ALADDIN

European Commission | Horizon 2020 European Union funding for Research & Innovation

ALADDIN PROJECT

SHERPA

WORKSHOP

12 APRIL 2019

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 740859

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AGENDA

- Introduction
- Project description
- Pilot experiments
- Next Steps
- Conclusion

ALADDIN

Advanced ho**L**istic

Adverse **D**rone **D**etection

Identification & **N**eutralization

- H2020 Programme
- Research and Innovation Action

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PROJECT ORIGIN

Where does it come from?

A BIT OF HISTORY – CALL FOR PROPOSAL

- Secure societies – Protecting freedom and security of Europe and its citizens
  - Fight against Crime and Terrorism
  - Detection and neutralization of rogue/suspicious light drone/UAV flying over restricted areas, and involving as beneficiaries, where appropriate, the operators of infrastructure

PROPOSAL – GRANT AGREEMENT

- Proposal selected in January 2017
- Grant Award in August 2017
- Start in September 2017
- Duration : 36 months – 3 years
- 2 Cycles / Iterations
  - Beta version – 18 m – February 2019
  - Final version – 36 m – August 2020
- Security – EU Restricted
  - Nature of the topic: terrorism and organized crime activities
  - Sensitiveness of some matters / deliverables
    - gap analysis, vulnerability assessment, neutralisation tools and development of new capabilities

PROJECT DESCRIPTION

What is it about?

ACTION / PROJECT MAIN OBJECTIVES

- Study and develop a state-of-the-art, global, and extensible system to
  - Detect, Localise, Classify, and Neutralize :
    - suspicious, and potentially multiple, light UAVs over restricted areas
- Build a Counter-UAV system
  - Using BOREADES as the foundation
- Take into account Operational Constraints
  - Ease of use and deployment,
  - Quality of detection
  - Safety
- Provide tools for operational support
  - Investigations
  - Training

OTHER OBJECTIVES

- Assess
  - Relevant technology
  - Threat trends
  - Regulations
  - Societal, Ethical and Legal (SoEL) frameworks
- Develop new knowledge for
  - LEAs,
  - Infrastructure designers, constructors, and operators
- Develop innovative Curricula
  - E-learning
  - On site training

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CONSORTIUM

Who is involved

CONSORTIUM – 18 PARTNERS

- 3 Industrial leading companies
  - Diginext (DXT), CS, IDS
- 3 Innovative SMEs
  - SIRC, MC2, HGH
- 3 European Technical Research Centres
  - CERTH, Fraunhofer IDMT, PIAP
- 1 European Aeronautic Expert Centre
  - FADA CATEC
- 1 European Research Centre and Academic Institute
  - VUB
- 1 World-class Infrastructure company
  - Acciona Construcion
- 6 LEAs (End Users) : KEMEA, CAST/DSTL, MIF, PJ, MIPS, ADM

CONSORTIUM – EUROPEAN DIMENSION

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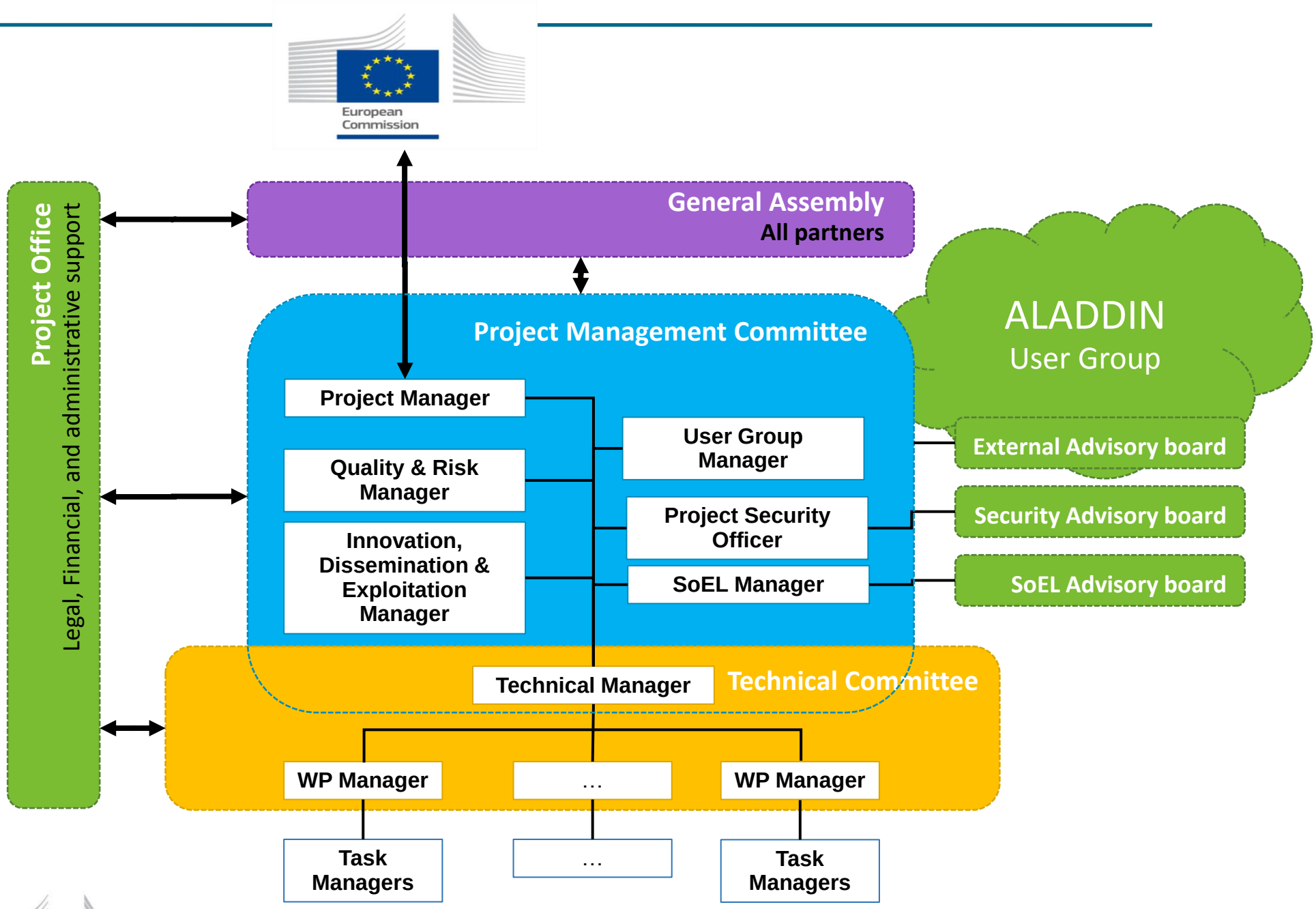
IMPLEMENTATION

How is it implemented

SOME FIGURES AND CONSTRAINTS

- 9 Work Packages
- 37 Tasks
- 2 Cycles / Iterations
- 6 Milestones
- 99 Deliverables
  - 12 EU Restricted => 21
  - 66 Confidential => 59
    - 21 to be reviewed by SAB - security perspective
  - 19 Public => 19

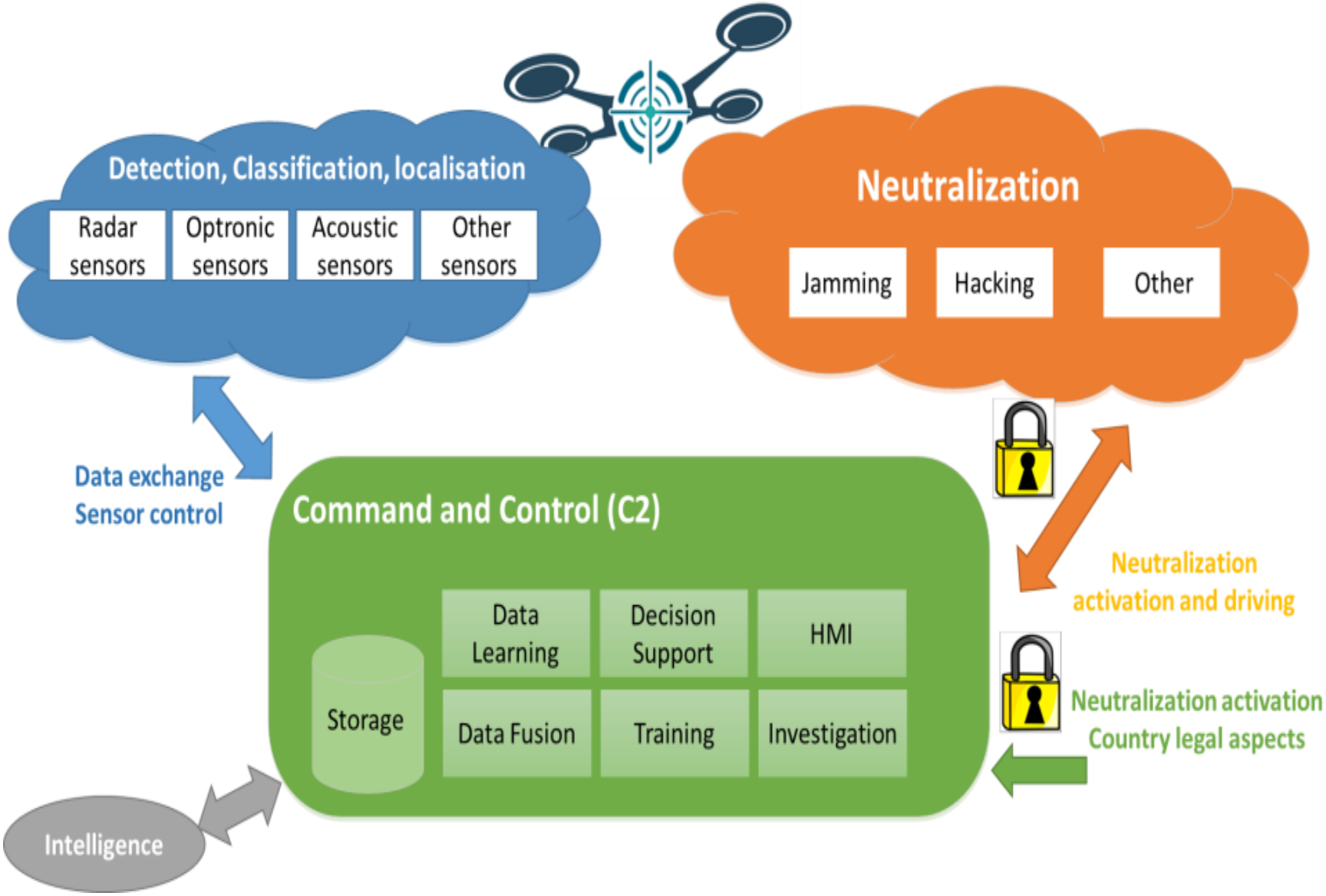
MANAGEMENT STRUCTURE



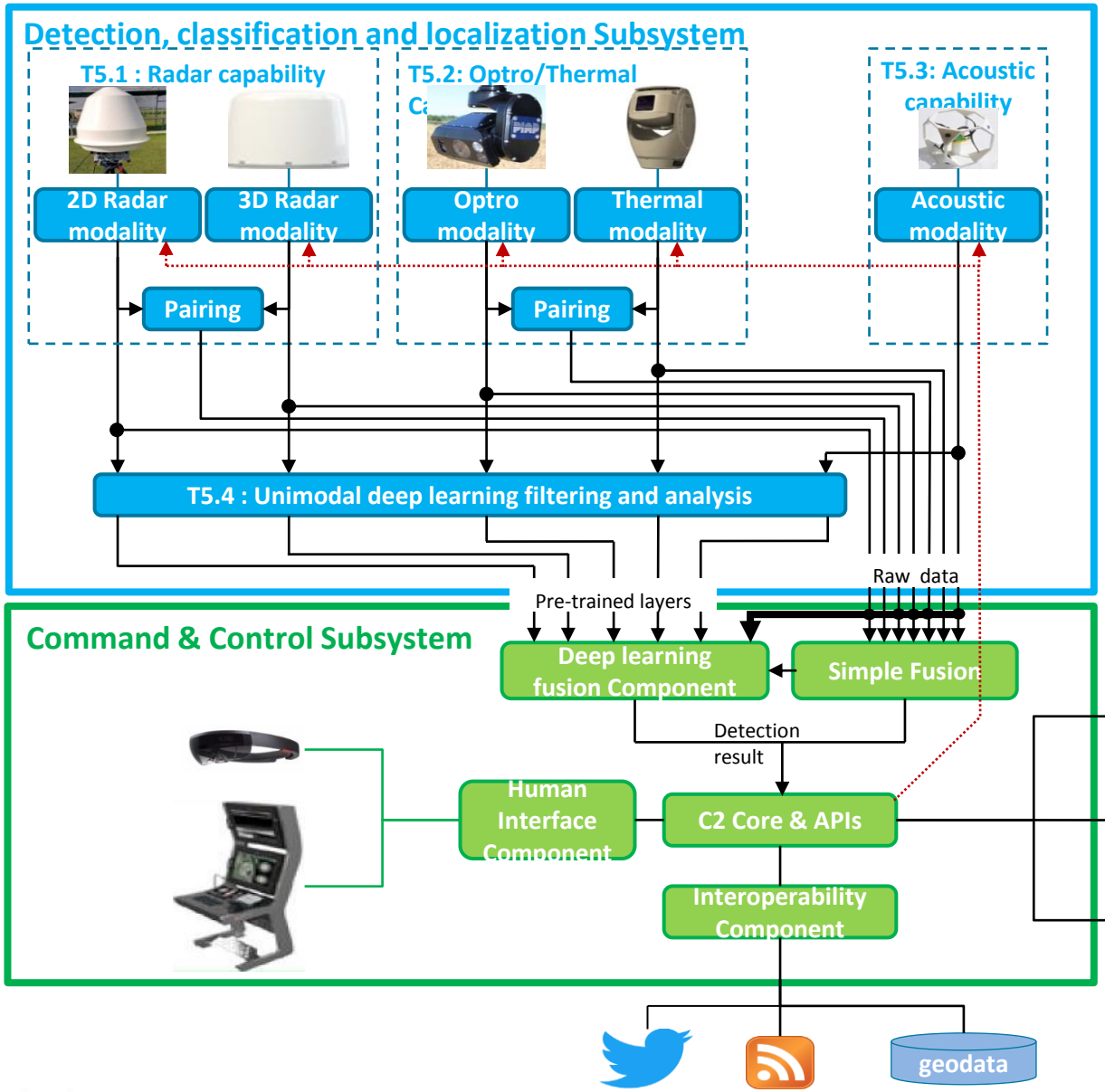
ARCHITECTURE

What is the system about?

PLATFORM / SYSTEM CONCEPT



NOTIONAL ARCHITECTURE

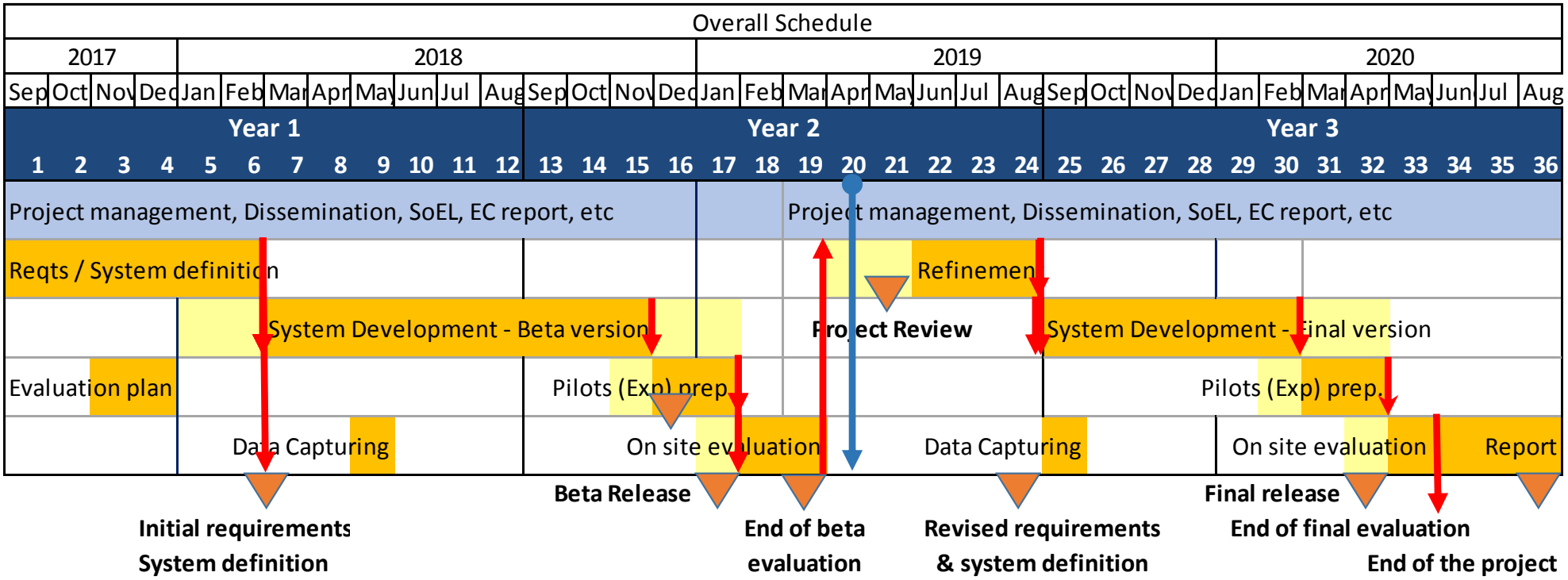


PROGRESS

Where are we?

SCHEDULE – PROGRESS

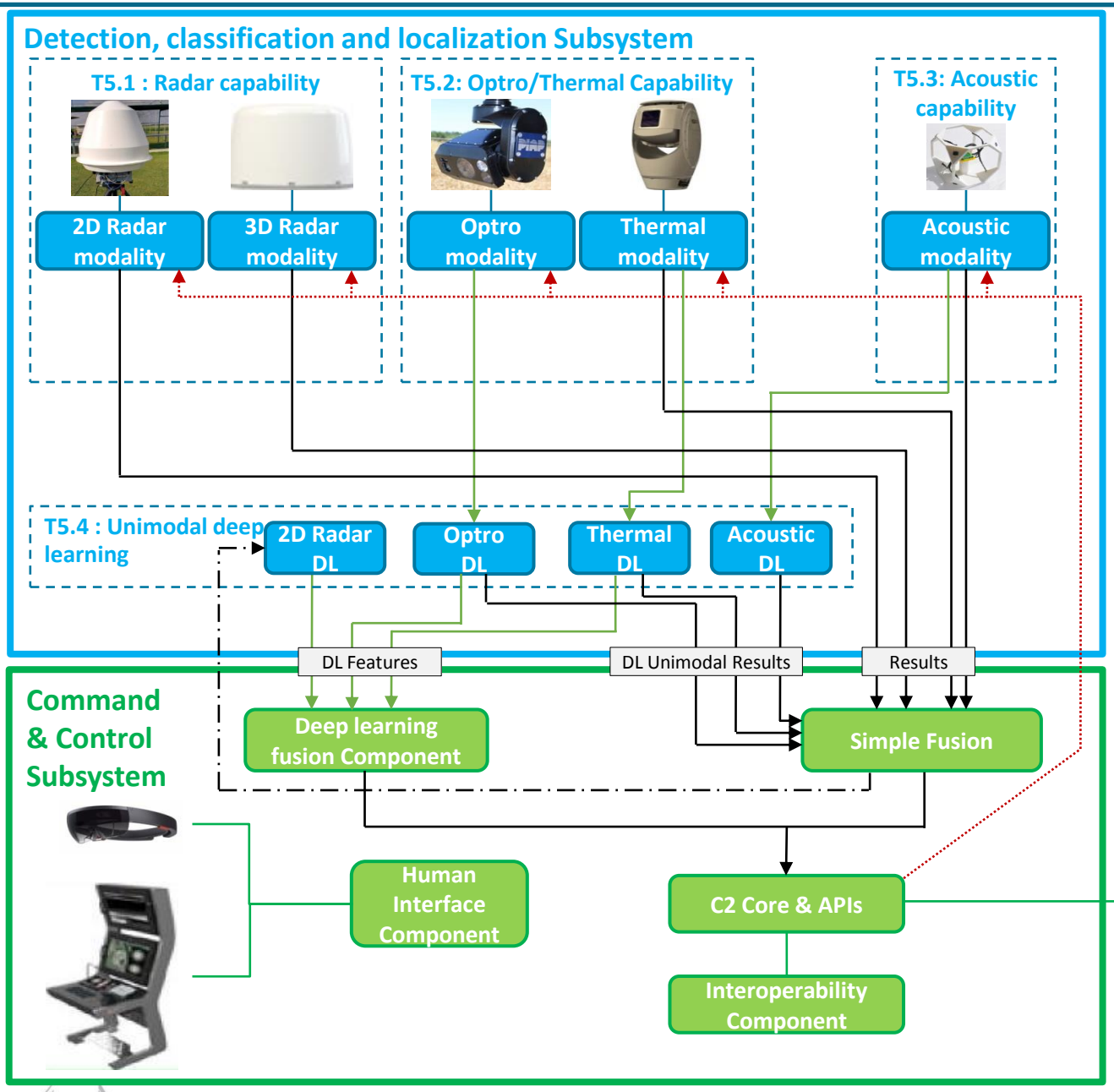
➔ Where we stand



BETA VERSION

Which system under evaluation?

BETA VERSION



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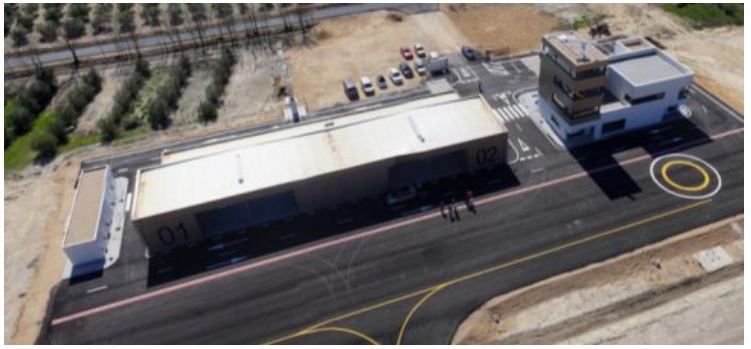
PILOT EXPERIMENTS

How to evaluate the system?

ATLAS Experimental Test Center

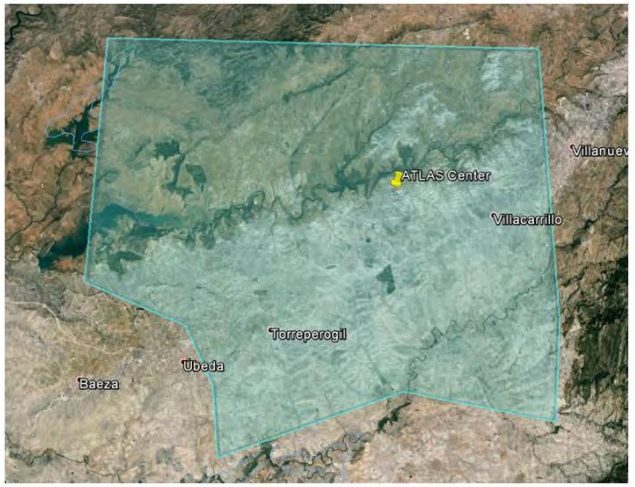
- **Location**
  - Flight test center for drones: www.atlascenter.aero
  - TSA: Temporary Segregated Airspace (30x35km up to 5.000ft AMSL)
    - Be able to perform BVLOS flights under current Spanish regulation
  - Hangars for drone and equipment logistics
  - Offices for workshops, meetings, etc.



ATLAS Experimental Test Center

- Possibility to perform high risk operations with drones due to the activation of the TSA

- Permits for flights at night conditions without lights under exception article of Spanish regulation (article 43)
  - Alignment with future European regulations ➔ definition of a standard scenario based on SORA risk assessment



2019 ALADDIN Demonstration experiments

- Beta version of ALADDIN system

Integration week	
JANUARY 2019	
Monday 21st	Installation & start of tests
Tuesday 22nd	Integration tests
Wednesday 23rd	Integration tests
Thursday 24th	Integration tests
Friday 25th	Integration tests

Experiments & Training week	
FEBRUARY 2019	
Monday 4th	Set up and continuation of integration
Tuesday 5th	LEA training - Experiments
Wednesday 6th	LEA training DEMO DAY preparation
Thursday 7th	DEMO DAY
Friday 8th	Evaluation of ALADDIN Collecting equipment

SCENARIO DEMONSTRATIONS

Pilot scenarios

- **Main situations identified in ALADDIN project**
  - Potential UAV actions
    - Malicious intentions
    - Negligent UAV
    - Accidental situation
  - Discussed scenarios:
    - Secured facility: prisons, nuclear plants, dams, other critical infrastructures.
    - Airports
    - Governmental buildings
    - Temporary public events: concerts, sports events, agricultural shows, VIP speaking event
  - Environments:
    - Rural
    - Urban

Pilot scenarios

- **Evaluation framework**
  - Three main threat scenarios considered:
    - A drone invades the protected area.
    - A drone is flying in the protected area at different conditions (heights, distances, etc.)
    - A swarm of drones is flying in the protected area
    - Night flights

Drones

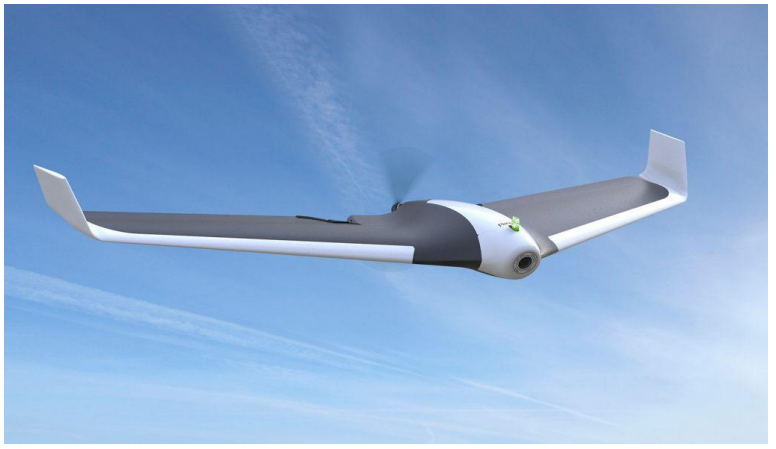
- Two types of drones used as intruder drones
  - Multicopter: different sizes available

Drone	Quantity	Weight (kg)	Size (cm)	Detection
DJI Phantom 3	6	1,3	35	Yes
DJI Phantom 4	1	1,4	35	Yes
DJI Matrice 600	1	15	170	Yes

Drones

- Two types of drones used as intruder drones
  - Fixed wing:

Drone	Quantity	Weight (kg)	Span (cm)	Detection
Parrot Disco	7-8	0,75	115	Yes



Testing on different weather conditions

- Different weather / light conditions have tested during integration phase
  - Foggy conditions
    - Difficulty for detection with the thermal infrared, and also camera tracking
  - Flight at night
    - Intruder drone without lights to give more representativeness
    - Impossible to detect in very dark conditions as in ATLAS with cameras. No effect on radar – good detections.
- Other circumstances which may affect:
  - Temperature, cloudy / clean sky, backlighting effect due to sun position,
  - Trajectories followed by the intruder drone, velocities, etc.

NEXT STEPS

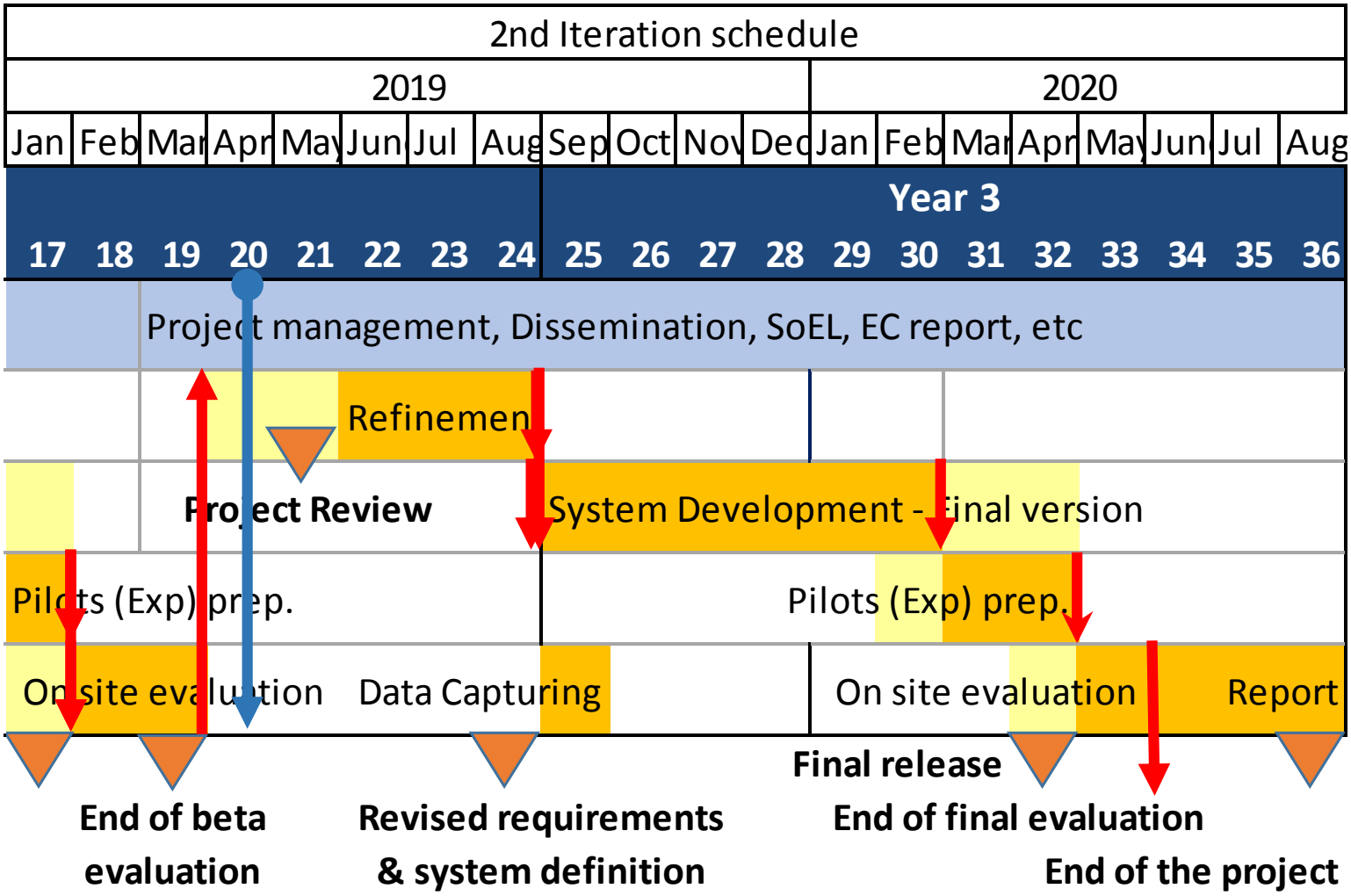
What's next?

END OF REPORTING PERIOD

- Preparation & submission (April) of Periodic Report (18 month)
- Evaluation by European Commission
  - Review with REA and experts - 16 May
- Start of second iteration (March 2019) => Final version (June 2020)
  - Workshop June/July
    - Review requirements, ConOps, Use Cases
    - Review architecture and functional specifications
    - Roadmap for Neutralisation means
  - Data capturing session – mid-Sept in Greece
  - Development of components, Curriculum
  - Integration, test and evaluation + Training
    - May 2020 in Greece
  - Final Report - Aug 2020

SCHEDULE – PROGRESS

➔ The plan till the end



CONCLUSION

ALADDIN - CONCLUSION

- European H2020 Project
- 3 year duration – Sept 2017 => Aug 2020
- Developing a Counter UAV
  - Building on BOREADES system
  - Sensor suite with acoustic capability and deep learning filtering
  - Innovative neutralisation capability
- Experiments in real environments
  - Open field - Urban area
- Enhance Security and provide tools for LEAs & Infrastructure Constructors and Operators
- Open to external users, experts, advisors

END OF PRESENTATION

➔ Any question?

➔ Web site

› https://aladdin2020.eu/

➔ Project coordinator

› Patrick.garnier@diginext.fr

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DIGINEXT be visionary

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Fraunhofer IDMT

PIAP

VUB VRIJE UNIVERSITEIT BRUSSEL

CS

IDS INGEGNERIA DEI SISTEMI

SIRC Sensing and Imaging Research Center

M2 technologies

HGH Infrared Systems

FADA FUNDACIÓN ANDALUZA PARA EL DESARROLLO AEROESPACIAL

KEMEA CENTER FOR SECURITY STUDIES

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