DELIVERABLES SUMMARY SHEET

Project Number: IST-2000-28084

Project Acronym: SEWING

Title: System for European Water monitorING

Deliverable N°: 5 ”Dissemination and Use Plan" (DUP)

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Short Description:

The deliverable No 5: "Dissemination and Use Plan" (DUP) was written according to hints given in the document "*Guidelines for Preparing Project Reports"*, page 12. The text, prepared by the co-ordinator, was agreed with all partners of the project SEWING.

The text has 3 parts.

In the first an overview of DUP is given. The project ideas are summarised, then a condensed description of expected results, approach to dissemination and use and aspects of marketing are given.

In the second a more detailed description of dissemination plan is given. The most important conferences and periodicals in which results are intended to be published are listed. Additionally is included the information about SEWING WEB page and about partricipants' views on the problem of standardisation of European water pollution monitoring.

In the third, a more detailed description of use plan is given. This part comprises the description of the final result of the project, being a set of prototypes of the system for water pollution monitoring. Some aspects of finalising the project are shown, such as NACE sectors interested in this result, risks, IPR and problems of industrial implementation.

It is expected that the detailed implementation activities will be described in the final document called TIP (*Technology Implementation Plan*).

The documents are available on SEWING WEB pages http://www.sewing.mixdes.org

Partners owning: Politechnika Warszawska

Partners contributed: Politechnika Warszawska

Made available to: Mr. Mario Verdese, Project Officer.

SEWING

IST-2000-28084

System for European Water monitorING

Dissemination and Use Plan

Done as deliverable No 5

Report Version:	1st
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Project Co-ordinator:	Politechnika Warszawska, Poland
Partners:	Politechnika Warszawska - PL, Instytut Technologii Elektronowej - PL., Technical University of Lodz - PL., Valtion Teknillinen Tutkimuskeskus - FI, Centre National de la Recherche Scientifique - F, MICROSENS - CH, Universitat Politecnica Catalunya - E, Institut fuer Wasservorsorge, Gewaesserekologie und Abfallwirtschaft - A, SYSTEA- I.

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1. Overview

1.1 Executive summary

The aim of the project ***SEWING***, which has started on September 1, 2001, is creating a cheap, flexible and generally accessible system for water pollution monitoring and early warning. The non-organic ions such as NH_4^+, NO_3^-, Ca^{2+}, K^+, Na^+ and also H^+ will be monitored in surface and drinking water.

Sensors are based on ISFETs (Ion Sensitive Field Effect Transistors), with data processing and storing on the chip. Software for displaying results on the central computer is included. The smart sensors will be relatively small and easy to insert in water resources. Nine partners from 7 European countries are partners in the project.

The project is interdisciplinary, integrating specialists from electronics, semiconductor technology, information technology, chemistry and environmental engineering. Among partners there is also a SME, which is responsible for industrial implementation.

The following tasks are to be done during the realisation of the project:

1. Choice of the most important areas, where the microsystems will be used in participating countries. Choice of the most important ions for monitoring for the environment protection system. Creating ion-selective materials for sensors, sensitive for monitoring of the chosen ions
2. Fabrication of sensors being Chemical Field Effect Transistors (ChemFETs), sensitive to the selected ions and having the requested range of selectivity and sensitivity. The sensors will be measured from the point of view of selectivity, sensitivity, temperature dependence, hysteresis, time, etc.
3. Construction of automated measurement stand for evaluation of the sensors performance in full range of different ions concentration (for chosen ions and determinated range of concentration)
4. Computer simulation of sensors compatible with other electronic simulators, allowing simulation of the whole system.
5. Creating software and hardware for data processing of information obtained from many sensors, each sensitive to a different kind of pollutant, including effects of temperature, age and interference.
6. Creating software and hardware for information storing, coding and transmission.
7. Assembling all the parts into one smart microsystem and optimising it from the point of view of cost, reliability, accuracy and lifetime. Lifetime is particularly important as most existing ISFETs can be now used continuously for not longer than days or a few weeks.
8. Institutions responsible for water management will receive the prototypes of the microsystems to demonstrate their usefulness in a real environment
9. Industrial partners will prepare the prototypes for industrialisation.

1.2 Overview of expected results

The main objective of the project can be stated as follows:

Elaborating a cheap and generally accessible system for monitoring and early warning of water pollution. Not only water resources will have the possibility to be monitored continuously, but also all kinds of water in high-risk industrial regions should have the possibility of early warning to prevent disastrous pollution. The main emphasis will be on non-organic ions in agricultural and mining regions, and complete prototypes of microsystems will concern the detection of hydrogen, ammonium, nitrate, calcium and sodium ions. These prototypes will be implemented and evaluated by end-users and prepared for industrial production.

This statement shows what results are expected. After realisation of many intermediate steps, which will be disseminated in forms of papers and reports, the prototypes of the final system will be done and implemented by end-users. The results will be broadly disseminated among all potential users of the system. This will occur in the final year of project realisation, in 2004.
After positive feedback from end-users the final industrial version of the system will be prepared by industrial member of the consortium and the production will be ready to start.

1.3 Approach to dissemination and use

Before reaching the final result described in 1.2, many intermediate results will be obtained, worth dissemination as having important scientific or technological meaning. They are as follows:

1. Computer models of ISFET sensors. Papers on conferences (like Eurosensors, MIXDES etc) and papers in journals (like Sensors and Actuators, IEEE Sensor Journal etc)
2. Realisation of ion selective chemical sensors. The information will be disseminated as above, on that basis the broad interest for obtaining such sensors and their production can start.
3. Prototypes of smart sensors for water monitoring. The sensors together with digital data processing hardware will be performed and announced in media. They will be the main part of the final system.
4. Transmission and data storing hardware and software will be elaborated and announced.
5. Preparation of the system for prototyping and industrial implementation. The results will be broadly disseminated in papers, articles, internet etc, what should lead to their marketing.

During running the project co-operation and clustering with other water monitoring projects will lead to better dissemination of partial and final results. These projects are for example: EUROLAKES, BLUEWATER, EDEN IW, TELEMAC and others.
The consortium is going to sign a detailed *Consortium Agreement* in which the problems of IPR during the realisation of the project, use of know-how, patents etc are included. The problem of owing the final result among partners is also described in this document.
At universities being partners of the project many doctor dissertations and master theses in the theme of SEWING are running.

1.4 Market overview

The final result, the *System for European Water Monitoring* after broad dissemination should be used by all water management institutions. Many of them, in Poland, Austria, Slovakia, Italy and in other countries have already expressed their interest. Also other FP5 projects, listed above, are interested in using the system. SEWING is described in CORDIS and PRISMA data base and the co-ordinator got already many letters of interest. Among them are:

- Centre Nacional de Microelectronica, Barcelona, Spain
- TEMPO, Czech Republic
- ELE International Ltd, UK
- IDEC Ltd, Greece
- Mackintoch Consultants, UK
- Geraldton Investments, Lugano, Switzerland
- IAPETOS S.A. Greece
- Varna Free University, Varna, Bulgaria

The system can be produced in hundreds, each containing hundreds of smart sensors, so the final market is expected to be broad.

2. Description of dissemination plan

2.1 Conferences/seminar/workshop

The following conferences will be the forum of SEWING partial results:

- Automation in Water Quality Monitoring, Vienna, Austria, 21-22 May, 2002
- New Development of Sensors for Environmental Control, Lecce, Italy, 27-29 May 2002
- MIXDES, Wroclaw, Poland, 20-22 June, 2002
- Third International Conference on Water Resources and Environment Research, Dresden, Germany, 22-26 July 2002
- EUROSENSORS, Praha, Czech Republic, 7 September 2002
- SEFI Annual Conference, Florence, Italy, 16-18 September 2002
- Interdisciplinary Approaches in Small Catchment Hydrology Monitoring and Research, Demenovska Dolina, Slovakia, 25-28 September 2002

The following topics will be submitted at these conferences:

- Chemical ISFET sensor measurement and calibration systems
- Creating ion- selective CHEMFETs
- Modelling of ISFETs and CHEMFETs
- Data processing and data fusion algorithms

During next years new partial results will be presented. Most of these conferences are periodical.

2.2 Publications

The following periodicals will be the forum for SEWING results:

- Sensors and Actuators
- IEEE Sensor Journal
- IEEE Circuits and Systems Newsletter
- Electron Technology

Similar topics will be presented in these periodicals and later new achievements in the next years.

2.3 WEB presence

The SEWING WEB page is as follows:
http://www.sewing.mixdes.org
The following windows are available:

- Home
- What is SEWING
- Project tasks
- Project presentation
- Conferences
- Login. For owners of password the following windows are open:
  - Reports
  - Meetings
  - Contacts

Information is also in CORDIS Data Base under the No 58428

2.4 Standardisation

It is extremely important to have standards for water monitoring data format and data visualisation. Broad discussion will be done with interested parties in the second year of

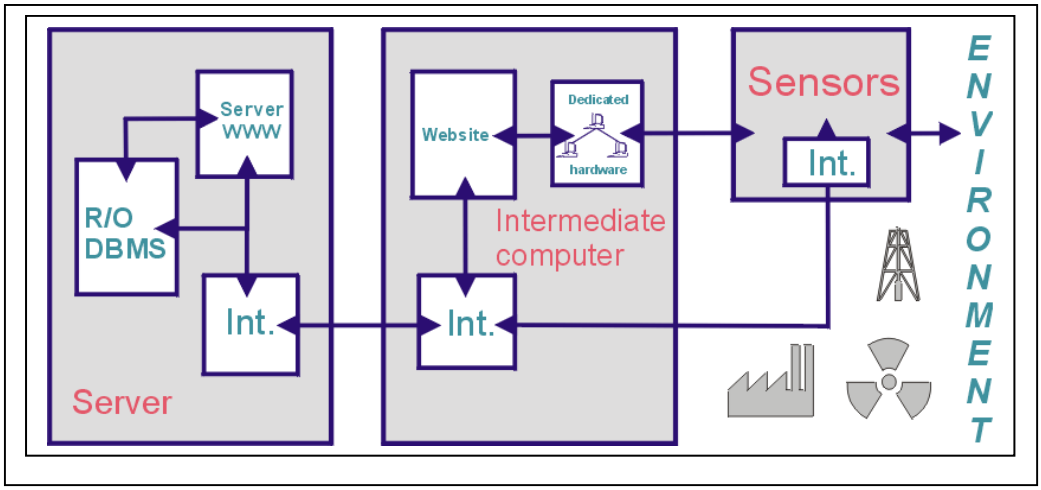
running the project. Final decisions will be done with co-operation with European Commission.

3. Description of use plan

3.1 Description and characterisation of final result

- System for European water monitoring
- The system has 3 layers:
  - Smart sensors
  - Software for computer with data collection and processing
  - Software for central computer with data storage

Below is the block diagram of the system:



The main final result is creation of prototypes of working system as above, with all hardware and software dedicated for efficient and flexible water monitoring. Together with appropriate dissemination of the results and preparation of industrial documentation for mass production and implementation it will create the possibility of general and standardised monitoring and early warning about ions polluting surface water.

The flexibility of the system will allow tailoring it for demands of particular end-users.

- The application of the final system is as follows:

The water management organisations all over Europe will implement the system in surface waters which should be monitored. Thanks to its flexibility different non-organic ions and different ranges of their activity will be measured. The intermediate and central computer will process the data transmitted from sensors (WAP protocols are intended to use) and give information of what is going on with water pollution in different places.

A very important aspect is that having the time and place where pollution occurred the polluter could be identified.

- The main innovation of the system is that monitoring is done in real time *in situ* and that no laboratory tests are necessary. It should be cheap enough for mass monitoring in hundreds of places. The sensors will be designed for lasting without service for at least one month. Compared with the state of the art in this area it is a step towards cheap and general water monitoring.
- When accepted by water managing institutions the system will be produced under the FP5 licence in many European (and not only) countries, giving a considerable European added value.

3.2 Market characterisation of final result

- The customers buying the system will be water management institutions and they will be the end-users.
- The following sectors will be involved in manufacturing and using the system (according to NACE codes)
  - 01. Agriculture
  - 24. Manufacture of chemicals
  - 29. Manufacture of machinery and equipment
  - 32 Manufacture of communication equipment
  - 41 Collection, purification and distribution of water
  - 72 Computer and related activities
  - 73 Research and development
  - 90 Sewage and refuse disposal, sanitation and similar activities.

The sector of water management and surveillance is not included in NACE codes.

- The analysis of the market and its potential size was not yet done. The project at its beginning is in the R&D status.

3.3 Approach, timing and estimated effort for use of final result.

- The potential risks of the project are as follows:
  - The life-time of chemically selective sensors can be not sufficient
  - Selectivity and accuracy of sensor matrices may be not sufficient for distinguishing one detected ion form another particularly if some pollutant ions are unexpected.
  - The possible choice of detected ions can be too narrow for some applications
  - The final interest of end-users can occur too narrow
- The intellectual property rights are protected in details in the *Consortium Agreement* signed by all partners. The details of using know-how of particular partners, way of patenting and financial conditions when production of the system will start are included there.
- When the project is concluded with successful prototypes of the system accepted by end-users the production documentation will be done by two partners being engaged in industrial implementation. This will occur in August 2004 and production should start some 6 months later.
- It is too early now to show what steps will be exactly done in participant's organisations to ensure exploitation. This will be certainly done when Technology Implementation Plan is prepared.