, students need access to opportunities for applied research projects in partnership with companies. Only by working early on solving real-world problems, can students better understand how industry works.

In doing so, students also strengthen commercial skills such as communication, business modeling, market orientation, leadership, or financial acumen - all of which are equally important to produce a competitive AI workforce.

1.3.3 Government Support

> “In Serbia, as in many countries, the regulatory and legal landscape for AI is still in its formative stages, but there's an evident push towards creating frameworks that ensure both innovation and ethical adherence. The Government of Serbia accepted the Ethical Guidelines for the Development, Application, and Use of Reliable and Responsible Artificial Intelligence in March 2023. The rules describe which domains of artificial intelligence systems are regarded as high-risk (biometric identification, critical infrastructure management, health, education, criminal prosecution), i.e. where they require particular investigation and review. In addition, our Government adopted the Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020-2025 and our institute was established as the first institute for the development of artificial intelligence in Southeast Europe.” - **Dejan Mircetic, Research Associate at the Institute for AI of Serbia**

The role of government support as a key driver for AI product development in the Central and Eastern Europe region is underscored by The Recursive AI Survey results. Nearly half (49.1%) of AI product companies and a significant majority (76.9%) of AI service companies identified it as such. Governmental involvement can be a game-changer in multiple ways, setting conducive regulatory frameworks, while also acting as a supporter, investor, and early customer for AI innovations.

As AI technology often requires substantial initial investment for research and development, government grants, tax incentives, and other financial support mechanisms can be invaluable for startups and established companies alike. In Bulgaria, for instance, the local government invested in the country’s top AI institute. They contributed nearly $100 million in funding over 10 years, which was complemented by $15M USD from donations by big-tech companies such as AWS, Google, DeepMind, VMware, SiteGround, and others.

The emergence of government-led initiatives such as AI committees and hubs across the region indicates an opportunity. These platforms, bringing together players from the public and private sectors, ensure a more holistic approach to AI development, aligning it with broader national goals and ensuring that progress in AI doesn't happen in isolated pockets but benefits society at large. National plans for AI, although late in the region compared to other parts of Europe, further provide a strategic roadmap for development and can help in concentrating efforts and resources in a coordinated manner *(for more on the topic, see page 155).*

1.3.4 Emerging AI Networks

> "There are all these events where people meet. We kind of know each other and things happen, but we don't have an umbrella. The Romanian AI Hub, for instance, should be a way to do this with a higher throughput because otherwise, we are doing this only based on some people. We don't have a very clear way to connect people together." - **Traian Rebedea, Principal Applied Scientist at Nvidia and Associate Professor at University Politehnica of Bucharest**

Finally, all these opportunities need to be brought together and organized, and this is where cross-sector and cross-country AI networks and communities come into the picture. These collaborations are particularly important in the region as the current picture depicted by AI product companies shows room for improvement in how academia, research, and industry cooperate.

What is encouraging to see is local AI community platforms and startup programs springing throughout the region and supporting the industry with events, networking, mentorship, and access to funding, while scientific committees and research hubs are fuelling innovation. Yet experts further point out the need for cross-sector stakeholders networks that create an organizational frame for AI and research, development, and regulation, and achieve an effective harmonization of stakeholders' efforts.

One such example is Romania's recently developed Committee for Artificial Intelligence (AIRomânia), which includes an AI Science and Ethics Committee for AI and a National AI Hub as part of the country's national strategy for AI.

There is a further need for linkages to international networks, opening up global opportunities for startups. An example in the region is Bulgaria's INSAIT becoming part of The European Laboratory for Learning and Intelligent Systems (ELLIS). This marks the first ELLIS unit in Eastern Europe. The core mission of the new unit is to bring world-class machine learning research, education, and deep tech entrepreneurship to Eastern Europe.

Yet another initiative connecting CEE to other markets is the European AI Forum (EAIF), which includes 5 out of 9 members from the region: Bulgaria, Croatia, Poland, Slovenia, and Lithuania. They are joined by local AI organizations in France, Germany, Austria, and the Netherlands. EAIF's goal is to collect and communicate "the voice of AI in CEE" to the European authorities, connect stakeholders and organizations, and break down and "translate" EU AI regulation for the national AI stakeholders.

1.4 Threats for the CEE AI Innovation Ecosystem

1.4.1 Challenging Macroeconomic Climate

The ongoing economic uncertainties taking place worldwide, exacerbated by factors such as inflationary pressures and trade tensions could pose challenges for an emerging innovation ecosystem such as CEE. Even after avoiding the recession, unfavorable business conditions persist, including slower economic growth and elevated inflation rates.

Economic instability has been leading to tightened spending and a more conservative investment approach, making it more difficult for startups across all industries to secure the necessary funding for research and product development. Macroeconomic challenges also lead to budget cuts in government-sponsored research and innovation programs, directly impacting tech initiatives that rely on public funding.

In such a climate, AI companies in the CEE region may need to look beyond traditional avenues for investment and explore alternative strategies such as public-private partnerships, joint ventures, or international collaborations to sustain innovation and growth.

1.4.2 AI Regulation Uncertainty

> "I think AI regulations are critical for a safer world. Preventing AI from racing beyond human control (the most obvious threat is military application, but not only), cognitive manipulation of people, collecting and disclosing private and sensitive information, etc. Unless regulations are unwarranted, I actually believe that they will be mostly beneficial. Regulations are also necessary because the development and training of large-scale models is associated with high costs and that could lead to a concentration of AI capabilities in the hands of a few corporations or governments with large pockets. This, in turn, would raise concerns about accessibility, fairness and the potential misuse of AI technologies." **Elina Halatcheva, Managing Partner at BrightCap Ventures**

The AI regulation landscape is rapidly evolving, presenting both challenges and opportunities. For stakeholders in CEE, it mostly appears to be a point of concern, with 27% of AI product and service companies in The Recursive AI Survey evaluating the existing regulatory framework as merely satisfactory (with an average score of 5.3 out of 10).

While the EU AI Act aims to provide a comprehensive framework for ethical AI development, its reception in the CEE region is mixed. Stakeholders appreciate its forward-thinking approach, especially in highly regulated sectors like healthcare. However, there are significant concerns that the Act might stifle innovation by imposing computationally infeasible requirements and putting regional companies at a competitive disadvantage globally. Startup associations and SME communities in CEE have argued for a more balanced approach that doesn't just impose hurdles but facilitates innovation.

While the task at hand is of utmost difficulty, one of the key ways to ensure that AI regulation serves both ethical and innovative aims, as suggested by regional stakeholders, is to take a multi-stakeholder approach to AI governance. They emphasized the need for dialogue among researchers, AI practitioners, and industry stakeholders. Furthermore, the design and implementation of AI regulation needs careful calibration to ensure it supports rather than stifles innovation. *(for more on the topic, see page 147)*

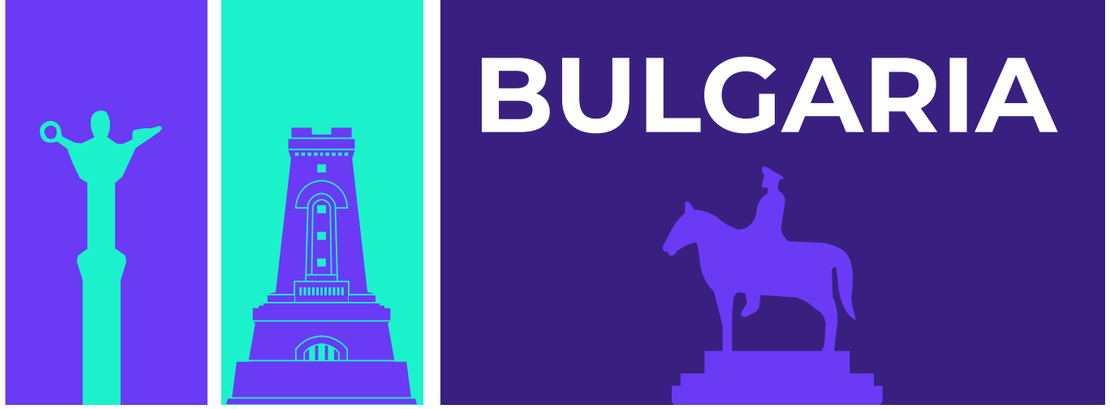
”Ultimately, our aim should be to establish an AI landscape that promotes innovation, allows fair competition, and prevents monopolies. Just like harnessing the power of fire, we need to strike a balance between mitigating risks and unlocking the vast potential AI offers.” - **Botty Dimanov, Ph.D., CEO & co-founder of Tenyks**

SOURCES

1. Bojan Stojkovski, “Greek ML Startup Causaly Raises $60M Series B to Advance Biomedical Research.” The Recursive, 2023, https://therecursive.com/greek-ml-startup-causaly-raises-60m-series-b-to-advance-biomedical-research/
2. Elena Vrabie, “Cornel Amariei’s journey: from growing up in a family with disabilities to building high-tech glasses that empower the blind.” The Recursive, 2021, https://therecursive.com/cornel-amariei-lumen-from-growing-up-in-a-family-with-disabilities-to-building-high-tech-glasses-that-empower-the-blind/
3. Elena Ivanova, “Alcatraz AI Raises $25M To Solve Your Biometric Authentication Needs.” The Recursive, 2022, https://therecursive.com/alcatraz-ai-raises-25m-to-solve-your-biometric-authentication-needs/
4. Elena Ivanova, “LatticeFlow’s $12M Series A Moves Bulgaria a Step Closer to a Deep Tech Hub.” The Recursive, 2022, https://therecursive.com/latticeflow-s-12m-series-a-moves-bulgaria-a-step-closer-to-a-deep-tech-hub/
5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Elena Ivanova, “Why CEE Startups Relocate: The Story Behind the Great HQ Migration.” The Recursive, 2022, https://therecursive.com/why-cee-startups-relocate-the-story-behind-the-great-hq-migration/
7. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
8. Elena Vrabie, “UiPath’s Startup Tribe: See How They Fuel The Romanian Tech Ecosystem.” The Recursive, 2022, https://therecursive.com/uipath-s-startup-tribe-see-how-they-fuel-the-romanian-tech-ecosystem/
9. The Recursive AI Survey (May-August, 2023)
10. Bojan Stojkovski, “Can AI Help Humans Build a Better Healthcare System?” The Recursive, 2023, https://therecursive.com/can-ai-help-humans-build-a-better-healthcare-system/
11. Bojan Stojkovski, “Top AI Scientist on Joining INSAIT: Turning a Longstanding Brain Drain into Brain Gain.” The Recursive, 2022, https://therecursive.com/luc-van-gool-joining-insait-brain-drain-to-brain-gain/
12. Eva Slonkova, “Ex-Avast Experts Boost Cybersecurity: ELLIO Technology Raises Pre-Seed Round.” The Recursive, 2023, https://therecursive.com/ellio-technology-raises-pre-seed-round/
13. Eva Slonkova, “What’s Next in Marketing: 5 CEE Startups Leveraging Conversational AI for Businesses.” The Recursive, 2023, https://therecursive.com/conversational-ai-in-marketing-5-cee-startups/

In the last five years, we have seen an explosion of activity in applied research and development - both from Greek startups and from traditional companies. For example, from electricity providers or companies that produce concrete and other building materials. There are two main drivers behind this. One is the hype, but the other is the publicity around actual results and use cases. There is a lot of shared knowledge about the benefits AI and data science bring that is reaching far and wide outside of the usual suspects.” **Prof. Vasilis Vassalos, Director of MSc in Data Science at Athens University of Economics and Business**

The Current State of the AI Innovation Ecosystem: Country Profiles



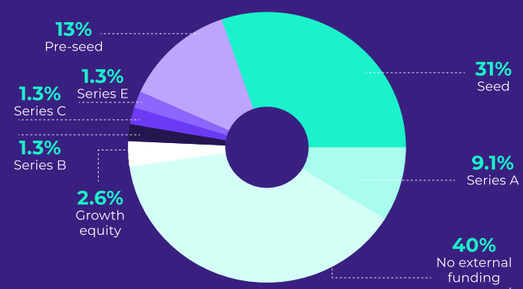
Key Players in the AI Innovation Ecosystem

AI unicorn landscape in Bulgaria

Payhawk: a spend management solution for domestic and international businesses throughout Europe, the US, and the UK. It was founded by Hristo Borisov, Boyko Karadzhov, and Konstantin Dzhengozov. Its headquarters are in London, UK.

Number of companies by stage of development (1*)

We mapped 77 companies, at the following stages:



5 THE MOST PROMINENT AI PRODUCT COMPANIES (2*)

Name	Stage	Total Funding Amount
Hyperscience	Series E	$288M
Payhawk	Series B	$239M
Quantive	Series C	$160M
DRONAMICS	Series A	$64M
Alcatraz AI	Series A	$45M

Top industries and AI specializations in Bulgaria (3*)

Top 3 AI specializations

- Machine learning
- Big data analytics
- Deep learning

Top 3 industries targeted by AI companies

- Healthcare & Life Sciences
- Information Technology
- Finance

Supporting Infrastructure for AI Innovation in CEE

Communities, associations, event organizers

- AI Cluster Bulgaria
- AIBEST

Research institutions

- INSAIT
- GATE Institute
- Department of Computational Linguistics (Institute for Bulgarian Language, BAS)

Startup programs

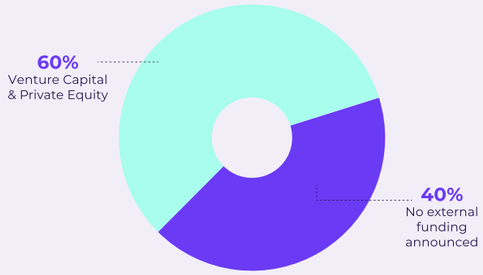
- Bulgarian Expansion Bridge

Funding Landscape for AI Innovation in CEE

Total funding raised by AI product companies in Bulgaria (4*)

$950,000,000

Funding sources for AI companies (5*)



Key local AI-focused investors

LAUNCHub Ventures

a leading early-stage venture capital fund focused on investing in startups in South-Eastern (SEE) and Central-Eastern (CEE) Europe.

Sofia Angel Ventures

A venture capital fund backed up by the EIF to co-invest alongside angels, family offices and other private investors and funds. They focus on startups at pre-seed & seed stage from SEE and CEE.

BrightCap Ventures

An early stage and accelerator VC fund based in Sofia investing in companies tackling global problems with the help of technology

New Vision 3 (NV3)

Investing in early-stage tech companies at the forefront of innovation

Talent Pool for AI Innovation in CEE

Number of people working in ICT (6*)

120,700 employees per year

Number of people working in AI (7*)

The number of people working in AI in Bulgaria across different AI specializations:

Universities and degrees that teach AI-related courses (8*)

a/ Number of students in IT&C or specifically AI related degrees

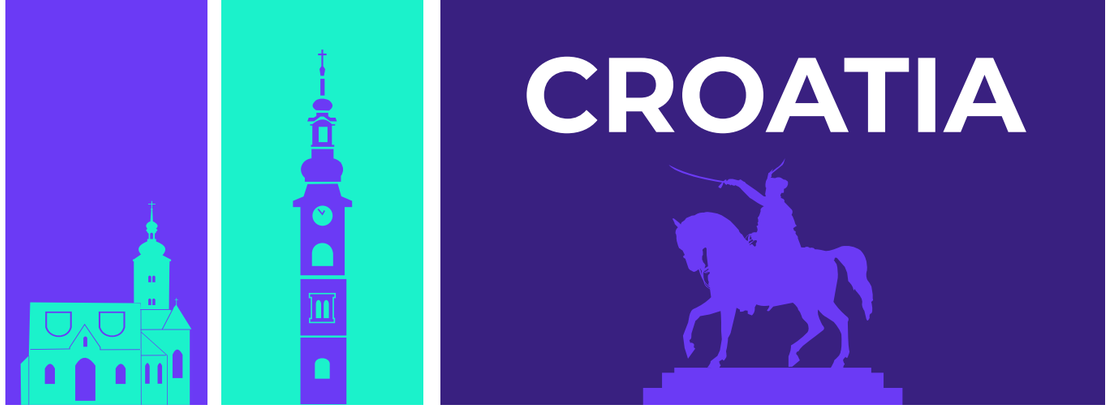
2,348 graduates in 2022

b/ Degrees in AI in Bulgaria

- Master's Program, Artificial Intelligence, Sofia University, Faculty of Mathematics and Informatics
- Master's Program, Artificial Intelligence and Robotics, Burgas Free University
- Master's Program, Systems for Artificial Intelligence, Technical University of Varna
- Master's Program, Software technologies with a specialization in systems with artificial intelligence, Paisii Hilendarski University of Plovdiv, Faculty of Mathematics and Informatics
- PhD Program, INSAIT
- PhD Program, Systems with Artificial Intelligence, Technical University of Sofia

Easiness with which companies manage to find and attract AI talent (9*)

6.0 score - medium to high difficulty



Key Players in the AI Innovation Ecosystem

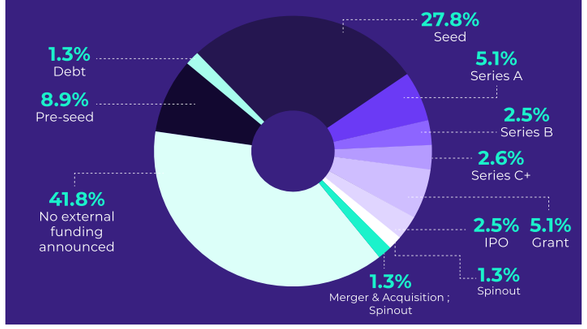
AI unicorn landscape in Croatia

Rimac Automobili: as a part of Bugatti Rimac, Rimac Automobili is an electric hypercar brand that designs, engineers, and produces the next generation of performance cars. Rimac was founded in 2009, in Croatia, by Mate Rimac.

Infobip: an omnichannel communications platform powering a broad range of messaging channels, tools, and solutions for advanced customer engagement, authentication and security. The company was founded in 2006 by Silvio Kutic and Izabel Jelenic.

Number of companies by stage of development (1*)

We mapped 38 product companies, at the following stages:



5 THE MOST PROMINENT AI PRODUCT COMPANIES (2*)

Name	Stage	Total Funding Amount
Rimac Automobili	Series D	$875M
Infobip	Debt	$800M
Cognism	Series C	$126M
Reversing Labs	Series B	$81M
Gideon	Series A	$37,5M

Top industries and AI specializations in Croatia (3*)

Top 3 AI specializations

- Machine learning
- Big Data Analytics
- AI Hardware and Infrastructure

Top 3 industries targeted by AI companies

- Marketing, Sales, and Customer Service
- Finance
- Healthcare & Life Sciences

Supporting Infrastructure

Communities, associations, event organizers

- CroAI
- DSC Croatia
- AI2FUTURE Conference
- AI Fertility Society
- Artificial Intelligence groups (Meetup)

Research institutions

- Center for Artificial Intelligence (CAI)
- TakeLab FER
- Center for Artificial Intelligence and Cybersecurity, University of Rijeka

Startup programs - incubators and accelerators

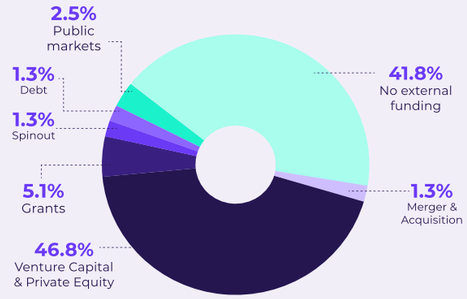
- BIRD Incubator
- Algebra LAB

Funding Landscape

Total funding raised by AI product companies in Croatia (4*)

$2,000,000,000

Funding sources for AI companies (5*)



Key local AI-focused investors

Fil Rouge Capital

Investment fund that focuses on early stage businesses from pre-seed, seed, and Series A rounds of investment

South Central Ventures

Investment partner for early-stage companies from South Eastern Europe with global ambition

SQ Capital

Investment management company managing alternative investment funds and is suited for investors looking for exposure to public, private and VC markets

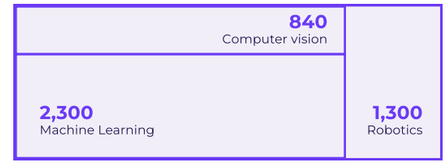
Talent Pool

Number of people working in ICT (6*)

63,400
employees in 2022

Number of people working in AI (7*)

The number of people working in AI in Croatia across different AI specializations:



Universities and degrees that teach AI-related courses (8*)

a/ Number of students in IT&C or specifically AI related degrees

Over **4,000** graduates per year

b/ Degrees in AI in Croatia

- Master of Science in Information and Communication Technology - Robotics at the University of Zagreb - Faculty of Electrical Engineering and Computing
- Joint Master Study Programme in Computer Science – Internet of Things and Artificial Intelligence at Algebra University College
- Master of Computing - Data Science at the University of Zagreb - Faculty of Electrical Engineering and Computing

Easiness with which companies manage to find and attract AI talent (9*)

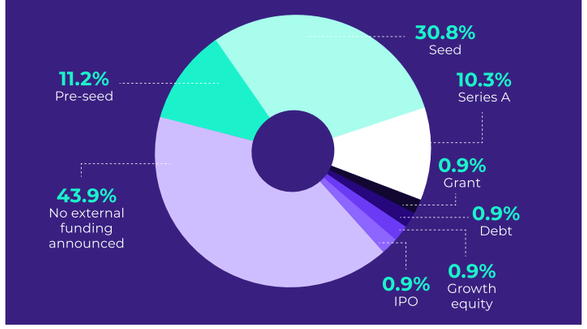
6.0 score - medium to high difficulty

CZECH REPUBLIC

Key Players in the AI Innovation Ecosystem

Number of companies by stage of development (1*)

We mapped 158 AI product companies, distributed as follows:



5 THE MOST PROMINENT AI PRODUCT COMPANIES (2*)

Name	Stage	Total Funding Amount
Rossum	Series A	$109.5M
Resistant AI	Series A	$30.4M
Deepnote	Series A	$23.8M
Phrase	Growth equity	$15.7M
Parrot	Series A	$14M

Top industries and AI specializations in the Czech Republic (3*)

Top 3 AI specializations

- Machine Learning
- Deep Learning
- Big Data Analytics

Top 3 industries targeted by AI companies

- Marketing, Sales, and Customer Service
- Information Technology
- Healthcare & Life Sciences

Supporting Infrastructure

Communities, associations, event organizers

- Brno.AI
- Prg.ai
- AI CZECHIA
- Dny AI 2023

Research institutions

- Czech Institute of Informatics, Robotics and Cybernetics (CIIRC CTU)
- AI Center (CTU)
- Institute of Computer Science (The Czech Academy of Sciences)
- IT4Innovations (VSB - Technical University of Ostrava)

Startup programs - incubators and accelerators

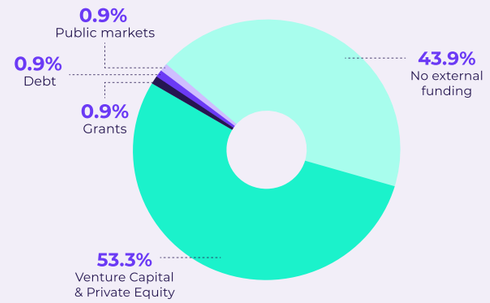
- Startup Yard
- AI Startup Incubator

Funding Landscape

Total funding raised by AI product companies in Czech Republic (4*)

$560,000,000

Funding sources for AI companies (5*)



Key local AI-focused investors

Look AI Ventures

investment fund focusing exclusively on early-stage AI startups in major markets.

Tensor Venture

deep tech-focused fund investing in AI, IoT, biotech, and quantum computing early-stage startups in CEE+ and the UK.

Y Soft Ventures

VC arm of Y Soft Corporation investing in B2B hardware & software CEE early-stage startups.

Presto Ventures

venture capital fund investing in early-stage B2B tech startups from the CEE region.

Talent Pool

Number of people working in ICT (6*)

233,000 employees in 2022

Number of people working in AI (7*)

The number of people working in AI in Czech Republic across different AI specializations:

1,600 Computer vision	
5,800 Machine Learning	2,400 Robotics

Universities and degrees that teach AI-related courses (8*)

a/ Number of students in IT&C or specifically AI related degrees

≈ 3,800 IT graduates per year

b/ Degrees in AI in the Czech Republic

- Bachelor's degree, Artificial Intelligence, Faculty of Information and Technology Czech Technical University in Prague
- Master's degree, Artificial Intelligence, Faculty of Mathematics and Physics Charles University
- Master's degree, Information Technology and Artificial Intelligence, Faculty of Information and Technology Brno University of Technology
- Master's degree, Artificial Intelligence and Data Processing, Faculty of Informatics Masaryk University

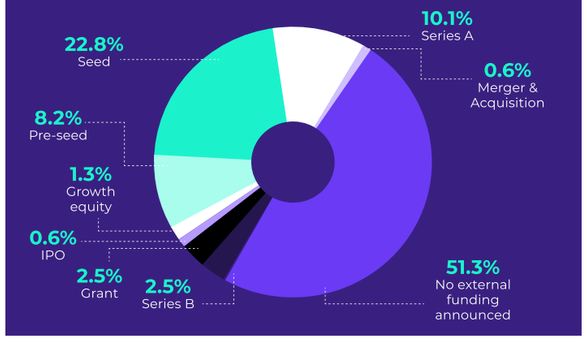
Easiness with which companies manage to find and attract AI talent (9*)

3.0 score low difficulty of finding and attracting AI talent

Key Players in the AI Innovation Ecosystem

Number of companies by stage of development (1*)

We mapped 158 AI product companies, distributed as follows:



5 THE MOST PROMINENT AI PRODUCT COMPANIES (2*)

Name	Stage	Total Funding Amount
Spotawheel	Series B	$127M
Causaly	Series B	$93M
Plum	Series A	$45M
Netdata	Series A	$35M
Balena	Series B	$31M

Top industries and AI specializations in Greece (3*)

Top 3 AI specializations

- Machine learning
- Big data analytics
- AI Hardware & Infrastructure

Top 3 industries targeted by AI companies

- Healthcare & Life Sciences
- Marketing, Sales, and Customer Service
- Retail

Supporting Infrastructure

Communities, associations, event organizers

- EETN - Hellenic Artificial Intelligence Society

Research institutions

- **Smart Attica Digital Innovation Hub** (DIH), coordinated by NCSR Demokritos. A hub for AI, focused on the digital transformation of SMEs and public sector organizations.
- **ARCHIMEDES** - a research hub focusing on AI, Data Science, and Algorithms. It was founded in 2022 and is supported by the NextGenerationEU Fund - Greece 2.0 initiative.
- **TALOS Center in Artificial Intelligence for Humanities and Social Sciences** - established in Rethymnon, the University of Crete, and funded by the Horizon Program.
- **Athena Research and Innovation Information Technologies**

Startup programs - incubators and accelerators

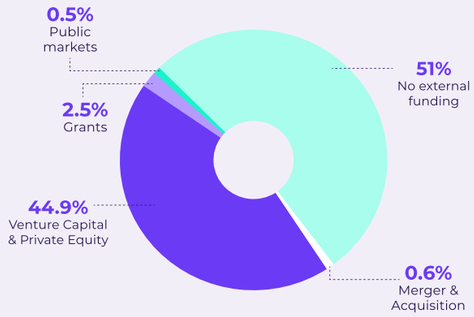
- Enso XL Accelerator

Funding Landscape

Total funding raised by AI product companies in Greece (4*)

$765,000,000

Split of funding activity and sources for analyzed AI companies in CEE (5*)



Key local AI-focused investors

BIG PI

Big Pi Ventures

a € 50M deep tech venture capital fund investing in Greek startups from seed stage to Series A.

METAVALLON

Metavallon

venture capital fund investing in early-stage technology startups connected to Greece. They provide initial funding of up to € 1.5m and hands-on support to Seed and Seed+ stage investments.

MARATHON VENTURE CAPITAL

Marathon

venture capital fund investing in early-stage technology startups connected to Greece. They provide initial funding of up to € 1.5m and hands-on support to Seed and Seed+ stage investments. Their focus is on (but not limited to) ML & AI, robotics, big data & analytics, IoT, blockchain, VR & AR in different verticals, and have 14 AI-first startups in their portfolio.

Talent Pool

Number of people working in ICT (6*)

103,100
employess in 2022

Number of people working in AI (7*)

The number of people working in AI in Greece across different AI specializations:

	2,200 Computer vision	
10,000 Machine Learning		2,800 Robotics

Universities and degrees that teach AI-related courses (8*)

a/ Number of students in IT&C or specifically AI related degrees

108,122 IT	undergraduate students	**8973**	postgraduates
61,448 STEM	undergraduate students	**2670**	postgraduates

b/ Degrees in AI in Greece

- MSc in Data Science and Machine Learning, National Technical University of Athens
- Artificial Intelligence, Aristotle University of Thessaloniki
- Artificial Intelligence, Department of Computer Engineering & Informatics of the University of Patras
- Data Science in National and Kapodistrian University of Athens
- Master of Science in Machine Learning and Data Science Program (MLDS), Technical University of Crete

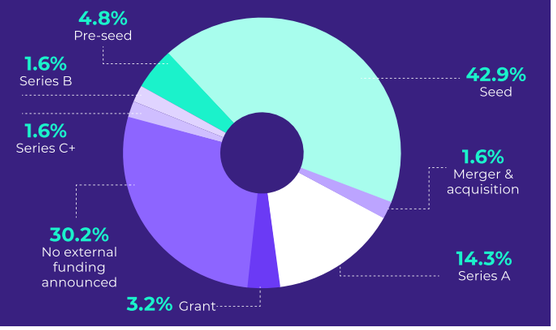
Easiness with which companies manage to find and attract AI talent (9*)

6.0 score so medium to high difficulty

Key Players in the AI Innovation Ecosystem

Number of companies by stage of development (1*)

We mapped 63, distributed as follows:



5 THE MOST PROMINENT AI PRODUCT COMPANIES(2*)

Name	Stage	Total Funding Amount
SEON	Series B	$108M
Bitrise	Series C	$83.5M
Almotive	Series C	$68M
Turbine	Series A	$34M
Commsignia	Series A	$11M

Top industries and AI specializations in Hungary (3*)

Top 3 AI specializations

- Machine learning
- Computer Vision
- Big Data Analytics

Top 3 industries targeted by AI companies

- Healthcare & Life Sciences
- Marketing, Sales, and Customer Service
- Retail

Supporting Infrastructure

Communities, associations, event organizers

- AI & Aut EXPO
- Open Natural Language Processing Meetup
- Budapest Artificial Intelligence Meetup
- Budapest Deep Learning Reading Seminar

Research institutions

- Artificial Intelligence National Laboratory (MILAB)
- Budapest University of Technology and Economics (BME)
- AI Research Group (Eötvös Loránd University)

Startup programs - incubators and accelerators

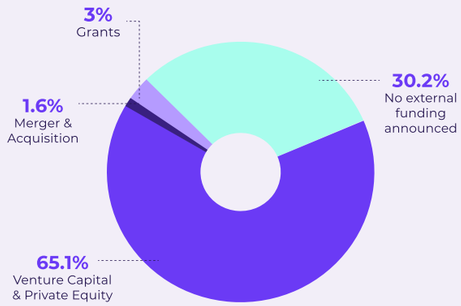
- Artificial Intelligence Coalition (AI Coalition)

Funding Landscape

Total funding raised by AI product companies in Hungary (4*)

$360,000,000

Funding sources for AI companies (5*)



Key local AI-focused investors

Fiedler Capital

is a first check investor helping overlooked founders from peripheral European ecosystems defy the odds and create breakout companies.

Solus Capital

is a venture capital fund manager addressing early-stage, growth, or mature companies. Their portfolio includes 10 AI-enabled startups.

Talent Pool

Number of people working in ICT (6*)

193,600
employees in 2022

Number of people working in AI (7*)

The number of people working in AI in Hungary across different AI specializations:

	1,300 Computer vision	
4,600 Machine Learning		2,000 Robotics

Universities and degrees that teach AI-related courses (8*)

a/ Degrees in AI in Hungary

- Bachelor's Degree, Computer Science, Eötvös Loránd University
- Bachelor's Degree, Computer Science, University of Debrecen
- Master's Degree, Computer Science Engineering, Pázmány Péter Catholic University
- Master's Degree, Computer Science - Artificial Intelligence, Eötvös Loránd University
- Master's Degree, Engineering Information Technology, Szechenyi Istvan University

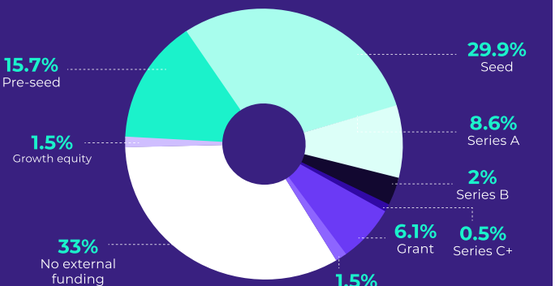
Easiness with which companies manage to find and attract AI talent (9*)

8.0 score high difficulty

Key Players in the AI Innovation Ecosystem

Number of companies by stage of development (1*)

We mapped 199 product companies, distributed as follows:



5 THE MOST PROMINENT AI PRODUCT COMPANIES(2*)

Name	Stage	Total Funding Amount
Silent Eight	Series B	$55M
Infermedica	Series B	$45M
Synerise	Series B	$42.2M
Nomagic	Series A	$30.6M
Cosmose	Series A	$27M

Top industries and AI specializations in Poland (3*)

Top 3 AI specializations

- Machine learning
- Computer Vision
- Big Data Analytics

Top 3 industries targeted by AI companies

- Healthcare & Life Sciences
- Marketing, Sales, and Customer Service
- Finance

Supporting Infrastructure

Communities, associations, event organizers

- Digital Poland Foundation & their initiative AI Poland
- Warsaw.AI
- Polish Artificial Intelligence Society
- MI².AI

Research institutions

- IDEAS NCBR
- The Center of Excellence in Artificial Intelligence - The AGH University of Krakow
- AI Division - part of the Institute of Computer Science, at the Faculty of Electronics and Information Technology of the Warsaw University of Technology
- Department of Artificial Intelligence - Wroclaw University of Science and Technology

Startup programs - incubators and accelerators

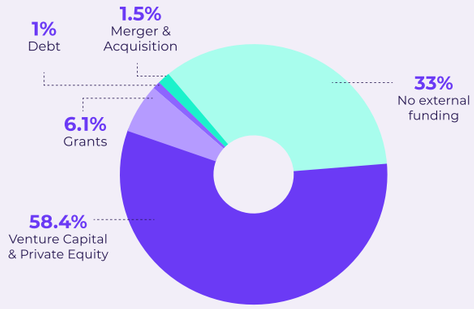
- Nextgrid

Funding Landscape

Total funding raised by AI product companies in Poland (4*)

$870,000,000

Funding sources for AI companies (5*)



Key local AI-focused investors

LT Capital

Venture capital fund investing in early-stage Industry 4.0 startups from the CEE region

OTB Ventures

Venture capital fund investing in early growth startups, focusing on spacetech, AI & automation, fintech, and cybersecurity verticals

SpeedUp Venture Capital

A group of venture capital funds investing in European early-stage startups and interested in ML, AI, and picture recognition technologies

Sunfish Partners

Early-stage venture capital fund focused on Polish deep tech startups

Movens Capital

Managing a VC fund for early-stage CEE startups with a focus on AI, deep tech, Industry 4.0, fintech, SaaS, and marketplaces.

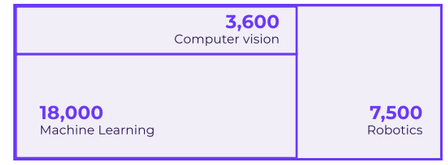
Talent Pool

Number of people working in ICT (6*)

601,000 employees in 2022

Number of people working in AI (7*)

The number of people working in AI in Poland across different AI specializations:



Universities and degrees that teach AI-related courses (8*)

a/ Number of students in IT&C or specifically AI-related degrees

≈ 11,000 IT graduates per year

b/ Degrees in AI in Poland

- Master's degree, Artificial Intelligence, Warsaw University of Technology
- Master's degree, Machine Learning, University of Warsaw
- Master's degree, Artificial Intelligence, Wroclaw University of Technology
- Bachelor's degree, Artificial Intelligence, Poznan University of Technology
- Master's degree, Computer Science and Intelligent Systems: Artificial Intelligence and Data Analysis, AGH University of Krakow

Easiness with which companies manage to find and attract AI talent (9*)

7.0 score medium to high difficulty in finding and attracting AI talent

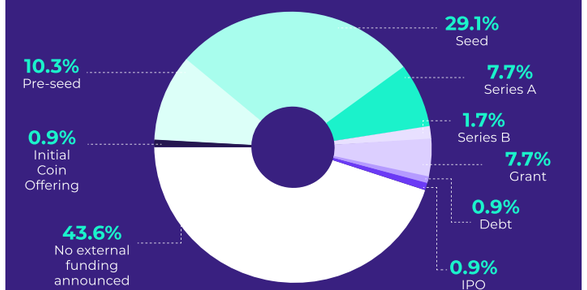
Key Players in the AI Innovation Ecosystem

AI unicorn landscape in Romania

UiPath: a global software company that makes robotic process automation software. It was founded in Bucharest, Romania, by Daniel Dines and Marius Tîrcă. Its headquarters are in New York City, New York, United States.

Number of companies by stage of development (1*)

We mapped 117 AI product companies, distributed as follows:



5 THE MOST PROMINENT AI PRODUCT COMPANIES (2*)

Name	Stage	Total Funding Amount
UiPath	IPO	$2B
FintechOS	Series B	$91M
DruidAI	Series B	$50M
FlowX	Series A	$43M
Dexory	Series A	$38M

Top industries and AI specializations in Romania (3*)

Top 3 AI specializations

- Machine learning
- Computer vision
- Big data analytics

Top 3 industries targeted by AI companies

- Healthcare & Life Sciences
- Finance
- Retail

Supporting Infrastructure for AI Innovation in CEE

Communities, associations, event organizers

- Romanian AI Days
- Bucharest Deep Learning
- Romanian Association for Artificial Intelligence (ARIA)

Research institutions

- Romanian Institute of Science and Technology
- Research Institute for Artificial Intelligence, Romanian Academy (RACAI)
- University Politehnica Bucharest (UPB) - The Lab of Artificial Intelligence and Multi-Agent Systems

Startup programs - incubators and accelerators

- Techcelerator – Advancing AI Accelerator Program for Early Stage Startups
- BeAI Europe's AI Pre-Accelerator, by Bucharest AI

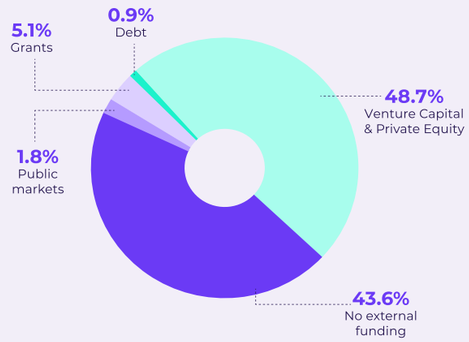
Funding Landscape for AI Innovation in CEE

Total funding raised by AI product companies in Romania (4*)

$2,400,000,000

Funding sources for AI companies (5*)

Split of funding activity and sources for analyzed AI companies in CEE:



Key local AI-focused investors

GAPMINDER

GapMinder VC

Venture Capital Firm with a focus on Deep Tech, investing at pre-seed and seed stages.

EARLYGAME VENTURES

Early Game Ventures

Venture Capital Firm, investing at pre-seed and seed stages.

techcelerator

Techcelerator

Accelerator program with a focus on AI, investing at pre-seed and seed stages.

Talent Pool for AI Innovation in CEE

Number of people working in ICT (6*)

215,000
employees in 2022

Number of people working in AI (7*)

The number of people working in AI in Romania across different AI specializations:

	2,600 Computer vision
6,400 Machine Learning	2,100 Robotics

Universities and degrees that teach AI-related courses (8*)

a/ Number of students in IT&C or specifically AI related degrees

≈ 9,000 IT graduates per year

b/ Degrees in AI in Romania

- Master's Degree, Artificial Intelligence, Politehnica University of Bucharest
- Master's Degree, Artificial Intelligence and Optimization, the Faculty of Automatic Control and Computer Engineering in Iasi
- Master of Machine Learning at the University Politehnica Timisoara
- Bachelor's Degree, Artificial Intelligence, the Faculty of Mathematics and Informatics of the Babes-Bolyai University (program approved by national authorities, will have 100 seats, ed.note)

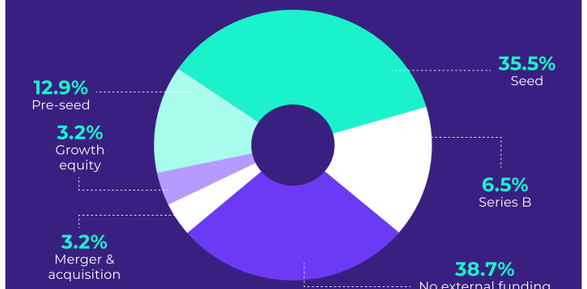
Easiness with which companies manage to find and attract AI talent (9*)

6.8 score — medium to high difficulty in finding and attracting AI talent.

Key Players in the AI Innovation Ecosystem

Number of companies by stage of development (1*)

We mapped 31 AI product companies, distributed as follows:



5 THE MOST PROMINENT AI PRODUCT COMPANIES (2*)

Name	Stage	Total Funding Amount
Brightpick Photoneo Group	Series B	$53M
Fuergy	Growth Equity	$17M
Segron	Series B	$8M
Powerful Medical	Seed	$7.8M
Atomontage	Seed	$5.7M

Top industries and AI specializations in Slovakia (3*)

Top 3 AI specializations

- Retail
- Information Technology
- Marketing, Sales, and Customer Service

Top 3 industries targeted by AI companies

- Machine Learning
- Big Data Analytics
- Computer Vision

Supporting Infrastructure

Communities, associations, event organizers

- National platform for AI development in Slovakia
- AIslovakIA - AmCham

Research institutions

- Kempelen Institute of Intelligent Technologies (KInIT)
- Project TERAIS
- Centre of Excellence for SMART Technologies, Systems and Services (Slovak University of Technology)

Startup programs - incubators and accelerators

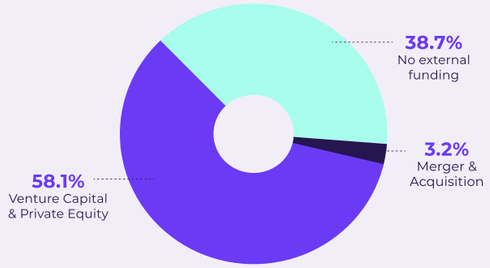
- Industry Innovation Cluster, an accelerator and platform for innovation in Slovak industry

Funding Landscape

Total funding raised by AI product companies in Slovakia (4*)

$100,000,000

Split of funding activity and sources for analyzed AI companies in CEE (5*)



Key local AI-focused investors

Zero Gravity Capital

a €23M venture capital fund fuelling pre-seed, seed, series A innovations.

Venture to Future Fund

a joint initiative of EIB, the Ministry of Finance of the Slovak Republic, and the Slovak Investment Holding looking for SMEs in high-tech industries in their growth phase (Series A and later rounds).

Talent Pool

Number of people working in ICT (6*)

115,500 employees in 2022

Number of people working in AI (7*)

The number of people working in AI in Slovakia across different AI specializations:

628 Computer vision	
1,800 Machine Learning	1,300 Robotics

Universities and degrees that teach AI-related courses (8*)

a/ Number of students in IT&C or specifically AI related degrees

7476 students	**1946** graduates

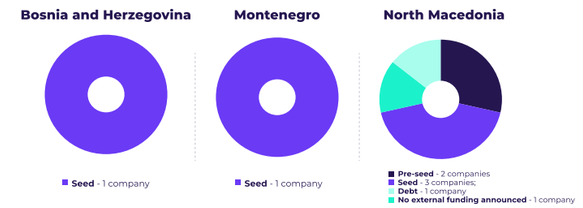
b/ Degrees in AI in Slovakia

- Cybernetics & Artificial Intelligence, Department of Cybernetics and Artificial Intelligence, Technical University of Kosice
- Data Analysis & Information Processing, Artificial Intelligence, Faculty of Informatics and Information Technologies, Slovak University of Technology in Bratislava
- Integrated Teaching for Artificial Intelligence Methods, The Laboratory of Artificial Intelligence at the University of Zilina

Easiness with which companies manage to find and attract AI talent (9*)

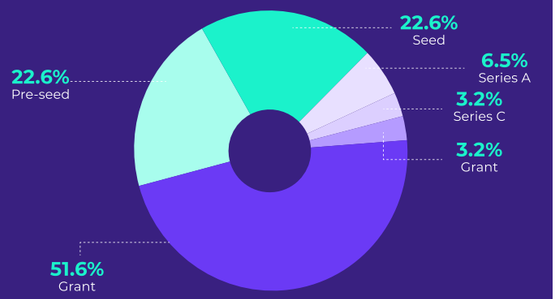
3.0 score low to medium difficulty

Key Players in the AI Innovation Ecosystem



Number of companies by stage of development (1*)

In Serbia we mapped 31 companies distributed as follows:



5 THE MOST PROMINENT AI PRODUCT COMPANIES (2*)

Name	Stage	Total Funding Amount
Seven Bridges	Series C	$113M
Wonder Dynamics	Series A	$11M
Hunch	Series A	$9.6M
Rolla	Seed	$8.7M
Orgnostic	Seed	$5.8M

Top industries and AI specializations in Western Balkans (3*)

Top 3 AI specializations

- Machine learning
- Big data analytics
- Deep Learning

Top 3 industries targeted by AI companies

- Marketing, Sales, and Customer Service
- Retail
- Healthcare & Life Sciences

Supporting Infrastructure

Albania:

Research institutions
- Albanian Institute for Artificial Intelligence

Community Platforms & Event Organizers
- Data and AI Tirana Meetup

Government-Led Initiatives
- Albania 4.0

Bosnia and Herzegovina

Research institutions
- Verlab Institute

Government-Led Initiatives
- Digital Transformation in The Public Sector In Bosnia and Herzegovina Project (2020-2024)

Kosovo

Community Platforms & Event Organizers
- ICK — Innovation Centre Kosovo

Montenegro

Research institutions
- Montenegrin Artificial Intelligence Association (MAIA)

Community Platforms & Event Organizers
- Data Zen Serbia & Montenegro

North Macedonia

Government-Led Initiatives
- ADA - AI-based Digital Assistant

Serbia

Research institutions
- The Institute for Artificial Intelligence Research and Development of Serbia
- ReLDI Centre Belgrade

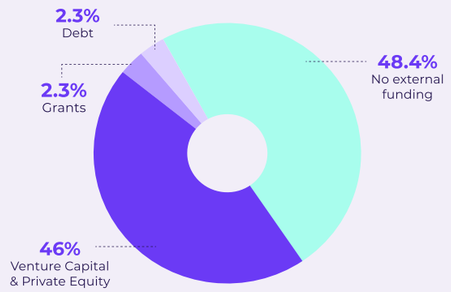
Community Platforms & Event Organizers
- Belgrade AI
- Serbian AI Society
- AI Serbia Meetup
- Data Science Serbia
- ICT Hub Serbia

Funding Landscape

Total funding raised by AI product companies in Western Balkans (4*)

Serbia	$147.5M
Bosnia and Herzegovina	$8.7M
Montenegro	$2.6M
North Macedonia	$2.0M

Funding sources for AI companies (5*)



Key local AI-focused investors

South Central Ventures

Investment partner for early-stage companies from South Eastern Europe with global ambition

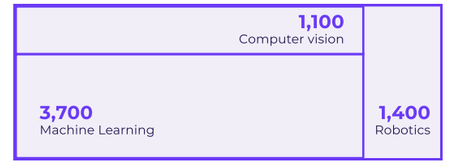
Talent Pool

Number of people working in ICT (6*)

98,000 employees in 2022

Number of people working in AI (7*)

The number of people working in AI in Western Balkans across different AI specializations:



Universities and degrees that teach AI-related courses (8*)

a/ Number of students in IT&C or specifically AI related degrees

≈ **5,000 IT** graduates every year

b/ Degrees in AI in Western Balkans

- Bachelor in Computer Science, Faculty of Computing in Belgrade
- Master's Degree, Advanced Data Analytics, University of Belgrade
- Master's Degree, Computer Games Development, University of Kragujevac

Easiness with which companies manage to find and attract AI talent (9*)

- **9.0** score high difficulty
- **7.0** score medium to high difficulty
- **7.0** score medium to high difficulty
- **9.0** score high difficulty
- **7.0** score medium to high difficulty

Sources

🇧🇬Bulgaria:

1 - 5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en)
7. LinkedIn search, 2023
8. National Statistical Institute, 2022 (https://nsi.bg/en/content/3405/tertiary-education-graduates-educational-qualification-degree-and-narrow-field-education)
9. The Recursive AI Survey (May-August, 2023)

🇭🇷Croatia:

1 - 5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en)
7. LinkedIn search, 2023
8. Invest in Croatia, 2018 (https://investcroatia.gov.hr/wp-content/uploads/2018/11/AIK_ICTinvest_web-1.pdf)
9. The Recursive AI Survey (May-August, 2023)

🇨🇿Czech Republic:

1 - 5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en)
7. LinkedIn search, 2023
8. Czech Statistical Office, 2022 https://www.czso.cz/documents/10180/164503427/06300622_b.pdf/5c021017-9b2e-4346-a274-24bafa4652b6?version=1.1
9. The Recursive AI Survey (May-August, 2023)

🇬🇷Greece:

1 - 5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en)
7. LinkedIn search, 2023
8. Human Capital Guide, Enterprise Greece: Invest & Trade, Students per field of studies (2020 Data) https://www.enterprisegreece.gov.gr/assets/content/files/c27/a6011/f230/Human%20Capital%20guide_EN.pdf
9. The Recursive AI Survey (May-August, 2023)

🇭🇺Hungary:

1 -5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en)
7. LinkedIn search, 2023
8. The Recursive AI Survey (May-August, 2023)

🇵🇱Poland

1 - 5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en)
7. LinkedIn search, 2023
8. Statista, 2022 https://www.statista.com/statistics/1023007/poland-number-of-ict-students-and-graduates/
9. The Recursive AI Survey (May-August, 2023)

🇷🇴Romania

1 - 5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en)
7. LinkedIn search, 2023
8. ANIS (2019)
9. The Recursive AI Survey (May-August, 2023)

🇸🇰Slovakia

1 - 5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2023 (https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en)
7. LinkedIn search, 2023
8. ICT Sector in Slovakia, SARIO Slovak Investment Trade & Development Agency (https://www.sario.sk/sites/default/files/sario-ict-sector-in-slovakia-2022-09-23.pdf)
9. The Recursive AI Survey (May-August, 2023)

Western Balkans

1 - 5. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
6. Eurostat, 2023 https://ec.europa.eu/eurostat/databrowser/view/ISOC_SKS_ITSPT__custom_7573931/default/table?lang=en
7. LinkedIn search, 2023
8. Vojvodina ICT Cluster, “ICT in Serbia.”, 2022, https://vojvodinaictcluster.org/wp-content/uploads/2022/12/ICT-in-Serbia-At-a-Glance-2022.pdf
9. The Recursive AI Survey (May-August, 2023)

Key players in the AI Innovation Ecosystem in CEE

Introduction

Which are the front-runners driving AI innovation in the CEE region currently?

In this chapter we reveal the top-funded AI product companies from Central and Eastern Europe who have achieved significant milestones in their growth journey and have gained both local and international investors' trust.

Offering solutions for primary industries such as finance, manufacturing, telecommunications, automotive, cybersecurity, energy, marketing and sales, you'll count several unicorn companies and (we believe) a lot more future unicorns.

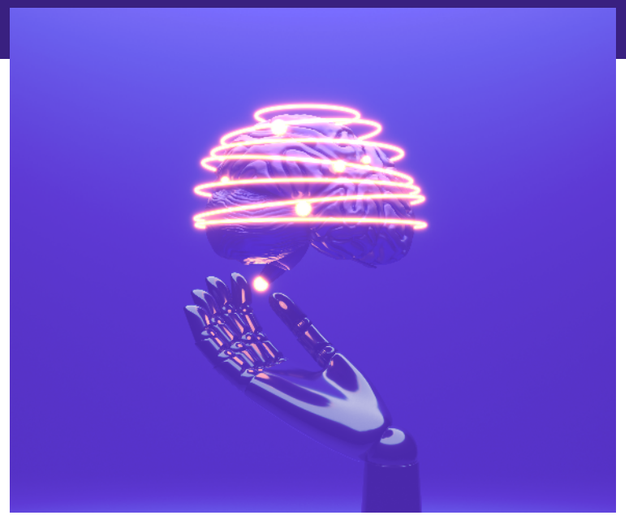
In their detailed profiles, we have gathered information about their target markets, area of focus and AI expertise, as well as key achievements showcasing their stage of development and growth potential.

In addition, you'll read in depth-interviews with some of those AI champions in which founders share their background story and perspective on building AI innovation from our corner of the world. They talk about the challenges they face, but also about their strategies for fundraising, acquiring and retaining talent and customers, and offer their views on how AI technology should be regulated.

AI service companies

Another group of key players in the AI innovation ecosystem are AI service providers. These companies are companies that offer AI outsourcing by providing AI capabilities and infrastructure to organizations.

We have mapped over 220 AI service providers from Central and Eastern Europe, and have included representatives of this stakeholder group in The Recursive AI Survey.



The analysis has resulted in a few key insights:

- Top three AI specializations for AI service providers in CEE are AI Consulting (24%), AI Integration (20%), and AI Development (19%).
- Their top three industries of focus are Finance (13%), Information Technology (12%), and Healthcare (10%).
- The majority of AI service companies (55%) were founded between 2015 and 2021, much like product companies.
- Half of them (50%) are small companies, with up to 99 employees.
- In our Survey, AI service companies indicated key challenges that clients confront in adopting AI technologies: lack of a clear goal or desired outcome (57.7%), data quality and availability (53.8%), cost and ROI (42.3%), lack of skilled talent (42.3%), and resistance to change (42.3%)
- They also reported medium to high difficulty in finding and attracting talent, low to average level of collaboration between academia and industry, and an average regulatory landscape for AI, in agreement with AI product companies.

"Selling machine learning or AI projects is difficult, because usually the obvious use cases will be done by the software houses. A lot of machine learning is very problem specific and it will take such a long time to develop skills there.

So, it makes more sense to focus on some small areas and develop them. We want to be very good at Explainable AI because we have background in research. For me, Explainable AI is a new type of way of doing regression modeling. We want to just be good at this one particular problem and try to win projects in this area. When I think of AI, I always think about a particular problem and how to wrap it in a solution."

Łukasz Borowiecki - CEO of 10 Senses, a consulting company helping organizations get a better understanding of their data assets

The sources for all company profiles featured in this section are the companies' websites, the founders' Linkedin profiles, as well as The Recursive website articles.

The **Front-Runners** of AI Innovation

BULGARIA

Hyperscience

Founding date: 2014
HQ New York, US

www.hyperscience.com

Connection to the CEE: Bulgarian co-founders, office in Sofia

Number of Employees: 400

Industry of Focus & Target Markets:

Main market or industry:
Enterprise Software

Target markets:
US

AI Technology Specialization: Hyperscience specializes in data automation technology to improve operational efficiency.

Solution: Hyperscience services are packaged into modularized, ready-to-use blocks, which are arranged into flows based on the business process. Users can train models using pre-trained ML data types for structured documents and a point-and-click interface for semi and unstructured documents. The company also provides Python libraries for developers to support block and flow customization.

Stage of Development:
Series E

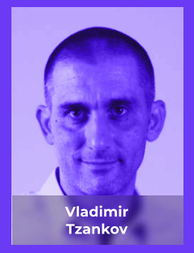
Achievements & Milestones

- HyperScience's last funding round was a **$100M** Series E in December 2021.
- HyperScience has successfully garnered the trust of global organizations, with its intelligent automation solutions being adopted by federal agencies, Fortune **500 companies**, and leading insurance giants.
- In 2021, Hyperscience acquired **Boxplot**, a startup based in Berlin, Germany, with the aim to deliver data processing and graph-based data storage in one platform.
- In 2023, Hyperscience received **SOC 2® certification** for its enterprise AI software infrastructure platform.

Funding & Investors:

Hyperscience has raised a total of $288.9M in funding over 9 rounds. The company has 27 investors including Global Founders Capital, Tiger, Stripes, and Bessemer.

Founders


Vladimir Tzankov


Krasimir Marinov


Peter Brodsky

Hyperscience was founded by Peter Brodsky, Krasimir Marinov and Vladimir Tzankov. Prior to founding Hyperscience all three founders worked together at SoundCloud – Brodsky was a Director, while Marinov and Tzankov were backend software engineers.

Payhawk

Founding date: 2018
HQ London, UK

www.payhawk.com

Connection to the CEE: Bulgarian co-founders, office in Sofia

Number of Employees: 300

Industry of Focus & Target Markets:

Main market or industry:
Finance/fintech

Target markets:
Europe, US, UK

AI Technology Specialization: Payhawk offers an AI camera feature that provides automated invoice capture and data entry. The AI-powered camera complements the company's OCR technology within their app, helping users to capture and crop receipts, extracting all the relevant expense information.

Solution: Payhawk offers a solution for spend management. By integrating corporate cards, expense reimbursements, accounts payable, and accounting software, Payhawk simplifies business payments for a global clientele spanning 32 countries.

Stage of Development:
Series B

Achievements & Milestones

- Payhawk became **the first Bulgarian unicorn** in 2022.
- Payhawk raises a **$112M Series B** Round in 2021.
- Payhawk raises a **$20M Series A** Round in 2021.
- Payhawk partnered with Yapily in 2023 to offer its customers the ability to link one or more bank accounts from **over 2,000 banks and institutions** from dozens of countries.

Funding & Investors:

Payhawk has raised a total of $239.1M in funding over 6 rounds. Payhawk is funded by 18 investors. Investors include Lightspeed Venture Partners, QED Investors, Earlybird Digital East, Eleven Ventures, and HubSpot Ventures.

Founders

Payhawk was founded by Hristo Borisov, Boyko Karadzhov, and Konstantin Dzhengozov. Prior to founding Payhawk, all three founders have worked at Telerik (acquired by Progress) – Borisov has a strong product development and market entry background, Karadzhov has a background in software development and product innovation, and Dzhengozov is a seasoned finance and investment professional with a tech industry and management consulting background.

Quantive

Founding date: 2015
HQ Colorado, US

www.quantive.com

Connection to the CEE: Bulgarian co-founders, office in Sofia

Number of Employees: 300-500

Industry of Focus & Target Markets:

Main market or industry:
Enterprise Software

Target markets:
Europe, US, UK

AI Technology Specialization: The AI embedded in Quantive's platform assists users across the entire strategy execution journey from planning to assessing outcomes to adapting strategy.

Solution: Quantive is a software and services company offering a data-driven OKR platform where companies can track their most important metrics to improve decision making.

Stage of Development:
Series C

Achievements & Milestones

- Quantive secured a **$120M Series C** funding round in December 2021.
- In mid-2022 Quantive acquired **Cliff.ai**, a UK-based operational intelligence software provider that uses machine learning to help business and operations teams track and analyze abnormal changes in the performance of KPIs.

Funding & Investors:

Quantive has raised a total of $160.6M. Investors include LAUNCHub Ventures, Techstars, Eleven Ventures, Index Ventures, and Charles River Ventures among others.

Founders

Radoslav Georgiev

Bulgarian Radoslav Georgiev is the CTO and co-founder of **Quantive**. He has a demonstrated history of working in the computer software industry. Prior to co-founding Quantive, he gradually built his software engineering career at Progress (the company that acquired Bulgarian Telerik).

Vince Gaydarzhiev

Founder of Alcatraz AI

> “Bulgaria boasts talented individuals with strong technical skills, particularly in math and physics, who possess a keen ability to self-learn and adapt to AI technologies.”

Vince Gaydarzhiev is the founder of the US-Bulgarian company Alcatraz AI. The hardware-as-a-service startup offers autonomous access control that uses facial biometrics, 3D sensing, and AI. The company closed a $25M Series A round in 2022.

Among the customers of Alcatraz AI are Fortune 500 companies, including telecoms and government-owned banks. Before becoming an entrepreneur, Vince worked as an engineer for companies like Apple and Nvidia. He holds several engineering degrees from Stanford and the Universities of Southern California and Florida.

The Vast Potential of AI in the Access Control and Security Industry

What were some of the biggest milestones and challenges for Alcatraz AI in the past year?

Primarily, we faced numerous obstacles related to selling our products to large enterprises and government entities, particularly in the US and Europe. The main challenge stemmed from the differences between GDPR-related privacy and security regulations in these regions. In the US, the absence of a federal-level law similar to GDPR meant that each state had its own subjective approach to privacy and security.

To overcome these hurdles, we undertook extensive development efforts on the software, documentation, and certification fronts. Our aim was not only to comply with GDPR, which we had adhered to since the beginning but also to proactively meet any future federal-level privacy and security laws concerning access control and biometrics. This was crucial since our focus was on deploying biometric solutions to authenticate employees with their consent.

Over the last 12 to 18 months, Alcatraz AI dedicated significant resources to achieving these goals, and the results have been favorable. Presently, we have a comprehensive software, documentation, and legal package ready for our large customers, streamlining the onboarding process significantly.

One of Alcatraz AI's proudest achievements is the development of a pioneering biometric product, which features facial recognition technology. This innovative product is set to be unveiled early next year, and it will be unlike anything seen before in the biometrics industry.

Additionally, we expanded our market reach by initiating sales efforts in Europe and the broader EMEA region over the past four months. We recruited new salespeople based in Europe and Dubai to support our endeavors.

Almost everything from a software perspective has been developed in Bulgaria. We have a talented 30-person team based in Sofia, working on computer vision, machine learning, full stack, and mostly embedded software.

What are the current challenges or pain points in the access control and security industry that AI can address or solve?

We've been actively working with AI since 2016, even before it became widely known. Back then, we already envisioned the potential of AI for everyone, though not everyone else fully grasped its capabilities.

AI can address and solve many of the current challenges and pain points in the access control and security industry. For instance, in the context of corporations, security guards often perform face control, comparing employee badges with their faces to ensure the right person is granted access. They also handle manual two-factor authentication and may need to ask everyone to badge in to prevent tailgating. With AI, we've extensively trained and fine-tuned our algorithms to handle all these cases. Alcatraz AI can successfully perform face recognition and two-factor authentication continuously, 24/7, and even more accurately than a security guard. This significantly reduces the risk of unauthorized access.

Furthermore, AI enables powerful backend analytics, providing valuable data to security teams. For example, it can track the number of people entering and exiting areas, helping with building occupancy management. The data can be utilized to identify areas with lower security, where tailgating might be occurring, or even pinpoint specific individuals who may be enabling tailgating.

How do you think the upcoming EU AI regulatory framework will impact the adoption of AI products and services?

AI regulation is undoubtedly necessary, and at Alcatraz AI, we have already taken steps to regulate ourselves, and the large corporations we work with have also implemented preemptive rules to ensure strict compliance with biometrics, privacy, and security standards.

In fact, Alcatraz AI is well-positioned to comply with the upcoming EU AI regulatory framework and also to lead in creating robust regulations within the industry. We are proactively considering privacy and security aspects, and we are exploring ways to regulate the use of biometric data more effectively. Our approach includes considering solutions that may not even involve using pictures, videos, or specific employee data during access control processes. Instead, we are exploring innovative methods, such as relying solely on badge numbers to authenticate employees.

How would you evaluate the potential for growth and development in the AI innovation ecosystem in CEE and why?

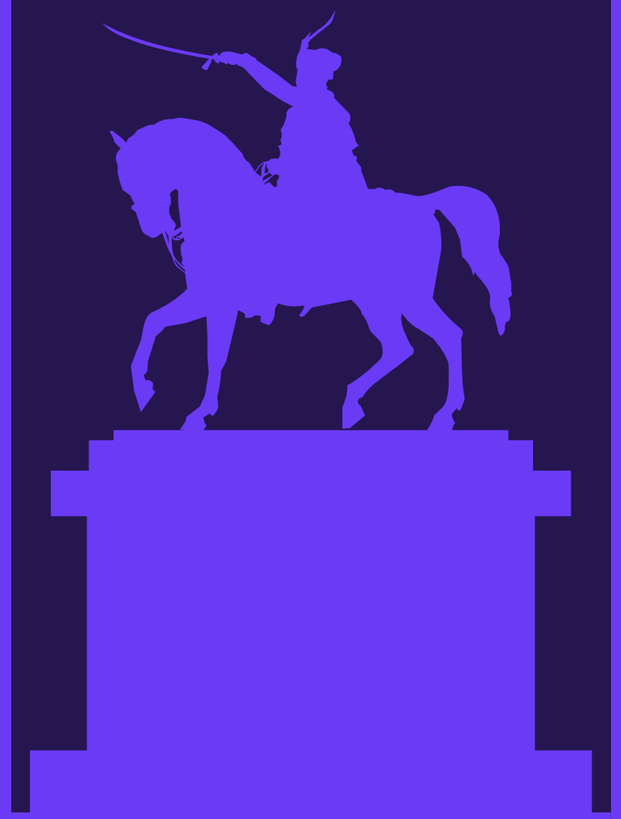
The main reason for the acceleration in the AI innovation ecosystem in CEE is the abundance of talent in the region. We have a pool of highly skilled professionals with expertise in math, physics, computer vision, and computer science. Some engineers have years of experience, while others are fresh out of college. In the past few years, educational institutions have also started offering majors specifically focused on AI, computer vision, machine learning, and neural networks. This has contributed to fostering a strong talent base.

Which are the top AI specializations and skills in Bulgaria according to you?

The top AI specializations and skills in Bulgaria are rooted in strong math and physics backgrounds. Individuals in the region possess a good foundation in these areas and have been catching up with AI technology through self-learning, even if it wasn't covered extensively in their formal education.

Another strength of the talent in Bulgaria is their capacity to work effectively in teams to solve complex problems over the long term. Unlike the trend in some other regions, where engineers may frequently switch companies, we observe a higher degree of loyalty in the Bulgarian talent. Many engineers stay with one company for 2 to 5 years, or even longer. This commitment allows them to deeply focus on addressing significant issues, especially with an AI focus. It also facilitates active involvement in product implementation and deployment, gathering customer feedback, and iterating on the product to continually improve it.

CROATIA



Rimac Automobili

Founding date: 2009
Location: Sveta Nedelja, Croatia

www.rimac-automobili.com

Number of Employees: 1000-5000

Industry of Focus & Target Markets:

Main market or industry:
Automotive manufacturer (electric hypercars)

Target markets:
US, EU

AI Technology Specialization: Creating core EV systems in-house - from power-dense drivetrain systems to advanced autonomous-driving and user experience enabled through infotainment technologies.

Solution: Rimac Automobili is developing and manufacturing electric hypercars and high-performance components and technological solutions for electric vehicles.

Stage of Development:
Series D

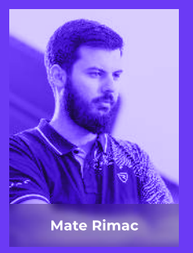
Achievements & Milestones

- In November 2021 Rimac Automobiili acquired French sports car brand **Bugatti** and acquired a 55 percent stake in the new Bugatti-Rimac company.
- In May 2022 Rimac Automobili got a **€120M investment** from Italian investment firm Investindustrial, a leading European group of independently managed investment.
- In June 2022 Rimac Automobili **raised €500M** in a Series D round led by giants SoftBank and Goldman Sachs, as well as existing shareholders such as Porsche and InvestIndustrial.

Funding & Investors:

Rimac Automobili has raised a total of $875M in funding over 9 rounds.The company has 10 investors, including SoftBank Vision Fund, Goldman Sachs and InvestIndustrial.

Founders


Mate Rimac

Rimac Automobili was founded by Croatian entrepreneur Mate Rimac, who also serves as the company's CEO. With headquarters in the town of Sveta Nedelja in Croatia, Rimac started the company as a garage project, and managed to grow Rimac Automobili over the years and turn it into an industry powerhouse.

Infobip

Founding date: 2006
Location: Vodnjan, Croatia

www.infobip.com

Number of Employees: 3700

Industry of Focus & Target Markets:

Main market or industry:
Enterprise software
and telecommunications

Target markets:
US, EU, EMEA

AI Technology Specialization: Omnichannel engagement platform powering a broad range of messaging channels, tools and solutions for advanced customer engagement, authentication and security.

Solution: Infobip offers a variety of cloud communications services to enterprises and telecoms providers.

Stage of Development:
Debt financing

Achievements & Milestones

- In July 2020 Infobip **raised €200M** from One Equity Partners, in a deal which valued the company at over $1 billion.
- In April 2021 Infobip acquired **developer conference** Shift and appointing its founder and CEO Ivan Burazin as Chief Developer Experience Officer
- In November 2021 Infobip **raised $500M** through direct loan placement and acquired Voice-over-Internet Protocol (VoIP) provider Peerless Network
- In July 2022 Infobip acquired business and tech **magazine Netokracija** for an undisclosed amount.

Funding & Investors:

Infobip has raised a total of $800M in funding over 2 rounds. The company has been funded by 3 investors, including BlackRock and Ares Management.

Founders


Izabel Jelenic


Roberto Kutic


Silvio Kutic

Infobip was founded in 2006 by co-founders Silvio Kutic and Izabel Jelenic, and later joined by Roberto Kutic. Silvio Kutic is the company's CEO, Izabel Jelenic is the CTO, and Roberto Kutic serves as its COO. Silvio Kutic, who has a background in electrical engineering, bootstrapped the company from zero to $1bn in revenue in 2020 with no external investment.

Cognism

Founding date: 2015
HQ London, UK

www.cognism.com

Connection to the CEE: One of the co-founders is from Croatia

Number of Employees: 400-500

Industry of Focus & Target Markets:

Main market or industry:
Marketing, Sales,
and Customer Service

Target markets:
EU, EMEA

AI Technology Specialization: The company is using patented AI technology that provides B2B sales teams with a blend of real-time company, people and event data to streamline prospecting and to find and deliver new revenue.

Solution: B2B sales acceleration software that provides a marketing and sales acceleration solution.

Stage of Development:
Series C

Achievements & Milestones

- In December 2020 Cognism acquired UK startup **Ricochet**, whose product is a Chrome extension for sales professionals
- In March 2021 Cognism **raised a $12.5M** series B round, led by existing investors AXA Venture Partners, Investiere, and VentureFounders
- In January 2022 Cognism **raised $87.5M** in Series C funding, led by new investors Viking Global Investors and Blue Cloud Ventures, together with follow-on investors AXA Venture Partners, Swisscom Ventures, and Volution.

Funding & Investors:

Cognism has raised a total of $126M in funding over 8 rounds. The company has been funded by 20 investors, including AXA Venture Partners, Volution Capital Management, Viking Global Investors and others.

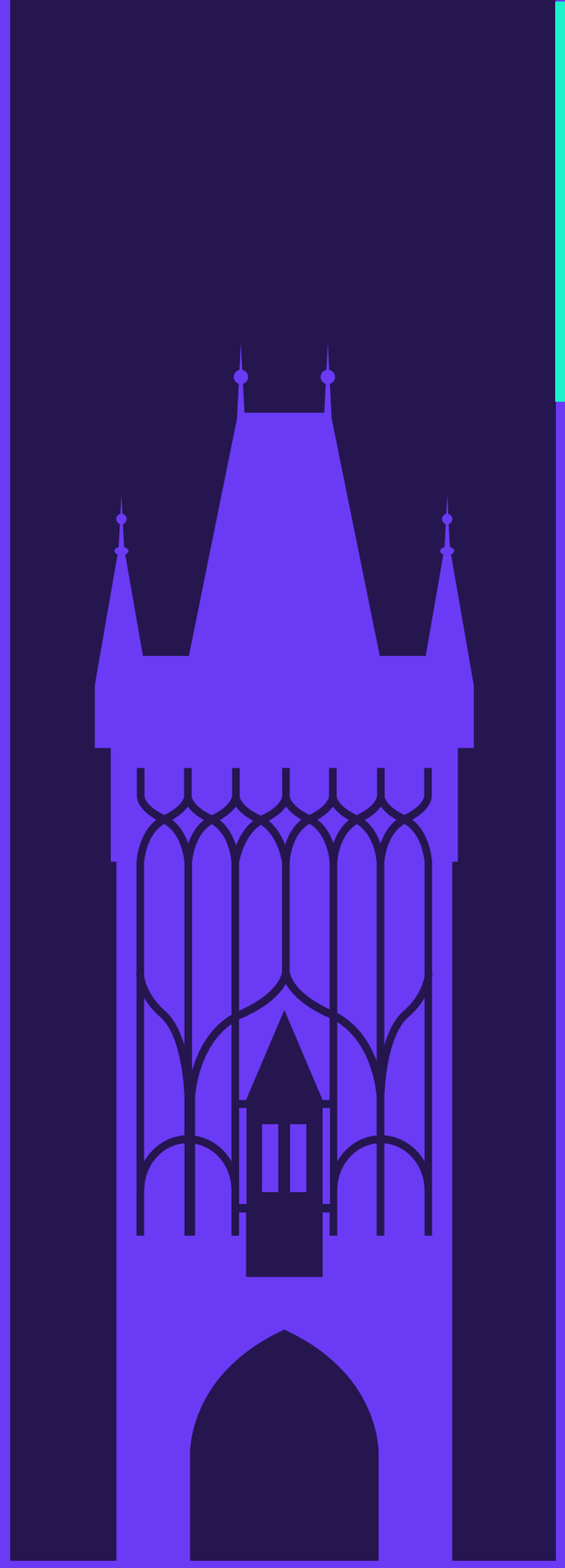
Founders


Stjepan Buljat


James Isilay

Cognism was founded in 2015 by entrepreneurs James Isilay, CEO, and Stjepan Buljat, CTO. Before founding Cognism, Isilay was a quantitative trader and analyst for energy companies and UBS Investment Bank, while Buljat worked as a computer science teaching assistant at the University of Zadar in Croatia.

CZECH REPUBLIC



Deepnote

Founding date: 2019
HQ San Francisco, US

www.deepnote.com

Connection to the CEE: Czech-Slovak founded, office in Prague

Number of Employees: 11-50

Industry of Focus & Target Markets:

Main market or industry:
Data science teams

Target markets:
US, Europe, India

AI Technology Specialization: Deep learning and natural language processing

Solution: Deepnote is a data science notebook that allows data scientists and analysts to collaborate on data projects, share code and insights, and run computations in the cloud. The startup provides Deepnote AI, a contextual AI help for data projects to generate, edit, and explain code.

Stage of Development:
Series A

Achievements & Milestones

- Deepnote raised its Series A round of **$20 million** in 2022, led by Index Ventures and Accel.
- Deepnote launched its AI-powered product **Deepnote AI** in June 2023.
- In 2022, Deepnote was used at 80 out of the top 100 universities in the world in at least one of their classes.
- Currently, over **100,000** data professionals use Deepnote.

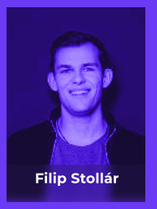
Funding & Investors:

Deepnote raised total funding of $23.8 million over two rounds, including a $3.8 million seed round and the latest $20 million Series A investment. Both rounds were led by Index Ventures and Accel, together with the support of other investors, including Y Combinator and Czech Credo Ventures.

Founders


Jakub Jurových


Jan Matas


Filip Stollár

Deepnote was founded by Jakub Jurových, Jan Matas, and Filip Stollár.

Petr Baudiš

Co-Founder, CTO,
and Chief AI Architect at Rossum

”There will be a growing emphasis on cross-border knowledge sharing and stakeholder collaboration. As AI technology continues to evolve, it will be evident that no single region or company possesses a monopoly on innovation.”

Petr Baudiš is a programmer and Computer Science researcher with a background in Theoretical Computer Science and Artificial Intelligence. Prior to co-founding Rossum, he co-founded Ailao, a company transforming deep learning research into commercial products.
Rossum is an Intelligent Document Processing (IDP) platform that takes your documents from start to finish, fast. Hundreds of companies across a variety of industries use Rossum to power their document processing operation. Combining advanced, AI-powered data extraction with streamlined validation workflows and automation capabilities, Rossum helps you process documents faster than traditional solutions.

About Rossum:

Founded: 2017
Founders: Tomáš Gogar, Petr Baudiš, Tomáš Tunys
Location: London, UK; HQ office in Prague, Czech Republic
Total funding: $109,500,000
Stage of development: Series A

Revolutionizing B2B Communication: Automating Document Processing with AI

How does Rossum leverage artificial intelligence and what sets your solution apart from the competition?

Rossum is an AI-powered platform that gives people back their time. Instead of spending hours copying and pasting data into sheets and cross-checking the validity to eventually report on it, users can now automate it all. Intelligent document processing means that it can all be done with better accuracy, speed, and efficiency. We built Rossum from our core belief that AI should help teams focus on other value-creation activities, but ultimately, we're focused on making B2B communication frictionless and seamless — without the need for endless email chains and confusion.

What distinguishes Rossum is not just our data extraction AI but also the unified platform that provides customers with a holistic view of documents, simplifying the automation of entire business transaction workflows. This significantly reduces manual intervention, typically needed in only about 10 percent of cases when documents require rework.

What is your perspective on the evolution of the AI startup landscape in the Czech Republic and the broader CEE region?

There will be an emergence of AI hubs, often clustered near academic institutions, that will result in a surge in startups. These academic resources drive innovation. However, despite AI's growing role in industries, governments lack comprehensive AI strategies for the future. This gap between thriving AI hubs and government strategy highlights the need for cohesive policy development and industry collaboration.

Additionally, what challenges or limitations do AI startups like Rossum face in the region?

As for the challenges faced, I can mention two critical things. In Central Europe, attracting the necessary talent can be a formidable task due to immigration restrictions and the difficulties in luring top-tier professionals to the region, even with financial incentives. Additionally, conducting global business from Central Europe can pose challenges. For example, imagine if the government subsidized direct flights between cities like Prague and New York, which would undoubtedly yield a positive GDP impact in the long run. While remote communication is prevalent, face-to-face interactions remain invaluable, fostering strong interpersonal connections and facilitating knowledge sharing within ecosystems.

What ethical principles and regulatory considerations guide your approach to developing and deploying AI solutions at Rossum?

One of our foremost commitments revolves around transparency and trust with our customers. This entails not only ensuring the security of their data but also providing clear insights into how their data is handled throughout the AI solution's lifecycle.

For instance, we implement stringent data protection measures, adhering to industry-leading security standards to safeguard sensitive information. We also provide transparent data handling practices, including clear data consent mechanisms, data access policies, and robust encryption protocols. This transparency is designed to empower our customers with a comprehensive understanding of how their data is utilized and to foster trust in our AI solutions.

Moreover, our commitment to ethical AI extends to continuous product improvement. We prioritize customer feedback and use it to enhance our solutions, ensuring they align with evolving ethical standards and customer expectations.

How do you evaluate the current availability and quality of AI talent in the Czech Republic and CEE region? From your point of view, what are the most crucial AI specializations and skills in the region?

We recognize that the region excels in engineering expertise but may face challenges in areas such as AI sales and business development. While the CEE region boasts strong engineering capabilities, AI sales require a global perspective and specialized skills that are not always readily available locally.

For example, in the Czech Republic, we often find a wealth of AI talent in natural language processing (NLP), computer vision, and machine learning engineering. These specializations have thrived due to the presence of world-class academic institutions and research centers. However, when it comes to selling AI solutions on a global scale, which often involves intricate market knowledge, relationship building, and a deep understanding of customer needs, it may be necessary to tap into international talent pools.

Are there specific AI trends or advancements you believe will significantly impact the regional ecosystem over the next 5-10 years?

There will be a growing emphasis on cross-border knowledge sharing and stakeholder collaboration. As AI technology continues to evolve, it will be evident that no single region or company possesses a monopoly on innovation. You can already see this in international partnerships, research collaborations, and open-source contributions like the one we were recently involved in when we published the world's largest research dataset and benchmark.

Secondly, regulations will play a pivotal role in shaping the AI industry in this region. Governments and regulatory bodies are becoming more proactive in establishing guidelines and standards for AI applications, addressing concerns related to ethics, data privacy, and transparency. Preparing for these changes and being able to adapt quickly will prove crucial to the ecosystem’s sustainability. But in the end, the ball is now on the government's side in defining thoughtful regulations that achieve critical objectives without suffocating the local AI ecosystem.

Furthermore, as the CEE startup ecosystem matures, it'll show that many of the most groundbreaking AI innovations will come from startups. Even when larger companies acquire these startups, the small, agile teams often continue to drive innovation within the parent organization. Current startups and scale-ups evolving into mature companies will also contribute to creating a generation of alumni who bring their valuable experience and insights back into the ecosystem.

Martin Rehák

Founder and CEO of Resistant AI

“I believe that AI should provide sophisticated answers to deep questions - questions that can be answered differently depending on the levels of sophistication you approach them with. It's the customer's right to ask if this is a legitimate subscriber - I want a Yes or No answer. And while engineers hate giving Yes or No answers, and so do I, it is our job to do so. And we need to get increasingly more innovative to just keep on par with the attackers, who are constantly increasing their sophistication.”

Martin Rehák serves as the founder and CEO of Resistant AI. A serial entrepreneur, he previously established Cognitive Security, a company that was acquired by Cisco in 2013, and served as the foundation for Cisco's Cognitive Threat Analytics (CTA) team, a unit dedicated to advanced threat detection for over 25 million users across the globe.

Resistant AI is a Czech startup that uses AI to provide document and transaction forensics, protecting customers from fraud attempts and document forgery among other financial crimes.

How Is AI Changing the Game in Cybersecurity

How has the use of AI in cybersecurity changed the enterprise sector?

The game of security is always the one of escalation and AI makes this no different. It is a patient game - the attackers do something and then they adapt, they reflect our actions, they hide and then we hit them again. The fundamentals never change. What changed is the timescales. In the old financial days, fraudsters were operating the timescales of days or months, you did commit a couple of frauds per day, you were happy, went home, and then you went to another branch, you flew to the other side of the country etc.

Now you commit fraud - if it works, you add a simple cycle into the code that actually is doing the attack. And you scale up by a factor of 1000 within 10 seconds after the first one, and what seemed like a funny loss to a company can become quite catastrophic.

How has the Resistant AI product portfolio changed since its launch?

It has changed dramatically - our first idea was a complete failure and it's important to share with the startups that you don't always get things right immediately. Our idea was to look for gaps in AI models and to basically do vulnerability research on the AI models. Something that would be very popular now, but fell flat four years ago.

Our second idea was the one we started after a customer request - we started looking at fake images and digital documents. And this basically became the onboarding security product, which is now helping our customers to defeat increasingly sophisticated forgeries.

There is an emerging AI innovation ecosystem in Czech Republic - what are the strengths and the weaknesses?

I think the strengths are a very good educational system with some very talented and smart people.

The second strength is the ability to attract talent from abroad despite the best efforts of the Czech state to keep everyone from coming. But that's hopefully changing, although not quickly enough. There is the fact that the Czech Republic is an open place, Prague is an open place where you want to live.

The third strength is that the ecosystem is shaping - when we started the first company doing AI here in 2008, everyone thought we were crazy and there were like three startups in the whole country, and there were one or two VCs. Now we have more than 20 VC funds in the country, and around 500 actual startups.

How would you evaluate the level of collaboration between AI companies and academia?

We have a very good relationship with academia because we come from academia, and the situation now is such that basically when you leave the university, going to work for a startup in the AI domain is almost like a default choice.

Therefore, academia has reflected the fact that there is a demand for students to go work for startups. There's plenty of collaboration, and the door is quite open. We even keep training PhD students in collaboration with universities, which is all very good and very productive.

What are your thoughts when it comes to the talent pool that is available for AI companies?

The potential is quite huge because there are plenty of smart graduates leaving universities and plenty of talented people willing to move to Prague.

The reason why some people say it's hard to hire people is that they are not willing to train the people. So as a company, the culture is such that you'll have to hire young people with not so much experience. We don't expect to be able to hire people who know how to do AI in the market.

What are you currently missing or would like to see more of when it comes to AI and deep tech innovation?

First, we are mostly selling to financial institutions and banks, and their willingness to embrace AI is somehow limited by the regulation. So one thing that's missing is the regulator being firm with respect to the goals of the regulation, while at the same time being flexible in terms of means used to achieve the goal, where AI is one of the ways to solve it.

Before, you could have easily claimed that you can't analyze millions of transactions per day to find all the money laundering because it's too hard. With AI, the expectations of performance and on quality should be rising, and they are rising.

What is your view on the EU's AI Act and does it change anything for the industry?

If you look at the AI act, the whole act comes from the principle precautionary regulation - someone wants to regulate the AI to protect us from our fear or to regulate the AI to avoid anything bad from happening. But if you look at the specific clauses, how for example high-risk systems have been defined, you see that something is considered a high risk system based on a single anecdote or a single case somewhere in the US or in a book mentioned by someone.

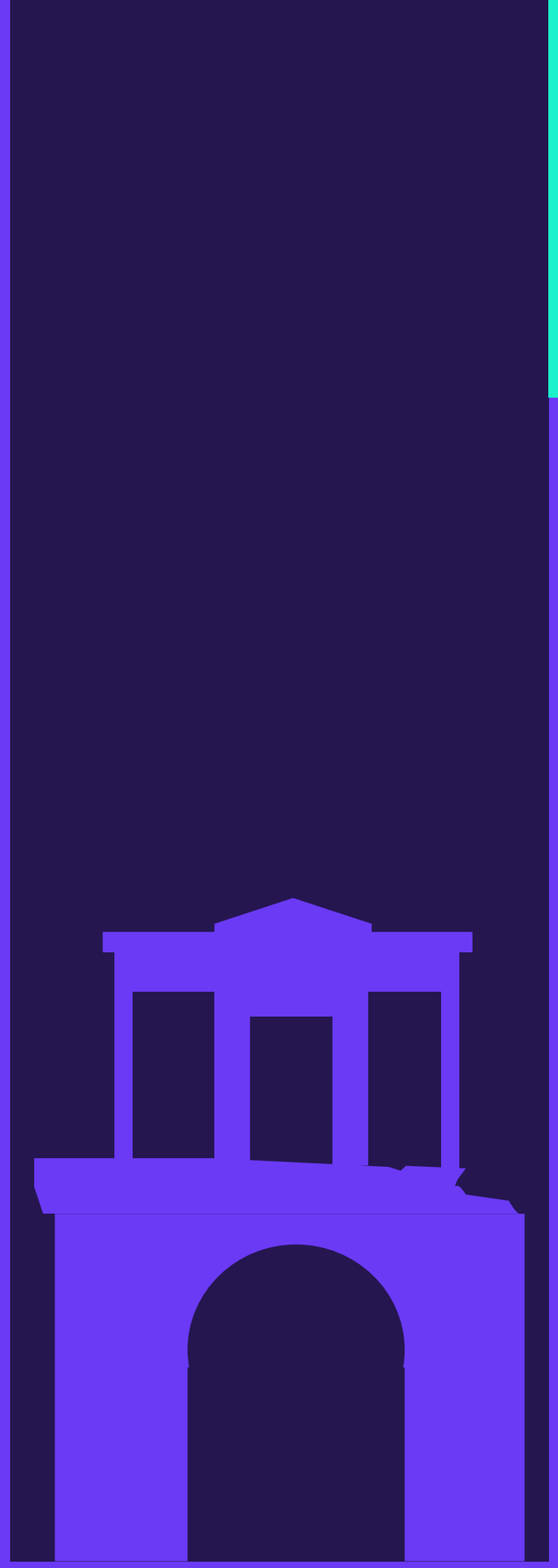
If we want to turn Europe into a place where innovation doesn't happen, and where innovation dies and be the last ones to adopt new technologies, then the AI act is a really good way of fast-forwarding to that future.

How has funding and investor support affected the overall development of Resistant AI?

I think that the funding situation has improved dramatically in Europe, and the European VC ecosystem is maturing very quickly. It doesn't operate at the scale of the US one yet, but it already operates at a scale that's pretty good and gives us enough support.

In CEE this became very obvious with UiPath, and other companies are following, so the region is growing very dynamically. I think the tech scene is actually taking in lots of talent, and for many students who are leaving universities, going into startups is becoming the career option to follow. It all kind of clicks together - it's the talent, the capital, the maturity, and the knowledge of the previous generations of founders who basically lead the way and are now helping to drive the ecosystem.

GREECE



Spotawheel

Founding date: 2015
Location: Athens, Greece

www.spotawheel.com

Number of Employees: 100-499

Industry of Focus & Target Markets:

Main market or industry:
Automotive; Retail

Target markets (geographies):
Europe

AI Technology Specialization: Machine Learning; Recommender Systems

Solution: An online B2C platform for used cars in Europe. It uses efficient and customer-centric proprietary technology to empower people to buy a reliable car.

Stage of Development:
Series B

Achievements & Milestones

- In **2015** Spotmechanic, an inspection service for used cars, **was launched**.
- In 2021, it was named by **FT1000** among the **fastest-growing** companies in Europe.
- Spotawheel has received **€120M** in funding until 2022.
- It is present in Greece, Poland, Germany, and Romania and **plans to enter 10 new markets** by 2026.

Funding & Investors:

The company has raised an investment of almost €120M in six rounds. Their latest round was a Series B of €100M led by VentureFriends. Other investors include UNIQA Ventures, Rockaway Ventures, and Velocity Partners.

Founders & Team


Kiriakos Agadakos


Charis Arvanitis

Charis Arvanitis, founder and CEO, background in economics and business administration

Kiriakos Agadakos, founder and VP of Marketing, holds a degree in Electrical and Computer Engineering from the National Technical University of Athens

Causaly

Founding date: 2018
HQ London, UK

www.causaly.com

Connection to the CEE: A Greek co-founder and an office in Athens

Number of Employees: 100-499

Industry of Focus & Target Markets:

Main market or industry:
Healthcare and Life Sciences

Target markets (geographies):
Europe, US

AI Technology Specialization: Natural Language Processing (NLP); Machine Learning; Deep Learning; Big Data Analytics

Solution: The company aims to shorten and simplify the biomedical R&D process of finding new drugs and preparing them for commercial use.

Causaly's platform maps the correlations across vast amounts of scientific data, which in turn helps medical professionals, experts, and innovators to focus on developing novel medicine.

Stage of Development:
Series B

Achievements & Milestones

- In 2021, the company raised **$17M** in Series A in a round led by Greek VC Marathon Ventures.
- It collaborates with research labs such as **University College London** and **King's College London.**
- In 2022, the company **has tripled its revenue and customers**, serving pharma giants such as Gilead, Novo Nordisk, Regeneron, the FDA, and the NIEHS.
- IIn 2023, the company raised a **$60M** Series B round

Funding & Investors:

The company has a total of $93M of funding. Their latest round was a $60M Series B round. Among their investors are Iconiq Growth, Index Ventures, Pentech, EBRD, and Marathon VC.

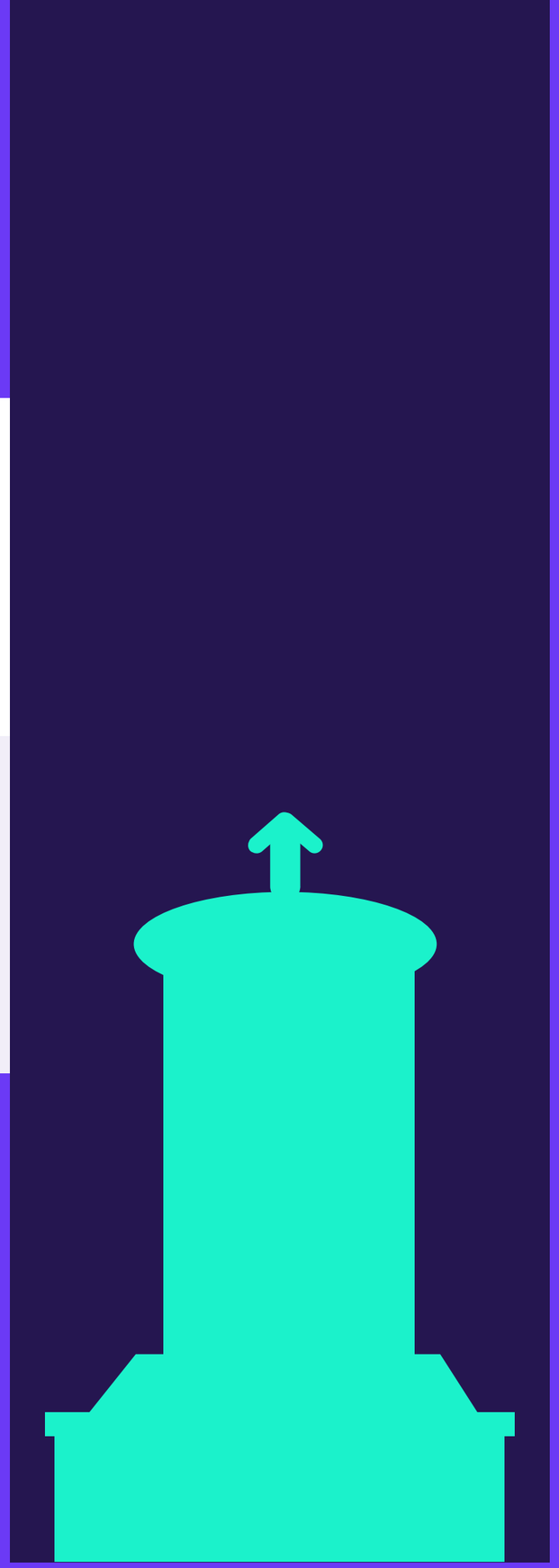
Founders & Team


Artur Saudabayev

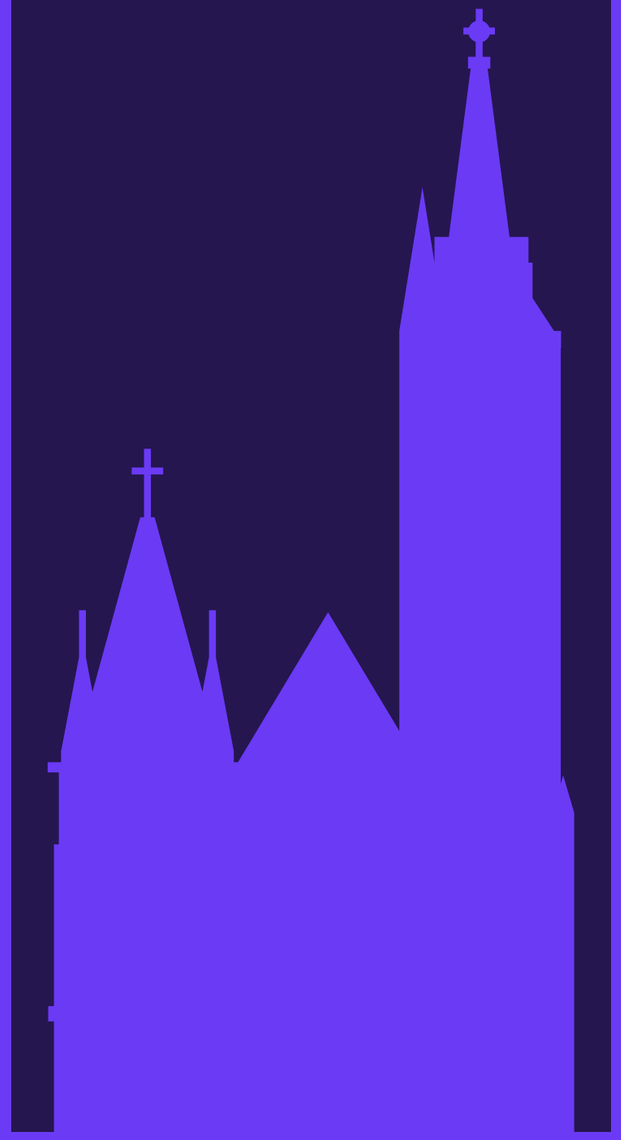
Artur Saudabayev, Co-founder & CTO, is a computer scientist and intelligent systems expert, with a background in machine learning and bioinformatics. He has attended Singularity University Future Studies and has a Master's degree from the University of Edinburgh.


Yiannis Kiachopoulos

Yiannis Kiachopoulos, Co-founder & CEO, holds a Bachelor's and Master's in Computer Science, and an MBA from the Hong Kong University of Science and Technology.



HUNGARY



SEON

Founding date: 2017
Location: Budapest, Hungary

www.seon.io

Number of Employees: 100-499

Industry of Focus & Target Markets:

Main market or industry:
Security, Cybersecurity

Target markets:
Europe, US, APAC, LATAM

AI Technology Specialization: Big Data Analytics, Predictive Analytics

Solution: SEON is an online fraud prevention platform that aims to help online businesses, from finance to e-commerce, detect and stop fraud in real-time through transactional data analysis.

Stage of Development:
Series B

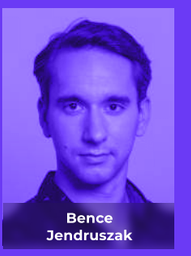
Achievements & Milestones

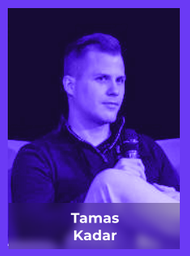
- The company **raised a seed investment round** in 2018 after which they launched the **Intelligence Tool**
- They opened an office in **London**, in March 2020, and a new office in **Budapest** in August 2020, followed by offices in **Austin, Texas** and **Jakarta, Indonesia** in 2021
- They were listed on multiple fast growth startup lists by tech analysts, including **Delotte's Growth Star** and **G2's Fastest Growing Products**
- The company raised a **$94M** Series B in April 2022, to expand its presence across North America and LATAM.
- **SEON's** customers include **Revolut**, **Patreon**, **Sorare**, and **NuBank**
- They acquired compliance and **AML specialist firm Complytron** in February, 2023

Funding & Investors:

SEON has raised a total of $107,800,000 across 6 rounds, including a $94 million Series B in 2022. The company has over 16 investors including PortfoLion Capital Partners, IVP, and Crew Capital

Founders


Bence Jendruszak


Tamas Kadar

Bence Jendruszak (co-founder and COO)
Tamas Kadar (co-founder and CEO)

Bitrise

Founding date: 2014
HQ Budapest, Hungary

www.bitrise.io

Number of Employees: 100-499

Industry of Focus & Target Markets:

Main market or industry:
IT Services and IT Consulting, Mobile Application Development

Target markets:
EMEA, US

AI Technology Specialization: AI Hardware & Infrastructure

Solution: Bitrise is a mobile DevOps platform built around industry-leading mobile CI/CD and DevOps tooling. The company aims to bring confidence, velocity, and continuous improvement across the entire cycle of app value creation, delivery, and realization.

Stage of Development:
Series C

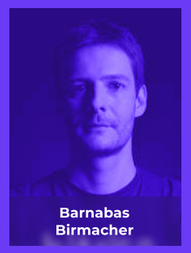
Achievements & Milestones

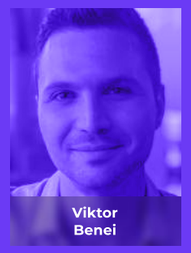
- In 2017, **Bitrise** was the first to make it into **Y Combinator**
- In the **same year** they opened a new office in San Francisco and raised a **$3.2M** Series A round
- In 2019, the company acquired monitoring tech company **Outlyer**, opened an office in Boston, US, and raised a **$20M** series B round
- They raised a **$60M** Series C in 2021 to keep companies updated with constantly changing mobile requirements
- The platform is used by more than **6,000 mobile product organizations worldwide**, including Rakuten, WISE, Bose, Virgin Mobile, Grindr, Compass, Mozilla, Philips Hue, and Marks & Spencer

Funding & Investors:

Bitrise raised almost $83,500,000 in total across 5 rounds, including a $60 million Series C. They are backed by Y investors including Fiedler Capital, Insights Partners, Partech, and Y Combinator.

Founders


Barnabas Birmacher


Viktor Benei


Daniel Balla

Barnabas Birmacher (CEO)
Viktor Benei (CTO)
Daniel Balla (CPO)

Turbine

Founding date: 2015
HQ London, UK

www.turbine.ai

Connection to the CEE: Hungarian founders and office in Budapest

Number of Employees: 10-99

Industry of Focus & Target Markets:

Main market or industry:
Healthcare and Life Sciences

Target markets:
EMEA, US

AI Technology Specialization: Machine Learning

Solution: Turbine's platform aims to decipher the inner mechanisms of cancer and thus assist the discovery of novel targets and precision medicinal therapies.

Stage of Development:
Series A

Achievements & Milestones

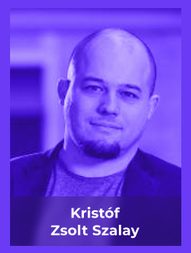
- In 2019, the **Turbine** raised its **€3M** seed round to redesign the oncology drug discovery process into a series of rational steps with its human cell model and simulation platform
- The company has partnered with **Cancer Research Horizons**, allowing the organization access to its machine learning platform to analyze what patient populations would most benefit from a cancer treatment
- Recently, **Turbine** was selected as **one of world's top AI companies** by CBInsights
- They raised a **$25.5M** Series A in two stages, in 2022 and 2023, to advance programs and partnerships

Funding & Investors:

Turbine raised a total of $34,200,000 in funding across 5 rounds, including a $25.5 million Series A in 2023. The company is backed by 14 investors including MassMutual Ventures, Mercia Fund Managers, DAy One Capital, Accel, and Delin Ventures.

Founders

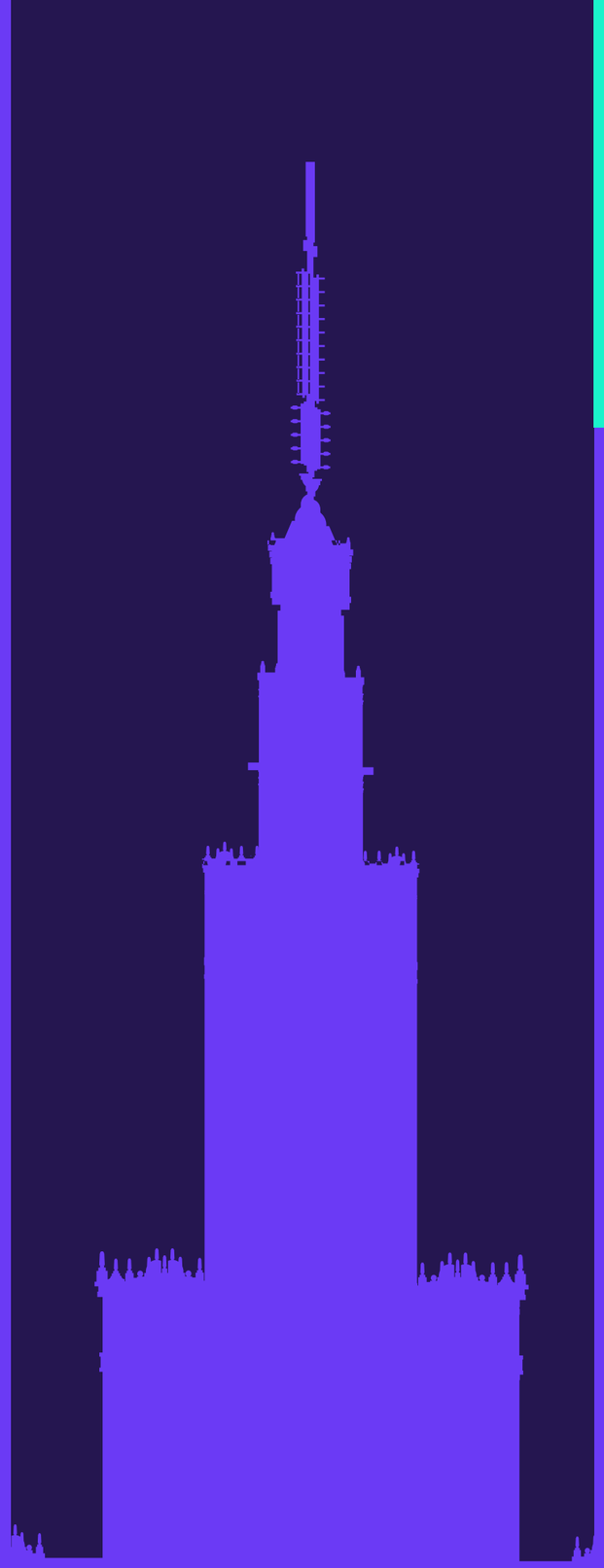

Dániel Veres


Kristóf Zsolt Szalay


Szabolcs Nagy

Dániel Veres (Chief Scientific Officer)
Kristóf Zsolt Szalay (Chief Technology Officer)
Szabolcs Nagy (CEO)

POLAND



Silent Eight

Founding date: 2013
HQ Singapore

www.silenteight.com

Connection to the CEE: Polish-founded, office in Warsaw and a large part of the team in Poland

Number of Employees: 51-200

Industry of Focus & Target Markets:

Main market or industry:
Financial Industry

Target markets:
Global

AI Technology Specialization: Machine Learning, Natural Language Processing, Neural Networks

Solution: Silent Eight's platform 'Iris' employs White Box Machine Learning technology to generate transparent and auditable results at scale, speed, and precision. The solution is designed to proactively prevent money laundering and other financial crimes by providing insights and explanations into potential risks and anomalies in financial transactions and activities.

Stage of Development:
Series B

Achievements & Milestones

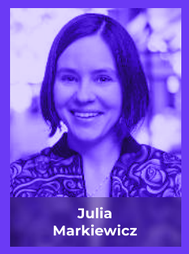
- **Silent Eight** secured a second Series B funding in 2022, raising **$40M** with lead investor TYH Ventures.
- **Silent Eight** won the **AI & Machine Learning RegTech Award in 2018** (Regulation Asia Awards for Excellence 2018).
- The company's COO was recognized among the **Top 25 Women Leaders in FinTech of Europe** 2020, 2021, and 2022. The CEO was named among the **Top 50 Fintech CEOs** Globally in 2021 and 2022 (The Financial Technology Report).
- The solution is deployed in **over 150 markets**.
- **Silent Eight's** clients include Standard Chartered Bank, HSBC, and **First Abu Dhabi Bank**.

Funding & Investors:

Silent Eight has raised $55M over eight funding rounds. Prior to its most substantial Series B round of $40M in 2022, the company secured a first Series B investment of $8.8M in 2020 and a Series A $6.2M funding in 2019. Silent Eight's investors include TYH Ventures, Polish OTB Ventures, SC Ventures, HSBC Ventures, SC Ventures, and Wavemaker Partners.

Founders


Martin Markiewicz


Julia Markiewicz


Michael Wilkowski

Silent Eight was founded by Martin Markiewicz, Julia Markiewicz, and Michael Wilkowski.

Infermedica

Founding date: 2012
Location: Wroclaw, Poland

www.infermedica.com

Number of Employees: 201-500

Industry of Focus & Target Markets:

Main market or industry:
Healthcare providers, insurance companies, telemedicine

Target markets:
US, Europe

AI Technology Specialization: Machine learning and natural language processing

Solution: Infermedica automates primary care, from symptom evaluation to outcomes through advanced healthcare technologies. Infermedica's Medical Guidance Platform helps reduce inappropriate medical service utilization, improve patient navigation, and enhance user satisfaction with seamless integration options into websites, mobile apps, and patient portals.

Stage of Development:
Series B

Achievements & Milestones

- In 2022, **Infermedica** raised its latest and most substantial funding of **$30M**.
- Following the investment, **Infermedica** launched its **Medical Guidance Platform**, streamlining healthcare services throughout the entire healthcare journey.
- **Infermedica** was named among Digital Health 150 by CB Insights, featuring the **150 most promising private digital health companies**, in 2022.
- The solution is currently used in **32 countries**, including China, UAE, Australia, and Brazil, outside the US and Europe, and 24 languages.
- **Infermedica's** clients include **Microsoft, Allianz Partners, Médis, and Gothaer.**

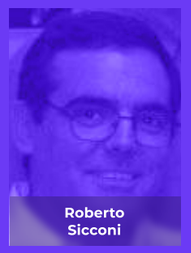
Funding & Investors:

To date, Infermedica has raised $45 million over 11 funding rounds. The company secured its latest Series B round of $30 million in 2022, led by One Peak Partners. Its prior Series A funding of over $10 million in 2020 was led by the European Bank for Reconstruction and Development (EBRD) and Heal Capital. Other investors backing the startup include Estonian Karma Ventures and Polish Inovo VC.

Founders


Piotr Orzechowski


Irving Loh


Roberto Sicconi

Infermedica was founded by Piotr Orzechowski, Irving Loh, and Roberto Sicconi.

Synerise

Founding date: 2013
Location: Krakow, Poland

www.synerise.com

Number of Employees: 101-250

Industry of Focus & Target Markets:

Main market or industry:
Agnostic (including Retail, Banking, e-Commerce, Automotive, Insurance)

Target markets:
Europe, US, UAE

AI Technology Specialization: Machine learning & automation

Solution: Synerise provides an AI-driven infrastructure specifically designed for collecting, analyzing, and interpreting behavioral data. Utilizing AI and machine learning to transform raw behavioral data into actionable intelligence, Synerise empowers organizations to make data-driven decisions with accuracy and efficiency.

Stage of Development:
Series B

Achievements & Milestones

- **Synerise** secured Series B funding in 2022, raising **$23M** led by Carpathian Partners.
- **Synerise** was named **#1 Poland's** and **#17 Europe's Fastest Growing Technology Sector Company** according to the Financial Times 2022 report.
- The company **won** 2nd place winner at the ACM RecSys Twitter Challenge 2021, 3rd place winner at the ACM KDD Cup 2021 hosted by Stanford University in the US, and 2nd place **winner** at the ACM WSDM Booking.com Data Challenge 2021.
- **Synerise** has led the first-ever program in Poland to **support AI education** in elementary and high schools, Synerise AI Schools, involving more than 2,200 students in more than 300 groups at 140 sites.

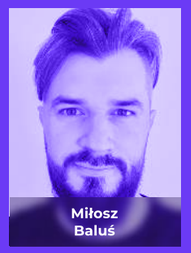
Funding & Investors:

To date, Synerise has raised $42.2M over ten funding rounds. Prior to its Series B round of $23M in 2022, the latest rounds the company secured were a $2.7M venture round in 2020 and a seed investment of $7M in 2019. Synerise's investors include Carpathian Partners and Techni Ventures.

Founders

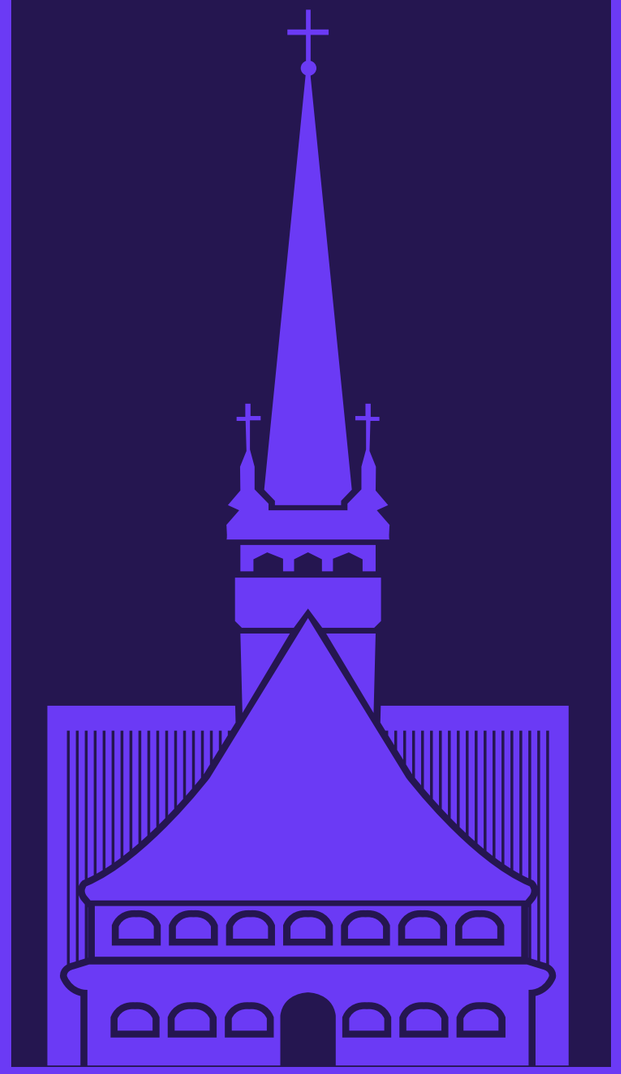

Jarosław Królewski


Krzysztof Kochmański


Miłosz Baluś

Synerise was founded by Jarosław Królewski, Krzysztof Kochmański, and Miłosz Baluś.

ROMANIA



UiPath

Founding date: 2005
HQ New York, US

www.uipath.com

Connection to the CEE: founded in Romania, with a large part of the team in Romania

Number of Employees: 1000-5000

Industry of Focus & Target Markets:

Main market or industry:
Technology; Finance; Healthcare and Life Sciences; Manufacturing

Target markets:
Americas, EMEA, APAC

AI Technology Specialization: UiPath specializes in robotic process automation and machine learning.

Solution: UiPath aims to use the transformative power of automation and AI to “liberate the boundless potential of people and accelerate human achievement”. One of the leaders in Robotic Process Automation, today they are pushing their boundaries beyond RPA and into delivering a powerful and easy-to-use AI-Powered Business Automation Platform.

Stage of Development: IPO

Achievements & Milestones

- The company was **founded in 2005**, in Bucharest, Romania, as DeskOver
- In 2013, the team released their first **desktop automation** line at the request of customers who wanted to build automation themselves.
- In 2015, DeskOver **changed its name** to UiPath.
- In 2017, UiPath had one of the largest Series A rounds of funding in Europe at the time, **$30 million**, led by Accel. They moved headquarters to New York, closer to its international customer base.
- In 2019, the company launched their end-to-end **RPA platform** and soon after was recognized as a RPA market leader in RPA by tech analyst firms.
- In 2021, UiPath raised **$1.3 billion** in an IPO on the New York Stock Exchange - one of the largest US software IPOs in history.

Funding & Investors:

UiPath has raised a total of $2 billion in funding over 7 rounds, including a $750 million Series F. In 2021, they raised $1.3 billion in an initiative public offering on the New York Stock Exchange. Among UiPath’s investors, there are Accel, Alkeon, Capital G, Coatue Management, Credo Ventures, Dragoneer, and Earlybird, to name a few.

Founders


Marius Tîrcă


Daniel Dines

UiPath was founded by Daniel Dines (Chief Innovation Officer) and Marius Tîrcă.

FintechOS

Founding date: 2017
HQ London, United Kingdom

www.fintechos.com

Connection to the CEE: founded in Romania, with a large part of the team in Romania

Number of Employees: 200-500

Industry of Focus & Target Markets:

Main market or industry:
Software Development, Financial Services

Target markets:
Europe, US

AI Technology Specialization: When it comes to artificial intelligence applications, FintechOS specializes in Machine Learning, Predictive Analytics, and Big Data Analytics.

Solution: FintechOS aims to make fintech innovation available to every company. The no-code, low-code FintechOS platform simplifies and accelerates the launching, servicing, and expansion of next-generation financial products and services, helping businesses recognize value up to 5 to 10 times sooner than with other approaches.

Stage of Development: Series B

Achievements & Milestones

- Founded in 2017, the company **raised a seed round** in 2018.
- In 2020, they launched **FintechOS 20**, aiming to empower non-technical teams in financial institutions to innovate.
- In 2021, they raised **$60 million** in a mix of equity (~$51M Series B) and debt (~$9M), looking to expand globally and launching new solutions on the market.
- In 2021, the company releases **FintechOS 22, as well as the FintechOS Academy**, which offers tutorials and resources to anyone wanting to certify as a FintechOS consultant or developer
- The company works with over **40 institutions**, like Erste Bank, Societe Generale, Scotia bank, Hyperion Insurance Group, Vienna Insurance Group, on 20 markets and four continents.

Funding & Investors:

FintechOS has raised a total of $91 million in 6 funding rounds, including a $60 million Series B. Among FintechOS' investors, there are Gapminder VC, Endeavor Catalyst, Early Bird Digital East, LAUNCHub Ventures, OTB Ventures, and others.

Founders

Sergiu Negut


Teo Blidăruș

FintechOS was founded by Teo Blidăruș and Sergiu Negut.

DRUID

Founding date: 2018
HQ London, United Kingdom

www.druidai.com

Connection to the CEE: founded in Romania, with a large part of the team in Romania

Number of Employees: 10-99

Industry of Focus & Target Markets:

Main market or industry:
Human Resource; Marketing, Sales, and Customer Service; Finance; Retail

Target markets:
Europe, US

AI Technology Specialization: DRUID specializes in Conversational AI and Chatbots.

Solution: DRUID aims to enhance the conversational AI landscape with their full-fledged conversational automation platform, which is integrated with ChatGPT. DRUID's platform gives enterprises the tools to build and design conversational business applications (CBA).

Stage of Development: Series B

Achievements & Milestones

- Throughout 2019-2021, the company was recognized for its **fast growth rate** by tech analysts.
- In 2022, DRUID raised a **$14 million** Series A round to scale its solution internationally, in Europe and North America.
- By the end of 2022, the company had reported a **2.5-fold increase YoY** in annual recurring revenue.
- In July 2023, DRUID announced **integrating ChatGPT**'s generative capabilities into their existing suite of conversational AI-powered solutions
- In September 2023, the company announced raising a **$30 million Series B.**
- Today, the company has companies with over **10,000 employees** that use virtual assistants to interact with any department of the company, from legal to HR, procurement or finance.
- **Its' customers include** Texas Children's Hospital, White Castle, NHS, Auchan, Georgia Southern University, Société Générale, Erste Group, BNP Paribas, and Axa.

Funding & Investors:

So far, **DRUID** raised over $50 million across 6 funding rounds, including a $30 million Series B in 2023. It has 11 investors onboard, including TQ Ventures, GapMinder VC, Verve Ventures, Hoxton Ventures, Karma Ventures, Endeavor, and SeedBlink.

Founders


Liviu Drăgan


Bogdan Pietroiu


Daniel Băläceanu


Andreea Pleșea

DRUID was founded by Liviu Dragan (CEO), Andreea Plesea (Global VP, CCSO), Bogdan Pietroiu (CTO), and Daniel Balaceanu (CPO).

Ioan Iacob

Founder and CEO of FLOWX.AI

> “AI has this type of disproportionate impact, where numbers don't matter anymore, in a sense. I believe this can be a fantastic driver for growth in the region.”

Before FLOWX.AI, Ioan founded, grew for more than 15 years and successfully exited QUALITANCE, a pioneering consulting company focused on enterprise digital transformation programs for large global brands like IKEA, Merck, Ford or NewsCorp.

FLOWX.AI is a revolutionary enterprise AI application modernization platform that fundamentally changes how large enterprises build core digital products and modernize applications systems and infrastructure. FLOWX.AI raised in May 2023 the largest Series A globally in the industry in recent years to modernize large enterprises and bring AI to the enterprise world at scale.

How AI Can Bring Massive ROI and Better Experiences for IT Teams

What are the main pain points and challenges that FLOWX.AI aims to address?

IT teams are currently suffocating under layers of technologies, solutions, and proprietary languages. In this landscape, we took a step back and asked: how can we help companies dig their way out of that predicament?

Our solution comes on the back of more than 10 years of working on digital transformation projects with global enterprises. We created a platform that is completely different from anything else on the market, which is seen in the results of our customers today: they can build in weeks what used to take them years. It offers a totally different level of efficiency in building enterprise software. We give back control to the enterprises over technology and their businesses. And we give them an incredible competitive advantage, by being able to respond to the market and to transform in real time.

What is the role of AI in the solution you offer, as well as in the enterprise sector, which you address?

Our goal, from the very beginning, was to leverage AI and make the best platform for enterprises to build modern digital solutions, both customer and internal-facing. Today we're using AI to essentially understand enterprise business and translate that into digital solutions. To make integrations with other systems, including legacy systems, an order of magnitude faster than anything else on the market. We can provide machine learning-powered insights for our clients to optimize their business. Ultimately, this kind of disproportionate impact of AI is why the teams using the FLOWX.AI platform are orders of magnitude faster, and why organizations can drive massive ROI.

So when talking about the supportive ecosystem you had around building the product from Romania, would you mention any particular opportunities that helped you?

I think it’s very interesting that a lot of talent developing engineering products and AI around the world comes from the region. I think this shows a strong pragmatic drive for things that are substantive and for creating value. So there's this extremely deep talent pool in Eastern Europe for building great engineering products. Romania is kind of one of the leaders and we certainly have one of the biggest success stories - UiPath. Also, if you look also at companies like DeepMind, many of their employees are from this region. So, for that reason, at FLOWX.AI, we will continue to have our main development team here for the foreseeable future.

In terms of support from the ecosystem, what would we need more of to unlock the next level of growth?

One of the things we really appreciate is that the government is smart enough to understand that they don't want to create friction for companies operating here. Of course, like with any government, there's always room for improvement. We'd love to see more thoughtfulness on how to reduce friction and on efficient and smart regulation. We already have a great internet and great infrastructure from that point of view. I think that is actually incredibly useful and has contributed a lot to the accessibility of Romania as a talent pool.

But I believe there is a massive opportunity for Eastern Europe and Romania, in particular, to drive this emphasis in the education system around edge technologies - and AI is definitely one of them.

How do you see the level of collaboration between academia, the scientific community, and the public sector, at the moment, and going forward?

I believe it's been improving a lot, and I think there's been a lot of advancement in de-siloing academia, the private sector, and the public sector. Especially in Romania, we've seen a lot of joint initiatives between academia and private companies. The more pragmatic and results-driven we can make our academic programs, the better for the students and the ecosystem, as well.

How was the process of raising a Series A? What were the challenges for you?

We announced the opening of the round and one week later, we had six term sheets and some of the best VCs in the world. And I think that's because we're really focused on solving a huge problem unsolved in the industry for a long time, and because we've been consistently demonstrating or enabling our clients to demonstrate results. I think what resonated a lot with our investors - is the opportunity to completely change how enterprise software is being developed for the next 50 years. It's not like a kind of next-couple-of-years type of opportunity; it's transformational for the entire industry.

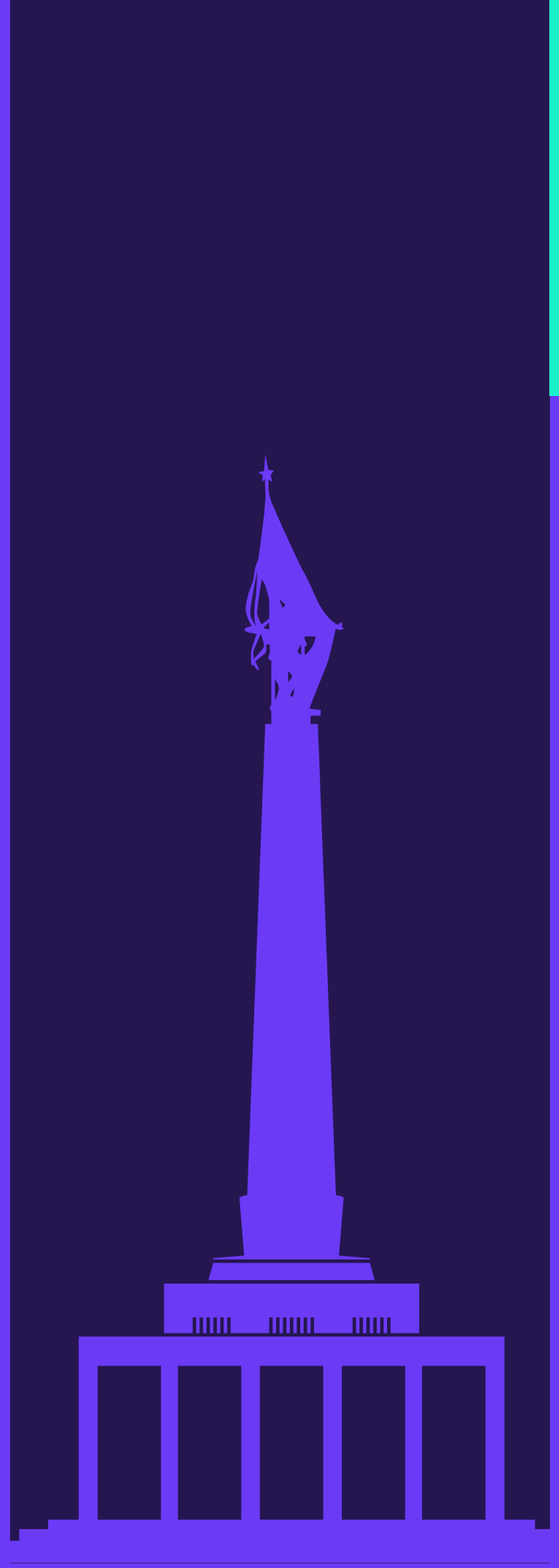
What’s your stance on AI regulation?

I believe in smart regulation. I think the one thing we need today is efficient, smart regulation in the AI area. It's an iterative process and we're going to get there. I am not super happy about the current status, but I believe that these are kind of natural iterations that just need to happen.

What’s next for FLOWX.AI?

The very first step is to bring a very stable and mature platform to customers in the US and to more customers in Europe. We believe a lot in the transformational power of AI in the enterprise sector. Our belief is that AI will completely reshape the enterprise sector. And that was also the belief of our investors. So we believe that AI is what is going to allow enterprises to pick themselves up out of this complexity that they find themselves in and it will allow people to develop digital products faster and cheaper, and, by the way, take advantage of their legacy systems in a completely new way. Ultimately, this will translate into benefits for employees and customers.

SLOVAKIA



Photoneo Brightpick

Founding date: 2013
HQ Bratislava, Slovakia

www.photoneo.com

Number of Employees: 100-499

Industry of Focus & Target Markets:

Main market or industry:
Logistics; Manufacturing

Target markets:
Europe, US, China

AI Technology Specialization: Computer Vision

Solution: Photoneo is a developer of robotic vision and AI-powered automation solutions for industrial applications. It helps companies from various fields including automotive, logistics, e-commerce, food, and medical industries to improve the performance and efficiency of their manufacturing, fulfillment, and assembly processes.

Stage of Development: Series B

Achievements & Milestones

- **Founded** in 2013 by three Ph.D. students at Comenius University specializing in machine vision, physics, and AI.
- In 2016, Photoneo launched its first commercial product, the **PhoXi 3D Scanner**.
- In 2018 it launched its versatile **robotic software** for industrial bin-picking applications.
- In 2019 it developed its **AI platform**.
- In 2021 IPM Group and Alpha Intelligence Capital led **$21M** Series B investment round.
- In 2023, Photoneo closed its overall Series B round at **$40M.**
- Photoneo cooperates with **over 40 partners** and distributors around the world as well as with many universities.

Founders

Jan Zizka, Co-founder,
CEO of Photoneo Group

Branislav Puliš,
CRO of Photoneo Group, responsible for international sales and business development.

Tomas Kovacovsky,
Co-founder and CTO, is an expert in the field of Computer Vision and Computational Photography.

Michal Maly,
Co-founder and Director of AI; received his PhD in the field of Computer Science, AI, FMPI at Comenius University in 2013.

Funding & Investors:

The company has a total funding of $52.6 million.

Fuergy

Founding date: 2017
HQ Bratislava, Slovakia

www.fuergy.com

Number of Employees: 10-99

Industry of Focus & Target Markets:

Main market or industry:

Energy and Utilities

AI Technology Specialization: Recommender Systems, AI Hardware & Infrastructure, Deep Learning

Solution: Fuergy provides solutions for energy optimization, developing its own modular battery system and software platform powered by AI, from smart energy storage systems and enhanced utilization of green energy sources to dispatch systems or automated energy trading.

Stage of Development:
Growth Equity

Achievements & Milestones

- The Slovak startup raised **€16M** in its first venture round in 2023, led by Pro Partners Holding, to develop and expand to markets.

Founders

Radoslav Stompf, Chairman of the board & CEO, has more than twenty years of experience in developing control and optimization systems for the energy industry.

Branislav Safarik, Vice-chairman of the board & COO/CFO, background in innovation and business development that includes 5 years in Slovak Guarantee and Development Bank and 3 years as General Director of the Slovak Business Agency.

Rastislav Kuba, Member of the Board & CTO, spent over 23 years working for a company focused on energy backup systems.

Vladimir Miskovsky, Member of the Board and CMO, with a background in marketing and advertising.

Funding & Investors:

The company has a total funding of $17 million in growth equity.

SEGRON

Founding date: 2012
HQ Amsterdam, Netherlands

www.segron.com

Connection to the CEE: The Main Office of Segron Automation is in Bratislava

Number of Employees: 10-99

Industry of Focus & Target Markets:

Main market or industry:

Telecommunications; Automotive; Retail

AI Technology Specialization: AI Hardware & Infrastructure

Solution: SEGRON is a provider of test automation services. Their automated end-to-end testing tool empowers engineers to perform more than thousands of test cases per day per instance, resulting in higher test quality in record time, with a significant reduction in costs, improved resource utilization, and shortened time-to-market.

Stage of Development:
Series B

Achievements & Milestones

- More than **25 years ago**, SEGRON's founders identified a need for faster and more efficient testing. They established a consulting firm that specialized in telco network design, deployment, and testing.
- In 2012, SEGRON **was born**.
- In 2017, SEGRON's **Automated Testing Framework (ATF)** was launched
- Today, SEGRON is **venture capital-backed** and their clients include big telecom operators such as Deutsche Telecom, A1 Telecom Austria, Telefonica, and other big brands like Audi and Swisscom

Funding & Investors:

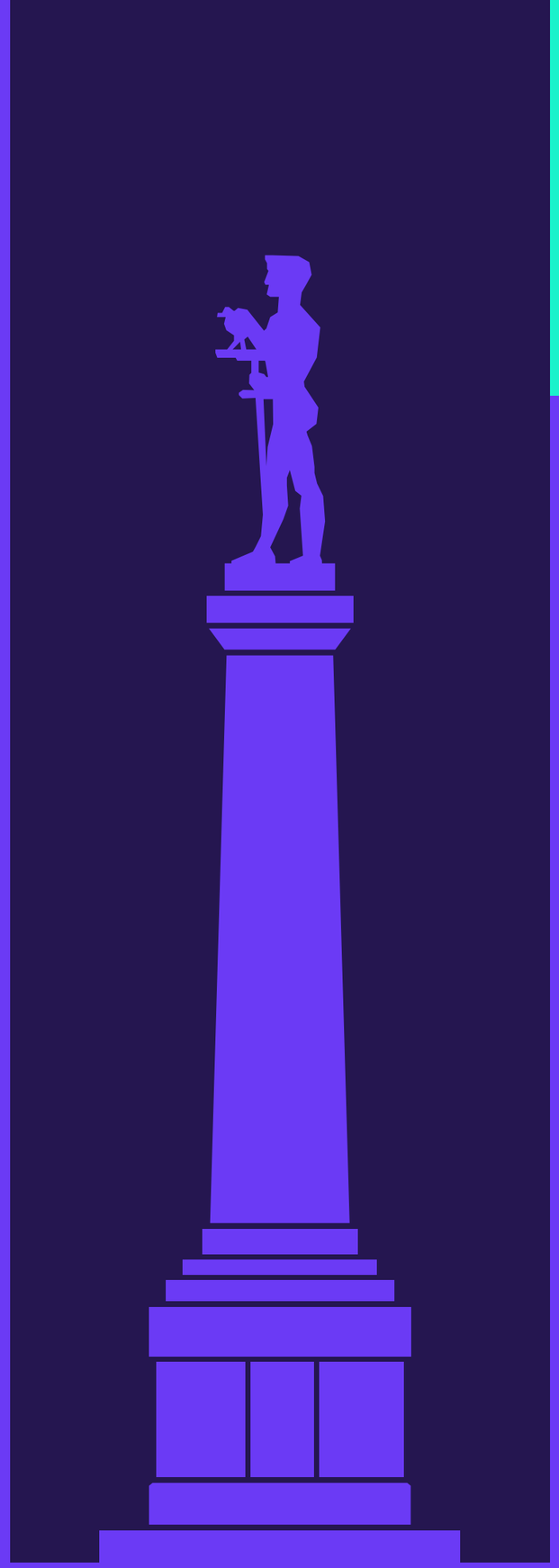
The company has a total funding of $7.8 million.

Founders

Thomas Groissenberger, Founder & CEO at SEGRON, has more than 25 years of experience in software, testing, and management in Europe and the US. He is a member of the Forbes Technology an Invitation-Only Community for World-Class CIOs, CTOs, and Technology Executives.

Jari Nurminen co-founder, and chief architect at SEGRON

WESTERN BALKANS



Seven Bridges (Velsera)

Founding date: 2009
HQ Massachusetts, US

www.sevenbridges.com

Connection to the CEE: Founded in Serbia

Number of Employees: 250

Industry of Focus & Target Markets:

Main market or industry:
Biotechnology

Target markets:
US

AI Technology Specialization: Biomedical data analysis accelerating breakthroughs in genomics research for cancer, drug development and precision medicinetonomous-driving and user experience enabled through infotainment technologies.

Solution: The company specializes in software and data analytics to drive healthcare research.

Stage of Development:
M&A

Achievements & Milestones

- In February 2016, Seven Bridges **raised $45 million** to advance its large-scale genome analysis platform in a round led by Kryssen Capital.
- In April 2021 the company closed its **first $15 million of a planned $30 million** Series C from a new life sciences investor.
- In January 2023, together with healthcare and life science firms Pierian and UgenTec, Seven Bridges was acquired by investment fund **Summa Equity** for an undisclosed amount and merged to form a new precision medicine company called Velsera

Funding & Investors:

Seven Bridges has raised a total of $113M in funding over four rounds. The company has been supported by Kryssen Capital and First Star Ventures.

Founders

Deniz Kural

Igor Bogicevic

Seven Bridges was founded in 2009 by computational biologist Deniz Kural and software engineer Igor Bogicevic.

Wonder Dynamics

Founding date: 2016
HQ California, US

www.wonderdynamics.com/#Team

Connection to the CEE: One of the founders comes from Serbia

Number of Employees: 250

Industry of Focus & Target Markets:

Main market or industry:
Media and Entertainment

Target markets:
US

AI Technology Specialization: Wonder Dynamics develops and combines AI technology with storytelling, aiming to democratize the visual effects (VFX) production industry.

Solution: AI production tool that allows independent filmmakers to deliver blockbuster-level VFX on a fraction of the budget.

Stage of Development:
Series A

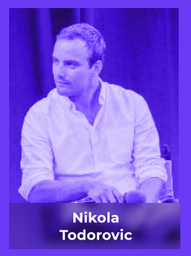
Achievements & Milestones

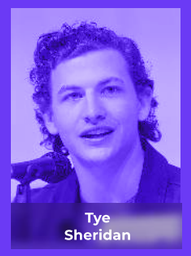
- In April 2021 the company closed a **$2.5M** seed round led by San Francisco-based Founders Fund, American entrepreneur and angel investor Cyan Banister, Greek movie producer Paris Kassidokostas-Latsis, the LA-based MaC Venture Capital, Robert Schwab, Capital Factory, and Terry Dougas's Realize Tech Fund.
- In December 2021, Wonder Dynamics raised a $10M Series A round led by Horizon Ventures, together with seed round investors Founders Fund and MaC Venture Capital

Funding & Investors:

Wonder Dynamics has raised a total of $11.5M in funding over three rounds. The company has been supported by nine investors, including Horizons Ventures and Epic Games.

Founders


Nikola Todorovic


Tye Sheridan

The company was founded in 2016 by Serbian filmmaker and entrepreneur **Nikola Todorovic**, who also specializes in VFX projects, and actor-producer **Tye Sheridan** (Ready Player One, X-Men).

Hunch

Founding date: 2016
Location: Belgrade, Serbia

www.hunchads.com

Number of Employees: 50

Industry of Focus & Target Markets:

Main market or industry:
Marketing, sales and customer service

Target markets:
EU, EMEA

AI Technology Specialization: The Hunch platform automates creative production and media management to improve the performance of marketing teams.

Solution: AI- driven dynamic creative solutions for social commerce marketing.

Stage of Development:
Series A

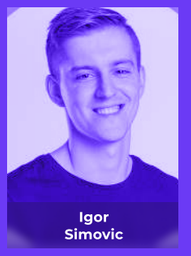
Achievements & Milestones

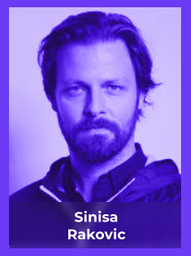
- In June 2022 Hunch raised **€4M** in a round led by VC fund Catalyst Romania, backed by 3TS Capital Partners, alongside co-investors Euroventures, North Base Media, SeedBlink and South Central Ventures.

Funding & Investors:

Hunch has raised a total of $9.6M in funding over four rounds. The company has been funded by six investors, including SeedBlink and Euroventures.

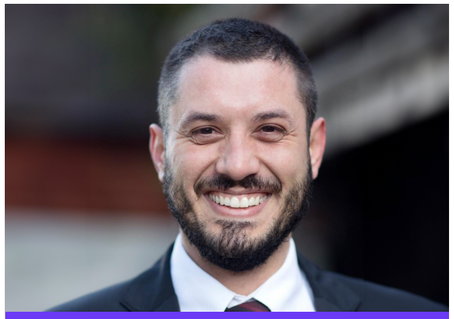
Founders


Igor Simovic


Sinisa Rakovic

The company was founded in 2016 by **Igor Simovic, CTO, and Sinisa Rakovic, CEO**, who is a serial entrepreneur with several exits.

CASE STUDIES



Integrating unique AI SOLUTIONS

Developing a legislative framework, building unbiased LLMs and guaranteeing data privacy are only some of the concerns for the future of AI. To discover more on these topics and others, we sat down with high-impact entrepreneur Iskren Krusteff. He shared how Integrator/NTGR AI, his latest venture in AI, emerged.

Interview with Iskren Krusteff, CEO Integrator JSC

As of November 2022, AI has been a hot topic in the business world. But what challenges do you see emerging for companies trying to implement the technology?

The biggest problem companies need help with engines such as ChatGPT and other LLM models is the quality of the generated output. A model that is not well trained can lead to biased output or even 'hallucinations', which in a business environment could jeopardize the business overall. When AI is implemented to optimize business processes, the data must be precise and exclude or limit the bias within the datasets while training the models. This brings us to the question of how we select our AI partner. Integrator brings globally recognized expertise..

How do you tackle this problem with NTGR AI? What's the company's specialty?

NTGR AI creates extraordinary business value for our customers by providing tailored AI solutions that rely on our team's 200+ years of combined experience. We orchestrate industry-leading large language models to fit the specific use cases of our clients, which helps them optimize processes, save time and money, improve customer satisfaction and upskill their employees. We take extra care to ensure that the data used to train the engines is carefully reviewed, analyzed and optimized to ensure the generated output fits the specific need. To achieve this, we rely on our team of data science experts, who work closely with our clients' focal points to ensure that we have the needed breadth and depth of understanding of their data.

Can you walk us through how you collaborate with a client?

Our approach to helping businesses integrate AI solutions is based on their needs. We start with a discovery phase consisting of workshops with the client, where our team gets inside the organization to evaluate the business needs. We are looking at process optimization opportunities that can be tackled via AI Integration. We assess the data sets that are needed to build a solution, as well as infrastructure readiness. Based on this, we can advise the client on the methodology best suited for their integration needs.
Companies who build exceptional AI products can find a partner in us, who helps them reach wider adoption of their products. At Integrator, we are dedicated to assisting companies to integrate AI in various industries with a prime focus on healthcare, retail, manufacturing, finance, transportation and BPO.

Which factors will shape the future of AI?
AI has the potential to overhaul our lives and businesses. But to achieve this, three essential factors will shape the future development of AI technology. Regulations need to be developed in close cooperation with research institutes, developers of AI algorithms, AI companies, experts in the field and all other relevant stakeholders. This will ensure that regulations will promote the ethical use of the technology without hindering its development.
Communicating the value and addressing fears around AI's impact would turn opposers into technology advocates. This will lead to mass adoption. Our role in this process is to showcase the capabilities of AI while solving pressing problems.

Ensuring that we have the required infrastructure to run AI technology is the factor in shaping the future of the technology. With the hype created around ChatGPT and now all LLM Engines to follow, the rapid adoption brings a lot of new challenges. In the upcoming years, the data flows will be so overwhelming that we will have to become more creative in optimizing AI to ensure speed in data processing and execution. With larger datasets with higher requirements for computing resources, as the complexity of AI models advances and the demand for actual cloud infrastructure increases, we will need the power of quantum engineering and computing to uncover the next layer of potential for AI.

AI Coaching: The Future of Work?

In today's rapidly evolving work landscape, the integration of AI into organizational processes is no longer a luxury but a necessity. TheCoRD.ai is one of the startups at the forefront of this evolution. With a mission to make remote teams healthier, the company focuses on improving efficiency of distributed organizations.

The firm's vision is anchored in its proprietary Natural Language Processing (NLP) algorithms, designed to dissect organizational behavioral patterns and offer actionable AI coaching insights. With remote hiring surging by 156% in the past six months alone, and a staggering 8 out of 10 teams lacking a healthy work climate, theCoRD.ai aims to fill this crucial gap in the market.

A co-creation platform is central to theCoRD.ai's strategy. It serves as a transparent interface for both team members and managers, offering context on recurring patterns in team dynamics and clear examples of collaborative work. The platform enables trackable processes on both team and individual levels, thereby fostering greater engagement across the community.

theCoRD.ai directly tackles a range of challenges faced by remote teams, managers, and C-level organizational leaders. These include misalignment, disengagement, and the high burnout rate among team members. Their solution aims to alleviate these issues by providing a structured approach to time management, prioritization, and team communication.

theCoRD.ai's development is backed by a robust layer of R&D and a talented team, comprising 20 team coaches, two PhDs in ML and NLP, two full-stack software engineers, and a UX/UI designer. Their achievements so far include a machine learning (ML) engine trained on 3.000 coach-annotated team meetings, boasting an accuracy rate of 92%, expected to increase to 98% by the time this text is published.

Q&A with Ruxandra Cord, co-founder of theCoRD.ai

Why did you decide to start theCoRD.ai?

Witnessing the swift transition to remote work, I felt a profound connection to the challenges teams faced. It wasn't just about the numbers, but the human stories behind them - the voices unheard in meetings, the brilliant ideas lost in a sea of inefficiencies. I saw a gap, not just in technology but in the very essence of how we collaborate remotely.

I founded theCoRD.ai with a dream: to not just patch the surface but to fundamentally transform remote collaboration. I wanted to build a space where every voice resonates, every idea flourishes, and where collective wisdom defines our path. It's more than just a company; it's a heartfelt mission to pioneer a new era of healthy, effective, and inclusive teamwork.

What are your plans for the next 3 years?

Over the next three years, theCoRD.ai plans to redefine the future of work and team collaboration. Recognizing that team dynamics extend beyond synchronous meetings, we'll harness meetings to decode team patterns, offering managers a comprehensive view of their teams. We also intend to delve into asynchronous communication tools, reflecting the blended nature of modern work communication. A primary focus is addressing biases, both in distributed team collaboration and in AI. We aim for our AI-driven solution to be unbiased, fostering an inclusive and productive work environment.

What are your biggest current priorities in order to achieve these goals?

To achieve our expansive vision for theCoRD.ai, collaboration is paramount, especially with experts in R&D and academia who enrich our AI solutions. Traction-wise, our product is currently being beta-tested by three remote companies, with another 30 in the pipeline for our co-creator cohorts. This cohort also includes esteemed AI and organizational science researchers. This isn't just about quantity; the diversity of these collaborations ensures our approach is well-rounded and effective.

While we pride ourselves on bootstrapping theCoRD.ai thus far, our vision for reshaping the future of work necessitates partnering with like-minded investors. We are on the brink of launching our pre-seed funding round, aiming to enhance our market presence and onboard 300 clients by 2024.

CHILDISH.AI

Data Science & AI

AI Research, Design and Development Lab. CHILDISH.AI is on a mission to empower start-ups and enterprises to build tech products. With a team of over 30 professionals, they have already successfully completed 80 projects, out of which 50 were AI-heavy. Their team includes experts with a strong foundation in science and hands-on experience, with deep roots in banking, insurance, fintech, and healthcare.

Case study. Design, Developing and Deployment of ML-based models for cardiovascular pathologies detection for a MedTech start-up (KARDI AI)

The client. KARDI AI is a European MedTech start-up that seeks to improve cardiovascular health through the detection of anomalies using wearable devices like the Polar H10. Their ambition is to disrupt the ECG signal-based detection market for heart disease pathologies.

- ***The research phase.*** KARDI AI partnered up with CHILDISH.AI to develop the ML-based models and support the Class 2A medical device certification, ensuring the safety and effectiveness of their system for home use.

- ***The strategy design phase.*** During the discovery phase, which lasted less than eight weeks, CHILDISH.AI's Data Scientists assessed the client's existing ECG signal processing system and computation-based algorithms. They also conducted rigorous testing against internal and external medical datasets, extending the scope of detectable medical conditions resulting in actionable recommendations.

- ***The design & development phase.*** The project consisted of leveraging the client's raw ECG signal data and annotated training sets so that the data scientists could design & craft robust ML-based models for 'soft' and 'hard' noise detection. This was a prerequisite for the following development of the pathologies detection models.

- ***The operations phase:*** In the next phase, the ML engineers and the KARDI AI team, made sure all of the stringent performance requirements are met, following integrated production pipelines directly into KARDI AI's platform. They continue to collaborate in creating additional solutions using pathology detection ML algorithms.

The results: During an entire year of close collaboration, the development lab helped their client accelerate MedTech innovation by applying for Class 2A certification for their AI-powered medical device system. With this certification, their client unlocks access to a broader customer base, enabling early detection & prevention of heart-related medical conditions.

erda

Almost human AI support. ERDA - Where empathy meets technology. It's a Romanian start-up on the mission to take customer support to new heights and drive further through tech-based, human-like interactions. In numbers, ERDA has improved SLA response times by 40%, with 1200 successfully resolved tickets over 3 months.

ERDA is an autonomous customer support solution that goes beyond automated responses to deeply understand and connect with your customers. One of the biggest challenges of digital businesses is staying close to their customers. Whether this means understanding their motivators and their behaviors or providing them with the best customer experience, being able to truly connect on a personal level is becoming more and more of a requirement.

Its major competitive advantages are improved customer support efficiency with ERDA acting as a proxy between customer support teams and customers, as well as overall enhanced customer satisfaction through a decreased waiting time.

By leveraging a powerful AI model, ERDA understands how to talk to customers not just based on their informational needs or the query a customer types in, but also taking into consideration the tone of voice, the intent behind the message and the context at hand.

AI-driven meaningful interactions. The novelty and the business case behind this tool is therefore its ability to establish emotional connections with customers. It understands nuances in language and sentiment, and it responds to what you say as well as how you say it. Chatbots and AI-based support are used to treat customers as data points instead of regular people with feelings, emotions and basic needs. By embedding emotional intelligence, ERDA fundamentally creates a better standard of meaningful interactions between brands and customers.

From a business perspective, this tool is highly versatile. ERDA is on the path to redefining the future of customer service, tapping into the very connection that makes personal interactions so valuable and automating them for the customer's benefit.

Joberty

Joberty, the workplace community for developers, is a Serbian start-up leveraging the power of AI to generate perfect matches between talent and their future workplace.

The power dynamics between talent and companies is shifting, with more tech talent focused on having a meaningful work experience rather than just earning more. Joberty is at the forefront of this transformation, reshaping the way IT professionals connect with prospective employers.

Local expertise meets global reach. Starting this September, Joberty marks its entry into the global market, facilitating the connection between IT professionals and the jobs that are right for them. From its inception in 2019 up until this month, Joberty operated exclusively in 6 countries in Southeast Europe, where they gathered over 100,000 users and over 2,000 IT companies under the same platform.

The perfect match is achievable. Joberty believes that while there's no perfect job in absolute terms, a perfect match is achievable. The company uses AI to create a matching system that increases the likelihood of compatibility between talent and companies, right from the start. IT professionals have the opportunity to express what they're looking for from their next dream job not just in terms of location, salary and tech stack but also concerning company culture, team support, preferred working style etc. This way, candidates can look for a meaningful place to be, where they are encouraged to evolve on their own terms. Consequently, companies also fill in their preferences for the open roles, so that the matching process can take place. Once this is done, the algorithm matches the company's inputs with the existing reviews on the platform to create the perfect match.

Empowering candidates to find global opportunities. Making informed decisions (on both sides) is at the heart of Joberty. By guiding users to focus on what truly matters to them during their job search, Joberty ensures that career choices reach far beyond titles and salaries.

With Millennials and GenZ taking over the workforce, the global pool of talent needs more than a steady paycheck - it wants a place to thrive, to be challenged and – ideally – to pour a little of themselves into.

Nurturing innovation, one candidate at a time. Joberty's transition to a global market means that IT professionals everywhere can now use the platform to find an employer that they're aligned with.

KARDI AI

ZAYA

Redefining cardiac care. KARDI AI is living proof that our technological capabilities have the literal power to save lives, save doctor`s time and health care costs, when used for the service of people. KARDI AI, a HealthTech startup based in the Czech Republic, embodies this transformative synergy. Founded in 2022 by entrepreneur Stephen Burke and distinguished cardiologist doc. MD Tomáš Skála, Ph.D., FESC, KARDI AI is on a mission that resonates at the core of human welfare - performing large-scale preventive screening and remote monitoring of cardiovascular disease.

Harnessing AI for a healthier tomorrow. As far as tech solutions go, pioneering an approach that provides continuous long-term monitoring of patients' ECGs is a textbook form of innovation for good. Aside from monitoring arrhythmias, this platform also detects them, contributing to one of the most crucial aspects of cardiac care - early arrhythmia detection can avoid fatal events such as stroke, heart failure and or early onset of dementia.

Saving lives beyond borders. KARDI AI's commitment to transforming cardiac care extends beyond the Czech Republic. With operations already rooted locally, this start-up's vision extends to Central and Eastern Europe, where they aim to improve the lives of tens of thousands by 2024. This expansion is as much about business growth as it is about widening access to a life-saving piece of tech.

The journey of KARDI AI is very relatable and not just from a technological perspective, as it reflects a broader narrative in the healthcare sector - the promise of integrating AI solutions into patient care processes. Through capabilities like long-term monitoring and helping the early detection of anomalies, this start-up helps patients and gives physicians an unprecedented proactive way to tackle serious health conditions.

As far as its ramifications go, being able to expand the scope of preventive healthcare strategies and mitigate the escalation of healthcare conditions is one of the biggest promises of modern medicine in general.

AI meets diagnostics. Zaya AI is a new generation of diagnostic AI tools in pathological anatomy based on specialized data to reduce diagnostic time, laboratory costs, human error and to improve patient outcomes. Critical in helping pathologists diagnose more cases faster, they aim to develop into a true virtual AI pathology wizard that empowers pathology experts to remotely diagnose patients faster and more accurately.

A multidimensional business model. To maximize accuracy and efficiency, Zaya is based on three different pillars: the medical clinic, the pathology lab and the AI tool they use to bring it all together.

AI tool already performing similarly to expert pathologists. Currently, Zaya AI has a really impressive database of digitized tissue images of several pathologies, with about 500,000 cases and millions of tissue images. But the real head-turner is that their AI model has reached a performance similar to real expert pathologists.

7/9 on the NASA tech readiness scale - This means that their prototypes are tested and demonstrated in an operational environment such as hospitals and pathology labs. The potential of Zaya AI extends far beyond conventional boundaries: it's already conquering groundbreaking strides in drug discovery, predictive therapy, and a remarkable reduction in laboratory costs, alongside an impressive threefold increase in diagnostic speed while concurrently diminishing the margin of human error by a noteworthy 30%.

Mitigating the global shortage of pathology workers. From a macroscopic perspective, the deficit is glaring. Ideally, there should be 10 specialists for every 100,000 people, while the EU average is 3 pathologists, with countries like Germany where there are only 2 pathologists per hundred thousand.

The consequence of talent shortage in healthcare is that it leads to late diagnoses, poorer medical care and poorer overall patient outcomes. Creating a wizard that allows faster and more accurate diagnoses could finally provide a long-term solution.

Capitalizing on AI:

The Funding Landscape of Central and Eastern Europe

Author: Eva Slonkova

Key takeaways

- ***Rising regional AI interest and funding surge***: The heightened investors' interest in AI technology and a surge in funding during 2021 give a promising outlook to the Central and Eastern European AI ecosystem, outlining the region's potential for AI-driven innovation.

- ***Disparity in funding***: While the AI landscape in CEE is thriving, it's noteworthy that a few standout startup successes raise the majority of funding, and some early-stage startups express the challenge of securing funding.

- ***Venture capital dominance***: Venture capital remains the primary source of funding for CEE AI startups, focusing mainly on early-stage investments, creating a gap for companies seeking financial support during the growth phase.

- ***Global recognition and foreign investment***: The success stories of CEE startups are placing the region on the global map, attracting international capital for investment, and opening doors for local startups to access funding from global sources.

1. AI investment trends in CEE

1.1 Central and Eastern Europe in a global VC funding picture

The global venture capital investments in AI companies have experienced notable growth, surging from under $3 billion in 2012 to nearly $75 billion in 2020 (*1). Globally, venture capital investors from the US took the lead as the most prominent participants in AI firm investments, contributing 43% to total VC AI investment value in 2020. Chinese investors followed closely, accounting for 20%, with investors from the EU comprising 9% of the total. Within the European Union, Germany and France played a significant role, collectively attracting approximately two-thirds of VC investments in AI startups.

Shifting our focus to Central and Eastern Europe, investors committed at least $4.2 billion between 2021 and August 2023, and at least $4.4 billion between 2015 and 2023, showing a booming interest in the region in recent years (*2). The momentum continues. Close to a third (30%) of funded AI startups (152) raised money in 2022, growing from 21% in 2021 and doubling the amount in 2020 (14%). 86 companies of funded companies (17%) got financed by August 2023 .

Nevertheless, it is important to note that while Europe has made strides in AI investment, it remains a region in development, with the Central and Eastern European countries still catching up to Western Europe.

> “I think that the funding situation has improved dramatically in Europe, and the European VC ecosystem is maturing very quickly. It doesn't operate at the scale of the US one yet, but it already operates at a scale that's pretty good and gives us enough support. In CEE, this became very obvious with UiPath, and other companies are following, so the region is growing very dynamically. It’s the talent, the capital, the maturity, and the knowledge of the previous generations of founders who basically lead the way and are now helping to drive the ecosystem.”
>
> ***Martin Rehák**, CEO of Resistant AI*

1.2 Interest is rising, but so is caution

> "When AI Startup Incubator was founded in late 2017, there was already enough computing power and data storage available, and deep machine learning was already on the rise. It was easy to recognize the significant advances and the potential. Many advances in text and image processing were already present at that time. In the past few years, it matured in capabilities and quality, which exceeded the expectations of many of us. However, the potential of AI is far from being exploited, and I expect many breakthroughs in the forthcoming future
>
> ***Martin Dostál**, Chief Science Officer at AI Startup Incubator and Investment Committee Member at Look AI Ventures*

The interest in artificial intelligence has been gradually rising among European investors over the past decade. In 2016, approximately $2 billion was invested in the technology. The amount reached nearly $7 billion in 2022, with a peak of $9.4 billion during the tech-spiking pandemic year of 2021 (*3).

However, with the current boom and hype around artificial intelligence, it also became critical for investors to distinguish between startups that merely incorporate AI as a feature and those genuinely dedicated to AI as a core product, shared venture capitalists during conducted interviews. Moreover, investors also aim to identify truly innovative AI solutions that will benefit society and cannot be easily replicated.

1.3 Investment approach toward AI

Drawing insights from discussions with CEE investors, the AI funding landscape recognizes the importance of properly assessing a solution integrating AI technology. This approach is supported by several regional investment funds having a designated AI expert as part of a team to develop or oversee an AI investment strategy.

For example, Martin Dostál from Look AI Ventures, who has over 20 years of experience in AI research and development, designed methodology and evaluation processes tailored particularly to AI startups. In more general terms, his analysis takes into consideration areas such as technology approach, feasibility, maturity, IP, risks, mitigations, and a few others.

The Recursive survey findings outlined most CEE investors are not focused on AI technologies, but AI startups are part of their portfolio (*4). Moreover, investment funds with a more focused strategy toward deep tech, including AI, recognize that comprehensive AI technology assessment requires insights from specialists who can accurately identify the potential of these solutions.

Such a cooperative approach underscores the interest in making well-informed investment decisions within the dynamic landscape of AI innovation.

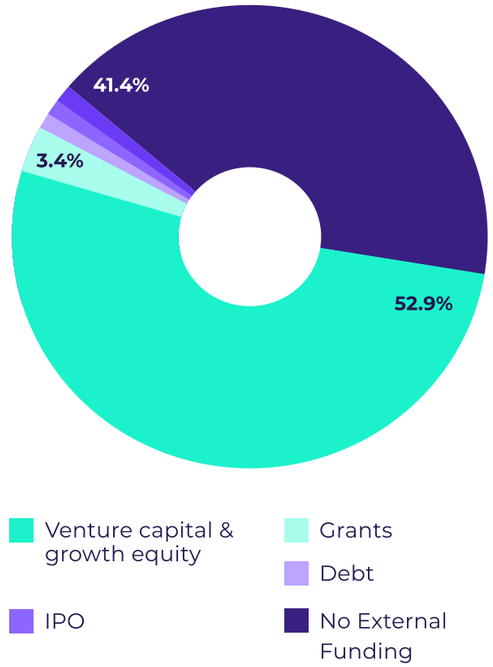
1.4 CEE AI funding in numbers

In an emerging ecosystem like Central and Eastern Europe, many AI product companies are still in their early seed stages. Our database reveals that nearly half (41%) of startups have not announced any external funding. Additionally, we estimate that 53% of AI startups are at the venture capital or growth equity funding stage to fuel their growth, 4% have received grants or debt, 0.6% have taken their companies public, and 0.8% have entered a merger or acquisition.

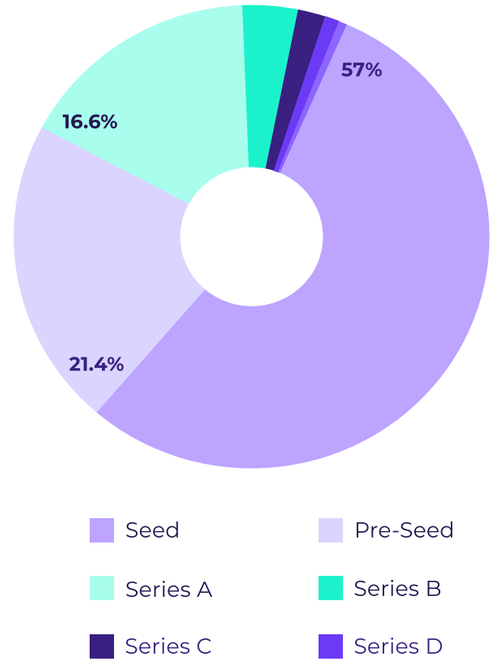
Among the companies funded through venture capital and growth equity, more than half (57%) are at the seed stage and 21% at pre-seed. As development progresses, 17% have successfully secured Series A funding, 4% have reached Series B, and only 1.5% have advanced to Series C-E rounds.

The median funding amount across these stages is $1 million, signifying that while some startups have attracted substantial investments, many are operating with relatively less capital.

Split of funding by source for CEE AI Product Companies



Split of VC & PE funding value by stage for CEE AI Product Companies



Source: The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)

Up to date, the five most funded CEE AI companies are:

Name	Country	Total Funding
UiPath	Romania	$2B
Rimac Automobili	Croatia	$875M
Infobip	Croatia	$875M
Hyperscience	Bulgaria	$288M
Payhawk	Bulgaria	$239M

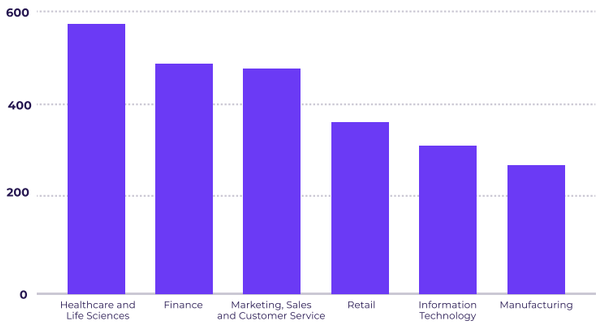
AI startups from the CEE region have raised a total of ~$8.2 billion. However, more than half of the funding ($4.2 billion or 52%) was notably invested in outliers – startups with exceptionally large funding rounds of over $100M. Without the outliers, regional startups raised ~$3.9 billion (48% of total).

1.5 Sector-specific AI investments

According to The Recursive analysis and Crunchbase data (*2), excluding outliers, industries that have received the most funding in the CEE region among the product companies are

Healthcare and Life Sciences, Finance, Marketing, Sales, and Customer Service, Retail, Information technology, and Manufacturing.

Top Industries by Funding Value for AI Product Companies in CEE
[$ Million]



Source: The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)

The majority of surveyed investors (93.8%) express strong optimism in the Healthcare sector, viewing it as one of the most promising industries in the next five years. Approximately half of the respondents also recognize the growth potential in Cybersecurity (56.2%), Education (56.2%), Finance (50%), Information Technology (50%), Manufacturing (43.8%), and Marketing and Sales (43.8%) as rising verticals in the AI landscape (*4).

Moreover, in terms of interest in AI technologies, our survey revealed that the majority of investors in Central and Eastern Europe are closely monitoring advancements in AI technologies, with particularly high interest in Machine Learning, Natural Language Processing (NLP), Big Data Analytics, Computer Vision, Cybersecurity, and Deep Learning. However, only a quarter of respondents mentioned conversational AI and chatbots (*4).

2. The state of the CEE AI funding landscape

2.1 Strengths of the CEE AI funding landscape

2.1.1 Emerging AI innovation ecosystem

"Naturally, together with the rest of the world, we see an increased activity in AI investments in CEE. More new companies based on AI/ML models are being born, e.g., intelligent virtual assistants, AI-powered marketing tools, logistics and shipment automation systems based on AI, 3D modeling, health-tech AI assistants, smart homes/devices, etc., as well as other deep tech companies that empower organizations to build robust and trustworthy AI models. Many existing businesses are also rushing to augment their offering with additional AI capabilities – a well-known example of this is UiPath RPA, applying AI to make better predictions, handle variability, and interpret unstructured content." - **Elina Halatcheva, Managing Partner at BrightCap Ventures.**

Building upon the global surge in investments in AI-powered startups, the CEE AI ecosystem mirrors these worldwide trends. From the investors' perspective, such shifts open a wide range of possibilities and opportunities to invest in AI technology.

Central and Eastern Europe experienced a significant rise in the number of AI companies founded in the mid-2010s, peaking around 2018-2019. The largest number of product companies were founded between 2015 and 2023 (694 companies, or 80% of total), with 115 companies in 2018 and 115 companies in 2019. 230 of all companies were founded between 2020 and 2023, during and after the pandemic (*2).

2.1.2 Investors' appetite for AI technologies

"AI has become a buzzword on the startup's side, but also funds are promoting investing in AI, and some are quite generous, if I may say so. As a result, now should be a great time to raise for all companies with an AI focus, though there needs to be more of an AI than just mentioning it in your pitch to successfully raise." - **Tatjana Zabasù-Mikuž, Managing Partner at South Central Ventures.**

In reaction to the emerging CEE AI ecosystem, the growing investors' interest in innovative technologies is another notable strength within the regional funding landscape. Both local and international investors have increasingly turned their attention to the region, recognizing the potential and growth prospects it holds. The infusion of capital and mentorship from these investors not only fosters the growth of AI companies but also further propels the ecosystem's evolution and potential for future success.

2.1.3 Factory for efficient innovation

"The cost of living and operating businesses in the CEE region is still lower compared to Western countries. This cost advantage can be attractive to investors and companies looking to maximize their AI development budget while maintaining high technical expertise. Romanian and CEE startups can showcase their ability to provide high-quality AI solutions at a competitive price" - **Cristina Toncu, the Co-Founder of Techcelerator.**

As identified throughout the report, the CEE region possesses a strong tradition of technical education and engineering expertise. This robust talent pool extends to AI startups, where a focus on team quality becomes instrumental, particularly for early-stage investors.

Nevertheless, there is another factor drawing both local and international investments. Several interviewed investors pointed out Central and Eastern Europe offers a distinct economic edge – cost competitiveness. The region's relatively lower cost of development, compared to Western counterparts, positions it as an appealing choice for both investors and companies. Furthermore, cost efficiency presents an opportunity for more attractive valuations.

Among the most successful businesses, prior research found that CEE unicorn founders exhibit the ability to use capital efficiency to create value and scale with smaller funding than founders from other regions. Otherwise said, CEE unicorns have proven their ability to do more with less (*5).

As a result, the cost advantage not only aligns with the region's reputation for technical excellence but also positions CEE startups to offer high-quality AI solutions at a competitive price point, further enhancing their appeal in the global AI landscape.

2.2 Weaknesses of the CEE AI funding landscape

2.2.1 Investors' AI expertise

With AI startups, there is a higher feasibility risk than with a regular IT startup. So, the ability to qualify technology assessment is a critical skill for successful investing in AI companies. Not every venture capital investor has the expertise and experience to evaluate technologically complex projects with AI, so some really good AI startups are difficult for some investors to understand and value in terms of technology."

Martin Dostál, *the Chief Science Officer at AI Startup Incubator and Investment Committee Member at Look AI Ventures.*

The current explosion of new AI businesses intrigued most technology-focused investors in Central and Eastern Europe. Nevertheless, many don't possess the expertise to evaluate these projects. Moreover, during our interviews, it was noted one of the challenges of a focus on deep tech is that it requires more time and financial resources.

Naturally, this is applicable to investors worldwide. However, it may represent a more significant challenge for the CEE region as the AI ecosystem is still developing, and many investors have yet to establish well-defined processes and strategies for effectively navigating the complexities of AI investments.

While some AI or deep tech-focused funds have a dedicated in-house expert, the position also opens opportunities for collaboration with a wider ecosystem of qualified professionals to consult and assess the AI startup potential.

2.2.2 Funding availability

> "There's significant potential for startup growth in the CEE region, and AI-based solutions can undoubtedly address many industrial challenges. However, funding remains a persistent challenge restraining the growth of innovative startups. Investment in the early-stage ecosystem is quite limited compared to what we see happening in Western Europe. Thus, a robust foundation for startup expansion would necessarily involve infusing more funds into early-stage AI startups." - ***Ljubiša Bojić, Senior Research Fellow and Coordinator at the Digital Society Lab, Institute for Philosophy and Social Theory, University of Belgrade.***
>
> "At the moment, there is enough funding for the seed stage and Series A. If you go beyond that for Series B, etc., we don't have many funds in the region focusing on those stages. Startups need to go out. This is a challenge. But if they have good traction and they've been able to build a substantial company with Series A funding, it should not be a problem." - ***Aristos Doxiadis, Partner at Big Pi Ventures***

The CEE region's funding landscape for AI startups presents a dual challenge. Firstly, compared to Western ecosystems, there is a noticeable disparity in funding availability for AI startups across all stages, several interviewed experts noted.

Our survey also highlighted securing funding as the most frequently mentioned challenge by AI product companies (56.4%). Also, a quarter of AI product companies (24.5%) evaluated funding for AI products in the region as only average (5 out of 10). The average rating across all responses was 5.3 out of 10 (*4).

Moreover, developing complex AI technologies requires substantially high funding, which, as interviewees expressed, may currently represent a challenge. While the CEE region has witnessed several AI startups securing significant funding, the scale of investment rounds remains notably smaller than counterparts in more mature markets.

The gap is more noticeable when startups progress beyond the seed and Series A stages. According to our regional investor analysis of over 90 VCs, most funds specialize in backing startups at early stages, with over 40% focusing on seed stages, nearly 30% on pre-seed, and 20% on Series A. On the other hand, less than ten invest in further growth. Fundraising locally, within the region, may pose a barrier for more developed startups aiming to secure Series B funding and beyond. As a result, they often turn to larger international investors.

2.3 Opportunities in the CEE AI funding landscape

2.3.1 Collaboration

> "We always try to combine forces with investors and other industry stakeholders alike, for every company that we invest in, not only AI-powered. Experienced co-investors (and their founders) can bring valuable knowledge and help new founders avoid fatal mistakes and expedite their progress. Traditional industry players can validate the need for a more automated and intelligent solution based on AI and become future customers. They can also provide the data (adhering to privacy policies, of course) to train those AI algorithms. We have a large network of partners (who are industry experts) that we engage with on both of these when we see such an opportunity." - ***Elina Halatcheva, Managing Partner at BrightCap Ventures.***
>
> "We should market the region, just like Southeast Asia managed to market itself. As entrepreneurs we should try to connect the CEE region together because we have what it takes - we have the engineering talent, we have more and more entrepreneurs and we should be definitely more patriotic, but in a regional way." - ***Borys Musielak, Managing Partner at SMOK Ventures.***

To achieve an AI market state that is able to compete on a global level, the element of collaboration within and beyond the ecosystem emerges as a significant opportunity. And investors can play a pivotal role in fostering synergistic partnerships between AI startups, research institutions, and established industries. Moreover, there is an opportunity for Central and Eastern Europe to not only cooperate within each country but also throughout the region to increase global awareness and attract foreign capital.

2.3.2 Attracting international investors

Regional success stories like UiPath put Central and Eastern Europe on a global AI landscape map. These success stories are tangible evidence of the region's innovation potential and excellence in AI technology development.

The presented strengths, including the CEE talent, cost efficiency, and market potential, are being recognized by international investors with rising interest in the region. As a result, foreign investors, ranging from venture capital firms to corporate giants, are increasingly drawn to the emerging regional AI landscape.

Foreign venture capital funds that have previously invested in the CEE AI startup landscape include, for example, German Earlybird Venture Capital with investments in UiPath (Romania) and Photoneo (Slovakia) and B2venture (formerly btov Partners) investing in LatticeFlow (Bulgaria) and Neptune (Poland) (*6).

Our research indicates that a significant portion of CEE AI investors focuses on early-stage projects. Consequently, the trend of collaborating with international funds has become more prominent, especially among well-established scaleups seeking substantial investments to propel their growth to the next level.

2.4 Threats for the CEE AI funding landscape

2.4.1 Economic uncertainty

The current economic landscape, not only in the CEE region but also globally, presents a substantial threat to the growth of the AI funding ecosystem. The post-COVID era has brought along economic uncertainties, including the challenges of high inflation rates. As one of the interviewed experts mentioned, this economic instability has led to investors being more cautious and risk-averse, making the process of securing funding for AI startups more challenging.

While venture capital investments signaled resilience in 2022 – particularly in the first half of the year – the amount of CEE startup funding has been dropping in 2023, falling by more than half in H1 2023 (~€1.2 billion) compared to H1 2022 (*7). Regarding the deep tech VC investments in Europe, similarly, Q1 2023 showed the lowest funding since Q1 2022, outlining an ongoing slowdown. Nevertheless, artificial intelligence still remains the most funded deep technology in Europe, attracting $1.9 billion this year so far (*3).

2.4.2 Regulatory measures

> “Regulations will stifle the growth of AI for sure, but the question is, ‘How much?’ The US seems to be taking it easy on regulation, so the AI ecosystem will be moving at full speed. The EU, on the other hand, is gearing up for a more restrictive regime, and undoubtedly, this will make it more difficult for startups to compete with their American counterparts.” - **Petar Petrov, Chief AI Officer at Eleven Ventures.**

The global surge in AI is resulting in a wave of innovation accompanied by a series of concerns. To address these concerns, the European Union took the pioneering step of proposing the EU AI Act in April 2021, intending to reach an agreement by the end of 2023.

In Central and Eastern Europe, as in other regions, there are varying opinions regarding the EU AI Act. The Act's emphasis on safety and ethics aims to ensure widespread AI benefits while minimizing negative impacts. However, there are concerns about the Act's limitations and the practical challenges of implementing computationally demanding requirements. Additionally, there is a valid concern that the Act may place European companies at a competitive disadvantage compared to counterparts in less-regulated regions unless similar measures are adopted globally (*8).

Among CEE venture capitalists, the interviews highlighted the importance of regulatory compliance when evaluating an investment opportunity. Investors are paying attention to startups' approach toward the measures in order to prevent potential compliance challenges once the AI Act comes into effect.

3. Funding sources for AI startups in CEE

Through our research of available funding opportunities for startups, we have identified more than 120 players in the AI funding space of the CEE region. Out of these, the major source of capital (over 70%) was venture capital funds.

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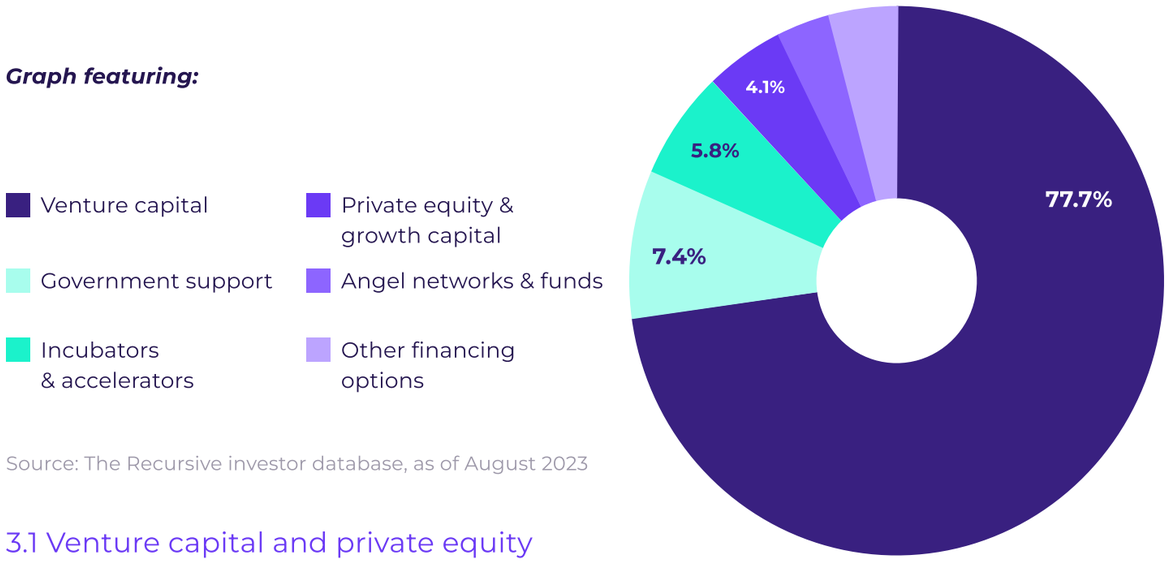


Source: The Recursive investor database, as of August 2023

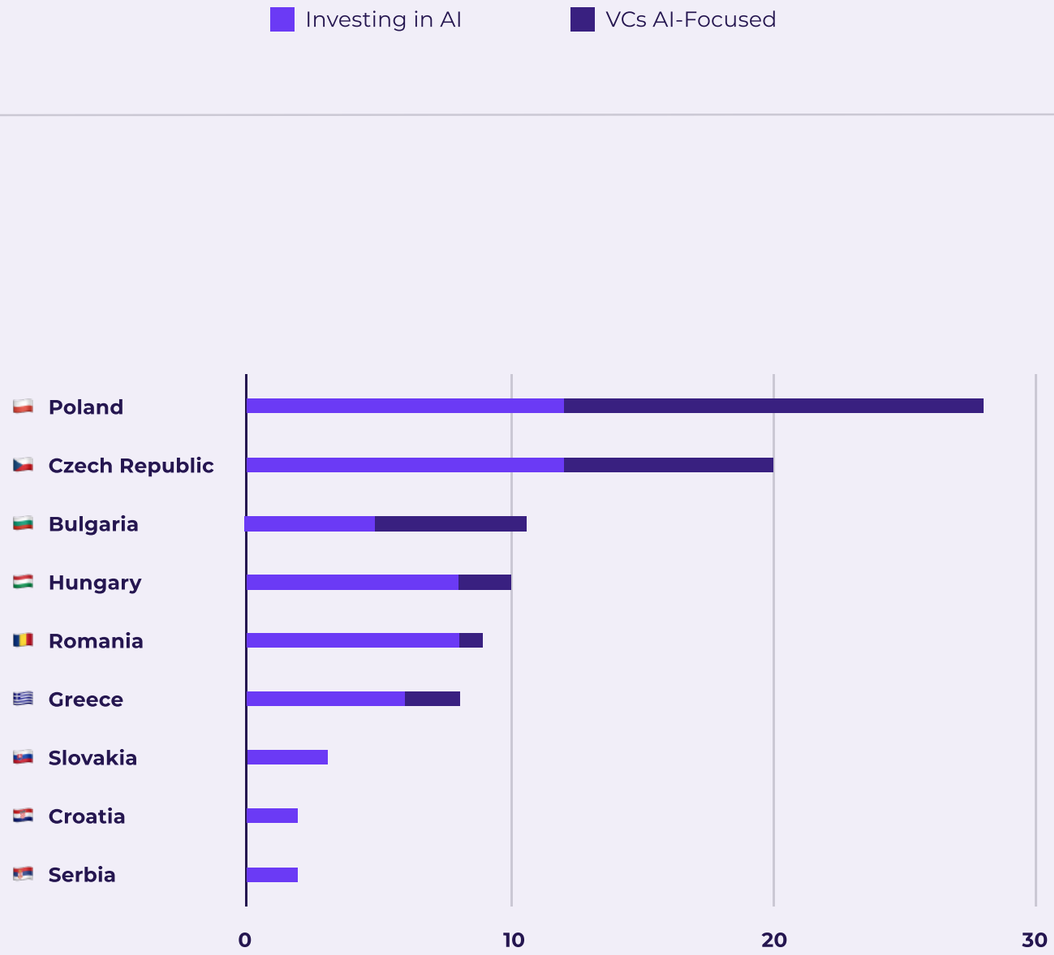
3.1 Venture capital and private equity

Venture capital plays a pivotal role in fueling the growth of AI startups in Central and Eastern Europe. It stands as the primary regional source of funding for these innovative companies and marks its significance in not only providing the necessary capital for expansion but also offering mentorship and access to extensive networks. VC firms act as strategic partners and offer startups guidance and expertise to develop emerging technologies.

Based on the analysis of available sources and databases, The Recursive has identified more than 30 CEE venture capital funds focusing their investments on domains including AI. In addition, over 50 more CEE VC funds with a broader technology focus back the innovative AI projects. Altogether, we have identified over 90 venture capital and five private equity firms actively supporting the Central and Eastern European AI ecosystem.

A substantial portion of these funds originates from the largest regional ecosystems of Poland and the Czech Republic, followed by Bulgaria, Hungary, Romania, and Greece.

Split of AI-Focused and Other VCs Investing in AI



Selection of AI-focused venture capital funds in the CEE region

Fund name	Country	Focus	Stage	Avg. ticket (€)
Big Pi Ventures	Greece	GR, EU, US	Seed	1-3M€
BrightCap Ventures	Bulgaria	Bulgaria, global	Pre-Seed; Seed; Series A	200K-3.5M€
GapMinder VC	Romania	RO, CEE	Seed; Series A	up to 2M€
Look AI Ventures	Czech Republic	EU	Pre-Seed; Seed	up to 250K€
LT Capital	Poland	CEE	Pre-Seed; Seed	250K€
Presto Ventures	Czech Republic	CEE	Seed	200K-1.5M€
RKKVC	Poland	CEE	Seed; Series A	N/A
SpeedUp Venture Capital	Poland	CEE	Seed; Series A	50K-4M€
Sunfish Partners	Poland	PL	Pre-Seed; Seed	250-500K€
Tensor Ventures	Czech Republic	CEE+	Seed; Series A	up to 2M€
Y Soft Ventures	Czech Republic	CEE	Seed	N/A

Selection of other CEE funds investing in the AI ecosystem

Fund name	Country	Focus	Stage	Avg. ticket (€)
Credo Ventures	Czech Republic	CEE	Pre-Seed; Seed	up to 5M€
Early Game Ventures	Romania	EU	Pre-Seed; Seed; Series A	50-500K€
Eleven Ventures	Bulgaria	SEE	Seed	up to 1M€
Fil Rouge Capital	Croatia	HR	Pre-Seed; Seed; Series A	10K-1M€
Hiventures	Hungary	HU	Pre-Seed; Seed	40K-2.6M€
LAUNCHub Ventures	Bulgaria	CEE, SEE	Pre-Seed; Seed; Series A	300K-3M€
Metavallon VC	Greece	GR, EU	Seed; Series A; Series B	500K-1M€
South Central Ventures	Serbia	CEE	Seed; Series A	up to 5M€

3.2 Government support

3.2.1 European initiatives

As the technological landscape continues to evolve, governments across the Central and Eastern European region are starting to recognize the pivotal role of startups, particularly those specializing in the rapidly emerging field of artificial intelligence.

Horizon Europe represents the EU's key funding program for research and innovation from 2021-2027. The program carries a budget of €95.5 billion. Within the framework of Horizon Europe, the European Innovation Council (EIC), along with its venture investment arm known as the EIC Fund and the EIC Accelerator, actively supports groundbreaking and disruptive innovations through a dedicated budget of €10 billion. To date, 700+ companies have been selected for equity financing, 285 approved investments, and 500+ million invested (*9).

In 2023, the EIC Accelerator is set to provide a total of €1.13 billion in funding, including grants of up to €2.5 million and equity investments ranging from €500,000 to €15 million. Notably, in Q3 2023, the EIC fund was recognized as the largest deep tech VC investor in Europe by the amount invested and third in the number of deals (*9). The program supported several CEE AI startups, including Czech Neuron Soundware and Filuta AI.

Another important player on the European innovation funding scene is the European Investment Fund (EIF), which provides finances to private banks and funds, including Fund of Funds, to support SMEs across Europe. The EIF has backed several CEE deep tech funds, including Polish Radix Ventures and OTB Ventures. In 2023, the EIF and the Czech Republic launched a new €55M Fund-of-Funds initiative targeting early-stage Czech start-ups and spin-offs developing digital technologies, including AI (*10).

The European Bank for Reconstruction and Development (EBRD), the European Institute of Innovation and Technology (EIT), and EIT InnoEnergy represent further European initiatives contributing to the innovation ecosystem.

3.2.2 Government funding and support

> "AI specifically has been a priority for many European countries in recent years (and even longer for the US and China). While others are massively investing in AI, the Czech Republic isn't treating AI as an integral part of modern industry. We have all kinds of small initiatives, plans, presentations, etc., but when you compare the numbers, we need to catch up in terms of real investment."
>
> ***Tomáš Mikolov**, Senior Researcher at CIIRC CTU.*

The nation's support in Central and Eastern Europe has been noted during the interviews. Several experts highlighted the need for more government support for nurturing the local AI ecosystem, particularly in R&D and the early stages of development. The opinion has been shared by both academia and entrepreneurship professionals. And while the first efforts to approach artificial intelligence as a strategic tool for growth are appearing around the region, the structure is yet to be developed.

Regarding government-backed AI innovation, certain countries across the CEE region support the ecosystem through venture capital funds and research institutions.

An example of a national funding initiative is the executive Polish agency National Center for Research and Development (NCBR), acting within Poland's national science, science and technology, and innovation policies. As the largest R&D funding agency in CEE in terms of diversity of activities, financial resources, and territorial and institutional outreach, NCBR co-finances innovative projects of entrepreneurs and scientists through grants or seed funds (*11). An example of NCBR's recent AI investment is a Polish startup NeuroSYS.

3.3 Other financing options

In addition to the conventional channels of venture capital and government funding, AI startups in Central and Eastern Europe have an opportunity to approach various alternative funding sources that can catalyze their growth. These alternatives include incubators, accelerators, as well as angel investors, and angel networks *(see a list of the supporting infrastructure on page 119).*

3.3.1 Angel networks and funds

Distinguished from traditional venture capital firms, angel investors often provide more personalized mentorship and guidance to early-stage startups due to their direct involvement. Our analysis of available data has identified three angel-powered funds diversifying their portfolio with AI projects. Growceanu, based in Romania, is an example of a business angel platform growing its portfolio with multiple AI startup investments, including Romanian Aqurate and EmailTree AI.

3.3.2 Angel networks and funds

Incubator and accelerator programs, commonly offered to an extent within the early-stage venture capital support, provide essential support to AI startups at the beginning of their journey by offering mentorship, resources, and often seed funding.

Our research shows several regional organizations actively support startups through such programs. Moreover, within the AI space, we have identified at least three programs dedicated specifically to deep tech and early-stage AI projects. In the Romanian ecosystem, Techcelerator has supported more than 120 European tech startups and currently administers an 'Advancing AI' initiative tailored to early-stage startups in Southeast Europe. Another notable player is the Czech deep tech accelerator StartupYard, which has supported over 100 projects since 2011, including successful startups Rossum and Neuron Soundware. The Czech AI Startup Incubator, today part of Look AI Ventures, supports exclusively AI solutions.

> "There's a difference between doing an R&D and building a prosperous business. We can talk about culture and policy yet nothing beats watching your peers raising the bar repeatedly and building successful companies that go the distance and have significant liquidity events. In Greece and the broader region this is missing. Even though we already have some role models for the next wave of entrepreneurs - founders who are determined to change the world and crash competition - we need more people who go the extra mile and offer 10x solutions instead of 10%.", **Alex Alexakis, Investor at Marathon Venture Capital**

SOURCES

1. "A Sharp Increase in AI-Related Venture Capitalist Investments Could Transform Global Economies and Shape the Future of Artificial Intelligence." OECD.AI, n.d. https://oecd.ai/en/vc.
2. The Recursive Analysis based on Crunchbase, 2023 (as of August 8, 2023)
3. "Deep Tech: Europe." Dealroom.co, August 4, 2023. https://dealroom.co/guides/deep-tech-europe.
4. The Recursive AI Survey (May-August, 2023)
5. Elena Ivanova, "The 2022 CEE Innovation Ecosystem in 5 Record-Breaking Facts." TheRecursive.com, December 19, 2022. https://therecursive.com/the-2022-cee-innovation-ecosystem-in-5-record-breaking-facts/.
6. Antoanela Ionita. "35+ Deep Tech Investors From CEE and DACH Looking for Visionary Founders." TheRecursive.com, July 19, 2023. https://therecursive.com/your-comprehensive-guide-for-deep-tech-investors-from-cee-and-dach/
7. Konrad Koncerewicz. "VC Funding in CEE Report 2Q 2023." Vestbee, August 24, 2023. https://www.vestbee.com/blog/articles/vc-funding-in-cee-report-2q-2023.
8. The Recursive CEE AI Report, Governance chapter, page 149.
9. "EIC Fund." European Innovation Council, n.d. https://eic.ec.europa.eu/eic-fund_en.
10. "European Investment Fund." eif.org, April 4, 2023. https://www.eif.org/.
11. "The National Centre for Research and Development." Gov.pl, n.d. https://www.gov.pl/web/ncbr-en.

Martin Dostál

Investment Committee Member at Look AI Ventures, Chief Science Officer at AI Startup Incubator

”The complexity of AI solutions is growing. Thus, it is really important to carefully evaluate every startup from the perspective of AI technology, its feasibility, and maturity to make good investment decisions.”

About Look AI Ventures:

Founded: 2022
Focus: Artificial intelligence
Geo-focus: Global with focus on Europe
Stage: Early-stage (pre-Series A)
Ticket: up to €250,000

Navigating Investment Challenges in the CEE Region: AI Startups Need To Have Defensible Technology

How has AI investment in the Czech Republic and CEE changed, and what key trends do you observe?

The number of AI startups is clearly growing, and AI has become mainstream. However, the quality and innovativeness vary vastly across startups. Of course, there is a huge rise in startups applying large language models and generative AI. Czech startups follow CEE trends and stay caught up in technical areas. On the other hand, I still see that Czech startups are still lagging a bit in business competence and global, or at least regional, ambitions, but at the same time, it is improving. Also, the complexity of AI solutions is growing. Thus, it is really important to carefully evaluate every startup from the perspective of AI technology, its feasibility, and maturity to make good investment decisions.

Martin Dostál is an R&D scientist and an AI/Machine learning expert focusing on disruptive technology since his university studies in the late nineties. He is an Investment Committee Member at Prague-based Look AI Ventures fund and a Chief Science Officer & Partner at AI Startup Incubator.
Look AI Ventures (LAIV) is the first investment fund in the Czech Republic focusing exclusively on early-stage AI startups, with a mission to nurture the AI ecosystem and drive the growth of disruptive AI-driven solutions in major markets.

What factors contribute to the attractiveness of the CEE region as a whole for AI investment?

I am convinced that in Czech and more or less in CEE, we also benefit from very good technical education and engineering tradition. Another benefit is the lower cost of development. I have seen around 4,000 AI startups worldwide, and I see CEE companies having the same level of technical quality as US startups, however often with more attractive valuations. In CEE, we also have quite a few spinoffs from universities with superior and unique AI technology and IP. So, I am not concerned about AI technology in CEE. Areas where CEE needs to improve are entrepreneurship and building business competency, which goes across the whole society, including individual's mindset, business environment, and education system, to name a few.

What are some of the challenges faced by AI startups seeking funding in the Czech Republic and CEE region?

In the current post-covid, high inflation environment, investors are more careful and risk-averse, so it is more difficult to get funding. Moreover, generally speaking, the US venture capital ecosystem is more mature than the Czech one, so the investor playground is smaller.

Furthermore, not every venture capital investor has the expertise and experience to evaluate technologically complex projects with AI, so some really good AI startups are difficult for some investors to understand and value in terms of technology. Our Look AI Ventures fund is purely focused on AI, and we have seen several such examples of quality startups rejected by other investors because of technology depth and complexity. Lastly, it would be beneficial if, in the Czech Republic, the government would focus on improving the entrepreneurship environment for innovative companies to make it simpler, faster, and more predictable.

Do you offer support to your portfolio startups in implementing AI strategies and developing the technology?

Yes, we share our experience and help startups with AI technology advisory and mentorship. I share the expertise I have gained in spending more than 20 years in R&D, including academia and industrial R&D. We have regular calls with CTOs or the technical team to discuss the progress, challenges, and possible mitigations. It is really exciting to work together on breakthrough AI solutions.

What do you view as some of the obstacles Czech startups encounter when developing AI-powered research, products, and services?

Czech startups are facing global, not local only, competition. So, on the technical side, it is important to have a defensible technology. There should be something unique, a method, IP, performance, machine learning models, or data sets to give a few examples. Otherwise, they could be easily disrupted. And finally, let's not forget about the business side; technology is just one element in the success equation.

When evaluating AI startups for investment, how do you address the ethical considerations related to their technology and practices, ensuring responsible AI development and deployment?

I am spending a lot of effort following the latest updates on AI and regulations. It includes the EU AI Act as well as vertical, domain-specific regulations. Interestingly, the AI regulation area is, at least from my experience of communicating with startups, largely underestimated and underskilled by startups. It might cause significant problems later on when AI regulation is put into force, so we take regulatory considerations during the technical evaluation. It is a mandatory component of our technical evaluation. In the areas where vertical regulation is mandatory, such as healthcare, we carefully evaluate the technology outcomes subject to regulation and roadmaps to achieve regulatory compliance. It is a huge difference if you have a working prototype that does not address the regulatory requirements or a product prototype with some existing regulatory deliverables and a clear roadmap to achieve regulatory compliance.

How do you expect AI technologies to impact the venture capital industry?

AI technologies can help venture capitalists even today. Let me mention a few use cases. First, AI can be used to automate or improve efficiency in scouting startups. Furthermore, AI can collaborate on analyzing investment opportunities by smart searching and collecting data to strengthen data-driven decision-making and efficiently summarize information. There are already valuable datasets in venture capital portals such as Crunchbase, Pitchbook, Traxcn, or CB Insights. AI-driven features are being gradually introduced on these platforms, or they could be potentially used to build custom machine learning models to help with analysis - for instance, for analyzing competition, features, funding, or exit potential. AI can also improve tracking portfolio companies' progress, including media presence and employee or customer satisfaction.

At Look AI Ventures, I have developed a custom methodology to evaluate AI startups, including some AI techniques to analyze relationships between individual categories and cross-validation of the technical evaluation outcomes. Thus, I am using AI to help us make better decisions and not to replace humans, their skills, and extensive experience in the investment process. As I am still an active R&D person, I have a vision to significantly enhance the use of AI methods in my technology evaluation tasks.

Why Being an Investor in AI Startups from CEE is the Best Job on the Planet?

OTB Ventures, is the largest VC firm with roots in the CEE region in terms of assets, managing over EUR 300M. The fund targets local late Seed, Series A, and early B companies that develop technologies in 4 verticals: SpaceTech, AI & Automation, FinTech, and Cybersecurity. We spoke with Marcin Hejka, Co-founder and General Partner of OTB Ventures, to discover why the fund focuses on deep tech startups and ***why he ranks CEE among the top 2 technological development destinations globally.***

Marcin Hejka,
General Partner at OTB Ventures

OTB has been investing in AI startups from CEE since 2017. Can you share how the regional landscape has changed over the past 6 years?

Before establishing OTB Ventures, we always believed that the CEE region had a lot of potential because of the excellent tech talent. I rank the region among the top 2 technological development destinations globally, together with Silicon Valley.

For the past 7 years, since OTB was established, we have been seeing how this potential is materializing. There are a number of super successful startups that emerged from this region and achieved global success like Grammarly, People AI, AVG and DataRobot.

You're focused on investing in deep tech startups. Why so? What potential do these companies hold?

What makes deep tech startups our forte is the transformative power they hold. By utilizing technological solutions, they can change how different tasks are being performed or how businesses operate. The second characteristic that deep tech startups have is that they always strive to solve global problems. There's no such thing as a local deep tech innovation.

Several OTB portfolio companies showcase this potential. Silent Eight uses artificial intelligence to help financial institutions manage their compliance and risk obligations. The startup prevents the occurrence of financial crime, also saving thousands of hours of manual labor.

Can you share what kind of support AI startups need on their road to success?

For AI startups, capital is definitely an important factor to be successful. However, there are other very important aspects that are required to achieve international impact. This is where the quality of investors matters. There are VCs who have a better understanding of the market and the global ecosystems and also provide access to a larger network of potential partners.

At OTB Ventures, we aim to support our portfolio companies with the high-quality network we've built over the years.

With my background in corporate investing, we helped some of our portfolio companies secure partnerships with large international corporations. Utilizing Adam Niewinski's experience as Deputy CEO of the leading bank in CEE, we helped portfolio startups secure financial institutions as clients.

On your website, you mention that you invest in category-defining startups. Can you share with us which are the qualities and requirements for a company to redefine a category?

Opposite to more traditional tech solutions, deep tech startups base their business model on a technological approach that plays the role of a key differentiator. For OTB Ventures category-defining startups are those who solve a pressing problem for businesses on the global stage by utilizing unique technology or technological approach. These technologies need to be hard to build and very hard to replicate. ICEYE is a good example as it provides the world with access to satellite imagery regardless of day/night and through clouds by utilizing its synthetic aperture radar (SAR) satellite constellation.

What will be the factors that will shape the future of AI in the CEE region?

In 10 years, I believe that every company will be an AI company, as it can be applied in pretty much every area of our lives. It has the potential to change the way people learn through private AI tutors and the way we take care of our health through the development and administration of new drugs.

I believe that we're still at the beginning of materializing the potential of the region and many investment opportunities will emerge. This excites me for the future and makes the job of being an investor in AI startups from CEE the best one on the planet.

Fiedler Capital:

The AI Landscape in CEE from a VC Lens

Fiedler Capital is a new pre-seed focused first check fund with a remote-first team that invests in selected CEE and Baltic markets. Their initial tickets range between $250,000 and $750,000. The team partners with entrepreneurs in the earliest phases of company formation and loves helping founding teams dream up companies that can be successful and impactful on a global stage. Some of the firm's early successes include Bitrise and SEON, each of which raised around $100 million from top-tier VCs.

The Recursive interviewed Founding Partner Robert Hegedues to understand more about the VC perspective on recent AI developments in the region.

Robert Hegedues,
Founding Partner at Fiedler Capital

What's The Current Perception of AI among VCs?

The introduction of technologies like ChatGPT has marked a significant shift in the startup ecosystem. AI, which was often dismissed as a buzzword by investors just a year ago, has now become a de-facto requirement in every startup pitch. Entrepreneurs are quickly adopting AI into their business models. While some startups feature truly original ideas, many still feel like buzzword drops. The potential use cases for AI technology are numerous, leading to deep excitement among investors and entrepreneurs alike. However, there's uncertainty about where value will accrue, especially when it comes to CEE startups.

How Well Positioned is CEE to Benefit from the AI Race?

CEE has several positives, such as a solid technical talent pool, growing ambition, and an increasing number of founders and executives with company-building experience. Entrepreneurs in the region also show a good ability to adapt.

However, CEE lags behind in the availability of capital at the earliest stages. Foundational AI infrastructure companies require massive early-stage rounds due to their high CAPEX intensity, making them mostly out of reach for CEE investors. Even application-level projects often require significant pre-seed rounds, for which there's very little appetite in the investor community in the region.

Bull Case and Bear Case for CEE Startups

Bull Case: Success stories similar to Skype or UI Path and the emergence of specialized AI-focused centers of excellence could attract both talent and capital, creating a virtuous cycle of growth.

Bear Case: The lack of capital and opportunities could lead to a talent drain, with the most promising entrepreneurs leaving the region to seek better prospects. This would revert the ecosystem to a state similar to the 2008-2016 period, characterized by mediocre outcomes.

Which Kind of AI Startups Will Be Most Successful in the Future?

Same as always - startups that offer unique market insights and superior solutions to large problems are likely to succeed.

Is There a Difference in How You Evaluate AI Startups?

For foundational AI technologies, team credentials and scientific backgrounds are crucial. For AI applications or AI-enabled products, the evaluation is similar to that for SaaS companies.

How Can Fiedler Help Startup Founders?

Fiedler Capital assists startups in securing pre-seed funding quickly and provides them with connections to experienced founders, investors and operators across Europe and the US.

We are an international team with business backgrounds who have spent over a decade in management consulting internationally before transitioning into venture capital. As a result, we have a deep understanding of B2B processes. Over the years, we have been fortunate to follow teams from their founding stages to global scale, learning many aspects and dealing with numerous challenges of company building.

While we have a deep understanding of the CEE region, we adopt an international perspective from day one, having lived in multiple countries across Europe, the Middle East, Asia, and the United States.

What's Your Vision for the Future?

We want to help the next generation of founders in CEE start the next wave of iconic companies.

Credo Ventures believes CEE's tech talent is uniquely positioned to build amazing AI companies

Credo in 2 sentences

Credo Ventures is an early-stage investor focused on the CEE region with USD 250m under management. In the 13 years that they have been active, the Credo team has invested in more than 70 startups originating from the region, including the likes of UiPath, Productboard, and Eleven Labs.

Credo's thesis

Credo Ventures was established in 2010, and its thesis has remained unchanged since then. CEE has a great technical talent pool out of which amazing companies can emerge. When combined with the ambition of building global businesses, CEE founders are uniquely positioned to create incredible products that rely on a strong technical moat, thanks to resilient and pragmatic engineering teams leveraging the many academic hubs of the regions.

CEE x AI

In an alternate timeline where a marketing error led to Artificial Intelligence being rebranded "Applied Statistics" (an equally accurate term for the field of knowledge that is AI in Credo's opinion), the obvious truth would have been plain to see. Building products that leverage Artificial Intelligence requires strong fundamentals in maths and data science. Something CEE has historically been amazing at. In fact 4 CEE countries figure in the top 10 of cumulative gold medals in International Maths Olympiads.

And so, while on November 30th 2022, the shared understanding of what is possible with AI was changed by the release of ChatGPT, what the headlines sometimes forgot to convey, is the natural continuity of progress in the field of "Applied Statistics" that ChatGPT anchored itself into. OpenAI itself was created in 2015, and its first large language model was released in 2018.

And although ChatGPT was a breakthrough it was not the first successful AI product. Tons of incredible businesses already used AI at scale, albeit in much more narrow applications. And thanks to the mathematical talent of the region, a number of them are from CEE. Probably the earliest example of this is the wave of successful antivirus companies created in CEE in the mid-90s: Avast and AVG from Czechia, ESET from Slovakia, Bitdefender from Romania.

In fact, Credo's very first investment ever in 2011 was an AI company. "Cognitive Security [...] uses advanced Artificial Intelligence techniques..." reads our memo from March 2011. The company has since been acquired by Cisco, and the founder has gone on to start another AI company (Resistant AI) in which Credo also invested. Uipath, one of the most highly valued private companies at the time of its IPO (USD 35b), was created in Romania on the basis of making AI-enabled robots available to enterprises.

The talent pool reaches beyond CEE. OpenAI's co-founder and tech lead on the GPT model is from Poland. Databricks and Snowflake, two of the key companies enabling machine learning, have Romanian and Polish co-founders respectively. Google's Deepmind is also full of CEE talent, current and former. In fact, one of Credo's most recent investments is a team of Czech and Slovak ex-Deepmind who had previously built an AI to beat poker (now they are trying to beat markets).

Conclusion

AI winners anchor themselves into years of research. CEE has a long historical track record of building AI companies, and Credo Ventures is convinced that this trend is here to stay. What better company to illustrate this point and conclude this article than Eleven Labs. While the company's success appears to be overnight, this hides the fact that investors (including Credo) had come in as early as June 2022 and the founders at the time had already been working on their model for more than two years. And needless to say, the road ahead is equally long. One thing is for sure though, many of those future successful companies will have CEE founders, and Credo wants to be there to support them.

Supporting Infrastructure for AI Innovation in CEE

Author: Snezhana Simeonova

Key takeaways

- The Central and Eastern European (CEE) region, with its diverse landscape, showcases a variety of players rooting for and supporting AI innovation. Leading the pack are countries like the Czech Republic, Poland, and Hungary, each boasting a robust support infrastructure marked by numerous research institutions and startup programs.

- When compared to Western benchmarks, the CEE region lags in terms of world-class research, scale, and funding. However, research institutes like INSAIT in Bulgaria andor The Institute for Artificial Intelligence Research and Development of Serbia are striving to level the playing field.

- The region's future growth hinges on fostering more public-private partnerships, developing specialized AI hubs, and forging international collaborations to leverage regional strengths.

1. The Impact of a Supporting Infrastructure on the AI Innovation Ecosystem in CEE

A robust supporting infrastructure is the backbone of any thriving innovation ecosystem, and this holds especially true for the rapidly evolving field of AI. In the context of Central and Eastern Europe (CEE), the significance of this infrastructure becomes even more pronounced given the region's aspirations to be a global AI contender. *(see a comprehensive list on page 124)*

1.1. Importance of Supporting Infrastructure Players in CEE

Key Components of AI Supporting Infrastructure in CEE

1 Research Institutions	3 Startup Programs, Incubators, & Accelerators
2 Community Platforms and Event Organizers	4 Government-led Initiatives

1.1.1. Research Institutions:

These are the bedrock of AI knowledge and innovation. A prime example is INSAIT from Bulgaria. Born from a collaboration between ETH Zurich and EPFL, and structured as a special unit of Sofia University “St. Kliment Ohridski”, INSAIT has been instrumental in shaping the future of the CEE's deep tech ecosystem. Drawing inspiration from the models of eminent institutions like MIT and Stanford, INSAIT serves as a catalyst for spawning innovative startups. Their unique approach to mentorship, combined with support from AI scientists and serial entrepreneurs, has been pivotal in the success of the startups they incubate.

INSAIT announced its first deep tech spin-off, Martian Lawyers Club (MLC), which recently secured a significant pre-seed investment of $2.2M to innovate the gaming industry using advanced machine-learning technology. (*1)

1.1.2. Startup Programs, Incubators, and Accelerators:

Essential for nurturing early-stage AI ventures, these entities play a pivotal role in shaping the AI landscape. Nextgrid in Poland stands out as a prime example. With a mission to accelerate AI-driven innovation, Nextgrid has been globally recognized, being listed among the best impact investing accelerators and incubators. Their commitment to the AI community is evident through their numerous hackathons and events, attracting AI professionals and enthusiasts from around the world. Moreover, their global influence is underscored by invitations to speak at international institutions, reflecting their pivotal role in the AI ecosystem. (*2)

1.1.3. Community Platforms and Event Organizers:

These entities play a crucial role in binding the AI community together, facilitating knowledge sharing, collaboration, and networking. CroAI from Croatia stands as a testament to the power of community platforms in influencing AI policy and development. Actively involved in shaping the regulatory landscape, CroAI has been a vocal advocate for creating a conducive environment for AI startups. Their proactive approach in submitting formal opinions on the EU's White paper on AI and their involvement in defining

Croatia's national AI strategy underscores their significance in the AI ecosystem. Beyond policy, CroAI's commitment to community engagement is evident through its diverse range of events, from national conferences like AI2FUTURE to monthly meetups that cater to various segments of the AI community. (*3)

1.1.4. Government-led Initiatives:

Reflecting the commitment of national governments to AI innovation, these initiatives provide a roadmap for AI development and ensure a conducive environment for AI innovation. Serbia stands out with its proactive approach to AI ethics. The country's recent adoption of the Ethical Guidelines for the Development, Application, and Use of Reliable and Responsible Artificial Intelligence (March 2023) showcases its dedication to ensuring responsible AI development, especially in high-risk sectors. These guidelines, coupled with the earlier Strategy for AI Development and the establishment of the Institute for AI of Serbia, highlight Serbia's strategic importance in the AI landscape of the CEE region. (*4)

1.2. Support Needed by the CEE Region

Analyzing the landscape of the CEE region, several insights emerge on what the AI ecosystem needs in terms of supporting resources to unlock the next stage of growth:

- ***Collaborative Synergy:*** While individual countries have their strengths, there is a need for more collaborative platforms that can bring together the best from each country.
- ***Specialized Training:*** With AI's vast applications, there is a need for more specialized courses catering to niche AI domains.
- ***Public-Private Partnerships:*** Enhanced collaboration between universities, and research institutions, and private entities can drive faster innovation and implementation. AI-Focused Startup Programs: The region would benefit from a greater number of incubators and accelerators specifically tailored for AI startups, helping them navigate the unique challenges and opportunities of the AI sector.

2. The Current Status of the Supporting Infrastructure in CEE

Central and Eastern Europe has been making strides in the AI domain, with a burgeoning ecosystem of startups, research institutions, and community platforms. However, as with any rapidly evolving sector, there are both strengths to capitalize on and areas that require attention.

2.1. Strengths

2.1.1. Abundance of AI Communities and Networks:

> "We initially set out as a traditional association with a primary focus on policy and policymakers. However, a few years down the road, we underwent a significant shift, transforming into a movement. We began to emphasize that while policies certainly matter, perhaps it's not our best use of time. So, we redirected our energy towards nurturing a vibrant community that encourages its members to embark on audacious ventures, experiment relentlessly, and dare to build companies and pursue novel endeavors.
>
> In addition to this, we contemplated what we could offer to the wider public. Consequently, we initiated self-organized lectures in schools and elsewhere. These talks weren't centered on the debate of whether AI is good or bad, but rather on individuals who refuse to be defeated, who aspire to create, and whose lives brim with excitement. We believed that such narratives could serve as a wellspring of inspiration for high school and elementary school students alike, motivating them to become active participants in our community"
>
> ***Mislav Malenica**, President of CroAI*

The region boasts a supportive community for AI innovation. Numerous events, startup programs, and meet-ups are organized, fostering collaboration and knowledge sharing. For instance, platforms like CroAI in Croatia, and MAIA – Montenegrin AI Association serve as "umbrella" organizations, bringing together AI professionals, enthusiasts, and researchers. These platforms not only facilitate networking but also act as hubs for AI-related activities, ensuring that the community remains vibrant and engaged.

2.1.2. World-renowned Research Groups:

> "We have very well-established research groups that are well-known worldwide, focusing on areas such as computer vision, speech recognition, image processing, natural language processing, and others"
>
> ***Tomáš Mikolov**, Senior Researcher at CIIRC CTU Prague*

The CEE region is home to several research groups that have gained international recognition for their work in pivotal AI domains. For instance, the CIIRC CTU Prague stands as a beacon of AI research excellence, with its diverse research groups contributing groundbreaking work in their respective domains. Their presence not only elevates the region's standing in the global AI community but also provides a solid foundation for academic and practical advancements in AI.

Some examples from CIIRC CTU Prague include (*5):

- The Foundational AI (FAI) group, led by Tomáš Mikolov.
- The Machine Learning (ML) group, under the leadership of Robert Babuška.
- The Robotic Perception (ROP) group, spearheaded by Václav Hlaváč.
- The Intelligent and Mobile Robotics (IMR) group, overseen by Libor Přeučil.
- The Big Data and Cloud Computing (BDC) group, directed by Jan Šedivý.
- The AI & Reasoning (AIR) group, helmed by Josef Urban.
- IMPACT, orchestrated by Josef Šivic.
- Robotics for Industry 4.0 (R4I) group, championed by Robert Babuška.

2.1.3. Technology Transfer Laws:

> "We completely overhauled legislation on spin-offs and technology transfer out of universities and research centers. After the new law passed two years ago, we have seen an explosion in the number of spin-offs coming out of universities"
>
> ***Aristos Doxiadis**, Partner at Big Pi Ventures and Vice-President of The National Council for Research, Technology and Innovation (NCRTI), Greece*

Greece's 2021 technology transfer law upgrade, while not AI-focused, aims to spearhead the country as a leader in university spin-offs in the region.

Under the law, the establishment of a spin-off company requires the submission by the researchers concerned to the University's rector's council or the board of directors of research organizations, and the decision shall be adopted no later than four months after the submission. The law further provides for the possibility of setting up a joint spin-off company with the participation of several researchers from different research organizations, and for registering the seat in Greece, or another country, should they have an office in Greece. They are also allowed to transfer their registered seat after incorporation in another country, on condition that a branch, office, or other establishment recognised by the Greek tax legislation is maintained in Greece.

To promote the development of spin-off companies, the law provides that research organizations can use 0.5% of the funds received from the overheads of the total budget of the projects financed as seed capital for their participation in spin-offs and/or the registration of the organization's IP rights in relation to the research findings.

2.2. Weaknesses

2.2.1. Availability of AI Education:

> “We are becoming more aware of the urgent need to provide comprehensive education to individuals straddling the line between academic research and the business world. The goal is to better prepare these academic professionals to transition smoothly into entrepreneurship, where they can effectively commercialize and scale their research-intensive startups”,
> ***Ljubisa Bojic, Senior Research Fellow and Coordinator at the Digital Society Lab, Institute for Philosophy and Social Theory, University of Belgrade***

A significant concern raised by both AI product and service companies is the level of AI education and training. According to The Recursive AI survey (*6), respondents rated the level of education provided in AI-related fields by local research institutions and universities as only average (at an average of 5.8/10). This underscores the need for a more rigorous and industry-relevant curriculum in AI disciplines.

2.2.2. Collaboration Between AI Product Companies and Academia:

> “There are lots of good researchers in academia and also in industry, and usually people don't know exactly how to connect with them. So we don't have this way of connecting interested people together. In order to connect people, we need to have all these events for people to participate in, to market themselves, their companies, their products, or their research projects, if they are from academia,” ***Traian Rebedea, Principal Applied Scientist at Nvidia and Associate Professor at University Politehnica of Bucharest***

> “It's imperative to distinguish the multifaceted benefits that institutions like INSAIT and academia bring to the table. The relationship transcends merely incorporating industry products into academia. Rather, academia's primary objective revolves around nurturing adept individuals who comprehend the cutting-edge methodologies. In this context, INSAIT's role becomes pivotal – producing talents who can not only grasp but also advance the state-of-the-art AI landscape.”
> ***Petar Tsankov, Co-founder and CEO of LatticeFlow, Bulgaria***

While some AI service companies have reported satisfactory collaboration with academia, AI product companies seem less enthused. The largest number of AI product company respondents (20%) evaluated their cooperation with research institutions as average, with an overall rating of 5.4/10. This indicates a potential disconnect between the needs of AI product companies and the offerings of academic institutions.
However, there are shining examples of successful collaboration. LatticeFlow, a company that raised $12M in a Series A round in 2022 (*7), is one such example. Petar Tsankov, Co-Founder & CEO of LatticeFlow, emphasizes the importance of collaboration with academia.

2.2.3. Moving Forward

The feedback from the survey highlights the need for a more symbiotic relationship between the AI industry and academia in CEE. While there are strengths to build upon, such as the supportive community and some successful collaborations, there is a clear call for improvements in AI education and more effective partnerships between AI companies and research institutions.

In the future, it would be beneficial for academic institutions to work closely with industry players to tailor their curricula, ensuring that students are equipped with the skills that are in demand. Additionally, fostering more platforms for dialogue and collaboration can bridge the existing gaps and propel the CEE region to the forefront of global AI innovation.

> “What is missing both globally and locally is cooperation between the top companies and business in general and top academics and research institutions. In the future, we need to find a way to connect the AI innovation currently happening to keep up with the top universities and countries globally. Historically, the biggest breakthroughs within both AI research and Applied AI were happening in academia. However, now, innovations occur in the industry or just within the leading companies, which is odd. We really need both AI areas to be on the highest level. The programs in the Western nations are mostly successful because they are able to combine these two AI worlds.”
>
> ***Radovan Kavický,*** *Data Science Evangelist at AIslovakIA*

3. The Future of the Supporting Infrastructure in CEE

3.1. Opportunities

3.1.1. Specialized AI Hubs:

The establishment of more and more specialized AI hubs or centers of excellence within universities and research institutions can act as epicenters for advanced research and innovation. These hubs can foster deeper collaborations between academia, industry, and startups, driving forward the AI agenda.

> “The best deep tech incubators in the world are the computer science departments of strong universities because that is where the strongest people are and it is where one constantly plays with new ideas,”
>
> ***Martin Vechev****, Architect of INSAIT (*8)*

The establishment of more and more specialized AI hubs or centers of excellence within universities and research institutions can act as epicenters for advanced research and innovation. These hubs can foster deeper collaborations between academia, industry, and startups, driving forward the AI agenda.

One example of a specialized AI hub in the CEE region is AI Cluster Bulgaria. This professional non-governmental organization is dedicated to building a sustainable ecosystem in the Artificial Intelligence sector. Their technology profile spans a wide array of AI domains, including Machine Learning, Big Data, Computer Vision, and more.

One of the cluster's standout initiatives is the AI Club, founded in collaboration with Sofia Tech Park, which focuses on nurturing systems thinking, problem-solving, and research in AI. The cluster also emphasizes the importance of interconnecting different AI ecosystems, as this fosters the exchange of expert knowledge and the generation of unique ideas.

AI Cluster Bulgaria has forged successful partnerships with various institutions and organizations, such as the Ministry of Economy, BSMEPA, Sofia Municipality, and more. They've also collaborated with the Health & Life Sciences Cluster and the United Drone Association to stimulate high-value cross-industry projects. Furthermore, the cluster is a member of the Advisory Board of BRAIT (Bulgarian Employers' Association for Innovation and Technology), with several other tech clusters, and actively participates in entrepreneurship events in partnership with various organizations.

On the international front, AI Cluster Bulgaria is a part of the European AI Forum, an initiative aimed at ensuring startups and innovators in EU Member States have a voice in building an AI regulatory framework. They are also co-initiators of the Borderless AI Initiative with AI Austria, aiming to connect AI clusters globally to exchange best practices and develop policy recommendations. (*9)

3.1.2. Enhanced Collaboration with Academia:

"Academia's primary objective revolves around nurturing adept individuals who comprehend cutting-edge methodologies. The symbiosis between academia and business manifests as a conduit for developing top-tier professionals who can effectively bridge theory and application", ***Petar Tsankov, co-founder and CEO of LatticeFlow***

While certain segments of the AI industry in CEE already demonstrate promising collaboration between the private sector and academia, there's significant potential to deepen these ties. The Recursive AI Survey (*6) (indicates that AI service companies have given a favorable rating to their cooperation with research institutions (an average score of 6.4/10). This presents an opportunity to further leverage academic research for practical applications, bridging any existing gaps and fostering innovation.

A prime example of academia's pivotal role in AI development is the Master's Program in Data Science and Machine Learning at the Athens University of Economics and Business. As shared by Professor Vasilis Vassalos (*10), this program, initiated in 2015, was the first of its kind in Greece and among the pioneers in Southeastern Europe and the Southeastern Mediterranean. Over the years, it has become a reference point for curriculum development in the region. It accepts 35 to 40 students annually and its graduates have permeated virtually every AI initiative in Greece, with many also making their mark internationally. Companies across Greece with AI activities invariably boast a graduate from this program, underscoring the program's influence and the potential for enhanced collaboration between academia and the private sector.

"Companies and startups in Greece in general don't have a very strong relationship. Universities are not plugged in and in contact with the private sector, but in AI that situation is completely different. There is a very strong collaboration with companies of all sizes, from small startups to large established companies. Every Master's program in AI and Data Science has an industry component." ***Prof. Vasilis Vassalos, Director of MSc in Data Science at Athens University of Economics and Business***

3.1.4. Regional Synergy:

Given the diverse strengths of individual countries within the CEE, there is an opportunity to create a synergistic AI ecosystem. By leveraging the unique strengths of each country, the region can establish itself as a holistic AI powerhouse, offering a comprehensive suite of AI solutions, research, and innovation.

"We are striving to establish a stronger network within Central and Eastern Europe. This network involves identifying best practices, solutions, and implementations across different domains. Essentially, we are fostering connections between companies with specific expertise that can be shared throughout the region.

***Ilia Krastev**, Chairman of the Association for Innovation, Business Excellence, Services, and Technology (AIBEST)*

3.2. Challenges

3.2.1. Disconnect between Research and Commercialization:

"It is natural symbiosis because science without a use-case is useless bytes on some hard drive, while industry cannot solve problems and commercialize solutions without serious scientific research. So, science alone cannot put its fruits into production, and the industry alone cannot offer something genuinely new. There are plenty of cases in Silicon Valley and all around the world where the leading people in the industry research laboratories are professors in the universities, especially when the number of scientific papers exponentially grows. I'm happy that this is the case in Macedonia as well", ***Stojancho Tudjarski, data scientist from North Macedonia, senior Data Science Consultant and Data Science Trainer***

One of the significant challenges in the region is the gap between academic research and its practical, commercial application. Ensuring that groundbreaking research finds its way into real-world applications and startups will be crucial.

3.2.2. Lacking Cross-Sector Leadership Structures:

"I think the main problem right now, is that the entire community, including events, is built on the backs and time of a couple of people. We need these events to happen not only because a couple of people are putting in their free time, but because we have a mechanism, something like a hub. We should have a formal mechanism where we start building things", ***Traian Rebedea, Applied Scientist at Nvidia and Associate Professor at the University Politehnica of Bucharest***

While the region boasts an active AI community, there is a reliance on a select group of dedicated individuals driving many of the initiatives. This presents a challenge in terms of sustainability and scalability. Establishing structured hubs or networks with leaders from different sectors and a unified agenda is crucial to fostering collaboration and ensuring a more resilient and dynamic AI community.

List of key supporting infrastructure players

by country (A-Z) and by category

ALBANIA

Research institutions
1. Albanian Institute for Artificial Intelligence

Community Platforms & Event Organizers
1. Data and AI Tirana Meetup

BOSNIA AND HERZEGOVINA

Research institutions
1. Verlab Institute

BULGARIA

Research institutions
1. INSAIT
2. GATE
3. Department of Computational Linguistics (Institute for Bulgarian Language, BAS)

Startup programs
1. Bulgarian Expansion Bridge

Community Platforms & Event Organizers

1. AI Cluster Bulgaria
2. AIBEST

KOSOVO

Startup Programs: Incubators & Accelerators
1. ICK — Innovation Centre Kosovo

Community Platforms & Event Organizers
1. ICK — Innovation Centre Kosovo

MONTENEGRO

Research institutions
1. Montenegrin Artificial Intelligence Association (MAIA)

Community Platforms & Event Organizers
1. Data Zen Serbia & Montenegro

HUNGARY

Research institutions

1. Artificial Intelligence National Laboratory (MILAB)
2. Budapest University of Technology and Economics (BME)
3. AI Research Group (Eötvös Loránd University)

Startup Programs: Incubators & Accelerators

1. Artificial Intelligence Coalition (AI Coalition)

Community Platforms & Event Organizers

1. Meetup - Artificial Intelligence groups in Hungary
2. Open Natural Language Processing Meetup
3. Budapest Artificial Intelligence Meetup
4. Budapest Deep Learning Reading Seminar
5. AI & Aut EXPO

CZECH REPUBLIC

Research institutions

1. AI Center (CTU)
2. Czech Institute of Informatics, Robotics and Cybernetics (CIIRC CTU)
3. Institute of Computer Science (The Czech Academy of Sciences)
4. IT4Innovations (VSB-Technical University of Ostrava)
5. Center for Machine Perception (CMP)
6. BUT Speech@FIT
7. RICAIP

Startup Programs: Incubators & Accelerators

1. AI Startup Incubator
2. Startup Yard

Community Platforms & Event Organizers

1. Brno.AI
2. prg.ai
3. Prague Artificial Intelligence & Deep Learning Meetup
4. AI Observatory and Forum

GREECE

Research institutions

1. ARCHIMEDES
2. Democritus University of Thrace
3. Athena Research and Innovation Center
4. Artificial Intelligence and Learning Systems Laboratory
5. TALOS Center in Artificial Intelligence for Humanities and Social Sciences
6. Artificial Intelligence Group
7. Laboratory of Intelligent Systems & Robotics + Optical Computing Laboratory (IPTHIL)
8. Smart Farming Technology Group - Agricultural University of Athens
9. AUEB Natural Language Processing Group
10. Institute for Language and Speech Processing

Community Platforms & Event Organizers

1. EETN - Hellenic Artificial Intelligence Society

SLOVENIA

Research institutions

1. International Research Centre on Artificial Intelligence (IRCAI)
2. Department for Artificial Intelligence (Jožef Stefan Institute)
3. Faculty of Computer and Information Science, University of Ljubljana
4. Faculty of Electrical Engineering, University of Ljubljana

Community Platforms & Event Organizers

1. Start:up Slovenia
2. SLAIS | Slovenian Artificial Intelligence Society
3. OECD AI Observatory

POLAND

Research institutions

1. IDEAS NCBR
2. AI division (part of the Institute of Computer Science, at the Faculty of Electronics and Information Technology of the Warsaw University of Technology)
3. Department of Artificial Intelligence at Wroclaw University of Science and Technology
4. Artificial Intelligence Research Institute
5. Computer Vision Laboratory AGH

Startup Programs: Incubators & Accelerators

1. Nextgrid

Community Platforms & Event Organizers

1. AI Poland
2. Big Data Technology Warsaw Summit
3. Warsaw.AI
4. Artificial Intelligence Poznan
5. Digital Poland
6. Nomagic Warsaw MIMotaurs

ROMANIA

Research institutions

1. Romanian Institute of Science and Technology
2. Research Institute for Artificial Intelligence, Romanian Academy (RACAI)
3. University Politehnica Bucharest (UPB) - The Lab of Artificial Intelligence and Multi-Agent Systems

Startup Programs: Incubators & Accelerators

1. Techcelerator – Advancing AI Accelerator Program for Early Stage Startups
2. BeAI Europe's AI Pre-Accelerator, by Bucharest AI

Community Platforms & Event Organizers

1. ARIA | Romanian Association for Artificial Intelligence
2. AI Romania
3. Artificial Intelligence Bucharest Meetup
4. Association For Science And Application Of Artificial Intelligence
5. IAȘI AI
6. Romanian AI Days
7. Timisoara Deep Learning Hub

SERBIA

Research institutions
1. The Institute for Artificial Intelligence Research and Development of Serbia
2. ReLDI Centre Belgrade

Community Platforms & Event Organizers
1. Belgrade AI
2. Serbian AI Society
3. AI Serbia Meetup
4. Data Science Serbia
5. ICT Hub Serbia

SLOVAKIA

Research institutions

1. Kempelen Institute of Intelligent Technologies (KInIT)
2. Project TERAIS
3. Centre of Excellence for SMART Technologies, Systems and Services (Slovak University of Technology)
4. SAS - Institute of Informatics
5. Slovak Centre for Artificial Intelligence Research

Startup Programs: Incubators & Accelerators

1. Industry Innovation Cluster, an accelerator and platform for innovation in Slovak industry

Community Platforms & Event Organizers

1. National platform for the AI development in Slovakia
2. AISlovakIA - AmCham

SOURCES

1. Snezhana Simeonova, "INSAIT's Ecosystem Sparks Success: First Deep Tech Spin-off Raises $2.2M Pre-Seed", The Recursive, 2023, https://therecursive.com/martian-lawyers-club-an-insait-spin-off-lands-2-2m/
2. Nextgrid, official website, 2023, https://nextgrid.ai/
3. CroAI, official website, 2023, https://www.croai.org/
4. The Government of The Republic of Serbia, "Ethical guidelines for development, use of artificial intelligence adopted" (government statement), 2023, https://www.srbija.gov.rs/vest/en/203799/ethical-guidelines-for-development-use-of-artificial-intelligence-adopted.php
5. Czech Technical University in Prague (Czech Institute of Informatics, Robotics and Cybernetics), Teams & labs, official website, 2023, https://www.ciirc.cvut.cz/teams-labs/
6. The Recursive AI survey, May-August 2023
7. Elena Ivanova, "LatticeFlow's $12M Series A Moves Bulgaria a Step Closer to a Deep Tech Hub", The Recursive, 2023, https://therecursive.com/latticeflow-s-12m-series-a-moves-bulgaria-a-step-closer-to-a-deep-tech-hub/
8. Snezhana Simeonova, "INSAIT's Ecosystem Sparks Success: First Deep Tech Spin-off Raises $2.2M Pre-Seed", The Recursive, 2023, https://therecursive.com/martian-lawyers-club-an-insait-spin-off-lands-2-2m/
9. AI Cluster Bulgaria, official website, 2023, https://www.aicluster.bg/home
10. The Recursive Interview with Prof. Vasilis Vassalos, September 2023

Prof. Martin Vechev

Architect of INSAIT – Institute for Computer Science, Artificial Intelligence and Technology

Prof. Martin Vechev is a Full Professor of Computer Science at ETH Zurich where he leads the Secure, Reliable, and Intelligent Systems Lab. He obtained his Ph.D. from the University of Cambridge, England. His work spans the broad intersection of artificial intelligence and programming languages, including both theoretical and system aspects. He has co-founded 3 startups in the area of Safe and Robust AI, Blockchain Security, and AI for Code (2 acquired).

> "It is imperative for CEE to follow the INSAIT example: work on becoming a technological leader where technology is actually created, not just outsourced or applied. World-class research is absolutely fundamental, there is no way around this."

INSAIT's Innovation Alchemy: Transforming Research into Thriving Ventures

Sofia-located INSAIT – Institute for Computer Science, Artificial Intelligence is the first of its kind in Eastern Europe to offer world-class research facilities and conditions. It was founded in April 2022, in partnership with Switzerland's ETH Zurich and EPFL, and is closely advised and supervised by top academics from U.S., European, and Israeli universities and research labs.

INSAIT has been funded with nearly 100M USD by the Bulgarian government over 10 years and about 15M USD from donations by big-tech companies such as AWS, Google, DeepMind, VMware, SiteGround and others.

What are some of the most promising AI research areas or applications that your organization is currently exploring?

We are currently exploring a range of strategic directions in AI: robotics, computer vision, AI for space data processing, trustworthy, safe, and ethical AI, quantum computing, and many others.

What is INSAIT's strategy for commercializing research? Are there any plans for spin-out startups in the next 24 months based on the technologies developed inside the institute?

INSAIT's strategy for commercialization is the same as that of all world-class universities such as MIT, Stanford, ETH Zurich, Technion and similar. This strategy revolves around the same basic simple principle: get the best people and give them freedom to think and create. Many great startups will follow from here. INSAIT announced its first deep-tech startup (Martian Lawyers Club (MLC), ed.note) literally months after it started operating, demonstrating why this approach works in practice. I would say this is by far the most successful and proven model in the world for creating deep-tech companies. It's really different from anything else that exists in CEE as of today, but with INSAIT, the situation is changing.

How do you think the upcoming EU AI regulatory framework will impact the adoption of AI products and services? Are there any specific implications for research institutions like INSAIT?

This is a very important topic as AI can really be used for all kinds of malicious purposes. I think regulations of some kind are a good idea, but they need to be carefully thought out, in order to avoid hampering innovation. INSAIT is very involved with regulations, and soon we will announce results that impact the enforcement of the regulatory framework.

Which are the current drivers of the European AI research industry in your view and what kind of initiatives can further boost its growth?

One of the most important global initiatives (EU level) is certainly ELLIS , an initiative that aims to unite Europe in order to be more competitive in AI. It is really a network of research institutions and getting into ELLIS is not easy. For instance, not a single ELLIS unit exists in Eastern Europe (current units are in places like Oxford, Zurich, Haifa, etc.) and now INSAIT is the first one! Aside from that, governments must have a strategy for building up and funding research, like INSAIT has done in Bulgaria. More and more governments are realizing this.

Which are the top AI specializations and skills in Bulgaria according to you?

I believe the strongest suit in Bulgaria is the mathematical background. Good AI rests on such skills. So this is something that should be encouraged and developed further.

What global AI trends do you think will have the most impact on the CEE region?

Some of the automation that the latest AI systems provide can be dangerous for CEE. This is because it will automate many outsourcing-type of tasks or call-center type of tasks, which are not uncommon in the region. This is why it is imperative for CEE to should follow the INSAIT example: work on becoming a technological leader where technology is actually created, not just outsourced or applied. Really, world-class research is absolutely fundamental, there is no way around this.

Prof. Sylvia Ilieva

Ph.D, Director of GATE Institute (Big Data Research Institute part of Sofia University)

Sylvia Ilieva is a professor at the Faculty of Mathematics and Informatics and Director of GATE Institute at Sofia University “St. Kliment Ohridski”. Her research interests are in the areas of software platforms, software development processes, data management, and software engineering for AI. She has participated in over 20 European research and education projects.

> “The biggest challenge which the CEE countries face with respect to AI is linked to the general lack of traditions for pushing for innovation and the absence of organizational frameworks and experience in management of the innovation ecosystem.”

GATE Institute Elevates CEE in NATO's Innovation Odyssey

Advancing Big Data and AI within the DIANA Initiative

GATE Institute, part of Sofia University “St. Kliment Ohridski” in Sofia, Bulgaria, offers a Master's program titled "Big Data Technologies." The program delves deeply into data science and big data analysis. Designed to equip students for the surging demand in data management in our digital age, the course spans over three semesters. The program boasts collaborations with software companies such as Ontotext and Rila Solutions, as well as global universities like Chalmers University and University of Milano Bicocca.

What are some of the most promising AI research areas or applications that your organization is currently exploring?

In the Future Cities domain, GATE offers solutions using geospatial data, AI, and IoT for better city planning and enhancing citizens' quality of life. Our semantically enriched 3D city models harness Geospatial AI (GeoAI) for knowledge discovery from vast spatial data.

GeoAI merges spatial data science with AI, drawing from fields like computer science, civil engineering, and ML. While AI's application in geography isn't new, advancements like Generative Adversarial Networks have revolutionized it. GeoAI, with its focus on spatial relationships, offers solutions for urban planning challenges like urban heat islands and air quality.

In Digital Health, GATE centers on Big Data for digital transformation, emphasizing Translational Neuroscience. We study neurodevelopmental disorders like autism and neurodegenerative diseases like Alzheimer's. Our R&D directions include:

- Autonomous Reinforcement Learning for Remote Detection of Motor Paroxysms: Aiming for a robust system adapting to monitoring environments.
- Multi-stable autonomous neuro-dynamics: A new framework using multi-stable models with physiologically informed parameter choices.
- Brain-like computing architectures for clinical diagnostic and surveillance purposes: Integrating Neural Network Modelling and Complex Networks for tasks like visual attention switching.

How does GATE Institute, as a part of NATO's DIANA initiative and its recent collaboration with Quasar, plan to advance AI-focused projects for the Alliance?

NATO’s Defence Innovation Accelerator for the North Atlantic (DIANA) aims to create a vibrant ecosystem of innovators, entrepreneurs, researchers, investors, and experts in the field of security and defense so that they can co-develop next-generation technologies for the benefit of national resilience across the Alliance.

Following a successful bid with NATO’s International Secretariat, GATE was recognized to be a DIANA test center in the field of big data and artificial intelligence. Being a part of DIANA’s ecosystem, GATE is going to host innovators from Bulgaria and across the Alliance, who can bring their concepts for evaluation, verification, and validation.

GATE is also building a network of local partnerships, including that with the Center of Competence (Quasar). The objectives of our mutually reinforcing partnership include an exchange of knowledge and good practices as well as joint activities of common interest.

Are there any AI-focused NATO projects that GATE is currently working on or ones we can anticipate in the near future?

NATO's DIANA strategy for 2023 emphasizes energy resilience, secure information sharing, and sensing and surveillance. These areas are pivotal in today's unpredictable landscape, especially post-natural disasters or in conflict regions.

For Energy Resilience, DIANA aims for modular microgrid designs ensuring consistent supply. The Secure Information Sharing challenge focuses on establishing a trusted environment for live data streams, including real-time video and digital radio. The Sensing and Surveillance challenge seeks advanced systems for subsurface coastal monitoring, encompassing seafloor mapping, undersea infrastructure checks, marine-life tracking, and climate impact sensing.

How would you evaluate the potential for growth and development in the AI innovation ecosystem in CEE and why? What is the biggest challenge in your view?

Bulgaria as well as the entire CEE world is well-positioned to play a role in the adoption of AI from an academic point of view. The potential for growth of AI applications in both industry and other spheres of society is very much in line with the common European trends due to the comparable size of the CEE economies, despite somewhat falling behind the West European economies due to historical reasons.

However, the biggest challenge which the CEE countries face with respect to AI is linked to the general lack of traditions for pushing for innovation and the absence of organizational frameworks and experience in management of the innovation ecosystem. However, this obstacle can be overcome by the adaptation of well-established frameworks for innovation management from leading European countries, like the UK, Germany, and Sweden, for example.

What societal impacts do you foresee from the AI technologies being developed at GATE?

GATE is focusing on Responsive research and innovation and the AI technologies have very strong societal and business impact.

The GATE research is aiming to fight global challenges such as pandemics (Digital health area COVID-19 HUB project), climate change (Future Cities and Digital Twin City program, DTCC, employEMDS, FLEdge, GEO-AI projects) and disinformation (Disinformation flagship program and BROD and TRACES projects).

> “NATO's DIANA strategy for 2023 emphasizes energy resilience, secure information sharing, and sensing and surveillance. These areas are pivotal in today's unpredictable landscape, especially post-natural disasters or in conflict regions.

Dejan Mircetic

PhD, Research Associate at the Institute for Artificial Intelligence of Serbia

> “The blend of pure science and its commercial potential is what will shape the future of AI and the broader tech industry in Central and Eastern Europe.”

Dejan Mircetic is a scientific researcher at the Institute for the Artificial Intelligence of Serbia, where he currently works on projects related to the application of AI solutions to business and industry problems.

Established in March 2021 by the Serbian government, the Institute for Artificial Intelligence of Serbia brings together AI enthusiasts - scientists, researchers, and industry experts - dedicated to the research of AI and its application in various fields.

How Commercialization Fuels Technological Progress in AI

How do you see the intersection between scientific research and the commercialization of the industry right now?

The industry's commercialization not only provides the necessary funds and resources to continue cutting-edge research but also serves as a feedback loop, highlighting real-world challenges that require innovative solutions. This synergy propels both scientific discovery and entrepreneurial ventures forward.

However, it's crucial that as we stride ahead, the integrity of research remains uncompromised, and the commercial benefits are balanced with ethical considerations. In essence, the blend of pure science and its commercial potential is what will shape the future of AI and the broader tech industry in Central and Eastern Europe.

What are the current challenges or pain points in industries across the CEE that AI can address or solve?

One prominent challenge is the modernization of legacy systems, especially in manufacturing and public services. AI can help streamline operations, optimize supply chains, and predict maintenance needs. Another pressing concern is the efficient utilization of resources in agriculture. Advanced AI models can assist in precision farming, enabling farmers to use water, fertilizers, and pesticides more judiciously, thereby enhancing yield and sustainability.

What are the potential risks and challenges associated with the adoption of AI in the industry?

The adoption of AI in industry, while offering tremendous benefits, brings with it several risks and challenges. One of the most pressing concerns is ethical considerations. As AI systems make decisions, there's a potential for biases, especially if the data they're trained on is not representative or contains inherent prejudices.

This can lead to unfair or discriminatory outcomes in sectors like finance, healthcare, or recruitment. Another challenge is the potential loss of jobs. Automation through AI might lead to job displacement in certain sectors, necessitating a significant focus on upskilling and reskilling the workforce.

Then, there's the matter of data privacy. As AI systems often rely on vast amounts of data, ensuring that personal and sensitive data are protected and not misused becomes paramount.

What are your concerns when it comes to the ethical implications of AI in your particular area of research?

In my work with time series forecasting and supply chain analytics, the ethical implications of AI weigh heavily on my mind. One primary concern is the potential misuse of predictive data, which could lead to biased decision-making, especially if the underlying data is not representative or has inherent biases.

Furthermore, as supply chains inherently involve multiple stakeholders, the transparency of AI-driven decisions becomes paramount. Without clear communication of how certain predictions are made, there could be a lack of trust among partners or even unintentional favoring of one entity over another.

How would you evaluate the availability and quality of talent with the necessary AI skills in Serbia and the region?

Evaluating the AI talent pool in Serbia and the broader CEE region, it's clear that there's a rich reservoir of skilled individuals. Historically, this region has a strong foundation in mathematics, engineering, and computer science, providing an advantageous starting point for the development of AI expertise. Institutions of higher learning in Serbia have been progressively introducing and updating AI and data science curriculums, which is a testament to the growing talent base.

However, while there's an abundance of raw talent, there remains a gap when it comes to specialized skills and hands-on industry experience. In the AI domain, businesses and research institutions are looking for expertise in areas like time series forecasting, deep learning, natural language processing, and computer vision. But beyond technical skills, there's an increasing demand for professionals who can navigate the ethical and societal implications of AI, emphasizing the need for interdisciplinary training.

Which are the top AI specializations and skills in Serbia according to your findings so far?

In my research within time series forecasting and supply chain analytics in Serbia, several AI specializations and skills have emerged as prominent. First and foremost, expertise in deep learning, particularly recurrent neural networks (RNNs) and Long Short-Term Memory (LSTM) networks, is highly sought after due to their proficiency in handling sequential data like time series.

Machine learning model interpretability is another crucial area. As supply chains can be complex and involve multiple stakeholders, understanding and explaining AI-driven decisions is essential to foster trust and collaboration. Additionally, optimization techniques, especially those related to nonlinear programming and constraint optimization, are crucial as they directly impact supply chain efficiency. This ties closely with skills in operations research, which is integral to many supply chain problems.

> Beyond technical skills, there's an increasing demand for professionals who can navigate the ethical and societal implications of AI, emphasizing the need for interdisciplinary training.

Adrian Matei:

Witnessing a historical moment with the rise of Generative AI

Adrian Matei, Data, AI & Enterprise Digital Solutions Director at Orange joined us in a conversation on the future of AI, from the lens of an expert with access to a global company whose priority is to encourage and leverage tech innovation.

Global AI Strategy and Local Alignment: How do global strategies in Data and AI influence local markets, and how has Orange Romania adapted these strategies to fit the local context?

Data & AI is a core catalyst accelerating global digital transformation, and it's an important part of Orange Group's 'Lead the Future' strategy. Orange Romania aligns with it by positioning data as a core company asset and embracing AI and automation at scale.

Regarding challenges, ensuring the responsible, ethical and green use of AI, and data security and privacy is a core concern, especially when scaling up AI inside the organization, plus the need to reskill and upskill employees impacted by AI.

Regarding opportunities, Data and AI adoption facilitates educated responsible decision-making and people empowerment, increases productivity and efficiency, and fuels sustainable business value creation and growth.

AI Integration in Various Sectors: How is AI being integrated across various sectors such as customer service and network development?

In customer services, Orange Romania implements virtual digital assistants, chatbots like Djingo and voice bots like Djia. On top of that, AI algorithms support customer trends and patterns analysis, personalized experiences generation and targeted campaign execution. Today, around 17% of our total customer contacts are handled by Djingo and Djia.

For telecommunication networks operations, we use AI to predict network outages and minimize service disruptions to our customers. We perform automated problem detection and root cause analysis on VoIMS / VoLTE services, moving from an hour-based to a minute-based granularity. Other applications include smart prioritization of fixed fiber and mobile 5G investments.

Collaboration with Industry Leaders: How do collaborations with tech giants impact the digital transformation process in the telecom sector?

To accelerate digital transformation, we rely on internal capabilities, as well as an ecosystem of local and global ICT partners.

The collaborations with tech industry leaders like Google, SAS or OpenAI and Microsoft provide a perfect balance between enterprise-grade access to infrastructure and architecture standardization.

In terms of Data & AI the strategic global partnership with Google on Cloud is instrumental. Cloud is a change in mindset, a complex journey that is both technical and cultural. In Orange we are building a unified secure telco Data Lakehouse in Google Cloud.

We are witnessing another 'iPhone' moment, with the rise of Generative AI. This is a new frontier, where Orange is experimenting alongside core partners like Google, OpenAI and Microsoft.

Startups, Innovation, and Orange Romania: How are startups contributing to AI innovation in the telecom industry, and how has Orange Romania engaged with startups for testing and implementing AI solutions?

With more than 100 projects to date, our core innovation program has 50 startups enrolled since 2017. Some success stories include the integration of the Nestor employee experience and performance product; the cases implemented with SecurifAI in the field of real-time video surveillance; the product built with SiScale on CyberAI for infrastructure security and AIOps; and many more.

Future of AI in Telecom and Orange Romania's Goals: What are some key goals and strategies in the AI domain for the telecom industry over the next 3-5 years?

Data Management and AI are integral to the future of all telco providers. The industry is already rich in terms of AI-powered solutions, but over the next 3-5 years we expect them to mature.

Aside from Cloud-based unified Data Lakehouse, Generative AI, other core strategic areas of development include Zero-Touch Operations and Autonomous Networks, Decision Intelligence, Data and AI Literacy at scale, and Ethical and Responsible AI observing ESG principles.

Talent Pool for AI Innovation in the CEE

Author: Bojan Stojkovski

Key takeaways

- The difficulty in attracting AI talent in the CEE region could threaten its future as an AI hub, but ongoing efforts to improve AI education present an opportunity for addressing such challenges.

- While there is a high demand for AI-related skills like data scientists and AI software engineers in CEE, there is also a shortage of roles like machine learning solutions engineers and MLOps engineers, highlighting the need for a more diversified talent pool to support various aspects of the AI industry.

- Collaboration between academia and industry is seen as a promising avenue to bridge the skills gap and capitalize on local talent, despite challenges like limited specialized AI education and the brain drain phenomenon.

The Central and Eastern Europe (CEE) region has emerged as a promising hub for AI innovation, with a growing pool of talent contributing to both product and service companies. In this segment, we will dive into the intricacies of the AI talent ecosystem in CEE, offering insights into the challenges faced by startups, companies, and investors.

The difficulty in finding and attracting talent poses a potential threat to the region's future as an AI powerhouse, while the current momentum in improving AI education serves as an opportunity. Additionally, AI product companies grapple with a wide range of challenges during product development, with funding and customer adoption being particularly pressing issues.

Both the survey and expert interviews conducted by The Recursive in the past few months have shown that the region faces significant challenges, but also certain strengths which can prove key when it comes to building and sustaining a robust AI talent ecosystem.
The demand for AI-related skills in the CEE region is evident from job postings, highlighting the critical roles of data scientists, machine learning engineers, AI software engineers, and others. However, insights from AI startups and companies indicate that there is a particular shortage of roles like machine learning solutions engineers and MLOps engineers, illustrating a need for a diversified talent pool that can cater to various facets of the AI industry.

On the bright side, the CEE region boasts a strong IT foundation, a pool of talented professionals, and reputable educational institutions specializing in IT. This technical prowess provides a solid foundation for AI innovation, and the region's engineers have a reputation for loyalty and dedication, which is invaluable for addressing complex AI challenges.

Countries like Bulgaria, Romania, and the V4 countries, with rich histories in mathematics and engineering, further enhance the local talent pool's development. Their contributions to AI, both in terms of talent and successful startups, demonstrate the region's enormous potential.

However, the limited availability of specialized AI educational programs has hindered the development of a skilled AI workforce. Additionally, the phenomenon of brain drain, where IT professionals seek opportunities abroad, poses a substantial concern.

Nonetheless, opportunities are emerging in the form of improved collaboration between academia and industry, and such initiatives are expected to help bridge the skills gap and provide exciting opportunities for the industry to tap into local talent.

1. The Talent Challenge: Finding and Attracting AI Experts

- Despite the CEE region's strong reputation for IT talent, AI product companies face significant challenges in finding and attracting skilled AI professionals

- The quality of AI education and training in CEE research institutions and universities is rated as only average by both AI product and service companies

Finding and attracting talent remains a critical issue for AI product companies in the CEE region, despite its reputation for strong IT talent. In The Recursive AI Survey, product companies reported having medium to high difficulty in finding and attracting talent with the needed skill set and expertise in the AI field. In fact, the majority, or

20%, answered with high difficulty, rating it at 8 out of 10, while the average rating across the sector was a moderate 6.3 out of 10. This disparity highlights the persistent challenge of sourcing and attracting top-tier AI talent in the CEE region, even though it boasts a wealth of IT expertise.

Furthermore, companies in the region seem to believe AI education in the CEE region could be vastly improved, which may be related to the current lack of local AI talent development. Most AI product and service companies rated the quality of education and training provided in AI-related fields in local research institutions and universities as only average, with 5.8 out of 10. These scores reflect a potential threat to the future of AI talent in the region, as the education system may not be providing graduates with the skills and knowledge necessary to meet industry demands effectively.

2. Skills in Demand: Insights from CEE AI Product Companies

- Job postings in the CEE region highlight strong demand for specific AI roles, including Data Scientists responsible for data analysis, Machine Learning Engineers and Researchers designing machine learning models, and AI Software Engineers building AI-powered software systems

- AI product companies in the region primarily employ experts in machine learning (80%), followed by data science (65.5%) and natural language processing (43.6%), with a lesser focus on computer vision (10.9%) and robotics

- AI service companies have a different talent composition, with AI software engineers dominating (46.2%), followed by data scientists (26.9%), and a smaller percentage specializing in sales and marketing (11.5%)

A closer look at job postings on LinkedIn in countries from the CEE region reveals a distinct trend: certain job positions within the AI industry are in exceptionally high demand. These roles not only underscore the critical role AI plays in various sectors but also shed light on the skill sets most valued by organizations seeking to harness the potential of AI technologies.

Data Scientist: Data scientists are responsible for collecting, analyzing, and interpreting complex data to drive AI and machine learning projects.

Machine Learning Engineer/Researcher: These professionals design and develop machine learning models and algorithms, making them crucial in AI research and development.

AI Software Engineer: AI software engineers build and maintain software systems that incorporate AI and machine learning capabilities.

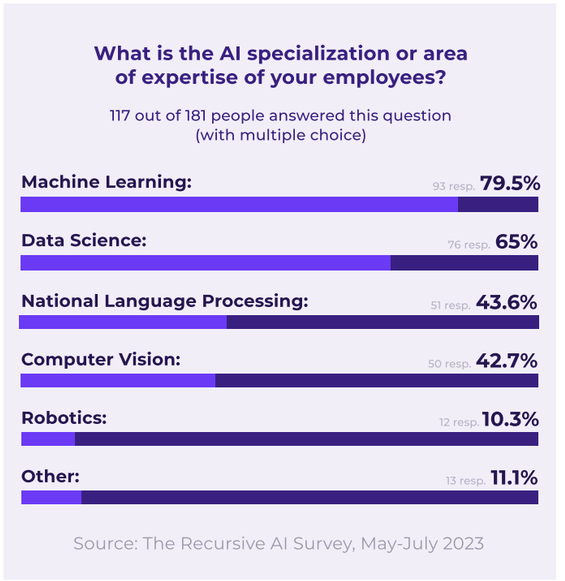
DevOps Engineer: Their primary responsibility is to bridge the gap between software development and IT operations by advocating for practices, tools, and culture that facilitate collaboration, automation, and efficiency throughout the software development lifecycle.

Natural Language Processing (NLP) Engineer: NLP engineers specialize in developing AI applications that can understand and generate human language.

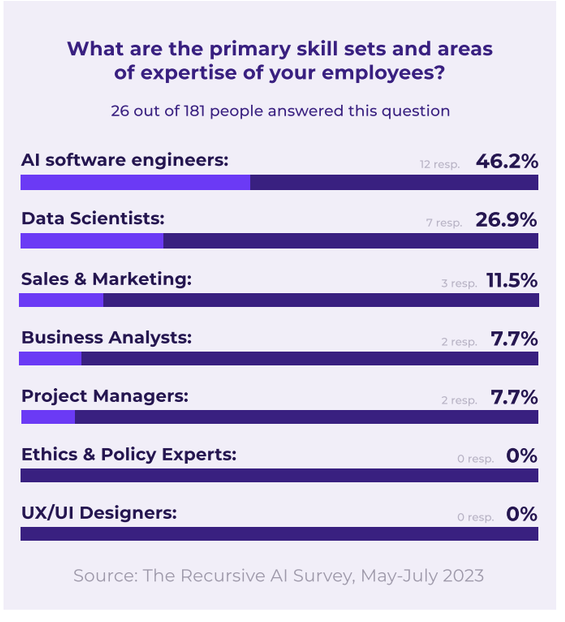
Computer Vision Engineer: Computer vision engineers work on AI systems that can interpret and understand visual information from images or videos.

AI/ML Product Manager: Product managers with expertise in AI/ML help define and lead the development of AI-powered products and solutions.

The Recursive AI survey has unveiled critical insights into the talent landscape for AI product companies (*1). According to respondents the area of expertise among their employees primarily revolves around ***machine learning***, with a substantial 80% of the workforce specializing in this domain. Following closely behind, ***data science*** expertise stands at 65.5%, while ***natural language processing*** garners a significant 43.6% concentration. In contrast, ***computer vision*** takes a somewhat lesser spotlight, with a presence of 10.9%, and robotics trails behind.



On the other hand, AI service companies have their unique talent composition and set of challenges. The survey indicates that AI software engineers dominate the workforce, constituting 46.2% of their employee base, followed by data scientists at 26.9%. Sales and marketing professionals make up 11.5%, while a smaller percentage, 7.7%, specialize in other areas.



Finding and attracting the right talent remains a challenge for AI service companies in the region as well, with 23.1% rating it as above 5 out of 10, and 15.4% rating it above 8 out of 10, resulting in an average rating of 5.8. Domain knowledge is the most elusive expertise, closely followed by mathematics and statistics, programming skills, and project management. These challenges underscore the importance of innovative talent acquisition strategies and ongoing investment in skill development in the ever-evolving field of AI for both product and service companies.

2.1. Key sources for AI talent acquisition

When it comes to sourcing AI talent, product companies rely on various avenues. Employee referrals are a dominant source, with a majority share of 55.5%. University partnerships play a significant role, contributing to 39.1% of talent acquisition, followed closely by job boards and online platforms at 38.2%. In-house training and upskilling programs are leveraged by 32.7% of these companies, while networking events and conferences make up 28.2% of their talent pipeline.

2.2. A note on the effects of automation on the job market

Impressively, a significant 88.1% of AI product companies in CEE do not anticipate job cuts due to AI automation. However, despite their commitment to AI, a notable challenge persists in finding and attracting the right talent, with 20% rating the difficulty as 8 out of 10 and 19.1% rating it as 7 out of 10, resulting in an average difficulty rating of 6.3 out of 10. Interestingly, the primary challenge lies in sourcing talent with domain knowledge, followed by mathematics and statistics, programming skills, and product management expertise.

Meanwhile, for AI services companies employee referrals remain a crucial source for talent acquisition, with 53.8% relying on this channel. In-house training and upskilling programs, job boards, and university partnerships all contribute equally, with 34.6% each. A significant 84.6% of AI service companies do not anticipate job cuts due to AI automation, showcasing a positive outlook in this regard.

2.3. Insights from regional innovation experts

When it comes to evaluating the availability and caliber of talent with essential AI skills, particularly in Bulgaria and the broader region, multiple interviews that The Recursive team had with Bulgarian AI startup founders have shown that three main roles that are challenging to find are- machine learning engineer, machine learning solutions engineer, and the MLOps engineer (*2).

The first role, the machine learning engineer, often conjures up a misconception. It's commonly thought that you need a PhD, deep research experience, and a wealth of publications. However, this notion isn't entirely accurate. The PhD-intensive focus is more aligned with the local machine learning scientists or researchers – the trailblazers developing novel machine learning techniques, architectures, and loss functions. These experts, often at institutions like DeepMind or OpenAI, are shaping the future of AI.

For most startups, what's really needed are machine learning engineers. These engineers possess a solid understanding of machine learning and can be taught the specifics. What's more crucial is their engineering foundation, their capacity to construct modular, well-structured code with excellent architectural practices.

The machine learning solutions engineer is a role that requires more interpersonal and sales-oriented skills. It's about actively listening, understanding customer needs, and aligning those needs with the benefits the product offers, necessitating a deep understanding of machine learning, the customer landscape, and the unique context of each company.

There is also the coveted role of the machine learning ops engineer – the unicorn among talents, as experts are referring to it. This role is akin to the DevOps engineer, but tailored specifically for the realm of machine learning. These engineers grasp the intricate infrastructure involved in building and deploying AI algorithms at scale, manage pipelines, ensure the smooth execution of processes, and safeguard data integrity through multiple steps.

3. Strengths of the CEE Talent Pool for AI

> ""I think innovation is already happening and will accelerate in the AI innovation ecosystem in Central and Eastern Europe (CEE). The main reason for this acceleration is the abundance of talent in the region. We have a pool of highly skilled professionals with expertise in math, physics, computer vision, and computer science. Some engineers have years of experience, while others are fresh out of college. In the past few years, educational institutions have also started offering majors specifically focused on AI, computer vision, machine learning, and neural networks. This has contributed to fostering a strong talent base"
>
> ***Vince Gaydarzhiev**, founder of Alcatraz AI (Bulgaria).*

- The CEE region possesses a robust IT foundation supported by skilled IT professionals and renowned IT-focused educational institutions, making it well-suited to integrate and leverage AI as an extension of its technological expertise
- Unlike some other regions where engineers frequently switch companies, the CEE region stands out for its high degree of loyalty among talent
- Countries like Romania and Bulgaria benefit from rich histories in mathematics and engineering, enhancing their local talent pools

One of the notable strengths in the context of adopting Artificial Intelligence is the region's robust IT foundation. With a strong IT background, bolstered by talented IT professionals and reputable educational institutions specializing in IT, CEE is uniquely positioned to leverage AI as a seamless extension of its technological prowess.

Another strength of the talent in the region is their capacity to work effectively in teams to solve complex problems over the long term. The interviews that The Recursive team had with CEE-based AI startups and companies resulted in a conclusion that while in other regions engineers may frequently switch companies, the CEE region is becoming known for a higher degree of loyalty.

The insights that The Recursive got from industry experts also show that in many cases, engineers stay with one company for 2 to 5 years, or even longer, and this commitment allows them to deeply focus on addressing significant issues, especially with an AI focus. It also facilitates active involvement in product implementation and deployment, gathering customer feedback, and iterating on the product to continually improve it.

Bulgaria's neighbor Romania is one of the countries that has a rich history in mathematics and engineering, which further enhances the development of the local talent pool, experts from both countries told The Recursive. In turn, this effectively helps Romania establish the necessary educational bases to develop cutting-edge AI models, optimization techniques, and advanced algorithms that solve complex problems.

The country also has had a lot of talent developing engineering products, illustrating the deep talent pool of Eastern Europe through success stories such as UiPath. Additionally, global companies are also having a significant number of employees from the region. Therefore, startups and tech companies are choosing to have their main development team in the country for the foreseeable future, industry experts from Romania told The Recursive.

The V4 countries are another example due to their deep technical knowledge and the local talent that is present in these countries. According to V4 industry experts, on a fundamental level, countries such as Hungary and Poland for example have a history of developing great mathematicians and a foundation for fundamental computing (*3).

While issues might arise in the form of bureaucracy and outdated educational systems, the V4 region does remain in a good position for the local talent pool to be on the edge of innovation.

4. Weaknesses of the CEE Talent Pool for AI

> "One notable challenge prevalent in Eastern Europe, however, pertains to talent. The pool of individuals well-versed in state-of-the-art AI technology remains somewhat limited. This limitation emanates from the educational framework and the level of research in the region. Addressing this discrepancy presents a more complex challenge with longer-term implications, one that requires thoughtful consideration and investment. Despite this drawback, it's imperative that we navigate these dynamics with awareness and discernment,"
>
> *Peter Tsankov, co-founder and CEO of LatticeFlow (Bulgaria)*

- The CEE region faces significant challenges in AI education, with limited availability of specialized programs, weak academia-industry collaboration, and a brain drain phenomenon
- The region also lacks world-class machine learning and AI skills, especially in local institutions, leading many scientists to develop professionally in Western countries due to a lack of research and education institutions in the field
- In addition to technical skills, there's a growing demand for professionals who can handle the ethical and societal implications of AI, emphasizing the need for interdisciplinary training

Despite its promising potential in the field of AI, the region faces significant challenges that warrant attention. One of the foremost hurdles is the limited availability of specialized AI educational programs, which has hindered the development of a skilled workforce in this critical domain.

Additionally, there is also weak collaboration between academia and industry, meaning that universities don't have enough collaborations with industry and therefore students don't get enough hands-on experience in various fields.

The phenomenon of brain drain which is a common issue for CEE economies, with IT professionals seeking opportunities abroad, poses a substantial concern (*4). This exodus of talent not only depletes the country's intellectual resources but also hampers its ability to compete on the global AI stage.

Addressing these challenges by investing in AI education and creating an environment conducive to retaining top talent will be instrumental in unlocking the full potential of AI for the nation's growth and development.

Additionally, the region is not strong in world-class machine learning and AI skills, especially when it comes to local institutions. This is also one of the reasons that many scientists who came from the region developed professionally in the West - mostly due to the lack of institutions that do research and education in that space. (See Chapter 4 for more details)

Additionally, aside from engineering talent, the region pretty much lags in other professions that are shaping up the industry. For example, positions such as DevRel (Developer Relations), according to founders, are close to impossible to find (*5).

Furthermore, experts that The Recursive talked to also emphasized the challenge of finding individuals with customer-facing skills who can assess customer needs and perform technical sales effectively (*5). This points out the importance of product managers who focus on features that appeal to customers and adapt based on customer feedback.

While the region has an abundance of raw talent, there remains a gap when it comes to specialized skills and hands-on industry experience. In the AI domain, businesses and research institutions are looking for expertise in areas like time series forecasting, deep learning, natural language processing, and computer vision.

However, according to The Recursive's qualitative interviews with AI innovation players from the CEE, beyond technical skills, there's an increasing demand for professionals who can navigate the ethical and societal implications of AI, emphasizing the need for interdisciplinary training (*7).

Furthermore, soft skills like problem-solving, critical thinking, and effective communication are highly prized, as these complement the technical aspects of AI development. As the region continues to grow as a tech hub, fostering a culture of continuous learning and collaboration is crucial to ensure that talent is not only nurtured but retained.

5. Opportunities in the CEE Talent Pool for AI

> "I think that here we have a lot of great talent that's basically wasted on doing boring stuff and not creative enough. As a country, and probably the EU as well - we just don't believe in ourselves enough that we can be the innovators. So that's why we're always playing defense, thinking of whether this would harm our status quo, and how to prevent people from the US, China, or Israel from using their innovations and disturbing our normal way of life."
>
> ***Mislav Malenica,*** *the President of Croatian Artificial Intelligence Association (CroAI)*

- The emergence of new AI educational programs at technical universities in the CEE region is a positive step towards addressing the skills gap
- Entrepreneurs in the region emphasize the need for more significant opportunities to motivate and utilize the existing AI talent effectively
- Improved collaboration between academia and industry can unlock exciting opportunities for the AI industry to access talented researchers and scientists

However, is this enough to create and motivate young AI innovators across the region? Many entrepreneurs across the region argue that there should be bigger opportunities for the talent that is out there to do more.

As the collaboration between academia and industry improves though, exciting opportunities could arise for the industry to tap into a pool of talented researchers and scientists. This synergy fosters innovation and strengthens the region's position in the global AI landscape, as academia's expertise meets the real-world challenges posed by industry, ultimately driving forward advancements in AI technology and applications.

Individually, countries across the CEE are also seeing an increase in the number of AI professionals. Greece is one of the positive examples, as the country has seen a rise in the number of professionals with AI expertise, thanks to increased interest and investment in the field. Experts that The Recursive talked to also argue that the quality of talent in Greece is comparable to that in Western Europe, with a growing number of skilled individuals contributing to the global AI industry (*8).

However, there is also the fact that there is still a demand-supply gap for certain AI specializations and expertise - in areas such as reinforcement learning, unsupervised learning, and AI ethics.

6. Threats for the CEE Talent Pool for AI

> "Beyond these technical domains, there's an increasing emphasis on the ethical and governance aspects of AI. Skills related to understanding the societal implications, biases in AI, and regulatory compliance are becoming just as essential as the core technical proficiencies."
>
> ***Dejan Mircetic****, scientist and research associate at the Institute for Artificial Intelligence of Serbia*

- Regulatory obstacles related to data privacy and complex EU regulations can hinder the integration of AI technologies
- While the current approach involves making AI specialists from the region available to companies in Western Europe and the US, this strategy may have short-term benefits but could be detrimental to the region's long-term AI development

Compared to Western Europe and other developed markets, CEE struggles with obtaining substantial funding for AI development. Although regional AI startups are achieving significant funding, the investment rounds in CEE are comparatively smaller, posing a limitation to the growth of AI technology in the region. *(see funding chapter on page 97 for more details)*

Regulatory hurdles and data privacy concerns, often influenced by complex and evolving EU regulations, can also impede the seamless integration of AI technologies into various sectors. Moreover, fostering a culture of innovation and entrepreneurship, which is essential for AI talent development, can be challenging in some CEE countries due to bureaucratic barriers and a lack of robust support systems for startups.

At the same time, while the primary modus operandi right now is making AI specialists from the region available to companies in Western Europe and the US - this can only be good for the time being and hurt the region in the long run.

“Greece and the Greek diaspora have a high density of AI engineers and scientists. This is indicated by the high number of top AI researchers. If you look at the top AI conferences of recent years, you can find a high percentage of Greek scientists who published papers. They are testaments to the high level of education that Greek STEM universities offer. Now as more and more AI-first companies are created, growing and reaching global audiences, and achieving exciting milestones, I think we will continue to see not only more AI talent coming straight out of university but also more senior people who can build and lead world-class teams in AI. ”

Alex Alexakis, *Investor at Marathon Venture Capital*

SOURCES

1. The Recursive AI Survey, May-August 2023
2. The Recursive interview with Botty Dimanov, CEO and founder of MLOps tools startup Tenyks, September 2023
3. The Recursive interview with Csongor Bias, Managing Director at Startup Hungary, September 2023
4. Emerging Europe “Migration raises brain drain concerns for many CEE countries as the regional economy slows”, October 2019

https://emerging-europe.com/business/migration-raises-brain-drain-concerns-for-many-cee-countries-as-regional-economy-slows/

5. The Recursive interview with Vedran Cindric, CEO and founder of API monitoring and analytic startup Treblle, August 2023
6. The Recursive interview with Aristos Doxiadis, partner at Big Pi Ventures, September 2023
7. The Recursive interview with Dejan Mirčetić, research associate at the Institute for Artificial Intelligence of Serbia, August 2023
8. The Recursive interview with Angelos Stavrakis, CEO and founder of footwear sizing startup SafeSize, September 2023

Why is AI the technology of the next generation?

Most popular for its place among the Big Four professional services networks, KPMG offers a lot more than that today. The company has built strong technology centers globally to support its partners in digitizing their processes. One of the key technology centers for the company is the Bulgaria-based KPMG ITS. The local entity has more than 500 employees and serves as the tech arm of KPMG for the European and Middle East regions. KPMG ITS now focuses on developing AI products that help the organization and its partners but has a history of working with the technology.

How did it all start?

6 years ago the company automated the way accountants can scan and extract information from contracts for reporting this data to the tax authorities. The solution was built on IBM's cloud infrastructure with IBM Watson, saving large amounts of time for employees, and allowing them to scan paper contracts signed by hand and extract data from the companies' ERP systems. After being run through an optical character recognition (OCR) tool, the data in the contracts could be crawled by ML algorithms and extracted the information by the authorities.

The AI Landscape

Svetoslav Spasov, CEO of KPMG ITS highlights the introduction of ChatGPT as a very important moment in popularizing AI, by allowing regular business users to experience the technology and discover how it works. According to him, before this, companies were looking for other technological solutions to solve their problems.

"More developments in the AI landscape have occurred in the last year, than the previous 5 collectively",

Svetoslav explains.

There are two major challenges that need to be resolved for the wider adoption of AI technology: the legislative framework and the business's lack of internal knowledge. The first one needs international alignment, and the second one is helping businesses gather capabilities for AI projects:

"A lot of our clients are hesitant to start large-scale AI projects without having internal capacity. That's the reason the whole ecosystem needs to embrace a more systematic approach to developing talent in the field of AI",

Svetoslav Spasov shares.

Why AI is the technology for the new generation?

KPMG ITS' strategy for talent development is built on the basis of the company's big goal - to be the Center of Excellence for AI technology for the global organization KDN (KPMG Delivery Network). In the first stage, the company wants to accelerate the adoption of the technology internally for KPMG and implement it to solve certain business cases. In the second phase, KPMG ITS aims to work closely with its clients to help them implement AI solutions.

To achieve this, KPMG ITS introduced two new tracks to the Cloud Master program in its internal academy, providing the necessary knowledge for professionals to work with Microsoft and Google's AI solutions. On top of this, the company uses the "learning by doing" approach to make sure that all professionals gain hands-on experience by developing internal projects in different areas of the KPMG business.

KPMG aims to develop talent in several different fields. First, consultants with T-shaped skills, and a broad understanding of technological solutions. Second, AI architects who will build the whole AI infrastructure, developers who will be responsible for the implementation, Data Scientists responsible for developing ML models, and the positions of the future like prompt engineers and quality engineers.

"Although we look to build a core team of senior people, our belief is that AI is the technology of the new generation. There are quite a lot of young people who are passionate about this technology and invest their personal time to learn and develop. They're also not burdened with legacy solutions, which allows them to embrace it faster and develop quicker. That's the reason KPMG ITS aims to understand their needs and help young people develop and find their place in the tech world",

Svetoslav explains.

Government Strategies for AI Innovation in CEE

Maria-Antoanela Ionita

Key Takeaways

- Central and Eastern Europe's agile and smaller market can accelerate AI adoption, but only in the presence of strong AI governance that balances innovation and ethics.
- Strong AI governance is needed in order to mitigate risks posed by these technologies, including from job displacement, bias, explainability, and data security.
- Yet the European Union's AI Act, which aims to regulate AI applications based on their societal risk, prompted mixed responses from CEE stakeholders regarding its potential impact on innovation and market competitiveness.
- Going forward, CEE nations can foster AI development and governance through national policies, multi-country collaborations, funding opportunities, and initiatives like the European AI Forum, with a focus on bridging academia-business gaps.

1. The Importance of a Strong AI Governance

> "Currently, the CEE region is poised for a unique opportunity. The adaptability of smaller markets can translate into an advantage. Agile companies can pivot quickly, invest resources effectively, and adapt to change, all of which is essential in an evolving market. This is where the smaller scale of our markets can become an asset. The nimbleness of companies in our region positions them to potentially outpace larger corporations that often face challenges in swiftly implementing changes across their extensive operations. Conversely, larger markets are encountering a potential slowdown in activities like venture capital and private equity investments."
>
> ***Ilia Krastev**, Chairman of the Association for Innovation, Business Excellence, Services and Technology (AIBEST, Bulgaria)*

The governance of artificial intelligence is a critical issue that requires immediate attention everywhere around the world. Robust governance is not just about setting rules; it is about creating an ecosystem that balances innovation with ethical considerations and resilience.

There is an undeniable economic opportunity in AI, from producing more complex and valuable products and services and thus contributing to growth, to increasing productivity despite growing demographic challenges. Yet for that, governments and companies alike need to work together to increase trust and confidence in AI systems as well as mitigate the implications for global security and stability.

Governments play a pivotal role in shaping the AI innovation landscape, serving as both regulators and facilitators.

Four strategic interventions for governments:

Create a legislative framework that establishes guidelines for the ethical and competitive development of AI	Create an organizational frame that unites the efforts of stakeholders from all economic sectors
Ensure a competitive STEM education system and generally spearhead efforts to equip the population with essential digital and AI skills	Complement private funding with financial mechanisms such as tax incentives and grants.

On the other hand, companies need to lean in to demonstrate openness and cooperation to meet these goals.

CEE, as a smaller market, can be at an advantage in the AI race. Smaller companies and markets tend to move more swiftly and adapt faster, as there are fewer fixed costs and less complex infrastructures in need of change at play. Still, the degree to which these governments embrace a supportive and forward-looking stance can significantly influence the trajectory of AI innovation and adoption within the CEE region.

2. The Risks of AI

Regional stakeholders agree on the need for a certain level of AI regulation, in order to address risks to social welfare, security, data privacy, or equity.

Five key risks posed by artificial intelligence:

1. **Displacing Workers**
2. **Discrimination and Bias**
3. **Explainability and Trustworthiness**
4. **Data privacy and Data security**
5. **Artificial General Intelligence**

2.1 Displacing Workers

> "What truly matters is how quickly we can adapt to these changes. Do we have a strategy in place to reshape our business models, our economy, and the industries specific to each market and country? If we don't get it right, some companies might struggle or even fail. It's a bit like survival of the fittest, not only for companies but also for countries. Countries won't collapse, but they might face setbacks if they don't adjust swiftly."
>
> ***Ilia Krastev**, Chairman of the Association for Innovation, Business Excellence, Services and Technology (AIBEST)*

Some of the regional experts we talked to warned about job losses as the most immediate human-centered challenges posed by AI and automation. They point out that automation is not just a technological shift, but a societal one, with the potential to displace workers in various sectors. This necessitates a proactive focus on upskilling and reskilling the workforce, preparing them for the jobs of the future.

We cannot afford to simply marvel at the advances in AI without considering the very real human costs associated with such technological leaps. The need for reskilling becomes especially critical in sectors most susceptible to automation, as neglecting this could lead to widespread unemployment and social upheaval.

Other stakeholders believe the challenge does not lie in the change, which is inevitable with technological progress, but in the way we adapt, not just at the organizational level, but also at the level of entire economies and countries. It's a competitive landscape where the ability to adapt quickly could make the difference between thriving and failing, not just for companies but also for nations. Countries that fail to adjust may not collapse, but they will likely face significant setbacks, including economic stagnation and reduced competitiveness on the global stage.

2.2 Discrimination and Bias

> "As AI systems make decisions, there's a potential for biases, especially if the data they're trained on is not representative or contains inherent prejudices. This can lead to unfair or discriminatory outcomes in sectors like finance, healthcare, or recruitment." - **Dejan Mircetic, Research Associate at the Institute for AI of Serbia**

The issue of discrimination and bias in AI is not just a technical challenge but a societal concern. AI systems are only as good as the data they're trained on. If that data is skewed or carries inherent biases, the AI algorithms can perpetuate or even amplify these biases, leading to unfair decisions in critical sectors like finance, healthcare, and recruitment.

To prevent such discriminatory outcomes, it's crucial to implement rigorous auditing processes for AI systems and the data they're trained on. Transparency in algorithmic decision-making, combined with a commitment to ethical AI practices, can help ensure that AI serves as an instrument of fair and equitable solutions, rather than perpetuating existing inequalities.

2.3 Explainability and Trustworthiness

> "Working with our clients, we understood that explainability and transparency vary between AI stakeholders. While full explainability would be ideal, it may not be technically or economically feasible for complex AI systems our clients deploy. Rather than pursue universal explainability, we must align explanations to each context of use, application and stakeholder needs. For example technical teams would require detailed accounts of the model logic and performance, while the end-users would require understandable rationales for outputs of the system."
> **Maria Axente, Head of AI Public Policy and Ethics at PwC UK**

AI explainability refers to having the ability to extract the right information on how the machine learning model operates and how it makes decisions and to stream it to the right stakeholders. Many advanced AI models, such as deep neural networks, are often termed "black boxes" because it is difficult to understand their internal workings.

This lack of transparency can be problematic in critical domains like healthcare, criminal justice, and finance, where understanding the reasoning behind decisions is essential for trust and accountability.

A connected threat about AI trustworthiness is that of misinformation. AI can make it easier to manipulate online content and spread fake news. Deep learning has made it increasingly easier to create convincing fake content, including deepfakes, which can be used to manipulate public opinion. This issue is particularly relevant when it comes to algorithmic recommendations or recommender systems. AI algorithms, particularly those used in social media platforms, are designed to maximize user engagement. However, these can have a profound impact on people's values, emotions, and actions.

Central and Eastern Europe is especially vulnerable to misinformation because of geopolitical conflicts, as well as a predominantly rural population. The war in Ukraine has been followed by Russia's attempts to influence public opinion in the countries in the region. Meanwhile, a large part of the population in the region is rural and lacks basic digital skills, thus being more susceptible to media manipulation.

2.4 Data Privacy and Data Security

> "Industries must address potential vulnerabilities in AI, ensuring systems are resilient against malicious attacks. As the CEE region moves forward with AI integration, a balanced approach that combines technological advancement with ethical governance and public engagement is essential."
>
> ***Dejan Mircetic**, Research Associate at the Institute for AI of Serbia*

Advanced AI systems rely on vast amounts of data to train on. How this data is handled and whether it is safeguarded from malicious intent are two key concerns in the use of AI.

On the one hand, there is a risk that in the training process of AI, personal and sensitive information can be exploited with unintended consequences. A machine learning algorithm trained to assess creditworthiness, for instance, can use some variables that serve as proxies for racial or gender bias, thus leading to discriminatory practices.

Security challenges, on the other hand, concern the protection of data from unauthorized access and usage. AI also changes the dynamic for attackers in cyberspace, enabling more sophisticated attacks by a wider range of cyber actors.

Copyright infringement also falls under this category. With the advent of generative AI, we can now generate text, music, and art that closely mimic human-created content. These capabilities open doors for innovation and efficiency gains, yet they also raise concerns about the unauthorized replication and distribution of copyrighted material. Determining the boundary between fair use and infringement is increasingly complex and calls into question a reevaluation of copyright laws.

For companies in CEE, data privacy, security, and safety are particular issues of concern. Most respondents in The Recursive AI Survey said they would be willing to invest an additional 100,000 euros to ensure their AI products comply with these ethical considerations.

2.5 Artificial General Intelligence (AGI)

> "The quest for developing Universal General Intelligence (AGI) could also prove risky. While the idea of a central AGI platform seems appealing due to its perceived efficiency and profitability, it may expose our societies to latent dangers. On the contrary, using diverse algorithms for particular tasks that are not interconnected offers a safer path. However, the pursuit of profit may overshadow this safer approach, to the detriment of societal welfare." - **Ljubisa Bojic, Senior Research Fellow and Coordinator at the Digital Society Lab (Serbia)**

The development of Artificial General Intelligence (AGI) presents a double-edged sword. While the concept of a centralized AGI platform holds the allure of efficiency and profitability, it also harbors significant risks. Focusing solely on a centralized AGI approach could compromise societal welfare. The pursuit of profit could easily eclipse the safer, albeit less glamorous, approach of using specialized algorithms for specific tasks. This tunnel vision could expose our society to latent dangers, including but not limited to security vulnerabilities, unintended behavioral patterns, and even existential risks if the AGI were to act in ways that are not aligned with human values and interests.

The "alignment issue" adds complexity and urgency to the discussion. This refers to the challenge of ensuring that AGI not only understands but also acts in accordance with human objectives. The ability of AGI to act autonomously, especially when such actions have far-reaching implications outside the computational "box" that hosts it, is particularly concerning. The widespread availability of advanced AI tools exacerbates this issue, making it possible for individuals or entities with varying levels of expertise and ethical considerations to develop potentially misaligned AGI. Therefore, it becomes imperative to establish guidelines that restrict the unobserved or unchecked usage of AI, especially in contexts where it has the autonomy to act outside predetermined boundaries.

3. Pillars of a Strong AI Governance

1	Balanced AI Regulation	2	Tapping into the Economic Opportunity	3	Stakeholder Collaboration

3.1 Balanced AI Regulation

> "In the rapidly evolving domain of AI, my foremost recommendation for policymakers would be to remain agile and adaptive. Fixed, rigid regulations might stifle innovation, so a framework that's both robust and flexible is essential. It's crucial to strike a balance between ensuring ethical practices and allowing room for technological growth." - **Dejan Mircetic, Research Associate at the Institute for AI of Serbia**

One of the most pressing tasks for governments is to establish a legislative framework that guides the ethical development of AI. This involves creating comprehensive laws that address societal challenges such as the ones described above, including data privacy, biases, algorithmic transparency, and copyright infringement, ensuring that technology serves the public good while also fostering a competitive marketplace. Without a robust legal framework, the rapid advancements in AI further risk being ethically compromised or monopolized by a few players, stifling innovation and economic growth in the region.

The European Union is at the forefront of AI governance with its AI Act (*1), which aims to provide a regulatory basis for AI innovation and use. The Act adopts a risk-based approach, classifying AI technologies according to their level of societal and individual risk. It also proposes a category of banned applications, such as facial recognition in public spaces and certain biometric categorization systems. The idea is that the higher the risk associated with an AI application, the stricter the governance measures that need to be put in place. This would include increased transparency and more robust impact assessments to ensure ethical compliance.

The AI Act has far-reaching implications, including for generative AI systems like OpenAI's ChatGPT or Google's Bard, which would be subject to new transparency requirements. For example, such systems would need to disclose that their content is AI-generated, aiding in the differentiation between real and deep-fake images.

When it comes to its reception, in Central and Eastern Europe, like everywhere else, there are mixed feelings. Various stakeholders we talked to appreciated the forward-thinking approach to governance, especially in sectors that are highly regulated, like healthcare. They noted that a well-structured regulatory framework could serve as a catalyst for the adoption of AI technologies in such fields. Companies often hesitate to integrate new technologies without clear guidelines, and the EU AI Act aims to provide this clarity, thereby potentially boosting global AI adoption rates in regulated industries. The emphasis on safety and ethical considerations is seen as a way to ensure that the benefits of AI are broadly shared while minimizing negative impacts.

Others (*2) noted the provision for the establishment of regulatory sandboxes - controlled environments where businesses can test new products and services without the usual regulatory constraints. These sandboxes can offer opportunities for SMEs and startups to gain practical experience and refine their AI systems. The Act further mandates the European Commission to regularly assess certification and compliance costs and collaborate with Member States to reduce these costs where possible.

Many others, however, have expressed their concerns over the limitations and gaps in the Act. One critique is around oversights in the Act, such as AI-driven fraud, deep fakes, and data privacy. Others note that while the Act's intentions may be commendable, its practical implications could be difficult to implement, particularly when it comes to computationally infeasible requirements like those related to copyright.

Furthermore, in the context of market competitiveness, several European stakeholders expressed concern that the Act could put regional companies at a disadvantage relative to their counterparts in less-regulated regions.

Startup associations, trade bodies, and SME communities in the CEE region signed a joint statement (*3) arguing that the Act could stifle innovation by increasing expenses and reducing investor attractiveness. A more balanced approach, they observe, is required in order to facilitate innovation and not just impose hurdles.

Lastly, the issue of ethical trade-offs is a recurring theme among stakeholders. Given the wide range of AI applications, from industrial use cases to healthcare chatbots, each comes with its own set of ethical considerations and potential trade-offs between competing values like accuracy, fairness, and explainability. Stakeholders argue that these nuances need to be considered holistically, and caution

against a one-size-fits-all approach to regulation. This highlights the need for ongoing dialogue and iterative refinement of the Act, involving a diverse range of stakeholders, to ensure that it is both effective and equitable.

> "The upcoming EU AI regulatory framework holds profound implications for the adoption of AI products and services, and this is a matter of considerable concern. The European Union's stance on regulations, while often well-intentioned, poses significant challenges for companies engaged in research and development. It's important to acknowledge that a certain level of regulation is essential, particularly in an area as transformative as AI. However, the issue arises when these regulations hinder innovation and competitiveness on a global scale." - **Ilia Krastev, Chairman of the Association for Innovation, Business Excellence, Services and Technology (AIBEST)**

All things considered, the Act represents a significant step toward a European rulebook on AI, but it is still under negotiation, requiring coordination and input from various stakeholders to finalize its text. Stakeholders expect the process to take some time and undergo several iterations because it needs to result in a meaningful and feasible operationalization framework for institutions.

3.2 Tapping into the Economic Opportunity

To harness the aforementioned economic potential of AI, a comprehensive governance agenda is essential *(for more on the topic see page 160).*

First, investments in innovation and competitiveness must be amplified. Governments can provide financial mechanisms like tax incentives or grants to fill the capital-intensive needs of AI research and development. This includes increasing funding for fundamental AI research through national labs, universities, and research foundations. In countries like Romania, where public funding for AI is scarce, targeted programs like the Operational Program for Smart Growth, Digitization, and Financial Instruments could be pivotal.

Secondly, preparing the workforce for an AI-driven future is crucial. This involves creating a robust pipeline of STEM talent through educational initiatives, including research fellowships and expanded computer science curricula. Upskilling and reskilling programs are needed for workers who may be displaced by AI technologies. There is untapped potential in existing research institutes that could be utilized for AI development, but connections between these institutes and AI startups are often missing, highlighting a role governments can play in facilitating such partnerships.

Last but not least, public-private partnerships can facilitate the creation of high-quality datasets for the development of AI algorithms, and technology transfer frameworks can enable universities to partner with tech companies for advanced AI applications. As experts put it, the bedrock of AI lies in the availability and accessibility of reliable data. The CEE region can already look at other EU member states such as Finland and France for examples of established data hubs that offer access to data under secure conditions, for both public and private institutions.

3.3 Stakeholder Collaboration on AI Governance

> "Engaging directly with researchers, AI practitioners, and industry stakeholders can provide invaluable insights into the real-world implications of regulatory decisions. Creating open channels for consistent dialogue will ensure that policies remain relevant and effective." - **Dejan Mircetic, Research Associate at the Institute for AI of Serbia**

Tackling such challenges posed by the responsible and safe use of AI while tapping into economic opportunities, requires a multi-stakeholder approach to governance. A critical role for governments is to act as a unifying force among various stakeholders—be it academia, industry, or civil society. By creating an organizational frame, governments can help harmonize efforts across different sectors and ensure that the national AI strategy is effectively implemented. This involves facilitating dialogues, coordinating research, and aligning objectives to prevent redundancy and make efficient use of resources.

Collaboration should also take place between countries. There should be an international policy alignment, working with allies and partners to develop common approaches that reflect democratic values. This would include enabling trusted data flows across national borders and encouraging the adoption of common approaches to AI regulation and governance, as well as the use of trade and economic agreements to support the development of consistent and non-discriminatory AI regulations.

4. AI Governance Initiatives in CEE

4.1 The European AI Forum

> "We provide feedback to the European Commission in different forms like position papers, we take part in expert round tables in Brussels, and we support our national governments with the AI strategy." We are also in constant exchange with our national AI ecosystems and collect their opinions and feedback which we then provide to the EC in a structured way. We take the role of a connector and translator between the EC and the national AI ecosystems. As an umbrella organization we are in constant communication with EU authorities and single representatives."
>
> ***Kaloyan Ratchev**, European AI Forum | AI Cluster Bulgaria*

An example of cross-country collaboration for AI governance in the region is the European AI Forum (EAIF). With nine members, the forum includes five national AI organizations from CEE representing the countries Bulgaria, Croatia, Poland, Slovenia, and Lithuania. The objective of EAIF is to aggregate and convey "the voice of AI in CEE" to European authorities, facilitate connections among stakeholders and organizations, and interpret EU AI regulations for national stakeholders.

EAIF events, for instance, serve as a platform for European Commission stakeholders to express their viewpoints on EU AI regulation. The forum has hosted various high-profile EU figures as speakers at its events, including Mariya Gabriel, Margarethe Verstager, Maroš Šefčovič, and Virginijus Sinkevičius, among others.

As the focus shifts towards "life after the AI Act", EAIF anticipates its tasks will increasingly involve implementation, education, and operational management. Efforts will be required to integrate the AI Act into individual national ecosystems and companies. Future work is expected to concentrate more on regulatory sandboxes and providing legal expertise to companies. With developments like the AI PACT emerging, EAIF expects that there will always be new challenges to address.

4.2 National Policies for the Development of AI

In the past three years, most European states have outlined strategies for the development of artificial intelligence (AI). These policies aim to guide society, businesses, academia, and public administration in capitalizing on AI opportunities while ensuring human dignity and fair competition.

The "Policy for the Development of Artificial Intelligence in Poland" (*5), for instance, outlines roughly 200 goals to foster AI development and identifies existing challenges such as the lack of cooperation between academia and businesses. To tackle these issues, it plans to improve collaboration and facilitate the flow of knowledge and innovation.

Countries have taken different follow-up steps. To continue the example of Poland, in January 2022, they set up a dedicated team to oversee the implementation of the policy, focusing on achieving short-term goals set for 2023. However, as of now, no specific reports on the progress have been published.

In Romania, the Government is taking steps to develop a national AI strategy, with the aim of fostering AI adoption in the public sector. A memorandum detailing an initial set of strategic AI initiatives was approved by the Government in November 2022. The efforts are led by the Presidential Administration of Romania and the Ministry of Research, Innovation, and Digitization.

An Interinstitutional Commission for the Development of Romania's AI Strategy was officially adopted. The commission will coordinate the development of Romania's national AI strategy and action plan, leveraging progress made in the research project focused on the adoption and use of innovative technologies in public administration. To that end, the Government also set up the Romanian Committee for Artificial Intelligence (AIRomânia) (*6), designed to bring together local and international experts, businesses, and organizations.

4.3 Adoption of Ethical Guidelines in Serbia

> "Serbia has taken strides to establish an active AI strategy and ethical guidelines for the development and use of AI. This makes it the pioneer in the region for initiating such a move. While we remain hopeful for enacting an AI Act in the future, it serves as a reference point to the imminent EU AI Act." **- Ljubisa Bojic, Senior Research Fellow and Coordinator at the Digital Society Lab**

In Serbia, the government is proactively engaging with the ethical implications of AI. As of March 2023, Serbia accepted the Ethical Guidelines for the Development, Application, and Use of Reliable and Responsible Artificial Intelligence, focusing particularly on high-risk domains such as biometric identification, critical infrastructure management, health, education, and criminal prosecution. These guidelines call for intensive investigation and review in these sectors.

This comes on the heels of the country's earlier move to adopt the Strategy for the Development of Artificial Intelligence for the period 2020-2025. Additionally, the establishment of the Institute for AI of Serbia, one the first of its kind in Southeast Europe, signals the country's commitment to being at the forefront of AI development and ethics.

4.4 Integration of AI in Healthcare in Slovakia

> "The remarkable aspect was not just having a strategic vision, but also having a concrete roadmap that received the backing of dedicated individuals working on these projects. Some of these initiatives are on the brink of implementation, while others are diligently being prepared."
>
> ***Lukas Palaj**, Director of Digitalization and AI Dept. at Ministry of Health, Slovakia*

In Slovakia, the Department of Digitization and Artificial Intelligence took a strategic approach towards integrating AI in healthcare. Between 2020 and 2021, they formulated a strategy for deploying AI within Slovakia's healthcare sector.

This endeavor was made possible through technical support extended by the European Commission, and it involved researching global best practices and adapting them to the local healthcare landscape. They engaged in dialogues with experts and conducted workshops, and as a result, produced a comprehensive document that encapsulated their findings.

The timely introduction of the Recovery and Resilience plan by the EU allowed the government to translate the strategy into tangible projects. For instance, the department successfully developed a series of impactful AI algorithm prototypes for applications including fraud detection and the estimation of oncological patient numbers across different diagnoses.

4.5 Collaborations between research institutes and governments in Bulgaria

4.5.1 The INSAIT Institute

> "The future of innovation for CEE is without a doubt in initiatives like INSAIT, that is, if the region aims to be a leading technology hub. Without institutions like INSAIT, it really will not be able to compete with the rest and will have to rely on foreign startups opening offices locally, which is not the same." **- Prof. Martin Vechev, Architect of INSAIT**

The Institute for Computer Science, Artificial Intelligence and Technology (INSAIT) in Bulgaria is among the first AI institutes in Southeast Europe, created in partnership with ETH Zurich and EPFL Lausanne, two world-leading tech universities, as part of Sofia University.

INSAIT was backed with $100 million by the Bulgarian government for a period of 10 years, in addition to contributions from global and regional private tech companies.

Its mission is to be the catalyst for the transformation of the local economy into a competitive high-tech one, through open research, world-class research facilities, and globally competitive compensation.

Recently, INSAIT became part of ELLIS, one of the most important global initiatives aiming to unite Europe to become more competitive in AI.

4.5.2 The GATE Institute in Bulgaria

> "Creating a NATO test center in the field of big data and artificial intelligence in Bulgaria has the potential to attract new investors and provide Bulgaria access to the Alliance's latest technologies and best practices in the sphere of innovation. GATE acts as a bridge to make that happen." **- Prof. Sylvia Ilieva, Ph.D., Director of GATE Institute**

The Gate Institute in Bulgaria is a great example of a research institution that is working closely with public authorities to test emerging technologies such as artificial intelligence.

For instance, within the framework of Future Cities, GATE is closely collaborating with Sofia Municipality for the realization of the Digital Twin City flagship program and also for the implementation of several EU-funded collaborative projects such as FLeDge and Mobility Data Space Deployment. GATE has also signed a MoU with the municipality for implementing joint projects and providing training for the digital transformation of public administration. The last will be also supported with projects under Bulgaria's Recovery and Resilience Plan.

GATE was recognized to be a test "center in the field of big data and artificial intelligence for NATO's Defence Innovation Accelerator for the North Atlantic (DIANA). The project aims to create a vibrant ecosystem of innovators, entrepreneurs, researchers, investors, and experts in the field of security and defense. GATE will host innovators from Bulgaria and across the Alliance, who can bring their concepts for evaluation, verification, and validation.

SOURCES

1. European Commission, “Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (ARTIFICIAL INTELLIGENCE ACT) AND AMENDING CERTAIN UNION LEGISLATIVE ACTS.” EUR-Lex, 2023, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0206
2. George Chisuse, “The EU’s AI Act: A Quick Guide to Its Benefits for Startups and SMEs.” The Recursive, 2023, https://therecursive.com/eu-ai-act-a-guide-for-smes-and-startups/
3. SAPIE, “SAPIE AI Act (AIA) Joint Statement.” Sapie, 2023, https://sapie.sk/news/aia-joint-statement
4. Monitor Polski, “Policy for the development of artificial intelligence in Poland from 2020.” Monitor Polski, 2020, https://monitorpolski.gov.pl/M2021000002301.pdf
5. The Ministry of Research, Innovation and Digitalization, “The Romanian Committee for Artificial Intelligence (AIRomânia).” ai.gov.ro, https://ai.gov.ro/en/about-airomania/

“Greece and the CEE region are on the cusp of an AI-driven transformation, with AI adoption expanding across various sectors. While there are significant opportunities for growth and innovation, careful consideration of ethical, regulatory, and workforce implications will be essential to harness AI's full potential and minimize potential disruptions. Regional cooperation and collaboration will play a crucial role in shaping the AI landscape in the years to come.”

Dr. Ellie Diakanastasi, *Executive Director at Elevate Greece*

AI Regulation That Doesn’t Hinder Innovation

Google for Startups is a startup program launched by Google in 2011, active in over 125 countries and providing hands-on support for aspiring entrepreneurs. Google's engagement encompasses three core areas—technology access, best practice learning, and community networking.

Startups gain the advantage of Google's extensive toolset to build products efficiently. Concurrently, Google's curated resources, training sessions, and mentorship programs arm founders with decision-making insights in technology, product, and marketing. Finally, Google fosters an ecosystem that allows startups to connect with experts and potential investors, nurturing an environment where innovation can prosper.

This ecosystem is particularly critical when viewed in the context of AI policy, given the ongoing efforts from startups and AI associations in CEE to ensure a regulation that doesn’t hinder innovation.

Google’s AI Policy Agenda

Google's AI policy strategy is built on three foundational pillars—Opportunity, Responsibility, and Security.

1) Unlocking Opportunity: Google contends that economies that integrate AI technologies will gain a competitive advantage, particularly important for CEE countries aspiring to move up the value chain. Google recommends a multi-stakeholder approach involving governments, private sector, and educational institutions to invest in AI research and workforce development. The urgency is not just to prepare for a future AI economy but to actively shape it by developing STEM talent pipelines and retraining programs, an area where historically CEE has been lagging behind.

2) Promoting Responsibility: Trust is an essential component of AI adoption. Given the wide-ranging impact of AI on societal issues, Google calls for a governance model that involves multiple stakeholders. Google identifies a two-fold approach to regulation: standards and best practices for some challenges, and more specific, expert-guided regulations for high-risk AI systems. These regulatory frameworks must be adaptable, considering the fast-paced evolution of AI technologies.

3) Enhancing Security: Google highlights AI's double-edged sword in terms of security. While AI can enhance cyber defenses and counter disinformation campaigns, it can also be misused by malicious actors. To mitigate these risks, Google emphasizes the need for global cooperation, encouraging stakeholders to understand the safety implications of AI systems.

Interview with

Cezara Panait

Google Government Affairs & Public Policy Country Lead for Romania

From your perspective, how should policymakers properly regulate AI given it’s evolving so fast?

Generally, technology is evolving faster than regulation is, and this is why I believe that any rules we design now for AI should be future-proof and there will be flexibility to adjust to the latest technological advancements. Thus, regulatory requirements need to be sufficiently broad, flexible, and adaptable.

We welcome and encourage efforts by policymakers around the world to develop proportional, risk-based regulations that promote reliable, robust, and trustworthy AI applications, while still enabling innovation and the promise of AI for societal benefit.

From your stance, where’s the balance between enabling innovation and reducing risks when it comes to regulating general- purpose AI?

Today a new generation of more capable and versatile AI systems has emerged, and the nomenclature has evolved accordingly - we now talk of “general purpose AI” (GPAI) and “foundation models” , with “generative AI” as a thematic subset. But all remain essentially multipurpose AI systems, and most will seldom, if ever, be used in high-risk settings.

Certain multipurpose models may need added precautions, and we welcome efforts to clarify how GPAI, foundation models and generative AI should be treated within the context of the AI Act. However, it’s vital to keep a sense of proportionality on any general restrictions and avoid being overly broad in scope or overly prescriptive in ways that could limit development of tools for societally beneficial applications. In practice, this will require a clear focus on high-risk applications. It is important to mention that generative AI is not “high risk” in and of itself — it would only become so if used in a specific context deemed high risk by the AI Act.

The regulation of GPAI should focus only on the most capable foundation models when they are deployed for high-risk uses and requirements for Generative AI should be proportionate and to apply to those best-placed to implement them.

How can AI startups in CEE make their position heard and be part of the dialogue?

I believe that CEE startups could enhance their voice and presence by creating local coalitions, on one hand, to represent their perspectives and joining other regional initiatives to support their vision. The regulatory impact on startups will be definitely addressed by decision-makers and it is highly recommended that startups, SMEs and other stakeholders raise positions and manage to clarify the concrete effects on their work and businesses.

How Future Can Look Like for AI Innovation in CEE

Zornitsa Stoilova

“A combination of talent development, government support, collaboration between academia and industry, access to funding, infrastructure development, a supportive regulatory framework, and international cooperation will have the most significant impact on improving the AI outlook for the CEE region. These factors collectively create an environment conducive to AI innovation and growth”

Dr. Ellie Diakanastasi,
Executive Director at Elevate Greece

The future of AI innovation in CEE looks bright with a few occasional clouds to mitigate.

The focus on globally relevant challenges shows us that AI product companies in the region are very well positioned to scale beyond CEE. Stemming from smaller markets and used to running on scarce resources, CEE companies are also more agile and adaptable than their Western competitors. As the larger markets are gearing for an economic slowdown, this ability to pivot quickly and seize opportunities may turn into an unexpected asset to get ahead in the AI race.

The 40+ stakeholders we interviewed for the report affirmed the CEE AI innovation ecosystem is rooted in a strong foundation of talent and an academic tradition in mathematics and computer science. The recent startup boom and the unicorn legacy in the AI field hold the promise of considerable growth and development.

But for this potential to fully bloom, we need to act on it now.

We have compiled a list of factors that will have the biggest impact on improving the outlook for the AI-powered software or hardware product market in the CEE region based on the experts’ opinions.

Recommendations for Policy Makers & Stakeholders

- **Increase investments in AI Research and Development.**

Countries from the region can become leaders in AI research and commercialization only through robust support and financial infrastructure. We need both the right public policies that will incentivize the innovation, adoption, and use of AI, along with funding opportunities for startups and scale-ups, to foster growth.

“I would prefer to see more money spent on developing AI than on regulating it. From the perspective of the EU and its success in developing local products, prioritizing funding for regulation over the development of AI will allow other ecosystems, such as the United States or China, to move further ahead,”

***Filip Dvořák**, Founder and CEO of Filuta AI*

“The involvement of governance in facilitating and promoting AI projects and initiatives is vital. The degree to which these governments embrace a supportive and forward-looking stance can significantly influence the trajectory of AI innovation and adoption within the CEE region”

***Ilia Krastev**, Chairman of the Association for Innovation, Business Excellence, Services and Technology (AIBEST)*

- **Foster connections between universities, research institutions, and companies.**

Facilitating links among these key players is essential for easing the flow of knowledge and technology from academia to the industry. This will help bridge the gap between research and commercialization.

- **Opt for balance in the act of regulation.**

Governments should strive to create a thoughtful framework to encourage the responsible use of AI and protect consumers without suffocating regional AI companies and stifling innovation.

> “Promoting a supportive regulatory environment that encourages responsible AI innovation and data-sharing while protecting consumer rights and privacy will create a more predictable and stable market for AI companies,”
>
> ***Angelos Stavrakis,*** *Founder and CEO of SafeSize*

> “My main recommendation is to try to balance innovation with oversight. It’s self-defeating to stifle innovation. Because it will come from other regions of the world. Even if we manage to regulate very carefully producers in the EU, they will not be strongly regulated elsewhere”
>
> ***Prof. Vasilis Vassalos****, Director of MSc in Data Science at Athens University of Economics and Business*

- **Promote regional cooperation, partnerships with international companies, and participation in global AI initiatives.**

This can open up access to larger markets and opportunities for CEE-based AI companies to expand their reach and impact. Countries in the region should unite and promote the region as a destination for talent and innovation.

- **Build up business competencies in the local workforce and encourage an entrepreneurial mindset.**

Inspiring people with stories of locally and regionally-bred success is crucial for promoting CEE as a region that can attract talent. Educating people who can bring technological achievements or research outputs into a product that can be sold successfully on the market can further improve the growth journey of AI product companies.

> “I am not concerned about AI technology in CEE. Areas, where CEE needs to improve, are entrepreneurship and building business competency, which goes across the whole society, including individual's mindset, business environment, and education system, to name a few”
>
> ***Martin Dostál,*** *Investment Committee Member at Look AI Ventures*

- **Turn the brain drain into brain gain:**

The next big challenge for governments but also for businesses in the region is how to create the right incentive structure to attract and keep diaspora talent from abroad to drive innovation from our region.

> “We know we are blessed to have very strong technical talent. How do we take advantage of that and create the incentive structure for this talent to remain and create in our countries? I think this is going to be the next challenge for governments”
>
> ***Maria Axente****, Responsible AI & AI for Good Lead at PwC UK, part of Romania’s Scientific and Ethics Council in AI*

- **Review updated national AI strategies**

Most of the CEE countries are preparing updates of their national AI strategies reflecting on the latest advancements in technology. Those involve not only a vision of how AI should be regulated but also increasing awareness of the benefits and use cases of AI in the public sector, building critical infrastructure, and developing policies to support innovation in this area. These plans and the follow-up actions should be reviewed again in a year.

📊 AI Product Companies in CEE: Index

Country	Name	Team Size	Industry	AI Specialization	Founded date	Last Funding Type	WebSite (www.)
Bulgaria	**A4E**	0 - 10	finance, retail	Machine Learning; Big Data Analytics; Predictive Analytics	2015	**Seed**	a4everyone.com
Bulgaria	**Ablera**	10 - 99	finance;	Big Data Analytics, Conversational AIChatbots, Machine Learning,	2018	**N/A**	ablera.com
Bulgaria	**ABRAXA**	10 - 99	Maritime	Machine Learning; Big Data Analytics	2018	**Seed**	abraxa.com
Bulgaria	**AIoTCloud**	0 - 10	Energy and Utilities; manufacturing;	AI Hardware & Infrastructure, Big Data Analytics, Machine Learning,	2021	**Pre-Seed**	aiotcloud.app
Bulgaria	**Alcatraz AI**	100 - 499	Security and Cybersecurity	Computer Vision; Deep Learning; Machine Learning; AI Hardware &	2016	**Series A**	alcatraz.ai
Bulgaria	**Ameru**	0 - 10	Real Estate	Robotics, Machine Learning	2022	**N/A**	ameru.ai
Bulgaria	**AMPECO**	100 - 499	Automotive	Big Data Analytics; Predictive Analytics	2018	**Series A**	ampeco.com
Bulgaria	**Augment**	0 - 10	Gaming and eSports	Big Data Analytics, Computer Vision, Deep Learning, Machine Learning,	2021	**Pre-Seed**	augment.gg
Bulgaria	**AzBuki.ML**	0 - 10	information technology	Natural Language Processing, Machine Learning	2020	**N/A**	azbuki-ml.com
Bulgaria	**Barin Sports**	0 - 10	Sports	Machine Learning; Big Data Analytics; Predictive Analytics; AI Hardware &	2015	**Growth Equity**	barinsports.com
Bulgaria	**BIODIT**	100 - 499	Security and Cybersecurity	Computer Vision; Machine Learning	2009	**Seed**	biodit.com
Bulgaria	**Chaos**	500 - 1000	Media and Entertainment	Deep Learning; Computer Vision	1997	**N/A**	chaos.com
Bulgaria	**Columbo AI**	10 - 99	Healthcare and Life Sciences	Deep Learning; Computer Vision	2021	**Seed**	columbo.me
Bulgaria	**DRONAMICS**	100 - 499	Aerospace; Logistics; retail	Robotics and Drones	2014	**Series A**	dronamics.com
Bulgaria	**Dynamic Pricing AI**	0 - 10	retail	Predictive Analytics	2018	**Series A**	dynamicpricing.ai
Bulgaria	**Eden Photos**	0 - 10	Media & Entertainment	Machine Learning; Computer Vision	2015	**N/A**	edenphotos.io
Bulgaria	**Efemarai**	0 - 10	information technology	Machine Learning; Predictive Analytics	2020	**Pre-Seed**	efemarai.com
Bulgaria	**Eilla AI**	0 - 10	finance	RPA; Machine Learning; Predictive Analytics	2022	**N/A**	eilla.ai
Bulgaria	**EnduroSat**	100 - 499	Aerospace	Machine Learning; Autonomous Systems & Vehicles	2015	**Series A**	endurosat.com
Bulgaria	**EnskAI**	0 - 10	Sports	Machine Learning	2019	**Seed**	ensk.ai
Bulgaria	**EPIX.AI**	0 - 10	Healthcare and Life Sciences	Big Data Analytics; Predictive Analytics; Machine Learning; Deep Learning	2022	**N/A**	epix.ai
Bulgaria	**Evrotrust**	10 - 99	Public Sector	Machine Learning; Natural Language Processing (NLP); AI Hardware &	2015	**Seed**	evrotrust.com
Bulgaria	**FindMeCure**	10 - 99	Healthcare and Life Sciences;	Big Data Analytics, Conversational AIChatbots, Machine Learning, Natural	2016	**Seed**	trialhub.com
Bulgaria	**fragaX**	0 - 10	Aerospace	Robotics and Drones	2016	**N/A**	fragax.com
Bulgaria	**Giga Automata Ltd.**	10 - 99	manufacturing	Robotics; Machine Learning, Hardware	2018	**N/A**	gigaautomata.com
Bulgaria	**GridMetrics**	0 - 10	Energy and Utilities	Machine Learning; Big Data Analytics; AI Hardware & Infrastructure	2019	**N/A**	gridmetrics.co
Bulgaria	**Healee**	10 - 99	Healthcare and Life Sciences	Predictive Analytics; Big Data Analytics; Machine Learning	2017	**Seed**	healee.com
Bulgaria	**Hyperscience**	100 - 499	finance; Public Sector	Machine Learning; Predictive Analytics	2014	**Series E**	hyperscience.com
Bulgaria	**Identrics**	10 - 99	Media & Entertainment	Machine Learning; Natural Language Processing (NLP); Big Data Analytics	2015	**N/A**	identrics.net
Bulgaria	**Imagga**	0 - 10	information technology; marketing, Sales, and Customer Service;	AI Hardware & Infrastructure, Computer Vision, Deep Learning, Machine	2012	**Seed**	imagga.com
Bulgaria	**ImagineQr**	0 - 10	marketing, Sales, and Customer Service; Media and	Generative Adversarial Networks (GANs), Machine Learning, Natural	2023	**N/A**	imagineqr.io
Bulgaria	**Iris.ai**	10 - 99	Science	Natural Language Processing (NLP)	2015	**N/A**	iris.ai
Bulgaria	**Kelvin Health**	0 - 10	Healthcare and Life Sciences;	Computer Vision, Deep Learning, Machine Learning,	2020	**N/A**	kelvin.health
Bulgaria	**LatticeFlow**	0 - 10	Automotive; Healthcare and Life Sciences; information technology;	AI Hardware & Infrastructure, Computer Vision, Deep Learning, Machine	2020	**Series A**	latticeflow.ai
Bulgaria	**MediaBoard**	0 - 10	Media & Entertainment	Media monitoring	2010	**N/A**	mediaboard.bg
Bulgaria	**Micar Innovation**	0 - 10	Healthcare and Life Sciences	ep Learning	2016	**N/A**	micar21.com
Bulgaria	**MYX**	100 - 499	Telecommunications		2020	**Seed**	myxrobotics.com

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Bulgaria	**Childish - Data Science and AI**	10 to 99	2018	childish.ai
Bulgaria	**Cosense**	Below 10	2020	cosense.ai
Bulgaria	**Cosmos Thrace**	10 to 99		cosmosthrace.com
Bulgaria	**DigiTech Consult ltd**	10 to 99	2016	digitechconsult.com
Bulgaria	**Dreamix**	100 to 499	2006	dreamix.eu
Bulgaria	**Eden Tech Labs**	Below 10	2016	edentechlabs.io
Bulgaria	**Graze**	Below 10		graze.link
Bulgaria	**Hacker.works**	Below 10	2016	hacker.works
Bulgaria	**Humans in the Loop**	10 to 99	2017	humansintheloop.org
Bulgaria	**Identrics**	10 to 99	2016	identrics.ai
Bulgaria	**Moonlimit AAS**	100 to 499	2020	moonlimit.com
Bulgaria	**Next Consult JSC**	100 to 499	2010	next-consult.com
Bulgaria	**Next Solutions Bulgaria**	100 to 499	2019	nextforhr.com
Bulgaria	**Perceptica**	10 to 99	2012	perceptica.com
Bulgaria	**RPA Consulting Ltd.**	10 to 99	2017	rpa.bg
Bulgaria	**RS Consult**	Below 10	2007	rsc.bg
Bulgaria	**Service Centrix Ltd**	10 to 99	2008	servicecentrix.com
Bulgaria	**Tetracom Interactive Solutions Ltd.**	10 to 99	1996	tetracom.com
Bulgaria	**Trigonon**	Below 10	2015	trigonongroup.com
Bulgaria	**United Drone Community**		2015	udc.bg

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AI Investors Index

Country	Investor name	Investor type	Geography focus	Average ticket (€)	Stage focus	Year Founded	Website
Bulgaria	**AlfaStar Ventures**	Venture capital	Global		Pre-seed; seed	2023	https://www.alfastar.capital/
Bulgaria	**Black Peak Capital**	Private equity & growth capital	SEE	4-10M	Growth equity	2014	https://www.blackpeak-capital.com/
Bulgaria	**BrightCap Ventures**	Venture capital	Bulgaria, global	200K-3.5M	Pre-seed; seed; Series A	2018	https://brightcap.vc/
Bulgaria	**Eleven Ventures**	Venture capital	SEE	up to 1M	Seed	2012	https://www.11.vc/
Bulgaria	**Impetus Capital**	Venture capital	CEE	300-500K	Seed; Series A	2015	https://www.impetus.capital/
Bulgaria	**Innovation Capital**	Venture capital	Bulgaria	25K-1M	Pre-seed	2019	https://www.innovationcapital.bg/
Bulgaria	**LAUNCHub Ventures**	Venture capital	CEE, SEE	300K-3M	Pre-seed; seed; Series A	2012	https://launchub.com/
Bulgaria	**Morningside Hill**	Venture capital	Bulgaria	750K-3.5M	Seed; Series A	2014	https://www.morningsidehill.com/
Bulgaria	**Neo Ventures**	Venture capital	Global	up to 3M	Pre-seed; seed; Series A	2018	https://neoventures.net/
Bulgaria	**New Vision 3**	Venture capital	Bulgaria	100K-1M	Pre-seed; seed	2019	https://www.newvision3.com/
Bulgaria	**Silverline Capital**	Private equity & growth capital	Bulgaria	2.5-7M	Growth equity	2019	https://silverlinecapital.net/
Bulgaria	**Sofia Angels Ventures**	Venture capital	Bulgaria, SEE, CEE	200-500K	Pre-seed; seed	2020	https://sofiaventures.eu/
Bulgaria	**Vitosha Venture Partners**	Venture capital	Bulgaria	25K-1M	Pre-seed; seed; Series A	2020	http://vitosha.vc
Croatia	**Fil Rouge Capital**	Venture capital	Croatia	10K-1M	Pre-seed; seed; Series A	2019	https://filrougecapital.com/
Croatia	**SQ Capital**	Venture capital	SEE		Pre-seed; seed	2017	https://www.sqc.hr/
Czech Republic	**AI Startup Incubator**	Incubators & accelerators	Europe	up to 250K	Pre-seed; seed	2017	https://www.suincubator.ai/
Czech Republic	**Credo Ventures**	Venture capital	CEE	up to 5M	Pre-seed; seed	2009	https://www.credoventures.com/
Czech Republic	**Czech Founders VC**	Venture capital	CEE	50-350K	Pre-seed; seed	2022	https://czechfounders.vc/
Czech Republic	**DEPO Ventures**	Venture capital	CEE, Baltics		Pre-seed; seed	2016	https://depoventures.com/
Czech Republic	**Fazole Ventures**	Venture capital	Czech Republic	50-800K	Pre-seed; seed	2018	https://fazole.vc/indexEN.html
Czech Republic	**Grouport Ventures**	Angel networks & funds		30-250K	Pre-seed; seed	2019	https://www.grouport.cz/en/
Czech Republic	**J&T Ventures**	Venture capital	CEE, SEE	500K-2.5M	Seed; Series A	2014	https://www.jtventures.cz/
Czech Republic	**KAYA**	Venture capital	CEE	100K-3M	Pre-seed; seed; Series A	2010	https://www.kaya.vc/
Czech Republic	**Lighthouse Ventures**	Venture capital	Europe, Czech Republic	up to 2.3M	Pre-seed; seed	2018	https://lhv.vc/
Czech Republic	**Longevitytech.fund**	Venture capital	Global		Pre-seed; seed	2019	https://www.longevitytech.fund/en/hom
Czech Republic	**Look AI Ventures**	Venture capital	Europe	up to 250K	Pre-seed; seed	2022	https://lookai.vc/
Czech Republic	**MITON**	Venture capital	CEE		Seed	2000	https://www.miton.cz/en/
Czech Republic	**Nation 1**	Venture capital	Czech Republic	50K-1.5M	Pre-seed; seed	2019	https://nation1.vc/
Czech Republic	**Presto Ventures**	Venture capital	CEE+		Seed	2016	https://www.prestoventures.com
Czech Republic	**Purple Ventures**	Venture capital	CEE, Europe	200-750K	Pre-seed; seed	2019	https://www.purple-ventures.com/
Czech Republic	**Rockaway Ventures**	Venture capital	CEE, DACH		Seed; Series A	2021	https://rockawayventures.com/
Czech Republic	**Soulmates Ventures**	Incubators & accelerators	CEE	50K-1M	Seed	2020	https://www.soulmatesventures.com/
Czech Republic	**Springtide Ventures**	Venture capital	Europe, Israel	1-10M	Seed; Series A; Series B; Series C	2014	https://www.springtide.cz/
Czech Republic	**Startguide VC**	Venture capital	CEE	50-200K	Pre-seed; seed	2021	https://www.startguide.cz/en/
Czech Republic	**StartupYard**	Incubators & accelerators	CEE	20K	Pre-seed	2011	https://startupyard.com/
Czech Republic	**Tensor Ventures**	Venture capital	CEE+	up to 2M	Seed; Series A	2018	https://tensor.ventures/
Czech Republic	V-Sharp Venture Studio	Venture capital	CEE, EU	up to 1M	Pre-seed; seed	2019	https://www.vsharp.vc/
Czech Republic	Y Soft Ventures	Venture capital	CEE		Seed	2012	https://www.ysoft.com/en/company/ysof
Czech Republic	ZAKA VC	Venture capital	UK, DACH, Baltics, CEE		Pre-seed; seed	2019	https://zaka.vc/
Greece	Big Pi Ventures	Venture capital	Greece	1-3M	Seed	2017	https://bigpi.vc/
Greece	Genesis Ventures	Venture capital	SEE	100-400K	Pre-seed; seed	2021	https://www.genesis-ventures.vc/
Greece	Marathon Venture Capital	Venture capital	Greece	1-1.5M	Pre-seed; seed; Series A	2017	https://marathon.vc
Greece	Metavallon VC	Venture capital	Greece	up to 1.5M	Seed	2018	https://metavallon.vc

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