

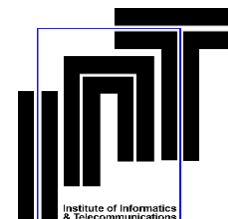
# Ολοκληρωμένα Συστήματα Πληροφορικής & Τηλεπικοινωνιών

**Δρ. Στέλιος Χ. Α. Θωμόπουλος**

Διευθυντής του Ινστιτούτου Πληροφορικής & Τηλεπικοινωνιών και Διευθυντής Έρευνας  
Επικεφαλής του Εργαστηρίου Ολοκληρωμένων Συστημάτων και Καθηγητής Ηλεκτρολόγων Μηχανικών

**Εργαστήριο Ολοκληρωμένων Συστημάτων**  
Integrated Systems Laboratory- ISL

<https://vimeo.com/isldemokritos/videos/page:1>



# ΠΡΟΦΙΛ ΕΡΓΑΣΤΗΡΙΟΥ ΟΛΟΚΛΗΡΩΜΕΝΩΝ ΣΥΣΤΗΜΑΤΩΝ



**Εθνικό Κέντρο Έρευνας Φυσικών Επιστημών (ΕΚΕΦΕ) «Δημόκριτος»** συγκροτείται από πέντε Ινστιτούτα :

- (i) **Ινστιτούτο Πληροφορικής & Τηλεπικοινωνιών**
- (ii) Ινστιτούτο Βιοεπιστημών & Εφαρμογών
- (iii) Ινστιτούτο Πυρηνικών & Ραδιολογικών Επιστημών & Τεχνολογίας, Ενέργειας & Ασφάλειας
- (iv) Ινστιτούτο Νανοεπιστήμης & Νανοτεχνολογίας
- (v) Ινστιτούτο Πυρηνικής & Σωματιδιακής Φυσικής



**Ινστιτούτο Πληροφορικής και Τηλεπικοινωνιών (ΙΠΤ)** (<https://www.iit.demokritos.gr/>)

- Διεξάγει έρευνα και αναπτύσσει τεχνολογίες στις περιοχές των Τηλεπικοινωνιών, των Δικτύων, των Ευφυών Συστημάτων Πληροφορικής και του Διαδικτύου.
- Έχει συμμετάσχει σε εθνικό και ευρωπαϊκό επίπεδο σε πολλά ερευνητικά προγράμματα FP4, FP5, FP6, FP7 και H2020.
- Συμβάλλει στο 54,7% της συνολικής εξωτερικής χρηματοδότησης που λαμβάνει ετησίως το ΕΚΕΦΕ «Δημόκριτος», ενώ καταναλώνει μόλις 7,9% της δημόσιας χρηματοδότησης, δηλαδή έχει συνολικά 7:1 ROI (Return On Investment).



**Το Εργαστήριο Ολοκληρωμένων Συστημάτων (ISL)** (<https://www.iit.demokritos.gr/el/isl>)

- Ένα από το 6 εργαστήρια του ΙΠΤ.
  - Περιλαμβάνει ποικίλο προσωπικό άνω των 40 ατόμων πλήρους απασχόλησης
- **Ο ρόλος του ISL επικεντρώνεται** στο σχεδιασμό και την ανάπτυξη καινοτόμων, προηγμένων και ολοκληρωμένων λύσεων εστιάζοντας σε:
    - Control, Command & Information (C2I) & Simulation Systems
    - GIS & Geo-spatial Information Management
    - LBS, Transportation Optimization, Data Fusion
    - Mobile Apps including multi-modal journey planning
    - Embedded Systems Design & Implementation
    - Security, Asset Tracking, & Crowd Modeling & 3D Simulation
    - Indoor Localization, Routing & Navigation
    - Signal Propagation & Antennae Design
    - Digital cultural heritage promotion and management

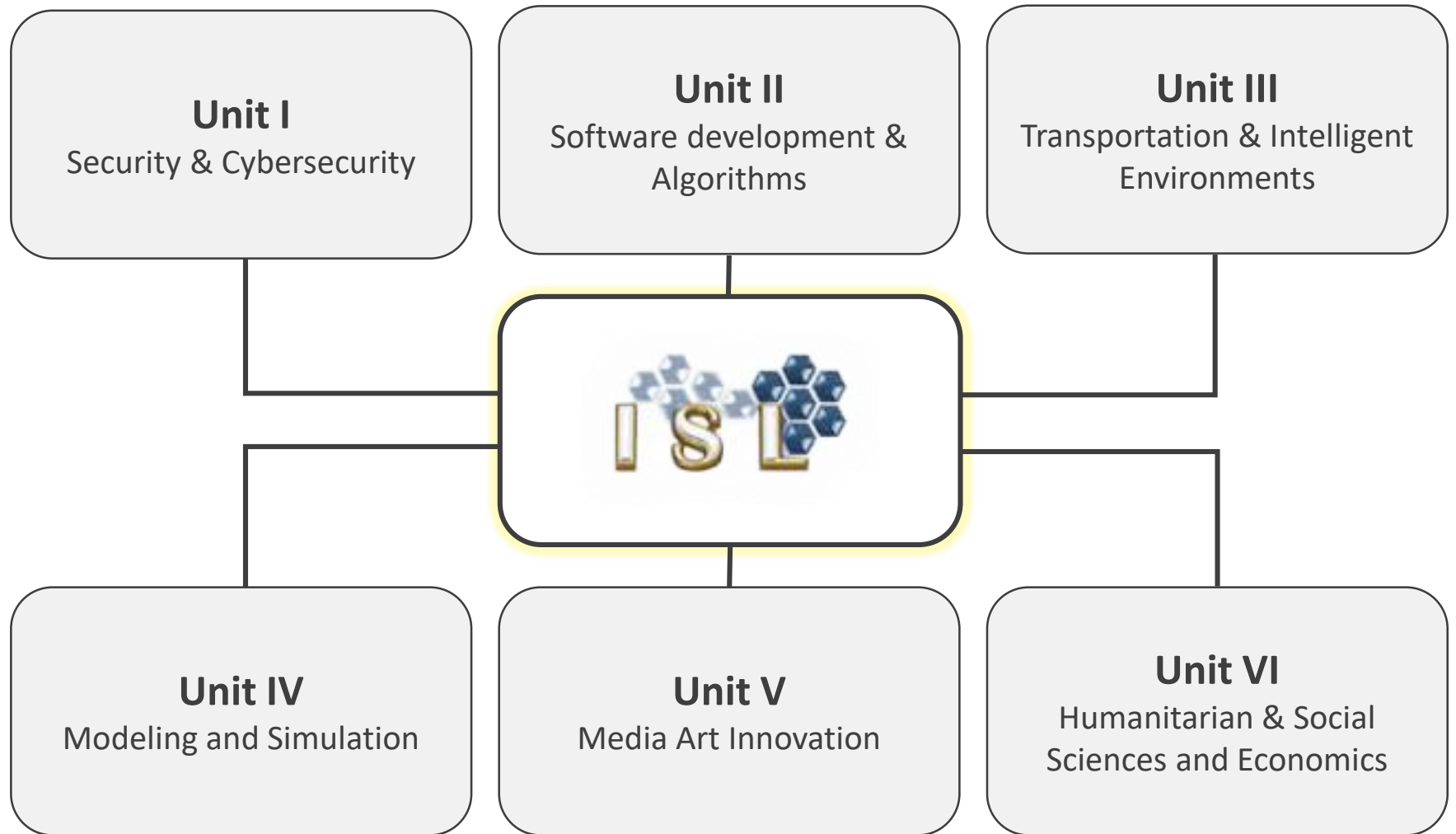
## Χρηματοδότηση 2000 - 2018

- Πάνω από 44 έργα
- Συνολική χρηματοδότηση ISL: πάνω από 32 Εκ. Euro
- Συνολική χρηματοδότηση έργων: πάνω από 156 Εκ. Euro

## Προσωπικό

- Διευθυντής: Στέλιος Χ. Α. Θωμόπουλος, PhD
- 43 Full-time Συνεργαζόμενοι Ερευνητές και εξωτερικοί συνεργάτες έρευνας

# ΔΟΜΗ ΕΡΓΑΣΤΗΡΙΟΥ ΟΛΟΚΛΗΡΩΜΕΝΩΝ ΣΥΣΤΗΜΑΤΩΝ - ISL



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Επίπεδα Ωριμότητας TRL 6-8

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## Risk Based Airport Security

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## Public Information Channel & Apps

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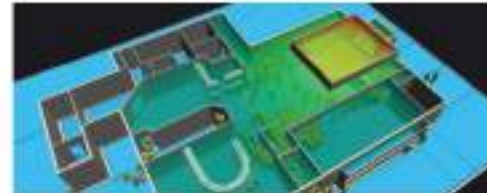
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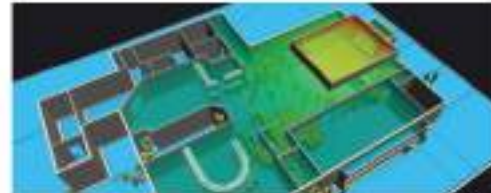
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OCULUS Sea C2  
PERSEUS Project  
Maritime Surveillance  
& Data Fusion Sys



OCULUS Fire C2  
AF3 Project  
Mega Fire Monitoring  
C2 Sys



OCULUS Air C2  
FlySec  
Airport Security &  
Monitoring C2 Sys



## Επίπεδο Ωριμότητας

Δοκιμαστική  
Εφαρμογή  
Πιλοτική επίδειξη  
PERSEUS East  
Campaigns I & II  
Aegean Sea  
**TRL 7**

Δοκιμαστική  
Εφαρμογή  
Πιλοτική επίδειξη  
AF3 Pilot  
Skaramangas  
**TRL 6**

Δοκιμαστική  
Εφαρμογή  
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Luxembourg  
Airport  
**TRL 6**

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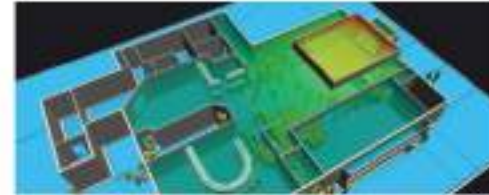
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Εφαρμογή  
Πιλοτική επίδειξη  
στη Ναυτική  
Βάση  
Σκαραμανγκά –  
Ιούνιος 2016  
και στο  
Αεροδρόμιο του  
Λουξεμβούργου  
LuxAir Φεβ. 2018  
TRL 8

Oculus Sea, Fire & Air  
C2&I First Responder  
Mobile App →

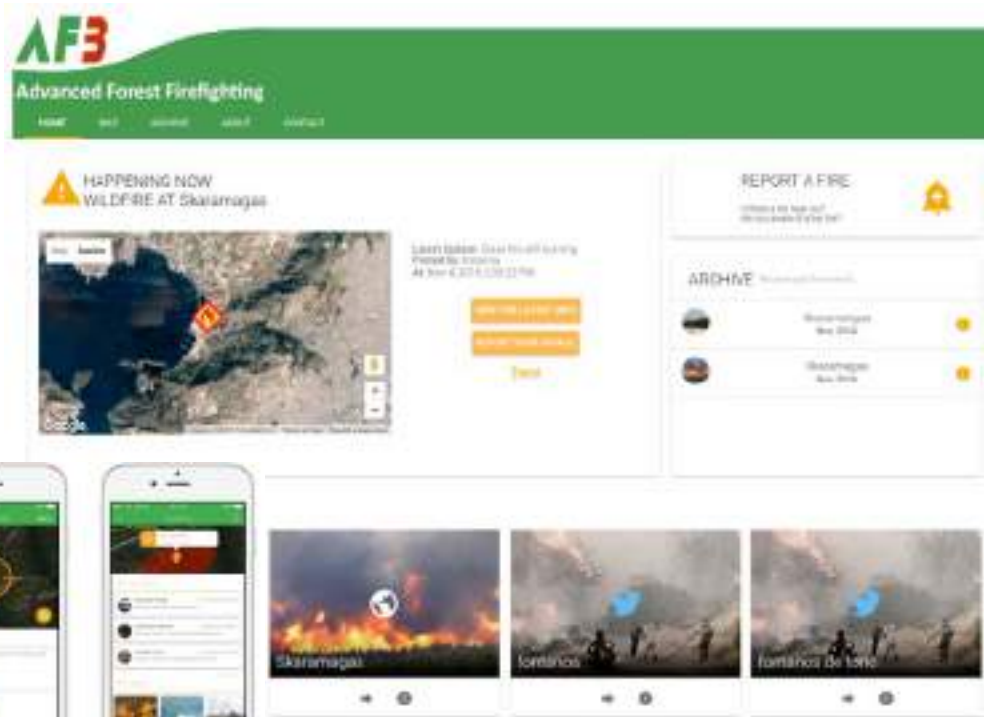
Assisting First  
Responders & security  
personnel in their  
operations and  
providing enhanced  
awareness in C2 and  
on the field



# ΕΦΑΡΜΟΓΕΣ ΣΤΟΝ ΤΟΜΕΑ ΤΗΣ ΑΜΥΝΑΣ:

## Public Info Channel and Citizens Mobile App (CitApp)

Oculus Fire: Public information channel, social media and citizen mobile apps for fire detection, crowd sourcing, early warning and incidents localization, powered by reliability assessment machine learning algorithms



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Δοκιμαστική Εφαρμογή Πιλοτική επίδειξη στη Ναυτική Βάση Σκαραμανγκά – Ιούνιος 2016 και στο LuxAir Φεβ. 2018 TRL 5-8

Oculus Air: Passengers Mobile App

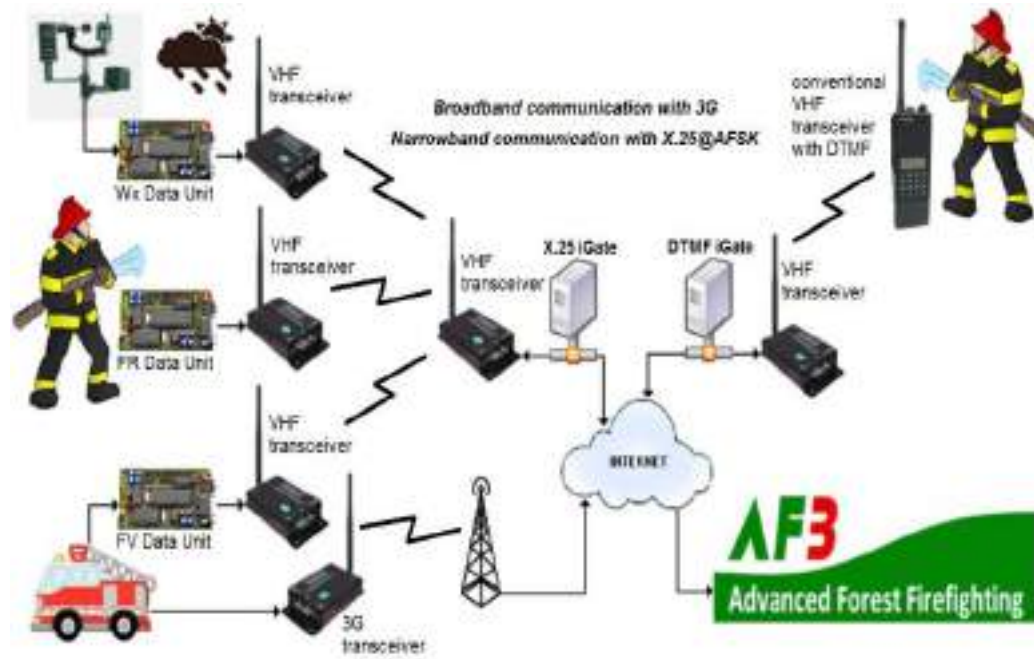


Construction & development of specialized h/w components which are wearable by firefighting personnel (**FR units**) and equipped in fire engines (**FB vehicle units**) allowing the delivery of low capacity & bit-rate data (e.g. location, telemetry, short text messages) through the onboard 2-way VHF voice transceivers.

Construction & development of conventional 2-way radios with **DTMF capability** to be used by the firefighting personnel and SAR teams in order to send basic information such as ID, location (in grid format) & status to the C4I.

Construction & development of **weather stations** on other VHF frequencies using the same encoding/encryption tech.

Development of **i-Gates** through which each communication network deliver information to the AF3 system.



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Ιούνιος 2016  
TRL 7



# NCSR-ISL expertise on cyber security

- **Cyber security econometric analysis**
  - Cyber security data collection and analysis tools
  - Cost-efficient econometric models/tools and cyber risks indicators
- **Social engineering penetration testing** (collaboration with HMOD)
  - Phishing attacks generation – feedback collection
  - Data Analysis
- **Behavioral, social and human interaction modeling** for the design of efficient and trusted computation systems and environments
  - **Testing and validation in a controlled virtual environment**
- Highly customizable dynamic simulation platform
  - **Agent-based simulation engine and federated simulation platform** for the creation of a controlled virtual environment – ability to connect to domain specific cyber ranges
- Cyber security and network Threat Analysis
- Distributed Ledger Technologies (blockchain)
- **Relevant projects:**
  - Economics in cybersecurity: SAINT (Coordinator)
  - Cybersecurity protection, awareness and data protection: DOGANA, CYBERROAD, PACT
  - Simulation platforms and virtual environments: FLYSEC (Coordinator), AF-3, TASS, PYRONES, PERSEUS



## Blockchain applications

- NCSR-ISL is exploring the use of blockchain in a variety of scenarios such as Digital Assets Rights management, Electronic Health Records management, Smart Contracts, and Network logs management.

## Potential applications of Blockchain in a Military Organization

- Blockchain can be used for identification and authentication purposes in a variety of scenarios because it uses public key cryptography.



# NCSR-D-ISL in Earth Observation: MARINE-EO Coordinator



1st Pre-Commercial Procurement  
in Earth Observation



Marine-EO / <https://marine-eo.eu>

Marine-EO

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[Consortium](#)

[Activities](#)

[PCP](#)

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<https://marine-eo.eu/call-tender>

**Call for Tender - Apply Now!**

**Deadline Submission - 09.04.2018**



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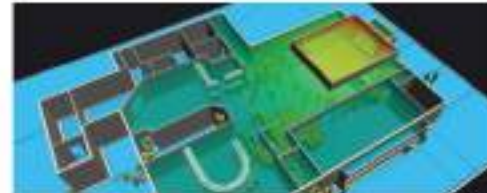
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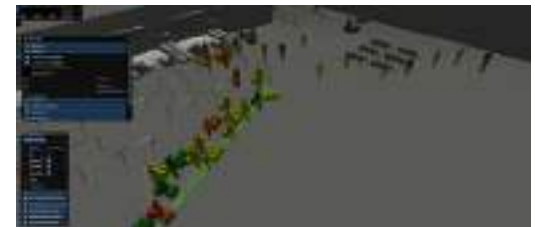
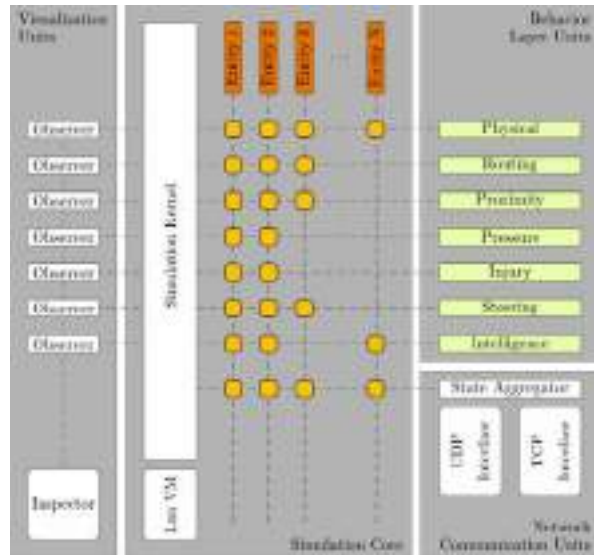
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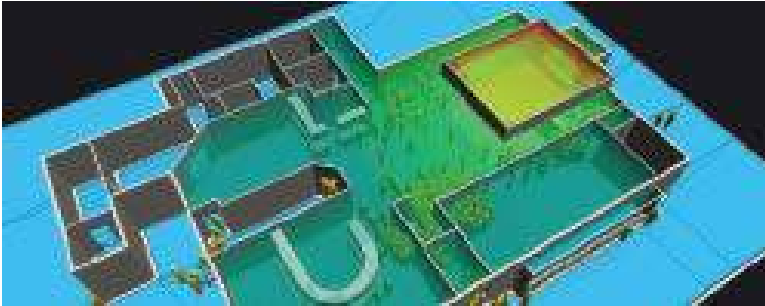
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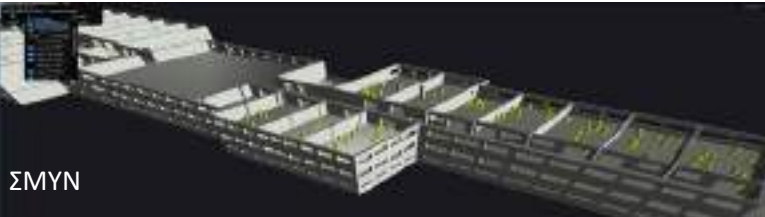


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**PYRONES: Fire Bldg Evac with BIM**



**AF3: Entire Village Evacuation Sim**



**TASS: Athens Int’nl Airport Evacuation Simulation & Photo Realistic Visualization**

iCrowd Sim Vimeo: <https://vimeo.com/155102249>



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Δοκιμαστική  
Εφαρμογή  
Πιλοτική επίδειξη  
**TRL 6**

Δοκιμαστική  
Εφαρμογή  
Πιλοτική επίδειξη  
**TRL 8**

# ΕΦΑΡΜΟΓΕΣ ΣΤΟΝ ΤΟΜΕΑ ΤΗΣ ΑΜΥΝΑΣ: Η Πλατφόρμα Προσομοίωσης iCrowd

## FlySec: AIA & LuxAir Int'l Airport Evac Sim & Photo Realistic Visualization



Επίπεδο Ωριμότητας

Δοκιμαστική  
Εφαρμογή &  
Πιλοτική επίδειξη  
AIA: Athens  
International Airport  
&  
LuxAir: Luxembourg  
International Airport  
**TRL 8**

## FlySec: Risk-based Security Analysis & Simulation AIA & LuxAir Airports



# AR/VR – GAMES - IMMERSION & Indoor Mapping & Navigation

## wayGoo: 3D Content Geocoding, Management & Navigation Platform & Mobile Apps

Vimeo: <https://vimeo.com/167716858> ,  
<https://play.google.com/store/apps/details?id=com.demokritos.waygoo>



Επίπεδο Ωριμότητας

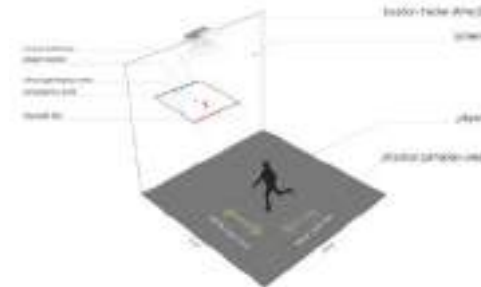
Δοκιμαστική  
Εφαρμογή  
Πιλοτική επίδειξη  
Εμπορική Εφαρμογή  
Επίδειξης iOS &  
Android  
**TRL 8**

## iGuide Knossos & iRescue: Immersive VR/AR Tours & Games

Vimeo: <https://vimeo.com/183327098>



3D AR/VR Spaces  
& Content  
Δοκιμαστική  
Εφαρμογή  
Πιλοτική επίδειξη  
**TRL 9**



Δοκιμαστική  
Εφαρμογή  
Πιλοτική επίδειξη  
**TRL 9**

# ΕΦΑΡΜΟΓΕΣ ΣΤΟΝ ΤΟΜΕΑ ΤΗΣ ΑΜΥΝΑΣ: Σχετικά Έργα: Η2020 - FP7 – Διακρατικά - Εθνικά

## Τρέχοντα

Μπλέ γραμματοσειρά → Project Coordination από ISL

- SAINT - Systemic Analysis In Network Threats
- CY CISE - Cypriot information sharing environment towards an integrated national maritime surveillance awareness and enhancement of cross-sector and cross-border exchange of information
- MARINE-EO - Bridging Innovative Downstream Earth Observation and Copernicus enabled Services for Integrated maritime environment, surveillance and security
- Hellenic CISE- Hellenic Common Information Sharing Environment
- FlySec - Optimising time-to-FLY and enhancing airport SECURITY
- EUTravel - Optimodal European Travel Ecosystem EU CISE 2020 - EU Common Information Sharing Environment 2020
- SYNTELESIS - Innovative Technologies and Applications Based on Internet of Things and Cloud Computing
- DOGANA - aDvanced sOcial enGineering And vulNerability Assessment framework
- CyberROAD - Development of the Cybercrime and Cyber-terrorism Reseach Roadmap

## Υπό συμβασιοποίηση

- CIVILnEXT - Next generation of information systems to support EU external policies
- Tresspass - robusT Risk basEd Screening and alert System for PASSengers and luggage
- ESTIA - Disaster Management Platform for Cultural Heritage Sites
- Cosmos - Cultural Osmosis - Mythology and Art
- Narration - Integrated system for management and curation of digital content and production of personalized and collaborative narratives
- TMI\_Builder - Tailor-Made Itinerary Builder: Αυτοματοποιημένο Σύστημα Παροχής Εξατομικευμένων Συστάσεων και Περιεχομένου Προς Ταξιδιώτες



## Ολοκληρωμένα

- **PYRONES** - PYRo-mOdelling and Evacuation Simulation system
- **Greco-Risks** - Hellenic Natural-Hazards Risk-Mitigation System of Systems
- **SYNAISTHISI** - Intelligent Networks for Data Collection and Processing for Energy Conservation
- **HIPOW** - Protection of Critical Infrastructure against High Power Microwave Threats
- **PACT** - Public perception of security and privacy: Assessing knowledge, Collecting evidence, Translating research into action
- **ACRIMAS** - Aftermath Crisis Management System-of-systems Demonstration
- **PERSEUS** - Protection of European seas and borders through the intelligent use of surveillance
- **TASS** - Total Airport Security System HMFM
- **DITSEF** - Digital & Innovative Technologies for Security & Efficiency of First responder operations
- **OPTI-TRANS** - Optimised Transport System for Mobile Location-Based Services
- **EMERGE** - Emergency Monitoring and Prevention
- **LIAISON** - Location based services for the enhancement of working environment
- **AF3** - Advanced Forest Fire Fighting
- **LIAISON** – Location based services for the professional markets
- **WIN** – Wireless Internet Network

## Το ISL διαθέτει

- ✓ **εμπειρία** στη διαχείριση έργων και προγραμμάτων από διάφορα έργα χρηματοδοτούμενα από την Ευρωπαϊκή Ένωση και σε εθνικό επίπεδο,
- ✓ **δυνατότητες** ολοκλήρωσης συστημάτων υλικού & λογισμικού μεγάλης κλίμακας και υλοποίησης σύνθετων πιλότων και δοκιμών πεδίου
- ✓ **τεχνογνωσία**, ανατροφοδότηση και γνώση από τα υλοποιημένα έργα.



# ΕΦΑΡΜΟΓΕΣ ΤΩΝ ΚΑΙΝΟΤΟΜΙΩΝ/ ΟΦΕΛΗ

## Δραστηριότητα σε ποικίλες θεματικές ενότητες

- Παρακολούθηση-επιτήρηση θαλάσσιου χώρου
- Έλεγχος και ασφάλεια συνόρων
- Διαχείριση μεγάλων πυρκαγιών
- Συστήματα συλλογής/επεξεργασίας/αξιοποίησης πληροφοριών για την εκτίμηση της επιχειρησιακής κατάστασης
- Κυβερνοάμυνα και Κυβερνοασφάλεια
- Ανάπτυξη δικτύων αισθητήρων
- Προστασία/Εξοπλισμός Προσωπικού για την ελαχιστοποίηση κινδύνων και απωλειών υγείας
- Προσομοίωση περίπλοκων και κατανεμημένων συμβάντων
- Εικονική & Επαυξημένη Πραγματικότητα, Παιχνιδοποίηση και Εκπαίδευση

## ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΟΦΕΛΟΣ

Αξιοποίηση τεχνολογίας, τεχνογνωσίας και πιλοτικών εφαρμογών

- μέσω ολοκληρωμένων συστημάτων στην εγχώρια αμυντική στρατηγική, και
- υιοθέτηση των προτεινόμενων συστημάτων και υπηρεσιών για τη βελτιστοποίηση διαδικασιών.

## Σκοπός

Παραγωγή καινοτόμων συστημάτων και εφαρμογών μέσω σύγκλισης Προγραμμάτων Πληροφορικής και Τηλεπικοινωνιών με την δημιουργία πιλοτικών έργων γύρω από τεχνολογίες αιχμής τις οποίες το Ινστιτούτο εκτιμά σαν ερευνητικές περιοχές μελλοντικής σημασίας και στις οποίες διαθέτει σημαντική τεχνογνωσία, επενδύει και προτίθεται να επενδύσει.

## ΠΡΟΤΑΣΕΙΣ & ΑΠΑΙΤΟΥΜΕΝΟΙ ΠΟΡΟΙ ΑΝΑΠΤΥΞΗΣ

Προτεινόμενο έργο	Κεφάλαιο	Χρόνος	Συνεργασία
Oculus Sea for Maritime Surveillance	2.300.000 €	Προϊόντα και υπηρεσίες σε TRL 7 μέσα σε 2 έτη	<ul style="list-style-type: none"> <li>• Αμυντική βιομηχανία</li> <li>• Υπουργείο</li> <li>• Εταίροι από όλη την Ευρώπη</li> <li>• Τελικοί χρήστες</li> <li>• Ειδικοί συνεργάτες</li> </ul>
Oculus multimodal Boarder Security	5.000.000 €		
Simulator για εφαρμογές πυρασφάλειας, πυρόσβεσης και εκκένωσης πολεμικών πλοίων	2.500.000 €		
Naval Battlefield Simulator	2.800.000 €		
Blockchain for identification & authentication			



**Ανθρώπινο  
Δυναμικό που  
θα απασχοληθεί**

- Διπλωματούχοι **Ηλεκτρολόγοι Μηχανικοί**, Πτυχιούχοι **Πληροφορικής**, Διπλωματούχοι **Μηχανικοί Υπολογιστών**
  - web-service
  - back-end development
  - mobile Developers
  - UI/UX Web Front-End Developers
  - block chain
  - data analytics & deep learning
  - Simulation
  - Computer vision
  - AR/VR & Gaming
- Πτυχιούχοι **Φυσικό/Μαθηματικοί** με μεταπτυχιακό τίτλο σε Αυτοματισμό/Αυτόματο Έλεγχο/ Μαθηματική Μοντελοποίηση & Αλγορίθμους
- Διπλωματούχοι **Αρχιτέκτονες Μηχανικοί** με μεταπτυχιακούς τίτλους σπουδών στη ψηφιακές τεχνολογίες, ψηφιακές τέχνες, στον υπολογιστικό σχεδιασμό, στο animation, και διοίκηση επιχειρήσεων
- Πτυχιούχοι Νομικοί, Κοινωνικές επιστήμες, Μάρκετινγκ, Κινηματογράφο & Εικαστικές Τέχνες





## Στοιχεία επικοινωνίας

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Μηχανικών

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<http://isl.iit.demokritos.gr/>

Ινστιτούτο Πληροφορικής και Τηλεπικοινωνιών

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