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WINSOC

Wireless Sensor Networks with Self-Organisation Capabilities
for Critical and Emergency Applications

QUARTERLY MANAGEMENT REPORT
Q 2.2

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Abstract: This document describes the results achieved and the evolution of the project during the second Quarter of the second Year of activity of WINSOC project.

Key words: winsoc, quarterly management report, QMR2.2

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1 PROJECT OBJECTIVES AND MAJOR ACHIEVEMENTS DURING THE REPORTING PERIOD

1.1 Objectives during the reporting period

1.1.1 Deliverables

During the reporting period the following deliverables were to be produced:

- D4.1.3 Node Level Simulator (T0+16)
- D4.4 System level network performance evaluation (T0 + 18)
- D7.1 Dissemination and exploitation: intermediate report (T0 + 18)
- D8.1 Validation and impact assessment: intermediate report (T0 + 18)

Report D4.1.3 “Node Level Simulator” has been delivered to the commission

As it regard the document *D4.4 System level network performance evaluation* (M 18), during the PCC4- Review Meeting In Rome, (cfr. MoM 22-23 January 2008) it was agreed among partners presents, to extend the delivery up to 4 additional months, from T0+18 to T0+22 in succession to the deliverables D4.1.x

Document D7.1 and D8.1 are in preparation, they will be submitted to the Commission at the end of this month.

2 WORKPACKAGE PROGRESS OF THE PERIOD

In the following paragraphs, a table is given for each WP, in which all the tasks assigned to the WP for the reporting period are listed. For each task, information on status, (re-)planning, risks and mitigation actions, or other major issues is provided. The acronym of the WP leader is underlined in the paragraph title.

2.1 WP2 (SCOM, INFO, CCSS, ICOM, AMI, ANTRIX)

No activities have been carried out on this WP, because it is terminated since 31-8-2007. All the Deliverables foreseen was provided to the Commission.

2.2 WP3 (SCOM, INFO, EPFL, UPC, CEAL, AMI, ANTRIX)

INFO

In this quarter, INFO has leaded the edition of D3.2 – Final Report on Algorithms Development.

In particular INFO has developed an algorithm with the capability to achieve consensus on a common parameter with a bounded noise variance in the steady state. The algorithm is based on the convergence of the involved nodes the states values. Achieving consensus with a bonded noise variance allows for a less sensitivity of the final estimate to the system parameter such as transmit power and convergence speed, whose optimal choice would involve the knowledge of topology parameters, such as the algebraic connectivity, that may not be known to the nodes in a practical implementation, since they depend on the geometry of the whole network and on the radio channels coefficients between any pair of nodes in the network.

Additionally, INFO has proposed an algorithm able to performed the decentralized spatial smoothing of an observed field. The algorithm is based on the design of the coupling coefficients among nearby nodes as the solution of the problem of minimizing the distance between the observed field and a polynomial with a given degree. In other words, the high dimensionality of the observed field, arising from the noisy nature of the measurements, is reduced to a prescribed dimensionality, given by the degree of the polynomial, that has to be chosen suitably to the physical nature of the observed phenomenon. The goodness of the resulting field can be improved by adding a “fidelity constraint” to the original observations in the update equations of the proposed algorithms.

SCOM has worked on the definition of the sensor node prototype specifications, which will be presented in the deliverable document D4.5. For this aim, **SCOM** has defined in details the contributions that other partners have to provide, according to the tasks already accomplished during the previous work packages, as well as in the first part of the WP4 itself.

The definition of the specifications has dealt both with the hardware and with the software (firmware) that will represent the node prototype.

The hardware specifications basically concerned:

- the definition of the components to use (i.e. the single chip radio transceiver, the micro controller, the size of the flash memory, the type of the batteries and others), with the focus to minimize their number and their size in order to respect one of the principle of the current project, that is the simplicity and low cost of the equipment,
- the analysis (together with CEAL) of the antenna and antenna front-end aspects,
- the environmental requirements that the sensor node prototype shall satisfy (temperature, humidity, electromagnetic emissions, safety and human health, and others),
- the metallic case that contains the node itself, together with the interfaces that it presents outwards.

The software specifications dealt with the definition of a finite state machine that was as lighter as possible, identifying the macro states that characterize the life cycles of the node (initial phase just after the deployment and steady phase corresponding to the “normal” behavior where the node transmits its internal state, receives the states of its one hop neighbors and updates its internal state to reach the consensus).

The basic software objects (timers, data formats, serial lines, buffers, and others) have been introduced.

SCOM has closely cooperated with **ICOM** to the mutual exchange of information for the development of the sensor node simulator (under charge of **ICOM**) in order to define a simulator that was as closer as possible to the wanted real node prototype and to reduce as much as possible the time and effort of the tests and validations on the node prototype. The results of the simulations are expected to provide detailed specifications on the sensor node prototype.

UPC

During this period UPC has contributed to deliverable D3.2 which was submitted on January 2008. UPC novel contribution to this deliverable includes the study of the convergence in the mean square sense for asymmetric links and the impact of quantization noise in the convergence. The results on the impact of quantization noise in the convergence of the consensus algorithms have been submitted to SPAWC’08 (see WP7)

Additionally, UPC has started a new research activity that deals with network topology design. So far, we have been reviewing existing literature on this topic. We aim at proposing novel algorithms useful for the design of the topology in the hierarchical structure of the WINSOC wireless sensor network.

AMRITA mainly concentrated on submitting the final document for the algorithm development, and also in simulating the algorithms developed as part of the WINSOC project.

The simulation of two algorithms “Energy Efficient and Fault-Tolerant Clustering Approaches in Wireless Sensor Network for Landslide Area Monitoring”, and “Threshold Based Data Aggregation Algorithm to Detect Rainfall Induced Landslides” are progressing. The simulation of “Threshold Based Data Aggregation Algorithm to Detect Rainfall Induced Landslides” tries to estimate the effect of sensor column density in data packet loss and on deciding the optimal arrival rate. These decisions may be utilized later in the laboratory set up to find the effect of sensor column density on landslide prediction.

The wireless sensor network deployed by **AMRITA** at Anthoniar Colony, Munnar is used for studying the delay in data propagation and data packet loss with respect to changing environmental considerations. The results can later be used for enhancing the algorithm developed for the hierarchical network.

Task	Status	Planned Date	Notes
D3.2	achieved		
	In progress	M15	EPFL: Development of nonlinear consensus algorithms

2.3 WP4 (SCOM, DUNE, INFO, EPFL, UPC, ICOM, CEAL)

DUNE

For WP4.1, DUNE took care of the writing and of the editorial management of D4.3 (authors: DUNE, INTRACOM) about the information extraction methodologies. The deliverable included both state-of-the-art solutions and new approaches, specifically tailored for WINSOC top-down network design. In parallel, the writing of the D4.1.3 (node level simulator) has been nearly completed, including both the already presented time-domain node design and the recently introduced frequency domain node design, both based on consensus on states.

DUNE also completed the in-depth analysis on the node and network behaviour employing the top-down design of nodes based on consensus on states, highlighting some drawbacks of the proposed methodology, especially due to the clock drifts among the nodes population, leading to an unrecoverable departure of the convergence value, increasing with time. To face this problem, a modification based on the introduction of a reference time has been introduced, and the recovery of the correct behaviour has been demonstrated by simulations. This however implies a noteworthy increase in node complexity. Another weak point of the time domain design was discovered in the scalability: the resilience against the propagation delay was insured by a proper design of the radio pulse shape, but this doesn't scale with the network size. In the same frame of activities, DUNE introduced a different paradigm of the top-down node design, based on the consensus on states operated in the frequency domain. The new design poses very loose requirements on the transmitted waveforms and perfectly scales with the network size. It has been implemented in the ad hoc developed network simulator, showing an intrinsic resilience against lack of synchronisation, multipath and clock drifts. Both designs, along with relevant results at network level, have been included in D4.1.3.

UPC

During this period UPC has successfully programmed the consensus algorithms in the Castalia simulator, an open source code Wireless Sensor Network (WSN) simulator. The first results have already been obtained and will be presented in next PCC meeting. This work includes not only the programming of the consensus algorithms, but also the study of the MAC layer of the nodes.

CEA is starting to consider antennas, FE electronic constraints and CC1100 parameters for their application in the project.

ICOM has conducted research on the information extraction problem for wireless sensor networks designed with the protocol-based approach. Several aspects of the design of a sensory system have been analyzed in depth from the perspective of the information extraction problem:

- Investigation of the effects of the sensing tasks on the in-network traffic.
- Survey over the various approaches for the data-delivery models (event-driven, continuous, query-driven, hybrid).
- Investigation of the efficient combination of data-delivery and communication models.
- Investigation through simulation of the effects of sink(s) placement in the field of deployment.

Finally, several performance metrics and criteria were defined for the evaluation of the efficacy of a given information extraction scheme.

ICOM has contributed to deliverable D4.3 "Report on the information extraction methodologies" describing the above work.

EPFL works on UWB solutions for consensus algorithm implementation

Task	Status	Planned Date	Notes
D4.3	Delivered	01/11/2007	Delay agreed in the 22/01/08 PCC meeting in Rome, due to a not foreseeable momentary manpower decrease (withdrawal of personnel in charge of the work) and the concentration the available manpower to new solutions against some drawbacks found in the previous implementations in WP4.
D4.1.3	Completed, under revision	01/01/08	Same motivation given above for the D4.3. At the time of writing this QMR, the D4.1.3 has been officially delivered.
D4.4	In progress		Delay agreed in the 22/01/08 PCC meeting in Rome, as it was decided that this deliverable will include the results and performance evaluation of the system and network level simulators due on month 20.
	In progress	M20	EPFL: Work on UWB solutions for consensus algorithm implementation

2.4 WP5 (SCOM, INFO, EPFL, ICOM, CEAL)

SCOM has worked together with CEA in the definition of the characteristics of the antenna front-end, identifying the frequency bands where the node is requested to operate, as well as the multiband behavior of the front-end circuit that shall be programmable to work on different bands. Starting from the already defined specifications, **SCOM** has started the development of the sensor node prototype.

EPFL continues in literature study on batteries and photovoltaic for sensor nodes

ICOM has started cooperating with SCOM in order to specify the operational requirements for the sensor-prototype under development. In support of this effort, ICOM has extended the node-level module of the CASTALIA simulator and has performed work on the development and adaptation of the node sub-modules that model the target hardware/software platform, in order to achieve a more realistic estimation of a node's energy consumption. Moreover work has been done in the adaptation of the separate time-synchronization sub-system, which will be used in order to analyse the performance of the WINSOC time-synchronization algorithm that has been designed by CEAL. The above simulation results have been utilized by SCOM in determining hardware and software component specs taking into consideration the application and networking context of the WINSOC project.

CEA-LETI continues the development works to miniaturize antennas and electronic FE in order to integrate it properly inside the node.

Task	Status	Planned Date	Notes
D5.2	In progress	M20	<i>In accordance with the operating frequency band chosen for the demonstrator, CEA-LETI continues the development works to miniaturize antennas and electronic FE in order to integrate it properly inside the node.</i>
D5.3	In progress	M26	EPFL: Literature study on batteries and photovoltaics for sensor nodes

2.5 WP6 (SCOM, DUNE, INFO, EPFL, CCSS, CEAL, AMI, ANTRIX)

DUNE

In the 23/01/08 PCC meeting in Rome, it was agreed a task sharing among the partners involved in WP6 (details can be found in the meeting minutes, pg.13). In particular, DUNE proposes to take care integrally of the pre-deployment tasks, comprising the performance assessment by simulations, whereas CCSS is asked to take care of the end-user testing technology transfer to EU context. A final agreement on the proposed is expected by the beginning of the next reporting period.

AMRITA is preparing a document on the existing infrastructure at AMRITA and also has deployed two sensor columns at the deployment site, Anthoniar Colony, Munnar, Idukki. The sensor columns are connected by a wireless network through which continuous data collection is ongoing.

In the first phase of the deployment two sensor columns were deployed on a portion of the landslide test site for geological data collection. One is dedicated for motion measurement and the second for soil pore water pressure measurement. The sensor columns have been deployed on 10 February, 2008 at Anthoniar Colony, Munnar, Idukki, Kerala, India. Continuous data collection is occurring through the wireless sensor network. The sensor column consists of the different sensors.

The sensor columns have been deployed at different locations. Each sensor column is 5 m deep. One sensor columns is deployed at the toe region of the hill and the other one is at the middle region.

Sensor column at the toe region where monitoring of the pore water pressure value is the major requirement. Therefore, two pore water pressure transducers have been deployed, one at 2m deep and the other at 5m deep. This sensor column also consists of a dielectric moisture sensor at 1m depth, and also a geophone. The pore water pressure sensor and the dielectric moisture sensor measure pore water pressure and moisture content of the soil respectively. Samples are taken every five minutes. The geophone is used to detect seismic vibrations and samples are taken at the rate of 10 samples/second. The samples are then converted to digital values by the ADC card on the wireless sensor nodes and sent through the radio to the next hop.

Sensor column located at the middle region where monitoring the displacement is the major objective. As a result, four tiltmeters are placed at different depths, and three strain gauges are also deployed at different depths. Along with those, one dielectric moisture sensor has also been deployed at 1m depth. These sensors are sampled every five minutes and sent wirelessly to the next relay nodes.

The preparation of the document on existing infrastructure is progressing.

ANTRIX

The deployment of the village resource centre at Anthoniar Colony, Munnar is on its final stages.

Communications with the partners involved in WP6 is ongoing. The document for existing infrastructure is progressing as per the partners' suggestions.

The work on infrastructure integration is progressing. The wireless sensor network developed by AMRITA has to be connected to the village resource centre (VRC). The village resource centre is kept approximately 300 m away from the wireless sensor network sink node. To connect both networks (VRC and the wireless sensor network), Wi-Fi will be used. Initial testing has been performed and satisfactory data has been received. Electric power has to be provided for using the Wi-Fi. Since the deployment site does not have a direct power line, as an initial remedy we use lead acid batteries to power it. These batteries may last up to 10 days. Later we will try to replace it with solar panels or another power source. This depends on whether or not the test solar panels installed at the deployment site produces sufficient power.

The geological assistance has been provided to AMRITA for the initial sensor column deployment. After the sensor column deployment, the deployment site has been visited weekly to analyze the delay in the network and data packet loss.

Task	Status	Planned Date	Notes
D 6.1	Progressing		Pre-deployment analysis
	In progress	M30	EPFL: Preliminary work on implications of the distributed algorithm for the sensor node realization

2.6 WP7 (SCOM, DUNE, SAP, INFO, CCSS, UPC, ICOM, CEAL, AMI, ANTRIX)

UPC

During this period, UPC has prepared and submitted the paper entitled “Distributed consensus in wireless sensor networks with quantized information exchange” to the 9th IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC’08).

ICOM

Gregory Yovanof has given a presentation on the WINSOC project at the Athens Information Technology (AIT) series of research seminars.

AMRITA

The inclusion of data visualization software to the website is progressing and also all the updates sent by the partners has been uploaded

As part of Phase III of the website enhancement, one of the new ideas we are pursuing is the incorporation of data visualization software to the website. We have completed 50% of desktop application which plots graph using offline data. We are also in the process of converting it into web enabled so that other customers can analysis data online from any location. The design phase of the software to convert into web application is progressing. Initially the visualization software is meant to be used with landslide scenario. This software will help to upload the data directly from the deployment site to the web.

WINSOC documents are uploaded to the website as per WINSOC coordinator Mr. Paolo’s approval. Also WINSOC partner’s presentation is uploaded.

WINSOC website database is backed up and the tables are re-organized for the better performance of the application.

Task	Status	Planned Date	Notes
Website population maintenance	Work in progress, on a continual basis	<no date required>	
Monitoring project results to assess exploitable issues	Work in progress, on a continual basis		
Technology tracking on pervasive computing for environmental sustainability	Work in progress, on a continual basis		
Compiling information on WSN business related matters – new actors/products entering into the field	Work in progress, on a continual basis		

2.7 WP8 (SCOM, SAP, INFO, CCSS, UPC, AMI, ANTRIX)

AMRITA

Soil tests of the deployment site have been conducted and further analysis is progressing. The verification of the pore water pressure sensor, dielectric moisture sensor, geophone, tiltmeter, and strain gauge etc has been performed.

The preparation of the document D8.1, Validation and impact assessment: intermediate report, is in the final stages. The document contains the details of the assessment of the algorithms from the point of view of the landslide scenario, the analysis of power solutions from the point of view of the landslide scenario, and the assessment of modulation techniques and radio technologies from the point of view of land slides scenario using COTS components.

Soil parameters are one of the key influencing factors for landslides detection and prediction that can be determined by different soil tests. As part of the sensor column deployment, two bore holes of 5 m depth were drilled and the soil at different depths such as 1m, 2m, 3m, 4m, and 5m were collected and tested. Partial test results for one of the sensor columns has been received. Using the soil test results the bulk density and texture has been calculated; this can be used for determining soil porosity. The soil porosity is one of the essential parameters in the characterization of rainwater infiltration and in the occurrence of slope failure. The effective soil porosity (ESP) is directly related to the water-holding capacity of a soil. The propagation of pore water

pressure will be delayed for soil which has a large water-holding capacity. This will indirectly affect the timing of slope failure. Previous laboratory experiments showed that initial soil porosity around the slip surface affects pore water pressure changes during slope failure and controls the debris-flow mobilization. All of the above mentioned reasons make soil porosity an essential parameter in the characterization of rainwater infiltration and the occurrence of slope failure.

One of the most important criteria to be validated and verified was the deployment of the pore pressure transducer. Another criterion to be validated and verified was the installation of the tiltmeters

ANTRIX

The preparation of document D8.1 has almost finished. The document contains the details of the assessment of algorithms from the point of view of landslides scenario, the analysis of power solutions from the point of view of landslides scenario, and assessment of modulation techniques and radio technologies from the point of view of landslides scenario using COTS components.

Regarding the algorithms, in summary, the distributed time synchronization algorithm can be implemented in the wireless sensor network for the landslide scenario. Due to the low number of expensive sensors columns and the requirement for detailed data from particular locations inherent to the landslide scenario, it is difficult at best to use the distributed consensus algorithms. A variety of alternative methods were presented in D8.1 for dealing with this issue. However, if the WINSOC partners settle on a digital implementation of the WINSOC developed wireless sensor node, then this node could likely be reprogrammed and used in the landslide scenario. Therefore, extensive validation in a punishing natural environment could be performed on the WINSOC hardware.

As per the recommendations of the analysis of power solutions, we have installed a test solar panel on one of the relays nodes. The current and voltage produced are being continuously measured and logged by the wireless sensor network itself. Preliminary results of the data have shown rather low amounts of solar insolation available for producing photovoltaic power. This is predicted by the incessant cloudiness of the area (a helpful factor for rainfall induced landslide). Nevertheless, a detailed study of the size of solar panel necessary to power the different components of the network – sensor columns, relay nodes, and network gateway will be completed. This will be based on measurements of the actual power generated by the solar panel installed at the deployment site itself.

Task	Status	Planned Date	Notes
D 8.1	Progressing	April 25, 2008	Validation and impact assessment: intermediate report

3 CONSORTIUM MANAGEMENT

3.1 Progress of Management Activities

During this period the have been performed the following activities::

- Monitoring of work packages in progress.
- Monitoring of report to be delivered at the end of this quarter
- Preparation & Management of PCC4 Review Meeting held in Rome on 22-23 January 2008
- Risks assessment review (ref. Annex to this QMR)
- Distribution to partners of 2nd Funding received from the Commission
- Preparation of this Quarterly Management Report QMR 2.2

3.2 Internal and external co-ordination activity

During this period the PCC4 project Review Meeting, hosted by INFO and supported by DUNE, has been held in Rome on 22-23 January 2008.

Each partners presented their work and main results reached during this period.

A review the project risk analysis has been started in order to identify possible significant future variations. In the section Annex – A, the results of this analysis are highlighted.

During this meeting it was discussed the following main issues (cfr. Minute of Meeting)

3.2.1 Delivery postpone in WP4

The consortium agreed to postpone the following delivery documents:

- D4.3 Report on the information extraction methodologies due in month 14 to month 17.
- D4.1.3 Node Level Simulator due in month 16 to month 17.
- D4.4 System Level Network Performance evaluation due in month 18 to month 22.

Justification and impact

D4.3 Report on the information extraction methodologies

The activity addressed by D4.3 has been carried out and some results and approaches have been already reported both in the Project Audit and in the 3rd and 4th PCC meetings. However, one of the contributors has experienced a momentary manpower decrease, due to the withdrawal of personnel in charge of the work: an event not foreseeable in advance. The problem has been already successfully solved, but the momentary decrease of the available manpower led the contributor to concentrate the available manpower to progress toward the design and simulations of new solutions to address certain shortcomings identified by himself in previous implementations in WP4 (a goal successfully achieved). This left insufficient resources for a timely delivery of the D4.3, which is presently in the writing phase. Its rescheduling at month 17 will not negatively impact on any other part of the project, as this is a stand-alone outcome of the system level evaluation, not directly exploited at that stage (i.e. before month 17) by other activities of the Project.

D4.1.3 Node Level Simulator

Referring again to the motivations already reported for D4.3, the relevant activity has been completed, but the momentary decrease in the available manpower caused a delay in the final delivery phase of WP4.1.3 as well,

which is now progressing. No significant impact is foreseen on WP4: the deliverable D4.1.3 is a part (a subsection) of the deliverable of WP4.1, which is scheduled at month 20, so the delivery of the D4.1.3 on month 17 will not cause any delay on the corresponding deliverable D4.1. On the other hand, this is in line with the delivery of the other two deliverables embedded in D4.1 (i.e. D4.1.1 and D4.1.2), both scheduled at month 20 as well. In addition, a possible impact could be on D4.5 (Specifications of the node prototype), which, again, is scheduled at month 20, well after the rescheduled delivery of D4.1.3.

D.4.4 System Level Network Performance evaluation

The main reason is that this deliverable will include the results and performance evaluation of the system and network level simulators due in month 20 in deliverables D4.1.1, D4.1.2 and D4.1.3 (now all included as parts of D4.1, due in month 20). The delay of deliverable D4.4 will not appreciably impact on WP5 or WP6.

3.2.2 Tasks responsibility in WP6

With reference to WP6 tasks description (cfr. Pag 83 Annex I ver. 5.7), it was agreed the following:

- *Pre-deployment* - These activities will be realized by partners DUNE and CCSS. The tuning for sharing of activities will subsequently be arranged among two partners;
- *Infrastructure integration* - These activities will be realized by the partners CCSS, AMRITA, ANTRIX, SCOM;
- *Deployment* - These activities will be realized by the partners CCSS, SCOM, EPFL, CEAL, INFOCOM;
- *End-User testing technology transfer to the EU context* - this task will be realized by AMRITA from Indian side and by partner DUNE or alternatively by CCSS from the European side. The Coordinator will verify the availability of two partners (DUNE / CCSS) to perform this task.

3.2.3 Approach for Sensor Node Development WP5

As it regard this WP (Sensor node development and validation) and in particular the development of wireless communications network, the partner SCOM (leader of WP5) proposed a “digital” approach digital rather than an “analogical” one. This solution will be justified and motivated in the project’s documents (report toward the Commission).

3.2.4 Contact with Prof. Alexander Dmitriev

Prof. Martin Hasler proposed to invite to next PCC-M5 Meeting Prof. Alexander Dmitriev Professor from Institute of Radio Engineering and Electronics of Russian Academy of Sciences. All partners present agree on Martin’s proposition .

3.3 Contractual issues

The Coordinator received on 25th February 2008, from the Commission the second funding of 494.980,11 EUR. It has been distributed to all partners on 29th February 2008, according to the following table:

2nd FINANCING DISTRIBUTION				
PARTNER N.	Short name	Total grant	2nd Financing (%)	2nd financing (€) Per Partner
1	SCOM	540.000	20,25406202	109.371,93
2	DUNE	128.798	20,25406202	26.086,83
3	SAP	83.700	20,25406202	16.952,65
4	INFO	253.175	20,25406202	51.278,22
5	EPFL	337.080	20,25406202	68.272,39
6	CCSS	296.000	20,25406202	59.952,02
7	UPC	145.150	20,25406202	29.398,77
8	ICOM	166.000	20,25406202	33.621,74
9	CEA	164.915	20,25406202	33.401,99
10	AMRITA	238.200	20,25406202	48.245,18
11	ANTRIX	90.838	20,25406202	18.398,38
	TOTAL	2.443.856		494.980,11

4 USE AND DISSEMINATION

4.1 Publications

The following table lists all publications made by the Project, identifying the type of publication, the media used for the publication, the authors and other details deemed useful.

Type of publication	Media	Date	Partners involved	Details
<i>Conference paper</i>	<i>Conference proceedings, also available online</i>	Dec. 2007	INFO	Gesualdo Scutari and Sergio Barbarossa co-authored a paper entitled "Distributed Decision over Wireless Sensor Networks Affected by Multipath Fading", presented at the 2 nd International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP 2007).
<i>Article</i>	Fine synchronization for wireless sensor networks using gossip averaging algorithms	19-23/05/08	CEAL	ICC 2008 N. Maréchal, J.-B. Pierrot, J.-M. Gorce

4.2 Participation in external events

The following table contains a list of the events such as conferences, meetings, workshops, in which the project has been in some way involved as a participant. The "Details" column describes the title of the event (e.g. conference title), the results obtained/expected from the participation in the event, the reference to particular project tasks etc.

Type of event	Location	Date(s)	Partners involved	Details
Conference	St. Thomas, Virgin Islands, USA	12-14/12/2007	INFO	Prof. Sergio Barbarossa has Attended the 2 nd International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP 2007).
Workshop	Brussels	15.2.2008	CCSS Charvat	<i>Towards a Single Information Space for the Environment in Europe</i>
Workshop	Brussels	19.2.2008	CCSS Cerba	<i>Information and Communication Technologies for Sustainable Cities</i>

4.3 Web Sites

SAP - The population of the website has been continued through maintaining the calendar.

4.4 Other important information

N.A.

5 EFFORT/EXPENDITURES

See attached Excel spreadsheet.

6 OTHER ISSUES

N.A.

Effort per WP and per Participant (Person-Months) - 2nd Quarter

Participant	WP1		WP2		WP3		WP4		WP5		WP6		WP7		WP8		Total per participant		Total Cumulative from start of the project		Notes (please justify variation > ± 20% w.r.t. planned)
	planned	spent	planned	spent	planned	spent	planned	spent	planned	spent	planned	spent	planned	spent	planned	spent	planned	spent	planned	spent	
1 – SCOM	1,0	1,1	0,0	0,0	0,0	0,0	6,0	7,0	9,0	8,0	0,0	0,0	0,0	0,0	0,0	0,0	16,0	16,1	43,9	44,2	
2 – DUNE	0,0	0,0	0,0	0,0	0,0	0,0	4,0	4,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	4,0	4,8	21,0	21,9		
3 – SAP	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,5	0,5	0,0	0,5	0,5	5,1	5,1		
4 – INFO	0,0	0,0	0,0	0,0	6,0	6,0	2,0	2,0	4,0	4,0	3,0	3,0	0,0	0,0	1,0	1,0	16,0	16,0	61,0	61,0	
5 – EPFL	0,0	0,0	0,0	0,0	6,6	6,9	2,0	2,0	0,8	0,5	0,5	0,3	0,0	0,0	0,0	0,0	9,9	9,7	42,5	35,4	PKD staff - been hired late - still working on the development of nonlinear consensus algorithms
6 – CCSS	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	3,0	3,2	0,5	0,5	0,5	0,5	4,0	4,2	20,5	19,9	
7 – UPC	0,0	0,0	0,0	0,0	0,9	1,0	5,3	3,1	0,0	0,0	0,0	0,0	0,2	0,2	0,0	0,0	6,4	4,3	26,9	24,0	
8 – INTRACOM	0,0	0,0	0,0	0,0	0,0	0,0	2,9	3,7	2,8	3,0	0,0	0,0	0,3	0,3	0,0	0,0	6,0	7,0	26,9	30,8	
9 – CEA	0,0	0,0	0,0	0,0	0,0	0,0	1,0	1,0	1,1	1,1	0,0	0,0	0,0	0,0	0,0	0,0	2,1	2,1	21,6	15,7	
10 – AMRITA	0,0	0,0	0,0	0,0	5,4	6,1	0,0	0,0	0,0	0,0	1,8	1,8	0,5	0,9	2,7	3,6	10,4	12,4	46,9	44,8	
11 – ANTRIX	0,0	0,0	0,0	0,0	6,0	6,0	0,0	0,0	0,0	0,0	2,0	2,0	0,0	0,0	0,0	0,0	8,0	8,0	29,0	28,0	
Total per WP	1,0	1,1	0,0	0,0	24,9	26,0	23,2	23,6	17,7	16,6	10,3	10,3	2,0	2,4	4,2	5,1	83,3	85,1	Grand total Q2		
Total Cumulative from start of the project	5,1	5,7	39,0	38,4	120,8	109,9	94,7	92,6	32,1	31,6	17,8	18,1	23,4	23,1	12,4	11,4	345,3	330,8	Grand total from start		

Expenditures per Participant (k€) - 2nd Quarter

Participant	Research / Innovation		Demonstration		Management		Total per participant		Total Cumulative from start of the project		Notes (please justify variation > ± 20% w.r.t. planned)
	planned	spent	planned	spent	planned	spent	planned	spent	planned	spent	
1 – SCOM	225,0	225,0	0,0	0,0	15,0	16,5	240,0	241,5	658,7	663,0	
2 – DUNE	24,0	25,4	0,0	0,0	0,0	0,0	24,0	25,4	153,0	161,7	
3 – SAP	5,1	5,1	0,0	0,0	0,0	0,0	5,1	5,1	55,7	54,8	
4 – INFO	100,0	98,1	0,0	0,0	0,0	0,0	100,0	98,1	374,4	396,9	
5 – EPFL	23,0	39,9	0,0	0,0	0,0	0,0	23,0	39,9	259,9	82,6	Personal costs now higher than planned due to the fact that the staff has finally been hired
6 – CCSS	30,0	28,0	0,0	0,0	0,0	0,0	30,0	28,0	156,0	154,0	
7 – UPC	41,5	35,0	0,0	0,0	0,0	0,0	41,5	35,0	204,1	193,3	Includes PM cost and PCC4 travel expenses
8 – INTRACOM	3,0	1,1	0,0	0,0	0,0	0,0	3,0	1,1	19,2	6,2	
9 – CEA	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	149,2	148,4	
10 – AMRITA	26,8	31,9	0,0	0,0	0,0	0,0	26,8	31,9	123,3	126,2	
11 – ANTRIX	16,3	16,3	0,0	0,0	0,0	0,0	16,3	16,3	67,8	63,5	
Total per cost item	494,7	505,8	0,0	0,0	15,0	16,5	509,7	522,3	Grand total Q2		
Total Cumulative from start of the project	1.808,4	1.633,8	6,0	7,5	30,4	33,0	1.844,8	1.674,2	Grand total from start		

7 ANNEX - RISKS ASSESSMENT REVIEW

Winsoc Project - Risks assesment form										
 WINSOC					 Information Society Technologies			Date Compilation: 28-feb-08		
Risk No.	Description of risk	Probability of risk occurring (1-3) (%)		Impact on Project			Risk factor (1-9)	Effects	Criticality	Control Action
				Impact on time (1-3)	Impact on cost (1-3)	Impact on performance (1-3)				
1	Delay in providing Deliver D4.3 - Report on the information extraction methodologies	2	100%	1	1	1	2	Since the developmet of HW/SW Sensor Node is running, missing a final decision about the best way to extract information from each node, can lead to a delay in WP6 activities or a degradation into communication protocol performance	Light	In a very short time valid indications on the Methodologies for extracting data have to be provided performing the due simulations. Action proprietary DUNE
2	Better relationship and correlation between WPs 3-4-5	1	10%	1	1	3	3	Missing a strong correlation among Design-Simulation and Developmet can bring to a non-optimal HW/SW implementation both in terms of network performance and time schedule	Moderate	Enforcing the exchange of information (technical, planning) among leaders of the involved WPs. Action Proprietary SCOM, Coordinator, DUNE, INFOCOM.
3	Better integratation with Amrita/Antrix partnership with the consortium	1	20%	1	1	2	3	Could not be properly Integrate and Tested Winsoc technologies into Landslide scenario	Moderate	Speed-up the activities foreseen into WVP6 in order to better know, as soon as possible, requirements and constraints connected with Landslide scenario. Proprietary action AMRITA/ANTRIX + Coordinator
4	Delay in Node Simulator complete development (integration on Castalia Tool of algorithmic issues)	2	30%	2	1	1	4	The analysys and production of the definitive Sensor Node Prototype Specifications, which will lead to the deliverable document D4.5, could be affected by the delay in node simulations; thus the prototype development will consequently be delayed.	Moderate	In the shortest possible time, (not over next PCC meeting) the integration of the different simulation aspects on Castalia Tool should be performed in order to define the most suitable algorithm (and other aspects) and to provide specifications for the sensor node prototype. Action propetary INTRA, UPC.
5	Delay in Sensor Node Specifications	1	15%	2	1	1	2	The development of the sensor node prototype could be affected by the delay in the definition of the specifications.	Ligth	The involved partners (SCOM, INFO, EPFL, ICOM, CEAL) should provide in the expected times the contributions to the node's specifications.
6	Problems coming from the integration of distributed consensus protocols with the DRAND MAC protocols	1	30%	1	0	2	3	In large scale networks with a high percentage of on/off switching nodes, the implementation of consensus protocols based on the DRAND MAC protocol could lead to a non optimal network decision-making time.	Moderate	Speed up the consensus algorithms and adjust the DRAND-based interaction protocols - Action proprietary SCOM