



2021

ANNUAL REPORT

INSTITUTE OF INFORMATICS & TELECOMMUNICATIONS

Innovation, one of the long-term strategic pillars of the Institute and a key part of our identity, evolved the most in 2021

Since the beginning of 2019, we set in motion a comprehensive strategic plan based on the parallel and synergetic growth of three excellence pillars - Research, Innovation, and Education - and the establishment of the corresponding support mechanisms for these pillars.

During the last three years, and despite the pandemic, we managed to fulfill most of the targets set. Our Institute met significant success in attracting funding from diverse sources, with EU projects remaining the major one, but with national and industrial projects contributing substantially to the overall revenue. We also significantly strengthened the intra-Institute collaborations, and the synergies with other NCSR Demokritos Institutes. Furthermore, we contributed to strategic initiatives and actions with national and European impact. Our coordinating role in the Hellenic National Strategy for AI, our participation in national and European flagship actions, such as the European AI-on-demand platform, the setup of the House of Classical Greek Ideas, are amongst these initiatives.

In the past year, our education activities continued to develop through the joint PhD programmes, the setup of a new industrial fellowship program, the organisation of summer schools and seminars as well as the expansion of joint MSc programmes with Greek Universities.

Above all, the most notable highlight during 2021, is our innovation activities. This is the area that improved the most due to the increased focus of the Institute on the pillar and the significant developments in the management of innovation-centered research European and national level. IIT made the most of the new opportunities stemming from the emergence of Digital Innovation Hubs (DIHs) as a major catalyst for connecting Research and Industry. IIT has been a pioneer within NCSR-D and probably in the whole Greek innovation ecosystem, in promoting, creating, and commercialising digital innovation, strengthening the service portfolio of the ahead DIH and moving forward with the vision of the expansive Smart Campus within NCSR-D.

At the operational level, 2021 is characterised by the growth of the eGovernance office, the re-organisation of the Network Operation Centre and the renovation of our network and computational infrastructure. These ensure that the Institute is equipped to handle the increased demand set by its central role within NCSR-D as the entity responsible for



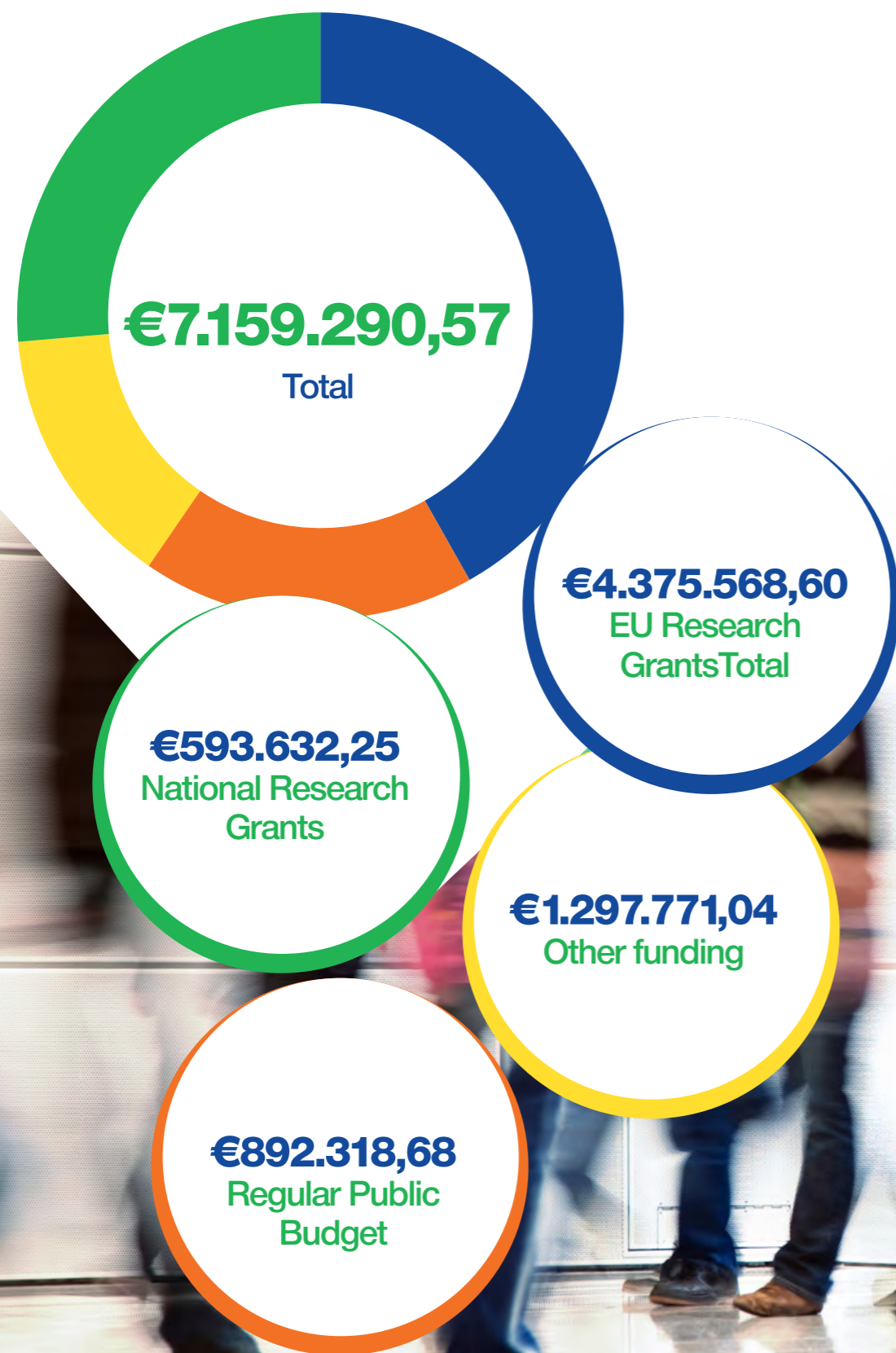
serving the connectivity, data management and compute requirements across disciplines. Furthermore, with respect to the building infrastructures, IIT office spaces were expanded and renovated to cover our increasing needs until the construction of our new smart building which is scheduled to be completed at the end of 2024.

I would like to thank the entire personnel of IIT for their efforts in realising our strategic plan. I am certain that in the future all together we will manage to bring further growth, placing our Institute and the whole Centre on the vanguard of Innovation-minded Research.

Dr Vangelis Karkaletsis
 Director of the Institute of Informatics
 & Telecommunications, NCSR Demokritos

financials

year at a glance



225
PEOPLE

106
PUBLICATIONS

15
NEW RESEARCH PROJECTS

38
PHD STUDENTS

15
POSTDOCS & PHD SCHOLARSHIPS

€6.3M
COMPETITIVE FUNDING

36
POSTDOCS

innovation
innovation
innovation
innovation
innovation



innovation

One of the long-term strategic pillars of the Institute and a key part of its identity, Innovation, was for yet another year an area with rapid evolution and prominent results.

IIT fully embraces and adapts to the significant developments in the management of innovation-centered research at European level and the changes in the financial and business status of the country. At IIT we work towards making the most of new opportunities stemming from the emergence of Digital Innovation Hubs as a major catalyst for connecting Research with the Industry, the increased demand from start-ups and emerging enterprises for advanced technologies, and the need to provide solutions for critical sectors of the country.

In this new landscape, the Institute initiated major activities and participated in critical actions pertaining to its key strategic aims for the Innovation pillar: it strengthened the service portfolio of the ahedd Digital Innovation Hub; it moved forward with the vision of the expansive Smart Campus within NCSR-D, while strengthening its ties with large enterprises; it intensified the actions of the NCSR-D eGovernance office; it continued to design and implement innovative projects closely related to innovation, such as the House of Classical Greek Ideas; and it promoted its fertile synergy with innovative companies of the Lefkippos Technology Park and beyond.

What's more, IIT further promoted its holistic vision for the connection of Industry with Science via the establishment of new Industrial PhD Fellowships and the organisation of training and informatory actions to bring Industry and Research closer.

The following pages summarise the main achievements in the Innovation direction during the past year. The future will bring further growth and the placement of the Institute on the vanguard of Innovation-minded Research via large-scale initiatives like the proposed Smart Attica European Digital Innovation Hub, an ambitious project led by NCSR-D that aspires to realise the deep integration of smart technologies in solutions for socially and financially critical domains.

More info: www.iit.demokritos.gr/about-innovation/

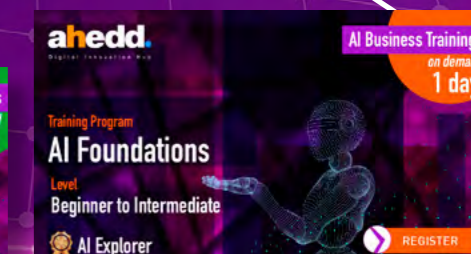
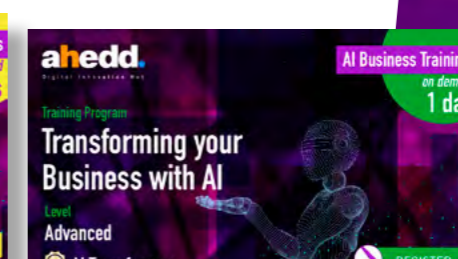
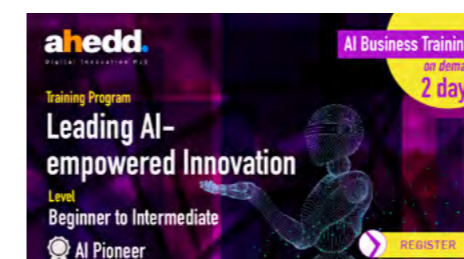
ahedd DIH extends its reach and becomes a Gold BDVA i-Space

ahedd, the Attica Hub for the Economy of Data and Devices, has been awarded the Gold Data Innovation Space (i-Space) label by the Big Data Value Association (BDVA), a European recognition of the maturity and quality of ahedd's efforts towards data-driven and AI-based innovation at local and European level. The i-Spaces Trophy Ceremony took place during the European Big Data Value Forum 2021 in Ljubljana, Slovenia.

Periklis Terlixidis, Executive Officer of ahedd DIH, stated regarding the award: "ahedd DIH benefits from its participation in European clusters such as BDVA/DAIRO, EUHubs4Data and the Digital SME Alliance amongst others, so as to communicate good practices to the Industry. We support extroversion of Greek SMEs by facilitating their matchmaking with partners that add value to their product and service offerings. The BDVA Gold Label encourages our strategic choice to support data-driven innovation at local and European level. This seal of excellence empowers trust and boosts collaborations".

ahedd DIH organises AI workshops to drive Business Innovation

ahedd's AI experts provide top-notch tailor-made trainings and hands-on workshops on AI through three innovative Artificial Intelligence (AI) training programmes addressed to Businesses, along with the *1000 Pioneers for AI in Greece* initiative.



ahedd DIH drives Innovation through partnerships with Greek and European stakeholders

Aiming at fruitful and productive partnerships to foster Innovation in Greece, ahedd DIH started collaborating with strategic business associations such as the Hellenic Federation of Enterprises (ΣΕΒ), and the Hellenic Association of Innovative Applications Companies (ΣΕΚΕΕ), with the Phaistos Investment Fund *5G Ventures* and with outstanding technology companies such as Qualco, Vodafone and the EY ZHN ecosystem.

Moreover, ahedd DIH continuously provides customised development and consulting services to several companies, exploiting the cutting-edge technology know-how of IIT's research labs and the hub's growing partner network.

Additionally, in 2021 ahedd DIH became part of the European Federation of Data Driven Innovation Hubs (H2020 EUHubs4Data-EUH4D), providing specialised AI and data services to SME experiments in collaboration with other DIHs in Europe and of the H2020 DIH-World network, providing AI services in the Smartchain experiment.

More info: www.ahedd.demokritos.gr/

ahedd
Digital Innovation Hub



NCSR Demokritos & Vodafone Greece join forces to create the Giga Campus

NCSR-D and Vodafone Greece announced their strategic partnership in July 2021, through the creation of the Giga Campus, situated in Aghia Paraskevi. The initiative aims to support the acceleration of Greece's digital transformation through Internet of Things (IoT) and 5G and contribute to the strengthening of the country's businesses for a more sustainable, digital tomorrow.

How important is a partnership like this for NCSR-D and the digital future of Greece?

Georgios Nounesis, Director and Chairman of the Board of NCSR-D stated: "Our agreement with Vodafone Greece is a fundamental milestone for our development strategy. At Giga Campus, Greek businesses will have a unique opportunity to access IoT and 5G infrastructure, as well as create synergies with leading research teams of NCSR-D. A dynamic digital innovation ecosystem is being created in Attica that will support Greek businesses on the road to their digital transformation. We are proud of our partnership with Vodafone Greece, and we will work hard and systematically to achieve brilliant technological goals, to highlight and utilise young scientists' talent and, certainly, to generate added value that will help underpin the recovery of the Greek Economy".

Why did you choose NCSR-D to partner with?

Harry Broumidis, Chairman and CEO of Vodafone Greece, said: "In NCSR-D we see a reliable partner that works with passion, so that Greece may take advantage of all the 4th industrial revolution's benefits. Vodafone consistently innovates in Greece, strategically investing in the development of cutting edge technologies. By utilising the power of Vodafone Giga Network 5G and the high specialisation of Vodafone's global IoT research and development centre in Greece, our partnership with NCSR-D will accelerate our goal of ushering in the digital future, by creating a hub of innovation that will contribute to Greece's effort to make its digital leap".

Will this partnership lead Innovation a step further?

Vangelis Karkaletsis, Director of the Institute of Informatics and Telecommunications, stated among others: "The Giga Campus complements NCSR-D ahead DIH. More solutions and support will be provided by exploiting the capabilities of Vodafone's 5G network. Together with Vodafone we will be able to do much more contributing to the digital transformation of Attica region and Greece".



NCSR Demokritos & Qualco launch their collaboration in October 2021

NCSR-D & Qualco announced the launch of their collaboration in October 2021 in promoting Innovation by using Artificial Intelligence and Big Data management technologies to meet business challenges in the field of financial technology (FinTech).

The relevant Fellowship programme supports young researchers to delve into their research in the FinTech field using AI and Big Data, two of the research areas that the Institute of Informatics and Telecommunications is extremely active. Under the 1st phase of the programme, three Fellowships are offered to PhD(2) and PostDoc (1) researchers in the domain of using unstructured, semi-structured and fully structured data to empower FinTech analysis.

Georgios Nounesis, Director and Chairman of the Board of NCSR-D stated:

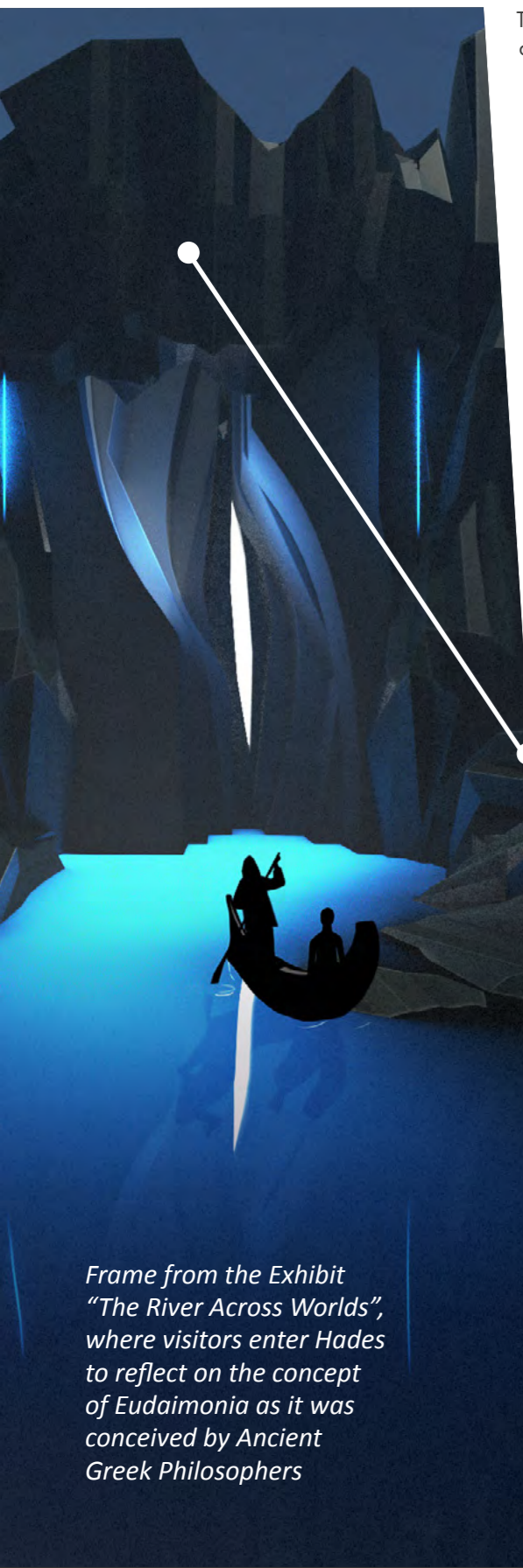
"This new collaboration with Qualco comes to confirm the maturity of NCSR-D, a public research organisation to transfer technology, contributing to the digital transformation of Greek companies and to co-develop intellectual property of great added value. We are very proud of this new collaboration that will also enable young talented researchers to create and succeed. In the 21st century, scientific and technological progress is inextricably linked to innovation and economic growth".

The CEO of Qualco, Orestis Tsakalotos stated:

"The cooperation of the two organisations is a practical proof that QUALCO, systematically invests in state-of-the-art technology, while supporting the entire spectrum of the scientific community. It is our honour, but also our obligation, to utilise the efforts of the young scientists of NCSR-D, regarding the implementation of research in the scientific fields of AI and Big Data. Our goal is to highlight innovative technological solutions, which will face effectively, efficiently and flexibly the modern business challenges, not only in our country, but also in the international financial environment. After all, AI has the potential to transform financial services by influencing business models and business operations".



house of classical greek ideas



Frame from the Exhibit "The River Across Worlds", where visitors enter Hades to reflect on the concept of Eudaimonia as it was conceived by Ancient Greek Philosophers

The project, which is a collaboration of the Institute with the Greek Ministry of Culture and Sports, develops a model exhibition on classical Greek ideas and ancient Greek philosophy -the greatest cultural achievement of Ancient Greeks and a worldwide cultural legacy.

Going through the exhibition, visitors will enter a new world, a digital philosophical realm, where notions usually taken for granted will be challenged. Through a unique interactive experience, visitors will explore Democracy and the related concepts of Ancient Greek Philosophers. Visitors will reflect on abstract ideas and values and ponder on the ever-current theme of how we can "live well together".

The development of exhibits utilises cutting-edge technologies such as smart interactive digital walls, visit customisation tools and applications that use artificial intelligence as part of the interaction with the visitor.

The project will be housed in the building of the Athens Conservatoire and can be combined with a visit to the adjacent archaeological site of Aristotle's Lyceum.

More info: www.iit.demokritos.gr/house-of-classical-greek-ideas/



Frame from the Exhibit "The Ring of Gyges", where visitors participate in a thought experiment concerning the concept of justice

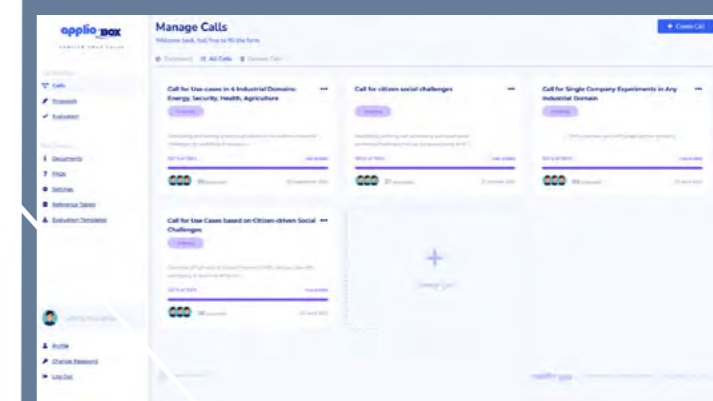
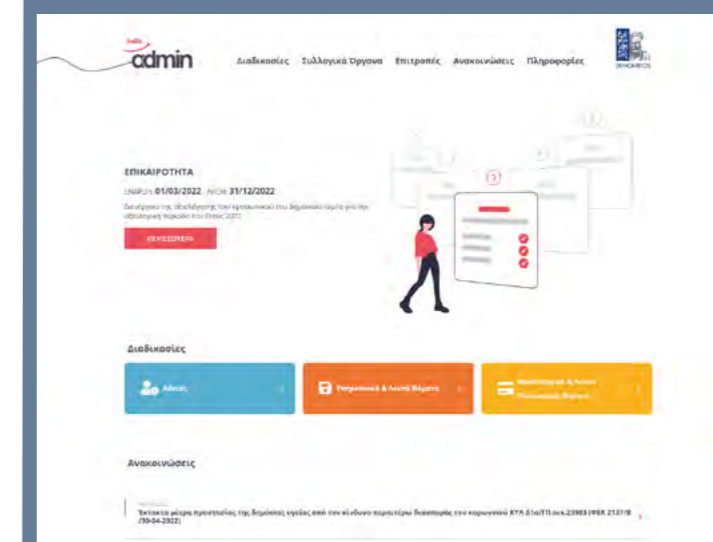
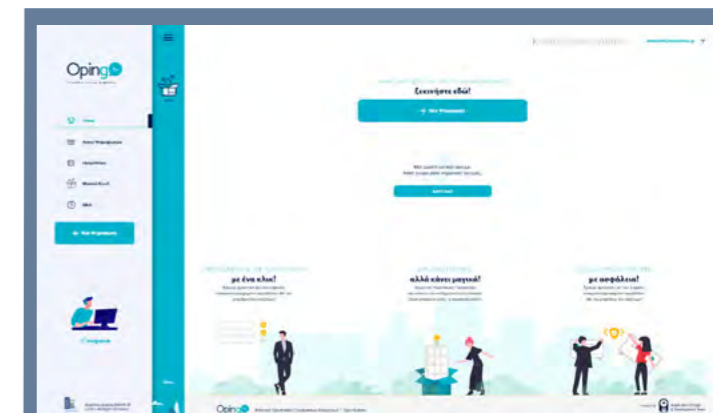
eGov office

2021 was an extremely busy year for the Applications Design & Development Team of the eGovernance Office. The Team, which is set up and run by IIT, comprises seven expert developers and designers. It serves the entire NCSR-D, and is responsible for the design, implementation and support of software services targeting different activities within IIT and across the Centre's Institutes. This year the Team's work was extended to providing its services to external entities and governmental bodies.

Notable results within the Centre were the creation and implementation of the website for NCSR-D's Administrative Division, and for the AI4Copernicus project. Additionally, the Team deployed an online voting system named Opingo and an electronic platform for submission of proposals which can be customised for the needs of other projects as needed.

In the context of the broader mobilisation of the Team's expertise, work has been undertaken for the General Secretariat of Research and Innovation (GSRI) with the creation of a completely new and modern website.

The design and implementation of the RView platform, which is to be used for the evaluation of the Greek Research Institutes and Centres, has been implemented at the end of 2021.



new projects in 2021

15 new research projects



DRYADS

EU H2020 - ISL

1/12/2021 - 31/5/2025
NCSR budget: 693,750€
www.dryads-project.eu/



Health CASCADE

Evidence-based co-creation methodology for closing the implementation gap between knowledge and action in health promotion

EU H2020 - ISL
1/1/2021 - 31/12/2024
NCSR budget: 243,018€
www.healthcascade.eu/



popAI

A European Positive Sum Approach towards AI tools in support of Law Enforcement and safeguarding privacy and fundamental rights

EU H2020 - ISL | SKEL | The AI Lab
1/10/2021 - 30/9/2023
NCSR budget: 245,000€
www.pop-ai.eu/



EVOLVED-5G

Experimentation and Validation Openness for Long-term evolution of VERTICAL inDustries in 5G era and beyond

EU H2020 - MNL
1/1/2021 - 30/6/2023
NCSR budget: 503,000€
www.evolved-5g.eu/



M-REWEAR

Innovative Textile Structures for Mechanical Electromagnetic Reconfigurability of Wearable Antennas

National projects - WiCom
1/10/2021 - 30/9/2024
NCSR budget: 195,740€



EUHUBS4DATA

EUHubs4Data

European Federation of Data driven Hubs

EU H2020 - SKEL | The AI Lab
1/10/2021 - 31/12/2023
NCSR budget: 52,200€
www.euhubs4data.eu/



AI4Copernicus

Reinforcing the AI4EU Platform by Advancing Earth Observation Intelligence, Innovation and Adoption

EU H2020 - SKEL | The AI Lab
1/1/2021 - 31/12/2023
NCSR budget: 2,703,125€
www.ai4copernicus-project.eu/



STEAM4ALL

Supporting the Digital Inclusion of all Students through an Inter-Disciplinary Programme for a Sustainable Future

Erasmus+ - NML & Mind
1/1/2021 - 29/6/2023
NCSR budget: 25,855€
www.steam4all.4learning.eu/



Colibri Women

Second Chance For Colibri Birds: Empowering and Increasing Capabilities Of Women

Erasmus+ - CIL
1/1/2021 - 29/6/2023
NCSR budget: 18,285€
www.colibrirbirds.gantep.edu.tr/index.php

ShakeIT

Corpus-Assisted Drama Translation Research: Shakespeare In Translation

National projects - CIL
22/4/2021 - 8/3/2023
NCSR budget: 12,400€



Smart Subs

Subtitled app for watching live performances

National projects - SKEL | The AI Lab | CIL
30/9/2021 - 29/11/2023
NCSR budget: 261,945€
www.smartsubs.ime.gr



ML-MULTIMEM

Machine Learning-aided Multiscale Modelling Framework for Polymer Membranes Marie Skłodowska-Curie Actions Individual Fellowships - SKEL | The AI Lab

15/11/2021 - 14/11/2023
NCSR budget: 153,085 €



DigiTeal

Digital Teaching Literacy

Erasmus+ - NML & Mind
1/6/2021 - 30/11/2022
NCSR budget: 33,980€
www.digitealproject.eu/



DIH-World - Smartchain

EU H2020 - SKEL | The AI Lab | ahedd
15/10/2021 - 30/6/2023
NCSR budget: 28,500€
www.dihworld.eu

AI for Geoapplications

National projects - CIL
9/12/2021 - 9/12/2024
NCSR budget: 33,418€

kick off in 2022

education

AI4Europe
An AI on-demand Platform to support Research Excellence in Europe
Horizon Europe - SKEL | The AI Lab

ENEXA
Efficient Explainable Learning on Knowledge Graphs
Horizon Europe - SKEL | The AI Lab

EVENFLOW
Robust Learning & Reasoning for Complex Event Forecasting
Horizon Europe - SKEL | The AI Lab

TITAN
AI for Citizen Intelligent Coaching against Disinformation
Horizon Europe - SKEL | The AI Lab

HARMONISE
Towards harmonisation in licensing of future nuclear power technologies in Europe
Horizon-Euratom - INRASTES | SKEL | The AI Lab

DIH4CPS
Fostering DIHs for Embedding Interoperability in Cyber-Physical Systems of European SMEs
H2020 - ahedd

i4Trust
Data Spaces for effective and trusted data sharing. Agrispace4Trust experiment
H2020 - SKEL | The AI Lab | ahedd

DIH²
A Pan-European Network of Robotics DIHs for Agile Production
H2020 - SKEL | The AI Lab | ahedd

SUSTAIN
cluSter bUilding SmarT reAdiness INdicators
SMP - COSME - SKEL | The AI Lab | ahedd

OPEN QKD
Open European Quantum Key Distribution Testbed
H2020 - CIL

aerOS
Autonomous, scalable, trustworthy, intelligent European meta Operating System for the IoT edge-cloud continuum
Horizon Europe - MNL Lab

GATEKEEPER
Smart Living Homes - Whole Interventions Demonstrator For People At Health And Social Risks
H2020 - CIL

The Institute of Informatics & Telecommunications is particularly active in the higher education landscape, maintaining strong ties with national and foreign Universities, participating in national cross-institutional MSc programmes, and in PhD scholarships programmes with foreign Universities, as well as organising training courses and summer schools.

IIT is strongly committed to supporting Education in all its facets, also devoting significant effort in PhD students' supervision.

This year, IIT partnered with Qualco, a leader in providing financial technology solutions and services, and initiated the NCSR-D - Qualco Fellowship programme which supports young researchers (PhDs, PostDocs) to delve into their research in the FinTech field using AI and Big Data.

The collaboration with the Stavros Niarchos Foundation continued through the SNF Industrial Fellowship Program which supports 4-year PhD scholarships and 3-year PostDoc scholarships.

This year IIT offered five full PhD scholarships in collaboration with US Universities: the University of Houston, Rice University, and the University of Texas at Arlington. The fields of research include Artificial Intelligence, Robotics, Machine Learning, Big Data and Bioinformatics.

IIT launched a successful series of tributes, dedicating each month to a different scientific field, aiming to raise awareness about scientific results. In this frame, June was dedicated to Education with various activities and online Info Days about the joint MSc Programmes taking place every week throughout June. All webinars are available on IIT's website as helpful online guidance for interested students.

In addition to the ongoing four cross-institutional MSc programmes with Greek Universities, a new MSc in Quantum Computing & Quantum Technologies was announced, led by the Institute of Nanoscience and Nanotechnology (INN), that is scheduled to start in 2022.

IIT was actively involved in the 56th Summer School of NCSR-D. IIT organised the High-Performance Computing (HPC), Quantum Computing & Edge Computing round-table with active participation of the EuroCC project, and the SingularityU Youth Event, in addition to many more researcher talks.

More info: www.iit.demokritos.gr/about-education/

Nourishing Talent for Industrial Research
Stavros Niarchos Foundation (SNF) Industrial Fellowship Program

AI talks

communication & outreach



CONTEXITY

BEHAVIORAL SIGNALS

MarineTraffic

ELSEVIER

ATYPON

causaly

lifebit

QUALCO

JADBio

The AI Industry Connect Talks series was launched in March 2021 by SKEL | The AI Lab of IIT and is supported by ahead Digital Innovation Hub.

2021 was a year full of talks on Artificial Intelligence and how it is implemented in the Industry.

Through this series of talks, we aim to bring AI innovation to the forefront and inform wider audiences of the endless possibilities. Domain professionals tell us how the Industry applies scientific results in real-life, while at the same time, they have the opportunity to interact and connect with the scientific community through fruitful conversations following the presentations.

This year we had the pleasure to host important stakeholders such as Marine Traffic, Contexity, Causaly, Atypon, Lifebit, JADBio, Elsevier, Qualco and Behavioral Signals. A new cycle of monthly talks is scheduled for 2022 with the participation of more outstanding technology companies, like SciFY, Purposeful, Omilia, Pollfish, Accenture and Intelligencia, to name a few.

The sessions are live-streamed via Zoom and on YouTube, while all the videos are available on the SKEL | The AI Lab website.

More info: www.skel.ai/ai-industry-connect-talks/

2021 was a year of growth for the Communications Team, with highly successful communications and outreach activities which spanned mainly online. The Team continued its work in supporting the Director, the Labs, the Researchers, and in many cases, NCSR-D centrally.

In the frame of European project dissemination and communication activities, the Team kept busy with new incoming projects leading the activities for European consortia and raising awareness about scientific achievements. Targeted audiences were reached by using the full spectrum of communication tools and channels. Numerous online scientific talks for internal and external audiences were organised throughout the year. Apart from the day-to-day work-related tasks, the Team also initiates activities that bring personnel together in social settings such as the annual Christmas festivities with fun games and gift bags for all, organising charity bazaars to support those in need, and much more. More ideas are to be implemented in the coming year with personnel breakfast meetings, volunteering initiatives for reforestation, participation in blood donation days, team sports activities and bonding getaway weekends for teams.

In our daily work, we continue to go by our motto:

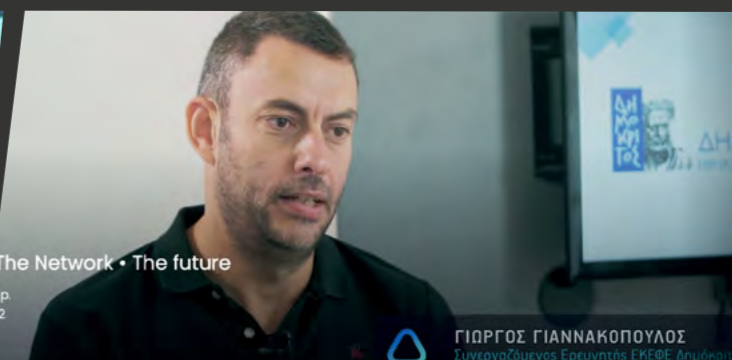
*Science for everyone,
not just for Scientists!*



IIT researchers on National Greek Television (EPT) - The Network series



A. KOURTIS, MNL Lab, participates in Cosmote 5G documentary series



The Network - The future

ΓΙΩΡΓΟΣ ΓΙΑΝΝΑΚΟΠΟΥΛΟΣ
Συνεργάζομενος Ερευνητής ΕΚΜΒΕ Ανθρώπινου

building work



In anticipation of the new IIT building, which will expand office space capacity and will host more than 150 colleagues, a refreshment of the current building was long due.

After a few months of planning and works on-site, the small-scale renovation of the Institute was completed. Building work started in Spring 2021 with a splash of colour on the walls and door frames. In the months that followed, visitor signage was put in place inside the building while large sized decal and branded visuals now adorn the corridors and foyer adding a playful note to our workdays.

As for the expansion of office space to the new building, which is co-funded by the European Investment Bank, a team of IIT personnel together with the renovation project manager and the NCSR-D Technical Unit finalised the building design. IIT managed to secure funding of about 1.5M euros in order to construct a Data Centre (DC) facility hosted in the new building. The specifications for this DC correspond to Tier 3 DC specifications. It is anticipated that the DC will host all the computing infrastructure that is currently distributed to various Labs and Server Rooms. In addition, the DC will host the eGovernance Office infrastructure as well as significant computing infrastructure used from other Institutes.

The procurement is scheduled to be announced by June 2022, with construction work planned to start before the end of 2022.



policies

Internal Regulatory Framework on Research Exploitation - Technology Transfer

NCSR-D has been a pioneer in innovation creation. The Board's decision regulated, for the first time in entirety and full range, the processes through which NCSR-D will support researchers in patenting, collaboration with the Industry and establishment of spin-off companies.

IIT is a key driver in this innovation pioneering role of NCSR-D, by promoting, creating and commercialising digital innovation through collaborations with enterprises and other economic entities.

Policy and Regulations on Ethics in Research and Scientific Integrity

NCSR-D has established a Research Ethics Committee (REC) with the aim to ensure the ethically correct conduct of research projects at NCSR-D. The main mission of REC is to provide support to the researchers in harmonising their projects with the relevant legal requirements as well as with the generally recognised rules of conduct for research. REC also develops wider educational and training initiatives in the field of research ethics.

IIT supports REC in initiatives related to ethical AI and has established a relevant Working Group. Its mission is to provide practical guidance for realising ethical and trustworthy AI, following the High-Level Expert Group on AI guidelines and taking into consideration the EU proposal for AI Regulation.

National Plan for Open Science

NCSR-D, mainly through IIT, actively participated to Greece's *Open Science Task Force*, a collaborative bottom-up initiative of 11 national academic & research organisations to draft a National Plan for Open Science. The Plan is intended to serve as a reference point for national policy makers towards the establishment of a national strategy for Open Science.

The National Plan for Open Science proposes a series of goals, policies and actions for the adoption of the core principles of Open Science, that include, Open Access to (a) scientific publications, (b) research data, (c) research software, and (d) research infrastructures and services. As a first step of the implementation process, we recently established an *Open Science Team* under the eGovernance Office.

Policy on Gender Equality

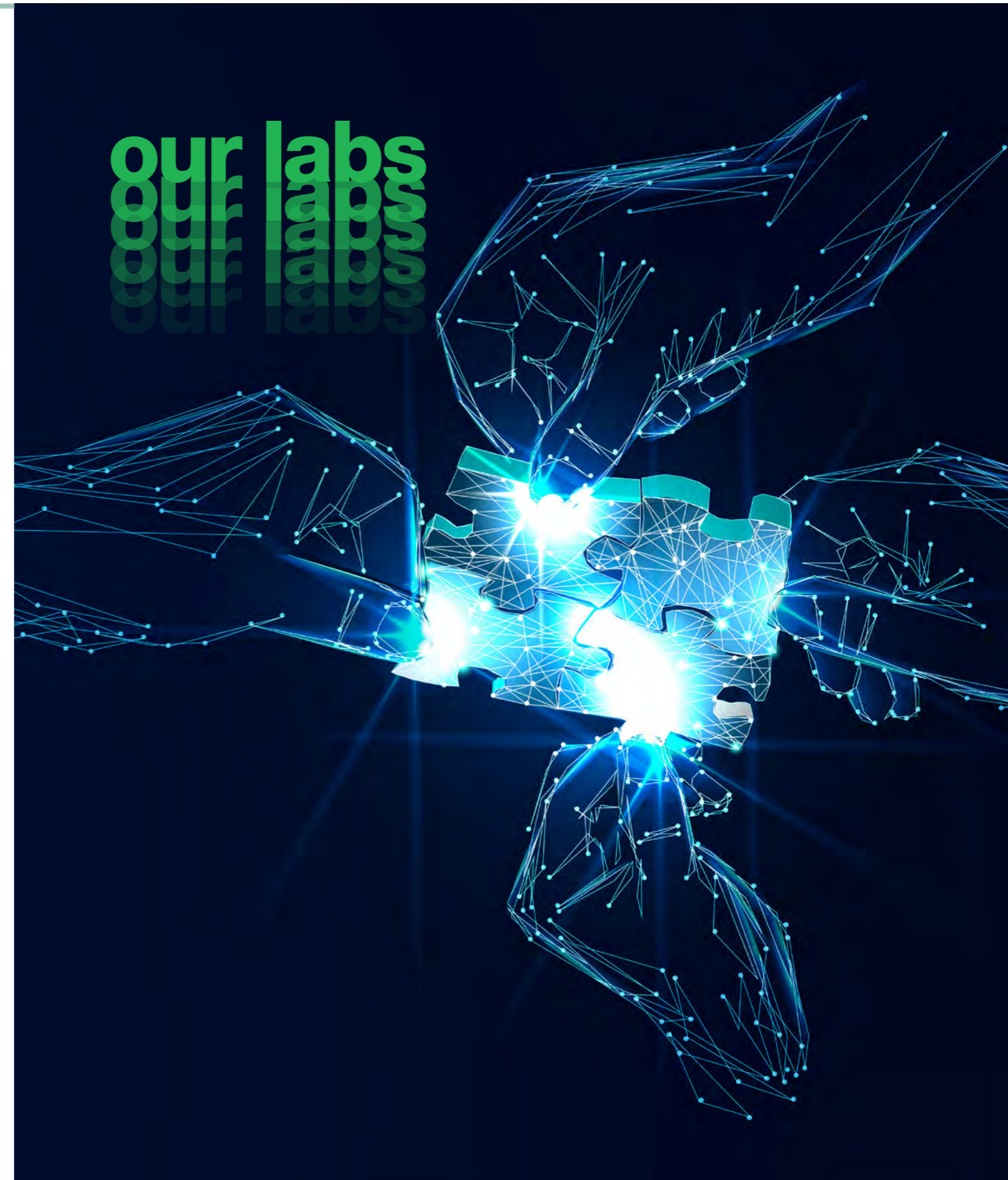
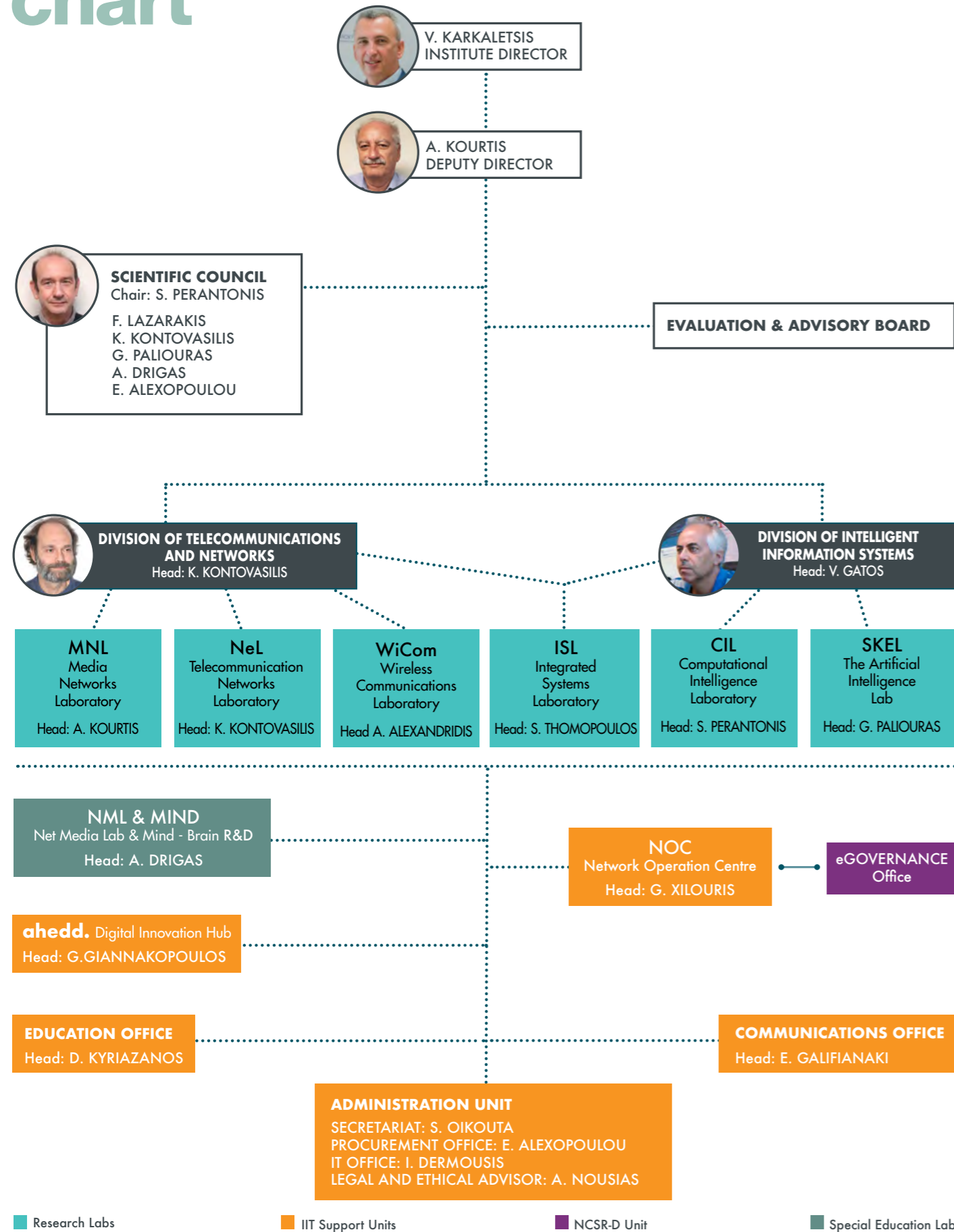
IIT fully adopts NCSR-D's decision to develop and implement a detailed Gender Equality Plan (GEP) emphasising on the following priority axes:

- i. Gender balance in leadership and decision-making
- ii. Gender equality in recruitment, employment and career progression
- iii. Integration of the gender dimension into academic, research and teaching content
- iv. Work-life balance and organisational culture
- v. Prevention of and combat against gender-based violence including mobbing and sexual harassment

The Centre has appointed a Gender Equality Officer and a Gender Equality Committee (with an IIT representative).



organisational chart



our labs

Computational Intelligence Laboratory

What is your mission as a Lab?

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 2021's activities would you like to highlight as the most noteworthy?

Currently CIL has five ongoing PhDs, over 20 students conducting their Bachelor and Master theses from four different Master Programmes and over five different Schools. CIL's members are teaching in over three different Master Programs, in six different courses. The Lab participates in 13 research projects. CIL has also a great societal impact via: (a) participating in projects such as Enorasis and SmartSubs, conducting research for applying multimodal analysis to enhance the accessibility and inclusion in cultural environments (b) collaborations with medical professionals (c) collaborations with major national cultural institutions (e.g. Athens Concert Hall, National Library of Greece, Library of the Hellenic Parliament, Monastery of Vatopedi Library in Mount Athos), whilst CIL has released MagCIL API, an audio and speech analysis cloud service and (d) participation of the eHealth Unit in new international networks, events and projects.

What are your plans for the future?

In the upcoming period, we plan to strengthen our position and visibility in our research community by organising several international conferences and other events. With regards to our publications, we plan to increase our publication rate up to 50 per year by 2025. Another important KPI for CIL is to increase our citation rate to 2000 per year (ranging from 1200-1700 in the last 4 years). Also, we are working towards implementing and deploying hardware/software infrastructures and tools that will provide ML 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. Our educational goal is to have six PhDs in the next 4 years, i.e. 1.5 average PhDs per year, a significant increase compared to the previous period. In innovation, our plan is to reach a budget of 100K euros per year from industry corporations, mostly through ahedd DIH. As for our societal impact, CIL will continue to expand its focus on applications of multimodal machine learning towards enhancing the accessibility and inclusion in cultural environments, as we believe that state-of-the-art deep learning applications using audiovisual data, can change the lives of people with vision and hearing impairment. In addition, CIL members will extend their educational and research activities with cultural institutions, mostly focusing on increasing the awareness in the musical industry towards using modern technology.



Computational Intelligence Lab

Computational Intelligence Laboratory



Dr Stavros Perantonis
Head of CIL



Dr Basilis Gatos
Research Director, CIL

More info: www.iit.demokritos.gr/labs/cil/

Integrated Systems Laboratory

What is your mission as a Lab?

Since its inception in 1999, ISL aims to converge IIT's Informatics and Telecommunications programmes through large scale integrated pilot projects relevant to contemporary and disruptive technologies in research fields with high impact, including physical and cyber security, digital culture, AR/VR immersive environments, and digital simulation. ISL's mission includes a holistic contribution including educational and capacity building activities, innovation through collaboration with highly innovative SMEs, and focus on application domains with horizontal and significant societal impact, achieved also through cross-disciplinarity, applied synergies with social sciences and the humanities.

Which of 2021's activities would you like to highlight as the most noteworthy?

During 2021, ISL continued with the evolution of i-Crowd, the group's innovative agent-based simulation whilst implementing research on hybrid-threat modelling and simulation for the purpose of analysing cyber-physical resilience as well as for behaviour analytics. Regarding the Lab's activities in digital culture, the COSMOS application, an innovative, non-linear and immersive digital application for presenting the ancient Greek Mythology and Art, achieved increased attention in relevant conferences and live streaming events.

At the educational pillar, ISL continued its support of summer school and tech camp activities, as well as the operation of the highly successful MSc programme in Clinical Exercise and Applications of Technology in Health with the department of Physical Education Science of the School of Physical Education and Sport Science of the Democritus University of Thrace.

Yet another noteworthy development was ISL's representation of Greece in the Civil Security EU research PC for Horizon Europe, and its membership in the Attica Prefecture Research & Innovation Council. ISL also coordinated IIT's Cybersecurity Month with participation from the extended Greek Ecosystem.

Finally, it is notable that ISL has won two H2020 grants in 2021 (i) as Coordinator of project popAI, winning the single call of EU in H2020 for a project addressing, in a dedicated manner, human factors and ethical, societal, legal and organisational aspects of using Artificial Intelligence in support of Law Enforcement and (ii) as a partner in the EU Green Deal call on forest ecosystem holistic protection, conducting research on climate security related simulation, crowdsourcing and decision support tools.

What are your plans for the future?

Key research priorities for the forthcoming period include Security and Cybersecurity including Defense and Climate Crisis, research on VR/AR/MR & Gamification, and Application in Arts and Culture. At the same time, ISL aspires to expand its roster of PhD, MSc and internship students in the aforementioned research fields.

Key targets are also the promotion of the commercialisation of OCULUS C2I Platform, the provision of services around Cybersecurity in the context of Digital Innovation Hubs and other Innovation-focused actions, IIT Digital Innovation Hub and Capability building: Cybersecurity know-how.



Integrated Systems Laboratory



Dr Stelios C. A. Thomopoulos
Head of ISL



Dr Dimitris Kyriazanos
Associate Researcher, ISL

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our labs

Media Networks Laboratory

What is your mission as a Lab?

MNL is one of the most prestigious Labs at national level, having contributed to the introduction and facilitation of new technologies related to telecommunications in the Greek market. The Lab's mission is centred around research and development in the telecommunication networks field, aiming at the optimisation of resources and the maximisation of quality of the provided services. Additionally, it delivers educational programmes and actions for the field, and effective innovation and knowledge transfer through the facilitation of technology penetration. It provides discussions and consulting services to public organisations, Ministries and private entities about spectrum licensing and service capabilities of new technologies.

Which of 2021's activities would you like to highlight as the most noteworthy?

In the past year, the Lab continued its successful implementation of multiple European and national projects revolving around the evolution of 5G and beyond, technologies. Research efforts culminated in the production of 21 publications in esteemed journals and conferences.

In 2021, the H2020 project EVOLVED-5G also started, which develops an DevOps ecosystem for the development of NetApps based on the 5G programmability feature toward enhancing the service provision and performance of vertical industries applications. Furthermore, MNL established and extended numerous relevant technical and infrastructural assets, notably including the 5GENESIS Athens platform, the Vodafone - NCSR-D Giga Campus, the Core Cloud/SDN experimental platform, and the 5G mobile platform for mission critical services.

MNL participated in the PhD Schools of ITN H2020 SEMANTIC project, lecturing on 5G system and Vertical KPIs and the second training session of the RESPOND-A project, which was held in September, with the participation of about 80 first responders. During this training session, first responders were introduced to the architecture, installation, configuration and use of a 5G portable communication system, able to support their operational needs in crisis events, like fires, earthquakes etc.

Moreover, MNL has organised technology demos of 5G and participated in the TV documentary series of Cosmote *How 5G will change the world*.

What are your plans for the future?

MNL will continue its research in cutting edge technologies like 5G and beyond, verticals adoption of 5G, network management, edge computing, cybersecurity and guaranteed quality of services in telecommunications. Major targets are the integration of distributed/ cloud environments towards a managed continuum infrastructure, research on (B)5G programmability, zero-touch management, high-end security, QoS and high availability.

Moreover, MNL will investigate the application of (B)5G networks in broader fields including drones and smart manufacturing, as well as wider applications of edge computing. Finally, a major goal is the creation of experimentation facilities, where industrial stakeholders, SMEs and the academic and research communities can experiment on new promising technological trends for 5G/6G networks, in combination with the evolution of existing infrastructures like the 5GENESIS Athens platform and the Vodafone - NCSR-D Giga Campus.



Media Networks Laboratory



Dr Anastasios Kourtis
Head of MNL



Dr Harilaos Koumaras
Associate Researcher, MNL

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Telecommunication Networks Laboratory

What is your mission as a Lab?

NeL focuses on the design, operation, management and optimisation of communications and computer networks, with an emphasis on performance and efficiency aspects. 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 2021's activities would you like to highlight as the most noteworthy?

During 2021 NeL leveraged its expertise and prior results towards considering various user or device mobility characteristics, also addressing different vertical use case requirements. For the domain of mobile IoT networks, in particular, a taxonomy was developed addressing scenarios, related applications, requirements, mobility features and related IoT standards. Additionally, NeL worked on the formulation, assessment and experimental evaluation of novel radio resource management and intermittent connectivity schemes that exploit the mobility characteristics of IoT nodes, considering use case scenarios related to Smart Cities and Smart Agriculture. On a related front, NeL contributed to the development of policy recommendations in the aforementioned use case scenarios addressing sustainability challenges to Think20, an international engagement group for G20, and gave invited presentations in webinars organised by the EU-GCC Clean Energy Technology Network on these topics. Moreover, the Lab participated in a successful funding proposal for the creation of a Competence Centre on 5G+ networks and advanced enablers for verticals, named *TT-NET*. This competence centre will bring together a strong and multifaceted consortium of industrial and academic/research partners with significant international presence on 5G+ networking technologies and on the application of these technologies to diverse industrial sectors. As always, 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. Topics of broader scope and/or greater complexity are expected to be addressed cooperatively, in collaboration with other peer institutions and/or other Labs within IIT, also leveraging the participation to the Competence Centre *TT-NET*.



Telecommunication Networks Laboratory



Dr Kimon Kontovasilis
Head of NeL

More info: www.iit.demokritos.gr/labs/nel/

our labs

Wireless Communications Laboratory

What is your mission as a Lab?

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 2021's activities would you like to highlight as the most noteworthy?

In 2021, WiCom continued its close cooperation with SKEL | The AI Lab under the ARIADNE project, the first initiative within IIT that bridges telecommunications and AI/ML domains in B5G networks. Significant effort was devoted to the study of Reconfigurable Intelligent Surfaces (RIS), a hot topic in wireless communications especially for mmWave networks and beyond 5G technologies. Moreover, channel modelling at the D-band (140 GHz) was investigated in depth. A number of results have been published in international journals (IEEE OJCS, IEEE Comm. Letters) and conferences (IEEE SPAWC, EUCAP 2021). Our activity also focused on design of High and Medium gain antennas (HGA, MGA) at D-band (reflector antennas, dielectric Lens antennas) but also on X-band (under ESA-DELHLA project). Furthermore, research effort in the field of wearable textile antennas in combination with the specialised equipment of the Lab contributed to securing funding for research in this area until 2024 (M-REWEAR project).

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.

Moreover, our target is to extend our measuring capabilities to D-band. It is noted that in the context of the successful evaluation of the proposal *Attica Sensor Technology Hub@Demokritos* by the Region of Attica (national funding), WiCom secured funding for the upgrade in mm-waves of the measuring equipment of the Anechoic Chamber. The research activity in the area of wearable textile antennas will continue based on the experience of the previous years and the secured funding until September 2024. 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.



Wireless Communications Laboratory



Dr Antonis Alexandridis

Head of WiCom

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Net Media Lab Mind & Brain R&D

What is your mission as a Lab?

The mission of NML & Mind - Brain R&D is the sustained R&D on ICT within the domains of Education and Inclusion-Equality as well as with other related scientific domains. The activities of the Lab bridge the technology and educational skills gaps and improve the equal inclusion and participation of all social groups in education, the labour market and finally, foster their equal participation in every societal aspect. As a result, the Lab's mission improves the R&D exploitation within sensitive and other related social groups and stakeholders (teachers, students, parents) and improves productivity and economic issues of the society in general via inclusive development and through improving skills (21st Century, etc.) as well as exploiting digital technologies.

Which of 2021's activities would you like to highlight as the most noteworthy?

During 2021, NML & Mind has conducted R&D&Education and has developed advanced ICT tools, services, scientific articles, activities & education materials for the acquisition of Digital, Soft, Social, Metacognitive, Higher Mental, 21st Century Skills in the context of eight projects, of which five successfully concluded in 2021. These activities culminated in the production of 35 publications in relevant scientific journals. Furthermore, the Lab continued the operation of the *Specialisation in ICT & Special Education: Psychopedagogy of Inclusion* postgraduate program in collaboration with the University of Thrace. In this context, ~100 new students graduated from the programme. Several of the Lab's articles have been referenced and its practices have been endorsed in impactful venues like the EC's Horizon Work Programme and UNESCO's and OECD's strategic programmes, while policy documents of several countries including the USA, UK, Ireland, Germany, Canada & 11 Asian South-Eastern countries included the Lab's results and recommendations. Finally, our project ROBOTICS4DEAF, received a Best Practice award by the EC.

What are your plans for the future?

For the upcoming period, the Lab's vision is to enhance, foster and widen its collaboration with its large network of organisations and new entities, with emphasis on digital tools & skills and the aforementioned sensitive groups and to expand it in new countries and in new thematic areas (technological or social), in order to expand, deepen and strengthen its R&D&E activities and products as well as its societal impact. One of the main targets is to enhance its R&D&E activities on e-services & tools emphasising on Social Innovation & Ethics, Gender Equality and most importantly, on inclusiveness for sensitive social groups. Additionally, it aims to engage with key human-centered, enabling and emerging digital technologies, for a more resilient, inclusive and democratic European society, and to enhance Educators-Trainers CPD to ensure a cleaner & healthier environment. Naturally, the Lab also aims to engage in new educational activities in new thematic areas, while the continuation of the successful run of its postgraduate programme is a top priority as is the continuation of annual seminars on exploiting digital technologies within education in collaboration with Universities (e.g. the University of the Aegean) and other educational entities.



Net Media Lab Mind & Brain R&D

Net Media Lab | Mind & Brain R&D



Dr Athanasios Drigas

Head of NML & Mind

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our labs

SKEL | The Artificial Intelligence Lab

What is your mission as a Lab?

The Artificial Intelligence (AI) Lab, SKEL aspires to become an international reference point for AI research and innovation. In this capacity, it aims at a balanced contribution to science, education, economy and society. Towards scientific excellence, the Lab is developing teams of experienced researchers and young talented scientists, who together can make significant breakthroughs. The research emphasis is on content and big data analysis, as well as intelligent human-machine interaction. Excellence is sought through innovative research projects, high-impact publications, and organisation of major events. In education, SKEL adopts a three-pronged approach covering research training, professional skills development, and technological literacy. Towards innovation, the Lab aims to establish a continuous dialogue with the Industry, generating new intellectual property and building innovative solutions. Finally, on the societal level, the emphasis is on the democratisation of AI and the acquisition of basic knowledge and skills by the wider public.

Which of 2021's activities would you like to highlight as the most noteworthy?

We continued our scientific contribution in the main areas of activity of the Lab, expressed mainly through high-impact publications. Our contributions include, amongst others:

- a formal computational framework for complex event forecasting;
- a novel ML method for financial numeric entity recognition;
- a novel evidence transfer approach for unsupervised deep learning;
- bioinformatics infrastructure for national flagships on precision oncology and SARS-CoV-2 response;
- a new project to bring European values into advanced digitisation.

Additional highlights include:

- a new multi-disciplinary programme on natural sciences and AI, comprising common projects and workshops with other NCSR-D Institutes;
- contribution to European flagships, e.g. the AI-on-demand Platform;
- strengthening innovation impact, through collaboration with startups, the ahead Digital Innovation Hub, and a new series of talks by Industry;
- various science communication activities, including the *1000 Pioneers for AI in Greece* initiative, and an AI book for the wider Greek public;
- contribution to policy documents for the democratisation of AI;
- contribution to UNESCO's 1st global recommendation on the ethics of AI.

What are your plans for the future?

We are dedicated to scientific excellence, exhibited through publications, as well as through our leading role in flagship and excellence-oriented research grants. At the same time, we aim to further strengthen our educational programmes, and complete the *1000 Pioneers for AI in Greece* initiative. Regarding Innovation, we will promote further our collaboration with the Industry, primarily through the ahead DIH. We also anticipate significant progress in our flagship initiatives related to Health and Culture, such as the House of Classical Greek Ideas. Finally, we will continue to contribute to national and European policies related to AI and Open Science, to increase the societal impact of technologies for all.



skel
THE AI LAB

SKEL | The AI Lab




Dr George Paliouras


Head of SKEL | The AI Lab

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