Bringing the OpenMI to LIFE

Progress Report No. 1 - 1st October 2006 – 31st March 2007

LIFE Grant Agreement Number
LIFE06 ENV/UK.000409

PROGRESS REPORT No. 1

Covering the project activities from
01-10-2006 to 31-03-2007

Reporting Date
30/04/2007

LIFE Project Name
Bringing the OpenMI to LIFE

Data Project

Project location	
Project start date:	01/10/2006
Project end date:	31/01/2010 **Extension date:** -
Total Project duration (in months)	40 months **Extension months:** -
Total budget	€ 4002 656
EC contribution:	€ 1988 628
(%) of total costs	49.68%
(%) of eligible costs	50%

Data Beneficiary

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KEYWORDS

Integrated modelling
Integrated water management
Model linking
Open Modelling Interface and Environment
OpenMI
OpenMI Association
Water Framework Directive

ABBREVIATIONS

EC	European Commission
HarmonIT	The short name for the Framework 5 project called IT Frameworks
OA	OpenMI Association
OADC	OpenMI Association Dissemination Committee
OAEC	OpenMI Association Executive Committee
OATC	OpenMI Association Technical Committee
OpenMI	Open Modelling Interface and Environment
WFD	Water Framework Directive

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[1] This does not include sub-contractors.

Project Name: Bringing the OpenMI to Life
Grant Agreement: LIFE06 ENV/UK.000409
Version: Progress Report No. 1 - 1st October 2006 – 31st March 2007

LIST OF CONTENTS

EXECUTIVE SUMMARY

1.1. PROJECT OBJECTIVES[2]

The Water Framework Directive demands an integrated approach to water management. This requires the ability to predict how catchment processes will interact. In most contexts, it is not feasible to build a single predictive model that adequately represents all the processes; therefore a means of linking models of individual processes is required. This is met by the FP5 HarmonIT project's Open Modelling Interface and Environment (the OpenMI).

The purpose of this project is to transform the OpenMI from research output to sustainable operational product. It will build the capacity to use the OpenMI and will demonstrate it in real-life situations. It will also develop, test and demonstrate the future support organisation for the OpenMI. Finally, information about the OpenMI will be disseminated to users.

1.2. LIST OF KEY DELIVERABLES AND OUTPUTS

The key deliverables and outputs for the reporting period are:

- Training courses prepared and held for users and developers
- Descriptions of the Scheldt and Pinios River basin use cases
- The Collaboration Agreement
- First Progress Report

Appendix 2 provides a detailed list of the task deliverables, dates of delivery and their current status.

1.3. SUMMARY OF THE FOLLOWING SECTIONS

The sections below report on the project's management, progress with the tasks, problems encountered, dissemination activities, work for the next period, financial issues and a review of progress. Appendices give an overview of the project, the deliverables, partner information and publications.

In brief, the project's management and tasks are proceeding as planned. No unexpected problems have arisen. Minor adjustments have been made, for example, some of the models to be used have been changed because of problems of availability. This type of issue is common in modelling exercises, was anticipated and alternatives were quickly found. Dissemination activities have focused on developing two websites, one for the project and one for the OpenMI Association. Now these are complete attention will turn to developing a dissemination strategy.

The expenditure is broadly on track. Overall, the project is slightly under spent. The partners are happy with this position as they would like to build a reserve for the challenges that inevitably lie ahead.

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[2] Readers who are not familiar with the OpenMI-Life project may like to read Appendix 1 where they will find an overview of the project.

SECTION 2. PROJECT MANAGEMENT

2.1. PROJECT CO-ORDINATION

Table 1 shows the formal Meetings and Workshops held to manage and co-ordinate the work of the project during the reporting period. All meetings were run and minuted in accordance with the Collaboration Agreement. Where appropriate, the minutes were distributed to all partners and the European Commission and will be published on the website.

Table 1 Organised meetings workshops and conferences

Meeting	Date	Host / Venue	Attendees
OpenMI-Life kick-off meetings	03-05/10/2006	VMM-AK, Belgium	All partners
OpenMI Association Executive Committee meeting 2	03/10/2006	VMM-AK, Belgium	CEH, RIZA, WSL, NTUA, WL|Delft, DHI, NTUA, Aguafin,
Steering committee meeting 1	05/10/2006	VMM-AK, Belgium	CEH, DHI, WL|Delft, WSL, NTUA, Aquafin, VMM-AK
Task B, Use case 'c' Technical meeting 1	6/11/2006	VMM-AWA Leuven, Belgium	Aquafin, VMM-AK, FH, VMM-AWA, ULG
Task B, Use case 'd' Technical meeting 1	14/11/2006	RIKZ Middelburg, The Netherlands	FH, RIKZ, WL_Delft
Task B, Use case 'c' Technical meeting 2	23/11/2006	VMM-AWA, Belgium	VMM-AK, ULG, VMM-AWA
Task A developers and end users training for Pinios	30/10-01/11/2006	NTUA, Greece	NTUA, UTH, DHI
Task A developers training for Scheldt	29/11-01/12/2006	ULG, Belgium	ULG, RIKZ, WL|Delft
Task B Technical meeting Use case 'b' and 'c'	06/12/2006	VMM-AWA, Belgium	VMM (+ULG), VMM-AWA, FH
Task B, Use case 'c' Technical meeting 3	11/12/2006	University of Liège, Belgium	VMM-AK, FH, ULG
OpenMI Association Technical Committee meeting 2	13-14/12/2006	WL | Delft, Delft, The Netherlands	DHI, WSL, WL|Delft, Alterra, RIZA
Task B Technical meeting ' b'	17/01/2007	VMM-AWA, Belgium	VMM-AWA, FH
Task A end users training for Scheldt	17-19/01/2007	VMM-AK, Belgium	VMM-AK, VMM-AWA, FH, ULG, Aquafin, WSL
OpenMI Association Technical committee meeting 3	22–23/01/2007	WSL, Wallingford, UK	DHI, WSL, WL|Delft, Alterra
Steering committee meeting 2	25/01/2007	CEH, Wallingford, UK	CEH, DHI, WL|Delft, WSL, NTUA, Aquafin, VMM-AK, HTSPE Ltd
OpenMI Association Dissemination Committee meeting 1	16/02/2007	NTUA, Athens, Greece	NTUA, CEH
Task B, Use case 'd' Technical meeting 2	16/02/2007	FH Borgerhout, Belgium	FH, RIKZ, WL_Delft
OpenMI Association Technical committee meeting 4	05–07/03/2007	DHI, Hørsholm, Denmark	DHI, WSL, WL|Delft
Task B Technical meeting Use case 'a'	05/03/2007	VMM-AWA, Belgium	VMM-AWA, Aquafin
Task C Technical Group Meeting Pinios: All Use Cases	05/03/2007	University of Thessaly, Vols, Greece	NTUA, UTH
Task B, Use case 'c' Technical meeting 4	6/03/2007	University of Liège, Belgium	VMM-AK, ULG
Task C Technical Group Meeting Pinios : Use Case 3	20/03/2007	University of Thessaly, Volos, Greece	UTH
Task C Technical Group Meeting Pinios: Use Case 1	28/03/2007	NTUA, Athens, Greece	NTUA
Task C Technical Group Meeting Pinios: Use Case 2	29/03/2007	NTUA, Athens, Greece	NTUA
Task B, Use case 'c' Technical meeting 5	29/03/2007	University of Liège, Belgium	VMM-AK, ULG
Task C Technical Group Meeting Pinios: Use Case 3	03/04/2007	University of Thessaly, Greece	UTH
Task C Technical Group	12/04/2007	NTUA, Athens, Greece	NTUA

Project Name: Bringing the OpenMI to Life
Grant Agreement: LIFE06 ENV/UK.000409
Version: Progress Report No. 1 - 1st October 2006 – 31st March 2007

Meeting	Date	Host / Venue	Attendees
Meeting Pinios: Use Case 1			
Task C Technical Group Meeting Pinios: Use Case 2	**13/04/2007**	NTUA, Athens, Greece	NTUA
Task B Technical meeting Use case 'a'	**17/04/2007**	Aquafin	VMM-AWA, Aquafin, Wallingford Software
OpenMI Association Dissemination Committee meeting 2	**17/04/2007**	Aquafin, Belgium	NTUA, Aquafin, WL	Delft
OpenMI Association Executive Committee meeting 3	**18/04/2007**	Aquafin, Belgium	CEH, RIZA, WL| Delft, DHI, WSL, NTUA, Aquafin, Alterra
OpenMI-Life Workshop	**18-19/04/2007**	Aquafin, Belgium	CEH, DHI, WL|Delft, HRWG, NTUA, UTH, Aquafin, VMM-AK, FH, VMM-AWA, ULG, RIKZ
Steering committee meeting 3	**19/04/2007**	Aquafin, Belgium	CEH, DHI, WL|Delft, WSL, NTUA, Aquafin, VMM
Task E Training and assistance on the OpenMI	**7-11/05/2007**	HEC, Davis, CA, USA	WL Delft, HEC

2.2. CHANGES TO PROJECT MANAGEMENT STRUCTURE

There have been no changes in the project management structure during the reporting period. No partners have withdrawn or been replaced. Appendix 3 lists, for each partner, the staff members involved in the OpenMI-Life project and their contact details.

2.3. PROJECT ORGANOGRAM

Figure 1 shows the project's management structure and reporting lines. These follow the proposal except that responsibility for quality will now lie with the task leaders, who are all Steering Committee members. Ultimate responsibility for quality will rest with the chairman. By this change, it is hoped to propagate a culture of appropriate quality throughout the project.
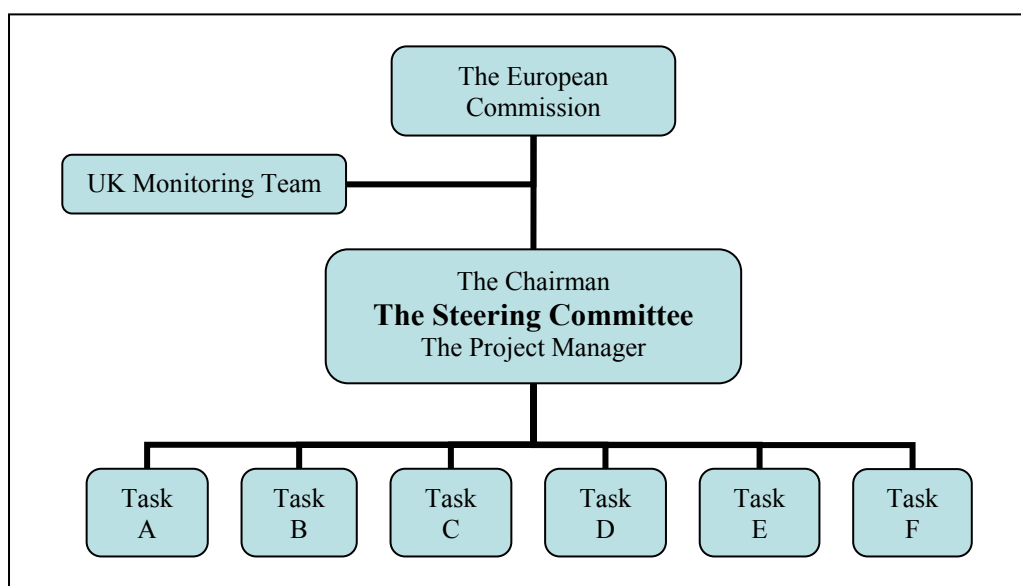

Figure 1 The structure and reporting lines of OpenMI-Life

2.4. PROJECT REPORTS

The following reports have been delivered during the reporting period:

Task B Demonstration of the OpenMI in the Scheldt - Use case descriptions
Task C Demonstration of the OpenMI in the Pinios - Use case descriptions
Task D Management Protocol Report

2.5. PROJECT EXTENSION

At the time of writing, no extension of the project duration is needed or envisaged.

SECTION 3.   TECHNICAL DEVELOPMENT

3.1. INTRODUCTION

The sections below describe the progress on each task during the reporting period.

3.2. TASK A – BUILD CAPACITY

3.2.1. Objective

The objective of Task A (Build Capacity) is to ensure that all partners involved in the project have the necessary skills to use the OpenMI. To achieve this, training is to be provided for two groups of users:

- developers or programmers who have to migrate existing models for later use in the use cases;
- end users (modellers and users from the competent authorities) who will use and evaluate the migrated models in solving operational integrated water management problems.

Whereas training for the first target group was successfully trialled during the HarmonIT project, the training for the second group represents a challenge, as the users, their skills and requirements are very diverse.

Besides guaranteeing a sufficient level of training for the partners to run their use cases on the Scheldt and Pinios basins, it is also the objective of Task A to develop the basis for the OpenMI Association's training programme which the Association can take on into the future after OpenMI-Life.

3.2.2. Progress

A first set of training sessions has been completed for both target groups and for both Demonstration Basins. Please see Table 1 of Section 2 for details on the dates and attendees.

The post course feed-back has so far indicated that the training provided a sufficient basis for starting the migration work. However, some of the partners (especially those developers who are less familiar with Object Oriented Programming) will require support while migrating their first models. That support is in place and all attendees should now know how it can be accessed.

3.2.3. Issues

Although end users are interested in the general principles of the OpenMI and need to understand them, their primary concern naturally relates to the specific models they will be linking. It is, of course, difficult for the trainers to have detailed knowledge of all the models that might be linked and, more particularly, to know when it is scientifically valid to link two models. Future courses will need to address this problem. Options may be to involve the model developers, to ask them to provide the training or to develop a course on the scientific aspects of linking models.

3.2.4. Plan and objectives for next period

A second set of training sessions with the aims of introducing new users and providing information about recent updates will be organised during the second year of the project. Detailed objectives and an agenda for this second set of courses will be discussed during the next six months.

3.3. TASK B – DEMONSTRATE THE OPENMI IN THE SCHELDT BASIN

3.3.1. Objectives

The objectives of the first period (October 2006 – March 2007) were :

- to define the Scheldt use cases
- to make the models required OpenMI compliant.

3.3.2. Progress

Four use cases have been proposed for the Scheldt:

- Use Case 'a' - 'Linking a sewer flow model to a river flow model' : definition report completed,
- Use Case 'b' - 'Linking two (different) river flow models' : definition report completed,
- Use Case 'c' -'Linking two river flow models to a river quality model' : definition report completed,
- Use Case 'd' - 'Linking a 1D river flow model to a 2D estuary model' : definition report completed.

Six models are required for the Scheldt use cases.

- InfoWorks CS which is already OpenMI compliant,
- InfoWorks RS which is already OpenMI compliant,
- MIKE11 which is already OpenMI compliant,
- PEGASE which is not yet OpenMI compliant. PEGASE is a UNIX based model and UNIX is not yet a supported platform for the OpenMI. Therefore it has been decided to develop a .net version and then migrate the .net version to the OpenMI. It is currently forecast that this will take until the end of 2007 to complete.
- Waqua which is expected to be OpenMI compliant by the end of June 2007.

- Delft3D which is already OpenMI compliant, has been upgrade for OpenMI-Life to enable it to exchange a greater range of quantities (modelled variables).

3.3.3. Issues

Considerable effort was put into preparing the use case definitions; however, the outcome of a brief review was that this effort was well spent and should enable the next stages to progress smoothly. The process had followed the recommendations in the Guidelines which had worked well.

It has been recognised that the use case definitions need to be living documents that they may well develop as the project proceeds.

Since the proposal was written, the issues surrounding the linking of models running on different platforms have become better understood, though the resources have not yet become available to release a full UNIX version of the OpenMI standard. For the OpenMI-Life project, it has therefore been decided to work only in the .net environment. An important consequence of this decision is that the ULG model, PEGASE, needs to be converted to the .net environment. This will require additional effort but should not cause a delay as the task is not on the critical path. ULG has already started the preparatory work necessary for the PEGASE model to become linkable with the river flow models InfoWorks RS and MIKE11.

3.3.4. Plan and objectives for next period

The objectives for the next period (April 2007 – September 2007) are :

- to complete making the models OpenMI compliant;
- to install the OpenMI compliant versions of the models on a PC and to validate them running independently against simple use cases;
- to make changes to the models as necessary;
- to model the use case problems with the models unlinked;
- to link the models and to perform the first tests of linked running. This last objective is not expected to be achieved for use case 'c'.

3.4. TASK C - DEMONSTRATE THE OPENMI IN THE PINIOS BASIN

3.4.1. Objective

The sustainability of the Thessaly area natural and built environments depends greatly on quantity and quality of water in the Pinios. All three scenarios included in the OpenMI-Life Pinios study use the OpenMI technology to facilitate the integration of in-house developed models with suitable models of other developers in order to successfully represent the different processes that interact in the basin. The three case studies focus on different water management issues: Use Case 1 involves the linking of a rainfall runoffmodel to a hydraulic model and to a quality model, in order to assess the impact of point sources of pollution, mainly from industry but also from municipal wastewater, along the Pinios. Use Case 2 combines a rainfall runoff model with a reservoir water management model to investigate the effect of climate change on the reliability of Smokovo reservoir. Finally, Use Case 3 evaluates the

sustainability of Lake Karla by linking a hydrological model to a groundwater model. More specifically, the objectives of Use Case 3 are: (i) to incorporate the OpenMI interface into the integrated water resources modeling system, (ii) to define an integrated water resources simulation system to facilitate the study the water balance of Lake Karla basin and the assessment of surface and groundwater resources, and (iii) to use the integrated water resources system to define a sustainable water resources management plan for the study area after the restoration of Lake Karla.

3.4.2. Progress

For Use Case 1, the in-house hydraulic model that will be used has been modified to solve the Saint-Venant equations using the implicit finite difference method, allowing for a larger time-step and providing more stable results than could previously be obtained. The migration process for the hydraulic model RISH-1D is in hand. Data have been collected for the Pinios basin from different sources including field surveys, Competent Authorities, the Greek National Data Base, the Ministry of Development and the Public Power Corporation. Since the data come from so many different sources, a quality control process is under way to exclude the data that may not support the goals of the study. The use case has been defined and a MIKE-11 model is currently being set up in the area.

In Use Case 2, a simple reservoir model has been developed and migrated in order to learn about the OpenMI migration process. Use Case 2 has been defined and the Simple Reservoir Model modified and upgraded to a Reservoir Management Model, which was easily made OpenMI compliant. The Reservoir Management Model has been linked in real-time with the Simple River rainfall runoff model and a basic but realistic water use scenario has been examined. Two test runs have been conducted; in the first run, the models were not linked while, in the second run, the models were connected in real time. The simulation results of both runs proved that the linking was successful.

For Case Study 3, the following steps have been performed:

- Data collection from local authorities and their assembly into a harmonized database (rainfall and temperature data, piezometric heads of boreholes, hydraulic conductivity values, land uses, geological formations, irrigation zones, water consumption values etc.)
- Identification of models to be used. The monthly conceptual water balance UTHBAL model (Loukas et al., 2003) has been adopted for assessing surface water resources and deep infiltration at monthly time scale. The Visual Modflow model is to be used for assessing groundwater resources.
- Preliminary application and evaluation of the stand-alone models
- Identification of additional spatial and temporal data requirements
- Definition of hardware requirements, links among the various models and harmonization of data formats
- Wrapping the UTHBAL model in lumped mode within OpenMI framework

3.4.3. Issues

The following issues were addressed during the migration process of Use Cases 1 and 2:

a. Finding suitable reliable data from among the different data sets available and deciding how to deal with the periods where data were missing.

b. Deciding how to replace the initial choice of rainfall-runoff model (MIKE-SHE), when the programme for migrating MIKE-SHE was delayed. After discussion, MIKE-11 was adopted.

c. Upgrading the NTUA hydraulic model to provide more stable results and to allow for larger time steps.

Use Case 3 faced similar issues, in particular, the lack of daily data had to be addressed.

3.4.4. Plan and objectives for next period

The following goals have been set for the next period:

Use Case 1
a. Complete the quality control of the rainfall and stage data, wherever not complete.
b. Finish the migration of the modified hydraulic model, RISH-1D;
c. Set up MIKE-11 rainfall-runoff models to compute the inflow to the main Pinios stream from the significant tributaries upstream of Larissa;
d. Link the MIKE-11 and RISH-1D models using the OpenMI and make an initial evaluation of the linked models

Use Case 2
a. Set up a MIKE-11 model to simulate the rainfall runoff (NAM Module) upstream of the reservoir.
b. Account for specific climate change scenarios by modifying precipitation and evapotranspiration data (input variables)
c. Evaluate the optimum operation rules for the existing and future conditions

Use Case 3
a. Create a distributed version of the UTHBAL model of the Lake Karla watershed
b. Couple the UTHBAL and Visual Modflow models using the OpenMI interface
c. Test and evaluate the OpenMI interface
d. Apply the linked UTHBAL and Visual Modflow models to the use case
e. Evaluate the Lake Karla restoration's effect on surface and groundwater resources

3.5. TASK D – DEMONSTRATE THE OPENMI TECHNICAL SUPPORT, MAINTENANCE AND CO-ORDINATION

3.5.1. Working procedures and protocols

The first versions of the protocols for managing the development and maintenance of the OpenMI were published in December 2006; they define procedures for:
- source control
- versioning
- testing
- releases
- handling change requests
- bug reports
- programming style.

The document is a living document and the procedures described will be regularly reviewed and updated by the OpenMI Association Technical Committee. The management protocol can be downloaded from: http://www.lictek.dk/openmi/Management%20Protocol%20Report.doc. It will be transferred to the Association web site as soon as practicable.

3.5.2. Building the support organisation for the OpenMI

It is an objective of the LIFE project to put in place a support organisation for the OpenMI. This organisation is to be called The OpenMI Association. Tasks D, E and F are actively involved in the process of its establishment and will provide the staff and resources to carry out its duties until it is a self sustaining organization.

The overall objective for the organisation is: "*The promotion of the development, use, management and maintenance of the Open Modelling Interface (the OpenMI), a standard for the exchange of data between computer software for environmental management*". A draft strategy document: "*Foundation of an Association*" has been prepared and is currently being reviewed by the founders. Until the OpenMI Association is formally established, the OpenMI-Life project is being supported by an interim organisation with a structure mirroring that proposed for the Association. An Executive Committee and two sub-committees, one covering dissemination and the other covering technical issues, have been established and are already taking care of the day to day management of the OpenMI website and OpenMI technical issues, respectively. This work is covered by tasks F, E and D.

3.5.3. OpenMI Association Executive Committee

The interim OpenMI Association Executive (OAEC) Committee had its first meeting on October 3rd 2006 immediately prior to the OpenMI-Life kick-off meeting. The next meeting will take place on April 17th 2007 prior to the 1st OpenMI-Life workshop in Antwerp. The main issues for the OAEC have been drafting the foundation document, deciding in which country to base the organisation, establishing a legal entity and further developing transatlantic co-operation.

3.5.4. OpenMI Association Dissemination Committee

The OpenMI Dissemination Committee (OADC) had a short meeting in February in Athens and the next meeting will take place on April 16th in parallel with the 1^{st}OpenMI-Life workshop in Antwerp. The OADC has reorganized the OpenMI website (http://www.openmi.org/openminew/) and will continue this work during the next period. It will then develop a dissemination strategy for the OA

3.5.5. OpenMI Association Technical Committee

The OpenMI Association Technical Committee (OATC) has had three working meetings, one in December (13th -14th), one in January (22nd-23rd) and one in March (5th-7th). Five three days working meetings are planned for the remainder of 2007. The minutes of the meetings for the Technical Committee are available on www.lictek.com/OpenMI. The OATC carries out its work using an iterative development approach. At every meeting, use cases from the OpenMI-Life project are reviewed in order to ensure that the developments to the OpenMI support the use cases. Change

requests placed on the OpenMI change request forum (http://sourceforge.net/projects/openmi/) are also discussed. Comments are then added to these requests so the requesting party can see if a request is accepted and, if so, in which OpenMI version the requested features are expected to be released (see http://www.lictek.com/OpenMI/OpenMIFeatureRequests.html).

The implementation tasks are distributed among the OATC members and the work is carried out in the period between the meetings.

The OATC is working along two tracks, OpenMI 1.n and OpenMI 2.n. The OpenMI 1.n track involves minor changes and bug fixes to the released version of the OpenMI (currently 1.2). A detailed description of the OpenMI 1.4 release has been completed and will be discussed by the OpenMI Executive Committee meeting in April; the release is expected to take place in July 2007. The OpenMI 2.n will represent a major upgrade of the OpenMI architecture with the focus on improved stability, flexibility, and computational performance, in order to meet the demands of large integrated modelling systems such as will be used for the Scheldt use cases. The first draft of the overall architecture for OpenMI 2.0 is completed. The main task for the next period is to upgrade all the supporting software tools and compliant models to the OpenMI 2.0 specification. During this process, the new standard is likely to require adjustment and as will the supporting tools. We will continue this process until a reasonably stable version is achieved. OpenMI 2.0 will then be released for internal use in the OpenMI-Life project around summer 2008 and a final public release is expected by the end of the OpenMI-Life project.

The amount by which computational performance is reduced when numerical models are run within OpenMI linked systems has been one of the most frequently asked questions by OpenMI users and potential users. The OATC made a detailed investigation of OpenMI performance, which showed that the increase in time spent on data exchange, even for bigger models exchanging large amounts of data through the OpenMI, was small and that the time spent on data exchange was of the order 3% of the model's total computational time. The full draft report is available on: http://www.lictek.dk/openmi/Meetings/Meeting04/Performance.doc

OATC answers questions raised on the OpenMI help forum on a daily basis.

SECTION 4.   PROBLEMS ENCOUNTERED

Project progress is monitored continuously by the Task leaders and three to four times a year by the Steering Committee. There were no significant problems encountered or deviations from the work plan during the reporting period. All the partners are working well together and making good progress on their Task objectives.

It is the objective of OpenMI-Life to move the OpenMI from the research environment to the operational sphere. It is anticipated that there will be problems in this process. It is the express purpose of OpenMI-Life to identify and solve them before the OpenMI goes out to the wider world.

SECTION 5.   DISSEMINATION (TASK E)

5.1.   OBJECTIVE

The objective of the OpenMI-Life dissemination activities is to plan and implement a dissemination programme that will include:

- reviewing the OpenMI user community identified in HarmonIT
- maintaining and extending awareness of the OpenMI in its potential European and global user communities
- identifying the most effective media for communication with each group within the community
- planning a dissemination programme together with opportunities for external evaluation and feed back
- implementing the programme

The dissemination deliverables are a best practice manual, papers and journals, press articles, conference presentations, OpenMI-Life and OpenMI Association websites, workshops, leaflets, posters, and a layman's report.

The dissemination task is split into two parts. One covers the dissemination of information about the OpenMI and the other covers the dissemination of information about the LIFE project. The former is being run by the Dissemination Committee of the provisional OpenMI Association.

5.2.   PROGRESS

The goals of the OpenMI-Life dissemination task as set out in the proposal have been reviewed and found to be still valid. An OpenMI-Life website has been set up and the OpenMI Association website has been reviewed and upgraded - further information on the websites can be found in Section 5.6. As high quality documentation with a distinct style will be important to achieving the effective dissemination of information about the OpenMI, a project logo and templates for slides and reports have been designed and distributed. The logo has been registered in the UK and will be registered through the Madrid Protocol one year after the UK registration date. A Members Only area has been created on the OpenMI-Life website to upload material and to support the communication and exchange of information between partners. Successful internal communication is regarded as an essential step, prior to sharing information with the wider community.

5.3.   ISSUES

No special concerns exist regarding dissemination at this point.

5.4.   PLAN AND OBJECTIVES FOR NEXT PERIOD

The planning and successful production of the dissemination deliverables relating to the LIFE project itself (as distinct from those which relate to the OpenMI Association and are the responsibility of the OATC) are the responsibility of the OpenMI-Life Steering Committee (SC). During the SC meeting of 19th April 2007, the Dissemination plans for the next period will be discussed. The Dissemination deliverables that will be addressed in the coming period are:

(a) The multilingual website option
(b) An OpenMI-Life website update to include presentations from the 1st Workshop
(c) An OpenMI-Association website update to include the latest migrated models and the progress of the Technical group
(d) A newsletter
(e) At least two conference presentations

The multilingual aspects of the website will be developed in stages as the partners have little experience in this area; as a first step, the NTUA will prepare a Greek version of the OpenMI-Life website. This will be of immediate value to the Greek partners, not all of whom speak English fluently. If the exercise is successful, other language versions will be contemplated.

The first Newsletter with information about the OpenMI-Life case studies will be ready by the end of July. The Newsletter will be available to download from the OpenMI-Life and OpenMI Association websites. To stream-line dissemination and communication, the partners will make a data base of key contacts.

Conferences are an important means of communicating with many of the OpenMI's users and potential users. The SC Committee will therefore have conference attendance as a permanent item on its agenda.

5.5. PUBLICATIONS

Scientific papers, conference papers, presentations and articles in the popular scientific press are all regarded as valuable vehicles for disseminating information about the OpenMI to the potential user community. All partners are actively encouraged to publish and a full list of publications is given in Appendix 4 .

5.6. COMMUNICATION (WEBSITE)

A website has been created for the project, which may be found at http://www.OpenMI-Life.org. It provides the following functionality to the participants, registered users and the public:

- Home page with links to:
    - A project overview
    - History of the OpenMI
    - A detailed description of the work
    - A list of project partners
    - Documents
    - News and events
    - Links

There are also options for registering, member services and 'What's new'.

- The member services section gives password protected access to the following facilities:
    - View documents
    - Add documents

- o Change your profile
- o Announcements
- o Search registered users
- o Discussion forum
- o Action list

The site is well used and is proving to be an important and effective means of communication. It is also under a continuous process of development.

A separate website (www.openmi.org/openminew) has been set up to promote the OpenMI Association. Its content is aimed at the end users of the OpenMI Standard and explains the concepts of the OpenMI Standard and Environment in varying levels of detail. An introduction to the OpenMI is provided in the "Getting Started" section, while separate sections contain the full specifications. There are links to the SourceForge CVS facility, so that users can download the latest version of the OpenMI source code and the OpenMI Document Series (technical documentation). An FAQ section provides answers to questions often posed to the developers of the OpenMI. There are also links to relevant activities and projects. The site features full-text search facilities and a calendar of upcoming OpenMI-related events and conferences. Finally, users can register themselves in order to receive news updates and take part in the OpenMI User Community.

SECTION 6.   ENVISIONED PROGRESS UP TO 30TH SEPTEMBER 2007

This section provides a summary of envisioned progress up to 30/09/2007. For full details of progress in each task see sections 5 and 7 above.

In Task A, apart from picking up the lessons learned from the first training courses, providing support and responding to any immediate training needs arising from, for example, staff changes or external requests, no significant activity is planned for the next period.

The aim of the teams working on Tasks B and C, the Scheldt and Pinios demonstrations, will be to complete their preparatory work of making models OpenMI compliant. They will then move on to run their models first separately and then in linked mode. The primary purpose of these runs will be to validate the models before moving on to the first of the three monthly cycles where they 1) agree objectives with Task D (representing the OpenMI Association); 2) if appropriate, take up the latest OpenMI modifications from Task D and/or model modifications from developers; 3) implement any changes in the models; 4) run/re-run the models; 5) analyse; 6) evaluate and 7) if appropriate, submit change requests to the Developers, who may then make change requests to Task D. The objective is to evaluate the benefits of integrated modelling, the OpenMI and the support organisation. There are no formal milestones or deliverables arising in the period but preparatory work should be complete and the first cycle well underway by the end.

Task D, the Demonstration of the OpenMI technical support, maintenance and co-ordination has as its major objective the formal establishment of the OpenMI

Association as a legal entity. All legal processes are slow, especially those requiring international agreement, so a back up plan will be prepared in case there is slippage.

Whatever happens on the legal front, the provisional OpenMI Association will continue to operate and its main task is to develop a strategy for the OpenMI's support and development.

Task D will also continue to support the OpenMI users, issue upgrades and bug fixes for the OpenMI Version 1 and work on the development of Version 2. There are no formal deliverables or milestones in the period but the main objective with respect to the OpenMI will be the release of Version 1.4.

Task E, Dissemination, will have as its major task the preparation of a dissemination strategy for the OpenMI Association. However, while this is being developed, it will have the ongoing task of maintaining and developing the project and Association websites and ensuring that the project and the Association maintains its profile amongst its user community.

SECTION 7.   FINANCIAL ISSUES

Table 2 shows the project costs for all partners incurred since the start of the project up until 31/03/2007.

Table 2 Project costs incurred

	Cost category	Total cost according to the Commision's decision	Costs incurred from the start date to 31/03/2007	%
1.	Personnel	2,660,632	379,763	14.3
2.	Travel	544,450	29,529	5.4
3.	Outside assistance	422,080	1,252	0.3
4.	Durables: total non-depreciated cost			
	- *Infrastructure sub-tot.*	0	0	0
	- *Equipment sub-tot.*	50,800	1,252	2.5
	- *Prototypes sub-tot.*	0	0	0
5.	Consumables	10,000	0	0
6.	Other costs	54,500	8,005	14.7
7.	Overheads	260,194	29,812	11.5
	SUM TOTAL	**4,002,656**	**455,712**	**11.4**

The major item in the project costs is staff time and the expenditure here is in line with the expected rate of spend. Overall, the project is slightly under spent at this point. The partners are comfortable with this as they would like to build a reserve to deal with the inevitable challenges that lie ahead.

SECTION 8.   PROGRESS AND PLANNED ACTIVITIES

At present, the project is, overall, on schedule. The current plan is shown in the Gantt chart in Figure 2. An expanded version of the plan can be found in the Proposal.
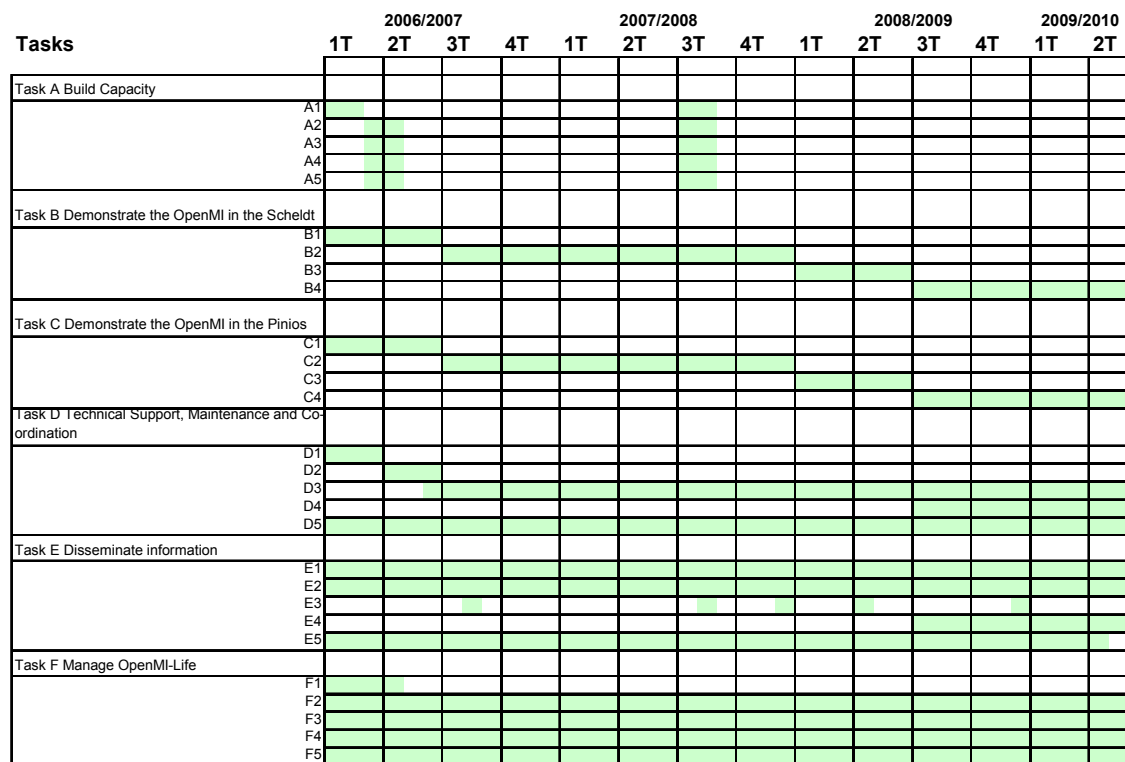
Tasks	2006/2007				2007/2008				2008/2009				2009/2010	
	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T
Task A Build Capacity														
A1														
A2														
A3														
A4														
A5														
Task B Demonstrate the OpenMI in the Scheldt														
B1														
B2														
B3														
B4														
Task C Demonstrate the OpenMI in the Pinios														
C1														
C2														
C3														
C4														
Task D Technical Support, Maintenance and Co-ordination														
D1														
D2														
D3														
D4														
D5														
Task E Disseminate information														
E1														
E2														
E3														
E4														
E5														
Task F Manage OpenMI-Life														
F1														
F2														
F3														
F4														
F5														

Figure 2 Overview of the OpenMI-Life Work plan

SECTION 9.   APPENDICES

Four Appendices are provided below giving information on the following topics:

- Project Summary for OpenMI-Life
- Task Deliverables and their Status
- Participant Information
- Publications

Project Name: Bringing the OpenMI to Life
Grant Agreement: LIFE06 ENV/UK.000409
Version: Progress Report No. 1 - 1st October 2006 – 31st March 2007

APPENDIX 1 PROJECT SUMMARY FOR OPENMI-LIFE

The goal of OpenMI-Life is to support the implementation of the Water Framework Directive (WFD) and, more particularly, make integrated water management feasible. This requires an ability to predict not only how individual catchment processes will respond to 'programmes of measures' but also to foresee how those processes will interact with each other. Prediction is achieved through the use of models but until the development of the OpenMI, no generic open practical mechanism existed that could link together models of different processes from different suppliers running on different machines – see State-of-the-Art section. HarmonIT, funded by FP5, has developed and proved the highly innovative concept of the Open Modelling Interface, which solves this complex problem. OpenMI-Life will demonstrate how it can be deployed, used, supported and funded at the operational level on real world scale problems. This demonstration will be conducted in co-operation with Competent Authorities in two Pilot River Basins, the Scheldt and the Pinios. It will also show how requests by users for changes to the interface will be handled and implemented. It is the intention that the procedures and systems demonstrated and refined in this project will continue after the project. The long term aim is that the OpenMI should become the European and global standard for model linking in the environmental domain.
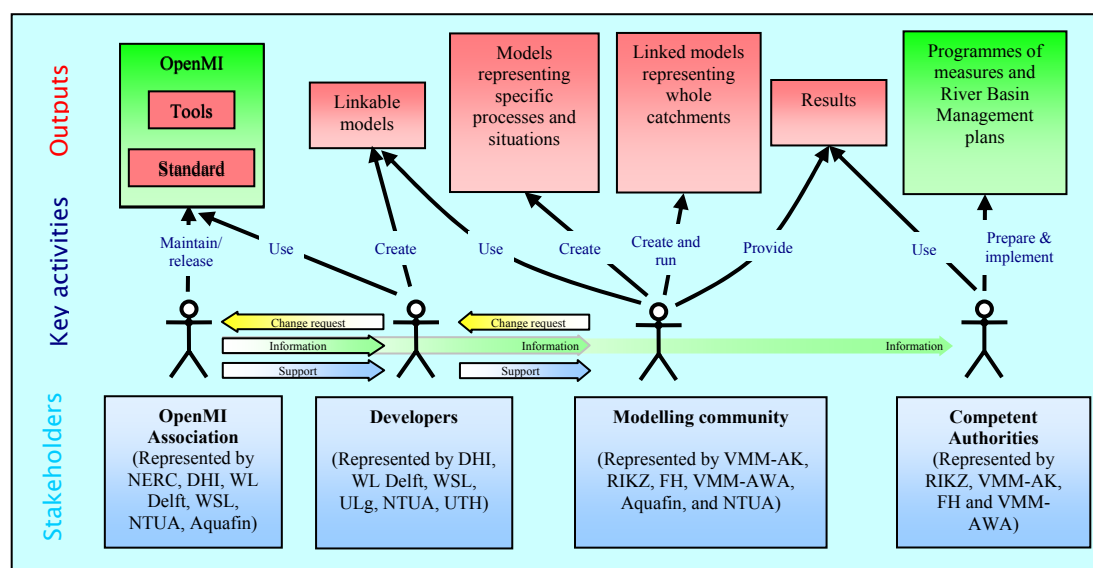

Figure 3 Simplified view of stakeholders and their involvement in the use, maintenance and dissemination of the OpenMI

Figure 3 illustrates the key stakeholders, procedures and products involved in the use, evolution and maintenance of the OpenMI. The tasks listed below are designed to demonstrate the OpenMI and these procedures working at an operational level. It is anticipated that the project will identify the need for change both in the OpenMI and the support procedures. The demonstration will show that both types of request can be handled in a sustainable way. Listed below are the main tasks involved in staging the demonstration:

A)Build capacity : For the OpenMI to become widely adopted there must be a core of knowledgeable modellers. This task will create and deliver training courses to

developers, modellers and users in the Competent Authorities of the Scheldt and Pinios and the wider modelling community if resources permit.

B)Demonstrate the OpenMI in the Scheldt and C) the Pinios river basins : The Scheldt and Pinios are Pilot River Basins where implementation of the WFD is being trialled. Both basins contain problems whose management requires an integrated approach and hence the use of linked models. The Competent Authorities of these basins will identify a range of problems. The modelling community will use models linked by the OpenMI to perform an integrated analysis of the problems and indicate the likely outcomes of different policies to the Competent Authorities. Model providers will upgrade the relevant models to be OpenMI-compliant so that they can be linked. The OpenMI Association will maintain and support the OpenMI making new releases in response to requests for change. An evaluation report will assess the value of a) integrated modelling and b) the OpenMI and its support organisation.

D)Demonstrate the OpenMI technical support, maintenance and co-ordination : The success of the OpenMI as a standard depends upon its widespread adoption at the European level. However, its use requires a small but significant degree of investment by developers. Therefore, it will only be taken up if there is confidence that it will be supported and maintained into the future. This task will identify and test a sustainable support and co-ordination organisation. The demonstration will begin using the current open source version of the OpenMI, the research output of HarmonIT. It is expected that this will not satisfy all the user needs. The resulting change requests will be used to exercise all aspects of the support organisation including the periodic release of new open source versions of the OpenMI standard and its supporting software and documentation.

E)Disseminate information : Global awareness of the OpenMI has been achieved in the water modelling community. If the OpenMI is to be widely adopted, it is essential that this is maintained and, ideally, extended into other domains. This task will confirm the target community and the best media for communication. It will then use those media to deliver appropriate information about the OpenMI and the benefits of integrated modelling.

F)Manage OpenMI-Life : The transformation of an IT product is a complex task involving risk. Substantial time will be allocated for active monitoring and management. A risk management plan is in place.

Figure 3 shows the OpenMI-Life participants and the stakeholder roles they will represent in the demonstration. The '**Competent Authorities**' responsible for implementing the WFD and IWM are represented by VMM-AK, FH, VMM-AWA and RIKZ who are, in their domains, the competent authorities for the Scheldt Basin. They are actively involved in the preparation of programmes of measures and the development of River Basin Management Plans. VMM-AK and RIKZ are leading members of the International Scheldt Commission. They have also been members of the Interreg III Scaldit project, which tested the implementation of the WFD. VMM-AK, RIKZ, FH, VMM-AWA, Aquafin, and NTUA represent the **modelling community**. VMM-AK, RIKZ, FH, VMM-AWA are regulators and Aquafin is the company responsible for waste water treatment for the whole of Flanders. All actively own and use models to analyse water management problems and *are anxious to know*

if integrated modelling will lead to better, more integrated solutions to water management problems. DHI, WL Delft, and WSL represent the major commercial **model developers** in Europe and probably the world. ULg, NTUA and UTH are academic developers, many of whose models have been taken up commercially. In the demonstration, the developers will interact with the modelling community and the OpenMI Association as they would in a real world context. Their motivation is to understand the opportunities and the threats that the OpenMI creates together with the costs and savings. They will receive requests for change to their models from the modelling community. If these requests require a change to the OpenMI, they will pass them to the **OpenMI Association** represented by NERC, DHI, WL Delft, WSL, AQUAFIN and NTUA. These organisations have been responsible for leading the €6M FP5 HarmonIT project that created the OpenMI and have planned the support organisation. NERC, DHI, WL Delft and WSL all have experience of maintaining standards and software on a national and international basis. All have a long term interest in and understanding of water management. NTUA managed the global dissemination programme for HarmonIT. Their collective interest is to be sure that the proposed support organisation is viable.

The OpenMI-Life project will be led by **the UK Natural Environment Research Council (Centre for Ecology and Hydrology) (NERC),** a world class research organisation with over 2500 staff and turnover in excess of €420M. Its science programme covers most aspects of the natural environment and related technologies; of particular relevance to OpenMI-Life are: hydrology, ecology, integrated management (especially of water resources), sustainable economies, modelling, data management, database design and environmental informatics. NERC works with both the public, private and academic sectors and has extensive experience of managing large national and international projects. It is committed to the delivery of its science to the user community and the market place. NERC has successfully led and managed the 14 partners from 7 countries, who developed the OpenMI over 4 years through the €6M FP5 HarmonIT project (Contract No EVK1-CT-2001-00090), delivering it on time and to budget.

Of the participants, NERC, VMM-AK, FH, VMM-AWA and RIKZ are publicly funded national bodies. NTUA, ULg and UTH are Universities and Aquafin, DHI, WSL and WL Delft are non profit companies. All the partners have participated in many past and current EC projects. Much of their recent contribution has been underpinning research for the Water Framework Directive. VMM-AK and NTUA are representing the Pilot River Basins where the WFD is being trialled. The two most relevant projects are the FP5 HarmonIT and Interreg III Scaldit.

APPENDIX 2 TASK DELIVERABLES AND THEIR STATUS

The table below shows a detailed list of the Task deliverables and their status.

Task Deliverables and their status

Deliverable No [3]	Deliverable title	Delivery date [4]	Status
TaskA/1	Training material	35	Ongoing
TaskA/2	Training course 1 on OpenMI concepts for end users	3	Completed
TaskA/3	Training course 2 on OpenMI concepts for end users	20	Not started
TaskA/4	Training course 1 on OpenMI upgrades for developers	3	Completed
TaskA/5	Training course 2 on OpenMI upgrades for developers	20	Not started
Task B/1	Defined Use Cases	5	Completed
Task B/2	Models migrated to use the OpenMI Interface	5	Ongoing
Task B/3	Evaluation report on integrated modelling using the OpenMI (from user and developer perspectives)	35	Not started
Task B/4	Evaluation report on the OpenMI from a user perspective	35	Not started
Task B/5	Evaluation report on the OpenMI support organisation from user perspective	35	Not started
Task C/1	Defined Use Cases	5	Completed
Task C/2	Models migrated to use the OpenMI Interface	5	Ongoing
Task C/3	Evaluation report on integrated modelling using the OpenMI (from user and developer perspectives)	35	Not started
Task C/4	Evaluation report on the OpenMI from a user perspective	35	Not started
Task C/5	Evaluation report on the OpenMI support organisation from user perspective	35	Not started
Task D/1	Management protocol report	2	Ongoing
Task D/2	6-Monthly software releases of OpenMI upgrades	Approx 6 monthly intervals	Ongoing
Task D/3	6-Monthly document addenda	Approx 6 monthly intervals	Ongoing
Task D/4	Final documentation release of the updated OpenMI	35	Not started
Task D/5	Evaluation report from OpenMI coordination perspective	35	Not started
Task D/6	Maintained OpenMI website	35	Not started
Task D/7	Business plan (Including After LIFE Communication report)	35	Not started
Task E/1	Best practice manual		Not started
Task E/2	Papers and Journals (6), e.g. Journal of HydroInformatics.		Not started
Task E/3	Press articles (8)		Not started

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[3] Deliverable numbers in order of delivery dates: D1 – Dn

[4] Month in which the deliverables will be available. Month 0 marking the start of the project, and all delivery dates being relative to this start date.

Project Name: Bringing the OpenMI to Life
Grant Agreement: LIFE06 ENV/UK.000409
Version: Progress Report No. 1 - 1st October 2006 – 31st March 2007

Deliverable No[3]	Deliverable title	Delivery date[4]	Status
Task E/4	Conference presentations (6), e.g. HydroInformatics and iEMSs		Started
Task E/5	OpenMI-Life web site (multi-lingual)		Ongoing
Task E/6	Workshops(5)		Ongoing
Task E/7	Associate with existing newsletters (3),e.g. Rivers List, IAHS, etc.		Not started
Task E/8	Leaflets (4, multi-lingual)		Started
Task E/9	Posters (4)		Started
Task E/10	Layman's report		Not started
TaskF/1	The Collaboration Agreement	3	Complete – collating all signed copies
TaskF/1	1st Progress Report to EC	7	Complete
TaskF/2	2nd Progress Report to EC	13	Not started
TaskF/3	3rd Progress Report to EC '(Mid-term Report')	19	Not started
TaskF/4	4th Progress Report to EC	24	Not started
TaskF/5	5th Progress Report to EC	31	Not started
TaskF/6	6th Progress Report to EC '(Final Report')	40	Not started
TaskF/7	Miscellaneous reports required by the EC	As required	Not started

APPENDIX 3 PARTNER INFORMATION

			TASKS A-F	CONTRACT	STEERING COMMITTEE	TECHNICAL COMMITTEE
Chairman CEH Wallingford, UK	Mr. Roger V. Moore CEH Wallingford Wallingford Oxon OX10 8BB. UK	Tel: +44 (0)1491 692235 Fax: +44 (0)1491 692424 Email: rvm@ceh.ac.uk	A, B, C, D, E, F	✔	✔	
Secretary CEH Wallingford, UK	Ms. Isabella Tindall CEH Wallingford Wallingford OX10 8BB. UK	Tel: +44 (0)1491 692205 Fax: +44 (0)1491 692424 Email: cit@ceh.ac.uk	A, B, C, D, E, F	✔	✔	
DHI Water and Environment, Denmark	Dr. Jan Gregersen representing DHI Water and Environment Agern Allé 11 DK-2950 Hørsholm Denmark Own company: LicTek, Tingstedet 8, DK-4070, Kirke Hyllinge, Denmark	Tel: +45 4640 3626 Fax: +45 4516 9292 Email: Gregersen@LicTek.dk	A, B, C, D, E, F	✔	✔	✔
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WL | Delft Hydraulics, The Netherlands	Mr. Jaco Stout WLDelft Hydraulics P.O. Box 177 2600 MH Delft The Netherlands	Tel: +31 15 285 87 63 Fax: +31 15 285 87 11 Email: jaco.stout@wldelft.nl	A, B, D, F	✔	✔	
WL | Delft Hydraulics, The Netherlands	Mr Stef Hummel WLDelft Hydraulics P.O. Box 177 2600 MH Delft The Netherlands	Tel: +31 15 285 85 09 Fax: +31 15 285 85 82 Email: stef.hummel@wldelft.nl	D			✔

Project Name: Bringing the OpenMI to Life
Grant Agreement: LIFE06 ENV/UK.000409
Version: Progress Report No. 1 - 1st October 2006 – 31st March 2007

			TASKS A-F	CONTRACT	STEERING COMMITTEE	TECHNICAL COMMITTEE
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NTUA National Technical University of Athens, Greece *Pinios partner*	Dr. Ria Safiolea (Contact person) NTUA Iroon Polytechniou 5 157 80 Athens, Greece	Tel: +30 210 772 2885 Fax: +30 210 772 2879 Email: safiolea@chi.civil.ntua.gr	A, C, D, E	Send to Maria Kalliampakou (financial & admin) mkalli@chi.civil.ntua.gr	✔	
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			TASKS A-F	CONTRACT	STEERING COMMITTEE	TECHNICAL COMMITTEE
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Aquafin Belgium	Gunther Waterschoot Aquafin Dijkstraat 8 2630 Aartselaar Belgium	Tel. +32 3 450 40 88 Fax +32 3 450 41 85 Email : gunther.waterschoot@aquafin.be	B			
VMM Vlaamse Milieumaatschappij Belgium *Scheldt partner*	Ir. Yves Ronse DVP Waterkwaliteitsmodellering VMM - Afdeling Kwaliteitsbeheer Werkadres : Gasthuisstraat 42, 9300 Aalst Postadres : A. Van de Maelestraat 96, 9320 Erembodegem	Tel : +32 53 72 66 31 Fax : +32 53 72 66 30 E-mail : y.ronse@vmm.be	A, B, D, E, F	✔	✔	
VMM Vlaamse Milieumaatschappij Belgium *Scheldt partner*	Mr. Tom D'Heygere DVP Waterkwaliteitsmodellering VMM - Afdeling Kwaliteitsbeheer Werkadres : Gasthuisstraat 42, 9300 Aalst Postadres : A. Van de Maelestraat 96, 9320 Erembodegem	Tel : + 32 53 726578 Fax : +32 53 72 66 30 E-mail: t.dheygere@vmm.be	A, B			
VMM Vlaamse Milieumaatschappij Belgium	Mr. Gunther De Mey VMM - Afdeling Kwaliteitsbeheer Werkadres : Gasthuisstraat 42, 9300 Aalst	Tel : + 32 53 72.63.26. Fax : + 32 53 72.62.31. Email : g.demey@vmm.be	B, E, F	✔	✔	

			TASKS A-F	CONTRACT	STEERING COMMITTEE	TECHNICAL COMMITTEE
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FH Flanders Hydraulic Research Belgium *Scheldt partner*	Mr. Hans Vereecken Vlaamse Overheid - Departement Mobiliteit en Openbare Werken Afdeling Waterbouwkundig Laboratorium Berchemlei 115 | B-2140 Borgerhout	Tel: + 32 3 224 61 89 Fax: + 32 3 224 60 36 Email: hans.vereecken@mow.vlaanderen.be	A3, B2, B3, B4, E	✓	✓	
FH Flanders Hydraulic Research Belgium *Scheldt partner*	Mr. Peter Viaene Vlaamse Overheid - Departement Mobiliteit en Openbare Werken Afdeling Waterbouwkundig Laboratorium Berchemlei 115 | B-2140 Borgerhout	Tel: + 32 3 224 61 83 Fax: + 32 3 224 60 36 Email: peter.viaene@mow.vlaanderen.be	A3,B2, B3, B4, E			
VMM Vlaamse Milieumaatschappij Afdeling Water Belgium *Scheldt partner*	Dhr. Kris Cauwenberghs Vlaamse Milieumaatschappij Afdeling Water Graaf de Ferraris-gebouw Koning Albert-II laan 20 1000 Brussel	Tel: +02 553 21 29 Fax: +02 553 21 05 Email: kris.cauwenberghs@lin.vlaanderen.be	A, B, E	✓	✓	
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ULG University of Liege Belgium	Ir. Jean-Francois Deliege Centre de l'Environnement - Aquapôle : Sart Tilman B53	Tel: +32 (0) 4 366.23.56 Fax: +32(0) 4 366.23.55 Email: jfdeliege@ulg.ac.be	A3, A5, B1, B2, B3, B4, E1, E3, F1,	✓	✓	

			TASKS A-F	CONTRACT	STEERING COMMITTEE	TECHNICAL COMMITTEE
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ULG University of Liege Belgium *Scheldt partner*	Ir. Joseph Smitz Centre de l'Environnement - Aquapôle : Sart Tilman B53 B - 4000 Liège (Belgium)	Tel: +32 (0) 4 366.23.54 Fax: +32(0) 4 366.23.55 Email: J.Smitz@ulg.ac.be	A3, A5, B1, B2, B3, B4, E1, E3, F1, F4	✓		
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APPENDIX 4 PUBLICATIONS

This Appendix lists scientific papers, conference papers, presentations, posters, leaflets and articles in the popular scientific press

Authors	Date	Title	Event	Reference	Type
Fortune, D	17-19/4/2007	The relevance of the OpenMI to the Yangtze River Forum	Yangtze River Forum		Oral presentations
Moore, R.V., Fortune, D and Gijsbers P	23/04/2007	The relevance of the OpenMI to the UK Environment Agency	Oral presentations to the UK Environment Agency giving an overview of the OpenMI, describing how it works and providing an end users perspective, Reading, UK		Oral presentations
Moore, R. V., Tindall, C. I.	30/04/2007	OpenMI Progress Report. October 2006 – March 2007.			Customer Report to the European Commission. April 2007.
Moore, R. V., Tindall, C. I.	30/04/2007	Collaboration agreement for LIFE Project No LIFE06 ENV/UK.000409			Collaboration agreement
Vits, S. (VMM-AWA)	03/05/2007	Interaction between models: OpenMI-Life Project	Congress: Conference on Water Systems Symposium: Modelling for integrated water management in Flanders		Oral presentation
Van Assel, J	22/05/2007	OpenMI-Life and the Scheldt Use case 'a'	InfoWorks Benelux User meeting in Hoeven, The Netherlands.		Oral presentation
National Technical University of Athens and Centre for Ecology and Hydrology	31/07/2007	OpenMI leaflet		Imprint: Athens, Greece: National Technical University of Athens, July 2007	Leaflet
National Technical University of Athens and Centre for Ecology and Hydrology	31/07/2007	HarmonIT poster		Imprint: Athens, Greece: National Technical University of Athens, July 2002	Poster
Moore, R. V., Tindall, C. I.	10-13/12/2007	OpenMI	MODSIM07 Conference, Christchurch, New Zealand		Conference paper and oral presentations

Note: Publications in grey are in the process of being prepared.