



## DELIVERABLE

EU Project No.: 228449

### DERri

Distributed Energy Resources Research Infrastructures

Integrating Activity: Combination of Collaborative Project and Coordination and Support Action

SEVENTH FRAMEWORK PROGRAMME

Capacities Specific Programme

Research Infrastructures

## Networking workshop conclusions

### D\_NA-2.1

Revision: R-6

Month 8

(agreed to become an evolving deliverable)

This is a Deliverable of NA2.1

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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium and the Commission Services	



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R-3	12.12.2010	Piotr Gburczyk	TULodz	Extension by including conclusions from Helsinki and Vienna workshops
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R-5	20.03.2011	Piotr Gburczyk	TULodz	Final document for submission after review, two versions: public (without Annex) and internal prepared
R-6	30.04.2012	Piotr Gburczyk	TULodz	The 4 <sup>th</sup> workshop in Vienna included The 5 <sup>th</sup> and 6 <sup>th</sup> workshop in Athens included

### Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

#### NOTES:

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For more information on the project DERri, link to <http://www.der-ri.net>



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## **EXECUTIVE SUMMARY**

This document constitutes the Deliverable D\_NA-2.1 scheduled for submission in Month 12 of the Project. Initially, it was thought as a summary of the first networking workshop that was scheduled in May 2010 (Month 8 of the Project) in Clamart, France. As the workshop was a successful event and the following workshops were agreed, this document shall include conclusions of all the networking workshops organized during the DERri project.

In the deliverable the details of the networking workshops are described. Some conclusions from the workshop discussions are presented. Also the effectiveness of this means of networking activity is assessed. Finally, the next steps within the task 1 of the NA2 work package are discussed.

Six workshops have been performed to date. The workshops are seen as a helpful means towards improving the interaction and integration of the DERri partners as well as their ideas on important issues of the DERri project.



## 1 INTRODUCTION

Within the DERri project the range of Networking Activities has been designed to facilitate easy communication between the project partners, users, practitioners and public stakeholders. The overall aim is to broaden the existing strong collaboration and to reach out and engage more effectively with external stakeholders, such as research and standardisation bodies, schools and educational institutions, etc.

Networking Activities have been divided in:

- NA1 Activity - Management of the Trans-national Access
- NA2 Activity – Definition of common standard and procedures
- NA3 Activity - Set up a user support service
- NA4 Activity – Information and dissemination

NA2 addresses an important issue for the users of large facilities; that is the compatibility of test procedures at the different sites.

The Networking activities within NA2 are being developed through the following Tasks:

**Task 1:** Organisation of networking seminars and workshops

**Task 2:** General criteria for laboratory work and equipment management

**Task 3:** Common protocol for research infrastructure access

**Task 4:** Development of common testing procedures and standards requirements

Within the task 1 networking seminars and internal workshops are being organised. These events should support and strengthen the network between the DERri partners by creating the conditions required to guarantee the reliability of the activities performed.

Important issues for this subtask are

- Selection of topics for the internal network programs.
- Identification of the people suitable to train the partners.
- Organization of networking seminars and training workshops.

**The first DERri networking workshop** was held on May 26<sup>th</sup>, 2010 in Clamart, France prior to the project general meeting. The venue of the workshop was EDF-SA (DERri partner) premises.

**The second DERri networking workshop** was held on October 27<sup>th</sup>, 2010 in Espoo, Finland together with the project general meeting. The venue of the workshop was VTT (DERri partner) premises.

**The third DERri workshop** was a two-day event held on the 24<sup>th</sup> and 25<sup>th</sup> of November, 2010 in Vienna, Austria. It was a separate meeting organized by AIT (DERri partner) at its premises.

**The fourth DERri networking workshop** was held on November 17<sup>th</sup>, 2011 in Vienna, Austria during the framework of the General DERri meeting. The venue of the workshop was again AIT premises.

**The fifth DERri networking workshop** was held on April 19<sup>th</sup>, 2012 in Athens, Greece during the General meeting of the project. The venue of the workshop was Divani Palace Acropolis Hotel.

**The sixth DERri workshop** was a separate event held on the 20<sup>th</sup> of April, 2012 in aAthens, Greece. It was a laboratory workshop organized by NTUA (DERri partner) at its premises.



## 2 1<sup>st</sup> DERri WORKSHOP IN CLAMART, FRANCE

### 2.1 Topic of the workshop

Aiming at an agreement for a common view of the required organization of access to DERri partners laboratories the following topic for the workshop was selected and agreed on:

#### **„Concept of virtual access to DERri infrastructure”**

As one of the DERri project objectives is to establish a unique, virtual, pan-European, demonstration laboratory with testing equipments linked together with a single communication protocol (both in terms of data structures and open communication means) the need for an in-depth discussion on its concept, means of realization and optimal management was the motivation for selecting this particular workshop topic.

The event was planned as an internal workshop of the DERri project.

### 2.2 Workshop agenda

The following agenda for the workshop was used. It supported active participation as well as discussion on the main topic amongst the number of partners involved during the workshop as well during the preparation:

WEDNESDAY, 26 <sup>TH</sup> MAY 2010		
10.15 – 10.20	Welcome and introduction	(TULodz)
10.20 – 10.45	Basic concept of JANDER	(IWES)
10.45– 10.55	Specification of interfaces	(NTUA)
10.55– 11.15	Integration of Hardware laboratories and Simulation laboratory	(EDF-SA)
11.15 – 11.45	Central SCADA system	(TULodz)
11.45 – 12.15	Simulated electrical coupling - aim, needs and challenges	(TULodz)
12.40 – 13.00	Safety procedures	(Tecnalia-LAB)

Each item of the agenda was intended as a point for open discussion based on the presentation of the problem with defined questions to be answered.



### 2.3 Workshop participation

A total of 23 persons from 14 DERri partners participated in the workshop. The full list of attendees is presented below:

ORGANIZATION SHORT NAME	PERSON NAME	
ERSE	Paolo	Mora
	Giorgio	Franchioni
	Omar	Perego
AIT	Alexander	Viehweider
	Elisabeth	Mrakotsky
CEA	Elisabeth	Lémaire
	Nicolas	Martin
CRES	Stathis	Tselepis
EDF-SA	Eric	Schultz
	Eric	Lambert
IWES	Thomas	Degner
	Alexander	Berg
KEMA	Erik	de Jong
TECNALIA-LAB	Emilio	Rodriguez
ICCS-NTUA	Efstathia	Kolentini
	Takis	Romanos
RISOE-DTU	Per	Norgaard
	Oliver	Gehrke
TU Lodz	Irena	Wasiak
	Piotr	Gburczyk
TUS-RDS	Anastassia	Krusteva
VTT	Marja-Leena	Pykala
USTRAT	Paul	Crolla

### 2.4 Workshop content

#### 2.4.1 Basic concept of JANDER

During the workshop the concept of remote access to laboratories of DERri partners was presented and discussed. As an introduction the general concept of JaNDER (Joint Test Facility for Smart Energy Networks with Distributed Energy Resources) was presented.

Participants agreed on the need to provide a detailed definition of the objectives which the implementation of JaNDER would serve. It was proposed to take advantage of the method of 'use cases'. All partners were asked to think about possible examples of use cases for remote access; which would be compiled to 3 use cases afterwards and would serve as basis for further work (Common Interface definition and development of measurement methods).



Figure 1. Discussion at DERri workshop in Clamart

#### **2.4.2 Specification of interfaces**

It was stated that when specifying the Common Interfaces the use of existing standards should be made (IEC 61850, CIM models). Probably some extension of the standards would be required.

#### **2.4.3 Integration of Hardware laboratories and Simulation laboratory**

The EDF laboratory Digi<sup>2</sup>tal and its link to JaNDER was presented. A choice of software for off-line simulation was discussed. The need for data model description and the formulation of simulation requirements for models was also pointed out.

#### **2.4.4 Central SCADA system**

During the workshop the foreseen structure of remote access was explained in detail, especially in the context of the specification of common interfaces and organization of access. As a basis for discussion the concept of a Central SCADA (Supervisory Control And Data Acquisition) system was proposed. It was concluded that remote access should also be possible without a Central SCADA system. The commercially available central SCADA software, performing at least HMI functions, should be used. It then needs to be installed in at least one laboratory facility.

#### **2.4.5 Simulated electrical coupling**

The results of simulation studies on simulated electrical coupling between laboratories were presented. The required infrastructure for realization of the proposed structure was assessed as not being likely to be implemented. A decision was made to find a very simple and limited solution.

#### **2.4.6 Safety procedures**

The safety and security aspects of remote access were discussed. It was agreed that the responsibility and liability lies on the facility operator.



Figure 2. 1<sup>st</sup> DERri workshop attendees

## 2.5 Workshop conclusions

All the aspects presented raised fruitful discussions. The relevant comments provided during the discussions were included in the concept of a unique, virtual, pan-European demonstration laboratory to be created within the DERri project, by its partners. Detailed conclusions were listed in the minutes of the workshop, which are presented in an Annex to the internal version of the Deliverable.

The workshop has been assessed as a helpful means towards improving the interaction and integration of the DERri partners as well as their ideas on important issues of the DERri project.

It was agreed to proceed with the organisation of future workshops to discuss the most important items of the project. Potential topics for future workshops were proposed during the concluding discussion. They are:

- Grid connected storage
- Do we need SCADA?
- Quality Management of labs



### 3 2<sup>nd</sup> DERri WORKSHOP IN ESPOO, FINLAND

#### 3.1 Topic of the workshop

The second workshop was held at VTT in Espoo, Finland in October 2010 during the framework of the General DERri meeting. Within DERri VTT is the task-leader of sub-task NA 2.2 “Criteria for Laboratory Work in the DERri project”, and contributes specific expertise in the field of quality management. Therefore, it was considered fitting to choose the following topic for the workshop:

#### „Quality Management in DERri laboratories”

The event has been planned as an internal workshop of the DERri project.

#### 3.2 Workshop agenda

The following agenda for the workshop was used. It supported active participation as well as discussion on the main topic amongst the number of partners involved during the workshop as well during the preparation:

WEDNESDAY, 27 <sup>TH</sup> OCTOBER 2010		
14.30 – 14.40	Welcome and introduction to Quality Management	(TULodz / VTT)
14.40 – 15.00	General criteria for laboratory work and equipment management	(VTT)
15.00 – 15.20	QM questionnaire - Presentation of Results, Inter-Laboratory Comparison	(AIT)
15.20 – 16.20	How to fulfil the criteria for QM – differences between labs with or without accredited methods	(VTT/AIT)
16.20 – 16.30	Wrap-up of Workshop and discussion	(TULodz)

#### 3.3 Workshop participation

A total of 26 persons from 15 DERri partners participated in the workshop. The full list of attendees is presented below:

ORGANIZATION SHORT NAME	PERSON NAME	
RSE	Paolo	Mora
	Omar	Perego
	Maria Luciana	Rizzi
	Giorgio	Franchioni



ORGANIZATION SHORT NAME	PERSON NAME	
AIT	Roland	Bründlinger
	Thomas	Strasser
	Elisabeth	Mrakotsky
CEA	Elisabeth	Lémaire
CRES	Evangelos	Rikos
EDF-SA	Eric	Lambert
IWES	Thomas	Degner
	Alexander	Berg
KEMA	Erik	de Jong
TECNALIA-LAB	Emilio	Rodriguez
	Eduardo	Zabala
ICCS-NTUA	Panagiotis	Kotsampopoulos
	Aris	Dimeas
RISOE-DTU	Per	Norgaard
	Henrik	Bindner
TU Lodz	Pawel	Kelm
TUS-RDS	Anastassia	Krusteva
VTT	Marja-Leena	Pykälä
USTRAT	Paul	Crolla
	Graeme	Burt
UNIMAN	Galina	Romanovsky
	Joseph	Mutale



### 3.4 Workshop content

The issues of measurement accuracy and reliability with non-accredited entities were discussed. The understanding for the diversity of standards and methods used within the DERri group was raised. Possible expectations as well as in-depth content relevant to quality management were discussed.

As a basis for the discussion the general criteria for laboratory work and equipment management was presented by VTT.

[include a photo of the actual workshop here, similar to Clamart above and Vienna below?]

General criteria for the laboratory work are the following:

- Comparable access to different labs is desired
- Comparable results from different laboratories requires common reference level
- Research purposes require Common basis with minimum requirements to follow
- Methods and procedures should be harmonized
- A basic laboratory manual in a common format is needed to document the procedures

Accreditation was recognized as a clear method for assuring the quality as long as the test procedures can be well documented.

The Quality Management for research activities is not as clear: no fixed procedures exist and acceptance criteria for the results are not uniformly defined. The flexible scope option assumes some practise of accreditation.

The Quality assurance was discussed as comprising:

- Well documented methods and procedures
- Competent personnel
- Traceable calibrations
- Periodic checks of the measuring data
- Internal and inter-laboratory comparisons of results, procedures etc.

### 3.5 Workshop conclusions

Based on the discussions that were held, it was concluded that in order to reach a common basis of quality management for research purposes, the minimum requirements to be met are:

- Harmonisation of methods and procedures (accuracy, setup, conditions)
- Build a real platform
- Draft a basic lab manual
- Have a common format to document the procedures

It was decided that VTT and AIT should define a minimum reference level and offer it to all partners (especially to those coming from academia) for discussion and/or approval. It is advised to make a distinction between university research facilities and testing facilities in the reference level.

Detailed conclusions were listed in the minutes of the workshop presented in an Annex to the internal version of the Deliverable.



## 4 3<sup>rd</sup> DERri WORKSHOP IN VIENNA, AUSTRIA

### 4.1 Topic of the workshop

The third DERri workshop was organized as a technical workshop related to JRA3 and was arranged as a separate two-day event at AIT premises in Vienna, Austria. The topic of the workshop was:

**„Real time simulation environment and parameter identification for power systems”**

AIT is the leader of JRA3 and therefore also organized the workshop. The event was planned as internal technical workshop of the DERri project.

### 4.2 Workshop agenda

The following agenda for the workshop was used. It supported active participation as well as discussion on the main topic amongst the number of partners involved during the workshop as well during the preparation:

1 WEDNESDAY, 24 <sup>TH</sup> NOVEMBER 2010		
13.00 – 13.15	Welcome and workshop overview	(AIT)
13.15 – 14.00	Short roundtable introduction, with description of partner activities in simulation and real-time simulation	(ALL)
14.00– 14.15	Presentation - Results of Deliverable JRA-3.1.1, Part A: Overview and identification of existing models and tools	(AIT)
14.15– 15.15	Brainstorming on “Categorization of DER components and simulation types”	(ALL)
15.30 – 17.15	Discussion on Requirements and Use Cases	(ALL)
17.15 – 17.45	Chapter Structure of D_JRA 3.1.2 and Task 3.1 ToDo’s	(ALL)
17.45 – 18.00	Wrap-up of first results: Clarification on Categorization and Requirements	(AIT)
2 THURSDAY, 25 <sup>TH</sup> NOVEMBER 2010		
8.30 – 10.00	Brainstorming on Common Reference Model	(ALL)
10.30 – 12.30	Brainstorming on DER Models	(ALL)
13.30 – 14.00	Chapter Structure of D_JRA 3.2.1 and Task 3.2 ToDo’s	(NTUA)
14.00 – 14:30	Wrap-up and Final Discussion	(AIT and ALL)
14.30	End of Meeting	



### 4.3 Workshop participation

A total of 20 persons from 13 DERri partners participated in the workshop. The full list of attendees is presented below:

ORGANIZATION SHORT NAME	PERSON NAME	
RSE	Carlo	Tornelli
AIT	Filip	Andren
	Felix	Lehfuss
	Christoph	Mayer
	Elisabeth	Mrakotsky
	Matthias	Stifter
	Thomas	Strasser
CRES	Evangelos	Rikos
EDF-SA	Eric	Lambert
IWES	Alexander	Berg
	Torsten	Reimann
KEMA	Erik	de Jong
ICCS-NTUA	Panos	Kotsampopoulos
RISOE-DTU	Oliver	Gehrke
TU Lodz	Piotr	Gburczyk
TUS-RDS	Anastassia	Krusteva
	Kiril	Paunov
VTT	Kari	Mäki
USTRAT	Paul	Crolla
UNIMAN	Galina	Romanovsky

### 4.4 Workshop content

#### 4.4.1 Workshop Overview

A review of the JRA-3 goals; objectives; tasks and necessary research work was provided.

The research focus of JRA-3 lies on real-time simulation and Power-Hardware-in-the-Loop (PHIL) experiments but also off-line-simulation should be taken into account.

A first categorization of targeted simulation objectives and DER components has been created during the first project year. Now, a fine-tuning of these objectives and components need to be

carried out. The focus should be on the most important DER components; a common agreement between the JRA-3 partners is necessary for this. Afterwards the requirements and use case definition can be carried out.

A common reference model for DER components should be developed in order to allow the easier exchange of models between JRA-3 partners and also to make simulation results better comparable.

Methods and models for PHIL simulations should be harmonized between the JRA-3 partners.



Figure 3. Discussion at DERri workshop in Vienna

#### **4.4.2 Brainstorming on “Categorization of DER components and simulation types”**

The brainstorming session was carried out in two groups and was followed by a common presentation of the results of both groups.

The goal was to produce a refined categorization of DER components and simulation types. Based on the existing list of DER components and simulation types/objectives taken from the deliverable D\_JRA-3.1.1 a refined list was found.

#### **4.4.3 Discussion on Requirements and Use Cases**

The brainstorming session was carried out in two groups and was followed by a common presentation of the results of both groups.

The goal was to find and discuss requirements and use cases for selected DER components and for each simulation type. A sample use case and its requirements was discussed. It was agreed that the JRA-3 partners would provide selected use cases and requirements for D\_JRA-3.1.2 in the specific domains they specialize in.



#### **4.4.4 Brainstorming on Common Reference Model**

The brainstorming session was carried out in two groups and was followed by a common presentation of the results of both groups.

The goal was to discuss the possibility of developing a common reference model for DER components which has an implementation independent representation (e.g. UML like CIM, SysML, etc.). As the result of the discussion it was decided that EDF together with RSE would check the possibility to initiate a formal liaison of standardisation bodies (e.g. IEC TC 57) with the DERri project in order to align the activities towards a common reference model. The European Commission should also be informed about this activity. As it was concluded, the common reference model is a minimum representation of DER components which allows to make individual results better comparable. In the future, the JRA-3 partners should probably look at the implementation of automated model transformation from the common reference model to simulation languages (e.g. Matlab/Simulink, RSCAD, PSCAD, etc.) and on standardisation. Such an activity could be the objective of a new research project.

#### **4.4.5 DER Models and Hardware Interfaces for real-time applications**

The need for model description of each partner (UML, or similar) was raised, importance of Common Reference Model was again pointed out. As the result, library of models is expected, with the main focus put on real-time simulation. In order to achieve the foreseen outcomes some important steps must be taken:

- Definition of lab tests should be performed
- Development and enhancement of simulation testing methods
- Specification of hardware interfaces.

### **4.5 Workshop conclusions**

During the workshop it became apparent that the partners had very different backgrounds and needs/expectations as regards to the simulation. A need for harmonisation has been recognised. A method of use cases and requirements were defined and agreed upon.

The first principles of the common reference model was defined.

Partners agreed to continue the work and a detailed work plan has been made. The next technical workshop is foreseen in May 2011.



## 5 4<sup>th</sup> DERri WORKSHOP IN VIENNA, AUSTRIA

### 5.1 Topic of the workshop

The fourth workshop was held again at AIT in Vienna, Austria in November 2011 during the framework of the General DERri meeting. The workshop was dedicated to the aspects of DERri Transnational Access (TA) and its topic was:

**"First debriefing of the DERri Transnational Access: offer, cases, improvement"**

The workshop was open also for the external attendees as members of the External Advisory Board and EC officer.

### 5.2 Workshop agenda

The following agenda for the workshop was used. It supported active participation as well as discussion on the main topic amongst the number of partners involved during the workshop as well during the preparation:

THURSDAY, 17 <sup>TH</sup> NOVEMBER 2011		
10.00 – 10.10	Introduction to the Workshop	(TULodz)
10.10 – 10.55	Research Infrastructures potential	(AIT)
10.10 – 10.25	RI Potential of TUS-RDS	(TUS-RDS)
10.25 – 10.40	RI Potential of IWES	(IWES)
10.40 – 10.55	RI Potential of KEMA	(KEMA)
10.55 – 11.10	Coffee Break	
11.10 – 12.10	Examples of User Projects	(TULodz)
11.10 – 11.30	User Project EVOLVE-MAS	(TECNALIA)
11.30 – 11.50	User Project W&S_IC	(RISOE)
11.50 – 12.10	User Project POLSAR	(USTRAT)
12.10 – 12.50	"As Built" implementation of the Access	(RSE)
	Discussion and proposals for improvement	(ALL)
	End Workshop	(TULodz)

### 5.3 Workshop participation

A total of 28 persons from 17 DERri partners and European Commission Research Programme Officer and Member of the External Advisory Board participated in the workshop. The full list of attendees is presented below:

ORGANIZATION SHORT NAME	PERSON NAME	
RSE	Giorgio	Franchioni
	Paolo	Mora
	Maria Luciana	Rizzi
AIT	Christoph	Mayr
	Elizabeth	Mrakotsky
	Thomas	Strasser
CEA	Nicolas	Martin
CRES	Evangelos	Rikos
EDF-SA	Benoit	Puluhen
	Hassen	Taidirt
IWES	Michael	Bauer
	Alexander	Berg
	Thomas	Degner
KEMA	Eric	De Jong
TECNALIA-LAB	J.Emilio	Rodriguez Seco
	Eduardo	Zabala
ICCS-NTUA	Panos	Kotsampopou los
RISOE-DTU	Per	Norgaard
TU Lodz	Pawel	Kelm
TUS-RDS	Anastassia	Krusteva
	Mariya	Petkova
VTT	Marja-Leena	Pykala
USTRAT	Paul	Crolla
UNIMAN	Joseph	Mutale
	Galina	Romanovsky
DERlab-A	Sini	Numminen
External Advisory Board	Sandro	Bologna
Research Infrastructures Directorate-General for Research, EC	Brigitte	Weiß

## 5.4 Workshop content

The workshop was divided into three installments.

First one, chaired by AIT was devoted to the research infrastructures potential (presentations by: TUS-RDS, IWES and KEMA). During the second part of the workshop, chaired by TULodz, examples of the use of DERri research infrastructures had been presented (presentations by: TECNALIA, RISOE and USTRAT). Throughout the ending part of the workshop (topic: *"As Built" implementation of the Access*) the open discussion was carried out corresponding to the implementation of the Transnational Access.



Figure 4. 4<sup>th</sup> DERri workshop

## 5.5 Workshop conclusions

Based on the discussions that were held, it was concluded that Transnational Access has been fully satisfactory for Research Infrastructures and External Users.

Laboratories learned the new ways of using their facilities in addition to research they perform.

The importance of precise evaluation, discussion and confirmation of the needs of the RI Users has been stressed.

Detailed conclusions were listed in the minutes of the workshop presented in an Annex to the internal version of the Deliverable.



## 6 5<sup>th</sup> DERri WORKSHOP IN ATHENS, GREECE

### 6.1 Topic of the workshop

The fifth workshop was held in Athens, Greece in April 2012 during the framework of the next General DERri meeting. The workshop was dedicated to the aspects of DERri research activity on grid connected storage systems and its topic was:

**" Filling the gaps in testing and characterization methods for DER power components"**

CEA is the leader of JRA2 and therefore also organized the workshop. The event was planned as internal technical workshop of the DERri project.

### 6.2 Workshop agenda

The following agenda for the workshop was used. It supported active participation as well as discussion on the main topic amongst the number of partners involved during the workshop as well during the preparation:

THURSDAY, 19 <sup>TH</sup> APRIL 2012		
9.00 – 9.10	Introduction to the Workshop	(TULodz)
9.10 – 9.20	Analysis of the review meeting comments on JRA2	(CEA)
9.20 – 10.30	Deliverable on performance testing	
	Review and comments on the document	
	Expected technical output of JRA2.1	
	Scheduling of the tests for each partner	
10.30 – 10.45	Coffee Break	
10.45 – 11.40	Deliverable on aging tests	(CEA)
	Discussion on the Methodology	
	Discussion on the criteria for lifetime prediction	
	MTBF	
11.40 – 11.55	How to highlight our work? / Dissemination	(CEA)
	IRES conference or other	
	Standardization process	
11.55 – 12.00	End Workshop	(TULodz)



### 6.3 Workshop participation

A total of 24 persons from 15 DERri partners participated in the workshop. The full list of attendees is presented below:

ORGANIZATION SHORT NAME	PERSON NAME	
RSE	Giorgio	Franchioni
	Paolo	Mora
	Maria Luciana	Rizzi
AIT	Felix	Lehfuss
	Roland	Bruendinger
	Thomas	Strasser
CEA	Nicolas	Martin
	Elisabeth	Lemaire
CRES	Evangelos	Rikos
IWES	Michael	Bauer
	Thomas	Degner
KEMA	Eric	De Jong
TECNALIA-LAB	J.Emilio	Rodriguez Seco
	Eduardo	Zabala
ICCS-NTUA	Panos	Kotsampopou los
RISOE-DTU	Per	Norgaard
TU Lodz	Paweł	Kelm
	Piotr	Gburczyk
TUS-RDS	Anastassia	Krusteva
VTT	Marja-Leena	Pykala
	Kari	Maki
USTRAT	Paul	Crolla
UNIMAN	Galina	Romanovsky
DERlab-A	Sini	Numminen

## 6.4 Workshop content

The aim of the workshop was to foster research performed within a Joint Research Activity 2 on grid connected storage systems. As a result of mid-term review meeting a need to clearly define the objectives was discussed. Two objectives has been proposed: definition of criteria for sizing (1) and operation (2) of storage system needed by EMS. Existing standards are oriented on existing applications, there is no standardized guideline how to operate storage in real time. CEA proposed to use the standardized power profile for testing performance of ESS in different applications. It was agreed that testing procedure should be technology independent. The following technical parameters of energy storage systems (ESS) that should be tested have been discussed in detail: nominal power, energy, efficiency, standby losses, response time, ability to fulfill a set point, SOE indicator accuracy, ability to inject reactive power. The standardized profiles have been proposed: Time shift (1), Power balancing – Load following (2), Power balancing – Frequency regulation (3) and High power – power quality (4).

As a separate problem testing of ESS lifetime and its predictions have been analyzed.



Figure 5. 5<sup>th</sup> DERri workshop

## 6.5 Workshop conclusions

As a result of the workshop discussion a detailed plan of activities including scheduling of laboratory tests and dissemination plan was prepared. It was decided to attempt to submit papers for IRES conference and also for conference on integration (both at the end of 2012 in Berlin). Also a possibility to organize a workshop within the IRES conference will be analyzed.

Detailed conclusions were listed in the minutes of the workshop presented in an Annex to the internal version of the Deliverable.



## 7 6<sup>th</sup> DERri WORKSHOP IN ATHENS, GREECE

### 7.1 Topic of the workshop

The sixth workshop was also held in Athens, Greece in April 2012 at the NTUA premises. The workshop was dedicated to the aspects of Power Hardware-in-the-loop testing and was a continuation of the 4<sup>th</sup> DERri workshop held in Athens. Its topic was:

**" Hardware-in-the-Loop Workshop"**

NTUA as a main contributor to JRA3 organized the workshop. The event was planned as internal technical workshop of the DERri project.

### 7.2 Workshop agenda

The following agenda for the workshop was used. It supported active participation as well as discussion on the main topic amongst the number of partners involved during the workshop as well during the preparation:

FRIDAY, 20 <sup>TH</sup> APRIL 2012		
9.00 – 10.30	Theoretic part	(NTUA)
	Welcome and introduction to the workshop	
	HIL: concept, advantages and typical applications	
	Power HIL: concept, stability and accuracy, interface algorithms and interface compensation	
	Presentation of the PHIL equipment of NTUA and laboratory challenges	
10.30 – 10.45	Coffee Break	
10.45 – 13.00	Experimental part	(NTUA)
	PHIL 1: The voltage of a simulated simple grid rises following the irradiation due to the production of a real PV inverter connected to PV panels.. Measurements of irradiation, voltage, current and power (AC and DC side of the PV inverter) are performed.	
	PHIL 2: A simulated low voltage grid contains several houses with high PV production. The real PV inverter is connected to a specific bus. The simulated PV inverters absorb reactive power in order to keep the voltage below the desired limits.	
13.00 – 14.00	Lunch	(NTUA)
14.00 – 15.15	Joint discussion	(NTUA)
	End Workshop	



### 7.3 Workshop participation

A total of 18 persons from 13 DERri partners participated in the workshop. The full list of attendees is presented below:

ORGANIZATION SHORT NAME	PERSON NAME	
AIT	Thomas	Strasser
	Felix	Lehfuss
CRES	Evangelos	Rikos
IWES	Ron	Brandl
TECNALIA-LAB	J.Emilio	Rodriguez Seco
ICCS-NTUA	Panos	Kotsampopoulos
	George	Messinis
	Alexandra	Kapetanaki
	Eleana	Hatzoplaki
	Thanos	Gravas
	Nick	Korres
RISOE-DTU	Per	Norgaard
TU Lodz	Paweł	Kelm
	Piotr	Gburczyk
TUS-RDS	Anastassia	Krusteva
VTT	Kari	Maki
USTRAT	Paul	Crolla
DERlab-A	Sini	Numminen

## 7.4 Workshop content

After a presentation of the Laboratory of Electric Energy Systems and related research activities and equipment the presentation of Control-HIL and Power-HIL concepts and selected examples (Real-Time protection testing and Voltage Divider Circuit) has been performed. Different types of Power Interface topologies and related requirements-problems in their operation. At this point emphasis was given to the inaccuracies that a RTS may present due to time delays and low-pass filter behaviour. The possible compensation methods in the interface by introducing function blocks either in the forward or in the feedback branch of the system have been discussed.

The three main interface algorithms has been presented:

- Ideal Transformer Model (most used),
- Partial Circuit Duplication,
- Damping Impedance Method (it combines features of ITM and PCD).



Figure 6. 6<sup>th</sup> DERri workshop on PHIL

The second part of the workshop included a presentation of the laboratories, equipment and activities of Electric Energy Laboratory. Specifically, the main equipment presented was:

- Experimental microgrid (power components, PLC, inverters, SCADA system, measured quantities)
- RTDS: basic components

The RTDS demonstration included two separate experiments used in order to make clear the usage of the equipment:

Test 1: Voltage increase at the connection point of a single-phase PV inverter to a LV grid under irradiance variations. Presentation of results for a day with scattered clouds.

Test 2: Voltage variations in a LV distribution grid which includes MV/LV transformer, 6 consumers, 3 simulated and one real PV system. The tests showed how the voltage increases especially in the end-point of the line due to increased PV production and how this changes when introducing reactive power control to the simulated inverters.

The session closed with demonstration of the MAS system, PV outdoor testing and WT design and testing.



## **7.5 Workshop conclusions**

After a laboratory part of the workshop a joint discussion on the benefits of using a RTS for tests took place. It was noticed that there are limitations in the implementation scale in RTS and this should not be the focus of PHIL at the moment due to interface issues and specifically stability and accuracy. The technology is not mature enough yet for large scale simulation. It is necessary that stability is achieved up to 1-2kHz in order to make the PHIL test able to fulfil the requirements of specific standards which regard device testing.

It was agreed that all partners involved in JRA3 will contribute in different ways to the round robin test of the RTS. Apart from the partners that own a simulator and can directly contribute into this activity, other partners will contribute by providing equipment and support in the selected models. The proposal was to perform a round robin test of a PV inverter at the power level of 1kW

Detailed conclusions were listed in the minutes of the workshop presented in an Annex to the internal version of the Deliverable.



## **CONCLUSIONS**

Six workshops have been performed to date. The workshops are seen as a helpful means towards improving the interaction and integration of the DERri partners as well as their ideas on important issues of the DERri project.

It was agreed to proceed with the organisation of future workshops to discuss the most important items of the DERri project. Selection process of potential topics for workshops has proved its efficiency and will be employed in future.