



# 2023

ANNUAL REPORT  
INSTITUTE OF INFORMATICS  
& TELECOMMUNICATIONS  
NCSR DEMOKRITOS

# IIT is growing fast, promoting research excellence and innovation in AI and Telecommunications



IIT is growing fast implementing its strategic plan through a multi-faceted approach that aims to promote research excellence and innovation in AI and Telecommunications. This approach is based on the principles that we continuously promoted during the last years:

- **Enforcing collaboration among the Institute teams and with other teams at NCSR Demokritos (NCSR).** The work in software-defined networks exploiting AI to make networks safer and smarter is such an example showing the potential of research collaboration among the two Divisions of IIT. Several research projects are currently implemented by IIT researchers in this area.
- **Fostering digital innovation services, in the dynamic field of data-driven innovation and AI technologies.** In 2023, ahead, our Digital Innovation Hub (DIH), was awarded the prestigious Platinum i-Space recognition from the Big Data Value Association. Smart Attica, the first European DIH for AI in Greece, coordinated by IIT, started its operations aiming at supporting the digital transformation of SMEs and public organisations.
- **Supporting the digital transformation of NCSR.** This is performed through our Network Operations Center (NOC) which manages and maintains the campus' core network infrastructure, and through our eGovernance office (eGov) which designs and develops applications and supports the users and systems of NCSR. In 2023, NOC executed a significant upgrade of our campus network and computing infrastructure, whereas eGov launched the D.U.A. Platform that unifies data from various systems and services for all NCSR employees.
- **Leading and contributing to various national and European initiatives in our domains of expertise.** We prepared, together with the National Centre for Social Research, the first empirical strategic foresight study on the use of Generative AI in Greece (GenAI Greece 2030). We are part of the coordination team for the major European project DeployAI, which aims to maintain and expand the European AI on Demand Platform to meet the needs of European SMEs and public organisations.

- **Fostering a collaborative environment where our multidisciplinary teams work on research and innovation projects aiming to meet societal needs.** During 2023 we launched, together with the Greek Ministry of Culture, AiTHERION, a space fostering tech-driven experiences on ancient Greek philosophy. Our emblematic European project VAST (Values Across Space and Time) which brings values to the forefront of advanced digitisation within the cultural domain, concluded successfully.

- **Fostering a culture of equal opportunities and promoting diversity and inclusiveness.** In 2023, we started implementing the Institute's two-year Equity, Diversity and Inclusion Action Plan. Members of IIT team were involved in several relevant actions inside NCSR, but also in the context of a broader network of Greek research centres and institutes.

- **Providing a better work environment in terms of operations and working spaces.** We finalised our Human Resources (HR) strategy and set up the HR Unit aiming to enhance and sustain an effective and balanced work environment. The construction of our new smart IIT building started at the end of 2023 and will be completed by the end of 2025. Our intention is to create a living lab environment that will also enhance well-being and productivity.

Last year was the best ever for IIT in attracting funding from various sources, mostly from EU projects, enabling us to speed up the implementation of our strategic plan, meeting our objectives and principles. It was also the year in which we started the re-organisation of IIT research Divisions and Labs to support our research work more effectively. IIT is growing at a significant pace. To sustain this growth in the coming years, it is a necessity to enhance our efforts towards attracting talented researchers and supporting basic research, sustaining also an effective work environment.

**Dr Vangelis Karkaletsis**

Director of the Institute of Informatics & Telecommunications, NCSR Demokritos

# Generative AI Greece 2030: Greece's possible GenAI futures

**NCSR** Demokritos (NCSR) and the National Centre for Social Research (EKKE) with the support of the Special Secretariat of Foresight, materialised the first empirical strategic foresight research approach on the use of Generative Artificial Intelligence (GenAI) in Greece. The study presents trends, opportunities, challenges, uncertainties and possibilities that will shape the future of the GenAI ecosystem in Greece. The main objective is to draw on the collective knowledge and foresight perceptions of a sample of Greek experts/specialists on the impact of the domestic GenAI ecosystem, in the time frame leading to 2030. In addition, the study intends to offer high level guidelines on how to adopt GenAI with positive outcomes and as such, it provides a framework of proposed strategic initiatives and policy recommendations.

The study was based on thorough preliminary desk research, systematic literature review and multimethod horizon scanning followed by a series of interviews via questionnaires. The participants were experts representing different stakeholders (public administration, research-academic community, business-private sector and civil society, professional and scientific associations), who already are or will be systematically involved in GenAI. Based on experts' opinions, GenAI is already here and seems to be an exponential and rather irreversible technosocial

development and nowadays, we are only observing fragments of tomorrow's GenAI's landscape. It is expected to have a large and multi-level impact on Greek society by 2030, with a prevailing optimistic outlook on the nature of this impact. The issues of digital ethics and regulation are of great concern and it is stated that excessive political or corporate interference and control may potentially limit the level of functionality and innovation of GenAI, hence, a balanced approach is needed.

All the information collected was fused and taken into consideration resulting in four scenarios of possible alternative future scenarios of GenAI in Greece by 2030. The first is called "techno-social acceleration", where the world is described as adaptable and free from technophobic entanglements, while the sustainability and value of the GenAI ecosystem are at a high level accompanied by a fairly resilient liberal political system. In the second scenario, the "techno-dwarf", the open economy and a set of favorable political intentions prevail, but the GenAI ecosystem loses momentum and is not a priority due to excessive regulations and strict bureaucratic rules. The third scenario is described by the term "technosocial tarriness". It represents a stunted or underdeveloped GenAI ecosystem in a closed and technophobic world, alongside a significant lack of ethical and regulatory frameworks, public policies, and institutional interventions. The



Presentation of the report "Generative AI Greece 2030" to the Prime Minister

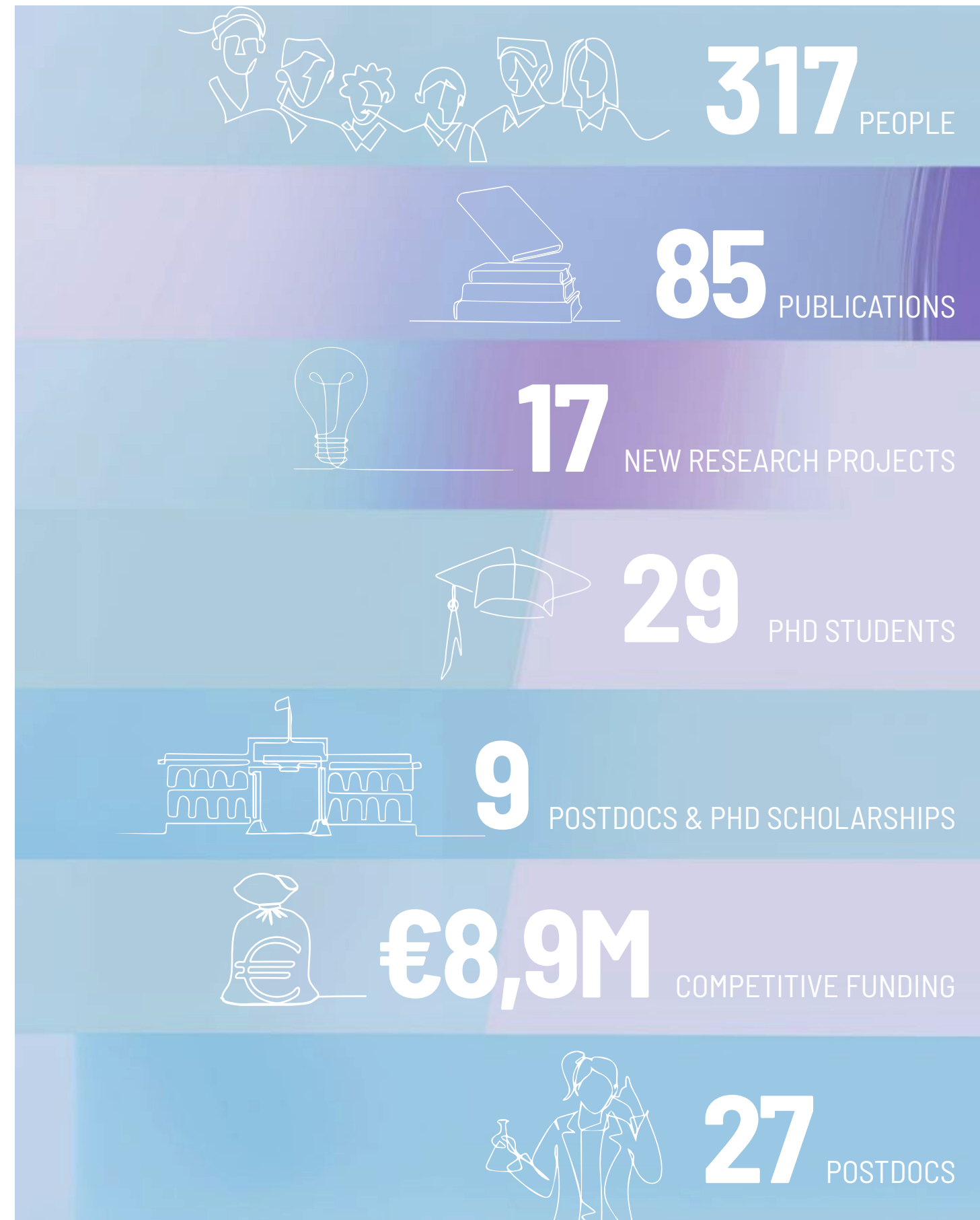
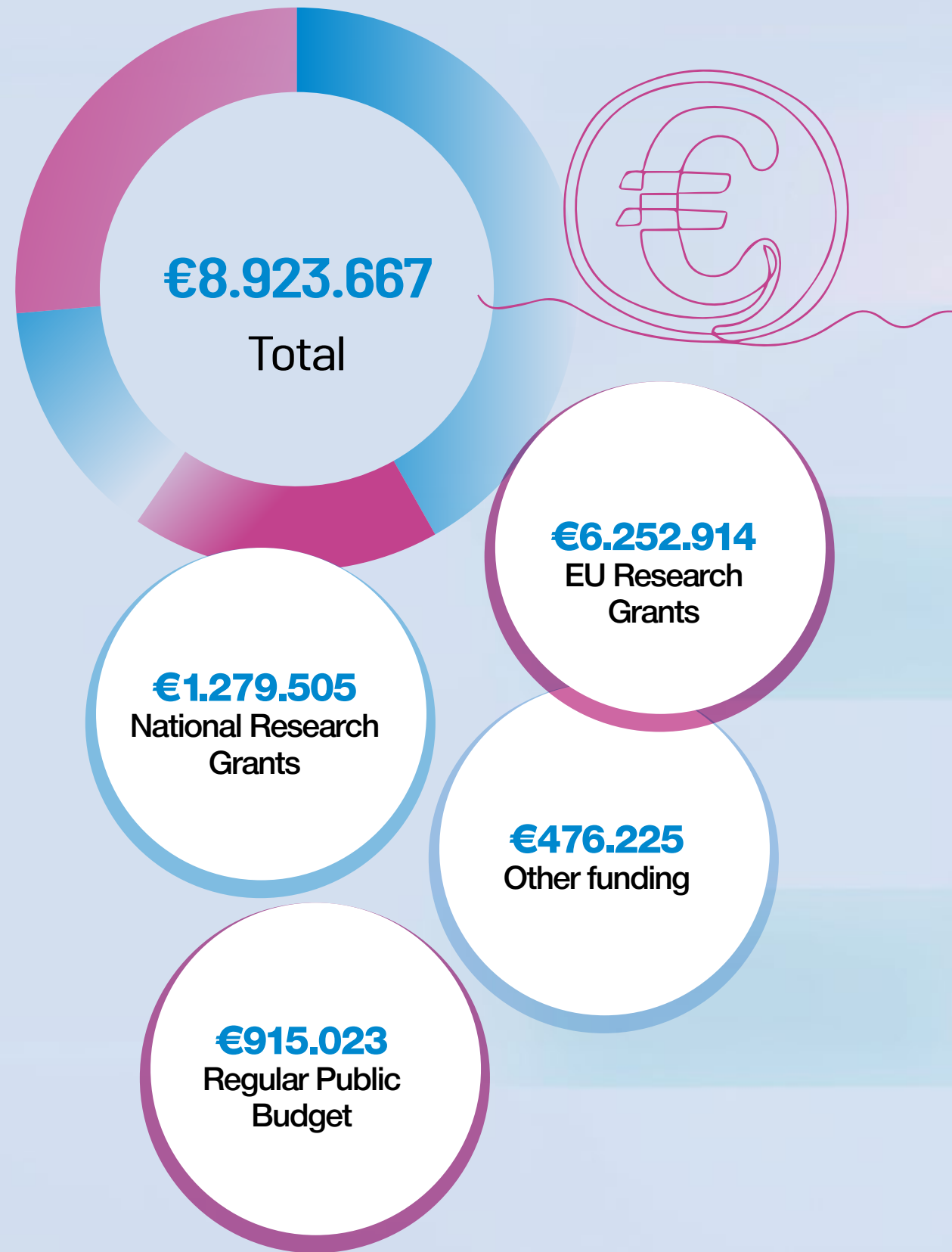
fourth scenario depicts a "techno-giant" with feeble legs and represents a GenAI ecosystem that reflects the global technological boom, but within a socio-cultural and political environment that is unable to turn speed into adaptation, to integrate modern techno-evolutions and to exploit the possibilities and opportunities they offer.

The global geopolitical and geo-economic landscape is becoming increasingly uncertain, complex and unstable and GenAI seems to amplify these systemic conditions. It is uncertain what the future holds but dealing with the vulnerabilities and complexities, setting long-term goals, adaptable institutions and mindsets, being adequately prepared, it will put the basis towards following the most favourable scenario - i.e., the "techno-social acceleration" scenario. This scenario is the one that offers the most benefits for Greek society with the adoption of AI. The widespread use -and particularly the use with positive impact, where opportunities "translate" into reality- flows with a series

of technological, ethical, and socio-political challenges that require complex and forward-thinking approaches. The way in which the appropriate environment for the flourishing of the positive scenario can be shaped involves a wealth of policy decisions and public policies based on targeted axes. The study concludes with policy recommendations on ethical guidelines and supervision mechanisms, investments in infrastructure, data governance, motivations for research and development, enhancing education, and AI diplomacy.



The "Generative AI Greece 2030" report



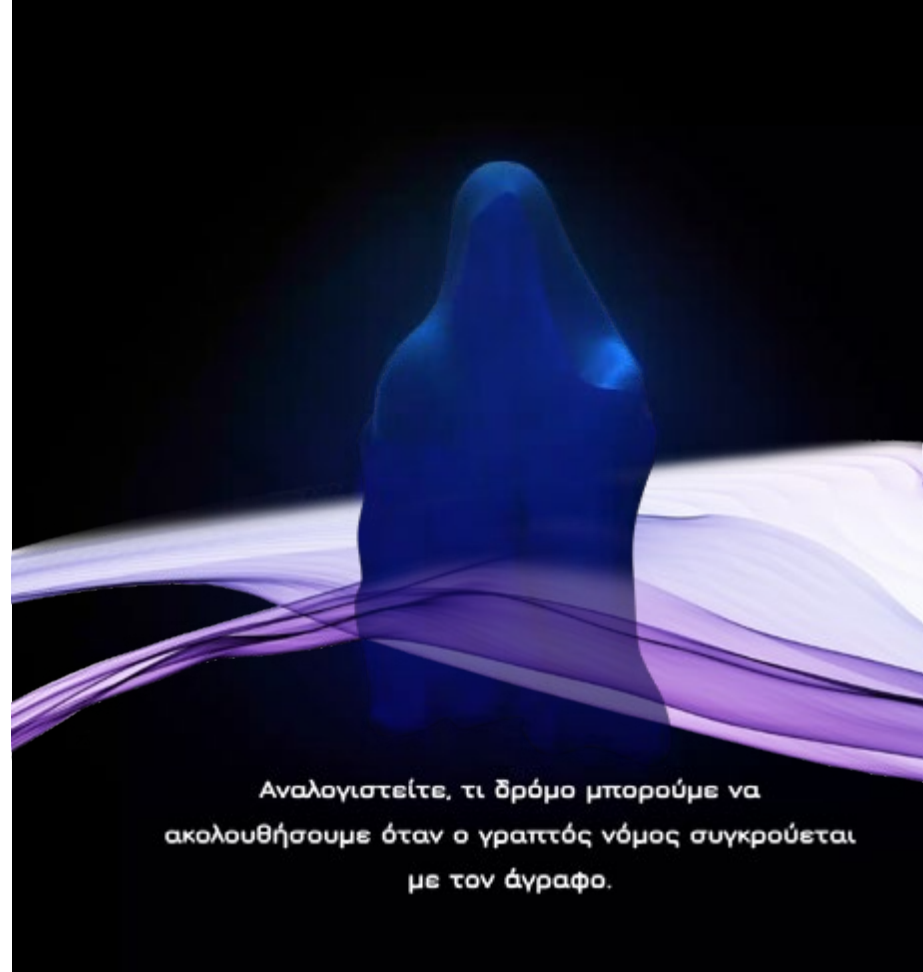
## Interview

# Bridging Technology and Humanity: Dr. George Petasis on innovation and citizen empowerment

In recent years, Dr. Georgios Petasis, a Senior Researcher (B') and the lead of CAKT group (Content Analysis and Knowledge Technologies), at the Institute, has been leading research initiatives that reflect IIT's commitment to bridging the gap between technology and society, fostering a collaborative environment where innovation serves the greater good. By envisioning the synergy of AI with digital humanities, Dr. Petasis leads a team of multidisciplinary researchers from both AI and digital humanities, which actively seeks to spearhead initiatives that promote personal reflection and growth, ultimately leading to innovative solutions that benefit society. In 2023, these initiatives actively engaged more than 4.000 citizens across Europe.

**Considering their impact and significance, which were the standout projects from 2023 for the CAKT group?**

I'd like to mention three projects that I have contributed in their conception, and I'm proud of all three. In 2023, we inaugurated and launched AiTHERION. It was also the year we designed TITAN, our initiative to counter disinformation, and concluded the VAST project.



These initiatives brought us closer to citizens and allowed significant impact to be made through our culture initiatives.

**What are the key aspects of the AiTHERION project?**

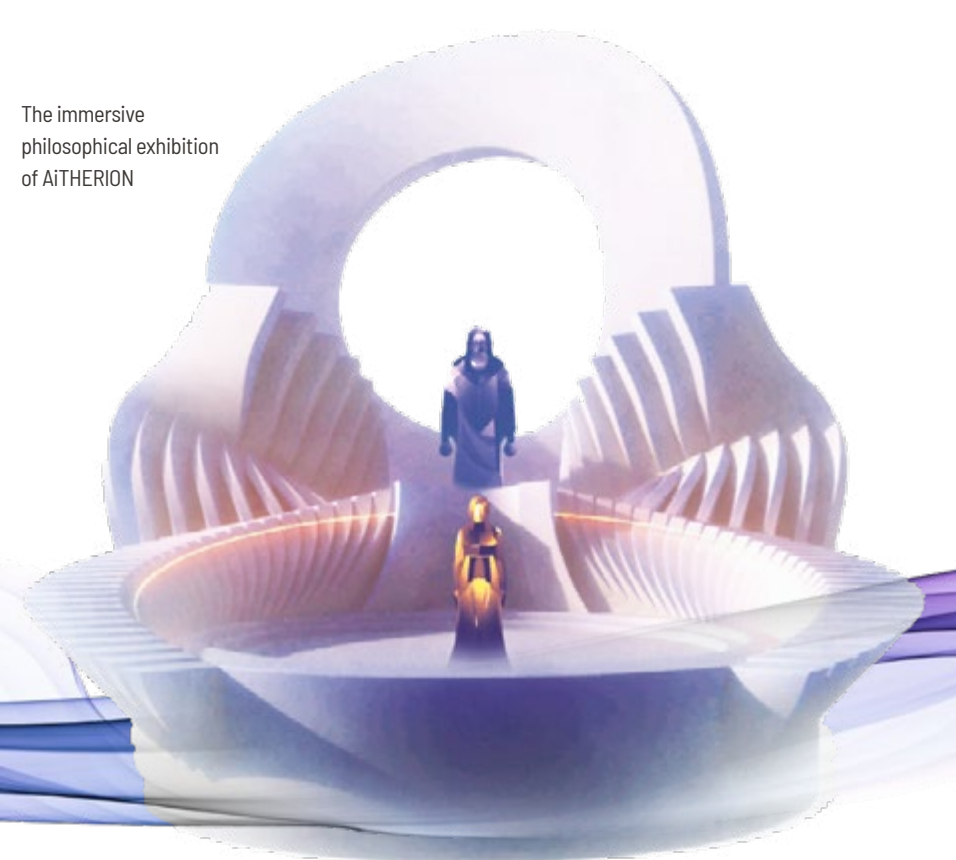
AiTHERION is a philosophical exhibition. There are no physical objects; everything is digital, participatory, and experiential. Having the philosophy of ancient Greek philosophers as a starting point, AiTHERION invites the user in a participatory experience, aiming to stimulate thinking and reflection on contemporary societal aspects. Technology plays an essential role in providing an immersive environment facilitating engagement, collaboration, and visual storytelling, providing the opportunity to stimulate further research.

**Could you elaborate on the VAST project and its objectives?**

VAST (Values Across Space and Time) emerged as a collaborative European initiative with a primary focus on studying (moral) values. Why do values matter? Values define who we are. Values are the trails of our common legacy, our collective memory, the way we think about ourselves and others. Values are

historically dynamic, they travel through material culture (artefacts, books, scientific instruments, etc.), they are appropriated in different places and times by different people, and they re-emerge in new cultural forms, whether tangible or intangible. VAST has brought values to the forefront of advanced digitization within the cultural domain. The project has traced and inter-linked: a) values of the past through the analysis of collections of narratives, such as theatrical plays, fairy tales, and scientific documents, that come from different places and from significant moments of European history (ancient Greek drama, 17<sup>th</sup> century Scientific Revolution texts, and folktales, having as a starting point the 18<sup>th</sup> century and the beloved fairy tales of the Grimm brothers); b) values of the present through the collection and digitization of how values are conveyed today and of how the audiences experience and perceive the communicated values. The plethora of activities that have been implemented across Europe (e.g. educational activities in schools and museums, theatrical performances and workshops, museum exhibits) have engaged more than 4.000 citizens.

The immersive philosophical exhibition of AiTHERION



Αφήνω τη ζωή μου στην κρίση των θεών! Ας ξεμπερδέψουν αυτοί αυτό το ανθρώπινο κουβάρι.

**How did technology facilitate the VAST project's objectives in engaging museums, promoting values in education, and fostering awareness without imposing specific values?**

Technology acted as a facilitator rather than an end goal in the VAST project. We encouraged museums to explore actions such as educational programs touching upon values, considering the ethical footprint of their collections. Technology, coupled with methodological support, aided this process, steering clear of didacticism or imposition of values. Instead, we aimed to raise awareness about the diversity of values and respecting the values of others. At the same time, we engaged in initiatives that foster the recognition of values from AI, like providing corpora supporting a benchmarking process currently underway at a conference called CLEF.

**Now, shifting focus to TITAN. Can you elaborate on its efforts to combat disinformation, emphasizing the empowerment of citizens in addressing this societal threat?**

The project TITAN explores once again the synergy between social sciences and technology for societal good, focusing on our efforts

regarding disinformation. Given that disinformation poses a significant threat to democracy and societal formation, regardless of its shape, the TITAN project targets citizens. Its aim isn't to label articles as disinformative or not, but rather to empower individuals to tackle the issue of disinformation themselves. Thus, its objective is to guide them in such a way so as to enhance their critical thinking and acquire awareness about personal biases regarding information consumption.

**How is TITAN addressing the problem of disinformation?**

For this purpose, we've created an AI-based digital assistant (chatbot), following a methodology where content is analysed by AI to detect signals of disinformation tactics, which are then used to plan a personalised dialog. Employing methods such as the Socratic method or the midwifery approach (meaning it won't directly answer user questions but rather pose questions back to the user, like an inverted chatbot), as well as theories from education, such as experiential learning. This way, we aim to prompt citizens to think critically when faced with an article alongside our digital assistant so that they arrive at their

## Interview



**Dr. Georgios Petasis**  
Senior Researcher (B')

own conclusions. Here, once again, we're engaging in self-reflection and enhancing critical thinking skills.

**What is the methodology behind TITAN, and how does it work?**

Here, we have developed a four-step methodology based on several theories derived from the Social Sciences and Humanities and all the research conducted in combating disinformation. All of this is now encapsulated in a Generative AI model. Dialogues have been meticulously designed, based on well-founded theories, to justify the chatbot's questions and their outcomes. This will then be transformed into a digital assistant using current GenAI technologies, similar to ChatGPT.

**What elements contribute to the success of these projects and differentiate them from other digital initiatives?**

What sets the AiTHERION apart is our aim to provide a digital experience that promotes self-reflection and awareness of decision-making. The VAST project shares a similar objective, enhancing awareness about values and their diversity, using technology to enhance the user experience and encourage visitors to contemplate a museum visit differently. The TITAN project aims to provide citizens with a digital assistant that helps them consume media under a more critical attitude.

# Navigating the Next Frontier: Dr. Harilaos Koumaras on the Evolution of Network Technologies at IIT



AI-generated image



**Dr. Harilaos Koumaras**  
Senior Researcher (B)

Senior Researcher Dr. Harilaos Koumaras has nurtured a dynamic research environment, leading a team of 15 researchers and students. Notably, 2023 saw the fruition of his efforts with the establishment of a bespoke 5G platform and a sophisticated cloud infrastructure within his group, namely FRONT, marking significant milestones in mobile communications research. His dedication to excellence in multimedia provision and quality evaluation underscores IIT's commitment to innovation, setting a solid foundation for future advancements.

**What were the main activities and focus areas of the FRONT research group in 2023?**

The FRONT research group focuses on 5 main areas: experimenting with 5G/6G technologies; making networks smarter and safer using AI; creating new network designs; connecting IoT, edge, and cloud technologies; and using 5G/6G for applications like vehicles and virtual reality. At present, we are managing 7 research programs, with a strong focus on AI. Our team is actively involved in experimentation and programmability for 5G/6G networks, particularly focusing on AI applications for the edge cloud continuum, with a specific focus on Industry 4.0, security, trustworthiness, and drones. Our aim is to offer a fully controlled experimental environment for testing. This environment, along with the accompanying tools, is purely experimental and fully controlled.

**Can you share details about the 5G/6G platform and how you think it positions your team for the transition to 6G technologies?**

Our 5G/6G platform, created at IIT and funded by EU projects, serves as a cutting-edge testing



AI-generated image

ground for new wireless technologies. It allows us to explore topics like network switching and improving internet speed and reliability. This platform is crucial for future breakthroughs because of its adaptability to upcoming wireless advancements. Starting as the 5G eGenesis platform, evolving into the 5G/6G Sandbox project, and now culminating in the Sunrise pan-European 6G platform, it aims to unify experimental 6G platforms across Europe. The platform we've developed is private and independent of commercial networks. It's dynamic, allowing us to intervene and make improvements as needed.

**How can the FRONT group's work on the 5G/6G network architecture improve wireless communication in the future?**

The FRONT group excels in enhancing the openness of the 5G/6G network architecture, increasing its flexibility for seamless application integration. Furthermore, we prioritise enhancing network programmability, ensuring quick adaptation to changing needs. Building upon the foundations laid by the 5G network, we have developed advanced programmable tools to seamlessly integrate AI across the network, fostering a smarter and more responsive communication ecosystem.

**Can you explain the concept of the cloud continuum and its distinctions from traditional cloud computing?**

As opposed to centralised data centres, the cloud continuum distributes computational resources across various nodes spanning a geographical range, from the network edge near the user to distant locations, even in other countries. The term "continuum" highlights the integrated and seamless infrastructure of geographically dispersed cloud computing resources. One challenge is the complexity arising from the convergence of telecommunications and cloud computing, where telecommunications' professionals may lack cloud computing expertise, and academics might be less familiar

with telecommunications. The cloud continuum aims to bridge this gap. Moreover, it facilitates the implementation of AI, as AI thrives on data, which the continuum readily provides. Future 6G networks are expected to integrate these elements into an environment that significantly enhances AI capabilities.

**What role does your group play in advancing technology for the cloud continuum?**

Our group is actively involved in developing a Meta Operating System for the edge cloud continuum. This system allows for the unified management and control of distributed cloud computing resources, hiding the underlying complexity of the network. Similar to how a computer operating system manages hardware and software resources, our Meta Operating System optimizes resource allocation and decision-making based on specific requirements, ensuring efficient and seamless operation across the cloud continuum.

**How will the implementation of 6G networks benefit from the cloud continuum advancements?**

As the telecommunications landscape transitions from hardware to software-based networks, our advancements in the cloud continuum facilitate the seamless integration of distributed resources, thereby simplifying the implementation of both 5G and future 6G networks. This is crucial as the 5G/6G network is gradually transitioning from the hardware era to the software era, requiring reliable and fast infrastructure to support it. The core network of 5G/6G is now software-based, making it imperative to have infrastructure capable of supporting it effectively. With the shift to the cloud continuum, implementing 5G and 6G networks becomes easier and less complex, as it allows for more efficient and seamless integration of distributed resources.

## Digital Innovation

ahedd receives the top Platinum BDVA award for Data Innovation Excellence



ahedd, the Digital Innovation Hub of NCSR Demokritos, was awarded the prestigious Platinum i-Space recognition from the Big Data Value Association (BDVA), during the European Big Data Value Forum 2023, a pivotal event in the data technology landscape. This award signifies the highest level of excellence in data innovation and highlights ahedd's contribution to the dynamic field of data-driven innovation and Artificial Intelligence technologies. ahedd is one of the 7 DIHs in Europe to achieve this remarkable distinction and the only one operating in Greece.



Dr. Kanellopoulou receives the BDVA Platinum award



AI-generated image



Dr. George Giannakopoulos  
Principal Investigator of ahedd, DIH

More info



## Digital Innovation

### SMART ATTICA European Digital Innovation Hub



Smart Attica EDIH workshop, October 2023

### Smart Attica and smartHEALTH EDIHs serve the Greek businesses

Smart Attica, the first European Digital Innovation Hub (EDIH) for Artificial Intelligence in Greece, coordinated by IIT, is now supporting the digital transformation of SMEs and public sector organisations under the DIGITAL EUROPE Programme. Its consortium consists of 17 highly acclaimed partners and is strengthened by an associate partner network consisting of more than 40 SMEs and large industries that increase the EDIH's innovation capacity. Smart Attica offers 4 types of innovation services: i) test before invest; ii) innovation ecosystem and networking; iii) skills and training; and iv) support to find investment in three critical business sectors of the Greek economy: Energy & Environment, Supply Chain & Mobility, Culture & Tourism. The EDIH organised and participated in a series of events to promote Digital Innovation. One of the highlights was Smart Attica's initiative "Greek EDIHs build a common Natural Disasters Resilience masterplan" which focused on the creation of a national strategic plan of action in light of the increasing impact of natural disasters on the country's economy and welfare. IIT is also a partner in smartHEALTH EDIH, which started offering innovation services in the field of Digital Healthcare.

### IIT supports Business Innovation with AI

IIT's research personnel, in collaboration with ahedd, provided innovation services as well as consulting and training to a variety of companies and organisations across the globe. Indicatively, we provided AI expert support in the areas of behavioural and speech analytics to OTE-COSMOTE, the largest technology company in Greece and to Behavioral Signals, a US-based start-up in emotion AI technology respectively; speech-to-text development services to Archeiothiki, an information management mid-cap. We also contributed to the AI upskilling of the personnel



Periklis Terlixidis (in the middle), Project Manager of Smart Attica, at the European Conference "Small enterprises' challenges in a changing economic environment"

of OTE-COSMOTE, of the National Council for Radio and Television, a Greek independent authority and of Capture One, a photography software house. Furthermore, IIT groups supported the application of machine learning in the European Commission's internal use cases, and provided development services to Vodafone's "Giga Campus" pilot applications. Moreover, AI expert support was offered to gMendel, a Danish start-up in healthcare.

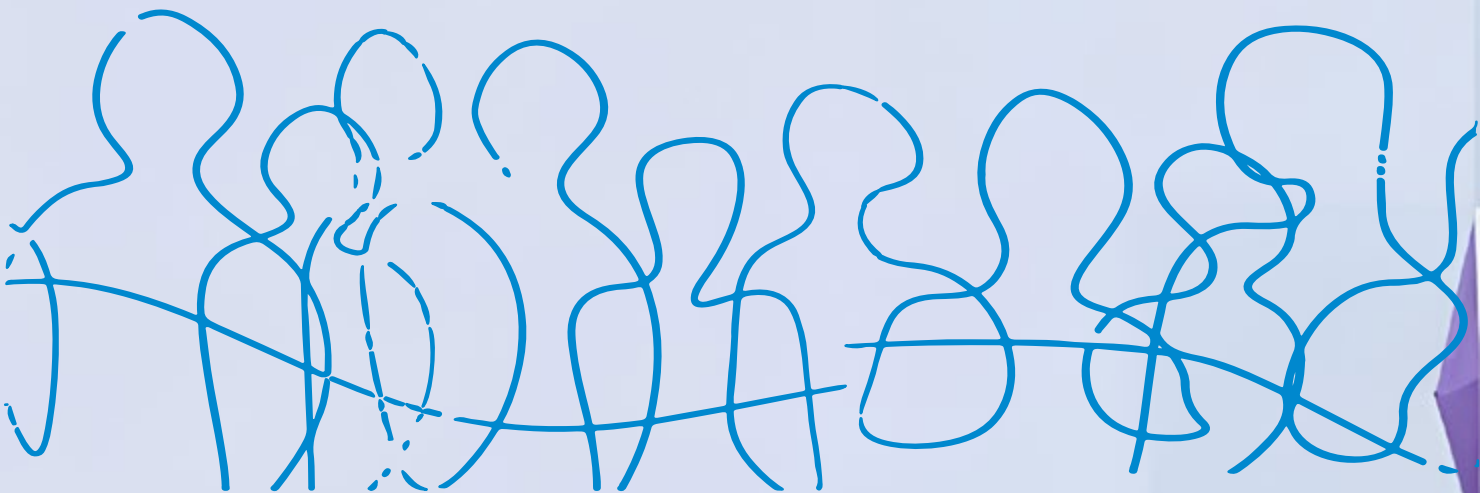
### Digital Innovation plans for 2024

In 2024, ahedd DIH will eventually become a spin-off, a necessary step for its sustainability and to grow its potential in offering one-stop-shop digital innovation services. Additionally, Digital Innovation will be further supported according to the strategic plans that the two Divisions of IIT are preparing, through the establishment of a dedicated Unit.



Dr. Kanellopoulou's interview on ANTI TV

# Projects 2023



## 17 new research projects



**EuroCC 2**  
1/1/2023 - 31/12/2025  
National Competence Centres in the framework of EuroHPC Phase 2. DIGITAL  
**SKEL | The AI Lab**  
389.266€



**OASEES**  
1/1/2023 - 31/12/2025  
Open Autonomous programmable cloud appS & smart EdgE Sensors. Horizon Europe  
**MNL | C.O.R.E**  
835.000€ | oasees-project.eu/



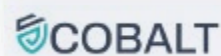
**SmartHealth**  
1/1/2023 - 31/12/2025  
European Digital Innovation Hub for Smart Health Precision Medicine and Innovative E-health Services. DIGITAL  
**SKEL | The AI Lab**  
341.865€ | smarthealth-edih.eu/



**PQ-REACT**  
1/9/2023 - 31/8/2026  
Post Quantum Cryptography Framework for Energy Aware Contexts. Horizon Europe  
**MNL | C.O.R.E**  
1.506.250€  
pqreact.eu/



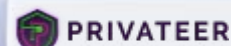
**MALT-P**  
12/1/2023 - 12/6/2024  
Machine Learning Automated Test Processes. Collaboration with Private Sector  
**SKEL | The AI Lab**  
70.103€



**COBALT**  
1/11/2023 - 31/10/2026  
Certification for Cybersecurity in EU ICT using Decentralised Digital Twinning. Horizon Europe  
**MNL | C.O.R.E**  
504.375€



**6G-SANDBOX**  
1/1/2023 - 31/12/2025  
Supporting Architectural & technological Network evolutions through an intelligent, secureD & twinning enaBled Open eXperimentation facility. Horizon Europe  
**MNL | FRONT**  
456.250€ | 6g-sandbox.eu/



**PRIVATEER**  
1/1/2023 - 31/12/2025  
Privacy first Security Enablers for 6G Networks. Horizon Europe  
**MNL | C.O.R.E**  
476.625€  
privateer-project.eu/



**Meta Materials**  
1/2/2023 - 31/1/2025  
Ανοιχτή συνεργασία ανάπτυξης καινοτομίας στον τομέα της τεχνολογίας επικοινωνιών και δικτύων 5G/6G. Collaboration with Private Sector  
**WiCom**  
198.400€

**BriGRETE**  
31/12/2023 - 30/12/2026  
Bridging the Gap: Research Ethics Training and Education. Erasmus+  
**ISL**  
53.000€



**Skills2Scale**  
1/5/2023 - 31/7/2024  
Deep Tech Empowerment for Higher Education Institutes. Horizon Europe  
**MNL | FRONT**  
85.293€  
skills2scale.eu/



**CREXDATA**  
1/1/2023 - 31/12/2025  
Critical Action Planning over Extreme-Scale Data. Horizon Europe  
**SKEL | The AI Lab**  
794.375€  
crexdata.eu/



**Hellas QCI**  
1/1/2023 - 30/6/2025  
Deploying advanced national QCI systems and networks in Greece. DIGITAL  
**CIL**  
279.056€  
hellasqci.eu/



**ETHER**  
1/1/2023 - 31/12/2025  
self-evolving terrestrial/non-Terrestrial Hybrid nEtwoRks. Horizon Europe  
**WiCom**  
399.375€  
ether-project.eu/



**AI4TRUST**  
1/1/2023 - 28/2/2026  
AI-based-technologies for trustworthy solutions against disinformation. Horizon Europe  
**SKEL | The AI Lab**  
625.000€  
ai4trust.eu



**Smart Attica**  
European Digital Innovation Hub (EDIH) 1/1/2023 - 31/12/2025  
Greek Innovation hub for Artificial Intelligence in Energy and Environment, Supply chain and mobility, Culture and Tourism. DIGITAL  
**SKEL | The AI Lab**  
1.330.433€ | smartattica.eu/

**SIMPATHIC**  
1/7/2023 - 30/6/2028  
Accelerating drug repurposing for rare neurological, neurometabolic and neuromuscular disorders by exploiting SIMilarities in clinical and molecular PATHology. Horizon Europe  
**SKEL | The AI Lab**  
315.000€



# Kicking off in 2024

## 11 new research projects

**6G CLOUD**  
1/1/2024 - 30/6/2024  
Service-oriented 6G network architecture for distributed, intelligent, and sustainable cloud-native communication systems.  
Horizon Europe  
**MNL | NeL**  
353.750€



**INSTAR**  
1/1/2024 - 30/6/2026  
International cooperation for digital standardisation.  
Horizon Europe  
**CIL**  
133.562€  
instarstandards.org/

**AIEdU**  
1/1/2024 - 31/12/2024  
How AI influences the way teachers teach and students learn to live in democracy.  
Collaboration with Private Sector  
**SKEL | The AI Lab**  
8.500€

**AGRARIAN**  
1/1/2024 - 31/12/2026  
SpAce-AIr-Ground Last Mile InfRastructure & Dynamic PrOgrAmmable DistRibuted Environment For Edge FArmiNg.  
Horizon Europe  
**MNL | C.O.R.E**  
1.559.375€



**CHANGER**  
1/1/2024 - 31/12/2026  
Challenges and innovative changes in research ethics reviews.  
Horizon Europe  
**SKEL | The AI Lab**  
547.500€

**ENVELOPE**  
1/1/2024 - 31/12/2026  
Evaluation and validation of connected mobility in real open systems beyond 5GS.  
Horizon Europe  
**MNL | FRONT**  
708.750€



**MANOLO**  
1/1/2024 - 31/12/2026  
Trustworthy Efficient AI for Cloud-Edge Computing.  
Horizon Europe  
**SKEL | The AI Lab**  
532.500€



**NOUS**  
1/1/2024 - 31/12/2026  
A catalyst for European CIOUd Services in the era of data spaces, high-performance and edge computing. Horizon - Euratom  
**SKEL | The AI Lab**  
651.785€ | nous-project.eu/



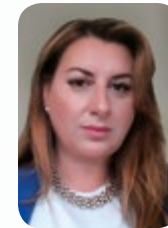
**SAFE-6G**  
1/1/2024 - 31/12/2026  
A Smart and Adaptive Framework for Enhancing Trust in 6G Networks.  
Horizon Europe  
**MNL | FRONT**  
430.900€  
safe-6g.eu/

**SUNRISE-6G**  
1/1/2024 - 31/12/2026  
Sustainable federation of Research Infrastructures for Scaling up Experimentation in 6G.  
Horizon Europe  
**MNL | FRONT**  
550.000€  
sunrise6g.eu

**DeployAI**  
1/1/2024 - 31/12/2027  
Development and Deployment of the European AI-on-demand Platform.  
DIGITAL-CSA  
**SKEL | The AI Lab**  
2.041.025€

# Communications Office

## Meet the Team



**Elena Galifianaki**  
Head of Communications



**Fay Pitsilidou**  
Senior Communications Officer



**Pelagia Drosaki**  
Communications Officer



**Yota Sotiropoulou**  
Graphic Designer

In 2023, the Institute's Communications Office strengthened its position as a prominent European team in research dissemination and communication.

With increased staffing and expertise, the Team effectively addresses the diverse communication needs of European projects, consistently developing strategic communication plans, highlighting project goals, innovations, results, and societal impact of each project throughout its lifecycle. Our active participation in major events and conference management further demonstrates our leadership in Science Communication and commitment to impactful research.

At the core of the Communications' Office mission lies the Institute's outreach strategy which includes meticulously overseeing all communication activities and leading Media relations.

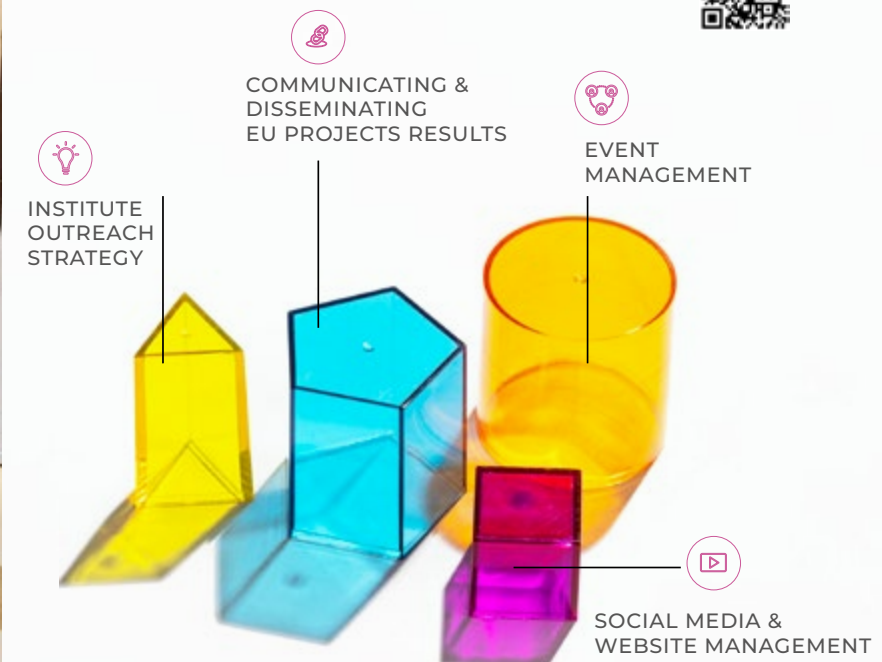
Our proactive multi-platform approach ensures that the Institute of Informatics and Telecommunications and NCSR Demokritos maintain a leading presence in scientific discourse.

We are dedicated to making scientific discoveries accessible and inspiring to wider audiences, setting a benchmark for excellence in research communication.

More info



E. Galifianaki and F. Pitsilidou at the AI on Demand Forum in Bologna representing EU projects



# Network Operations Center



**T**asked with the essential mission of providing network connectivity, security, and core network services, the Network Operations Center (NOC) has faithfully catered to the needs of the expansive NCSR campus. Its operational responsibilities include the management and maintenance of the campus's core network infrastructure.

NOC oversees more than 1.300 users and 3.000 devices spread across 6 institutes, 50 companies, and 3 administration units. Additionally, NOC manages out-of-campus points of presence (i.e. Anti-Doping Center and ACTRIS station at Helmos Mt), extending its impact and reach beyond the NCSR campus boundaries. Through continuous innovation and dedication, NOC aims to maintain its legacy as a leader in network technologies and a cornerstone of scientific and academic collaboration in Greece.

In 2023, NOC successfully executed a significant upgrade of the NCSR campus network and computing infrastructure as part of Action HEPHAESTUS. The year marked the deployment of a new wired and wireless network infrastructure that enhanced network capabilities and services, including the integration of VoIP telephony and a Central User Catalogue (LDAP Directory) to improve communication and user management. Additionally, the provision of EDUROAM access enabled seamless connectivity for NCSR personnel across participating institutions, further demonstrating NOC's capacity to implement advanced and customised technological solutions.

NOC is dedicated to enhancing operational capabilities and delivering superior services. In the short term, our focus is on completing the transition to a new campus network infrastructure and rolling out VoIP telephony, along with new central services for email, anti-spam, and SIEM (Security Information and Event Management).

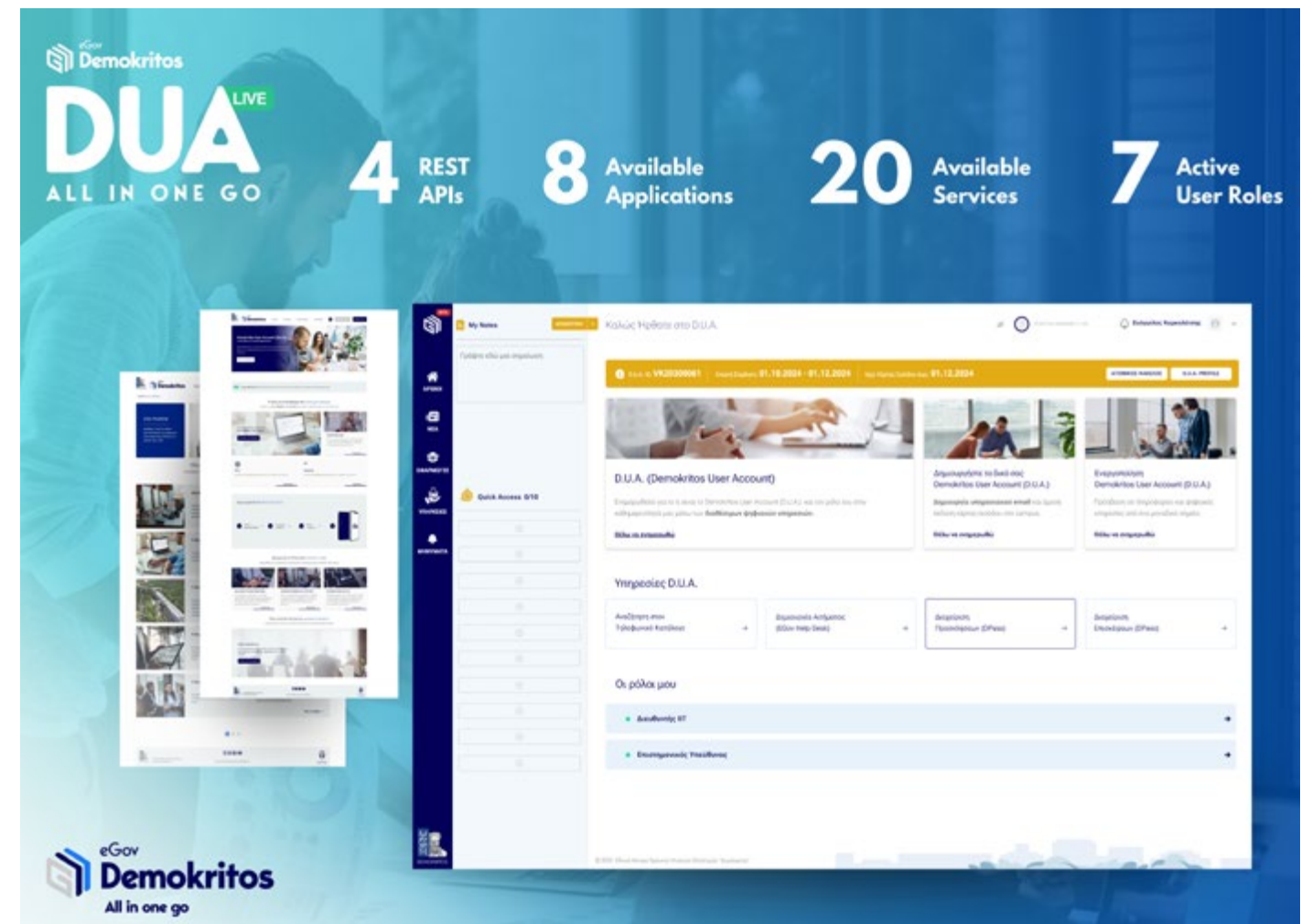
For the long term, our ambitious goals include implementing network automation to streamline management and improve service availability, enhancing cybersecurity through robust protective measures, and leveraging the capabilities of the upcoming Tier 3 Data Center to support AI-based and data-intensive research, ensuring scalability and reliability. These plans underline our commitment to innovation, efficiency, and security in both immediate and future endeavours.



**Georgios Xilouris**  
Head of Network Operations Center



More info



**T**he Applications Design & Development Team, at the eGovernance Office, had another productive year, implementing two major flagship projects for the digital transformation of NCSR. The first project, "D.U.A. Platform - All In One Go", unifies data from various systems into a single platform, providing employees with a unique Demokritos User Account (D.U.A.) for streamlined onboarding and access to essential services with just one click. Through the D.U.A. Platform - All In One Go, all new associates will be able to promptly acquire a professional email, an entry card, access to the electronic protocol, connectivity to the eduroam service, and other services, with a single click!

The first version of the D.U.A. Platform - All In One Go provides all D.U.A Users with the visitor management application called Dpass. This application was designed

taking into account the requirements of the Administrative Directorate and the Administrative Support Department of NCSR. With Dpass, access to the campus of NCSR changes, allowing employees to create an invitation easily and quickly for scheduling a visit to the campus. The invitation includes all necessary information required by a visitor.

In the upcoming period, the gradual implementation of the D.U.A. Platform - All In One Go is scheduled across all Institutes and administrative units of the NCSR. In collaboration with the Special Account Department, new electronic services tailored for the research and support staff within NCSR are being developed. The aim is for these new services to be integrated within the following year.

Along with the implementation of the D.U.A. Platform - All In One Go and in

collaboration with the Help Desk of the eGovernance Office, the website egov.demokritos.gr was developed as a point of reference and dissemination for the new D.U.A. Platform - All In One Go and all available services of the eGovernance Office.

More info



**Lefteris Koukianakis**  
Team Lead at Application Design & Development Team, eGovernance Office, NCSR Demokritos

# Education is a strategic pillar of the Institute



MSc in AI graduation



Student visit at AiTHERION



In the context of prioritising activities in Education and in line with its strategic plan 2023-2026, IIT proceeded in re-structuring its education sector in 2023. An Education Committee was formed, including the Education Officer who chairs the Committee, two Deputy Officers each of them acting as a liaison to their respective IIT Division. This is supported by the IIT secretary, the administrator of the MSc Programmes, and the Communications Office. Furthermore, we are moving towards the integration of the NML group, that focuses on education technologies (e-Learning Environments, AR/VR, Educational Robotics, Games, Mobile Apps, STEAM, BCI, Design4All), in the Education sector. NML targets students in general and special education, adults (women, seniors, disabled, refugees etc.) and other related stakeholders (educators, parents, public administrators, etc.) and offers them education, inclusion and skills improvement on and through digital technologies.

The re-structuring process aims to support the strategic growth of the IIT ecosystem, build team spirit and awareness and expand the engagement within educational activities.

Extending and promoting existing initiatives and partnerships remains a constant goal for Education. To this end, the Institute collaborates with Greek Universities to offer a wide range of comprehensive joint Master's Programmes. These Masters cover various fields, including Artificial Intelligence, Data Science, ICTs and Special Education, Applications of Technology in Health & Clinical Exercise and Quantum Computing & Technologies. It is noteworthy that the MSc Programmes in AI and Data Science include dedicated courses on ethics, ensuring that students gain a comprehensive understanding of the relevant ethical considerations and regulatory frameworks.

During 2023, the pioneering "Demokritos - Qualco Fellowship programme" has been supporting an R&D team comprising one post-doc and 2 PhD researchers and supervising 5 MSc. students of IIT's Master in Data Science. The team has been pursuing research

and innovation excellence in AI applied in FinTech solving research challenges with an industrial focus and publishing research work in internationally acclaimed workshops and conferences. Moreover, the team has co-organised the Financial Narrative Processing workshop in the context of the IEEE Big Data Conference 2023 and will participate in the Financial Natural Language Processing workshop in 2024 Joint International Conference on Computational Linguistics, Language Resources and Evaluation (LREC-COLING).

The focus on education further progressed through the continuation of joint PhD programmes, the hosting of the HIAS Universal AI Course in July 2023 where more than 400 students visited the premises and the organisation of training programs for companies.

As every year, IIT participated in the historic 58<sup>th</sup> Summer School of NCSR Demokritos, during which researchers delivered 10 days of free of charge engaging talks, workshops and demos for University students covering the diverse spectrum of the Institute's research and innovation domains.

# Esteemed colleagues retire from the IIT family



From left to right: Dr. G. Nounesis, Dr. E. Charou, Dr. V. Karkaletsis



From left to right: Dr. V. Karkaletsis, Dr. A. Kourtis, Dr. G. Nounesis

Retirement is the ultimate career milestone. It signifies that a colleague's professional journey is coming to a close and, in effect a cause for celebration and recognition. Following more than 30 years of service, to NCSR Demokritos and the Institute, Dr. Eleni Charou and Dr. Anastasios Kourtis were bid farewell by Georgios Nounesis, Director and Chairman of the Board at NCSR and Vangelis Karkaletsis, the Institute's Director in a ceremony at the central amphitheatre.

**Dr. Eleni Charou** is a lead researcher of IIT with numerous publications. Dr. Charou received her Diploma in Mathematics (1980) from the University of Athens, her MSc in Information Processing and Neural Networks (1991) from King's College, University of London, and her PhD in satellite image processing using Neural Networks (2001) from the Geology Department, University of Athens. Her current research interests include Machine Learning, Remote Sensing and Geospatial data analysis. Her most recent research project was on AI for Geoapplications (2021-2024) at the Computational Intelligence Laboratory (CIL).

**Dr. Anastasios Kourtis** worked for 38 years on wired and wireless broadband networks, multimedia applications, end to end Quality of Service (QoS) over heterogeneous networks and terminals, network management, network virtualisation and 5G networks. He received his BSc degree in Physics in 1978 and his PhD Degree in Telecommunications in 1984, from the University of Athens. Since then, Dr. Kourtis has been in charge of advanced research and collaborative projects. He has participated in more than 30 EU-funded research and development projects, and has been the Project or Technical Manager of many of them. He was the Head of Media Networks Laboratory (MNL) since 2011.





AiTHERION



AiTHERION digital visuals

The Institute of Informatics & Telecommunications of NCSR Demokritos, in collaboration with the Greek Ministry of Culture, developed AiTHERION, a space fostering tech-driven experiences on ancient Greek philosophy. The space that is housed in the building of the Athens Conservatoire, in the heart of the city, was inaugurated on 30 October 2023, by the Minister of Culture, Lina Mendoni.

AiTHERION currently hosts two exhibitions on ancient Greek Philosophy, one addressed to high-school students and the general public, titled "Democracy & Eudaimonia" and a second one developed for primary school students, aged 11-12 years old, named "The dilemma of the ring". Since the inauguration in October, free entrance to the two exhibitions is offered to schools and the general public during the first months of its operation. The first exhibitions are developed as group philosophical experiences involving personal reflection, dialogue and decision-making. Visitors reflect on abstract ideas and values and ponder on the ever-current theme of how we can "live well together".

AiTHERION is a permanent infrastructure of IIT that serves as a Hub for public dialogue on issues such as the future of Democracy and AI ethics. The vision is to constantly re-invent and expand spaces of contemplation, dialogue & public engagement. In this respect we envision to move forward in four directions: i) use the exhibition space as an Open Lab, open to researchers and academics, to test innovative technologies for culture and also receive feedback from citizens on ethical considerations, ii) create new exhibitions contemplating contemporary challenges (e.g. Ethics & Artificial Intelligence) ii) create interconnected twin exhibitions in other cities around the world, fostering cross-cultural dialogue among citizens, iv) create "crossroads" exhibitions that will explore the intersection with other philosophical traditions.

More info



The AiTHERION space



Minister L. Mendoni at the inauguration ceremony of AiTHERION

EXPERIENCE PHILOSOPHY



SmartSubs pilot show

During 2023, the Multimodal Analysis Group (MagCIL) has published scientific research papers presenting AI methods for analysing cultural content. More specifically, in the first paper, a multimodal benchmark and respective AI methods for recognizing the playing style of electric guitar was proposed. In the second paper, a framework for analysing and exploring solo Jazz music was presented at the Audio Engineering Society Convention in New York City. Additionally, 2023 was the second year of the museek project, coordinated by MagCIL, that monitors the public performance of music in Greece. This project aims to build an algorithmic pipeline that runs on a small device (such as Raspberry PI) and monitors songs in spaces such as restaurants, hotels, cafes, clubs and bars. A "public performance" of music is defined in most EU countries and the US by copyright laws to include any music played outside a small circle of friends and family that occurs in any public place. MagCIL and GEA are the two project partners, with the first building the core

algorithmic infrastructure of the project, utilising its expertise in fields such as audio analysis, music information retrieval and deep learning while GEA is the official music copyright collective management organisation of Greece and responsible for pricing such businesses that use music.

In the context of theatrical plays, in 2023 MagCIL participated in the SmartSubs project with a goal to develop and improve the existing know-how of automatic speech recognition and to promote research that aligns live oral performances with written subtitles. Towards this objective, an application which allows subtitles to be displayed on smart-glasses in theatrical performances (and more generally live cultural activities) was developed. The application has been tested in real performances, during 2023, and it was particularly addressed to deaf / hard of hearing users, making cultural content accessible to people with hearing problems through Greek subtitles in order to combat social exclusion.

# Implementation of IIT's Strategic Plan 2023 - 2026



In our strategic plan for 2023-2026, the main objective was to further promote Research Excellence, incorporating organisational changes, and implementing an action plan for promoting basic research.

**During 2023:**

- IIT finalised its Human Resources (HR) strategy and set up an HR Unit.
- An internal interdisciplinary team began implementing the Institute's two-year Equity, Diversity, and Inclusion Action Plan.
- The Education sector was restructured.
- The Communications Office was expanded.
- The administrative teams working in the different research groups joined forces to improve the administration of our projects.

In parallel, we proceeded with the re-organisation of our Research Divisions and Labs, to support our research work more effectively. As noted in our strategic plan, this is a necessity since the

scientific and industrial landscape in the Institute's areas of work is moving at an incredible pace, with funding schemes, orientation and application fields rapidly shifting and adapting to global developments. This re-organisation involved the following actions:

- Set up a Board for each Division (Intelligent Information Systems (IIS), Division of Telecommunications and Networks (T&N)). This Board monitors the implementation of the IIT research, innovation, and education strategy for the Division.
- Organise Labs in a more dynamic way, in the form of Research Groups. The aim is to adapt to the dynamic scientific landscape, as well as to provide incentives and roles to younger researchers. This is an ongoing process that will be completed during 2024.
- Attract talented researchers. We have assured 5 new positions for research personnel to be selected in 2024.
- Enhance efforts to exploit funding schemes more explicitly directed to basic research, like ERC and Marie Curie programmes.



## HUMAN RESOURCES

The rapid development and progress of IIT, along with the critical contributions of its personnel to the Institute's achievements, necessitate the establishment of a new structure for supporting Human Resources (HR). The primary objective is to enhance and sustain an effective and balanced work environment while simultaneously contributing to the overarching research, innovation, and educational goals of IIT's two Divisions. Consequently, a key priority in this year's strategic planning was the design of a comprehensive unit to perform core HR management functions.

In preparation for the upcoming launch of the Unit, the Institute finalised its new HR strategy during the last few months of 2023. A detailed plan was created, outlining operations and actions in various areas such as on- and off-boarding processes, information and guidance for personnel on organisational practices, tailored training and professional development procedures, as well as measures for employee health, safety, and well-being. A valuable tool for all the Unit's functions will be the newly established D.U.A. Platform, developed by the eGov office of NCSRD. The platform's digital applications and services will enable both the HR team and IIT staff to conduct various administrative and other relevant tasks, significantly facilitating their daily work life at the NCSRD.



## DIVERSITY AND INCLUSION

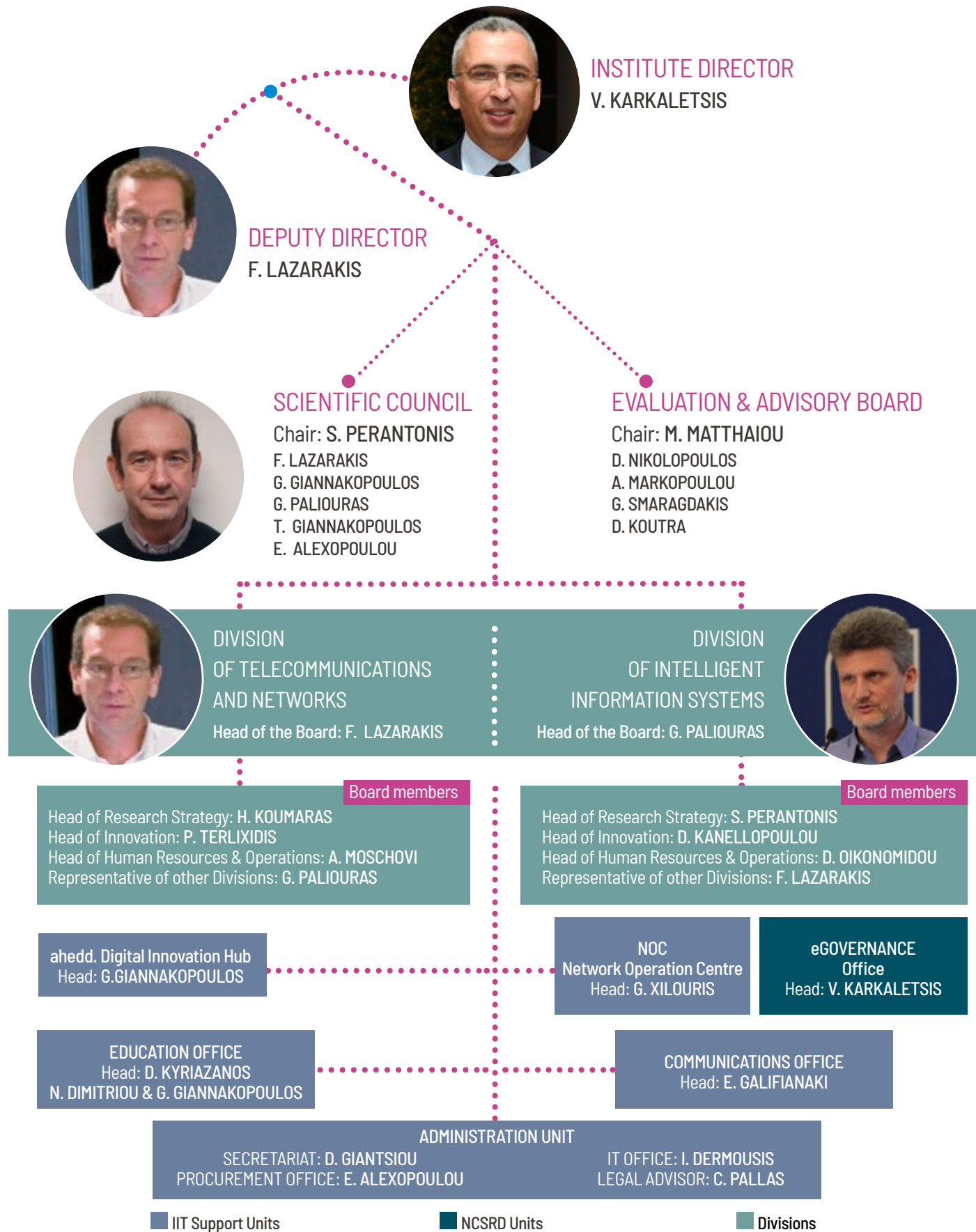
In 2023, an internal interdisciplinary working team began implementing the Institute's two-year Equity, Diversity, and Inclusion Action Plan. The primary objectives are to foster a culture of equal opportunities and promote diversity and inclusiveness in all aspects of IIT's work life. Throughout the year, the team organised several targeted initiatives, including internal discussions to raise awareness on issues related to the use of inclusive language, stereotypes around disability and women in STEM fields. Team members also participated in a tailored "train-the-trainers" workshop to address unconscious biases and discrimination in the workplace. The team prioritised accessibility for individuals with mobility and other disabilities, placing significant emphasis on planning improvements to the Institute's facilities. Additionally, the team focused on integrating the gender dimension into the educational content of postgraduate courses at IIT. In this context, lectures on topics such as gender and racial bias in Artificial Intelligence were designed and delivered to students, along with assignments concerning related approaches.

Members of the IIT working team were also actively involved in organising and implementing numerous actions as part of the current 1<sup>st</sup> Gender Equality Plan of NCSRD for 2022-2024. Women post-doctoral researchers from the Institute engaged in various events, such as open discussions on workplace inclusive practices and speed mentoring sessions for high school and university students. Further, IIT's representative on the NCSRD Gender Equality and Anti-Discrimination Committee participated in the activities of the broader network comprising relevant committees from thirteen Greek Research Centres and independent research institutes. Overall, as IIT strives to create a truly equitable and inclusive workplace and educational environment, it remains dedicated to the ongoing, coordinated and systematic implementation of actions that promote equality and combat all forms of discrimination.

More info



# Organisational Chart



# Scientific Boards

## The Evaluation & Advisory Board of IIT

The Institute's new Evaluation & Advisory Board, set up in 2022, is composed of five distinguished researchers in fields relevant to IIT's research areas.

Chair of the Board

**Michalis Matthaiou** Queen's University Belfast, UK  
**Dimitrios Nikolopoulos** Virginia Tech, USA  
**Athina Markopoulou** University of California Irvine, USA  
**Georgios Smaragdakis** TU Delft, The Netherlands  
**Danai Koutra** University of Michigan, USA

## The Scientific Council of IIT

The Scientific Council of IIT consists of Researchers and key personnel who meet regularly so as to discuss current issues of the Institute that require strategic decisions.

Chair of the Council

**Stavros Perantonis**  
**Fotis Lazarakis**  
**Evangelia Alexopoulou**  
**George Giannakopoulos**  
**Thodoris Giannakopoulos**  
**George Paliouras**

## Institute Director appointed member of the AI Advisory Committee in Greece by the Prime Minister

National acclaim for the Director of the Institute of Informatics & Telecommunications, Dr. Vangelis Karkaletsis, as he was appointed Member of the High-Level Advisory Committee on Artificial Intelligence to the Greek Prime Minister in October 2023. The Advisory Committee is Chaired by the distinguished Greek scientist and Professor of Electrical Engineering and Computer Science at MIT, Dr. Konstantinos Daskalakis. The Committee's purpose is to develop guidelines for the long-term formulation of a national strategy for Artificial Intelligence, focusing on the areas of importance for Greece: economy and society, improving productivity, increasing innovation, strengthening infrastructure, managing the effects of the climate crisis, supporting human resources and social cohesion, creating quality jobs, defending national digital sovereignty and improving the operation of the State. The Committee will also identify areas where Greece has a competitive advantage and can place itself at the forefront of the international debate on the use of AI and suggest ways to creatively combine the application of ethical and regulatory rules with the promotion of innovation, by the public and private sectors, and contribute national positions to the European debate on its



AI Advisory Board meeting with Prime Minister

regulatory framework AI. In this context, a study on generative AI (Generative AI Greece 2030) was presented on January 16, 2024 to the Prime Minister by Dr. Vangelis Karkaletsis, IIT's Director.

The aim of the study is to formulate a framework of strategic initiatives and policy recommendations, as emerged through the findings, regarding the impact of the domestic ecosystem of Productive Artificial Intelligence, with a time horizon of 2030.



AI-generated image

## Smart new IIT building works initiated

The new smart IIT building construction started at the end of 2023. According to the plan, the building will be completed by the end of 2025. The construction of this building as well as others in the campus is funded by the Public Investments Program and the European Investment Bank. The budget makes provisions not only for the construction costs but also for some of the systems, appliances and equipment that will be installed in the building. In this view, the new building has been designed to fulfill the requirements of a smart building.

A smart building can sense, interpret, communicate, and actively respond efficiently to changing conditions, such as the operation of technical building systems, the external environment, and demands from the grid. In fact, smart buildings not only optimise energy consumption and reduce environmental impact, but also enhance occupant well-being and productivity. Some of the services provided by the smart building are: i) DataCenter that will support the whole NCSR campus, ii) Smart Features (sensing, automation, etc.), iii) Green Features (Netmetering, Power Management, etc.).

Our intention has been to create an excellent work environment that can also be exploited as a living lab environment by our research projects.



Work initiated for IIT's smart building.

# The Division of Telecommunications & Networks (TN)

The **Division of Telecommunications & Networks (TN)** of IIT consists of 4 Research Groups, namely WiCom (Wireless Communications), NeL (Telecommunications Networks Laboratory), CORE (Connectivity and Cloud, Orchestration, Resource Optimisation and Experimentation), and FRONT (FutuRe cOmmunication NeTworks). These Groups specialise in a wide field of technologies for modern and future telecommunications networks, ranging from antennas and physical layer techniques to network management and optimisation, 5G/6G orchestration, privacy and security, Edge2Cloud, Cybersecurity Certification and Post Quantum Cryptography Applications. It must be noted that CORE and FRONT continue and build on the work of the Media Networks Lab (MNL) that was set up and led by Dr. Anastasios Kourtis, who retired at the end of 2023.

In 2023, the personnel of TN Division consisted of 7 permanent researchers, 61 research associates and 4 colleagues for administrative, scientific and technical support of the research activities. 3 new Smart Networks and Services (SNS) 6G projects were funded, 2 Horizon Cybersecurity, 1 Horizon Digital, Industry and Space, and 1 with a private company. H2020 ARIADNE was completed with excellent results; it is noted that ARIADNE was the first EU project that empowered the collaboration between TN and Intelligent Information Systems (IIS) divisions bringing together B5G technologies and AI. Finally, 29 scientific papers were published while members of the Research Groups were active in EU standardisation bodies, agencies and fora e.g., ETSI OpenCAPIF, ETSI MEC, ENISA.



**Dr. Fotis Lazarakis**  
Head of Board TN Division



## CORE

### What is your mission ?

The mission of CORE (Connectivity and Cloud, Orchestration, Resource Optimisation and Experimentation) research group is to lead and innovate in the field of Telecommunications and Smart Networking technologies, providing a robust foundation for the development and integration of advanced digital solutions. CORE focuses on pioneering research and development across key areas such as 6G, AI-enhanced programmable networks, cloud computing, edge-cloud continuum, vertical applications, and cybersecurity. Our mission encompasses designing novel architectures, deploying experimental infrastructures, and fostering innovation through educational and acceleration programs at both National and European levels.

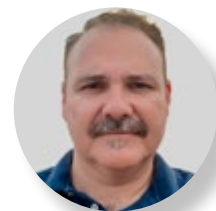
### Which of 2023's activities would you like to highlight as the most noteworthy?

In 2023, the CORE Research Group's achievements were highlighted by securing four significant Horizon Europe research grants, a testament to our innovative approaches and strong research capabilities. Notable projects include PQ-REACT, which explores cutting-edge post-quantum computing encryption schemes; COBALT, which aims at standardizing cybersecurity certifications; OASEES, which focuses on decentralizing intelligence in the Cloud Continuum; and PRIVATEER, which advances cybersecurity measures in 6G networks. Additionally, our continued efforts in evolving 5G and beyond technologies have not only resulted in influential publications but have also reinforced our position at the

forefront of telecommunications research.

### What are your plans for the future?

Looking ahead, CORE will continue the research in cutting edge technologies like 6G novel architectures, 6G programmability, and cybersecurity for 6G systems and trust/explainability of AI in telecommunication systems. Moreover, it is set to deepen its research into Post Quantum Computing, with a focus on post-quantum encryption and Quantum Secure key distribution. This initiative aligns with our goal to enhance security measures in anticipation of quantum computing advancements. Furthermore, we plan to explore opportunities within the European Defense Fund (EDF), particularly in dual-use technologies that leverage our existing research in communications and cyber-defense. These efforts will ensure that CORE remains a pivotal force in shaping the future of telecommunications, contributing to secure, reliable, and advanced network technologies.



**Dr. Georgios Xilouris**  
Head of CORE

More info



## FRONT

### What is your mission ?

The FRONT (Future cOmmunication NeTworks) research group focuses on five main areas: experimenting with 5G/6G technologies; making networks smarter and safer using AI; creating new network designs; connecting IoT, edge, and cloud technologies; and using 6G/5G for applications like vehicles and virtual reality.

### Which of 2023's activities would you like to highlight as the most noteworthy?

2023 was crucial for FRONT, as it was a landmark year both for the development and the research achievements of the team. More specifically, within 2023 FRONT successfully completed the research activities of the EVOLVED-5G project, in which Dr. Koumaras had the role of technical coordinator, developing within the IIT in collaboration with OTE and TELEFONICA an integrated ecosystem for development, testing and certification of 5G applications (5G Network Apps), as well as high-level expertise for the programming interfaces provided by the 5G network, which led to the creation of the ETSI SDG OpenCAPIF.

In addition, January 2023 saw the launch of the flagship European 6G-SANDBOX project, which placed the FRONT team and NCSR D in the Pan-European arena of 6G platforms. In the framework of the project and in collaboration with OTE, the FRONT team developed the experimental platform FRONT/Athens Platform, which consists

of two proprietary B5G/6G infrastructures providing the possibility to design and execute a multitude of experiments and tests.

Finally, three new European 6G projects (SAFE-6G, SUNRISE-6G, ENVELOPE) were approved in 2023, placing the group among the leading research groups in the 6G topic pan-European and expanding its action to new 6G topics, such as 6G trustworthiness, user-centric 6G, embedded AI on 6G.

### What are your plans for the future?

At present, FRONT researchers are managing seven research programs, with a strong focus on AI. The FRONT team is actively involved in experimentation and programmability for 5G-6G networks, particularly focusing on AI applications for the edge cloud continuum. Our aim is to offer a fully controlled experimental environment for testing.



**Dr. Harilaos Koumaras**  
Head of FRONT

More info







## NEL

### What is your mission ?

NeL's research involves the formulation of models for evaluating the performance and/or the energy efficiency of networks, or for guiding the design of improved protocols, mechanisms, or processes. A number of important infrastructure-based and infrastructure-less network paradigms are targeted, including Heterogeneous Radio Access Networks, 5G-and-beyond architectures and mechanisms based on SDN and NFV, Cyber-physical systems and IoT networks. Network architectures enabling the distribution of computation and intelligence and network management based on enhanced context awareness and Machine Learning are also in scope.

### Which of 2023's activities would you like to highlight as the most noteworthy?

During 2023 NeL continued its research efforts (collaboratively with MNL) on architectural frameworks for the Cloud-Edge-IoT (CEI) continuum and related Meta-Operating Systems. In this context, NeL explored ways of leveraging distributed ML frameworks and native AI Enablers for the effective management of resources end-to-end, a topic of direct relevance to both CEI scenarios and 6G networks. On another front, the Lab maintained a leading role within  $\pi$ -NET, the Competence Centre on 5G+ networks, and led a research project (vs-net) on the use of XR in 5G networks, particularly focusing on advanced use cases relating to cultural heritage and education. Moreover, NeL participated actively in the formation of relevant working groups within  $\pi$ -NET, focusing on 5G Metaverse/ XR (for Education, Culture, Tourism) and on Smart Islands/Cities. Finally, NeL was an active contributor of services to the scientific

community and lab members were invited to the Technical Program Committees (TPC) of more than 10 leading international conferences on networking.

### What are your plans for the future?

The domain of future networks presents important challenges, such as the integration of heterogeneous softwarised networks, the move towards autonomous/self-driving networks and autonomous cyber-physical systems, the quest for integrated sensing and communications, and the broader exploitation of AI/ML for network optimisation. In response to these challenges and in alignment with the Lab's profile and expertise, NeL will explore relevant and timely topics related to Heterogeneous Networks, Network Management using AI/ML, Mobile IoT Networks, Computing-aware Networking, and Experimentation on 5G/6G Networking Technologies and Infrastructure for advanced vertical use cases.



**Dr. Kimon Kontovasilis**  
Head of NeL

More info



## WiCom

### What is your mission ?

WiCom specialises in electromagnetic radiation aspects, propagation of electromagnetic waves and radio access of various communication systems including advanced transmit/receive techniques and MIMO systems. The Laboratory has long experience in system-level analysis, simulations and development of software tools, antenna design and interaction between antennas and human-body. Recently, special focus is given on antennas with magnetic materials or metamaterials, wearable antennas including design and implementation of textile antennas (suitable for smart clothing).

### Which of 2023's activities would you like to highlight as the most noteworthy?

In 2023, EU project ARIADNE was concluded with an excellent overall assessment stating, "Project has delivered exceptional results with significant immediate or potential impact".

We continued our research on Reconfigurable Intelligent Surfaces (RIS), mmWave technologies and channel modelling at the D-band. Moreover, we initiated a new direction, i.e., modelling the channel between LEO (Low Earth Orbit) Satellites and Earth (user device) at mmWave frequencies (SNS ETHER project). Our activity also focused on the design of high gain deployable antennas at X-band (ESA-DELHILA project). Furthermore, significant research effort was applied in the field of reconfigurable wearable textile antennas (M-REWEAR project). In parallel, a collaboration project with METAMATERIALS Inc. started to jointly work on metamaterial intelligent surfaces and optical transparent antennas design and characterization for beyond 5G applications. Research results have been published in international journals and conferences. Finally, our

measuring equipment has been upgraded with a new VNA covering (100 kHz - 44 GHz) and (75-110GHz) bands.

### What are your plans for the future?

In the upcoming period, our work will be based on the main research directions of our Laboratory aiming also at further developing our expertise on evolutionary technologies. Specifically, we will exploit our previous work on B5G and 6G systems and technologies especially for mmWave frequencies, Reconfigurable Intelligent Surfaces, PHY techniques and network optimisation based on AI/ML techniques, antenna technologies and wearable textile antennas. WiCom will have the opportunity to work on 6G Terrestrial-to-Non-Terrestrial networks integration through the SNS project ETHER, as well as to closely work together with MetaMaterials Inc on RISs for beyond 5G applications. The research activity in the area of wearable textile antennas will continue based on the experience of the previous years and the secured funding. In order to attract external funding, we will exploit opportunities under Horizon Europe and especially the Smart Network and Services (SNS) work programme, European Space Agency (ESA), our current collaborations with private companies, Universities/Research Centres as well as upcoming national funding programmes.



**Dr. Antonis Alexandridis**  
Head of WiCom

More info



# The Division of Intelligent Information Systems (IIS)

IIS brings together the three main research laboratories of the Institute that are active in the field of Artificial Intelligence; namely SKEL, CIL and ISL. With more than 150 members of staff, IIS is one of the largest AI-oriented research teams in Greece. It also continues a long tradition of pioneering research in AI, including the establishment of the Hellenic AI society, in the 80s.

IIS researchers are active in a variety of fields, covering basic research from Natural Language Processing and Deep Learning to Probabilistic Reasoning and Multimedia Analysis. At the same time, they develop innovative solutions in domains, such as Life Sciences, Natural Sciences, Culture and Security. The variety of technologies and expertise available in the Division has also enabled us to address fundamental issues that cut across domains and methods, such as the ethical development and use of AI, the development of European AI infrastructure (AI-on-demand platform) and the democratization of AI, through the education of the wider public.

Therefore, IIS takes a holistic view of AI research and innovation, striving for academic excellence, and at the same time seeking for high impact in industry and society. These efforts are backed by a wide range of education activities, addressing postgraduate students, but also school pupils and professionals. All interested to learn and practice AI methods. This multi-pronged activity is made possible by a flexible structure, including people dedicated to knowledge transfer, project management, research communication, and technical support. In this context, IIS aims also to be a place of personal development and creativity for all of its people.



**Dr. Georgios Paliouras**

Head of Board IIS Division



## CIL

### What is your mission ?

CIL's mission is twofold: on the one hand it focuses on conducting core research in the fields of machine learning, deep learning and multimodal signal analysis (image, music, speech and video analysis, as well as information fusion), while on the other hand the members of CIL participate in building real-world AI applications from various domains: culture, health, environment and AI-driven B2B and B2C applications.

### Which of 2023's activities would you like to highlight as the most noteworthy?

CIL participates in 14 research projects, out of which the following started during 2023: Film Cluster (training in new technologies as well as preparing user guides and videos for project <https://filmcluster.gr>), arxeiothiki (a speech2text system for automatic transcription for accounting data) and HellasQCI (Deploying advanced national QCI systems and networks in Greece).

CIL consists of 3 groups, the Document Image Analysis Group (DIA), the Multimedia Analysis Group (magcil) and the ehealth and Knowledge Management unit (<https://ehealthunitdemokritos.eu>). During 2023, magcil employed 10 post-graduate members 2 of which are PhD students, DIA employed 5 post-graduate members 3 of which are PhD students, while the ehealth and Knowledge Management unit employed 8 persons including 1 PhD student. In addition, magcil has strengthened its collaborations in cross-disciplinary domains achieving the publication of 3 interdisciplinary papers in combining AI with computational biology in cooperation with the University of Rockefeller. The group also achieved 2nd place in the competition Psychotic and Non-Psychotic Relapse Detection using Wearable-Based Digital Phenotyping (ICASSP 2024).

The DIA group presented 5 research papers in the 17th International Conference on Document Analysis and Recognition (ICDAR 2023), San José, California, USA. The ehealth and Knowledge Management unit was very active in the co-creating healthcare domain achieving the publication of 3 papers in the area during 2023.

### What are your plans for the future?

Our aim is to achieve research of high quality regarding both basic and applied research. We plan to publish in high quality Journals and International Conferences and to further increase our citation rate as well as improve the visibility of our groups in the AI scientific community. We will also work towards implementing and deploying hardware/software infrastructures and tools that will provide Machine Learning services to partners and external users. Additionally, our funding targeting will be towards the EU calls for Culture and Creativity, as we plan to use our ongoing scientific expertise in the fields of document analysis, music information retrieval, image aesthetics recognition and content-based recommendation of multimodal content. We will continue to expand our focus on applications of multimodal machine learning towards enhancing the accessibility and inclusion in cultural environments. Supporting high quality PhDs will continue to be a main pillar of our research activities.



**Dr. Stavros Perantonis**  
Head of CIL



**Dr. Basilis Gatos**  
Research Director, CIL

More info



## ISL

### What is your mission ?

ISL was founded in 1999 with the scope to converge IIT divisions through large scale integrated pilot projects. Aligning with IIT's evolving strategic plan, ISL aims today at applied research on innovative and disruptive technologies in research fields with high social impact, including physical and cyber security, security engineering, location analytics, sensor fusion, trustworthy intelligent information systems, privacy & ethics by-design, AR/VR immersive environments, gamification and digital simulations. ISL focuses on the Civil and Climate Security application domains with an extensive portfolio and social impact achieved through cross-disciplinary research and international collaborations, including applied synergies with the social sciences and humanities.

### Which of 2023's activities would you like to highlight as the most noteworthy?

In 2023, H2020 project popAI, focusing on the responsible use of AI in Civil Security, successfully concluded. popAI results and impact was well acknowledged at the final review, with 5 Proof of Concept Innovation Hubs deployed for the responsible use of AI by Law Enforcement in 5 EU MS, delivering multi-disciplinary ethical AI recommendations and a practical AI ethics toolbox. Coordinated by ISL, popAI is a success story of cross-group and cross-disciplinary research, involving SKEL, AIPoliteia research groups and NCSR Institute INRASTES.

In addition, ISL made notable contributions in the context of trustworthy AI in Civil Security:

- Chairing the AI Session in Research and Innovation Symposium for European Security and Defence (RISE-SD)
- Delivering AI policy recommendations to DG HOME and the EC

in the context of EU AI Act Civil Security negotiations phase

- Organising research cluster conference on Ethical and Legal Aspects of AI for Law Enforcement, co-organised with the European Commission

Moreover, ISL continued its research activities on (i) anomaly detection using ML on trajectories for civil/climate security and dual-use and (ii) environmental sensor fusion and applications for First Responders.

In other highlights of 2023, ISL, in collaboration with ClaRET IKE spin-off, continued to expand the capabilities of i-Crowd simulator for research on cyber-physical resilience as well as behaviour analytics.

### What are your plans for the future?

Key priorities for the forthcoming period are to continue and extend our research on multi-sensors integration & fusion, location data analytics, AI ethics and edge AI applications. Intense and well-planned effort will be placed in winning new grants in Civil Security and European Defence Fund frameworks, including multi-disciplinary collaboration on environmental & CBRNE security. At the same time, ISL aspires to improve its bibliometric scoring, publishing recent popAI and other security research results in high impact-factor journals and recruiting PhD students.



**Dr. Dimitris Kyriazanos**  
Head of ISL

More info



## IIS Division



## SKEL

### What is your mission ?

SKEL aspires to contribute AI methods and tools that are trustworthy and of measurable value to society. Our activities cover a wide spectrum, ranging from basic research to market innovation. Additionally, we contribute to the global AI community, by being involved in important initiatives, while we also strive for a positive impact to the national economy. We believe in the democratization of AI, through education at all levels, from school pupils to young researchers and professionals.

### Which of 2023's activities would you like to highlight as the most noteworthy?

In 2023 we intensified our efforts towards high-quality research and impactful innovation. We initiated 8 new projects, covering a wide range of basic and applied research topics: the analysis of social media to monitor developing news and detect disinformation, the forecasting and monitoring of critical events, the use of knowledge graphs to repurpose drugs for rare diseases, the automated development of component tests for the space industry, two European digital innovation hubs to promote AI in the local industry.

Additionally, ongoing efforts resulted in numerous research contributions, including:

- A new study of representations for multi-modal data;
- A novel representation for complex knowledge graphs, facilitating efficient analysis;
- Novel ways to train Graph Neural Networks, addressing label sparsity and oversmoothing;
- Improved incremental recognition of complex events in noisy data streams;
- New ways to extract event recognition logic and automata from data;
- Novel methods to semantically index and analyse the biomedical literature;
- Representation and identification of human values in text;
- An awarded autonomous surface vessel aimed to clean water.

Furthermore, we contributed significantly to various AI-related activities, including:

■ deployment of the european AI-on demand platform (AIoD);

■ The inauguration of the AiTHERION exhibition on philosophical ideas, visited already by thousands of people, in its first few months of operation;

■ Cultural events across Europe related to human values in cultural heritage, including a challenge and a conference;

■ Collaboration with the Council of Europe, the Greek government, and the National Commission for Bioethics and Technoethics, on AI policy making, ethics and education;

■ Chairing the International Symposium on Temporal Representation and Reasoning;

■ Co-organising events on financial text analysis, nanotechnology, earth observation, data stream analytics, biomedical question answering, complex networks and graph learning.

Beyond scientific excellence, we had several important outreach initiatives, including:

■ Provision of AI innovation services, consulting, and training to national and international companies, as well as the European Commission.

### What are your plans for the future?

We are excited to be meeting our targets in terms of quality AI research with significant innovation value and impact on society. We are committed to continue working towards these goals, striving for optimal integration of basic and applied research. Additionally, we will be contributing to large-scale European AI infrastructures and policymaking initiatives. We are particularly devoted to the democratization of AI and its ethical use, and we will promote this vision in related policies being shaped.



**Dr. George Paliouras**

Head of SKEL | The AI Lab

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