

UGELAS

Publishable Executive Summary

Unattended Ground Sensor Networks for Large Area Surveillance

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1 Introduction

This document summaries the activities and results of the project UGELAS (Unattended Ground Sensors for Large Area Surveillance) carried out by the consortium Sagem, FOI, ITTI. This study was commissioned by the European Defence Agency under the contract 11.R&T.OP.83.

2 Objectives

The objectives of the project are as follows:

WP1: Technical Input to Capability Analysis: It consists in a technico-operational analysis of UGSN (Unattended Ground Sensor Network) requirements. Benefits and limitations of UGSN are assessed, regarding traditional surveillance means as patrols or checkpoint.

WP2: Survey of the enabling technologies: It consists in a technological approach of the main technologies that could be useful to build a UGSN.

WP3: State of the art of UGSN: Database including the main characteristics of the components of the systems, benchmark of the existing systems to determinate the most interesting components and determination of a technology road-map at the 10-15 years horizon.

WP4: Design of Preliminary System Architecture: Proposition at short term (2 years) of a system architecture that could be realized with existing components.

3 Project organization

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4 Project Results

WP1 “Technical Input to Capability Analysis”: A technico-operational analysis is conducted, identifying use cases for unattended ground sensors system in two scenarios: Camp protection and large area surveillance. Each use case is characterised (its context, surrounding conditions, occurring events...) and expected UGSN functionalities and constraints are identified

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A sensor versus threat analysis is provided.

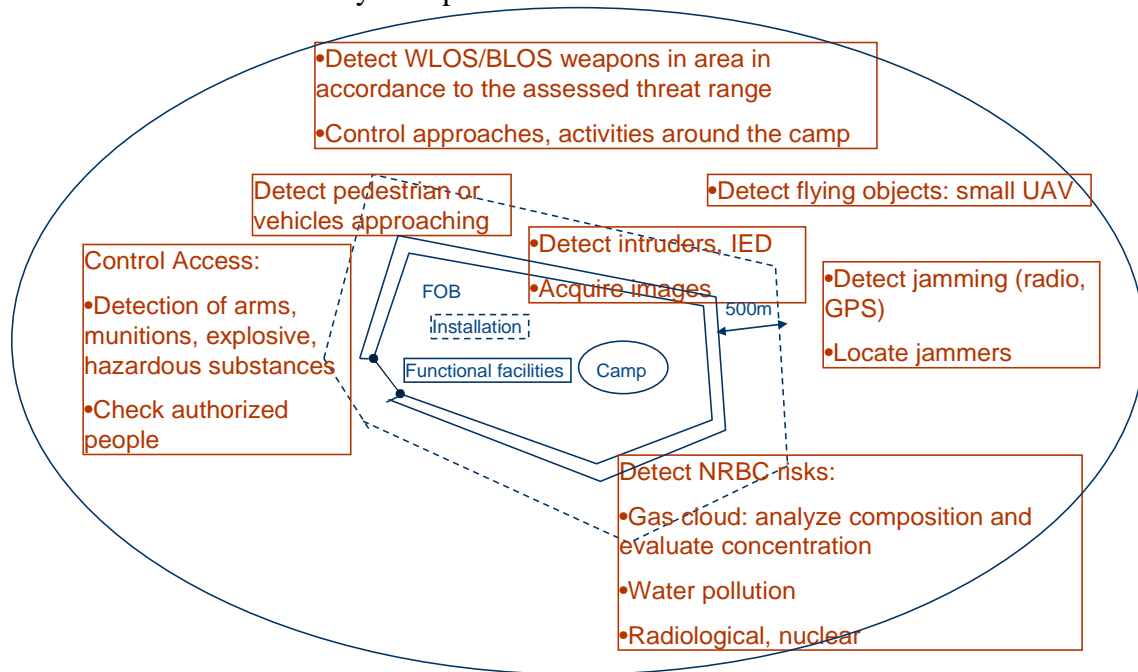


Figure 1: UGSN use cases in Camp protection scenario.

A SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis compares benefits and limitations of traditional surveillance means as patrols or checkpoint relatively to a UGSN.

WP2 “Survey of enabling technologies” identifies the main technologies involved in UGSN conception and proposes a first analysis of potential solutions, their maturity, advantages and disadvantages.

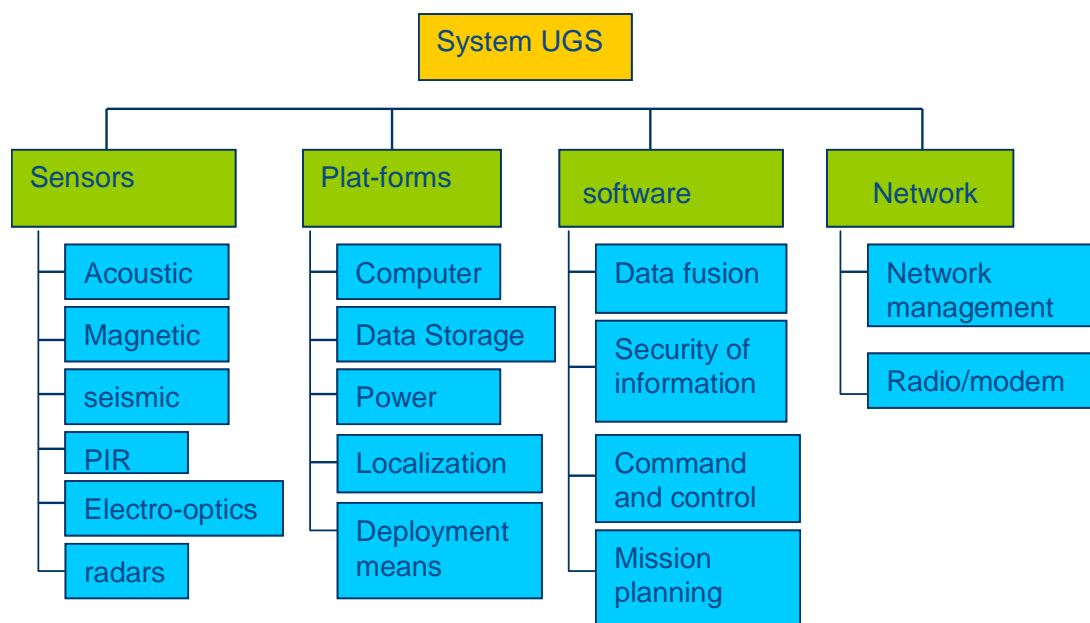


Figure 2: Enabling technologies

WP3 “state of the art of UGSN” has provided three outputs:

- A database of existing UGSN systems and potential UGSN components

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- A list of benchmarking criteria, which can be used to assess UGSN performance.
- Technical roadmaps for each main domain involved in UGSN and associated system roadmap.

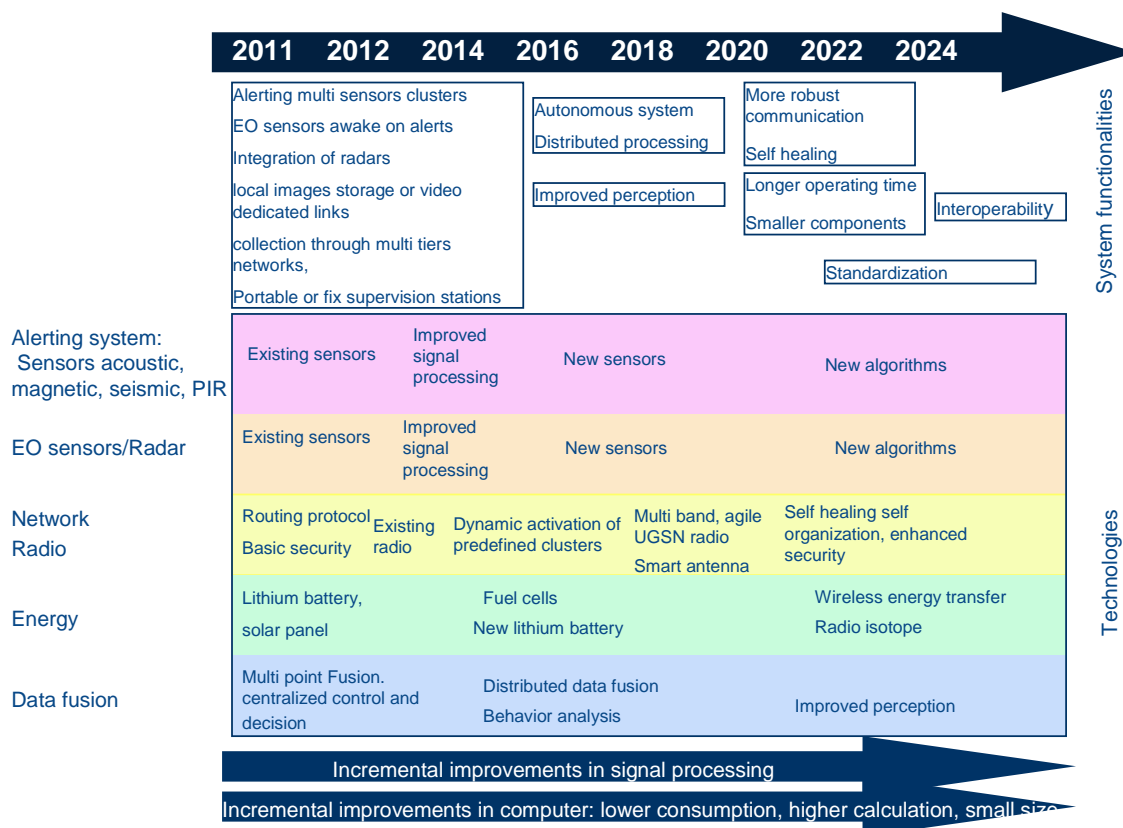


Figure 3: UGSN system roadmap (15 years)

WP4 “Design of preliminary architecture system architecture” proposes a UGSN architecture for a two years demonstration, using existing military or commercial off-the-shelf products.

The architecture is proposed for a large surveillance area scenario.

A profile of main components and an example of deployment are described in the report.

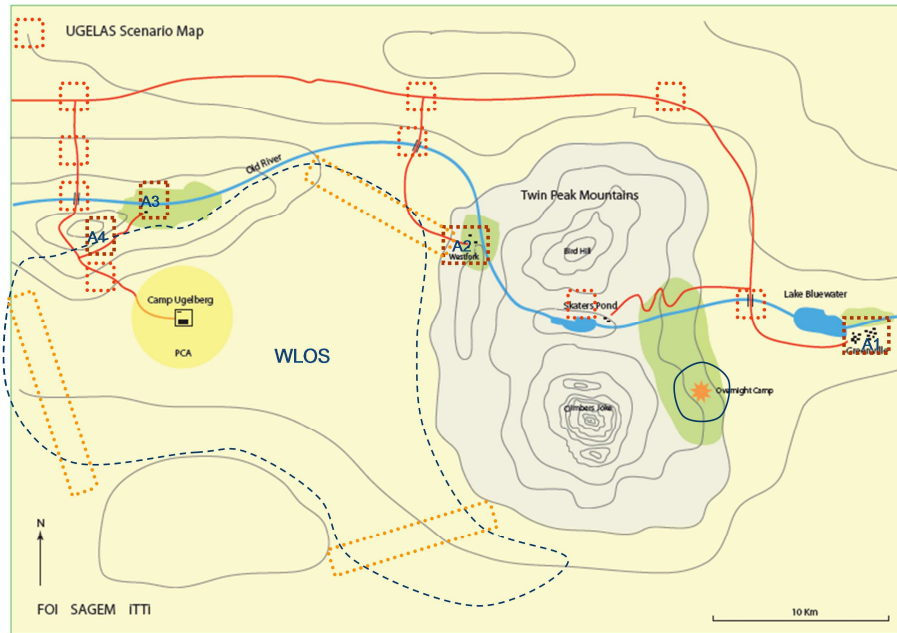


Figure 4 - Terrain analysis: positions of elementary areas to be monitored

5 Main Conclusions

Main conclusions of the study are:

- Interest and feasibility of Unattended Ground Sensor Networks in case of Large Area Surveillance have been verified.
- Roadmaps concerning UGSN systems and dedicated roadmaps concerning technologies have been established
- Concrete definition of a system for demonstration in two years term has been proposed.

Technologies inventory shows that:

- A large quantity of sensors is existing on the market. A few systems are in use.
- Limitations of the sensors consist in their size, autonomy (energy consumption).
- Limitations of the networks consist in the radio systems (frequencies, bandwidth, data rate, power) and the progress to be done in routing mechanics.
- Great improvement is expected from data fusion techniques.