



**Integrated Coastal Zone Management via
Increased Situational Awareness through
Innovations on Unmanned Aircraft Systems**



In the European Interreg 2Seas 3i - project England, France, and The Netherlands combine research efforts to stimulate the use and public acceptability of unmanned aerial vehicles for maritime security and safety applications. The 3i-project will promote cross-border cooperation issues and implement joint actions on issues of common interest throughout the 2Seas area, and in particular those with a maritime dimension. The partners, the objectives and the funding is fully set out in our website which is available at: www.2seas-uav.com.

Compliance with end user requirements

The prototype UAV will be used for some operational scenarios, which maritime security and safety project partners believe could demonstrate the benefits of this technology. These scenarios so far identified fall into three categories: ‘Incident response’; ‘Preventative patrolling places of interest’ and ‘Critical infrastructure’ (see table) . The project is also to discuss and refine scenarios and to talk through the many other operational issues, such as command and control and data sharing, which would affect the use of such technology.

<u>Incident response.</u>	<u>Preventative patrolling places of interest.</u>	<u>Critical infrastructure.</u>
Where an incident has taken place and an organisations needs to collect data from the scene in a timely way. This concerns responding to incidents. Examples could include a collision at sea or in a harbour; a fire, explosion or chemical spillage at sea or on the coast; or a sinking vessel, person lost at sea or some other incident where life is at risk.	Where there are regularly problems or issues but no specific incident to respond to. This is preventative patrolling. For example effective supervision of the shipping in their anchorages offshore; dangerous navigation and anti-social behaviour in coastal waters; pollution through the use of inappropriate fuel or through discharging waste at sea; the supervision of protected fisheries, the sites of wrecks or other historic sites at sea or on the coast.	The final category concerns oversight of areas where there aren't regular problems but where trespass or other incidents would constitute a serious criminal offence or significant threat, for example object like lost containers or unexpected people trespassing on sites of Critical National Infrastructure at sea (wind farms) or on the coast (power stations, oil refineries or storage facilities) or the unexpected movements of small craft across frontiers (to smuggle commodities or people.)

Compliance with Security policies

The project partners will comply with general rules of data protection, human rights compliance and flight security. In general the 3i UAV will not collect images indiscriminately during the demo flights.

Some other security principles are:

1. an operator from the police force or harbour authority determines where the camera is pointing and what images will be recorded, similar to the current practise with manned surveillance aircraft operated by the police or security organisations
2. the 3i UAV operates in a predefined sector of the airspace and it will not depart from this airspace without approval from the police operator
3. There is no aim towards privacy sensitive images such as facial recognition. Next the image quality of the 3i UAV is not comparable to the high quality images of the expensive and large military UAV's . The aim of the 3i UAV is to provide a cost effective -increased situational awareness- and to provide a ‘man on the scene’.
4. To improve the design there will be studies done on artificial vision technology , like;
 - a. automated triggers and filters in the vision software that can filter images before they are recorded. So that any privacy sensitive images that are not of interest to the mission can be filtered out. The triggers can also be used to start recording only when an anomaly has been detected, e.g. a fire or an oil spill on the surface of the water.
 - b. on board processing of collected images to extract the useful features from an observed scene and send these over the limited bandwidth available for video transmission. An example would be to transmit only the number of vessels, their colour, size, and registration numbers, instead of transmitting an actual video .

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5. for the planned demonstrations of the 3i UAV, we will use dummy objects(e.g. vessels) in the scenario, or objects that have been informed of the demonstration and who are cooperating voluntarily. There will be no indiscriminate observation of random targets.
6. There will be set up procedures for Information Risk Management, like;
 - a. Selection of captured video/images that must be destroyed or must be made invisible.
 - b. Select the situations when to transmit Video/images on a secured and encrypted connection.
 - c. Provisions that video or image data still on board of the UAV will be automatically deleted in the event of a loss of the UAV due to technical malfunction.
 - d. Redundant location points in the demo area, to check the proper working of the GPS control
7. safety will be ensured on several levels. For the demonstrations the 3i UAV will operate in a designated airspace that is closed to all other traffic. The location of all other air traffic is available from the ADS-B transponder system, so infringement of the closed airspace can immediately be detected. The 3i UAV will incorporate send and avoid technology, which will automatically let the UAV make an evading manoeuvre to prevent collisions
8. airworthiness and reliability will be ensured by a robust design method that is aimed towards certification of the UAV. This includes an extensive analyses of all possible failure cases.
9. the 3i UAV is a technology demonstrator aimed to stimulate innovation, cooperation and UAV safety in Europe

Compliance with modern engineering

The 3i project is combining technical capabilities of various partners. Some design principles are:

1. Focus around the use of rapid prototyping of airframes in order to;
 - a. Reduce overall purchase costs of platforms
 - b. Allow rapid development of research platforms
 - c. Allow variants and modifications to be quickly and easily be incorporated.
2. Focus around the use of standard and open-source software for programming of the autopilot in order to allow future projects to build on the 3i results
3. Focus around operator friendly control of the UAV, this includes intuitive control, man –machine interface with touch screens and ergonomic interior of the mobile ground station.
4. Fair competition during purchasing of sub-assemblies and stimulate the use of new technologies.
5. Work in an open-innovation network with use of input of existing businesses and project observers.

Compliance with National and European policies

All results and outcomes of the project activities will be “open source” information and will be shared amongst the project partners, project observers and other EU members. Dissemination will be done via several papers, project website, partner websites, open meetings etc. The recommendations and conclusions of the 3i-project will be sustained in several new joint initiatives. The 3i project will accelerate the research and knowledge on unmanned aircrafts in Europe and contributes to the Lisbon and Gothenburg agenda. The project contributes to many local, regional, national and European policies and strategies, with the citizens of the 2 Seas member states as final beneficiaries.

