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FruitFlyNet II

Location Aware e-Services
The olive fly case paradigm

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Commercialisation of an Automated Monitoring and Control System against the Olive and Med Fruit Flies in the Mediterranean Regions

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1. Beneficiary:

AUA: Agricultural University of Athens, Department of Agricultural Economy and Rural Development, Informatics Laboratory, 75 Iera Odos, Athens 11855, Hellenic Republic, Attika region, EU.

2. Partnership:

- PP1/UCO: University of Cordoba (Spain, Andalusia, EUMC).
- PP2/UNIMOL: University of Molise (Italy, Lazio, EUMC).
- PP3/LARI: Lebanese Agricultural Research Institute (Lebanon, MPC).
- PP4/IO: Institut de l'Olivier (Sfax, Tunisie, MPC)
- PP5/RCCHAB: Centre Régional des Recherches en Horticulture et Agriculture Biologique (Sousse, Tunisie, MPC)

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Beirut - February 16th, 2023
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Content

1. Problem Overview – Problem to solve
2. IPM Practices – Innovation of LAS (Location Aware System)
3. LAS e-services
   - Classification
   - Digitization
   - e-Monitoring
     - micro-climatic conditions
     - pest identification and count
     - fruit infestation
   - Spraying applications and e-tracing
4. Cost issues
5. Social and environmental benefits
6. Commercialization of LAS

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Problem Overview- Problem to solve

- **Olive fly** (Dacus, *Bactrocera olae*) is one of the most significant entomological problem in olive groves in many countries around the world including almost all Med-basin countries.
- **Factors** affecting significantly the quality and quantity of the olive oil production.
  - **Monitoring** {pest distribution, no of pest captures, phenological stage of fruits, infestation of fruits, local meteorological conditions, etc.}
  - **Control methods** {spraying method (cover, bait, insecticide used), decision making of spraying application: *when*, *where*, and *how* }
- **Up to today's experience**:
  - **Monitoring:** It is usually based on manual methods (conventional traps).
  - **Control methods:**
    - *Bait spraying* is the most appropriate control method because:
      - Large-scale
      - Low cost
      - Small interventions in the environment compared to other spraying methods (e.g., cover spraying).
    - *Decisions* are based on empirical knowledge; there is no scientific intuition.

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Problem Overview - Problem to solve

Female adult dacus pest

Dacus attracts in olives

Dacus is the most significant entomological problem in olive trees. The control approaches used have major effects in the quality and quantity of the olive oil production in the Med Basin countries.

Adult larval olive fly

Dionysios Perdikis (AUA), New concepts for *Bactrocera* (= *Dacus*) *Oleae*, 1st Workshop, *FruitFlyNet-ii* project/ENICBCMED, 3.11.2020

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Problem Overview - Problem to solve

Conventional Methods

Not accurate	• Empirical approaches almost everywhere • Subjective assessments almost everywhere • Absence of guidance during spraying applications
Costly	• Labor and travel costs • Pesticide formulation costs • Insect monitoring costs
Effect the environment and the public health	• Non-compliance with safety distances in many cases • Out of target sprays in many cases • Non-compliance with environmental and safety conditions set in most cases
Influence the quality and quantity	• Residuals • Decrease in efficacy
Hard to evaluate	• Recording is limited • No tracking facilities of activities and conditions

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IPM Practices – LAS innovation

Develop and implement an automated e-monitoring and control system (*LAS: Location Aware System*) against the olive fly (dacus) able to provide best IPM practices (compared to the conventional methods) in order to:

1. Increase the efficiency
2. Reduce the overall cost
3. Increase the environmental protection, public health, residential areas
4. Trace the spraying application
5. Record the historical intervention activities

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LAS e-Services: Classification

The *FruitFlyNet-ii* e-services can be classified into the following six groups:

a. Group 1: User profile management and information.
b. Group 2: Area digitization and geospatial data collection.
c. Group 3: e-monitor micro-climatic parameters.
d. Group 4: e-monitor pest population dynamics
    - Pest identification of the trapped insects and counting.
    - Olive fruits infestation
e. Group 5: Decision module and production of infestation scaled spraying maps
f. Group 6: Provision of spraying e-guidance and tracing.

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LAS e- Services: Classification

	Packages				
E-services	**Basic**	**Standard**	**Balanced**	**Advanced**	**Premium**
Field digitization	Manual	Assisted	Assisted	Automated and Assisted	Semi-Automated
Micro-climate monitoring	Limited	Meteorological stations	Meteorological stations	WiFi/3G/4G	WiFi/3G/4G
Pest Monitoring	Assisted	Assisted	Assisted and Semi-automated	Automated	Semi-Automated
Infestation Risk	Assisted	Assisted	Automated risk and map creation	Automated risk and map creation	Semi-automated risk and map creation
Spraying Process	Tracking	Tracking and Guidance	Tracking and Guidance, Traceability	Tracking and Guidance, Traceability	Tracking and Guidance, Traceability

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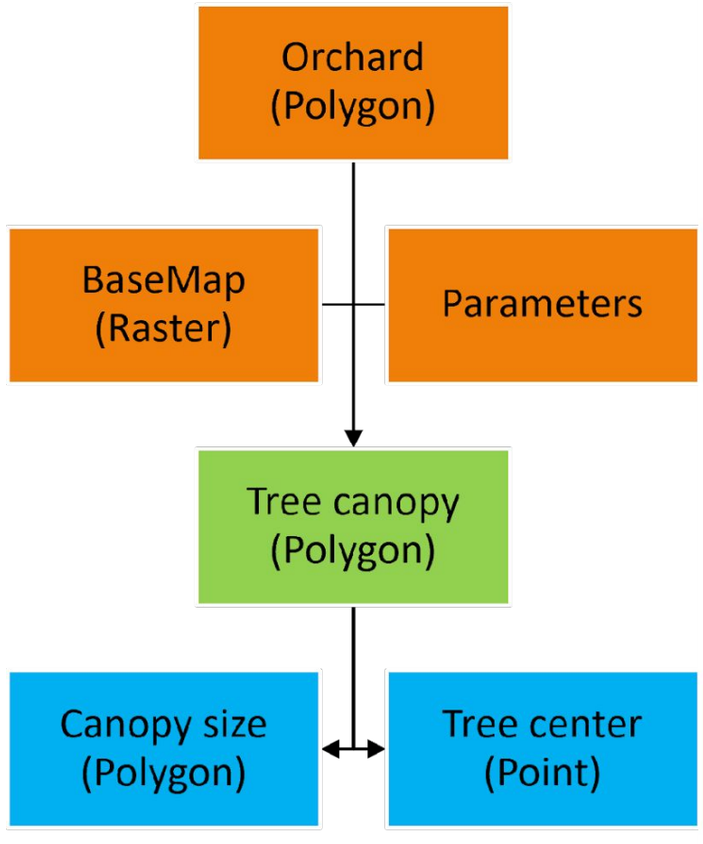
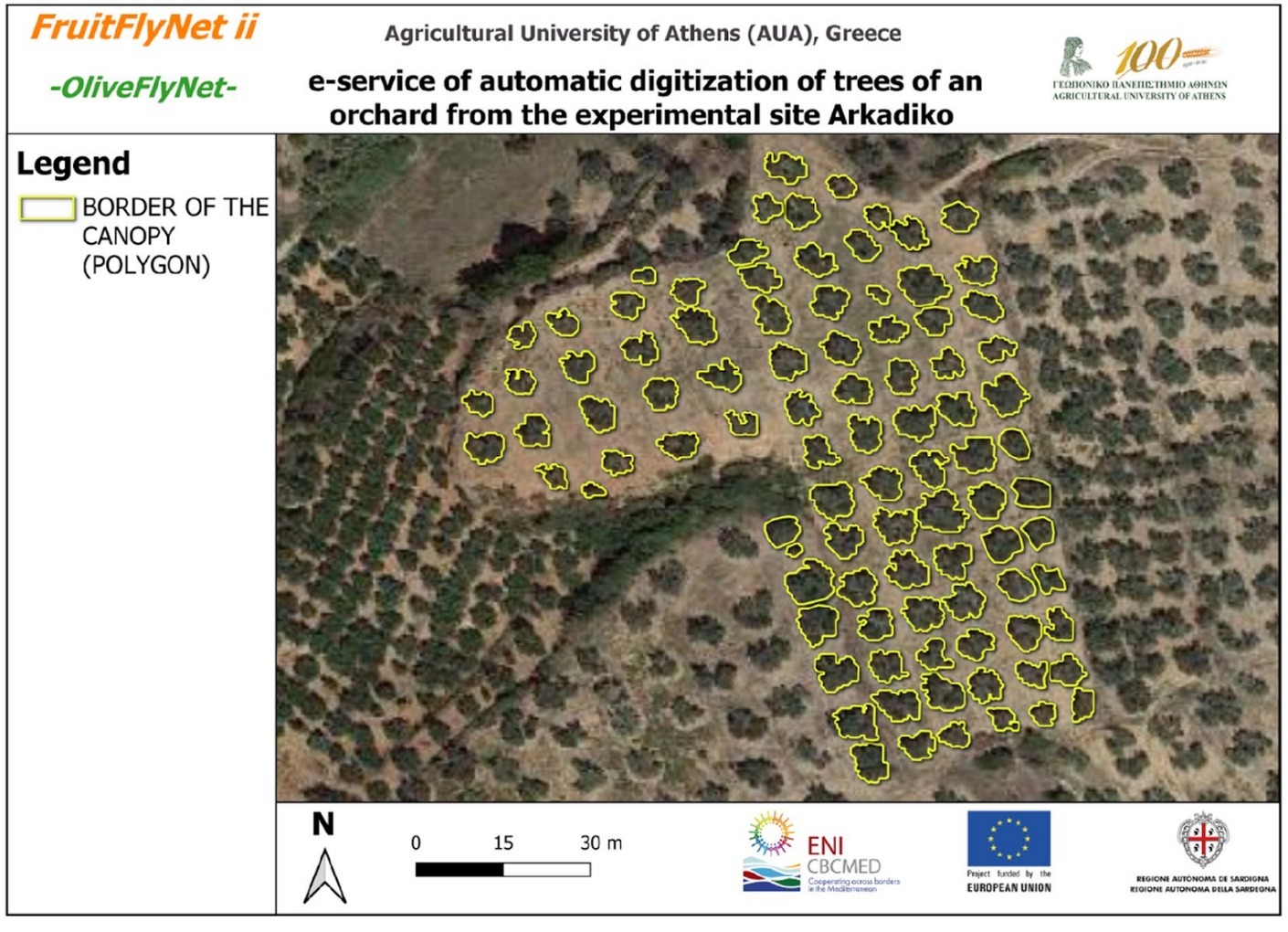
LAS e- Services: Digitization

2. Field digitization and geospatial data collection





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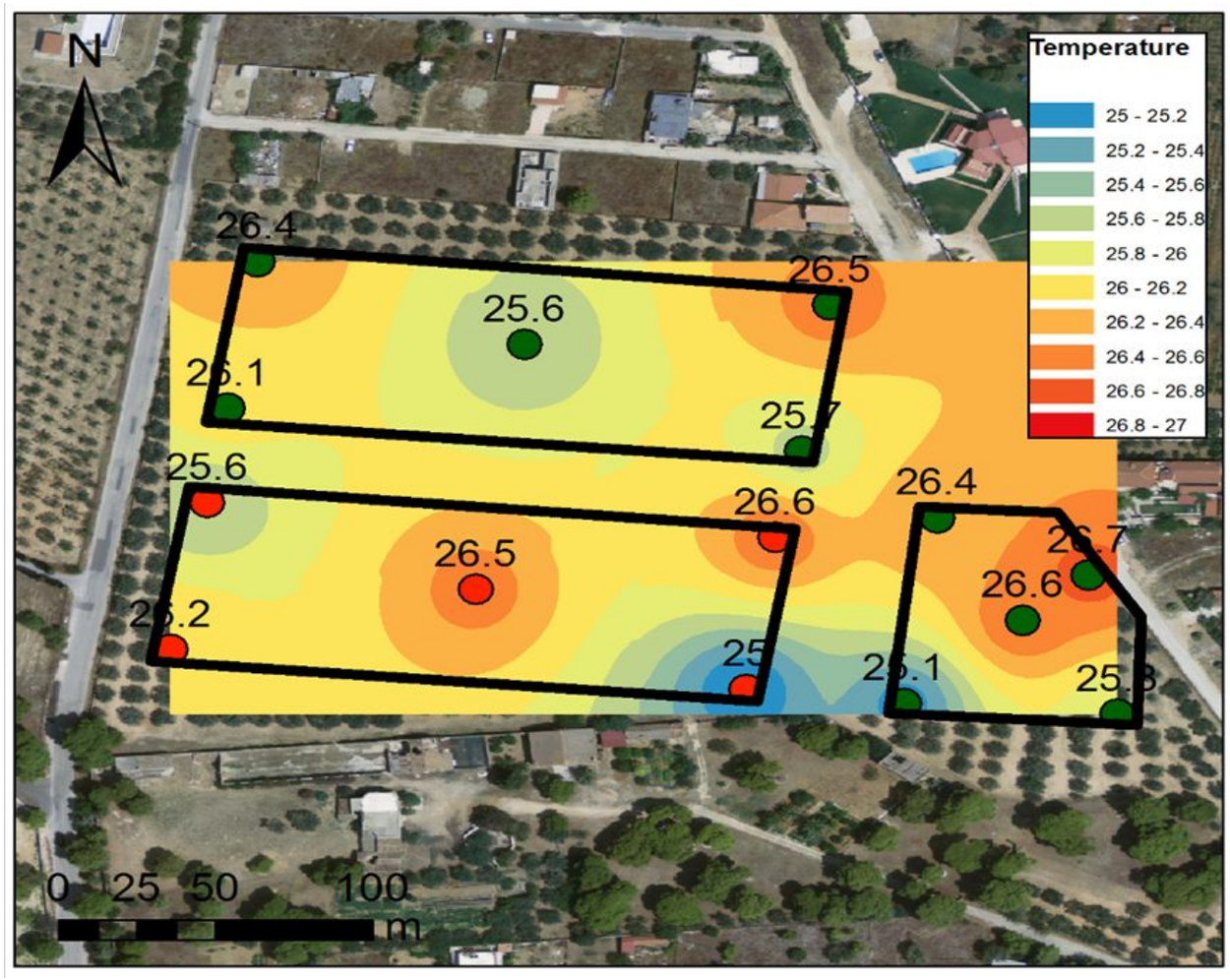
LAS e- Services: e-Monitoring

3. Group 3: e-monitor the micro-climatic parameters

- e-services for:
  - gathering the meteo-data from:
    - ✓ Sensors (temperature, relative humidity, wind speed, etc.).
    - ✓ Meteo-stations.
- store the values of the meteorological parameters to:
  - the server.
  - the cloud.
  - feed a specific DSS of the LAS to perform a particular task.
- Example: Some tasks may:
  - cancel a spray application due the high temperatures.
  - create micro-climate maps, using interpolation.



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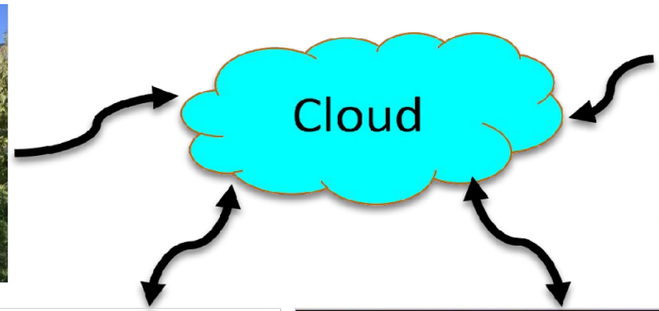
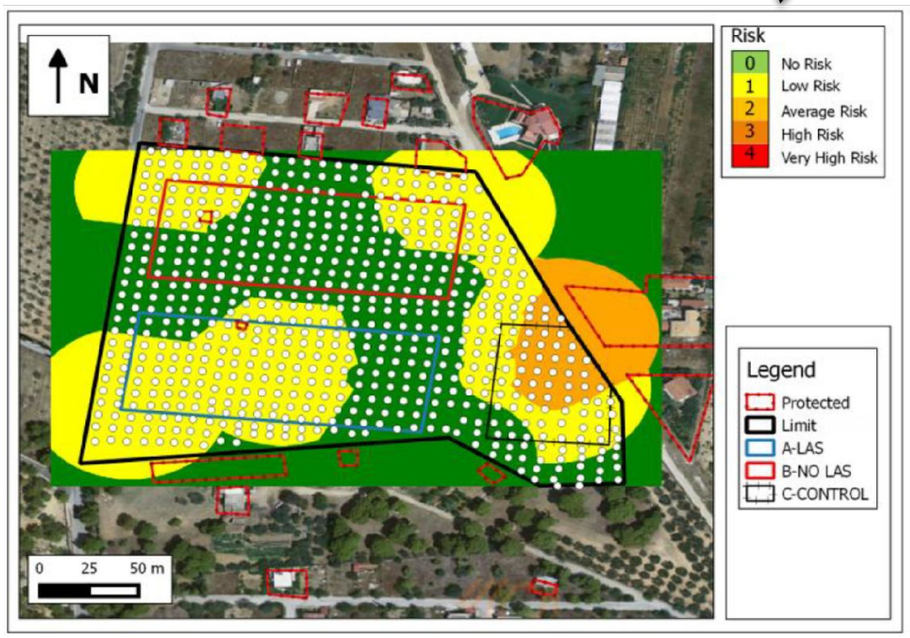
LAS e- Services: e-Monitoring

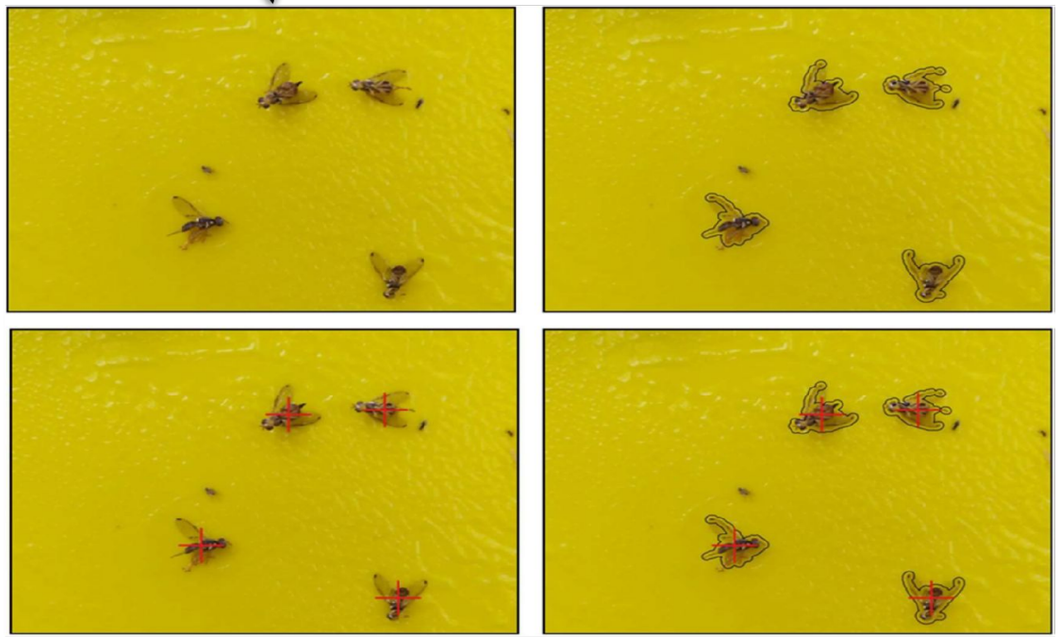
4. Group4: e-monitor pests' population dynamics
   - Pest identification of the trapped insects and counting.

Scaled spraying map creation



Dacus identification and counting





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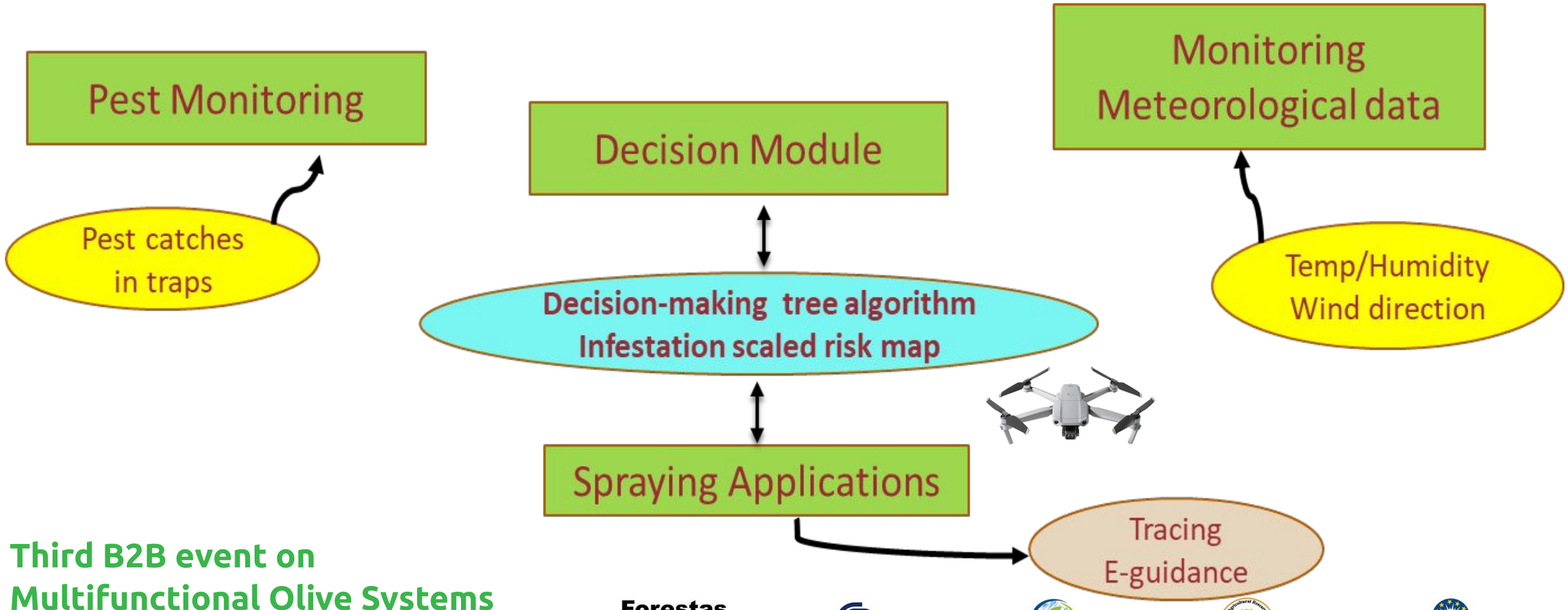
LAS e- Services: Spraying applications and e-tracing

4. Group 4-5: DSS spraying module
   - A decision support module is based on a decision-making algorithm which provides critical parameters affecting the bait spraying applications
     - Decision tree algorithm (*when*, *where* and *how* to spray)
     - The infestation-scaled spraying map (*where* to spray with *what* spraying intensity)



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Commercialization of LAS - Innovation cost

OliveFlyNet LAS e-services

1. Business Plan and Strategic analysis
   - Estimate the LAS parametric cost
     - ✔ Equipment
     - ✔ e-trap network establishment
     - ✔ E- services provided
     - ✔ Operational
     - ✔ Maintenance
   - Estimate the improved LAS parametric cost
     - ✔ e-trap improvement
     - ✔ additional e-services asked by stakeholders

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Commercialization of LAS - Innovation cost

OliveFlyNet LAS e-services

1. Business Plan and Strategic analysis
   - Estimate the LAS parametric cost
   - Estimate the improved LAS parametric cost
   - Technological driven improvements to reduce cost and increase autonomy of LAS in all levels
     - FFN-ii project research teams
     - Living Labs to combine and integrate solutions
       - ✔ Research teams,
       - ✔ Specialized companies
   - Market analysis - How does the LAS will be introduced in the Agri-market?
     - ✔ Web-based application development
     - ✔ Online subscription services

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Commercialization of LAS - Who will be benefit

OliveFlyNet Location Aware e-services

2. Spin0ffs creation
   - Development of a network of producers deserving the LAS implementation
   - Presentations and demonstrations of LAS e-services to
     - ✔ producers, groups of producers, cooperatives.
     - ✔ Olive and olive oil companies,
     - ✔ SFBs, specialized SMEs, pesticides companies,
     - ✔ IPM industry.
   - Searching for financial instruments and/or investors
   - Forecasting revenues and/or the forecasting savings from this innovation
   - Prepare legal documents for the spinoff creation

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Thank you for following !!

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