Development of knowledge-based web services to promote and advance Industrial Symbiosis in Europe (**eSYMBIOSIS**) LIFE09/ENV/GR/000300



END-OF-ACTION REPORT ACTION 1 Service and user requirements



June 2013¹

¹ Initial Submission September 2011

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Revision	Description	Date
Draft v.1.0	Initial Version Document	30/06/2011
v.2.0	Modified to include deliverables amendments	20/09/2011
v.3.0	Modified to comply with comments by Commission after review, for the detailing of the monitoring procedures wrt. this action.	04/06/2013

1. INTRODUCTION

1.1. MANAGEMENT FRAMEWORK AND PROCEDURES

NTUA is the overall Project Coordinator supervising the progress of all the actions in close collaboration with all the associated beneficiaries. In project Management, NTUA:

- (i) has the global view on the project;
- (ii) ascertains the progress;
- (iii) manages the priorities during the project;

(iv) secures the flow of information between the project actions/activities as well as between the project beneficiaries as required for the implementation of the project.

The Executive Committee composed from representatives of all beneficiaries of the project with the Project Coordinator manage the progress of the project, resolve issues, enhance communication among the participants and to inspect the quality and deliverables and reports. For each Action / Activity there has been assigned a Leader amongst the beneficiaries.

The end-of-Action Reports are internal management quality reports of eSYMBIOSIS, as described in the technical Annex of the project and conform to the standard of the Life+ Programme for monitoring project progress via reports/deliverables.

The end of action report is produced in the scope of Action 7, which is responsible for the monitoring and evaluating the project's progress and performance and is running during the whole duration of the project

The general procedures of Action 7 envisage that the coordinating beneficiary (NTUA) together with all the associated beneficiaries perform their monitoring tasks assessing progress of each Action with respect to the expected results and the performance indicators.

For each Action - Activity a managing representative is responsible to prepare a short end-of-Action report and submit it to the Executive Committee assessment. The endof-Action reports contain information on the work done within the Action under the scope of the Action objectives and the Indicators set.

1.2. END OF ACTION 1 REPORT

The present *End of Action* report covers Action 1, "Service and User Requirements". This action had a duration of 9 months (start date: 01/10/2010 and end date: 30/06/2011).



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Fig. 1: Action 1 Presentation Card – External Monitoring Visit, May 2012

Action 1 involves four Activities: A1.1, A1.2, A1.3 and A1.4 as follows:

- Activity 1.1: Review regional profile for the target region by evaluating clusters of companies involved and types of data available. Selection of sample cases for validation
- **Activity 1.2:** Review NISP practices from the viewpoint of waste and solution representation.
- Activity 1.3: Review NISP practices from the viewpoint of workflows and metrics used
- Activity 1.4: Identification of user requirement and web service functionality.

Action 1 of eSymbiosis has the following targets:

- Review existing UK Best Practice (i.e. NISP) models for assessment of environmental effects and metrics which will be used for optimization of partners selection in Action 2;
- Generate a global picture on existing practices in industrial symbiosis, in particular environmental, economic and technological consequences and opportunities;

 Produce a set of requirements to ensure flexible and operable industrial symbiosis service, to be used in the process of design and validation of the service in Action 2 and 3;

As indicators for the performance of Action 1 were selected the:

- number of industrial sectors represented in the requirements,
- number and types of waste streams and technological solutions represented for trade,
- number of functions to implement through web service,
- percentage of industrial cases to be using the service.

According to the Management / Monitoring Procedures Framework of eSymbiosis as previously described, the following responsibilities scheme applied:

- (1) Activity A1.1 : NTUA was leading Activity 1.1, sharing data and progress achieved from past projects also, using its knowledge of Viotia Industrial Status to link this Activity with dissemination initiatives following in later project.
- (2) Activity A1.2: All beneficiaries were responsible for subtasks of Activity 1.2 in their domain. L2E, succeeded by PIC led the work here, interacting with the teams of the academic beneficiaries (NTUA and UoS) and two developers (AVCO and CLMS) in order to define the needs of the ontology models and the core web services. The academic Partners ensured the soundness of eSymbiosis technology options. The developers focused on the requirements to implementing eSymbiosis Technologies as well as the technology constraints existing.
- (3) Activity A1.3: The beneficiary L2E was responsible for Activity 1.3, PIC has succeeded L2E in the activities they were engaged in a smooth manner. PIC reviewed the results of both Activities 1.2 and 1.3, guiding the teams from both the academic beneficiaries (NTUA and UoS) and the developers (AVCO and CLMS) as regards the business aspects of the requirements analysis.
- (4) Activity A1.4: NTUA in collaboration all beneficiaries, finalised the requirements for the eSymbiosis platform functionality. These requirements were transformed to design options during the course of the project (Action 2).

The Activities at level 2 were during the project Progress broken down to a third level of descriptions, to better monitor the detailed tasks within each one of them.

The next three cards from the external monitoring visit in May 2012 show the project Work Breakdown Schedule, the Task involvements per beneficiary, and the corresponding deliverables.



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Fig. 2: Activities 1.1 & 1.2 Presentation Card – External Monitoring Visit, May 2012

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Fig. 3: Activities 1.3 & 1.4 Presentation Card – External Monitoring Visit, May 2012

2. ACTION ASSESSMENT AND EVALUATION

2.1. PROGRESS ACHIEVED

In the following the progress of Action 1 is described as performed through each one of its subactivities

Activity 1.1 had the task to explore and determine what exists at the local level of the region. During Activity 1.1, the regional profile for the Viotia region was reviewed by evaluating clusters of companies involved and types of data available and sample cases for validation were selected. During this activity it was collected relevant information for the industrial activity in Viotia, forming its regional profile and ascertaining its features.



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Fig. 4: Activity 1.1 Presentation Card – External Monitoring Visit, May 2012 In Activity 1.1, a report on the review and recording analysis of the industrial activity profile for the target region was produced providing the following:

- Review of the regional profile of Viotia in connection to its industrial activity and the regional priorities
- Analysis of the survey methodology being undertaken for the selection of already existing – and updated available data

- Recording, analysis and classification of industrial sectors being involved in the survey,
- Recording and presentation of available data types
- Analysis of companies' clusters being selected as case studies for the verification of the efficiency of the web platform with regard to their production processes and various types of waste

Industrial clusters – sectors that are thoroughly presented in the second unit of deliverable 1.2 come up to twenty five (25) divisions which in turn are combined into eleven (11) general sectors.

The classification of clusters was based on Statistical Industrial Classification of Economic Activities (STAKOD 2008) as defined by the National Statistical service of Greece in two-digit analysis that is equivalent to the Nace, the European industrial activity classification.

The main parameters for the selection of the representative sample of companies involved a) the review of NISP successful stories b) the potential efficient utilization of the various types of waste produced and c) the trend of dynamic growth and the respective productivity of the industrial units themselves. The industrial clusters that have been selected for the verification are metallurgical, food and chemical. These clusters include about the 62% of the industries located in the studied area. Specifically, the estimated amount of metallurgical industries is 97, food and beverage industries come up to 41 and chemical industries to 77. The available data quantitative and qualitative, for the selected industrial cases include waste types such as solid and liquid (sludge) wastes and the raw and ancillary materials.

Activity 1.2 performed a review of the practice of Industrial Symbiosis. For that reason existing waste classifications that are endorsed by NISP, such as the European Waste Catalogue (EWC), the EWC STAT, classifications about the products (such as UNSPSC) and the Economic activities (such as ISIC, NACE and others) were reviewed. Important criteria that have been identified are: industries producing the waste, process producing the waste, category of the waste classification, chemical properties of the waste, and physical form of the waste.



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Fig. 5: Activity 1.2 Presentation Card – External Monitoring Visit, May 2012 Regarding the solution representation the focus was on the conceptualisation of the solutions as extracted from the NISP use cases. Moreover, some other ways of describing technologies such as the ISO 15926 were taken into consideration.

Effort was put into structuring data into an accessible form for the following grouping: chemical, metals, metal rich wastes, plastics rubbers and textiles, food and agriculture, inorganics, alternative fuels and energy, wood and paper, land and facilities, and services.

Activity 1.3, reviewed workflows and metrics used by NISP. Paramount to the success of the NISP programme has been the clear and reportable use of metrics. These are related to economic, environmental and social impacts. Specifically, the measured outputs involve Economic – (Cost Savings to Business, Additional Sales to Business), Environmental – (Landfill Diversion, CO₂ reduction, Virgin Raw Materials Saved, Hazardous waste eliminated, Water Savings), Social – (Jobs created, Jobs Saved). In addition, to track activity and progress a range of soft metrics involving the number of member companies recruited, resources captures, synergies in progress, workshops held etc. are used as complimentary measures.



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Fig. 6: Activity 1.3 Presentation Card – External Monitoring Visit, May 2012

Activity 1.4 captured the user requirements and web service functionality. During all activities the user requirements and the web service functionality has been collected and evaluated. The review of the standards, classifications and case studies focused on the way they can affect the user requirements and whether they can improve the functionality of the web service. The user requirements were separated into four (4) global groups: Overall Vision, Resources, Synergies/Outputs, and Knowledge portal. The requirements were further analysed for key stages of the eSYMBIOSIS workflow. Based on these requirements the web service functionalities were derived.



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2.2. DEADLINES AND DELIVERABLES

The deliverables of Action 1 were prepared as planned, within the specified timeframe. However, after internal inspection review, significant revision work had to be performed before final release. Much of this delay is attributed to the serious reorganization events affecting the project, as described in the problems and resolutions section of this report.

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163%	Start	LUE	Окт	Not	Дек	lav	065	Мар	Алр	Mai	louv
A1: Service and user requirements	1/10/2010	30/6/2011	-	_	-	-					
A1.1: Review regional profile for the target region by evaluatin	1/10/2010	30/6/2011	-			1					-
a1.1.1: Review Industry Data and Regional Profiles	1/10/2010	30/6/2011	Ĺ	1	-			-	-	-	-
a1.1.2: Selection of Representative Companies	1/10/2010	30/6/2011	_	-	-	-	-	-		_	
D1.2: Recording, analysis and assessment of industrial cl	30/6/2011	30/6/2011				1		1			
A12 Review Best practices from the viewpoint of waste and	1/10/2010	30/6/2011	-			1					
a1.2.1: Review Information Structures	1/10/2010	30/6/2011	_	_	-	-	_	_		_	_
a122: Solution Technologies, Information Classification	1/10/2010	30/6/2011	_	_	_	-	_	_	_	_	_
a1.2.3: Enabling Metrics	1/10/2010	30/6/2011			_	-	_	_		_	_
a124: Models - Ontology Engineering	1/10/2010	30/6/2011	_		-	-	-		-	_	-
A1.3 Review Best practices from the viewpoint of workflows	1/10/2010	30/6/2011			-	-					
a1.3.1: Review WF models of the IS trade	1/10/2010	30/6/2011		-	_	-	-	_	_	_	_
a1.3.2: Determine Compositions of stages	1/10/2010	30/6/2011	_	-	_	-	_	_	_	_	
a 1.3.3: Review and Identify measurement data for metrics	1/10/2010	30/6/2011		-	-	-	-	-	_	_	_
D1.1: Recording, analysis and assessment of existing pr	30/6/2011	30/6/2011									
A1.4: Identification of user requirement and web service funct	1/10/2010	30/6/2011		_		1					-
a141 Environmental economic and technology requir	1/10/2010	30/6/2011	_	-	-	_	-	_			_
a142 Functional Requirements for discovery matching	1/10/2010	30/6/2011	_	-	_	-		-		_	_
a1.4.3 Operational requirements	1/10/2010	30/6/2011	_	-	_	-		_		_	
D1.3. Set of requirements for the components and the w	30/6/2011	30/6/2011									1
M1: Completion of specification of the requirements for the co.	30/6/2011	30/6/2011									A

Fig. 8: Activity Deadlines Presentation Card – External Monitoring Visit, May 2012

The expected results have been prepared and were internally available through adhoc reports. The deliverables revision action had to re-pack and assemble all this information not available in the June Release. In the following Table the deliverable products of Action 1 are presented along with the deadlines and status.

Name of the Deliverable	Deadline	Status
Recording, analysis and assessment of existing practices and operation in terms of industrial symbiosis in the UK and internationally (waste and solution representation, workflow and metrics)	30/06/2011	Finished 30/09/2011
Recording, analysis and assessment of industrial clusters in the target country - Greece	30/06/2011	Finished 30/06/2011
Set of requirements for the components and the web platform	30/06/2011	Finished 30/09/2011
Inception report	30/06/2011	Finished 30/09/2011

eSYMBIOSIS considers that the Milestone related to Action 1 has been achieved with a small delay due to the review of deliverables 1.1 and 1.3.

2.3. PROGRESS INDICATORS

The overall assessment of Actions is performed on the basis of evaluating the level of target figures reached. As regards Action 1, all four Activities have been completed successfully regarding expected results and progress indicators as presented in the following tables.

Expected Results	Status	Comments
Minimum of three models for assessment of environmental effects and concomitant metrics (CO ₂ emission, landfill and water conservation)	\checkmark	5 models
A global picture on existing practices in industrial symbiosis, in particular environmental, economic and technological consequences and opportunities	\checkmark	
A set of requirements to ensure flexible and operable industrial symbiosis service, to be used in the process of design and validation of the service in Action 2 and 3		

Expected results for Action 1

Indicators of Progress	Status	Comments
Minimum 12 different industrial sectors represented in the requirements	\checkmark	25 sectors evaluated
Minimum 10 different waste streams and 10 different technologies included in the course of the project		
Minimum of 5 functions to be included (waste registration, technology registration, partner matching, partnership ranking and progress monitoring)		
50% of targeted 400 companies expected to participate fully in the course of the project	Ongoing	To be evaluated after the launching event

Indicators of progress for Action 1

The performance indicators of Activity 1.1 as shown in the above table have been achieved and relate to the number of industrial sectors and industrial units included in the eSYMBIOSIS web platform. To elaborate on that, the number of industrial units

being involved so far in the 1st Action reached 378, which in turn are included in 25 different industrial sectors. The estimated number of industrial units expected to participate fully in the course of the project will be determined after the organization of Launching Event expected on November 2011.

2.5 OVERALL ACTION EVALUATION

Overall, Action 1 is considered to have succeeded its goals. The academic teams NTUA and UoS have ensured that the knowledge gained from reviewing the NISP practices and case studies is adequate to the web service. The development stage for the ontology models and the core web service by AVCO and CLMS are satisfactory. The set of requirements for the individual components will be revised in the course of the project in order to take into consideration the feedback from the targeted region.

3. RISKS, PROBLEMS ENCOUNTERED AND SOLUTIONS FOLLOWED

Two problems were encountered during the implementation of the project;

A. The Kallikratis Plan (Law 3852/2010) led to the consequence that the Legal status of Viotia Prefecture would have to change until the end of 2010, when all responsibilities were transferred to the Region of Central Greece, as is the current situation, active since the 1st January 2011.

For project continuation, stability and efficiency reasons, this had the implication that the project co-ordination would have to be transferred from the Viotia Prefecture to NTUA.

However large this change has been, in terms of participations the effects were smaller, as the former Viotia Prefecture is now heading the Region of Central Greece and consequently an even stronger participant. That is, through the Prefecture, eSYMBIOSIS will be able to more easily disseminate its activities and results to a wider region.

B. The partner Link2Energy had to withdraw from the project as the company fell short of resources due to the general economic crisis. L2E continued to help with the

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preparation of deliverables due in this period; however a replacement had to be found. The search for a suitable replacement partner has been successful and the request to the EC will be made to replace L2E by Paul Innes Consulting (PIC) that brings a team with a particularly strong experience in Industrial Symbiosis from NISP. The team includes a former development director of NISP, a NISP Regional Director (four UK regions) and the database architect of NISP. PIC already attended a meeting and participated in several teleconferences.

It should be noted that one single modification request is submitted together with the inception report made in order to cater for both issues raised below. The proposed modifications will strengthen the eSYMBIOSIS consortium and the continuation of the successful implementation of the eSYMBIOSIS project.²

² The mentioned in this document Project Structure Modification was approved by the Commission, March 2012.