SEVENTH FRAMEWORK PROGRAMME OF THE EUROPEAN COMMUNITY
(EC GRANT AGREEMENT N° 288819)

INTELLIGENT SERVICES FOR ENERGY-EFFICIENT DESIGN AND LIFE CYCLE SIMULATION

Deliverable D8.4.1:

Initial Exploitation Plan

Responsible Authors:

Byron Protopsaltis, Thyrsos Hadjicostas

Co-Authors:

Raimar Scherer, Peter Katranuschkov, John Grunewald, Tuomas Laine, Tobias Mansperger, Gudni Gudnason, Matevz Dolenc, Constantinos Balaras, Miha Kavcic

Due date: 1.12.2012
Issue date: 3.12.2012
Nature: Other

Start date of project: **01.12.2011** Duration: **36 months**

Organisation name of lead contractor for this deliverable:

SOFiSTiK Hellas A.E. (SOF)

History

Version	Description	Lead Author	Date
0.1	Initial draft	Byron Protopsaltis (SOF)	12.11.2012
0.2	Contributions by all partners	All partners	23.11.2012
0.3	Addition of dissemination activities and overall review	Constantinos Balaras (NOA)	28.11.2012
0.9	Full pre-final version	SOF	30.11.2012
1.0	**Checked and approved final version**	TUD-CIB	03.12.2013

Copyright

Citation

Protopsaltis B., Hadjicostas T., Scherer R., Katranuschkov P., Grunewald J., Laine T., Mansperger T., Gudnason G., Dolenc M., Balaras C., Kavcic M. (2012): *ISES Deliverable D8.4.1: Initial Exploitation Plan*, © ISES Consortium, Brussels.

Acknowledgements

The work presented in this document has been conducted in the context of the seventh framework programme of the European community project ISES (n° 288819). ISES is a 36-month project that started in December 2011 and is funded by the European Commission as well as by the industrial partners. Their support is gratefully appreciated.

The partners in the project are TECHNISCHE UNIVERSITÄT DRESDEN (Germany, Coordinator), GRANLUND OY (Finland), UNIVERZA V LJUBLJANI (Slovenia), SOFISTIK HELLAS A.E. (Greece), NYSKOPUNARMIDSTOD ISLANDS (Iceland), NATIONAL OBSERVATORY OF ATHENS (Greece), LEONHARDT ANDRÄ UND PARTNER BERATENDE INGENIEURE VBI GMBH (Germany) and TRIMO INZENIRING IN PROIZVODNJA MONTAZNIH OBJEKTOV, D.D. (Slovenia). This report was created through the joint effort of the above organisations.

Project of the SEVENTH FRAMEWORK PROGRAMME OF THE EUROPEAN COMMUNITY		
Dissemination Level		
PU	Public	
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 (including the Commission Services)	**X**

TABLE OF CONTENTS

Executive Summary

The goal of exploitation activities in WP8 of the ISES project is to package results into products and services, identifying elements suitable to be commercialised and assessing related risks and opportunities according to the developed intellectual property rights (IPR) management approach. Furthermore, the goal of the associated dissemination activities is to ensure that the generated knowledge from ISES is propagated to large audiences, in particular in the construction and the related equipment and element production sectors, the ICT sector and the energy sector, including academic and research institutions EU wide and beyond. The work in WP8 of ISES is in particular structured in 7 tasks:

- T8.1 Project Web and Collaboration Infrastructure,
- T8.2 Dissemination Planning and Management,
- T8.3 Target End User Groups,
- T8.4 Exploitation Planning and Management,
- T8.5 IPR and Risk Management,
- T8.6 Contribution to eeBuilding Data Models Harmonisation,
- T8.7 Organisation of the 3rd eeBDM workshop at the ECPPM 2012.

It results in the following formal deliverables:

- D8.1: Project Web Site and Collaboration Infrastructure,
- D8.2.1 – D.8.2.5: 5 Project Newsletters,
- D8.3.1 – D8.3.2: Intermediate and Final Public Workshops,
- D8.4.1 – D.8.4.3: Initial, Intermediate and Final Exploitation Plan,
- D8.5: Internal Risk Management Database and IPR-related Monitoring,
- D8.6.1 – D8.6.3: Contributions to eeBDM Harmonisation (Initial, Intermediate and Final Report),
- D8.7: Third eeBDM Workshop – Summary and Proceedings.

The Exploitation and Dissemination as a result of the ISES project are outlined in the form of an initial plan in this report, which comprises formal deliverable D8.4.1. The detail level of the plan down to specific activities is, however, not very high, because the target for the project is not fully defined yet as precise products aimed at specific markets that may be analysed with regard to quantity, pricing, business practices and future development.

The present report introduces (Section 1) the ISES Initial Exploitation Plan and presents exploitable knowledge and its use (Section 2, including IPR issues). Further on, it presents the joint ISES exploitation plan (Section 3, including the ISES exploitation value chain and partner roles) and the individual exploitation plans of each ISES partner (Section 4). Finally, the report presents the consortium level and individual dissemination plans (Section 5, including major dissemination activities to date).

1. Introduction to the Exploitation Plan

The **objective** of the ISES project is to develop ICT building blocks to integrate, complement and empower existing tools for design and operation management (FM) to a Virtual Energy Lab. This will allow evaluating, simulating and optimizing the energy efficiency of products for built facilities and facility components in variations of real life scenarios before their realization, acknowledging the stochastic life-cycle nature.

The **focus** of the prototype application domain is on buildings, factories and warehouses, because in buildings about 40% of the global energy is used and 30% of CO_2 emissions and solid waste is created. There is a huge market for more energy-efficient design of new buildings and for refurbishing of the huge building stock through energy-efficient component products.

The goal of the project is to increase, by an order of magnitude, the quality of energy-efficiency in design through the development of an In-Silico Energy Simulator Laboratory, based on an interoperable ontology-supported platform. The focus of RTD is on multi-model design and testing, stochastic lifecycle analysis/simulation in combination with new supporting ontology and interoperability tools and services, and respective re-engineering of existing tools, making them more intelligent and smartly interoperable. Further goals are the combination of energy profile models with product development STEP models (Standard for the Exchange of Product model data, ISO 10303) and building and facility BIM models.

The **Virtual Energy Lab** will be configured as an ontology-controlled service oriented architecture (SOA) system with distributed services, distributed modelling and analysis/simulation tools and distributed data sources. This will allow concentrating the RTD work on ICT gaps, whereas existing, market-proof services, tools and data sources can be incorporated nearly development-free.

The present **ISES Exploitation plan** is developed as a **framework** for how the project results may be exploited by different stakeholders in the future. For the understanding of this plan it is important to note that the ISES main goal is the development of a stochastic and model-based Virtual Energy Lab for new component product development and integrated engineering design. It will be a modular platform, from which each ISES partner may configure any specific module or combination as required for his individual exploitation needs, providing the same interfaces are being used. The Virtual Energy Lab will therefore be the main prototype, but not the marketable product of the ISES project – each ISES partner may exploit the Virtual Energy Lab in their own configuration, possibly also with third party software exploiting the ISES data models and interfaces.

The pillars upon which ISES is built are:

- Interoperability of ICT tools based on ontology-extended Building Information Modelling (BIM) and Service-oriented Architecture (SOA) platform,
- New model and system ontology enabling semi-automatic simulation model configuration,
- A set of new supporting services and tools to enable efficient simulation and evaluation of lifecycle behaviour,
- Cloud facilities with intelligent access and logistics control,
- Stochastics (Input data - weather / climate data, material data, usage profiles, and Processes – related to energy performance simulation).

The research results are as such representing scientific achievements that are exploitable as components in future RTD projects, education, software development, standardisation, consulting and process development for example. This is the exploitable knowledge acquired through the project in addition to the tangible software products. The exploitation plan is dealing with the exploitation of this knowledge in a summary fashion. The report is primarily concentrating on the areas where the software products and tools can be used for developing new business by stakeholders and potential end user industries.

As the ISES products will be mainly applications and tools on cloud middleware, the **immediate challenge** is to identify how these products can add value to the business of different stakeholders. The focal elements in the exploitation plan are therefore:

- to define the stakeholders,
- to identify the specific ISES benefits for these stakeholders,
- to find paths along which the stakeholders can develop business based upon such benefits,
- to identify competing solutions and competitors,
- to exemplify business development, mainly based upon the partners' individual exploitation plans and collaboration opportunities emerging as a result of the project,
- to clarify IPR issues.

Regarding the **stakeholders**, there is a distinct difference between knowledge providers (mainly universities, research institutes etc.), software providers and end users. The plan is therefore distinguishing between these groups in the analysis of the user benefits obtained and how the ISES platform will be used.

Most **direct results** of ISES are public or open source, which means that the business models and competitive advantages are based upon the stakeholders' ability to adapt to the platform and to develop the platform's industrial usefulness, rather than IPRs on the ISES products or exclusivity for use. The result of the ISES project is not a fully marketable operational platform with integrated business level semantics but rather a set of integrated functioning pre-market prototypes.

2. Exploitable Knowledge and its Use

As already mentioned the goal of ISES is to provide a stochastic and model-based Virtual Energy Lab for new component product development and integrated engineering design. The vision of future engineering is a flexible, secure, robust, ambient accessible, interoperable, pay-per-demand access to information, communication and processing resources. The exploitation of ISES results is directed toward standardised product modelling, organised in virtual enterprise environments that constitute the future basis of engineering processes.

Green Building, High Performance and Sustainable Buildings, Energy Efficiency, and CO_2 Emission Control, are **key headlines** which are widely discussed nowadays. Experts are expecting the construction sector to become one of the double winners in this area, by activating private and public investments. The main winners are those who are integratively considering the whole building lifecycle, which is also mandated by the Energy Performance of Buildings (EPBD) recast (2010/31/EC). The *Green market* is already an important segment for building or equipment component product suppliers, facility operators/managers and building designers (architects and engineers). It is expected to significantly increase in the future, especially for the renovation of existing buildings, but also for the design and construction of new buildings. Any means and tools, which will help to improve competence in this area, provide an additional advantage. The most important end users are component product suppliers, building designers and facility managers. Therefore, there is a considerable market potential for BIM-based applications that are enhanced by functionality and interoperability, supporting energy-efficiency and CO_2 emission calculation and cost prognosis.

The ISES project will deliver new methods, tools and data models for energy efficient design and operation of component products, facilities and buildings including integrated lifecycle testing, poor performance indication and cost prognosis through simulation, which is of upmost importance, particularly for large scale facilities. Today there is a considerable gap for calculating operation cost, determining an optimum and sustainable energy mix, analysing and identifying poor performance in order to draw the right conclusions even during the conceptual component design stage and hence before implementation. It is expected that these ISES developments will have noteworthy impact on collaborative processes within architecture, engineering and construction (AEC) and the related supply and FM industries. In particular, this means that there is a need for *knowledge transfer* to decision makers and training activities for adoption of new methods and tools. Furthermore, the ISES partners expect that special emphasis will be needed on integration of energy optimization tools into existing design and operation processes, which depending on specific tools and design principles that are being used, requires further studies of provided interfaces and research on data integration tools. For the future we also see great potential in the field of small and medium enterprises (SMEs), not for typical consultancy work but for affordable training programs and access to know-how databases.

A **key scientific challenge** of ISES is how cloud and BIM technology can be used to provide a mechanism to support the interoperability of software and services working with complex and semantically rich information within virtual organisational settings.

One of the major technological goals of ISES is to make the cloud infrastructure available to the small to medium enterprise (SME) companies that are providing and using engineering software and services. In parallel, ISES is creating a platform supporting various emerging international standards.

There are several **target groups of ISES** (e.g. AEC industry, infrastructure, civil safety, etc.). During the ISES project we have, however, decided to concentrate mainly on the AEC sector for the demonstrations and use cases as the proof of concept is considered made by this.

ISES will in particular develop ICT building blocks and a SOA-based integrated platform. Therefore, there are two kinds of exploitable results, namely the integrated platform itself and the individual components, which are elaborated next.

1) The integrated ISES platform can be exploited:

1a) As a technical Virtual Energy Lab to study new products (building components, technical components) and services before their realization and perform an in-depth analysis of poor performance under lifecycle conditions in order to draw the right tuning or decisions,

1b) As a concurrent engineering design tool for the design and redesign of facilities and buildings to study in depth alternatives under various life-cycle conditions, in order to come up with the best balanced design decision for the facility owner,

1c) As a system analysis tool to analyse the energetic and emission behaviour of existing facilities and buildings, in order to find out their weak components or poor-operation and to make suggestions to the owner for the redesign, retrofitting or reengineering of the operation processes.

2) The individual components can be additionally used as stand-alone tools or together with other tools, which provide BIM based interoperability infrastructure:

2a) Building Operation (FM) tools which are enhanced with sophisticated energy and emission analysis tools, enhanced with BIM based interoperability capabilities and hence access capabilities to energy and climatic data and scenarios and enhanced graphical representation, in order to study life cycle behaviour of the building and investigate upgrading scenarios,

2b) Sophisticated energy and emission analysis tools enhanced with BIM model and interface related interoperable interfaces, which provide beneficial use of the service-supported BIM world like databases (e.g. the Oracle industry foundation class - IFC interface), presentation tools (e.g. the various browser tools, xml based 3D presentation tools and e.g. Acrobat R9 with the IFC interface for pdf presentations),

2c) Intelligent Access Services as web services, which can be provided as ASP for intelligent data access in particular for BIM model and cloud and mapping capabilities for various uses,

2d) API interfaces for various numerical engineering tools (e.g. structural, wind, airflow, moisture, cost) for the BIM model,

2e) User sensitive multi-model navigator as a web service for general purpose use to represent the nD information space, preferable simulation data of spaces (i.e. rooms, zones), structured objects (buildings) etc., in order to be used by experts by providing very detailed technical representation capabilities, as well as by lay persons, like building owners, by providing easy-to-understand 3D representation and navigation capabilities,

2f) Multi-model filter to generate model views for several interlinked models, which use BIM as the basic model,

2g) Model combiner including semi-stochastic process combination and simulation for energy studies, which configures variations of a simulation model according to a variation matrix of the variation parameters

2h) A simulation analyser that analyses and prioritises simulations according to pre-defined criteria,

2i) Interface from BIM to STEP models, which is focused on a simplified geometric, but yet fully functional representation of the STEP-modelled product,

2i) An ontology for BIM models to generically manage various BIM domain models, e.g. as supporting service for multi-model management, filtering and navigation,

2j) A product catalogue management system for management of BIM component products or STEP-imported products.

It is important to note that the above individual components of the ISES platform can be exploited and marketed separately by each ISES partner, as deemed suitable for their individual exploitation needs.

2.1 ISES Exploitable Knowledge

The major ISES deliverables that are presented in **Table 1** below constitute the exploitable knowledge of the project, which will in particular be protected through intellectual property rights (IPR).

Table 1: ISES Exploitation Knowledge

NUMBER	TITLE	TYPE
D1.2	Use case scenarios and requirements specification	Specification
D2.1	Overall stochastic approach for the Virtual Energy Lab Platform	Technical Document
D2.2	Architecture and components of the Virtual Lab Platform	Specification
D4.1	Technical specification of the overall framework and the principal energy profile and consumption patterns	Specification
D4.2	Prototype of the intelligent search, access and interoperability services to the energy-related ICT	Software
D4.3	Prototype of the intelligent services for BIM-based product catalogue profiling and BIM integration	Software
D4.4	Characteristic energy profile and consumption patterns for the ISES Virtual Energy Lab	Software
D5.1	Prototype of the multi-model integration services	Software
D5.2	Prototype of the multi-model combiner	Software
D5.3	Prototype of the simulation configurator	Software
D6.1	Prototype of the host product multi-model filters	Software
D6.2	Prototype of the simulation synthesis and the version management service	Software
D6.3	Prototype of the simulation evaluation service and the multi-model navigator	Software
D7.2	Cloud-enabled software integration	Technical Document & Software
D7.3	Prototype of the developed intelligent workflow definition, execution and monitoring services	Software
D7.4	Use of the Prototyped Virtual Energy Lab on a Cloud Environment	Technical Document
D10.3	Final Project Report	Technical Document

The ISES project results will be only to a very limited extent delivered as fully exploitable end user or provider products. This is one of the major challenges in the development of the present exploitation plan. The **deliverables** from the project are mainly functioning **demonstrable prototypes** on cloud middleware plus knowledge acquired and documented by the different contractors.

The middleware developed is also in principle agreed to be "**Open Source**" (F/OSS), which means that the software as such is in the public domain. A formal body maintaining the IPRs of the platform is proposed, with the responsibility for coordinating the further development, versioning and the free licensing of the ISES platform. Formalising the dissemination and distribution of the ISES middleware in an open source environment is more important for the future exploitation of the results than protecting it from being copied or used in new contexts not directly controlled by the consortium partners.

There are, however, a number of knowledge elements that may be further exploited by one or more of the consortium contractors *without* direct link to the use in the future ISES development. These elements will be dealt with by separate protective measures initiated by the IPR owner and eventual bilateral/multilateral agreements between the interested parties.

The real challenge regarding IPR is emerging when further development of ISES produces products as a direct extension to the platform:

- User adapters and special ISES services: Modelling tools, APIs and GUIs adapted to business segments, Business ontologies, Accounting and other business related services, etc.
- ISES enabled applications: Resources like Software and other specific Services annotated and made available for ISES users by providers of such software and services.

2.2 IPR Issues

The IPR issues for ISES are initially dealt with in general terms in the Consortium Agreement, where the Commission Contractual Rules (Annex II General Conditions – Part C) "Intellectual Property Rights" are cited as base for the agreement between the partners. These rules are globally dealing with:

- *Ownership of Knowledge* – The IPR generally owned by the contractor or contractors generating the knowledge; specific IPRs claimed by personnel working on the project; the rules for transfer of IPR.
- *Protection of Knowledge* – The obligation to protect acquired knowledge; the rules for publication of knowledge.
- *Use and Dissemination* – The right to use and disseminate knowledge; the rules for such use and dissemination.
- *Access Rights* – The right to access acquired or pre-existing knowledge relevant to the execution of the project for contactors or eventual third parties; the general rules for such access; the rules for use of such knowledge.
- *Incompatible or restrictive Commitments* – Eventual exceptions to the grant of access to knowledge.

The Consortium Agreement is confirming, complementing or amending the general rules dealing with:

- *General* – Stating the general validity of the Commission Rules.
- *Ownership and Protection of Knowledge* – Knowledge shall be the property of the Contractor or eventually the joint property of the Contractors generating it; this includes the obligation to protect knowledge and eventually to inform the other contactors if such protection is not sought.
- *Publication of Knowledge* – The approval by owners of knowledge by contractors not owning the knowledge; the obligation to provide for review by all contractors of planned publication of knowledge; the obligation to disseminate after the project; the right to use project deliverables agreed public without consent from the other contractors.
- *Access Rights* – The general obligation according to the Commission rules; the identification of pre-existing knowledge brought into the project and the principle of preferential fee or no-royalty on such knowledge; rules for amalgamating knowledge from two or more contactors; the principle of written request for use of access rights and the rules for extending access rights to affiliated partners; the access to needed software and justified limitation to such access regarding source code.
- *"Have Manufactured" Rights* – The rights for the IPR owner(s) to have manufactured products based upon the knowledge acquired and the rights of the other contractors to have priority to such commercialisation.
- *Use of Marks* – The need for approval from the owner of Marks to any other contractor wanting to use the marks in their own publications.

The IPR issues dealt with in this report will require several actions regarding protective measures, bilateral and multilateral agreements and eventual establishment of joint body for IPR ownership and ISES maintenance and future licensing management. There is a specific free of charge service available for direct assistance in developing IPR policies and concrete protection schemes:

http://www.ipr-helpdesk.org/controlador/principal?seccion=principal&len=en

Furthermore, specific IPR Agreements will be set up bilaterally between a knowledge owner and a party wanting to exploit this knowledge. Such cooperation plans will be identified and listed as a part of the Exploitation Plan before the finalisation of the project. In general, it is the obligation for contractors claiming ownership to Knowledge to undertake adequate measures to ensure such protection and document this.

3. Joint Exploitation Plan

The main impact of ISES is in the supply industry for the construction domain and the construction industry itself. The construction sector is responsible for about 40% of the energy use and 30% of greenhouse gasses emitted. The ISES Virtual Energy Lab (IVEL) will have a big impact on the reduction of energy consumption and emission, because:

Firstly, ISES provides a Virtual Energy Lab to product developers, which will allow the development of highly energy-efficient and emission-efficient and at the same time cost-balanced component products. With IVEL, these products can be tested and validated under development virtually in the host products, i.e. the facilities and buildings, and hence together with other component products which configure the host system. ISES will close a gap that exists today and which has been identified as one of the main reasons why the target energy-efficiency of component products in the host product cannot be realized, since the component product is developed independently from the host product today and only some requirements or very simplified assumptions about the host product, its system and context can be modelled. Therefore, full scale tests are needed, which are very cost and time intensive and are single representative examples of the host product, i.e. the facility or building. Variants of the host product are even not imaginable. IVEL will allow extensive tests of virtually new component products in multiple variations of the host product and hence on low-cost basis before expensive realization. Therefore, it is expected that IVEL will have a considerable impact on improving energy and emission reduction of facilities and buildings through the validated improvement of functionality of component products by about 30% or even more. Thus ISES will strongly contribute to the reduction of energy and CO_2 emission and to delivering a sustainable, low-carbon society, helping to reduce the negative impact of our built environment on climate and on energy consumption.

Secondly, ISES provides a concurrent engineering design tool to the facility and building designers allowing them to optimize energy-efficient facilities and buildings. In addition, it tests and hence validates their designed complex energy systems under virtual stochastic life-cycle conditions. This way, it will be possible to improve today's practices of designing facilities and buildings that are handled by architects independently from the energy analysis handled by service engineers. Enabling a stochastic life-cycle analysis in ISES will further advance and improve current simplified simulation practices that currently use assumed deterministic one-year climate data or test reference years, at best. The advanced ISES capabilities will have an impact of lowering the energy demand and green gas emission of facilities and buildings and at the same time reducing reinvestment costs for taking corrective actions to improve energy systems and building components.

Thirdly, ISES will also open the green building and facility market for the general ICT industry, since it will provide an integrated virtual energy design and test lab on an open SOA basis with full modelling capabilities of any possible facility and building component, providing the integration of STEP models (ISO 10303) of component products in the BIM model of facilities and buildings. Further more, the open SOA allows the integration of mechanical and electrical engineering tools and third-party ICT building blocks and is a basis to integrate and test ICT control equipment of the Building Automation Systems.

The exploitation potential of ISES is described in the following sections, emphasising on the specific exploitable ISES knowledge and features that are adding value to engineering processes in general.

There are challenges encountered by bringing the ISES results to the market and how these challenges may be met with market activities. The ISES exploitable results are seen under two perspectives:

- Exploitable Knowledge,
- Exploitable Products.

The Exploitable Knowledge is evaluated as knowledge derived from the ISES research, which can be used as basis for further research and development in the participating research and university organisations as well as elsewhere. Such exploitation is difficult to quantify in business terms.

The Exploitable Products developed in ISES are evaluated on the basis of exploitable features being specific for ISES and having business development potential within relevant market sectors. In this we are using business terms for the assessment of the exploitation potential.

Synergies in the market efforts between the partners are being evaluated in the individual exploitation plans dealt with in the next section. There are five main exploitation channels, which will be developed by the partners during the project:

(1) Marketing the ISES platform as a whole or partially.

(2) Applying the ISES platform or its components in their own company in order to improve the partner's efficiency for becoming a market leader in their active field and improve their expertise and services (e.g. for new building components and construction projects, the design of new buildings and refurbishment, etc.).

(3) Improving education and graduate programs.

(4) Providing consultancy to industry and specific client developments.

(5) Improving research and competitiveness for participating in research projects, which is of particular interest to all partners.

3.1 Knowledge

The Knowledge acquired in the project will be exploited directly through the future use of the ISES platform in different business models. Some important individual results may, however, be exploited separately, as being demonstrated in some of the individual exploitation plans given in the report.

The key scientific question of the project is how cloud technology can be used to address the interoperability of software and services working with complex and semantically rich information typical for collaboration in dynamic virtual organisations (VO).

ISES is developing a stochastic and model-based Virtual Energy Lab for new component product development and integrated engineering design. The tangible results of ISES are expressed in several Cloud-enabled components forming:

- The ISES platform,
- Platform compliant applications (several existing engineering design tools, engineering data management tools, facility management software, rendering applications which will be made ISES compliant),
- Software libraries.

The overall vision for ISES is to provide a modular platform, from which each ISES partner may configure any specific module or combination as required for his individual exploitation needs, provided the same interfaces are being used. Exploitation of the knowledge stemming from the project is therefore very much dependent on how the tangible results are being implemented in the targeted industries, how the products are developed further by relevant communities, and how research and educational institutions are adopting the results as a basis for further research and learning.

3.2 Products

The Exploitation Plan concentrates on the exploitable products as basis for the different elements to consider. This is mainly because industrial exploitation is regarded as being more measurable than the exploitation of knowledge.

A major challenge in Exploitation Plan development has been to single out the user benefits coming from the specific ISES functionality and separate those from the advantages generally related to IT issues such as cloud computing. In traditional project organisation the different members of the project team have to "navigate", by their own means finding the resources needed for the project on the Web or directly from providers. Communication and interoperation between them may be aided by the use of standardised models and file formats, but this is then determined from case to case. The resources found on the Web are also limited as Cloud HPC possibilities are not commonly available. Hence, the outcome of the process is a set of:

1. ISES Key Exploitable Products,
2. ISES Unique User Benefits,
3. Domain specific benefits related to the industries targeted by ISES.

Some of the identified product features are not to be realised within the scope of the ISES project. The process of bringing ISES to the market will continue after the project is finished.

3.3 ISES Exploitation Value Chain and Partner Roles

In order to understand the interests and likely benefits of the partners in the ISES project consortium it is important to understand the value chains in the building industry. Each building project starts with the building owner, who bares all the costs and is the key customer. There are two basic types of building projects, with a varying delegation of risks: (1) Traditional and (2) Public–Private Partnership (PPP).

In *traditional building projects,* the contracts between owner and clients / sub-clients represent a complex and hierarchical top-down delegation of risks, while the owner keeps the risk of performance of the building. Consultants, contractors and software vendors have to find their business niches in this complex network. This can only be implemented if risks and benefits of an integrated approach, as being promoted by BIM, are shared between partners on contractual basis. In some countries very successful examples can be observed, while other markets are still facing significant difficulties in implementing the BIM-methodology as a common basis.

Today, as more and more professional building owners are deciding to concentrate on their core business, they are becoming keen to delegate the risk for their buildings. This has resulted into the emerging market of *PPP building projects*, where contractors are taking over the risk for the planning, construction and performance of a building design during a significantly long lifecycle phase (typically 25-30 years).

ISES is focusing on the life-cycle energy performance of buildings. As the PPP contractor is taking over the risk responsibility for a long value chain, from planning over to construction until operation, the energy performance of a building is one of the risk factors he has to manage, in order to ensure his profitability. Under the impression of increasing energy costs, this factor is becoming more and more critical. Consultants, software companies and researchers are part of this **value chain**. The better they can support this process, the more they will bring benefit to the PPP contractor, who will win more projects.

The ISES consortium features a mix of 8 partners from 5 European countries, covering the whole knowledge transfer chain and all key areas of research and development relevant to the ISES project goals. They represent 4 types of market segments:

- **End users**. These are construction companies and component product developers, architectural and engineering companies which respectively will apply the ISES software and which are the drivers of the project. They provide the knowledge on the business processes, the needs of the component product developer and the building operators/owners, the workflow and orchestration process information needs, the granularity of the models and the management of multi-models.
- **Software developers**. Their functions are to provide software from architectural design (CAD), building operation (FM) and energy analysis, as well as the human resources and knowledge for the development work for enhancing the basic software, the development of web services and the Navigator GUI, and to prototype them.
- **Academic organisations**. These are universities providing the scientific knowledge on energy analysis, BIM, interoperability, ontology, SOA architecture and orchestration, and stochastic modelling.
- **Research institutes**. They provide the knowledge on BIM modelling and management, including model view, transformation, mapping and interoperability and the knowledge in climatic, usage and user activity modelling.

An overview of the partner roles in the ISES project is provided in **Table 2**.

Table 2: ISES Partner Roles

Partner	Type	Country	Key Competencies	ISES Project Role
TUD – Institute of Construction Informatics **(TUD-CIB)**	University	DE	BIM model hierarchies, data management, interoperability, model filtering and mapping, SOA, web services, ontologies	Academic research and development
TUD – Institute for Building Climatology **(TUD-IBK)**			Energy and comfort analysis methods and software tools	Academic research and development
University of Ljubljana **(UL)**	University	SI	Data management, SOA, web services, cloud / grid computing and high-throughput computing	Academic research and development
Granlund Oy **(OG)**	S/W Developer	FI	Energy consumption, lifecycle FM methods and software, SOA, web services and end user (provide engineering services), cost estimation software	Industrial S/W developer, integrator and consultant
SOFiSTiK Hellas S.A. **(SOF)**	S/W Developer	GR	Numerical methods, CFD computations, modelling of complex geometries and the engineering of analysis software	Industrial S/W developer, integrator and consultant
Nyskopunarmidstod Islands **(NMI)**	Research Institute	IS	Sustainable design and construction, service life planning, LCC, LCA, environmental assessments, renewable energy, energy performance and efficiency	Developer and knowledge provider
National Observatory of Athens **(NOA)**	Research Institute	GR	In-depth knowledge and access to a calculation engine for performing building energy use calculations and building thermal performance	Developer and knowledge provider
Leonhardt, Andrä und Partner **(LAP)**	End User	DE	Detailed design, construction engineering, site supervision, facility designer of technical and engineering aspects	Industrial end user
Trimo d.d. **(TRI)**	End User	SI	New construction materials, elements and structural systems, component product and facility developer	Industrial end user

4. Individual Exploitation Plans

The exploitable results of the ISES project are classified into products, services and knowledge. These are identified for each ISES partner in the following individual exploitation plans, along with the corresponding expected market reach of ISES and the market position and marketing approach of each partner.

4.1 Exploitation Plan of TUD-CIB

4.1.1 Expected Market Reach of ISES for TUD-CIB

The ISES project is seen as an extension of the software platform developed within the FP7 HESMOS project, under the coordination of TUD-CIB. The HESMOS integrated virtual energy laboratory is a platform for architects, facilities managers, operators and owners engaged in PPP projects to examine life-cycle energy and related cost issued to take more informed and efficient decisions. The ISES project will further enable the solution of complex energy-related tasks where higher risks, greater uncertainty or increased responsibility of decisions because of the high repetitiveness of the designed facilities and the used products is the case. In this effort, TUD-CIB will in particular lead the design architecture and the stochastic energy simulation approach.

4.1.2 Position of TUD-CIB in the Market

TUD is one of the oldest and largest technical universities in Germany. It is member of the group of the 9 leading Technical Universities in Germany (“T9 Board”). It is a full-scale university with 14 faculties, 36.000 students, over 4.500 employees and about 600 professors. In ISES it is represented by the Institute of Construction Informatics (TUD-CIB) and the Institute of Building Climatology (TUD-IBK).

TUD-CIB in particular is engaged in the education of civil engineers in CAE/CIC as well as in active research work in the field of applied computer science in the building industry. TUD-CIB has long experience in the cooperative work between academic organisations and industry through its participation and management of several national and international research projects.

The research areas of TUD-CIB comprise product and process modelling, concurrent engineering, virtual organisations, ontologies, information logistics, internet-enabled network infrastructures, Semantic Web technology, stochastic simulation and fuzzy methods. TUD-CIB works on the application of distributed systems and multidimensional data management as well as on methods of artificial intelligence for dynamic business process modelling. Software technology know-how encompasses advanced Internet solutions based on EJB, Java, XML, Web Service and Grid technology. Related papers are published in specialised journals as ITcon, Artificial Intelligence and Automation in Construction, and conferences like eChallenges, ICE, ICCCBE, CIB-W78 and ECPPM. TUD-CIB has been a leading developer of BIM and related standardization groups - in particular STEP and IFC models and related intelligent management methods - for more than 20 years.

Teaching activities include four basic and four advanced courses in construction IT along with active participation in the European ICT Euromaster program.

4.1.3 Proposed ISES Marketing Approach of TUD-CIB

The marketing approach of TUD-CIB with regard to ISES includes education, research, contributions to standardisation and consulting to the German industry.

4.1.4 ISES Exploitation Objectives for TUD-CIB

TUD-CIB will use ISES in extending existing energy analysis and simulation services, as well as to adapt the developed platform to various other scenarios, by:

- replacing part of the data models as appropriate,
- creating new link model and model transformation instances and schemes as baseline,
- replacing the computational tools and appropriate domain applications.

In parallel, TUD-CIB will continue to develop and use background tools, such as ViewEdit (filtering of BIM data) and M2A2 (multi-model container management). Also, TUD-CIB will continue cooperating actively in the eeBDM initiative, in particular for forwarding the eeBDM framework to standardisation in BuildingSMART.

Finally, teaching activities relating to ISES within a Master Programme will be continued as part of the teaching offer of TUD-CIB.

4.2 Exploitation Plan of TUD-IBK

4.2.1 Expected Market Reach of ISES for TUD-IBK

As already mentioned, the ISES project is an extension of the software platform developed within the FP7 HESMOS project, with the active participation of TUD-IBK. The HESMOS integrated virtual energy laboratory is a platform for architects, facilities managers, operators and owners engaged in PPP projects to examine life-cycle energy and related cost issued to take more informed and efficient decisions. The ISES project will further enable the solution of complex energy-related tasks where higher risks, greater uncertainty or increased responsibility of decisions because of the high repetitiveness of the designed facilities and the used products is the case. TUD-IBK will in particular lead the simulation configuration in this effort.

4.2.2 Position of TUD-IBK in the Market

Research at TUD-IBK in particular focuses on the theoretical basis of combined heat, moisture, air and salt transport in building materials as well as other areas of building physics. The expertise of TUD-IBK includes modelling and software development (dynamic hygrothermal room model, building envelope model etc.), energy efficient building (with special emphasis on “zero-energy building” in the new-built and refurbishment sectors), durability and risk analysis. TUD-IBK has long-term experience in development of efficient numerical solvers for solution of coupled parabolic differential equations with highly non-linear transport coefficients. This is typical for transient building physics problems related to durability and energy. The solvers are completed by professional user interfaces and material and climate data bases. The software helps other research institutes in their work, assists students in learning fundamentals of building physics, and supports the work of engineers, architects and others working in the field. TUD-IBK software can in general be used during planning phases to estimate the condensation risk of a construction under various environmental conditions, or to investigate the impact of thermal bridges. It can be used also to determine the causes of damage to constructions or materials, to test new materials for potential application areas and limits, and to help optimize materials accordingly.

An important goal of the research work is the dissemination of new knowledge to other research institutes and practitioners. Therefore, TUD-IBK continuously integrates new findings in its user friendly software and calculation tools.

4.2.3 Proposed ISES Marketing Approach of TUD-IBK

Bringing together scientific work and the needs of design teams inside the productive environment is one of the key factors for successfully handling current and future requirements, not only in the field of building science. Firstly, working in a multidisciplinary and heterogeneous project team speeds up the transfer from research results into productive tools. In particular, TUD-IBK can get fast feedback from design professionals about handling, speed and modeling issues of its simulation tools. Secondly, TUD-IBK can extend the interoperability capabilities of its tools so as to close the gap between different data formats describing building structures.

TUD-IBK will use the benefit caused by the better interoperability of tools developed through ISES as an essential argument for networking activities to find new partners and co-workers in the scientific community and the commercial surrounding area to complete the capabilities of its simulation tool chain or to contribute its software and knowledge into new solutions and projects targeting energy efficient building design and life cycle.

4.2.4 ISES Exploitation Objectives for TUD-IBK

TUD-IBK will use ISES in order to develop and exploit its simulation tools. Because of their generic approach, the generalization of input data structures and handling of simulation results reduces maintenance work on the source code. Optimized functions for analysis and reporting will be developed, which will handle data from different sources.

In parallel, the work done in the ISES project will accelerate and support the development of tools and platforms for conceptual early and detailed design work, and for the operational phase of buildings with low level of energy demand and a high standard of user comfort and thermal behavior. This goal fits perfectly in past work and the main strategic orientation goals of TUD-IBK.

All results of the ISES project fit in the strategic orientation of TUD-IBK's software development department, which produces scientifically sound tools for scientists, engineers and students. TUD-IBK will publish these results in reports and scientific papers available via specialized publication channels and the Internet.

The ISES project will extend the capabilities of existing simulation tools, which will be partly available free of charge, especially for students, and partly for sale for scientific and commercial use. Within the newly developed functions and extensions TUD-IBK will gain new users of its tool chain and offer updated versions of its software to existing clients.

Furthermore, as teaching students in energy efficient design of buildings practicing holistic and life cycle orientated approaches is one of the main tasks of TUD-IBK, all publicly accessible deliverables, experiences and outcomes related to the ISES project (including the enhanced software tools) will enrich the lessons of further classes and initiate student research projects and other new research work.

Finally, the development and integration of functions used for data handling, extraction and translation of building information inside IFC files significantly extends the knowledge of TUD-IBK in this field. The new functions for post processing and reporting will close the gap between rough simulation data and the aggregated results provided for different user groups, and use case driven demands on one hand and the scientific view and requirements formulated from a skilled point of view inside a productive environment on the other hand. The deployment of TUD-IBK's tools in conjunction with the web based ISES framework inside a modular SOA initiates new ideas for providing these software tools to a broader range of users in much easier way than before.

4.3 Exploitation Plan of OG

4.3.1 Expected Market Reach of ISES for OG

The ISES project is expected to support OG and its customers business in the following areas:

- Design of energy efficient buildings,
- Energy and comfort analysis,
- Facilities management.

4.3.2 Position of OG in the Market

OG is the largest consultant in HVAC and electrical design in Finland and strong in energy efficiency and FM consultancy and related software.

The competitors in the design consultancy market are big, wide scope consultants, which have architectural, structural and building services design in the same company. Open, interoperable and collaborative design environment is a key factor for OG as a narrow field expert.

4.3.3 Proposed ISES Marketing Approach of OG

OG has been active collaborator in BuildingSMART / IAI since 1995 and participated in the creation of many BIM guidelines by public building owners in Finland, USA and Norway. Through consulting services by OG the new ISES solutions will be brought fast to industry customers.

4.3.4 ISES Exploitation Objectives for OG

OG's primary exploitation objective is to increase the knowledge base for use in:

- Education (influence on undergraduate and graduate teaching process, master course, visiting lecturing at foreign universities, etc.),
- Research (further extend research ideas, research papers, contribution to standards etc.),
- Collaboration (with members of different scientific projects, consulting activities, transfer of knowledge etc.),
- Participation as partner in future RTD projects,
- Overall improvement of research and competitiveness for the ISES project consortium.

4.4 Exploitation Plan of UL

4.4.1 Expected Market Reach of ISES for UL

The core business of UL where exploitation plans with regard to ISES are being set up includes education, research and consulting to the industry.

UL is the largest university in Slovenia and has over 50.000 students. The Institute of Structural Engineering, Earthquake Engineering and Construction IT (IKPIR) is part of the Faculty of Civil and Geodetic Engineering. Over the last 30 years IKPIR has developed into the largest teaching and research unit at the Faculty and is mainly involved in the fields of structures, earthquake engineering and construction information technology. Professors at IKPIR were mentors to 20 Ph.D., 30 M.Sc. and over 170 B.Sc. students.

4.4.2 Position of UL in the Market

UL's work involves research of methods for the design of structures, the development of computer programs including their transfer into practice, design projects involving the fields of the non-linear analysis of structures and, finally, industrial processes. UL's interest in construction IT evolved from the management of its computing center and computational needs in the structural and earthquake engineering areas. Computer integrated construction (CIC) is systematically researched at UL since late 1980s. UL has been actively participating in the work of the CIB's working group W78 on CIC and the corresponding group WG6 of IABSE. UL has also been studying the computerization of building regulations, electronic technical document management, integrated information systems and object-orientated databases.

In 1993, IKPIR of UL was among the first in the field to start publishing on the Internet and the WWW and studied the role of communication media, such as the internet, on construction industry's practice. A number of frequently visited services were prepared, aimed at the international community of researchers and scholars. Together with the Building Center of Slovenia, IKPIR set up the WWW core of Slovenia's technical information system for building and civil engineering - TIGRA. IKPIR also hosts the first construction related international electronic academic journal - ITcon, an internationally renowned earthquake engineering database EASY, bibliographic database on CAAD CUMINCAD and many others.

Additionally, in 1999 UL founded a company "Institute FGG" which is looking at exploiting research results commercially. FGG already sells engineering analysis software as well as an integrated suite of applications MONCAD. It plans to move into the e-market, capitalizing on UL's long tradition in providing internet services.

4.4.3 Proposed ISES Marketing Approach of UL

The marketing approach of UL with regard to ISES includes education, research and increased collaboration with other academic and research bodies.

4.4.4 ISES Exploitation Objectives for UL

UL has plans to develop and exploit the ISES Virtual Energy Lab infrastructure both internally, to support teaching, and as publisher of engineering software. UL's primary exploitation objective is to increase its knowledge base for use in:

- Education (influence on undergraduate and graduate teaching process, master course, visiting lecturing at foreign universities, etc.),
- Research (further extend research ideas, research papers, contribution to standards etc.),
- Collaboration (with members of different scientific projects, consulting activities, transfer of knowledge etc.),
- Participation as partner in future RTD projects,
- Overall improvement of research and competitiveness for the ISES project.

4.5 Exploitation Plan of SOF

4.5.1 Expected Market Reach of ISES for SOF

The project is aimed at SOF's customers that are mainly involved in AEC and the construction industry. The target market is indicated in the Civil Engineering and Architectural fields, whose envisaged applications include:

- Civil Engineering: Ventilation and Thermal Transfer for buildings of concrete, steel etc.,
- Architectural Engineering: Energy and Emission Analysis,
- Architectural Engineering: Natural Ventilation,
- Architectural Engineering: Presentation tools and beneficial use of service-supported BIM part libraries,
- Mechanical Engineering: Thermal transfer.

Buildings account for about 40% of the total energy consumption and nearly the same share of CO_2 emissions. Consequently, reducing the energy consumption of buildings is a key priority for any country or community striving to save money and reduce CO_2 emissions. There are already European Directives and national plans for increasing the number of buildings for which CO_2 emissions and primary energy consumption are very low or equal to zero. The European Member States are expected to have to set targets for the minimum percentage which those buildings in 2020 (with intermediate targets in 2015) shall constitute in relation to the total number of buildings, and represent them in relation to the total useful floor area. With the ever-increasing demands for sustainable buildings, engineers are developing more complex and diversified designs to reduce loads, boost efficiency and utilize renewable resources. **Fluid dynamics simulations** have proven to be a powerful and effective tool, providing flexible solutions in increasingly complex and demanding projects.

Engineering companies, extensively use building simulations as an optimization and validation tool at an early phase in the design process, since simulation supports implementation of innovative designs and energy-saving measures geared toward decreasing the overall facility's energy costs while maintaining or improving occupant comfort. Sophisticated software is already needed for natural ventilation calculations at an early phase in the design process and the demand is expected to rise in the following years. Simulation supports implementation of innovative designs and energy-saving measures geared toward decreasing the overall facility's energy costs while maintaining or improving occupant comfort.

The situation for **air flow analysis** inside and outside buildings and large constructions as well as energy efficiency is comparable with the mechanical engineering software market 15 years ago. In the last decade computational fluid dynamics (CFD) software for mechanical engineering has been the fastest growing simulation software in the marketplace. CFD analysis has been turning from complicated software for specialists to an everyday tool for design engineers. It is expected that a similar situation will emerge to the market for **ventilation and energy efficiency**. Furthermore, it is expected that since the above requirements for energy efficiency have increased, CFD analysis will become necessary for almost any building design, as well as other similar civil engineering constructions. Today CFD is one of the fastest growing branches of Computer Aided Engineering, with double digit annual rates of growth.

4.5.2 Position of SOF in the Market

SOF is a Greek software house focusing in the area of structural and mechanical engineering. SOF offers state-of-the-art software tools for bridge engineering, structural steel, tunneling, and wind loading on structures resulting from CFD calculations, aerodynamic plus fluid-structure interaction problems, and energy-related design optimizations of structures and mechanical components. SOF works intensively together with leading software companies in Germany and acknowledged Greek experts, including Technical Universities and R&D teams. With a portfolio of about 400 customers it belongs to the most prominent engineering consulting offices in Greece, and is among the first 50 in South and East Europe. SOF also cooperates closely with other partner companies in Germany that offer structural analysis software worldwide, and have an installed base of at least 5.000 desktop systems. These customers will be the starting base for selling the new applications.

Mergers and acquisitions in the software industry for integrated multi-physics analysis software have created competitors with large customer bases and a large software portfolio. Most CFD software vendors offer multi-physics solutions. There are only few if any other software platforms providing CFD simulation customized for natural ventilation and energy efficiency enhanced with BIM based interoperability capabilities and access to energy and climatic data and scenarios and stochastic lifecycle analysis/simulation. Furthermore, there are no cloud computing services offering the possibility to run ventilation and energy simulations on remote servers. SOF with the ISES service is expected to provide very fast computation times plus optimization of the results for the customers that do not want to invest in expensive multiprocessor grid servers and want to get simulation results in a limited amount of time.

4.5.3 Proposed ISES Marketing Approach of SOF

The software tools and engineering design that will be developed by SOF in this project will comply with the current versions of the European Design Codes. National and international recommendations and standards will be reviewed, along with current practice and technical developments, in order to be taken into account for the product development. The developments of SOF in the project cannot be patented. The best protection in the software business is to be ahead of competition.

In particular, SOF will commercialize the individual partial products of the project (the CFD applications) through all its well established channels:

- Individual sales,
- Direct sales through partners,
- Indirect sales through the available dealers in Germany, the rest of central Europe, East and Southeast Europe,
- Internet offering,
- Offering parts of the products as O.E.M. - Software to other software houses.

Engineering services will be offered directly from Athens. The dealers that are now under contract are not ready to sell and support the new products. Thus a training plan will be necessary.

4.5.4 ISES Exploitation Objectives for SOF

SOF's primary exploitation objective is to increase business potential through marketing of the ISES products. SOF will take advantage of most of the parts and functionalities of the ISES platform to provide and market its software and services with emphasis on energy efficiency, indoor air quality,

airflow requirements over buildings, pollution reduction, thermal comfort, fire/smoke management, green building design, and solar shading.

The cloud enabled software applications will improve the quality of analysis, optimization and fast re-analysis with higher accuracy. In addition, SOF will seek to take advantage of new interoperability capabilities as well as Pay-per-Use and flexible licensing within the cloud environment

Moreover, the software will be used by architects to produce visualizations for marketing purposes and to enhance their communication with prospective clients. Through the use of airflow modeling, prospective customers will be able to explore the ventilation system performance in the design phase rather than having to wait until construction to complete. This will enable engineers to streamline the selection of diffuser locations, to optimize supply flow rates and temperatures, and to quickly explore various design alternatives and materials.

4.6 Exploitation Plan of NMI

4.6.1 Expected Market Reach of ISES for NMI

The target market for the project deliverables and know-how is the national AEC/FM industry, including Architect, Engineering and Construction companies involved in the design, construction and refurbishment of buildings, building product and material manufacturers and companies specialising in property and Facilities Management. Applications include:

- Energy performance of products and buildings,
- HVAC design,
- LCA and LCC,
- Environmental assessment (BREEAM, LEED),
- Sustainable building including CO2 emissions.

Since 1970, domestic renewable energy resources have replaced imported fossil fuel. Today 100% of the electricity and 99% of hot water and space heating is by renewable energy sources in Iceland. CO_2 emissions and energy efficiency is nevertheless of primary concern. Under the “Declaration on a Sustainable Nordic Region 2009-2020” the Government of Iceland will commit to a 15% reduction in the carbon footprint by 2020 (effectively equals 30% reduction over current targets set by the Kyoto Protocol for Iceland) and to reduce energy consumption and increase energy performance of buildings as further elaborated and declared in the State Energy Policy.

In 1979, 1990, 2000 and 2010 the Government of Iceland launched programs to increase energy efficiency and reduce energy consumption in the existing building stock where property owners were subsidized when installing more efficient heating systems, renovating the building envelop for energy losses or introducing other more energy efficient measures. During those initiatives NMI has provided expertise, software, building element and cost libraries and knowhow to the industry.

The products of ISES fortify NMI in this context and to always have the best possible state-of-the art knowledge, software tools and services available to its base of 1.500 customers in the construction industry and wider base of over 2.500 customers within the building product and material industry and within state, municipal and government organisations.

4.6.2 Position of NMI in the Market

NMI is a non-profit public organisation. Its primary objective is to conduct research and knowledge transfer to the benefit of Icelandic industries. It is a leading research centre in the national market and operates in close cooperation with the national Industries and higher education institutions.

NMI has a unique position in the national market and emphasizes cooperation to avoid completion through its dominant market position.

4.6.3 Proposed ISES Marketing Approach of NMI

The developments, knowledge and know-how obtained through participation in ISES will contribute to the NMI's participation in advice to government, national policy making and development of the national building regulations.

NMI will use its established channels and direct routes with current clients to offer extended services based on ISES products, components and acquired knowledge:

1) Product and material manufactures and suppliers for which it provides testing and certification services, including windows and door manufacturers, insulation and insulation panel manufacturers, building element manufacturers, heating systems manufacturers and electronic control systems developers.
2) Design, engineering and construction companies for which currently NMI provides engineering services, training and consultation.
3) Public institutes and offices, state and municipalities for which it provides consultation.

4.6.4 ISES Exploitation Objectives for NMI

NMI's main exploitation objectives are to strengthen the position of the institute as a leading research centre in the national and international market and to drive innovation in the industry towards more energy efficient and sustainable buildings. NMI will focus on advantages brought by ISES directly or indirectly in energy simulation and technological advancements in areas including:

- Energy efficiency and energy performance analyses for new and existing buildings,
- Thermal and indoor air quality analyses,
- Sustainable building design,
- Introduction of renewable energy sources in existing buildings situated in cold areas of Iceland i.e. where no usable geothermal heat is available and electricity is used for space heating).

NMI will exploit the project results following several paths, applying and incorporating acquired know-how, expertise and technology into industry targeted engineering and consultation services, training and higher education, information dissemination and networking activities, continuation in projects. The project impact will seek further initiatives in cooperation with energy companies, large property owners and other stakeholders to further exploit and replicate the project results in diversified settings.

4.7 Exploitation Plan of NOA

4.7.1 Expected Market Reach of ISES for NOA

The main NOA activities where exploitation plans with regard to ISES are being set up include:

- *Research* (mainly at international level). The decisions made in the concept and design stages of new buildings, as well as in renovation of existing buildings, influence about 80% of the total life cycle energy consumption. Information and communications technology (ICT) has been identified as one possible means to design, optimize, regulate and control energy use in buildings. Key research, technology, and development priorities include the integrated building design and decision support tools.
- *Education* (mainly at national level). Educational activities with regard to the assessment of the energy performance of buildings, integrated building design and the opportunities for the refurbishment of existing buildings, include continuing education efforts, seminars and workshops for consulting engineers, architects and professionals. Additional efforts on dissemination and awareness campaigns targeted to buildings owners that may also influence and drive the market demand for more energy efficient buildings.
- *Standardisation* (mainly at national level). The European Committee for Standardisation (CEN) has developed over 40 new standards to satisfy the requirements of the European Directive on energy performance of buildings (EPBD) that constitute the basis for standardisation on national level. Follow-up efforts in Greece have been underway over the past few years for ensuring compliance and national transposition efforts through the development of regulations and technical guidelines by the Greek Ministry of Environment, Energy and Climatic Change (YPEKA) and the Technical Chamber of Greece (TEE). Specific standardization efforts for ISES related issues are still in their infancy but will soon have to be addressed as the market evolves towards a holistic building design and the need for flexible decision making tools for the design or refurbishment of energy efficient buildings.
- *Consulting* (mainly at national level, to third parties, consultants and architectural/engineering offices). Building thermal simulations and computational fluid dynamics analysis have emerged as powerful tools that enable consultants and building firms to design, construct and refurbish buildings with improved energy performance. Given the time requirements and expertise for their use, they have not yet been integrated in routine practices. However, given the recent developments with EPBD adaptation in all EU member states, there is already a growing need for a holistic new building design or major refurbishment of existing buildings, that mandate the need for using this kind of tools. In addition, consulting and design firms will need support for integrating their different models and simulation tools in the ISES Virtual Energy Lab.

4.7.2 Position of NOA in the Market

NOA is a government/public research centre, with five institutes, supervised by the General Secretariat for Research and Development of the Greek Ministry of Education. NOA is the first research center in Greece, established in 1846. Participating in ISES, the Group Energy Conservation (GREC) is an integral element of the Institute of Environmental Research & Sustainable Development (IERSD), active since 1995 in national and European R&D projects related to rational energy use in buildings, energy conservation, RES, active & passive thermal and solar building applications, solar cooling, thermal and CFD building simulations, analysis and numerical modeling of thermal energy

systems, building energy audits and retrofitting, indoor environmental quality, HVAC installations, natural ventilation, thermal imaging and infrared inspections, large scale solar heating systems, weather data for simulations, and computer tool development.

Participation in research projects is amongst NOA's major activities. During the period 1995-2012, GREC/NOA completed close to 40 projects financed by the European Commission, national Ministries, industry, and engineering / architectural consulting firms.

The educational activities of GREC/NOA include organization of professional seminars on software for assessing the energy performance of buildings (e.g. the official national software - TEE KENAK prepared by GREC/NOA for TEE, based to a great extent on its previous experience as an evolution of EPA-NR software that was developed during a European project), educational programs organized by YPEKA (e.g. training the trainers of building energy auditors) and various workshops on the use of software developed by GREC/NOA as a result of its participation in European projects (e.g. EPA-NR and TABULA) as a potential teaching tool for students on HVAC and prepare them as energy consultants and energy building auditors (e.g. Aristotle University of Thessaloniki). Members of the GREC/NOA team participate as lecturers to professional seminars organized by TEE, and in educational postgraduate programs.

Standardisation activities of GRECE/NOA are focused on the energy performance of buildings through participation in various committees for the development of national regulations (e.g. Hellenic Regulation on Energy Performance in the Building Sector – KENAK) published by YPEKA and the relevant Technical Guidelines (TOTEE) developed by TEE.

Consulting services of GREC/NOA are targeted to electromechanical (E/M) & architectural offices (e.g. J.E. Papagrigorakis & Associates, Electrical – Mechanical Engineers – Consultants, I. Printatkos & Associates, Z. Samourka-Architects) and other organizations (e.g. Hellenic Aviation Authority) providing expertise on building thermal simulations and CFD analysis in new and refurbished commercial buildings, hospitals, residential buildings etc. Prominent studies include airport terminals, the new Acropolis Museum etc.

Fragmented efforts by software development houses attempt to address the needs for BIM and to facilitate the design and assessment of building's energy performance. However, these efforts are undermined due to the conceptual structure of specific software, limited coverage to specific software house tools and inherently due to the limitations of the necessary computational power. The ISES project results position this process in an advantageous stage for providing the necessary flexibility of various tools, with enhanced input features and enable investigation of multitude scenarios, with suitable support for the decision making process.

4.7.3 Proposed ISES Marketing Approach of NOA

The market is ready for the ISES results given the growing need to approach the design, construction and refurbishment of buildings in a coherent and holistic manner. The advantages of having access to a variety of tools with enhanced features for the exchange of input data, providing the necessary computational power to expedite the investigation of numerous scenarios, can significantly reduce cost and pave the ground work for day-to-day (routine) use. This is along the lines of the EPBD recast, national legislation and regulations that have been introduced across the EU, which change the way buildings are designed or refurbished. Potentially, there will be a need for support standardization efforts and possibly certification of processes or even professionals, which are currently in their infancy, but would be necessary in order to demonstrate the body-of-knowledge. Consulting services to various stakeholders and consulting firms that would need to find their way in these new standard practices will pen significant opportunities for the exploitation of ISES know-how and expertise to

enable expansion of the prototype Virtual Energy Lab, by integrating specific tools, additional input data etc.

Promotion of research results is planned through various activities, including:

- Participation in international expositions (e.g. Climatherm, Building Green, EnergyRES etc.) for the dissemination of information and promotion of services.
- Electronic promotion of achieved results and services through a dedicated website on GREC/NOA activities (cf. www.energycon.org).
- Contributions and announcements in electronic Newsletters of professional associations, e.g. eNewsletter of the ASHRAE Hellenic Chapter.
- Presentations in technical and professional conferences.
- Direct communications with Greek Ministries and professional associations like the TEE. Similar activities have been successfully implemented in the past for the promotion of other EU project deliverables that include, for example:
  - EPA-NR software (EIE/04/125/S07.38651) that was upgraded and adapted to national requirements in order to develop for TEE the official software (TEE-KENAK) for energy audits and energy performance certification of buildings in Greece, according to EPBD provisions; this calculation engine is also used by commercial software, to ensure consistency for benchmarking the energy performance of buildings.
  - TABULA method and tool (IEE-08-495) that is currently considered by YPEKA for supporting the national efforts in accordance to the EPBD recast.

4.7.4 ISES Exploitation Objectives for NOA

NOA's primary exploitation objective is to increase the knowledge base for use in:

- Research (further extend research ideas, research papers, contribution to standards etc.),
- Education (participation in undergraduate and graduate level programs, lectures at postgraduate seminars and workshops, involvement in diploma projects and thesis, etc.),
- Collaboration (with members of different scientific projects, consulting activities and services to E/M & architectural offices, transfer of technical and scientific knowledge etc.),
- Participation as partner in future RTD projects,
- Overall improvement of research and competitiveness for the ISES project,
- Support of national efforts for the development of standards, regulations and technical guidelines undertaken by professional associations (e.g. TEE) and ministries (e.g. YPEKA).

4.8 Exploitation Plan of LAP

4.8.1 Expected Market Reach of ISES for LAP

ISES is aimed to improve LAP's consulting of clients in building projects regarding energy and sustainability. The target market of LAP's work includes:

- Public clients (governments, local authorities, etc.),
- Industrial clients,
- Building industry,
- Investor consortiums,
- Private clients.

Sustainability has become a very important issue for the design and refurbishment of buildings in recent years. Although guidelines of evaluating sustainability are published, the tools for covering all aspects are circuitous and imperfect. The reduction of energy consumption of buildings can have a great contribution to the reduction of CO_2 emissions and governments increase the standards and codes constantly. Not only legal standards get clients to the demand of energy efficient buildings, but also the costs of energy are rising exponentially.

4.8.2 Position of LAP in the Market

LAP is an independent Consulting Engineering Company registered with the World Bank in the field of bridge design and structural design. During more than seven decades of professional practice LAP has been in the forefront of the design profession through creativity and innovation, having conceived many new theories and techniques, new structural elements and details, and construction methods. LAP has designed thousands of structures, among them very outstanding ones such as suspension and cable-stayed bridges, television towers and many types of building structures all over the world.

While the design of wide-span bridges is the figurehead of its work, the design of buildings is one of LAP's core businesses.

In the design of buildings LAP is in the leading group of German consultants with the focus on larger non-standard buildings for public and industrial clients. LAP has developed several building methods and materials in the past decades and also current innovations are on their way. Some examples are:

- Reinforced concrete high rise towers (The TV-Tower in Stuttgart was the first of that kind, erected in 1954),
- Carbon fibre reinforcement,
- Reinforced concrete cores for building stabilization,
- Orthotropic steel - concrete composite bridge decks (current),
  etc.

4.8.3 Proposed ISES Marketing Approach of LAP

The know-how gained from the ISES project and the ISES platform itself will help to improve LAP's consulting of clients regarding energy efficiency and sustainability of buildings.

As industry partner, acting on the market is part of LAP's daily work. ISES as a reference will help to acquire more energy and sustainability aware clients.

4.8.4 ISES Exploitation Objectives for LAP

LAP will use ISES as a reference to gain new projects clients for the design of energy efficient buildings. The project as a reference will also help to widen the spectrum of work regarding sustainability.

Using the BIM technology and proving its benefits will help to convince project partners to use BIM for all disciplines participating in the design process. By achieving a holistic design process planning costs will be reduced, which will strongly help to improve LAP's position in the market of buildings and construction facilities.

4.9 Exploitation Plan of TRI

4.9.1 Expected Market Reach of ISES for TRI

The ISES project is aimed at TRI customers, which are involved in building design and optimization in the sense of energy efficiency. The target market is in the Engineering and Architectural fields, whose envisaged applications include:

- Engineering: Energy efficiency of building,
- Architectural Engineering: Energy and Emission Analysis,
- Architectural Engineering: BIM part libraries of TRI products,
- Mechanical Engineering: Thermal transfer.

TRI holds a number of patents relevant to the building sector and will be strengthening the ISES consortium with product development know-how, in particular related to end user demonstration. The ISES project will improve TRI's market reach of clients, in particular regarding new construction materials, elements and structural systems. TRI will also exploit end-user data to design the future capabilities of the Virtual Energy Lab.

As also mentioned earlier, buildings account for about 40% of the global energy consumption and nearly the same share of CO_2 emissions. Consequently, reducing the energy consumption of buildings will be a key priority for any country or community striving to save money and reduce CO_2 emissions, and national plans for increasing the number of buildings of which CO_2 emissions and primary energy consumption are low or equal to zero will be drawn. The European Member States are expected to have to set targets for the minimum percentage which those buildings in 2020 (with intermediate targets in 2015) shall constitute in relation to the total number of buildings, and represent them in relation to the total useful floor area. Due to these considerations, energy efficient design and production of buildings and building components is a primary strategic goal for TRI.

4.9.2 Position of TRI in the Market

TRI is engaged in the engineering and production of pre-fabricated buildings. It is a high-tech company providing with its product range comprehensive solutions in steel prefabricated buildings, roofs and facades, steel structures and modular units. The company has production facilities in Slovenia, Russia, Serbia and the United Arab Emirates. Its products are sold in more than 40 countries around the world through an extensive network of companies, representative offices and agents. TRI is high above the industry average in value added per employee, share of exports and R&D investments and has been recognized as one of the most innovative companies receiving a significant number of awards and prizes in the field of development and innovation. In addition to the central R&D Department and a registered R&D Centre, TRI established the CBS Institute, which is regularly invited to various international meetings for exchange of practice in business processes and innovative practices.

4.9.3 Proposed ISES Marketing Approach of TRI

The know-how gained from the ISES project and the ISES platform will help to significantly improve TRI's marketing of new construction materials, elements and structural systems to its interested client companies and organizations.

4.9.4 ISES Exploitation Objectives for TRI

TRI will use ISES as a reference to gain new projects and clients for the use of new construction materials, elements and structural systems, as well as the means and opportunity for close cooperation and improved response to project needs.

4.10 Summary of ISES Exploitable Results

The exploitable results of the ISES project are classified into products, services and knowledge, as summarised in **Table 3**. These include all IPR-protected exploitable knowledge of the ISES project.

Table 3: ISES Exploitable Results

PARTNER	EXPLOITABLE RESULTS FROM ISES PROJECT		
	Products	**Services**	**Knowledge**
TUD – Institute of Construction Informatics **(TUD-CIB)**	Enhanced grid/cloud enabled domain tools by BIM and ontology-based methods Intelligent access and management tools for the ISES Virtual Energy Lab Prototype of the multi-model integration services Prototype of the host multi-model filters New multi-model ontology and model transformation schemas for eeBDM	Feedback to design professionals about handling, speed and modeling issues of simulation tools Creating dedicated new link models for specific energy-related tasks Consulting to the German industry in BIM, eeBIM and ontology use Forwarding the eeBDM ontology framework to standardisation in the frame of buildingSMART, extending the work begun in the HESMOS project	Develop teaching activities related to ISES within a Master Programme Further development of research activities Overall stochastic approach for the ISES VEL platform Architecture and components of the ISES platform
TUD – Institute for Building Climatology **(TUD-IBK)**	Optimized functions in simulation tools for analysis and reporting, Tools for conceptual work, design and operational phase of buildings, Prototype of the simulation configurator, Prototype of the host multi-model filters	Feedback to design professionals about handling, speed and modeling issues of simulation tools Extending the interoperability capabilities of simulation tools so as to close the gap between different data formats describing building structures	Enriching the lessons of further teaching classes Initiating student research projects and other new research work
Granlund Oy **(OG)**	Prototype of simulation synthesis and version management service Prototype of simulation evaluation service and multi-model navigator	Improvement of research and competitiveness with Granlund's service palette	Influence on the undergraduate and graduate teaching process Extending research ideas and contribution to standards

PARTNER	EXPLOITABLE RESULTS FROM ISES PROJECT		
	Products	**Services**	**Knowledge**
University of Ljubljana **(UL)**	Develop and exploit Virtual Energy Lab infrastructure to publish engineering software Cloud-enabled software integration Prototype of intelligent workflow definition, execution and monitoring services	Improvement of research and competitiveness in UL's competence domain	Exploit ISES to support teaching Increase knowledge base for use in education and research Use of prototyped Virtual Energy Labs on a cloud environment
SOFiSTiK Hellas S.A. **(SOF)**	Improved ISES CFD capabilities on cloud environment Interoperability, pay-per-use and flexible licensing Prototype of intelligent services for BIM-based product catalogue profiling and BIM integration Prototype of multi-model combiner	Exploitation of airflow modeling to explore ventilation system performance in the design phase, enabling engineers to streamline the selection of diffuser locations, optimize supply flow rates and temperatures, and quickly explore various design alternatives and materials	Exploit parts and functionalities of the ISES platform to market its software and services with emphasis on energy efficiency, indoor air quality, airflow requirements over buildings, pollution reduction, thermal comfort, fire/smoke management, green building design and solar shading
Nyskopunarmidstod Islands **(NMI)**	Prototype of intelligent search, access and interoperability services to energy-related ICT, Characteristic energy profile and consumption patterns for Virtual Energy Lab	Exploit energy simulation and technological advancements in areas including energy efficiency and energy performance analyses for new and existing buildings, thermal and indoor air quality analyses, sustainable building design, introduction of renewable energy sources in existing buildings situated in cold areas of Iceland Apply and incorporate acquired know-how, expertise and technology into industry targeted engineering and consultation services	Drive innovation in the industry towards more energy efficient and sustainable buildings Apply and incorporate acquired know-how, expertise and technology into training and higher education as well as information dissemination Participation in advice to government, national policy making and development of national building regulations Technical specification of overall framework and principle energy profile and consumption patterns
National Observatory of Athens **(NOA)**	Exploit know-how and expertise to enable expansion of the prototype Virtual Energy Lab by integrating specific tools and additional input data	Consulting activities and services to E/M & architectural offices Improvement of research and competitiveness	Increase knowledge base for use in research, education and knowl. transfer Support of national efforts for the development of standards, regulations and technical guidelines

PARTNER	EXPLOITABLE RESULTS FROM ISES PROJECT		
	Products	**Services**	**Knowledge**
Leonhardt, Andrä und Partner **(LAP)**	Exploit BIM and ISES VEL for all disciplines participating in the design process, thus reducing planning costs and time	Widen spectrum of consulting work regarding sustainability	End-user know-how Use case scenarios and requirements specification
Trimo d.d. **(TRI)**	Exploit end user data to design future expansions of the Virtual Energy Lab	Improve design capabilities for exploiting the use of new construction materials, elements and structural systems	End-user know-how Pilot demonstrations of the Virtual Energy Lab

5. Dissemination of Knowledge

For any project to achieve a significant impact, sufficient dissemination of its core findings is a priority. ISES is aware of this fact and continues to adopt an active approach towards dissemination of its results to different target constituencies. The key target areas foreseen for ISES are, but not limited to:

- *The Energy, Construction Informatics and Architectural Research Communities* - The partners will actively participate in the events and publish relevant results in scientific journals and conferences on building design, grid/cloud, and construction informatics.
- *Industry* - The industrial partners in the project will focus on the visibility of the project in trade fairs and other promotional activities that they participate in.
- *Education* - The academic partners will exploit the research results of the ISES project into graduate curricula.
- *Other related projects* - The ISES project priority will participate actively in joint activities. The plan is to organize one or two joint events at major milestones of the project that will be open to representatives from other projects and include relevant presentations.

Furthermore, ISES will encourage publication of the project results in popular press and daily newspapers, such as the scientific supplement of leading national dailies. The professional press and Web sites as well as professional events (trade fairs, etc.) will be targeted as well. The main target audience through these additional channels will include software developers, industrial sector companies (AEC, etc.), middleware / cloud as well as project web companies.

5.1 Consortium Level Dissemination Plan

The consortium level dissemination plan will permit to establish target audiences and define key messages, to select the appropriate modes and tools of communication, to implement the dissemination activities among partners. It will be mainly targeted to construction industry and construction supplier industry (equipment, components, ICT) stakeholders, as well as to the ICT industry (especially in the area of Construction Informatics), but also to citizens for fulfilling the

societal objectives of spreading education and generating enthusiasm for energy efficiency and emission reduction. In relation to dissemination activities, a dedicated website (http://ises.eu-project.info/) has been developed at the beginning of the project. The ISES website enables the publication and updating of the new advances to a wider audience. It is linked to all relevant organizations and will be maintained after the conclusion of the project, for being interactive and accessible by professionals and researchers. In addition, a web seminar will be organized for experts and for the public.

Dissemination activities targeted to the *industry* in particular are handled through the ISES Newsletters, web portals and the participation of the industrial partners and the research institutes at trade shows. ISES aims at becoming visible in the global construction community by presenting itself on the ECTP.

In addition, the *academic and research* partners will publish scientific papers in popular scientific-technical magazines and international journals and participate in conferences in the areas of:

(1) Energy and emission efficient buildings,

(2) Building and facility component developers,

(3) BIM/model-based design,

(4) Distributed, collaborative systems and concurrent engineering,

(5) Ontologies and virtual enterprises.

Academic and research partners will use their position in the editorial boards of conferences and journals to promote the idea of integrated collaborative energy and emission simulation tools and interoperability of STEP-BIM-BAS and organise special issues and sessions. Open access media will be preferred, because they allow faster and wider dissemination. The academic partners will also build the findings into their graduate and postgraduate curricula.

Within the consortium the knowledge will be used according to the exploitation plans of the partners. The dissemination targets outside of the consortium include:

- *Energy Efficiency, in particular ICT related projects.* The ISES project will actively participate in concerted action activities, in particular organized by ICT4EE, and take initiatives to organize concerted events.
- *The research community.* The partners will actively participate in the events and publish in journals that cover energy efficient design and construction, collaborative working, ICT in construction and engineering informatics communities. The goal is to organize sessions and tracks at conferences such as ECPPM, CIB W78, ICCCBE, IABSE, FIP, ICT4SH, and make contributions to IAI/buildingSMART.
- *Green Building Initiatives.* The ISES partners are active in these initiatives and the intend is to enhance the promotion of the important role of ICT to strengthen the sustainable impact in improving energy efficiency.
- *The European Construction Technology Platform.* Several ISES partners are members of ECTP and will disseminate ISES findings and results there and will organize workshops and seminars in the course of ECTP.
- *Education.* The academic partners will build the research results of the ISES project into the graduate curricula to enhance and extend their educational programs.

The publication of ISES project results will target popular green press and real estate newspapers / magazines. The professional press and Web sites as well as professional events (trade fairs, etc.) will be targeted as well.

The main dissemination and awareness targets are:

- Building and facility product suppliers.
- FM companies and consultants as well as FM software developers.
- Architectural companies.
- Construction companies.
- Building owners and real estate companies (the people there are the secondary potential users of the ICT project results).
- Software developers (the authors of AEC software are the potential users of the project results).
- Associations, in particular ECTP and EAPPM as well as national associations in construction and energy agencies.
- Standardization committees, with focus on BuildingSMART and STEP, specifically BuildingSMART standardisation activities regarding BIM/IFC (ISO/PAS 16739), BuildingSMART standardisation activities regarding IDM (ISO 29481), ISO standardisation activities in conjunction with the development of new products, namely part libraries PLib (ISO 13584), ISO "Building Construction" for the organisation of information about construction works (ISO 12006, Parts 1-3), etc.

The ISES dissemination approach is structured at three levels: (1) between the consortium partners, (2) towards the EC and other cloud and energy efficiency projects, and (3) towards professional networks and the industry at large.

5.2 Individual Dissemination Plans of each Partner

Each ISES partner has in place their own dissemination strategies in addition to the common consortium dissemination plan presented earlier. The individual dissemination plans of the partners that supplement the common dissemination plan are described below.

5.2.1 Dissemination Plan of TUD (TUD-CIB and TUD-IBK)

As an academic organisation, TUD is strongly engaged in various scientific events (conferences, workshops, symposia), as well as in disseminating research results via its industry contacts and teaching activities. The specific dissemination strategy of TUD therefore comprises in first place the presentation of project results and research findings at international conferences, such as ECPPM, CIB W78, ICCCBE, Pro-VE, eChallenges etc., as well as the provision of advanced lectures to international students.

5.2.2 Dissemination Plan of OG

OG is a building services consulting company, and will be strongly involved in the evaluation of simulation results. Its dissemination activities during this process will therefore comprise presentations in the frame of ISES simulations, internal newsletters and presentations on their Internet homepage.

5.2.3 Dissemination Plan of UL

UL will publish conference and journal papers about ISES, particularly about the Virtual Energy Lab architecture, developments and technologies. Papers will be presented at the annual workshops and congresses of CIB (Conseille Internationale du Batiment), IABSE (International Association of Bridge and Structural Engineering), ASCE (American Society of Civil Engineers), ECAADE (Education in CAAD in Europe), ACADIA, national events, etc.

UL has a long tradition of publishing on the Internet and will contribute to an efficient presentation of project results on the Web. The project results will influence the undergraduate and graduate teaching process, visiting lecturing at foreign universities and scientific collaboration within Europe and beyond, including ITC Euromaster (European Master programme in Information Technology in Construction, http://euromaster.itcedu.net) and HPC4E (High-performance computations for Engineers, http://morpheus.pte.hu/~peteri/hpc2011/).

5.2.4 Dissemination Plan of SOF

SOF is a commercial company and the dissemination activities aim at promoting its products and services. SOF will therefore disseminate the results of the ISES project to a number of Fairs, International Workshops, Conferences and other events where the company participates regularly every year. SOF is also a founding and very active member of the Greek Association of Software Developers and Distributors (SETEL). A number of companies in the Association are active on international level. From this position, SOF will inform other Software Houses regularly about the progress of ISES. This is an ideal forum to discuss about possible future partnerships and co-operations.

5.2.5 Dissemination Plan of NMI

NMI intends to actively raise stakeholders' awareness and interest in the project through its industry customer base and its strong alliance in the industry. NMI will use every opportunity to promote ISES through related events and its range of seminars, training courses, newsletters and press releases and other networking activities involving the target market. NMI will participate in national conferences and meetings focusing on energy related issues, such as:

- Annual Meetings organized by the Federation of Icelandic Energy and Utilities companies and Ministry of Industry, focused on environmental issues, energy production and distribution, energy efficiency and energy saving.
- Annual conferences hosted by BIM Iceland – Organization of Public Procurers implementing Building Information Modelling.
- Annual meetings hosted by the Icelandic Facility Management Association (Fasti), Member of the Nordic Facilities Network.

Findings of the ISES project will be incorporated into the Civil Engineering Masters Program at the University of Iceland. Technical articles will also be published focusing on Designers, Facility Managers, Municipality Engineering Offices, Planning Offices and property developers. This will include publishing articles in the Engineering Magazine, in web blogs and discussion forums about innovation and technologies in Energy simulation, calculation methods and approaches and techniques as fostered by ISES. Finally, NMI will post regular articles on their website (www.nmi.is)

disseminating news on the ISES project. NMI will in particular publish at least one technical paper at an international conference covering findings from the ISES project.

5.2.6 Dissemination Plan of NOA

NOA dissemination activities are targeted to a variety of audiences through various activities including:

- Presentations at national and international conferences and workshops; plan for at least two related presentations.
- Technical publications; plan for at least one publication in a technical magazine / scientific journal.
- Electronic dissemination and promotion of the ISES project, work progress and results via:
  - The GREC/NOA website www.energycon.org,
  - News-briefs and relevant announcements contributions in eNewsletters; plan for at least two contributions in eNewsletter with high circulation to targeted recipients, e.g. consultants, engineers, architects, energy experts, to enhance exposure.
- Educational and teaching activities that GREC/NOA members periodically participate in, including:
  - Building Energy Management course at the MSc in Energy programme of the Mechanical Engineering Dept. - TEI of Piraeus in collaboration with Heriot-Watt University, UK,
  - MSc thesis in the framework of the MSc in Energy programme, on the use of the ISES Virtual Energy Lab for building design,
  - Continuing education seminars targeted to building design professionals.

5.2.7 Dissemination Plan of LAP

LAP is a design company in the field of structural engineering, and will be strongly involved in the development as well as the practical pilot implementation of the ISES Virtual Energy Lab. Its dissemination activities during this process will therefore comprise presentations in the frame of project applications, internal newsletters and presentation in their internet homepage.

5.2.8 Dissemination Plan of TRI

TRI is a high-tech company providing with its product range comprehensive solutions in steel prefabricated buildings, roofs and facades, steel structures and containers. Its dissemination activities during this process will comprise a variety of marketing related activities (e.g. presentations of project results, newsletters, direct promotions to customers etc.).

5.3 Major Dissemination Activities to Date

Within the period 1st December 2011 – 1st December 2012 (first year of project implementation), the following major ISES dissemination products have been realised:

- D8.1: Project Web Site (http://ises.eu-project.info) and Collaboration Infrastructure,
- D8.2.1: 1st Project Newsletter (http://ises.eu-project.info/downloads.php),
- D8.2.2: 2nd Project Newsletter (concurrently with the present report),

- D8.4.1: Initial Exploitation Plan (*present report*),
- D8.5: Internal Risk Management Database and IPR-related Monitoring (concurrently with the present report),
- D8.6.1: Initial Contributions to eeBDM Harmonisation (concurrently with the present report),
- D8.7: Third eeBDM Workshop (*Reykjavik, 26.07.2012*) – Summary and Proceedings (concurrently with the present report).

The very successful **Third eeBDM Workshop** (D8.7) in particular, attended by an audience of about 50 in Reykjavik, Iceland, included presentations and discussions about Energy Efficiency Vocabularies and Ontologies, specifically regarding to:

- The use of ontologies playing a major role for to achieve standardization and exchange of information.
- Ontological specifications for model integration in ICT and Building Energy Systems.
- Covering the interoperability gap from Building Information Modeling to Building Energy Management Systems.
- Energy and behavioral modeling and simulation at facility management.
- The use of vocabularies for semi-decentralized management of energy demand in house-holds.

In parallel to the Third eeBDM Workshop, the **9th European Conference on Product and Process Modelling (ECPPM 2012)** took place (*Reykjavik, 25-27.07.12*), attended by a large audience of over 200. ECPPM 2012 identified the most recent achievements and future research in the Product and Process Modelling technology in the times focused in integration and lifecycle management. The topics discussed and presented in the conference regarded in particular to:

- Integration of sustainability in the lifecycle processes (BIM and energy efficiency in different phases of the construction process).
- Modeling fundamentals, concepts and approaches , 4D and nD modeling.
- Interoperability focused in AEC/FM processes, platforms, interfaces and standards.
- Industry experiences and implementation of BIM in real projects, best practices and strategies.

OG, SOF and TUD-CIB attended the information sessions and *F. Forns-Samso* (OG) presented a paper on "*Building Information Modelling supporting Facilities Management*". ISES partners were also present at the open discussions between different academia, research and industry participants in the Conference and *P. Katranuschkov* (TUD-CIB) moderated one of the final plenary sessions and discussions.

Additionally, NOA has also initiated its dissemination efforts introducing the ISES project and its main objectives during the following presentations related to high performance buildings and energy conservation:

- *C.A. Balaras, "From the Energy Performance of Buildings Directive to Building Information Modeling and Intelligent Services"*, **4th innoFORUM 2012 – Green Economy**, Athens Information Technology (AIT), *Athens, May 25, 2012* - The event on green innovation & entrepreneurship, ICT for a greener world and green technologies was well attended by over 60 engineers, consultants, policy- and decision-makers.

- *C.A. Balaras, "Integrated Building Design, Construction & Operation: Legislation - Building Information Modeling (BIM) & Intelligent Services"*, **Scientific Symposium «Building & Energy»**, Technical Chamber of Greece, Regional Section of Eastern Macedonia & Thrace, Democritus University of Thrace, *Xanthi, September 7-8, 2012* - The event was very well attended by about 100 engineers, consultants, energy experts, graduate students and faculty.
- *C.A. Balaras, "Developments in the Legal Framework and the Integrated Energy Design of Buildings"*, **Eco Building Conference - 5th Int. Building Green 2012 "Passive Building and Urban Environment"**, Symposium "KENAK & Intelligent Solutions", Group Energy Conservation, IERSD/NOA, *Athens, October 5, 2012* - The event was organized by NOA and was well attended by over 74 architects, engineers, consultants.
- *C.A. Balaras, "From KENAK and EPBD Recast to Building Information Modeling (BIM) and NZEBs"*, **Int. Conference "Energy in Buildings"**, ASHRAE Hellenic Chapter and Technical Chamber of Greece (TEE), *Athens, 13 October, 2012* - The event was well attended by about 50 engineers and consultants.

As a first step for the electronic dissemination and promotion of ISES project, NOA has incorporated in its dedicated website on GREC/NOA activities (www.energycon.org) a short introduction in Greek and a link to the ISES website. This area will be updated with relevant information on ISES deliverables in Greek, as the project advances.

■