FIRST PROGRESS REPORT

6 MONTH DELIVERABLE

September 2012

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General Introduction

Elios 2 is a Pilot Project launched by the European Commission and entitled: "Facilitating access to insurance by self-employed builders and small building firms so as to stimulate innovation and the promotion of eco-technologies in the European Union".

This First Progress Report sets out the framework of the 6 months work carried out from the beginning of the Project.

Brief overview of the main steps

In January 2012, the first bilateral meeting with the European Commission members was organised in order to discuss the specifications of the Call for Tender and clarify the first deliverables expected from the Elios team.

At this occasion, the European Commission underlined the necessity not only to have a general overview of the different issues raised in the contract, but also to reach concrete results. As the previous Pilot Project, named Elios 1, constituted a feasibility study, the second phase of this project, named Elios 2, should be considered as a more operational Pilot Project. It aims to further elaborate on some aspects and recommendations of the Elios 1 project.

The first Forum, held in March 2012, was the opportunity to share different viewpoints with the Forum Members on the future collaboration and the division of tasks.

The second Forum, held in June 2012, was mainly focused on Work Package 1. Also, a few strategic questions were raised which resulted in the definition of a strategy to ensure good progress of the project, notably to respect the main deliverables and milestones based on the proposal by the Elios 2 consortium.

During the 6 months, the Elios 2 team focused on the elaboration of a strategy that will be executed over this three year project. To do this, the team made contact with different organizations operating on a European level.
After analysing the different statements made by these professionals, each Work Package ensured that the statements and thoughts that have been brought out these past six months will be carried through, including the challenging task of collecting the "right data" on factual basis.

The coordination role of WP 5

This part of the Progress Report does not intend to sum up all the findings of the different WP (see below the 4 corresponding contributions). We will only try to focus our attention on the necessary coordination between the different tasks undertaken, the possible **links** between them and the way each of them could be a part of a whole.

This coordination role, which WP 5 has to take in charge, is particularly delicate according to:

- The great diversity of the matters we have to take into account (knowing that each of this matter can receive a different treatment in the framework of the national regimes-see Elios 1 and the mapping of the EU 27 countries).

- The necessity to achieve concrete results during this operational pilot project

The Elios 2 study needed to start with a very large scale of research in order to bring out useful solutions that could be applicable in the 27 EU countries.
The only way to proceed in this project is by making clear choices as soon as possible and focusing on the orientations and guidelines set. We will then be able to adopt a pragmatic approach.

Fortunately, it already seems possible to consider or imagine some **concrete solutions** facilitating access to insurance by self-employed builders and small firms so as stimulating innovation and the promotion of eco-technologies in the European Union, especially concerning the cross border activities.

1. Quality signs (Work Package 1)

In order to fully achieve the deliverables mentioned in the Call for Tender, WP1 has taken into consideration the strategic questions and suggestions made by Forums Members. The orientations brought to these concerns in the project (points 1.1, 1.2, 1.3) lead us to a possible concrete result (1.4). A methodology to collect data was also proposed (1.5).

1.1 Understanding of the notion of conformity/ quality Marks

The call for tender specifies the term of Conformity/Quality Marks. The study that has been done over these first 6 months shows that this term/notion could evoke several meanings. This has been also one of the principal discussions with the Forum members.

WP1 has proposed to use the term "(quality) signs" and, according to the importance of the terminology, has started to elaborate a glossary.

The quality signs are defined as follows:

A quality sign is any kind of sign on the basis of which stakeholders rely on or give credit to when decisions or choices have to make.
Stakeholder: person or organisation that can affect, be affected by, or perceive themselves to be affected by a decision or activity. A decision maker can be a Stakeholder.

According to the existing diversity of quality signs in the EU-27 countries and in order to facilitate the inventory, it can appear useful to use general distinctions.

. The first one concerns the subject of the sign with a possible classification into 4 main categories: products, processes, works and actors

. The procedures used to deliver the signs are of course important, especially to analyse the rationale and the relevance of the information provided. Sometimes, the characteristics of the subject are

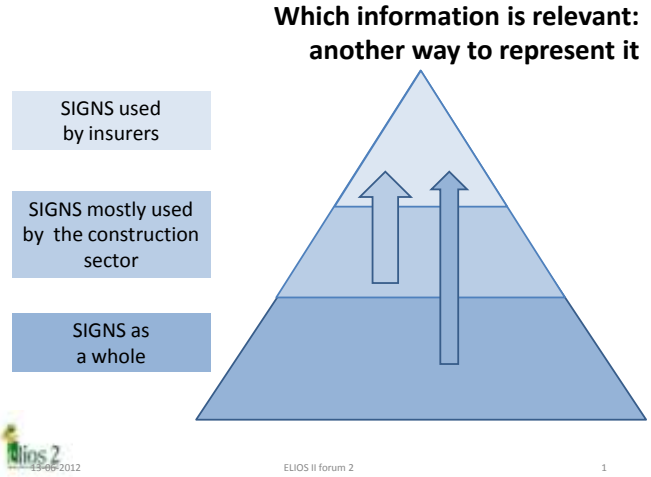
compared to available specifications (conformity assessment); in other cases the characteristics of the subject are specifically elaborated before the comparison (approval assessment).

. A distinction has been proposed according to the origins of the signs. The “regulatory” quality signs are defined by legal acts, whereas the “market-driven” quality signs are introduced by construction actors on their own initiative.

1.2 Scope of the study: focus on the signs taken into account by the insurance sector

The Elios 2 team has to analyse the relevance and to appraise the impact of quality signs at a European level. All the EU 27 countries have to be covered. Nevertheless, trying to achieve an exhaustive listing is out of reach and the risk would be to forget the key question of the access to insurance: what is the role that quality signs play in the functioning of construction markets their relation to the CE marking and how (re)insurers take them into account in risk appraisal (point 1.2.3 of the call for tender)?

The necessity to achieve some concrete results has driven the Elios 2 team to a pyramidal approach. This illustration aims to highlight that signs used by insurers are only a part of all signs used by the construction market.



The general framework and the objectives of the Pilot Project will bring the WP 1 to strengthen the research on the quality signs that are market driven. Especially on the signs (commonly) accepted by the Insurers.

1.3 First typology

In order to structure the use of the signs by the insurance sector, it is possible to make a distinction between, on one hand, the situation that brings the selection of signs with regard to the process “operation by operation”, and on the other hand, the underwriting by the insurer based on the liability of the actor.

In other words, on the top of the pyramid model, we could meet the following situations:

The insurer delivers coverage on the basis of the liability of one actor.

The insurer covers one operation/construction work, for instance for a guarantee period of 10 years.

Obviously, the types of signs to be considered are different according to the risk the insurer wants to assess.

Insurance cover for the craftsman is subject to different process compare to the insurance process to cover the construction works as a whole operation.

Within these two situations, a second distinction can be done between:

- Direct consideration
- Indirect consideration: the insurer bases on the quality signs that are themselves acknowledged by an external advisor, expert or technical controller. Remark: the access to insurance can also be decided by a broker or by a cover holder.

1.4 A possible concrete result: a directory focused on the access to insurance

The objective of WP1 is the development of a directory of signs used in all 27 countries for products, processes, works, and professional qualifications. The main recipients of this directory are supposed to be professional services providing expertise and advice to construction operators, investors and (re)insurance.

The choice to focus investigations into signs which are used by insurers when assessing construction risks could lead to a possible concrete result: the creation of a more detailed directory dedicated to the insurance sector, or more exactly to the actors involved in the access to insurance. A limited number of signs are used today when an underwriter is asked to cover a construction risk and this dedicated directory could potentially be quite exhaustive. This directory should contain a critical analysis of the rationale and the relevance of the information provided by the signs.

Easily accessible on Internet, well known by the actors of the (re)insurance sector, this directory could constitute a first step toward a mutual recognition of the national signs.

The goal would be to describe the processes used in each European country in order to access to insurance. What kind of signs is taken into consideration, why and according to which criteria? This question has to be seen with regard of the mapping of the 27 insurance regimes.

Consequently, how could these signs be used by other national insurers, especially for cross borders activities? Is a mutual acceptance possible according to the differences namely technical and climatologically?

The attempt will be here to eliminate a practical barrier and to facilitate the full implementation of the freedom of services into the internal market.

The idea has been to set up a typology of these different signs for a better understanding of the existing processes and realities. It has been considered to introduce distinctions regarding:

- the person that delivers the quality sign
- the "subject" of the quality sign (Product/Process/Work/Actor)

The European Commission would like to know which marks are refused by the insurance sector and what are the reasons. In order to set-up a clear plan of these signs and theirs conditions of acceptability or unacceptability, the team will concentrate on the factual information.

The conclusion made after the first Forum was the need to create a glossary of the terms related to the project.

The glossary defines the key words that contribute to the delimitation of the scope of our study. Since some of them can possibly receive different meanings, the glossary is also an opportunity to choose the orientations we are going to follow.

This first result achieved is crucial for understanding the Elios expertise.

More generally and in order to avoid misunderstanding, the terms used during the Elios2 study or connected to our work and defined by different other sources will also be reminded in the glossary.

1.5 Methodology

In order to collect information on signs in construction markets for products, processes, works and professional qualifications, a data collection strategy has been defined and is being implemented.

This strategy consists in a pack of options briefly described in the following table. They allow the collection of targeted data from different sources and are designed to provide clear and pedagogic information.

In particular, the analysis of signs production patterns presented during Forum 2 will be accessible. The "link with the insurance issues" and the "link with the SME's issues" will be emphasized.

A draft questionnaire is being tested out by WP1 partners who are also signs producers (BBRI, CSTB and TZUS) for a set of Product/Process/Work/Actor in Belgium, France and Check Republic.

At the beginning of 2013, WP 1 preliminary reports will focus on:

- The presentation of the variety of signs in construction and of the ways they are produced (accessible on the web). This presentation will be supported by examples concerning Product/Process/Work/Actor
- Signs used by the Insurers in the EU-27 Countries

The approach is consistent with the pyramidal model described in 1.2.

2. Building Pathology (Work package 2)

The target of Work package 2 is to develop an EU-wide knowledge base on quality indicators in construction and building pathology.

The Work package 2 is anticipating the next planned deliverables since collecting data is a challenging task.

2.1 Key notions

As a starting point, WP 2 has paid a special attention to the definition of some key words contributing to the definition of the scope of the study, especially: construction quality, indicators of quality in construction and building pathology.

The state of the art on building pathology already gives an overview of the sources and references and proposes the first classifications of the possible defects and their causes. The WP2-team has developed a questionnaire, which will be used for collecting information on the availability of sources on building pathology in Europe.

According to the specifications of the tender, WP 2 has also proceeded to a selection of 10 eco-technologies. Eco-technologies are defined here as: '*technologies which (are supposed to) have favourable impact on the environmental performance of the building (and whose use is less environmentally harmful than relevant alternatives)'.* They have been selected through a specific process based on the following criteria (defined in details in the WP 2 description):

Technologies that are mature enough, are available on the market and are commonly applied in construction in most European countries for a certain period of time to have some claim feedback from insurers, and experience on pathology data, typical risks;

Technologies that are also supposed to be 'problematic' or 'risky', in the sense of building pathology, defects, damages, non-performance etc. during the design, installation or use of the technology.

The selection was started with a very global list of technologies used across Europe. More than 30 products have been preselected and analyzed carefully.

Progressing in deep analysis of the 10 selected eco-technologies, the WP2 will keep the door open to include or exclude other eco-technologies on basis of the criteria launched by the experts from the Elios 2 team.

These first steps prove the great difficulty in collecting reliable data on quality and pathology in general, without focusing the attention on some specific issues.

2.2 A possible concrete result: eco-technologies warning procedure

Elios 2 could be an opportunity to initiate the creation of an "Eco-technologies Warning Procedure" (Procedure d'alerte) for some specific eco-technologies.

The idea would be to define a short list of eco-technologies that are commonly used and that have shown some issues during their life-cycle, according to the literature review. This selection would be done in cooperation with the stakeholders of the insurance and construction sectors.

With the listed eco-technologies, our team could try to create a network of contacts at a European level and to propose a "General Agreement", taking the form of a contract, in order to organize a European wide exchange of information.

The interested stakeholders could be the ones who are involved in the possible damages affecting or caused by the considered eco-technologies: mainly insurers, but also actors of the construction sector as contractors, as well as experts or consumers representatives. The mapping of the 27 insurance regimes is a useful tool to identify the best interlocutors in each country.

In order to arrive at such a Warning Procedure, it would be necessary to gather at least 2 or 3 interlocutors in each European country. They would have to report the issues/defects that they have noticed in their countries, for the listed eco-technologies.

The participants would thus receive an access to a platform of information on pathology and a precious return of experience. An EU-wide database and an exchange of information with a warning procedure could be organised as a possible end result of the Elios 2 project.

Such a warning system has to be worked out further during the course of the project. Naturally, such a 'warning procedure' should be embedded in rules and procedures in order to safeguard the interests of entrepreneurs and companies for being erroneously included. It should obviously not lead to 'blacklists' of construction products or companies.

3. Insurance schemes (Work package 3)

In regard of the objectives of the Pilot Project (see the Call for Tender specifications) the importance of WP 3 is obvious. WP 3 has to act operationally in order to achieve visible results, especially in updating the mapping and giving it a practical aspect about the realities of the different national markets. This will bring some light on the huge variety of the existing insurance schemes in EU countries and thus facilitate the tasks undertaken by the WP 1 and WP 2.

In this perspective, WP 3 has built a detailed methodology and got numerous contacts. Allianz has agreed to be member of the Elios 2 team, which constitutes a key-factor of success.

Two important observations can be done about the internal market and the insurance sector.

3.1 About the internal market

A Commission staff working document about "the result of the performance checks of the internal market for services" provided by Mr. Antonio Paparella in June highlights some important statements with regard to the project.

"Other barriers are sector-specific and concern requirements applied to service providers established in other Member States, such as …insurance obligations duplicating those to which providers are subject in their own Member States.

"A particular difficulty identifie in these three scenarios (including construction activities) concerns insurance obligations to which service providers are subject…

Businesses and professionals in search of insurance for their cross-border service provisions (be it insurance acquired in their Member State of establishment or in the Member State where they intend to provide services) face a practical problem: insurance to provide services in other Member States is difficult to find in the market, whether in their Member State of establishment or in the Member State here they intend to provide services…

Businesses and professionals face problems because of the lack of mutual recognition clauses in sector-specific EU legislation that provides for authorisation or registration schemes or the certification of experts (extracts)".

It is important that Elios 2 contributes to eliminate these remaining barriers, facilitating the cross borders activities, especially for the SME and regarding the use of eco-technologies.
In order to do it and to improve the situation, an essential mean consists to struggle against a lack of information at a European level. The concrete results proposed for WP 1 (see 1.3) and for WP 2 (see 2.2) are designed in this perspective and could constitute important steps on this direction.

These proposals are also in a perfect continuity with the findings and recommandations of Elios 1.

They suppose the fostering of strong bonds between, on the one hand, the work done about signs (WP1) and the WP3, and on the other hand, the work done on pathology (WP2) and WP 3.

3.2 About the insurance sector

The organisation representative of the insurance sector in Europe, Insurance Europe, has been following the Elios project from the beginning. Like some other key stakeholders, representing the construction sector, they have been members of the monitoring and steering group of Elios 1and associated to the feasibility study. And we are pleased to have their involvement in the second project.

On the basis of the Mandate of the Forum, Insurance Europe prepared several comments that are available in the Annexed Document.

We would like to highlight some extracts of these constructive and positive statements:

> "The final proposal of the Elios study, the creation of European Agency, is a good approach to manage the heterogeneity in the EU"
> "The (re) insurance industry welcomes a cooperation within the Elios 2 project, as we have a common interest in seeing more sustainable building methods and materials being developed."

The possibility to foster a dialog and to organize an **exchange of information with the insurance sector** is obviously vital for Elios 2.

Since this dialog concern different aspects of the Pilot Project and involves all the WPs, coordination is organised by WP 5. Several contacts and meetings have already been organised.

4. Forum and dissemination of data (Work package 4)

The Work package 4 is in charge of communication and dissemination of the information. A daily contact with WP 5 provides a maximum communication within the team, and externally.

Kim Haugbølle, as a leader of WP4, provides consultations through the situations presented during the project.

WP 5 has contributed to the newsletter and taken in charge the Elios website.

4.1 Newsletter

In order to differentiate our Newsletter from many types of Newsletters that our interlocutors may receive from different organisations, the WP4 tries to elaborate a strategy in order to distribute an attractive document including the relevant information and detailed progress of the Elios project.

The first edition of the Newsletter was sent in June 2012. CEA, as a coordinator, has adopted a very strict process of dissemination. It is not the number of sending's that was important for Elios team but the "right" people targeted.

Each partner and subcontractor provided us a list of potential contacts based on specific criteria in order to reach the professionals and organisations that would directly or indirectly have an interest in Elios project and its results.

In addition to the relevant international or European organisations, the contact with the national professional associations and organisations has been taken early in the year in order to ask the dissemination of any useful communication towards the practitioners in construction sector, especially the SME.

4.2 Website

The website is divided into 3 main parts:

- Elios 1 project and all its related documents
- Elios 2 project –its progress and the documents (Forum presentations, Meeting Minutes, intermediary reports, European articles related to Elios project, the inscription form for the Forum, etc)
- Intranet: for a professional level of coordination, the communication is one of the top level tasks that CEA is accomplishing through the intranet. Elios team members are able to upload any documents, they can make and receive comments on the documents uploaded, ask for an advice, synchronize the outlook calendar with Elios calendar. This platform supports massive but structured communication channels with the benefit of avoiding thousands of emails, including the draft documents exchanged.

The website is available in 2 main languages (French and English) and updated weekly.

CHAPTER I - WORK-PACKAGE 1

1. Work Programme

1.1 Expectations and objectives

The overall objective of work-package 1 is to provide impartial and reliable information on the opportunities and threats of quality/conformity marks that could support risk appraisal by (re)insurers, in a way compatible with Internal Market objectives.

The specific objectives of WP1 are:

- ✓ to highlight the variety of the usage and added value of these marks in the EU-27 countries so as to allow a better understanding of similarities and differences between local approaches;
- ✓ to reduce information asymmetry between EU construction producers (any actor developing goods and services) and users (such as e.g., home owners, investors, authorities, ..), taking into account the increasingly regulatory role of the (re)insurance sector in the assessment of risks;
- ✓ to help identifying compatibility and complementary issues with the CE marking;
- ✓ to assess the impact of the quality/conformity marks on the competitiveness of the construction industry and on the practices of the insurance sector;
- ✓ to make this information accessible on Internet by means of an EU directory on quality/conformity marks (labels, certificates, technical assessments, etc.) for construction products, processes, works and professional qualifications[1],

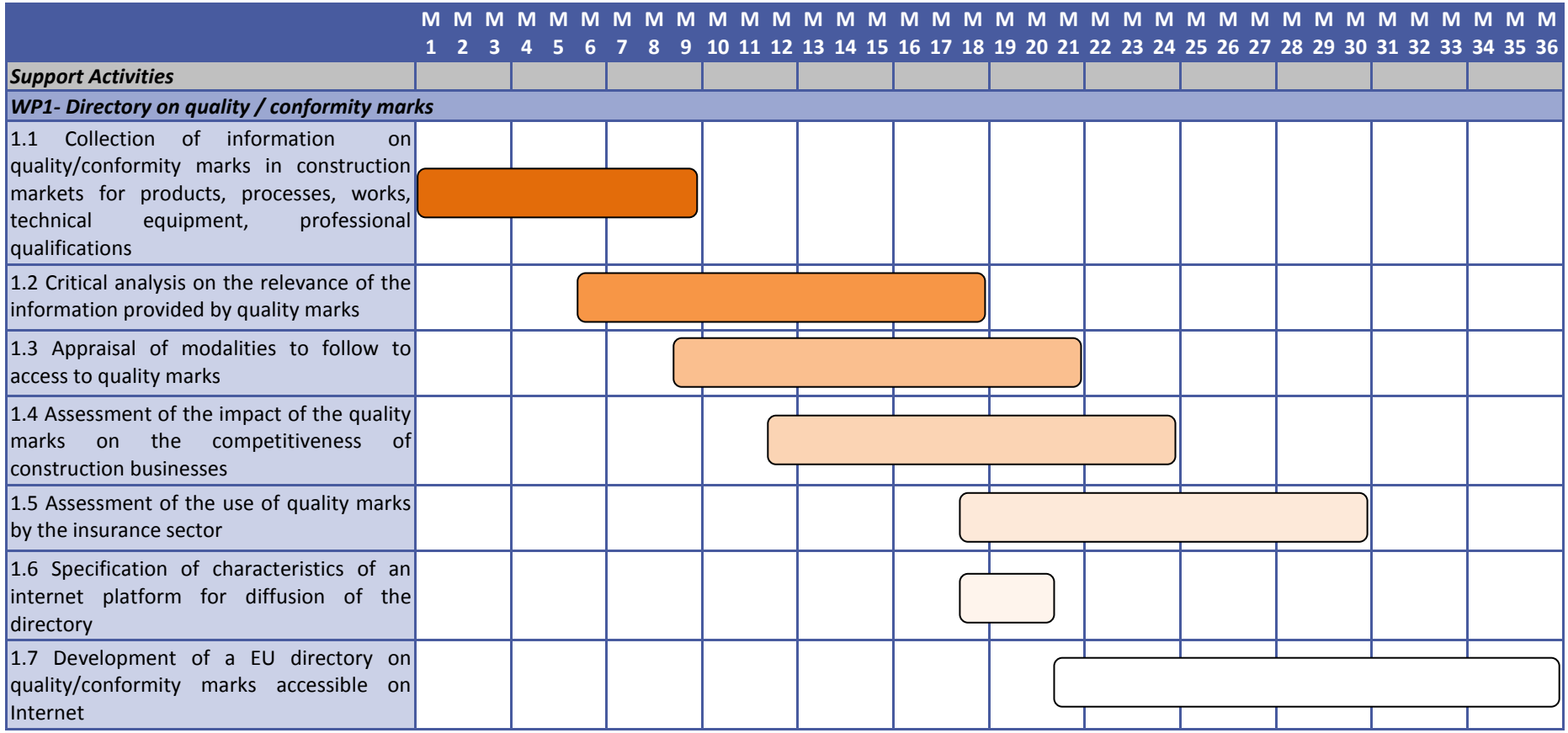
WP1 is organised in three tasks:

1 Task 1.1: Inventory of quality / conformity marks (labels, certificates, technical assessments, etc) in all EU-27 countries used in construction markets for products, processes, works, and, professional qualifications
2 Task 1.2: The contextual framework of quality / conformity marks
3 Task 1.3: Internet platform - Development of an EU directory on quality/conformity marks

[1]The call for tender mentioned the following list : construction products, processes, works, technical equipment and professional qualifications.
During the first forum, the merging of the two categories: “technical equipments” and “products” was acknowledged. The following list of subjects will then be used during the rest of the project: “construction products, processes, works and professional qualifications”.

1.2 Deliverables and milestones

The main WP1 deliverables and milestones, based on the proposal by the Elios 2 consortium, are shown in the scheme below:



1.3 Work carried out so far

The work carried out to end of Mid June 2012 includes:

- ✓ delivery of the report "Review of literature/information sources on quality/conformity marks and building pathology" in January 2012
- ✓ preparation and presentation during forum 1 (March 20) and forum 2 (June 13) of the foundation of the EU-directory : key definitions, organisation of data collection
- ✓ preliminary elaboration of a draft glossary of terms
- ✓ design and test by WP1 partners of a questionnaire aiming to collect information on quality signs.

1.4 Work described in this progress report

This Progress Report describes the results of the work carried so far, within Task 1.1: "Inventory of quality / conformity marks (labels, certificates, technical assessments, etc) in all EU-27 countries used in construction markets for construction products, processes, construction works…or professional actors":

- ✓ Vocabulary issues
- ✓ Information asymmetry in construction
- ✓ Elaboration of quality signs
- ✓ Objective of a sign directory
- ✓ Use of quality signs
- ✓ Report delivery and further steps

The main objective of WP1 is the development of a directory of quality/conformity marks so as to provide a **clear and extensive presentation of how the information needed by construction actors is produced.**

The need and expected added-value of such a directory has as strong theoretical background in economy known as "information asymmetry". Before addressing this subject, we first present vocabulary issues which are of the utmost importance in the context of the Elios 2 project.

2. Definitions: a key issue

During the first six months of the project, the importance of vocabulary issues was highlighted. Meanings of words can be quite different from one country to another. This may lead to misunderstanding.

A glossary of terms proposed to make shared definitions easily accessible to all involved parties.

A first draft was proposed by BBRI. It aimed to provide a common set of terms for those working within the project and, at the time of publication, for those reading the results of the project.

This draft was established as follows:

Terms identified as relevant during the project were added to the glossary;
Existing references (legislation, standards …) were examined for appropriate definitions

In case where references did not provide suitable definitions, new Elios definitions were proposed, where relevant starting from available dictionaries

The first draft happened to be very abundant and a shorter version was elaborated. Nevertheless, further discussions with the Commission concluded that it was necessary to reconsider the draft in order to have a final document more aligned with EU regulatory sources.

Few definitions will nevertheless be given in the present report.

3. Information asymmetry in construction

Some of the elements developed in this section were mentioned in the project proposal. They are fundamental for the next steps of the project so that deserve a specific attention.

On a daily basis, everyone needs and uses information to choose goods, select commercial offers or assess the adequacy of products for a specific purpose.

This information may be objective or subjective, oral or written, and may come in the form of a printed or electronic document which may be or not be associated with a logo. The importance of oral transmission of information in the construction activity must be emphasised (site activity, informal exchanges. tradition).

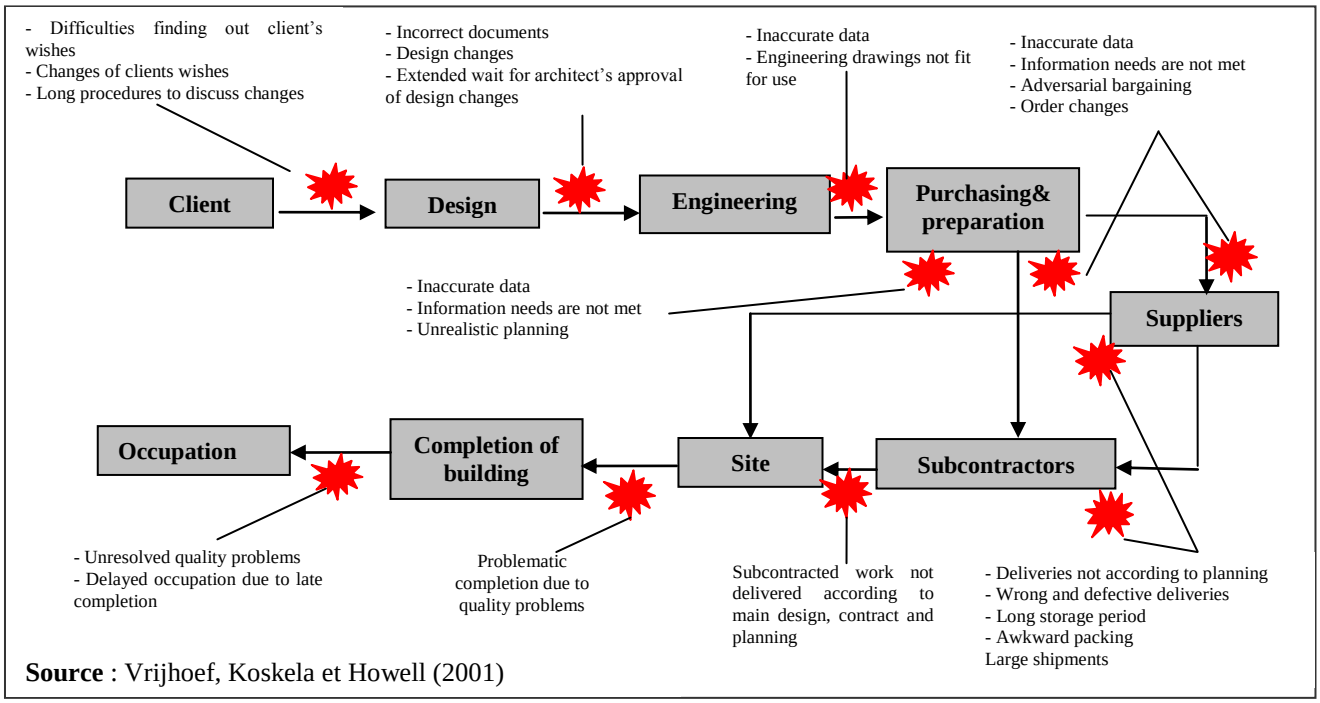
This information is meant to signal to users elements associated to the concerned item. It may concern the reputation (of a shopkeeper, of a product, of a contractor/stakeholder ...).

It may confirm the robustness of an item in certain circumstances. It may warn the user about the field of use of this item.

This list is far from being exhaustive but long enough to illustrate the variety of situations where information is crucial to make the best choices in situations that are always constrained (budget, available time ...).

What the society and the construction markets in particular are looking for is confidence.
In their seminal article, Gann and Salter (2000, p. 959) view "*construction as a process rather than an industry. (…) It includes designing, maintaining and adapting the built environment, involving many organisations from a range of industrial sectors, temporarily working together on project-specific tasks.*" In this project-based activity one of the key issues is the management of networks with complex interfaces.

Figure 1: generic problem in the construction process



Source : Vrijhoef, Koskela et Howell (2001)

Most problems in construction originate at the interfaces of different functions (Vrijhoef and al., 2001). Indeed most actors of the supply chain never worked together before the construction operation and will never work again together for other construction projects. This context objectively creates conditions for many kinds of disruptions in the exchange of information. Therefore, all actors involved in such a project need reliable information in order to hire the right competences, select the most suitable products or understand the conditions that are necessary to properly install/incorporate and use/maintain these products.

Once the building is completed and transferred to the occupant, reliable information on the expected characteristics (e.g. external/internal noise protection level, safety, energy consumptions) is also essential.

These situations illustrate the problems of markets with asymmetric information.

In economy the market is the meeting point of supply and demand. According to the classical theory suppliers and buyers are informed about all characteristics. But it appears that goods / services are not identical and homogeneous and that participants are not equally informed. Consequently markets are characterised by asymmetries of information between supplier and buyer. At least one party has relevant information whereas the other(s) do not. This situation favours opportunistic behaviours and impede the functioning of markets by leading to adverse selection (Akerlof, 1970).
Spence (2001) considered that there was a possible solution to the aforementioned problems. He argued that the person holding the information can signal to the other party the "quality" of the good/service he/she is selling. "*It should be noted that the information carried by the signal can be*

productive itself. This will occur if there is a decision that is made better or with greater efficiency, with better information (p.431)*."*

In order to circumvent the asymmetry information problem they have to face, operators of the construction value chain may also need to send signals to the market. Certificates, CE marking, labels, technical assessments[2], etc, are such signals that we propose to name "quality signs".

On the demand side clients, insurers and investors need adequate information in order to evaluate the risk that they bear in procuring and financing complex projects. This situation can be associated to the "screening theory" (Stiglitz, 2001).[3] This refers to the strategy used by the uninformed party to extract private information from another. For example license (meant as a permission to practice) can be considered as a screening process to identify the applicants who have attained the required degree of competency. As a consequence, it is a way to regulate a profession.

Thus it appears that procedures aiming to produce such quality signs are examples of means to reduce information asymmetry. It helps identifying the actors of the construction supply chain who have better experiences and records, and the quality of products / works / technical equipments.

The example of the market for Renewable Energy Systems (RES - QualiCert, 2011) illustrates how by reducing information asymmetries on operators of the construction value chain and on products, qualification scheme can improve the quality of installations and reinforce the trust of the consumers. The impact of qualification procedures could be twofold:

"*To enable the development of installation standards and best practices, while increasing the craftsmanship of professionals, and improving the general quality of RES installations;*
To increase consumer confidence in RES products and give them easy access to a network of qualified installers" (QualiCert, 2011, p.9).

4. Elaboration of quality signs

From the previous sections, the proposed definition of quality sign is "any kind of sign on the basis of which (construction) stakeholders rely on or give credit to when decisions or choices have to be made."

Any quality sign is a way for the operators to signal to other parties the quality of the product, process or service they are selling. For example suppliers may indicate to the market that their products, equipments, materials are conform to the requirements of the clients. Similarly contractors may demonstrate a certain level of knowledge and skills within the relevant field of practice. For these operators of the construction value chain it is also a solution to differentiate themselves from their competitors. A quality sign carries information concerning a subject (products, processes, equipments, actors, buildings,). This information is said to reflect properties of the subject which are of interest for the user of the quality sign (e.g. qualification, performance levels, field of use, design rules, etc).

[2] these terms will be defined in the glossary referring to definitions coming from CE documents
[3] In 2001, G. A. Akerlof, A. M. Spence and J. E. Stiglitz received jointly the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel *"for their analyses of markets with asymmetric information"*.

The interest of using the expression “quality sign” is twofold:

- ✓ it allows to focus on the content, the scope and the limits of the information rather than on the name attached to the outcome of the procedure,
- ✓ it highlights the CE marking as being a particular sign of interest for constructors with its own identity as defined in the Construction Products Regulation (CPR).

4.1 Generic procedure

A **general principle** to elaborate and deliver quality signs is to **compare the subject characteristics to a reference**, which of course depends on the subject:

- ✓ the characteristics of a **product** or a **process** are compared to standard characteristics, when available,
- ✓ the knowledge/skills of a **candidate** are compared to knowledge/skills required to practice a specific activity,
- ✓ the as-built characteristics of a **buildings** will be compared to specifications in order to deliver a quality sign which may concern safety, energy performance, etc.

When a construction actor (the applicant) wishes to be granted the right to use a quality sign which concerns his domain, the situation prior to application is one of the three following:

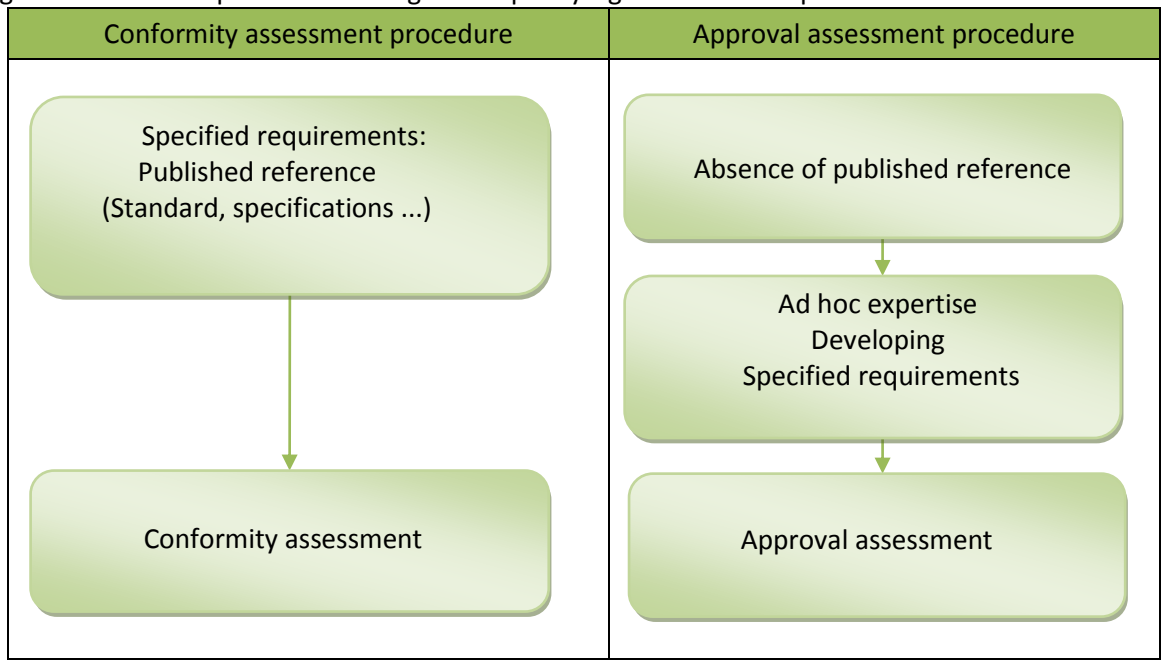
1. published references (specified requirements) are available that concern the subject so that the properties of the subject can be checked against specified requirements to assess;
2. published references are not available but can be defined (i.e. published) for a series of the concerned subject;
3. published references are not available and cannot be defined for a series (e.g. the subject is innovative and is a new-comer on the market). In this case, ad hoc expertise is called to elaborate specified requirements that are used to perform an approval assessment.

As far as construction products are concerned, two quality signs elaboration procedures result from these situations (figure 2):

- **conformity assessment** procedure : the relevant characteristics of the subject are compared to available specifications (e.g.; according to the CPR, the CE marking process of a standardised product results from the conformity of the concerned product with its declared performance.)
- **approval assessment** procedure: the relevant characteristics of the subject are specifically elaborated before the comparison (e.g. ATG, Avis Technique, BBA Agrément Certificate). According to the UEAtc (www.ueatc.com), this procedure:
    - ✓ provides users with guidance on the design of the works and the appropriate installation of the products,
    - ✓ allows monitoring the performance of the approved products and systems by appropriate product certification and by reviewing periodically the experience of users and developments by the manufacturers.

The quality sign delivery is the final stage of these procedures.

Figure 2: schematic presentation of generic quality signs elaboration procedures



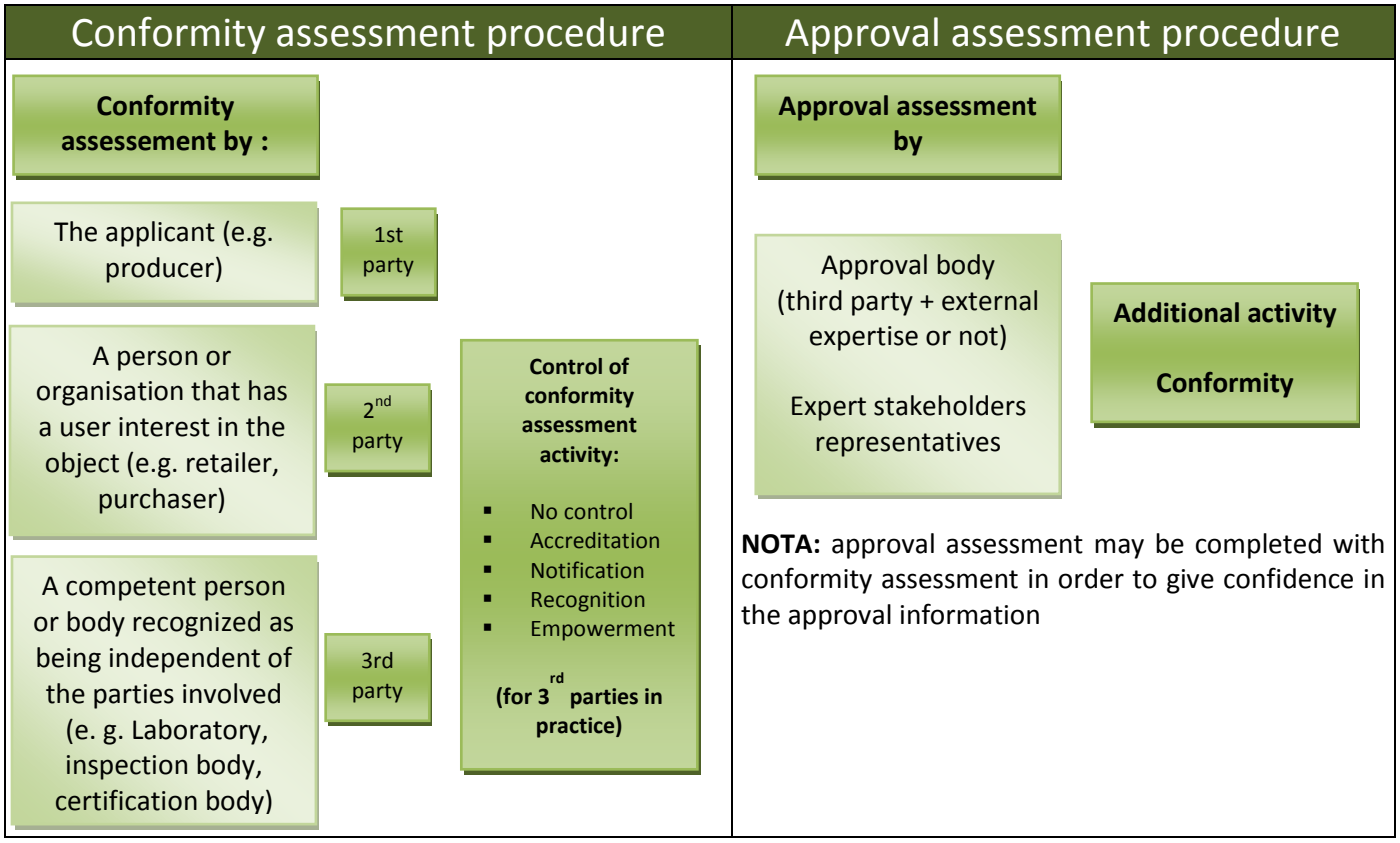
4.2 Variety of situations

The Elios 2 project considers a whole range of subjects which are relevant for construction: products, actors, buildings, processes. What follows was presented during forums and does not only concern construction products.
More details on the previously described procedures show that the level of confidence in the outcome of these procedures can be influenced by many factors such as:

- ✓ the independence of actors involved in the assessment activity;
- ✓ the scheme or procedures operated during the assessment;
- ✓ the control of the body in charge of the procedures;
- ✓ additional procedures which give more confidence in the assessment outcome.

Figure 3 presents a synthetic view of these factors that will be analysed in the course of the Elios 2 project.

Figure 3: schematic presentation of generic quality signs elaboration procedures



4.3 Origins of quality signs

The question of the origins of quality signs was debated during the first six months of the project. Though it is not a critical point for the analysis of the added value of quality signs for insurers and construction SME, it was recorded that quality signs can have two main different origins:

- ✓ some quality signs are defined or/and required as a demonstration mean by legal acts (even if the legal acts transfers the responsibility of quality sign delivery to construction actors). As an example, according to the CPR, CE marking. is mandatory for standardised products. In this way, being defined in a legal act does not always mean the sign is mandatory to all products. The legal act may just define the conditions under which the sign is required (what/when) and the conditions for its use/affixing. Generally such quality signs have a safety or consumer protection objective. We propose to name these signs “regulatory quality signs”,
- ✓ some quality signs are introduced by construction actors on their own initiative. Their motivation is generally to get an added-value objectively recognised: a differentiation signal (“My product/service is different from my competitors”, “I want to get objective demonstration to differentiate from “*cow-boys”* who work on my market without having the required skills and competences”). Such quality signs may become obsolete if they do not add value to the users. Lifetime is probably a main difference with “regulatory quality signs”.

Such a sign is generally very useful to support the demonstration that a contractual requirement is met and may sometime support or reassure stakeholders demonstrating that a legal requirement is met, even if it is not a "regulatory quality sign". We propose to name these signs "market-driven quality signs".

5. Towards a quality sign directory

The forums confirmed construction quality signs form a complex galaxy. The complexity results from the intrinsic number of quality signs, the diversity of situations acknowledged in previous sections, the competition between construction actors, etc.

As far as competition is concerned, it should be mentioned that quality signs also create conditions for a fair competition between actors. The scheme that rules quality signs production is the same for sign applicants (concerned with "similar" subjects) and known from all constructions actors. Comparison of characteristics included in the scope of the concerned sign is then possible for different "similar" subjects.

The creation of an exhaustive directory of quality signs is out of reach of the Elios 2 project (new quality signs bloom everyday especially in the wake of the eco-technologies booming development).

The objective of the directory is to reflect the diversity of the domain in each of the EU-27 countries. It should provide its users the possibility to fully understand how quality signs are produced, what is their origin, what they mean, what they do not mean, which information they carry, which information they do not carry. This directory should also help its users to better use available construction quality signs and to make some comparisons on quality signs of diverse origins concerning "similar" subjects.

To answer these questions, the Elios 2 team elaborated a questionnaire to grasp needed pieces of information (see appendix 1).

This questionnaire has been tested out by WP1 partners who are also quality signs producers (BBRI, CSTB and TZUS). The choice is shown in the following table where available filled in questionnaires are available (August 2012). It covers the whole range of identified subjects.

	Products	Process	Buildings	Actors
BBRI	thermal insulation (ATG)	BBCA Process certificate for concrete repair (available)	Valideo Non-residential buildings (available)	ATG certificate for installers of in-situ insulation (available)
TZUS	National technical approval (STO) applicable for any product	Quality mark called "Suitable for works" applicable for any product (available)	SB Tools CZ applicable for residential and office buildings (available)	TZUS certificate of competence of ETICS installers (available)
CSTB	thermal insulation products (ACERMI) (available)	Atex: Appréciation Technique d'Expérimentation (available)	NF HQE tertiaire (available)	OPQIBI

The analysis of these questionnaires will be soon carried out. It will provide feedback on the robustness, validity of the questionnaire as well as on the improvements needed before launching a web base questionnaire.

The directory should be considered as a shell which is likely to host information provided by any interested quality sign producer.

6. How are signs used?

Questionnaires provide a detailed view on selected signs. They will be sent to and filled in by specialists whose main activity is to deliver quality signs. Question 2.5 concerns the "Recognition/usefulness (of signs) to insurance schemes". Awaited answer can at best be the perception of the specialist on the usefulness for the insurance market of the information he produces.

We cannot then rely only on this source of information and we have explored different ways to collect data to answer the following contractual question: "*This analysis will in particular examine the role that quality/conformity marks play in the functioning of construction markets, their relation to the CE marking and how (re) insurers take them into account in risk appraisal.*" (point 1.2.3 of the call for tender).

Before choosing a method, we investigated various options summarised in the table next page.
Details on the status of these different options is given that justify the final choice for the "multi sourcing" option.

A specific investigation is being prepared in close cooperation:

- ✓ with WP3 to collect information on how information carried by quality signs is used by insurers ;
- ✓ with WP2 to collect information by eco-technologies providers.

7. Report delivery

The report "Review of literature/information sources on quality/conformity marks and building pathology" was delivered on March 31. This is a foundation block for the rest of the project as it deals with sources of information to be used during the three years of the project. These sources address two main areas: signs and pathology. It will then be used by WP2 as well. The list of sources can of course not be exhaustive at this early stage of Elios 2 as new sources may appear, whilst some others fall off because of non-relevance.

This report will be renumbered D1.0 in order not to change the deliverable list of the contract.

Table : description and comments on options to collect and prepare the analysis of information on quality signs

Option name	Description	Status/comments
Global cover	In each of the EU-27 countries, select four quality signs chosen in each of the four subject categories. Perform a thorough analysis of these (maximum) 4*27 = 108 quality signs according to the questionnaire in appendix 1. Selection would concern: the “same” product (can be traditional product, e.g. concrete block) the “same” actor (a trade) the “same” process (to be defined) There are only few signs on works operating on the market (some of them being non-European such as LEEDS) so that it will limit the interest of the exercise (same procedure in several countries). Comparison on these quality signs does exist but according to another framework.	This approach had the advantage to target a finite number of quality signs. But the choice of products/ actors/ processes revealed itself to be subjective and limited. This option was abandoned.
Case studies	Report the use of quality signs by insurers when assessing “similar” (‘sustainable’) construction projects in EU-27 countries.	From the first contacts with insurers, it was concluded that the identification of relevant case studies would a very uncertain process. The experience of Elios 1 was useful to assess this option that was abandoned.

Table : description and comments on options to collect and prepare the analysis of information on quality signs

Option name	Description	Status/comments
Sign fishing	Implement a web based data collection tool on the basis of the questionnaire in appendix 1.	The test of the draft questionnaire was very useful to identify strengths and weaknesses of the framework. This option will serve as a sound foundation for the directory elaboration.
The master and the pupil	Before implementing a web –based questionnaire, provide completely filled questionnaires on signs related to selected subjects. Doing so, a comparison of some quality signs concerning “similar” subjects would be possible. The candidate who is ready to make the effort to fill in the questionnaire for any other subject would have access to fully filled examples. He would appreciate the type of information and the level of detail that is expected.	The pedagogic aspect of this option happens to be essential for the success of the web-based questionnaire. Persons who will answer it will have access to examples that will help them both to grasp the interest and to fill in the form.
Multi sourcing	We propose to address targets groups with specific questions: Insurers: do you use quality signs (Y/N)? If Y, which ones/why? If N, why? Do you make a difference between two quality signs addressing the similar subjects? If Y what makes the difference? Parties bringing “eco-technologies” on the market: do you apply for quality signs? If N, why (cost, access to procedure ...)? If Y, why, for which purpose (client demand, insurer demand, competition, added-value service to installer ...)?	This option is proposed to collect information ont the “value” of quality signs perceived both by users (insurers) and by applicants in the eco-technologies domain.

8. Next steps

The work process during the six first months of the Elios 2 project was carried out with some hesitation. This may be considered as unavoidable when starting a new project with different cultural backgrounds (technical, economy, legal, responsibilities ...).

The vocabulary issue was not anticipated to be so important and some more discussion/exchanges will be needed to share common understanding and adjust the right level for details in the glossary to be finalised.

In depth face to face discussion with the Commission will help ending this task. Feedback during forum members was very helpful for the project team to build a robust roadmap for the remaining time.

We are now organised in order to produce concrete results that will bring elements to highlight the two following issues:

1. provide a clear presentation of how the information needed by construction actors is produced from various sources,(i.e. directory development)
2. highlight the data collection process by questioning insurers as signs users and eco-technologies providers as signs applicants

Voir appendix 1: quality sign characterisation and draft version questionnaire

References for Work Package 1:

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CHAPTER II – WORK PACKAGE 2

This Progress Report is prepared to set out the framework of work package 2 (WP 2), Building Pathology, of the Elios 2 project, methodology, work carried out so far and a description of the next steps in the study.

1. Work Programme

1.1 Expectations and objectives

The goal of this work package is to "develop an EU-wide knowledge base on quality indicators in construction and building *pathology*"'. The overall objective of this part of the study is to provide reliable information on the opportunities (and threats) of building pathology that could support risk appraisal by (re)insurance. Specific objectives are:

- ✓ To develop indicators and a mechanism to monitor the evolution of quality in construction and the pathology related to construction design techniques and the integration of eco-technologies;
- ✓ To make this information available in a pilot database.

1.2 Deliverables and milestones

The main WP-2 deliverables and milestones, based on the Proposal by the Elios 2 consortium, are shown in the scheme below:

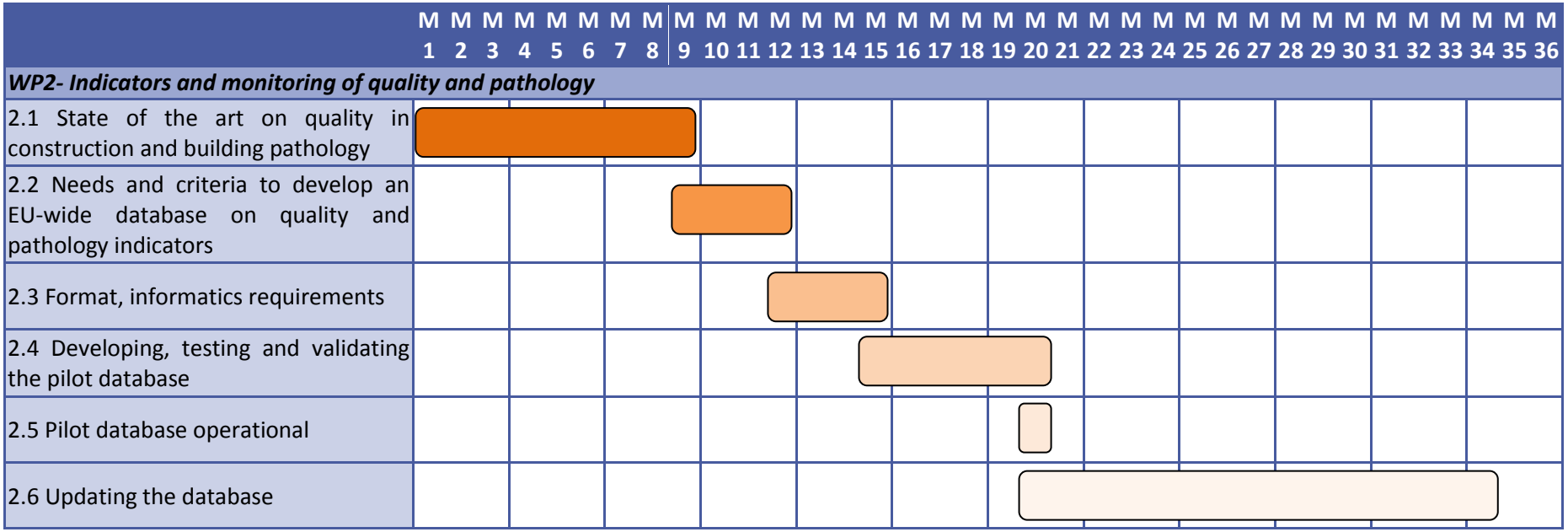

Figure 1: Work programme

2. Work carried out so far

2.1 Project direction

- ✓ The contract was signed January 2012;
- ✓ A kick-off meeting with Commission staff was held on 18 January 2012;
- ✓ A 'Review of literature/information sources on quality/conformity marks and building pathology' was delivered by the Elios 2 project team end of January 2012 (as deliverable 1.1 of the project). The list of literature/information sources on building pathology is again included in this Progress Report as Appendix 2.
- ✓ First Forum meeting on 20 March 2012.

2.2 Main activities within WP2

The work carried out to end of Mid June 2012 includes:

- ✓ Review of existing research work and data sources on building pathology, January 2012;
- ✓ Kick-off meeting with WP2 project partners/subcontractors, setting up the project organisation, and describing the responsibilities/tasks of each partner/subcontractor, April 2012;Selection of 10 eco-technologies, to be used as 'case study technologies' for setting up the pilot database, May 2012;
- ✓ Preparing a questionnaire for gathering information on the 10 selected eco-technologies, May 2012;
- ✓ Making a first list of organisations/bureaus in Europe to be approached for gathering information on availability of sources on building pathology data, June 2012;
- ✓ Starting collecting information on the 10 eco-technologies;
- ✓ Describing state of the art of building pathology, first draft, June 2012;
- ✓ Making a first case study (mechanical ventilation with heat recovery), July 2012.

2.3 Work described in this Progress Report

This Progress Report describes the results of the work carried so far, within Task 2.1: State of the art on quality in construction and building pathology:

- ✓ Definition of 'building quality' and 'quality indicators in construction';
- ✓ Selection of 10 eco-technologies;
- ✓ State of the art of building pathology;
- ✓ Case study;
- ✓ Definition of 'construction quality' and 'indicators of quality in construction'.

As outlined in task 2.1, one the goals of is "To develop indicators and a mechanism to monitor the evolution of quality in construction and the pathology related to construction design techniques and the integration of eco-technologies".

Starting with the first element ('indicators for quality in construction'), we first have to define what 'quality in construction' is.

'Quality' is a rather subjective term. 'High quality of a building' is the result of good design, good products, good workmanship, and correct installation. 'Low quality' is the result of bad design, products, workmanship and wrong installation.

As such the term is difficult to operationalize.

Insurers don't use the concept of 'building quality'. In order to underwrite a risk, the insurer deals with technical information to assess his risk, helped by his knowledge of the corresponding and/or foreseen pathology. Quality signs, that could be seen as a building quality mark, are not used to evaluate the risk (and therefore the premium), but rather as a minimum technical standard, a prerequisite level that is necessary and essential to obtain the cover.

This also applies for qualifications of the different stakeholders. Insurers don't care if contractors or designers are 'good', they have to comply with the qualifications needed by their mission in order to be covered. The same way that the materials and products have to comply with European standards.

On new technologies, quality signs may give some credit to the 'product' but as soon as the quality sign becomes a standard, it is judged as a prerequisite. The inherent risk assessed by the insurer is the technology underneath the product (and it's adaptation to the construction, and it's installation in the building), not the labelling itself.

In consequence, 'building quality', in insurance terms, is more objectively stated as a series of minimum criteria, characteristics or performances:

- ✓ clients' specifications;
- ✓ building regulations and standards/norms;
- ✓ levels of qualification of construction professionals, companies, persons;
- ✓ certification of products, processes;
- ✓ etc.

When we speak of 'quality indicators of construction' in the connection of this, it is not so much related to these minimum objective criteria, characteristics or performances, but to construction pathology (defects, damages).

In this sense, 'quality indicators of construction' are more of a statistical nature. On the basis of a large database of pathology records, it would be able to measure for example the number of damages of buildings each year, or the amount of money to repair the damage.

This is what amongst others, Agence Qualité de Construction has done in the report'Pathologie et statistiques' (Sycodés) [4] (pathology and statistics). The database collects building defects reported by insurance construction experts within the frame of the French national insurance context. Defects are assessed from a technical point of view. Statistics on defects and costs of repair are established.

Therefore, we would interpret the concept of 'quality in construction' in the context of building pathology. 'Quality indicators of construction' are in fact statistical indicators of a large set of building pathology data.

[4] http://www.qualiteconstruction.com/observation/sycodes.html

3. State-of-the-art of building pathology

Building Pathology can be defined as the systematic study of building diseases with the aim of understanding their causes, symptoms and treatment (Watt, 2007).

According to CIB (1993), Building Pathology is defined as the systematic study or treatment of building defects, their causes (aetiology), their consequences and their remedies (or therapy).

A comprehensive definition of building pathology says: building pathology provides an interdisciplinary approach to the study of defects and performance in order to develop appropriate remedial and management solutions. It considers how the structure and materials of a building relate to its environment, its occupants and the way the building is used, so as to develop a better understanding of building failures.

In the context of this study building pathology can be defined as *"the study of defects and performance in order to develop appropriate remedial and management solutions, including insurance schemes".*

3.1 CIB Working Group

One of the commissions of the International Council for Research and Innovation in Building and Construction (CIB) is W086 Building Pathology.

W086 Building Pathology is essentially concerned with learning from past and current building pathologies and encouraging the systematic application of that knowledge to the design, construction and management of buildings.
In this context, objectives of W086 are to produce information which will assist in the effective management of service loss, to develop and evaluate methodologies for assessment of defects and failures and consequential service loss, to apply systematic approaches to the investigation and diagnosis of defects and failures in buildings of all types and at all stages of life, to audit buildings in use to check the veracity of service loss prediction methodologies and to promulgate findings to all those involved in the production and management of buildings (cibworld.nl).

In 2012 a Building Pathology State-of-the-Art Report and national Building Pathology case Study Reports would be published. However, the release of these reports has been postponed several times.

3.2 Sources on building pathology

The majority of the publications on building pathology refer to defects, damage and decay of "traditional" building materials, products and building components, i.e. foundations, structures, concrete, roofing, facade, rendering, plumbing, equipment.

For example a monograph as Building Pathology (Watt, 2007) refers to defects, survey techniques and remediation of common building materials, often applied for centuries, and does not mention the risks of new products and technologies. Service life manuals (e.g. BCIS, 2006; SBR 2011) also refer to common applied building products.

The development of eco-technologies creates a new context. In contrast to sources on quality/conformity marks, it is more difficult to identify specific sources on pathology. The recent emergence of associated pathology just starts to be recorded. Nevertheless, some sources of information are proposed which allow beginning investigations.

Obviously, building services, and in this respect also eco-technologies that include building engineering artefacts as well as electrical and/or mechanical engineering parts, receive less attention by building pathologists than building materials and components.

Another observation is the fact that building pathology sources address especially the in-use period of building components; i.e. degradation by external causes or ageing.

In Appendix 2, the sources are gathered to identify pathology issues linked to construction sustainability in the EU-27, grouped as:

- ✓ Professional actors;
- ✓ Pathology records;
- ✓ Prevention, good practices;
- ✓ Professional journals;
- ✓ Books-reports- proceedings;
- ✓ Standards;
- ✓ Scientific articles,

The reasons of this choice are discussed in this chapter. Details are given in appendix 2.

3.3 Defects and their causes

3.3.1 Defects, failures and faults

During their lifetime, building components have to contend with defects, resulting in performance loss, through ageing and use. Most defects occur through the effects of external agencies on building materials.

Douglas and Ransom (2007) describe these as the principal components of the weather, namely solar radiation, moisture and air and its solid and gasceneous contaminants; biological agencies, in particular fungi and insects; ground salts and waters; and manufactured products used in conjunction with building materials, for example, calcium chloride.

Other authors classify the degradation mechanisms into:

- ✓ Biological;
- ✓ chemical;
- ✓ physical;
- ✓ mechanical (including wear and tear and mis-use),

Building defects often arise as a result of complexity. The consequences of these defects are twofold:

- ✓ The expected building performances may be altered.
- ✓ Some of the actors may be liable for defects (inadequate design, misuse of products; shortcomings in construction, installing and maintenance).

Douglas and Ransom (2007) make a clear distinction between a "*building defect"* and a "*building failure"*. A "*defec*t" is a shortfall in performance occurring at any time in the life of the product, element or building in which it occurs. A "*failure* "is the termination of a product or element's ability to perform its intended function.

In law a distinction would be made between a "*fault"* and a "*failure"* (Douglas and Ransom, 2007). A "*fault"* would be classified as a "*defect"*, that which caused or triggered the "*failure"*. A "*failure"* is the "*damage"* resulting from a defect. "This is important for the courts when it comes to assessing the cost of remedying construction failures to ascertain the extent of damages awarded to the aggrieved party if a case has been proved against the contractor or designer."

3.3.2 Classification of defects

Building failures can be categorised into several groups as listed in Table 1. The failure classifications are not mutually exclusive – some overlap with one another.

Table 1: Typical categories of failures (Douglas and Ransom, 2007)

Failure type	Example
Aesthetic failure	Crazing or shrinkage cracking of concrete or render Flaking and peeling of paintwork. Bossing and spalling of render. Staining and soiling of finishes Chipped, dented or lipped floor/wall/ceiling finishes and veneer to doors.
Functional failure	Misalignment of building components such as doors and window not operating properly Leaks in elements such as roofs, walls and floors. Sagging of floors.
Failure of materials	Chemical attack of rendering, mortar or brick. Fungal attack of timber. Corrosion of metals.
System failure of components and elements	Carbonation of concrete, leading to corrosion of reinforcement and subsequent cracking and spalling of concrete members. Debonding and bubbling of membrane from substrate owing to moisture or incompatibility.
Structural failure	Subsidence (a downward movement of a building caused by below ground factors – such as desiccation of clay soil). Settlement (a downward movement of a building caused by above ground factors – such as overloading).
Non-structural failure	Delamination of roof tiles and slates. Cracking and debonding of plaster or rendering. Blistering and peeling of paint coatings Tenting, debonding and bubbling of floor coverings.
Reversible failure	Jamming of doors and windows as a result of moisture intake by these components – usually in winter; in the summer the wood dries out and the windows and doors become unstuck.
Irreversible failure	Chemical reactions such as sulphate attack on mortar or rendering. Excessive distortion in beam/slab, column or wall owing to structural movement.

The Dutch Standard for Condition Assessment of Buildings made a framework of defect indicating the importance: to what extent does it influence the functioning of the building component?

Although the condition assessment process is not meant to analyse the causes of the defects, the framework already gives some indication, especially the categories 'basic quality' and 'maintenance'. See Table 2. Critical defects significantly threaten the function of the building component. Generally

material intrinsic defects like corrosion and wood rot, defects that threaten the building structure, e.g. stability and distortion, and 'functional defects', are weighted as critical defects. Functional defects are those that are already associated with a failure. Serious defects are gradually damaging the performance of building components, for example defects in the material surface.

Table 2: Framework defects Dutch Standard for Condition Assessment (NEN, 2006; Straub, 2010)

Importance	*Type*	*Explanation*
Critical	Basic functioning Basic constructional Material intrinsic Basic quality	Critical defects harm directly the functioning of the building component
Serious	Minor functioning Minor constructional Material surface Basic quality and ageing of secondary components	Serious defects mean degradation of a building component, without directly harming its functioning
Minor	Maintenance (1) Finishing Basic quality and ageing of tertiary components Deterioration (2)	Minor defects do not harm the function of building components

Notes: (1) Maintenance: maintenance actions meant to keep the building component in running were not executed, e.g. legal tests. (2) Deterioration: condition assessment based on the theoretical service life of the building component; this may be applied if the condition cannot be assessed visually.

3.3.3 Causes of defects: product-related and human-related

Most defects are located at 'singular points', where the interface between products, skills, know-how is concentrated. Main categories of defects, caused by human sources (designers, constructors, installers, etc.) could be listed as (CIB, 1993, Douglas and Ransom, 2007):

- ✓ Pre-design (poor or inadequate brief);
- ✓ Design (poor detailing, inappropriate specification, inferior quality of design or materials used);
- ✓ Products (faulty manufacture, damage as result of faulty delivery, damage resulting from inadequate storage of protection);
- ✓ Construction errors (poor workmanship, inadequate supervision, vandalism);
- ✓ Maintenance errors.

The factor method modifies reference service lives by factors to take account of the specific in-use conditions (ISO 2000). The Dutch SBR decided to make a practical application of the factor method and to list the criteria belonging to each factor (SBR, 2011; Straub 2012). The factors and criteria could be used as a reference for the causes of defects. The factors are:

- ✓ Quality of components (material and products);
- ✓ Design;
- ✓ Work execution;
- ✓ Indoor environment;
- ✓ Outdoor environment;
- ✓ In-use conditions;

- ✓ Maintenance.

Tables 3, 4, 5 and 6 specify the criteria of Design, Execution, Maintenance, and In-use conditions.

Table 3: Factors and criteria Design (SBR, 2011; Straub, 2012)

Criteria	Specification
Positioning	Exposure, shielding from weather, drainage, orientation, height
Detailing	Connections
Provisions for maintenance	Accessibility, space to work
Material compatibility	Suitability of the (combination) of materials
Dimensioning	Construction, subdivision, excess

Table 4 Factors and criteria Execution (SBR, 2011; Straub, 2012)

Criteria	Specification
Production	Prefab, in situ, working conditions, method of execution and exposing during execution
Discipline regarding execution rules and skills	Quality systems, supervision performance, competences, expertise and experience staff
Tracking changes	Registration for maintenance
Transport and storage on site	

Table 5: Factors and criteria Maintenance (SBR, 2011; Straub, 2012)

Criteria	Specification
Maintenance planning	Implementation of preventive maintenance on schedule
Discipline regarding maintenance rules and skills	Quality system maintenance contractor, supervision performance, quality of materials, competences, expertise and experience maintenance staff
Tracking changes	Registration for maintenance
Availability of spare parts	

Table 6: Factors and criteria In-use conditions (SBR, 2011; Straub, 2012)

Criteria	Specification
Intensity	Building function, private / public, commercial / residential
Loads	Variations, overload
Type of use	Incorrect, vandalism

In the questionnaire for data sources (see Chapter II – section 5 and appendix 3 this Progress Report) a distinction will be made between requirement management, delivery issues, installation problems and operational failure. See Table 7.

Table 7: Eco-technologies questionnaire, Possible causes of failure:

Requirement management	**Change in client's requirement** **Misunderstanding of the effectiveness of the technology** **Poor project management** **Inaccurate engineering or architectural data**
Delivery issues	Late delivery Storage issues Awkward packaging Poor transport of product
Installation problems	Incorrect design for installation Incorrect installation documentation Failure in installation Commissioning failure
Operational failure	Product failure once installed Incorrect user documentation

3.4 Knowledge on degradation, defects and failures

TO BE DEVELOPPED

3.4.1 The use of building pathology data

Introduction

Building Pathology data is being used by a range of professional organisations, amongst others real estate owners and managers, housing organisations, architectural offices, construction companies and installers, manufacturers, certification organisations, building inspection services, loss adjustors and insurance companies.

3.4.2 Use of building pathology data by Building inspection services

TO BE DEVELOPPED

3.4.3. Use of building pathology data by Loss adjustors and insurance companies

TO BE DEVELOPPED

3.4.4 Building pathology data for eco-technologies from literature

Defects and failures of eco-technologies

A first analysis of monographs on building pathology (Douglas and Ransom, 2007; Harris, 2001; Marshall et al., 2009; Watt, 2007), research papers (proceedings of CIB W086 congresses) and scientific journal papers (Structural Survey, Journal of Building Appraisal) make clear that research and new knowledge on deterioration and remedial work of ancient work and traditional building methods, is much more prominent than building pathology knowledge of new (eco) technologies. Besides, much research is done in other continents, under different environmental and cultural circumstances and focusing on different specific materials, products and technologies.

Next to the data being collected by means of the questionnaire, professional journals published in the countries covered by the consortium, guide books, internet publications, might reveal more information on building pathology of the selected eco-technologies.

TO BE DEVELOPPED

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4. Selection of 10 eco-technologies

4.1 Definition of eco-technology

OECD – EUROSTAT define 'environmental technologies' as: "environmental technologies help to measure, prevent, limit or correct environmental damage (pollution of water, air, soil) as well as problems related to waste, noise, landscape degradation, biodiversity loss and depletion of resources"[5].

In the 'Environmental Technologies Action Plan (ETAP)[6] of 2004, the European Commission defines 'environmental technologies' as: "Any technology whose use is less environmentally harmful than

[5] This is in line with the revision of the paper "L'industrie des biens et services environnementaux, Manuel de collecte et d'analyse des données", OECD – Office Statistique des Communautés européennes. 1999.

[6] European Commission, COM(2004) 38 final, Brussels, 28.1.2004

relevant alternatives". This definition is based on the definition given in Chapter 34 of Agenda 21 of the United Nations for environmentally sound technologies. This states that, "Environmentally sound technologies protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes (…). Environmentally sound technologies are not just individual technologies, but total systems which include know-how, procedures, goods and services, and equipment as well as organisational and managerial procedures"[7].

The 'Eco-innovation Action Plan (EcoAP)' of the European Commission[8] uses the term 'eco-innovative technologies', whereby an eco-innovation is described as: "any form of innovation resulting in or aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment, enhancing resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources."

These definitions all express the same idea, namely: technologies that contribute to sustainable development.

4.2 'Eco-technologies' and 'sustainable construction'

The Elios 2 project is conducted within the framework of the 'Lead Market Initiative for Sustainable Construction'. Therefore, the term 'eco-technology' should be seen in the context of sustainable construction.

What is meant by 'sustainable construction'?

A definition by the European Commission is from 2007:

> *"Sustainable construction can be defined as a dynamic of developers of new solutions, investors, the construction industry, professional services, industry suppliers and other relevant parties towards achieving sustainable development, taking into consideration environmental, socio-economic and cultural issues. It embraces a number of aspects such as design and management of buildings and constructed assets, choice of materials, building performance as well as interaction with urban and economic development and management. Different approaches may be followed according to the local socio-economic context; in some countries, priority is given to resource use (energy, materials, water, and land use), while in others social inclusion and economic cohesion are the more determining factors" (EC Task Force on Sustainable Construction, 2007:4)."*

In this definition there seems to be an overlap with 'sustainable (urban) development', or 'sustainable town planning' for which the European Commission has written a Communication in 2006.

[7] http://www.un.org/esa/dsd/agenda21/res_agenda21_34.shtml

[8] COM(2011) 899 final, Brussels, 15.12.2011

Some find this approach too broad, and favour to define sustainable construction by the three 'traditional pillars' of sustainability*: ecological (or environmental) performance*, *economic performance* and *social performance* of buildings[9].

The study 'The Lead Market Initiative and Sustainable construction: Lot 1, Screening of national building regulations' (PRC Bouwcentrum International, 2011), uses the following definition:

> *"sustainable construction: the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a construction works' life-cycle from initial planning approval to design, construction, operation, maintenance, renovation and deconstruction."*[10]

In this context it would be logic to define 'eco-technologies' as: '*technologies which are (supposed to) contribute to the environmental performance of buildings (and whose use is less environmentally harmful than relevant alternatives*)'.

In the PRC report the following topics are considered to make up environmental performance:

- ✓ Energy;
- ✓ Water;
- ✓ Waste and pollution;
- ✓ Protection of biodiversity and natural environment;
- ✓ Minimization of the use of resources,

For each of these topics, it is possible to identify a range of 'eco-technologies', like:

Topic of environmental performance	***Examples of eco-technologies***
Energy	
Energy performance	'passive house' / 'active house'
Usage of renewable energy sources	photovoltaic panels (PV's)
	wind turbine
	solar hot water (SHW)
Energy efficiency techniques	mechanical ventilation with heat recovery (MVHR)
	heat pump
	domotics, e.g. controls for space heating
Thermal insulation	insulation made of bio-materials, like natural fibers (hemp)
	Cavity wall insulation (CWI)
	Solid wall insulation (SWI)
	double skin curtain wall / façade
	EPS (expanded polystyrene) houses
	Vacuum-insulated panels (VIP's)
	double glazed windows with evacuated units

[9] See CEN/TC350 – Sustainability of construction works

[10] This study approaches sustainable construction from a broader sense than the three traditional pillars, by including 'functional performance'.

Other energy conservation techniques	passive shading devices (e.g. brises soleils)
	grey water heat recovery
Water	
Water conservation techniques	green roof / brown roof
	in house water-treatment system
	rainwater catchment basins, grey water harvesting
Water efficiency/management techniques	low-water use appliances, like spray taps, flush toilets
	ultra low water-efficient plumbing fixtures
	Sustainable urban drainage systems (SUDS)
	porous pavements
Water metering	water leakage detection systems
Minimize pollution	
Minimize waste during construction	biological waste treatment systems to treat waste on-site
Separate/recycle waste	composting toilets
	waste containers
Limitation of emission of CO_2, ozone depleting gasses, greenhouse gasses	ammonia cooling agent in cooling systems
Limitation of toxic chemicals	low VOC materials (paints, kits, glues)
Protect biodiversity and natural environment	roof garden
Minimize the use of resources	
Re-use or recyclability of construction works, their materials and parts after demolition	metal storage/ shipping containers
	aluminium or steel frame components/systems (up to 90% recyclable)
Usage of renewable materials	wood, bamboo
	paper-based (e.g. Warmcell)
Minimize materials	Bubble Deck floors

4.3 Criteria to select 10 case studies for eco-technologies

It must be emphasized that the examples of eco-technologies mentioned in the table above are generally perceived to have a favourable impact on the environmental performance of buildings, but that some of these technologies may not be so environmentally friendly when all matters are considered with sufficient knowledge.

For example: Vacuüm Insulation Products may be considered to be an eco-technology, because these products improve thermal performances while minimizing transport and thickness of construction elements. However, at the moment, we have little information about production and no statistically relevant knowledge about waste produced on site due to damage during installation, practical service life. So in reality VIP products may turn out to be not quite so environmentally friendly or not friendlier than a traditional insulation product.

However, the aim of Elios 2 is not to study, or to give a judgement on the environmental performance of certain eco-technologies, but to select 10 case studies for studying the relationship with insurance, and setting up a pilot database. The criteria for selection are:

- ✓ Technologies that are mature enough, are available on the market and are commonly applied in construction in most European countries for a certain period of time to have some claim feedback from insurers, and experience on pathology data, typical risks;
- ✓ Technologies that are also supposed to be 'problematic' or 'risky', in the sense of building pathology, defects, damages, non-performance etc. during the design, installation or use of the technology.

4.4 Final selection

On the basis of expert judgement of the team members of WP2, and on the basis of the 2 criteria mentioned above, the team chose the following ten technologies for studying the relationship with insurance, and setting up a pilot database:

1. Photovoltaic panels (PV's);
2. Ground source heat pumps;
3. Double skin curtain walls / façade;
4. Mechanical ventilation with heat recovery (MVHR);
5. Vacuum-insulated panels (VIPs);
6. Bio-material-based insulation, e.g. straw, hemp, sheep's wool;
7. Paper-based insulation, e.g. Warm cell;
8. Rainwater harvesting, including catchment basins & grey water re-cycling;
9. Green or brown roofs;
10. Low VOC materials, e.g. paints, kits & glue;

These technologies are expected to be mature enough, available on the market and commonly applied in most EU-countries.

5. Questionnaire

The WP2-team has developed a questionnaire, which will be used for collecting information on the availability of sources on building pathology in Europe.
See Appendix 3 for the questionnaire.

The questionnaire will be used as a guideline for the team members of WP2 during interviews with relevant organisations (insurers, building inspection services, certification bodies, national agencies, etc.) in several European countries.

The questionnaire is specifically aimed at the following key questions:

- To what extent are data on building pathology, especially with regard to eco-technologies, available in Europe; which organisations have databases on defects, damages and their causes?

- Are these data publically available, and/or are the organisations willing to share this data in a European database?

A draft list of contacts of the organisations to be approached is included in Appendix 5.

6. Next steps

Next actions within the Task 2.1: (State of the art on quality in construction and building pathology) are:

- Case studies on the 10 eco technologies.

  Each case study will describe:

  1. Introduction to the technology;
  2. Available types of technologies;
  3. The market;
  4. Some figures on the diffusion in the European market;
  5. Application of the technologies;
  6. Characteristics of the industry;
  7. Construction/installation process, players in the market, actors involved in the design, the production, the delivery, the technical control, the certification, the installation in the building and the operation/maintenance of the technology;
  8. Organisational and quality aspects (skills, quality marks, professional qualifications);
  9. Regulatory aspects, technical regulation;
  10. Strengths, weaknesses, opportunities, threats of the technology;
  11. Building pathology, defects, what can go wrong during the design phase, the installation phase and the use phase?

In appendix 4 a first draft case study by NHBC is given (mechanical ventilation with heat recovery).

- Data collection on availability of sources on building pathology data.

- Assessment of the value of the existing research work, data sources

On the basis of the collected information, we will assess this information on a number of criteria, like:

- ✓ useful quality and pathology indicators;
- ✓ informative value;
- ✓ potential use for making a pilot database / knowledge base with information on risk/defects/damages of eco-technologies;
- ✓ potential use for risk appraisal or other purposes (like building control)
- ✓ complementary aspects

In September 2012 the project team will also start with Task 2.2: **Needs and criteria to develop an EU database on quality and pathology indicators.**

For this we plan to organize panel discussions with representatives of the (re)insurance and construction sector. This leads to a 'program of requirements' for the database to be developed, as described in the Bid Proposal.

As the discussions with the insurance sector are also important for WP1 and WP3, the Elios 2 project team will consider the panel discussion as a joint initiative. We plan to organise the panel discussions with the help of Insurance Europe. Mid September 2012, Insurance Europe will have an internal meeting about this with their members.

Subjects to be discussed in connection with WP2 are amongst others:

- ✓ The need and the potential value for such a database for the construction and (re)insurance sectors;
- ✓ The criteria which should be fulfilled for the database to be successfully used;
- ✓ Information to be gathered (type of construction products, processes, buildings, category of defects, by regions);
- ✓ Possibility to make analyses possible in the future (statistics, correlation with marks, etc) ;
- ✓ Relevant media support, e.g. website, publications, alert on major defects, etc.;
- ✓ Possibility to engage an exchange of information between EU-parties (forum);
- ✓ The conditions and the modalities to gather, exploit and disseminate relevant data and information to all parties concerned (for example logistical/technical issues);
- ✓ Maintenance and exploitation of the database after the termination of the pilot project.

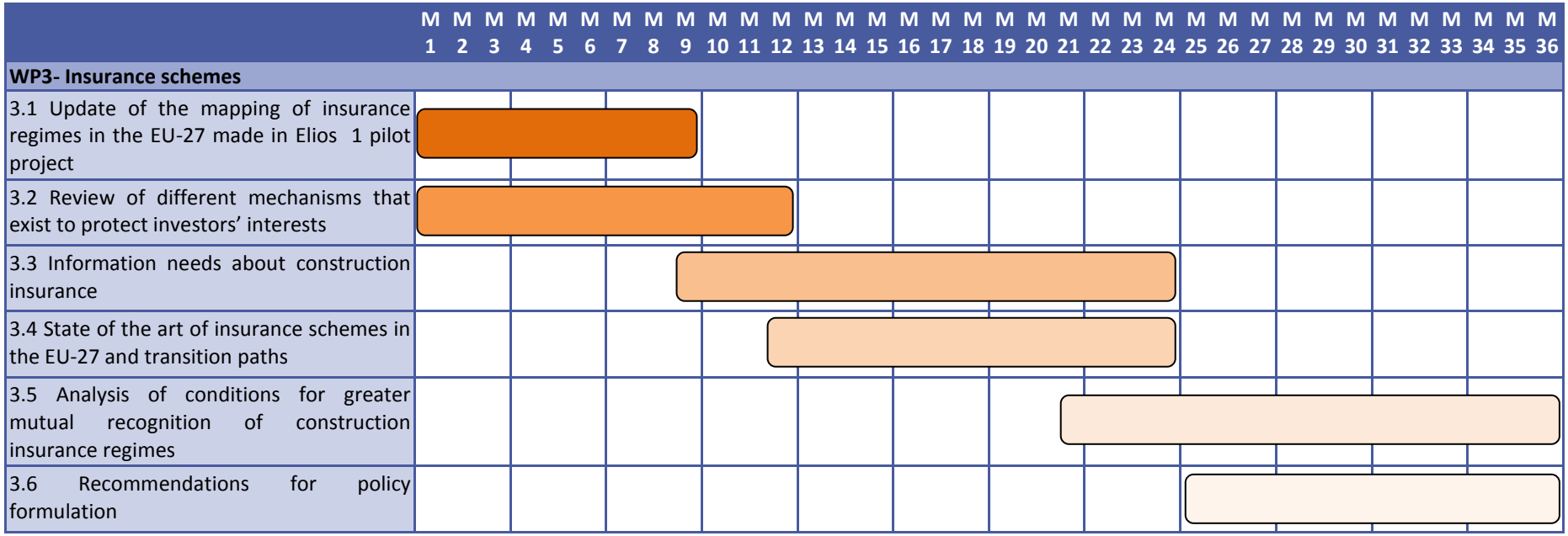
CHAPTER III –WORK PACKAGE 3

1. Work Programme

1.1 Expectations and objectives

As a reminder, the overall aim of work package 3 (WP3) is to analyse the conditions for a greater mutual recognition of the construction insurance regimes and to identify the criteria and modalities for the development of insurance schemes that could support cross border services and the cover of building sustainability performances.

1.2 Deliverables and milestones



2. Work carried out so far

Information, and notably for the mapping update part, is gathered through three different channels:

a) Insurance Europe

Insurance Europe will contact the federations, send them the existing regime description (made in Elios 1) for their country and ask them if it still reflects reality.

Once the WP3 questionnaire will be finished they will send it to retrieve additional information, notably on market volumes.

To accompany this process Hannover Re will participate to the next Insurance Europe meeting to present the project to the federations.

b) Allianz

As a subcontractor, Allianz main task is to update the mapping gathering information from its own internal network of branches on local markets.

The information to collect includes the update of Elios 1 information but also to extend it to more insurance market realities.

In order to do so, we are in the process of elaboration of a questionnaire that will be spread to all Allianz branches.

c) Hannover Re

As leader of the WP3 Hannover Re is retrieving information from the insurance companies through two channels:

- For western countries with important construction insurance markets, meetings will be held directly with major national companies. At the moment the following meetings are planned:
  - For France: Allianz (general insurer) Continuous
    MMA (general insurer) 30th may 2012 (done)
    MAF (architects) 17th July 2012
    SMABTP (construction insurance specialist) 6th Sept 2012
    AXA CS (general insurer for large accounts) to be planned
  - For Spain: ASEFA (construction insurance leader) End of July 2012
  - For Germany: VHV (construction insurance leader) 5th Sept 2012 (to be confirmed)
  - For Italy: Generally (construction insurance leader) September 2012 (to be scheduled)
  - For United Kingdom: NHBC (construction insurance leader) To be planned
- For secondary markets and eastern countries, we will send the questionnaire to the local insurers through our internal network.

The identification of valuable contacts as already been done for Sweden, Finland and Denmark through our Stockholm office, which is very active on Scandinavian construction reinsurance.

Beyond simple identification of the companies made for the call of tender, the difficulty lies in the identification of the right person within the companies with specific knowledge on construction insurance.

The direct meetings with the insurers deal with the insurance mapping made within WP3 but must also address the questions of quality signs and pathology. The scope of the meetings is more precisely about (extract from typical meeting preparation e-mail):

a) Insurance

- Recent evolution of the Legal framework of construction insurance in your country in regard of the description made in Elios 1 (Elios 1 regime presentation sent to the insurer);
- Links between the different guarantees: different guarantees and actors concerned (extent of liability) / practice of subrogation on liability / existence of limits on some guarantees / importance of annual basis insurance vs. single project insurance;
- Extent of covers: toward equipments (definition of equipment), what are the works covered values (replacement value / depreciated value);
- Role of insurance brokers on your national market;
- Is the cross-border insurance a problem for you? Whether it be for your clients wanting to work abroad or for foreign companies willing to work in your country (do you have a lot of demands)? Activities of your company abroad?
- Do you see any competition from foreign insurers coming under the "Freedom to Provide Service" European law?
- Evolution of the Insurance Market in your country, regarding CAR/EAR (Construction/Erection All Risks) and Decennial Guarantees (Volumes, level of subscription in regards of the obligation)?
- How do you take into account the eco-technologies in your covers (existence of specific contracts)?
- Are the energetic performance guaranties a topical issue at the moment in your country? Do you have specific covers?

b) Risk assessment

- How do you assess the construction risks in general and innovative construction systems more specifically (who makes the assessment and of does this assessment consist)?
- What is the importance of the Technical controller / inspection service in the insurer's underwriting process? In general is design / engineering made upstream or during construction?
- What quality signs existing on the construction market for eco-technologies are considered relevant and taken into account in the risk assessment (by the insurer and also by the Technical Controller)?
- Would access to information on Quality Signs existing abroad be of any interest?

c) Pathology

- Is there any "agency" collecting data on construction claims in your country?

- Do you have any specific focus / concern on pathology regarding eco-technologies? Which ones?
- Do you have the computing means to identify and characterize the claims on eco-technologies?
- To what form of "Pathology Forum", that could collect data on eco-technologies pathology, could/would you be willing to participate and exchange information, and what type of information? Would you get involved in an “Eco-technologies Warning Procedure”?

3. Preliminary Observations

3.1 Update of the mapping of insurance regimes

Based on the information gathered during the Elios 1 pilot project mapping, this study will update the information about the current different regimes in force in the EU-27.

As already mentioned, with the help of the questionnaire, we will extend pure update of the legal framework made in Elios 1 to market considerations.

3.1.1 Construction insurance schemes

The different construction insurance type of covers will be presented, reminding us of the purpose of Elios 2, which is to work towards guarantees concerning inherent failure cause vs external cause:

- Property insurance (during and after completion of works);
- General liability insurance;
- Professional liability / Professional Indemnity (PI);
- Product liability;
- Inherent defect insurance (based on first or third party liability);
- Guarantees dealing with performance;

We will also survey the existing tax incentives and more generally the regulatory framework regarding incentives for sustainable constructions.

3.1.2 Overview of the different situations

We will make a classification of the different legal frameworks situations and insurance situations.

The extent of the mapping toward “the insurance market state of play” should support the choice of the categorization criteria of the different national situations.

3.1.3 Construction Insurance Market

As indicated we should be able to present a “market state of play” in order to highlight existing differences, including:

- Total national volume of construction insurance for Engineering, Inherent Defect Insurance (IDI) and general liability / Professional Indemnity (PI) (when it’s possible to distinguish construction liability from other forms of general liability);

- Scope of the covers, including: description of covered works, definition of "equipments" (what is really covered), existence of limits;
- Example of covers;
- Recourse mechanisms with identification where final responsibilities lie (use of subrogation);
- Existence of "performance" guarantees;
- Use of Freedom to Provide Service;
- Use of Project by project policy vs. open covers;
- Systemic risk (serial);
- What is the covered value: value of a new work, rebuilt value, aged value?

Supported by the "State of the art of insurance schemes in the EU-27 and transition paths" analysis, it should appear that the main criterion to distinguish the situations is the general development of the country, whether it be from a wealth point of view or the size of the insurance markets.

This assumption is notably based on the fact that insurance is expensive and that insurers are only interested by what they call mature markets which can generate profits.

This development criterion is reflected at a European level by a clear distinction between western and eastern countries. Eastern countries seem to rely on simple liability with limited covers while western countries implemented more extended covers like IDI.

As already underlined in Elios 1, within western countries, each country seems to have very specific insurance schemes, mostly around IDI covers. Hence a 2nd criterion of classification seems to be the type of IDI coverage those rich countries have historically found through their custom practise of insurance.

3.2 Financial mechanisms for protection of investors interest

In parallel with the first objective, this task involves the following processes:

a) Identification of the different existing financial instruments aimed to the protection of construction works, notably other than insurance. This covers a wide range of public and private steering instruments such as insurance schemes, regulation, subsidy schemes, etc.

b) We will outline of the specific hurdles existing in the insurance of construction innovation and how the industry did in the past to handle innovation through a case study. This technology could be "structural sealant glazing" (SSG) now widely used in curtain walls.

3.3 Information needs about construction insurance

The following paragraph is only intended to draw a sketch of the future final content of the deliverable.

3.3.1 "Sustainable development" works

In relation with WP1 and WP2 definition of a typology of "Construction Works" related to "eco technologies":

Review of different types of construction works concerned by sustainable development.

3.1.2 Risk assessment principles

Based on the knowledge of the technical inspector, the insurer and the reinsurer in construction risk assessment:

- Description of the main risk analysis principles in construction insurance;
- Identification of the main technical information needs in the construction risk underwriting process for the different Construction Works categories.

3.1.2.1 Risk notion

a) Definition of the notion of catastrophic risk

The frequency risk comes back on a regular basis while the catastrophic risk is the risk of occasional unusually high losses.
Without a long history, innovative technologies clearly belong to the catastrophic risk type.

Since there is not enough pathology feedback to be able to extract a statistical law regarding its failure, risk evaluation of innovation has to be made upon specific technical inherent risk assessment.

The analyst will have to focus on a predictive failure analysis based on his knowledge of the technology, through a qualitative approach.

On specific technologies the insurer can also get assistance from an external specialist.

This definition is supporting the uselessness of a statistical approach in risk assessment of innovation.

b) Concept of “systemic risk”

A systemic risk is a widespread damage caused by a unique default on a product widely used. It is still a catastrophic risk but with a widespread damage.

It is the risk that insurers fear the most, because a small cause has a great impact in terms of damage and amount of loss.

c) Presentation of project by project policies vs. open covers

d) Concept of Not Current Technique

A Not Current Technique (NCT) is a technique without any accepted technical sign as relevant to assess the risk by the insurers.

For example in France, an innovative product that is outside national codes or framework, and that has no ATEC or recognized quality sign will be considered a NCT.

Those techniques need a specific insurance assessment to be covered since they are out of the “normal” insured works spectrum.

3.3.2.2 Stakeholders

Identification of the different stakeholders in the construction process that may be impacted by insurance:

- The project owner / The developers
- The manufacturer
- Designers including:
  - ✓ Architect;
  - ✓ Geologist, geotechnical engineer, hydrogeology and environmental engineering firms;
  - ✓ Engineering firms: structural engineering, ventilation engineering, heating engineering, acoustic engineering, electrical engineering;
- The contractors

3.3.2.3 Concept of conventional vs. real performance

Conventional performance is the theoretical performance of a construction work, not the achieved performance.

For example in terms of energy consumption of a building, the Conventional Performance requirements are met if you use certain materials and follow a set of rules. Therefore the effective real performance is not a requirement. One of the reasons of this approach is that effective performance depends on the user's behaviour, for example the perceived comfort temperature inside the building.

The implication of the use of conventional performance in the codes is that insurance cannot guaranty the real performance.

3.3.2.4 Technical Inspection Service role

In order to assess the risks the insurers usually need the assistance of an independent supervisor or so-called Technical Inspection Service (TIS) or Technical Controller.

Throughout the construction the TIS will:

- Assess the design (calculation hypothesis, drawings …);
- Assess the materials (specifications, test certificates, implementation methods);
- Control whether the standards are met;
- Control the execution of the works, onsite.

The TIS gives impartial advice to the insurer on the insurance risk.

It must be independent from the different parties involved (no participation in the design / management / supervision / construction of the building)

3.3.2.5 Risk assessment methodology

As previously stated, the risk assessment is made through a qualitative approach.

Based on his experience, the analyst must qualify the risk according to various criteria, focusing on known pathology, and on failure cost and probability of occurrence.

The result of an assessment is to define a level of insurability, or “aggravating factor” of the risk. A risk can be considered as “uninsurable”.

3.3.2.6 Risk assessment criteria

Main topics taken into account in the risk assessment:

a) Construction work type and foreseen use (including maintenance);
b) Location / environment of the construction / installation;
c) Actors of the construction process;
d) Materials;
e) Design;
f) Construction works inherent risk;
g) Methodology of construction / installation;
h) Technical Inspection Service opinion;
i) Surroundings / neighbouring (that may be impacted);
j) Existing works (technically linked).

3.3.2.7 Definition of relevant technical criteria

In relation to WP1, identification of relevant technical criteria, i.e. signs, used to assess “eco technology” risks in construction insurance.

As previously stated, risk assessment is essentially qualitative, on a case by case basis (for each risk), based on the analyst own experience. It appraises the adaptation of the “product” to the construction work and its environment in general.

The insurer doesn’t have the technical means to assess directly the risk of an innovative product at large. Therefore he also has to rely on quality signs.

The sign will define the required technical specifications of the product itself, in what environment it can be used (its purpose), and how to install it. Its aim and use are completely distinct from the insurer’s risk assessment. For the insurer, more than an appraisal tool, signs are usually only a prerequisite to the insurability of a risk.

As for standards and norms compliance, quality marks are seen as a requirement, a prior condition to be insured. They’re mandatory; it’s the absence of default of marking that prevents insurability. They’re usually not a positive assessment tool of valuation but a negative, essential “must have” label to access insurance.

Nonetheless a few signs seem to be discriminatory and give some information on the risk level. In order to retrieve this information, we decided to use a top down approach with WP1, and already got a few answers (see WP1).

3.4 State of the art insurances schemes and transition paths

The following paragraph is only intended to draw a sketch of the future final content of the deliverable.

These analyses will clarify existing transition pathways and burdens toward cross border services and cover of building sustainability performances.

They will notably rely on two major aspects:

- Historical reason: insurers presence is linked to the history of this insurance and legal framework.
- Financial reasons: construction insurance is expensive and is linked to the wealth of the country.

3.4.1 Insurance market access

Why can't foreign insurers access local insurance market?

- Language barrier;
- Lack of knowledge of local legal obligations and therefore absence of insurance products, with specific wordings;
- Lack of technical information to assess the risk:
  - ✓ Knowledge on local standard and normative framework requirements
  - ✓ Local climate and environmental stresses on the construction work
  - ✓ Local construction methods and practices, especially on connected works (ex: fittings)
- Lack of knowledge on defect feedback and local claim history of similar risks;
- Lack of knowledge on insurance market practices, especially on claim handling and legal proceedings (legal delays);
- Difficulty to manage claims from abroad;
- Necessity to have a trusted loss adjuster.

Lack of interest for IDI covers:

- The long tail covers like decennial guarantees are not financially attractive in regard of the length of their payback period; profitability can only be verified after 15 years. This duration takes into account the time between underwriting and the handover of the construction, the duration of the guarantee itself, the average duration of claims handling before final settlement.
- They need specialised underwriters with both technical skills and insurance knowledge.
- Specific Wordings. Construction insurance is known to be the most complicated insurance field.
- Necessity of a costly claim handling staff.

3.4.2 Construction market access

Why can't a foreign manufacturer or service provider find a local insurer?

- Lack of knowledge on local legal obligations (ex: EPERS in France);
- Lack of knowledge on local insurance market practices (ex: certificates of insurance, cover limits);
- Lack of knowledge on local market players (brokers, insurers, technical inspection services …);
- Lack of knowledge on local practices.

3.5 Conditions for greater mutual recognition of construction insurances regimes

The following paragraph is only intended to draw a sketch of the future final content of the deliverable.

This task will constitute an analysis of the conditions for a greater mutual recognition of construction insurance regimes, and the development of a set of guidelines for a policy formulation.

Mutual recognition may concern a wide range of stakeholders: it may be the construction companies / designers, the (re)insurers / brokers or the national authorities / financial control regulator.

Depending on the type of stakeholder the answer to the questions "what is intended by recognition?" and "what are the expectations or fears that are implied or understood behind the idea of recognition?" may be regarded very differently. Consequently the investigation actions must be adapted to the stakeholder.

On the one hand our "mapping update" questionnaire, intended for insurers, raises questions about the cross-border activities. But in order to widen our understanding we may have to create a small questionnaire intended to contractors that could be distributed by the FIEC and EBC representatives.

This questionnaire should notably ask: if they are interested by sharing information on their national insurance regime? Why? What information they would like to get from a hypothetic exchange system? In what form should this information be shared?

Obviously, considering the usual low return rate of questionnaires, it won't be sufficient to get an overview of the totality of the 27 countries. That's why this analysis will have to extrapolate the received answers to all encountered EU situations.

3.5.1 Impacts of national strategies on construction insurance

Analysis of the impacts of national strategies toward "sustainable goals" on construction insurance and the interactions with the financial protection mechanisms.

This case study will only be done on the limited range of existing situations where insurance is impacted by those "sustainability" strategies.

For example, we will see if public policies toward sustainable development had any impact on construction guarantees, especially if new energetic performance covers appeared.

3.5.2 General financial protection requirements and regulatory framework influence

Formulation of general financial protection requirements and regulatory framework influence in order to support the sustainable development: this section is to be developed.

3.5.3 Conditions for handling incompatibility of national insurance regimes

Those conditions will be in great part addressed in the policy formulation.

3.6 Recommendations for policy formulation

The following paragraph is only intended to draw a sketch of the future final content of the deliverable.

This analysis will provide recommendations for policy formulation stimulating good practices and insurance solutions.

As already indicated in Elios 1, legal and insurance frameworks throughout Europe can only be changed by the stakeholders being part of the national markets themselves since notably they're based on states' legal sovereignty. They are the result of local culture regarding construction methods, legal history, insurance, and financial realities. The update of the mapping and further analyses should shed some light on the origins of those differences.

In consequence our main lever to promote insurance will be to give incentives to the insurers in order to stimulate the market.

One of the goals of Elios 2 is to establish an internet site that would be the single point of contact for the different exchanges regarding construction insurance of eco-technologies. We'll see in the following recommendations how this tool can support different goals.

3.6.1 Risk of failure

One of the most efficient incentives would be to give some help to the insurers in their risk assessment.

Being able to make a reliable forecast of failure is the key element in order to do the pricing of a cover and propose guarantees.

As previously indicated, without claim history and statistical data this forecast can only be done through specific analysis of the risk.

Preliminary results of discussions indicate that:

- The technical classification of claims is a problem: it has to be done by experienced staff that can classify the claims, and it is unlikely that most insurers have the computational systems to differentiate “eco-technological” claims.
- Insurers are not interested in a pure statistical database, reporting numbers of claims, since it touches their internal pricing secrets. They seem to be more interested by an exchange on technical information on systems’ failures.
  - One form of exchange could be the creation of a “Pathology Forum” where insurers:
  - Decide together the systems to be assessed, corresponding to topical subjects
- Create together a simple typology of claims regarding eco-technologies that each insurer could implement in its own computational system, and that its staff can technically categorize.
- Send information on technical claims on those systems, without giving any information on the number of contracts underwritten in order to get rid of any strategic statistical data disclosure.
- Get the information processing and risk analysis done on those claims by the “Pathology Forum” itself, relieving every insurer to do it on its side.

With the involvement of insurers, another form of exchange of information could be the creation of an “Eco-technologies Warning procedure” (see general introduction by CEA - Contribution to WP2).

3.6.2 Quality signs

One way of helping the insurers who want to cover a foreign company is to give them the means to appraise the quality of this company through a better knowledge and understanding of its quality signs. The given information must be sufficiently relevant and discriminatory in terms of risk assessment to have an added value for the insurer.

On the other hand the companies should know what signs are used locally by the insurers to appraise the risks on their homeland, notably it they want to set up business or engage in a long term activity. Those signs are the ones overviewed in the “Risk assessment criteria” (Chapter III, 3.1.2) and in the “Definition of relevant technical criteria” section (Chapter III, section 3.3.2.7) in conjunction with WP1.

3.6.3 Construction techniques and normative framework

In order to help a company operating in a foreign country we could give information about the local construction techniques and normative framework.

Companies should get a better knowledge of:

- Local design codes and general normative framework, including local climatic or live loads.
- Local construction techniques for different type of construction elements. For example type of roofs and terrace sealants for a company installing photovoltaic panels.

This information should help the companies demonstrate that they comply with local design codes, and are taking into consideration the local environmental construction context and therefore should help them find insurance.

3.6.4 Legal and insurance requirements

The single point of contact should present the regimes individually for each country, and therefore the insurance requirements and/or legal risks to work in that country.

Interestingly we've met the French insurance federation (FFSA) that has already produced a Guide for European Builders in an attempt to help foreign companies understand the French legal framework and how to comply with it.

Beyond pure description of the local legal framework, this guide is a good example of the information we would like to give to the companies, i.e.:

- Description of how insurance works locally to alert on the risks of not following those local practices.
- Description of the administrative procedures to be insured (who, what information is needed, etc.

3.6.5 Insurance covers

Improve transparency of the existing insurance covers and existing financial offer.

On the other hand, the single point of contact should also give information about the usual insurers' information requirements regarding innovative risk. These requirements could be:

- Experience feedback on comparable projects
- Specific opinion of a TIS or expert

3.6.6 Technical Inspection services

Promote systematic inspection of construction works and on contractors like what is done by NHBC in order to diminish insurance costs.

3.6.7 Promotion of other guarantees

Promote the "completion guarantee" (perfect fulfilment), in order to get the remediation measures directly handled by the contractor without involvement of the insurer. The completion guarantee is a one-year guarantee under which the builder agrees to carry out the required work and assume related risks during the year following completion.

Find other direct repair schemes without involvement of insurance and extra cost arising from the "recourse" process.

Find ways for manufacturers and contractors to be more responsible of their work.

4. Next steps

The shortcoming foreseen actions are:

- Test phase of the update of the mapping questionnaire by internal staff of Allianz and Hannover Re. Before a widespread distribution of the questionnaire we want it to be tested by people that are both from different countries and in contact with local insurers.

- Regarding the financial mechanisms other than insurance we identified Germany as being a country where exist such protections. Therefore we are in the process of retrieving information from both CSTB and Hannover Re's German colleagues.

- Regarding information need about construction insurance we should start the draft report on risk assessment and the role of the Technical Inspection Service with the help of Apave.

- Regarding the transition paths, as the differences between the insurance schemes are becoming clearer, we should start the draft report on the socio economics underlying those construction insurance differences with the help of SBi.

CHAPTER IV – WORK PACKAGE 4

The expected milestones and deliverables of work package 4 (WP4) for the first six month period have been reached. In fact, WP4 is slightly ahead of schedule since the second forum meeting was executed a bit earlier than anticipated due to summer vacations.

1 Work Programme

1.1 Expectations and objectives

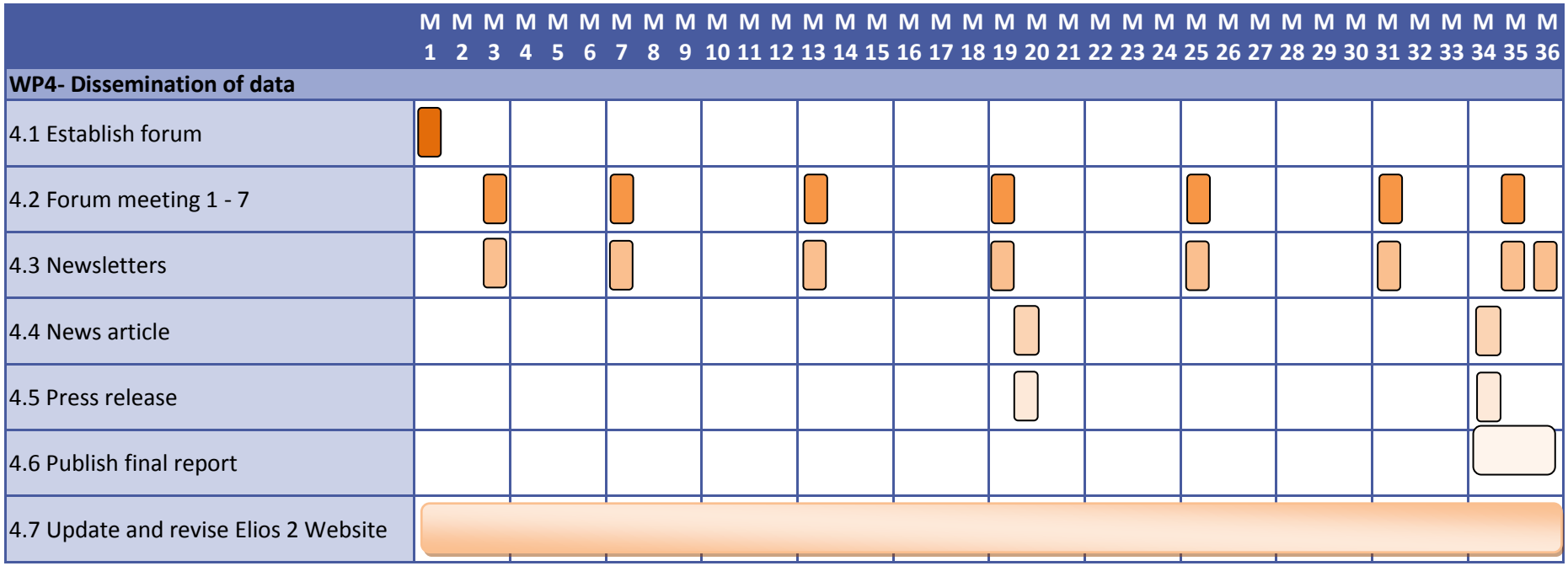
The overall aim of WP4 is to provide policy consultation for the European Commission on the results of the project and to disseminate the results of the project. More specifically, this work package has the following two objectives:

- To assist the Commission services for the setting up and functioning of a forum composed by representatives from the construction and the (re)insurance sector, Member States and Commission services to ensure guidance of the pilot project and a dialogue with stakeholders.
- To disseminate the results of the pilot project to practitioners, representatives of the construction and (re)insurance sectors, the research community and policy makers in the European Union.

1.2 Milestones and deliverables

According to the overall work plan, the first six month period of the project includes two milestones for WP4 along with four deliverables (see figure below):

Milestone 1: Establishment of forum (Month 1).
Milestone 2: Forum meeting 1 (Month 3).



The deliverables of the first six month period include:

- D4.1: Establish forum.
- D4.2: Forum meeting 1.
- D4.9: Newsletter 1.
- D4.22: Update and revise Elios 2website

Please note that deliverable "D4.3: Forum meeting 2" due in the second six month period is also included below, since WP4 is slightly ahead of schedule.

Please also note that deliverable "D4.16: Newsletter 8" due in the last six month period will no longer be included as it is considered redundant by both the European Commission representatives and the project team.

2. Work carried out so far

2.1 Establishment of the Forum (Deliverable D4.1)

- Deliverable D4.1 is to establish the forum, which include:

1. define the mandate of the forum,
2. identify members representing various interests from the construction and (re)insurance sectors, consumers, Member States, Commission services etc., and
3. establish and run the secretariat of the forum including responding to members' requests etc.

These tasks have been concluded. Below more details on this task is provided.

- Mandate of the Forum

The main objective of the Forum is to provide policy consultations for the European Commission DG ENTR Unit G5.

The tasks of the Forum include the following:

- Networking between the Forum members, the Commission services and the project team through interactive workshops etc.
- Information and debate of the Forum members on the current status of project results and similar initiatives and activities on quality/conformity marks, indicators for performance/pathology and insurance schemes.
- Consultation on the policy implications of the work through debates during Forum meetings, commentaries on the website etc.

In addition to these tasks, it may be of relevance for some of the Forum members of their own choosing to also contribute to:

- Dissemination of project results and policy recommendations since some of the Forum members may wish to act as nodal points towards their national and/or professional constituencies.
- Data gathering by providing contact persons, access to information sources etc.

- Forum members

The Forum is composed of members from:
- The construction sector;
- The (re)insurance sector;

- Member States;
- The research community;
- The general public;
- Various Commission services appointed by DG ENTR Unit G5;
- Members of the European Parliament.

The Forum has been limited to 40 participants for practical purposes, which are distributed as follows:

- Some 10 members from the European Commission services and the European Parliament;
- Some 10-12 members of the Elios 2 project team (leaders and partners only);
- Some 15-20 external members from the construction sector, (re)insurance sector etc.

The profile of the majority of external Forum members can be characterised in the following ways:

- Members are physically based in Brussels to reduce travel cost and ensure as high attendance as possible;
- Members belong to a professional body or similar, since small and medium sized companies seldom will be able or willing to participate in meetings of this kind on their own;
- Members belong to an international organisation in order to cover as many of the EU-27 member states as possible.

It should be noted that the composition continually will be assessed and possibly adjusted by inviting new members.

2.2 Forum meetings (Deliverables D4.2 and D4.3)

As scheduled the Forum has had two meetings during the first six months of the project period (deliverable D4.2 and D4.3). The work has included the preparation of invitations and working documents for the meetings and the draft of minutes.

The meeting themes for all seven Forum meetings are shown in the table below. The dates of meetings 2, 4 and 6 have been slightly rescheduled from July to June to accommodate for summer vacations in July.

No	Date	Themes for debate
1	March 2012	Strategy and detailed work plan
2	June 2012	Directory on the directory on quality/conformity marks (draft version)
3	January 2013	Database for indicators on quality and pathology (draft version)
4	June 2013	Analysis of insurance schemes (draft version)
5	January 2014	Cross-cutting debate on directory on marks, indicators and schemes
6	June 2014	Preliminary conclusions
7	November 2014	Final report and recommendations

The first Forum meeting was a half-day meeting held at Tuesday 20 March 2012. The purpose of the first meeting was:

- To introduce the project to the Forum members and discuss the overall project plan.
- To discuss the overall strategy of facilitating access to insurance by self-employed builders and small building firms so as to stimulate innovation and the promotion of eco-technologies in the European Union.
- To discuss the detailed work plan.

The agenda of the first Forum meeting was:

- Introduction and welcome – European Commission;
- Mandate of the Forum – European Commission; Presentations of the pilot project – project team;
- Debate on the overall strategic implications of insurance schemes to foster innovation;
- Summary – by the European Commission.

The second Forum meeting was a full-day meeting held at Wednesday 13 June 2012. The forum meeting focused on the directory on quality/conformity marks. The purpose of Forum Meeting 2 was:

- To introduce the project to new Forum members;
- To discuss the selected themes of 1 on quality marks;
- To report on progress of the other s;

The agenda of the second forum meeting was:

- Introduction and welcome – by the European Commission;
- Mandate of the Forum – by the European Commission;
- Progress report on WP1 Quality marks – by Jean-Luc Salagnac, CSTB.

Discussion of three selected WP1 themes:

Theme 1) Questionnaire: What type of information is required on the collection of information on quality/conformity marks?

Theme 2) Analysis: What are the critical issues to be addressed in the analysis of information provided by quality marks (compatibility with CE marking, complementarity, accessibility, 3rd party involvement/certification, acceptance of marks to insurers etc.)?

Theme 3) Requirements for internet platform: What is required to make the platform useful?

- Progress report on WP2 Building pathology – by Henk Vermande, ARCADIS
- Progress report on WP3 Insurance schemes – by Thomas Dunand, Hannover Re
- Progress report on WP4 Forum and dissemination – by Kim Haugbølle, SBi/Aalborg University
- Summary – by the European Commission

2.3 Newsletter (Deliverable D4.9)

The third task of WP4 is to prepare 8 newsletters – one following each of the seven forum meetings and one at the end of the project. The number of newsletters have been adjusted to seven in total to take into account that the last two last newsletters at the end of the project would be issued with a very short interval and not add any significant news. Thus deliverable D4.16 will no longer be relevant.

The first newsletter (deliverable D4.9) was prepared during the spring of 2012 and issued in June 2012. Below a screen dump of the top of the front page of the newsletter is provided.

The newsletter is designed not only to update interested parties on the progress of the project but also give them an opportunity to become involved whenever they see fit. The first newsletter was a basic overview of the whole project and each of the work packages.

However, the following newsletter will cover the current piece of work being undertaken by each and any key issues relating to it.

2.4 Website (Deliverable D4.22)

Deliverable D4.22 is to update and revise the Elios 2 website. This task has been initiated and a new version of the website has been launched in June 2012.

3. Next steps

In the second six month period of the project WP4 will focus on the fourth milestone of WP4, namely the execution of the Forum Meeting 3 (month 13). At the third Forum Meeting, a draft version of the database for indicators of quality and pathology will be available and debated with the forum members.

The deliverables of the second six month period (month 7-12) include:

- D4.3: Forum meeting 2. The Forum meeting has already been executed.
- D4.4: Forum meeting 3. Although the Forum meeting is not due until month 13, the preparation of the meeting will be a central activity in the coming period. A draft of the agenda will be prepared in November 2012 for final approval by the European Commission in early December and for distribution to Forum members in mid-December.
- D4.10: Newsletter 2. The second newsletter will be prepared during September for publication in late October.
- D4.22: Update and revise Elios 2 website. The Elios 2 website will be continuously updated during the coming six month period.

APPENDIXES

First Progress Report

September 2012

APPENDIXES

APPENDIX 1 : Quality sign characterisation and draft questionnaire (WP1)

A quality sign is any kind of mark, logo, brand name, document or whatever on the basis of which the market (the market may be general public, a professional or an insurer) is relying on or giving credit to when a decision or choice has to be done.

A quality sign is generally the conclusion of an assessment which is resulting from a service.

A quality sign may be described considering the following major characteristics:

- Identification
- Scope
- Organizational Scheme
- Characteristics which are addressed
- and considering our particular objectives: Recognition / usefulness to the market

Preamble

The undersigned has the authority to provide the information provided below and, in that capacity, permits the use of the information and of the sign in the framework of the ELIOS 2 project …
(need to state what ELIOS 2 intends to do with the information and how it will be presented/published)

Feeling in the questionnaire, depending on the type of scheme may require 15 to 30 minutes.
The questionnaire is composed of 5 parts dealing with: Identification, Scope, Organizational Scheme, Characteristics which are addressed and finally Recognition / usefulness to the market.

1- Identification

1.1 –Identification of the scheme (recognized/known as/"name" of the sign)

- Scheme name (may be a service collectively recognized by its given name/name of the procedure (some examples: Allgemeine bauaufsichtliche Zulassung, Agrément Certificate, Certification xxx)): _____

- Logo[11] (some examples: 

): _____
[jpeg format file - up to 500 Ko]
- Mark (some examples: Certifié CSTB Certified, ACERMI, CE Marking, Qualibat): _____

[11] When developing the directory, authorization for presentation of the logo in the communication tool shall be seek (preventing copyright trouble).

1.2 - Information on the body(ies) providing the service

1.2.1 Scheme owner (who has the legal rights for licensing of the sign)

- Name: _____
- Status: [☐ consumer association, ☐ public interest organization, ☐ private interest organization, ☐ union]
- Agency/department: _____
- Location: _____
- Website: _____
- Telephone: _____
- Member of (any related organization(s) or network(s) of relevance for the scheme): _____

1.2.2 Scheme operators (who is responsible for issuing the right to use the sign)

- Number: 0, if the scheme is operated by its owner; or _____ *(given number)*
- Name of the network of the operators, if any: _____

Depending on the number of operators, then identification of each of them:

- Name: _____
- Status:

[☐ consumer association, ☐ public interest organization, ☐ private interest organization, ☐ union]

- Agency/department: _____
- Location: _____
- Website: _____
- Telephone: _____
- Member of (any related organization(s) or network(s) of relevance for the scheme): _____

1.3 Information on the contact person for the service / responsible for providing precise and updated information on the service

- Name: _____
- Role/responsibility in the organization/body owning the scheme: _____
- Email address: _____
- Telephone: _____
- Address: _____

2 – Scope

2.1 Focusing on / being concerned with / category

i.e. element or stage of the construction chain to which the quality sign applies to
(normally One possibility in a list):
(Note/comment: if the scope is wide, it may be necessary to feel in the questionnaire several times, addressing in each answer a specific sub-family or category of element or stage of the construction chain to which the quality sign applies to, e.g. CE marking of cement is different from CE marking of insulation products.
Further information/details on the characteristics are addressed in item 4 of the questionnaire.)

Products, kits and systems or equipments

☐ Raw material (e.g. granulate)
☐ Construction product (or component or kit) or equipment (e.g. window, boiler)
☐ Construction system (product + design and/or installation conditions and specifications)
Processes
☐ Construction project management
☐ Design (design and/or calculation)
☐ Design and execution of a construction work (addressing both the design phase and the erection of the work, e.g. project supervision)
Management systems
☐ Factory production control
☐ Quality management system dedicated to a specific construction activity (declension of ISO 9001)
☐ Specific management system (e.g. safety of workers, environment, risk or others …) _____
☐ Construction works (or parts thereof)
☐ Qualification, competence or ability/capacity of professional(s)
☐ Service (e.g. maintenance)
☐ District or city
☐ Other _____

2.2 Technical designation of the scope (e.g. Window made of aluminum profile with thermal break): *(Note/comment: may introduce the general approach, intended information communicated or added value provided through the use of the scheme)*
[descriptive text - up to 1000 characters] _____

2.3 Eligibility / applicant (who may apply for the sign): [☐ regulators, ☐ architects, ☐ contractors, ☐ engineers, ☐ consultants, ☐ insurers, ☐ occupants, ☐ owners, ☐ promoters, ☐ other: _____]

2.4 Intended beneficiary(ies) of the scheme: [☐ regulators, ☐ architects, ☐ contractors, ☐ engineers, ☐ consultants, ☐ insurers, ☐ occupants, ☐ owners, ☐ promoters, ☐ other: _____]

2.5 Recognition / usefulness to insurance schemes (one or several possible answers):
National: [rating scale: from 1 (low) to 5 (high)]
European (several European countries) : [rating scale: from 1 (low) to 5 (high)]
International (other non European countries) : [rating scale: from 1 (low) to 5 (high)]

2.6 Recognition / usefulness to the market / stakeholders (one or several possible answers):
National: [rating scale: from 1 (low) to 5 (high)]
European (several European countries) : [rating scale: from 1 (low) to 5 (high)]
International (other non European countries) : [rating scale: from 1 (low) to 5 (high)]
(Question: any interest to know / get information on the concerned countries?)

3 – Organizational Scheme

The scheme could be based on the one hand on Technical assessment, or, on the other hand on Certification. (one scheme possibility only)

(Note/comment: Technical assessment is an assessment process where the body is analyzing the ability for construction work activity and results in a reporting document stating recommendations or conclusions. Certification is an assessment process where the certification body is checking that the "product" is complying with the requirements for the certification and results in a certificate which states this conformity and can generally specify performances.)

3.1.a Technical assessment

(possibility for choosing one scheme only in a list)

- performed by a college of peers (peer assessment[12])
- performed by a college of independent experts representing the stakeholders' interests
- performed by the body acting as:
  - an independent body (consumer association …)
  - or a body representing specific interest (trade union …)

OR

3.1.b Certification

(possibility for defining the precise scheme which is implemented, i.e. selection of several tasks/tools)

Development, review and maintenance of the specifications for the evaluation (one possibility in a list)

- according to existing standard(s)
- according to technical assessment
- defined by a college involving independent experts representing the concerned parties/stakeholders having interest in referring to (using) the certification
- defined by the certification body

Type of evaluation (one choice of type)

- First-party attestation of conformity: [Yes / No]
- Second-party attestation of conformity: [Yes / No]
- Third-party attestation of conformity: [Yes / No]

Evaluation based on (one or several choice of tools)

- Design appraisal: [Yes / No]
- Initial type testing or examination: [Yes / No]
- Testing or examination performed by: [who?: applicant or under certification body responsibility]
- Samples/cases selected by: [who?: applicant or under certification body responsibility]
- Samples/cases selected in: [where?: on the market or on the supplier's stock (possibility for both)]
- Surveillance testing or examination: [frequency: N in M month(s) or N in B batch(es)]
- Testing or examination performed by: [who?: applicant or under certification body responsibility]
- Samples/cases selected by: [who?: applicant or under certification body responsibility]
- Samples/cases selected in: [where?: on the market or on the supplier's stock (possibility for both)]

[12] Peers have generally the same interest promoting the quality of the concerned technology

- Initial audit of or control on, performed by an independent body under certification body responsibility:
- the running process: [Yes / No]
- the implemented quality system: [Yes / No]
- Surveillance audit of or control on, performed by an independent body under certification body responsibility: [frequency: N in M months]
- the running process: [Yes / No]
- the implemented quality system: [Yes / No]

3.2 Publication of information

- Scheme requirements: [☐ publicly available (Internet), ☐ on demand, ☐ private (to applicant only), ☐ other: _____]

- Communication on complying results: [☐ publicly available (Internet), ☐ on demand, ☐ private (restricted (registered/paying) information access), ☐ other: _____]

3.3 Recognition of the scheme:

- Recognition by (public) authorities (e.g. notification): _____
- Accreditation against (ref. of the reference standard for accreditation): _____ *(Question: Should we have a closed list?)*
- Any mutual recognition of the scheme: _____

4 – Concerned / Included / Foreseen Characteristics

Definition / designation
[e.g. pressure resistance]

* * * * *

APPENDIX 2: Sources on building pathology data (WP2)

Professional actors:

co un-try	acronym	Name	activity	web site	Lang ua-ges	Engli sh secti on	comments
BE	SECO	SECO	construction control	http://www.seco.be/	fr-nl-en	-	operates in several EU-27 countries
DE	TÜV Rheinland	TÜV Rheinland	construction control	http://www.tuv.com	de	Yes	operates in several EU-27 countries
DK	BSF	Byggeskadefonden (Building Defects Fund)	Body which aims to: -disseminate knowledge and experience in order to reduce construction defects -carry out statutory 1-year and 5-year inspections of listed buildings -provide support to repair building damages	http://www.bsf.dk/	dk	Yes	
DK	BvB	Byggeskadefonden vedr. Bygningsfornyelse (The Building Damage Fund for Urban Rewal)	Independent foundation established by the Danish government in 1990 which aims: -to support the repair of building damages -to inspect the urban renewed buildings 1 and 5 years after the completion of the renewal -to communicate findings and knowledge concerning the prevention of future building damages to the building sector -to participate in other activities that can improve and promote quality and efficiency in construction	http://www.bvb.dk/	dk	Yes	
FI	INSPECTA		construction control	http://www.inspecta.com/en/	en	-	operates in seven nordic EU-27 countries
FR	AQC	Agence Qualité Construction	Association of construction professional organisations which aims to prevent buildings defects and to improve quality in construction	http://www.qualiteconstruction.com/accueil.html	fr	No	
FR	SMABTP	SMABTP	insurance	http://www.smabtp.fr/assurancesbtp/groupe/smabtp	fr	No	web pages on pathology linked to traditional works

FR	APAVE	APAVE	construction control	http://www.apave.com/	fr	yes	operates in several EU-27 countries
FR	BATIPLUS	BATIPLUS	construction control	http://www.batiplus.net/	fr	no	
FR	BTP CONSULTANTS	BTP CONSULTANTS	construction control	http://www.btp-consultants.fr/	fr	no	
FR	BUREAU ALPES CONTROLES	BUREAU ALPES CONTROLES	construction control	http://www.alpes-controles.fr/	fr	no	
FR	DEKRA INSPECTION	DEKRA INSPECTION	construction control	http://www.dekra.fr/	fr	no	operates in several EU-27 countries
FR	PREVENTEC	PREVENTEC	construction control	http://www.preventec.fr/	fr	no	
FR	SOCOTEC	SOCOTEC	construction control	http://www.socotec.fr/	fr	no	operates in several EU-27 countries
FR	VERITAS	VERITAS	construction control	http://www.bureauveritas.fr	fr	no	operates in several EU-27 countries
HU	EMI-TUV	EMI-TUV	construction control	http://www.emi-tuv.hu	hu	yes	
IT	RINA Industry	RINA Industry	construction control	http://www.rina.org	it	yes	
LU	LUXCONTROL	LUXCONTROL	construction control	http://www.luxcontrol.com/	fr	no	
PL	UDT	URZAD DOZORU TECHNICZNEGO	construction control	http://www.udt.gov.pl	pl	no	
PT	ISQ	Instituto de Soldadura e Qualidade	construction control	http://www.isq.pt/	pt	yes	
UK	BLP	BLP-Building defects insurance	insurance	http://www.blpinsurance.com/	en	-	some web pages on pathology linked to eco-technologies
UK	NHBC	National House-Building Council	insurance	www.nhbc.co.uk	en	-	Inspection and claims data from c80% of new homes

							built in the UK
UK	Lloyd's Register Group	Lloyd's Register Group - Built Environment	construction control	http://www.lr.org/sectors/built_env/	en	-	

Pathology records:

country	actor / **type**	activity	web site	language	english section
-	-	discussion on pros, contras and conditions of databanks on building defects	www.irbnet.de/daten/iconda/CIB11723.pdf	en	-
CH	Swiss Re / Reinsurer	Sigma (studies and annual review on natural catastrophes and man-made disasters)	http://www.swissre.com/sigma/	en-de-fr-es	-
DE	Munich Re / Reinsurer	Schadenspiegel (reports and analyses on interesting losses)	http://www.munichre.com/en/reinsurance/magazine/publications/default.aspx	en-de-fr	-
DK	Danish Building Research Institute (Sbi) / **Building research institute**	National datbase created in 2010 to record building pathology after several serious collapses of primarily sport centres and farm buildings (barns etc.). Data are structured according to type of building, construction element, building material, type of failure etc., and of course location and date.	http://www.sbi.dk/byggeteknik/konstruktioner/sikkerhed-og-last/svigtdatabase	dk	no
DK	Byggeriets Evaluerings Center / **association for the promotion of quality in construction**	Created in 2002, the Danish Benchmark Centre prepares a report for a company with key performance indicators based on past performance data. At first hand such indicators were a prerequisite for contractors (and later consulting firms) who wanted to participate in building projects for the government but nowadays many companies have asked for a report as a way to brand the company in general.	http://www.byggeevaluering.dk/	dk	no
FR	Agence Qualité Construction / **association for the prevention of building defects and imporvement of quality**	Pathologie et statistiques (Sycodés) (pathology and statistics) The database collects building defects reported by insurance construction experts within the frame of the French national insurance context. Defects are assessed from a technical point of view. Statistics on defects and costs of repair are established.	http://www.qualiteconstruction.com/observation/sycodes.html	fr	no
FR	Agence Qualité Construction	Enquêtes de pathologie (investigations on pathology) Such an investigation on defects related to "eco-technologies" is planned for February 2012 (French context of the Grenellle de l'environnement).	http://www.qualiteconstruction.com/observation/enquetes-pathologie.html	fr	no

FR	Agence Qualité Construction	Tableau de bord Sycodés 2011 (2011 Sycodes synthesis)	http://www.qualiteconstruction.com/fiche-publication/collection/observatoire-de-la-qualite-de-la-construction/publication/tableau-de-bord-sycodes-2011.html	fr	no
FR	Agence Qualité Construction	Publication semestrielle de la C2P (biannual publicaiton of C2P) C2P is a commission of experts who assess risks of innovative products/processes. The says of C2P are absed on observations and Sycodès records.	http://www.qualiteconstruction.com/c2p/publication-semestrielle-en-cours.html	fr	no
NL	The Dutch PSIBouw programme (Process and System Innovation in Construction)	Some public clients in the Dutch construction sector make use of a benchmarking instrument of 'past performance' of building contractors, during the tender process. The better he performed in the past, the more points for his bid he gets. This is made possible for clients who have a registration system of their pool of contractors with records of their performances.	www.psibouw.nl/details/kennis?m=files&doc_id=227	en	-
NL	CURNET (www.curnet.nl) / **research institute**	The "construction safety platform" allows recording incidents with respect to construction safety (like the blowing away of facade plates from buildings, the (near) falling of balconies, etc.) Anonymous records on construction defects or near-failure can be made at the 'ABC meldpunt' (ABC notification point, www.abcmeldpunt). ABC reports (in Dutch) are made plubicly available on the web platform.	http://www.curnet.nl/index.asp?page=pagina.asp&id=pcv	nl	no
NL	Woningborg	Technische ABC-lijst Woningborg' ('Technical ABC-list Woningborg'), this list is regularly updated. The most recent version we possess is from 2008, but a digital version seem to be available at www.technische-abc.nl . Woningborg (www.woningborggroep.nl) is marketleader in the Netherlands for issuing guarantee certificates for new dwellings, comparable with NHBC in the UK. They also perform risk assessment of building plans, and site control during construction.	www.technische-abc.nl (password needed) www.woningborggroep.nl	nl	-
NL	Vereniging Eigen Huis (VEH), The Dutch Home Owners Association / **Client**	data records based upon completion inspections of newly built houses ('opleveringskeuring').	http://www.eigenhuis.nl/	nl	no

UK	The Standing Committee on Structural Safety (SCOSS)	Confidential Reporting on Structural Safety is the scheme established by SCOSS in 2005 to improve structural safety and reduce failures by using confidential reports to highlight lessons that have been learnt, to generate feedback and to influence change. A report should give: '- a description of the event or concern '- if there was a failure than the cause of the failure if known '- lessons that could be learnt.	http://www.structural-safety.org/how-to-report/	en	-

concern past performance (or benchmarking) of contractors.

Prevention and good practice:

country	actor / **type**	media	title	web site	language	english section
BE	CSTC-BBRI-WTCB / **technical body**	downloadable	Notes d'information technique (technical information) Les dossiers du CSTC (CSTC file)	http://www.cstc.be/homepage/index.cfm?cat=publications http://www.wtcb.be/homepage/index.cfm?cat=publications	fr-nl	no
DK	BYG-ERFA / **publisher**	web pages / experience sheets	BYG-ERFA (constructional experiences)	www.byg-erfa.dk	dk	no
ES	INTEMAC (instituto técnico de materiales y construcciones) / **technical body**	Fichas de ejecution de obras de hormigon	Fichas de ejecution de obras de hormigon	http://www.intemac.es/pdf/Catalogo_publicaciones.pdf	es	no
FR	ETI-Construction / **publisher**	CDs	Pathologies des bâtiments (building pathology)	http://www.eti-construction.fr/cat/actualites/pathologie-des-batiments/	fr	no
FR	Excellence SMA / **insurance (SMABTP)**	Web pages /booklets	Fiches pathologie du bâtiment (short format document on building pathlogy)	www.smabtp.fr/assurancesbtp/prevention/presentationbtp	fr	no
NL	Stichting Bouwresearch (SBR) _ Foundation of Building Research / **research institute**			http://www.sbr.nl	nl	no

NL	ISSO Kenniskaarten ('ISSO Knowledge Cards')		ISSO Kenniskaarten ('ISSO Knowledge Cards')	http://www.isso.nl/	nl	no
NL	Sdu Uitgevers		Handboek Bouwgebreken en Herstelkosten SDU ('Handbook of Building defects and repair costs')	http://www.sdu.nl	nl	yes
UK	Mike Parrett's guide to Building Pathology / **expert**	CDs	Mike Parrett's guide to Building Pathology	http://www.buildingpathology.net/default.asp	en	-
UK	BRE / **technical body**	Defect Action Sheets: the complete set	BRE Defect Action Sheets	http://www.brebookshop.com/details.jsp?id=46477	en	-

Professional journals:

country	publisher	title	web site	language
FR	Groupe Moniteur	Le Moniteur du BTP	http://www.lemoniteur.fr/	fr
FR	Agence Qualité Construction	« Qualité Construction », bimestriel dédié à la prévention des désordres	http://www.qualiteconstruction.com/revue-qualite-construction/presentation.html	fr
FR	Agence Qualité Construction	L'information professionnelle du maître d'œuvre	http://www.qualiteconstruction.com/publications/collection/collection/maitres-doeuvre.html	fr
NL	Reed Business Information b.v.	The professional journal "BouwWereld" provides up-to-date, detailed technical information from and for the building industry. The information covers the entire building process from the formulation of the standards to completion of the work. There are regularly articles on building defects/building pathology.	http://bouwwereld.nl/	nl
UK	RICS	Building Surveying	http://www.rics.org/buildingsurveyingjournal	en
UK	BSRIA	Delta T	https://www.bsria.co.uk/bookshop/delta-t/	en
	Elsevier	Building and Environment	http://www.journals.elsevier.com/building-and-environment/	en
	Elsevier	Construction and Building Materials	http://www.journals.elsevier.com/construction-and-building-materials/	en
	Elsevier	Energy and Buildings	http://www.journals.elsevier.com/energy-and-buildings/	en
	Sage Journals	Indoor and Built Environment	http://ibe.sagepub.com/	en

	Palgrave Macmillan Journals	Journal of Building Appraisal (Closes with Jan 2011 issue)	http://www.palgrave-journals.com/jba/index.html	en
	Sage Journals	(Journal of Building Physics)	http://jen.sagepub.com/	en
	ASCE	Journal of Performance of Constructed Facilities, ASCE	http://ascelibrary.org/cfo/	en
	Emerald	Structural Survey	http://www.emeraldinsight.com/journals.htm?issn=0263-080X	En
	Taylo & Francis	Building Research & Innovation	http://www.tandf.co.uk/journals/rbri	en

Reports, books, proceedings:

Year of publi-cation	Author	Title	Publisher	Nbr pages	lan gua ge	dowwnloadable at or CD
Various	Various BRE authors	BRE Defect Action Sheets	BRE	-	en	
Various	INTEMAC	Fichas de ejecution de obras de hormigon	INTEMAC	82	es	
2011	J. Vinha, J. Piironen, K. Salminen	Proceedings 9th Nordic Symposium in Building Physics, May-June 2011, Tampere, Finland	Tampere University of Technology	1390	en	http://webhotel2.tut.fi/nsb2011/
2011	Vasco Peixoto de Freitas, Helena Corvacho, Micheal Lacasse	Proceedings 12th International Conference on Durability of Building Materials and Components, April 2011, Porto, Portugal	FEUP Edições	2208	en	http://www.fe.up.pt/12dbmc/
2010	J. Thomas, G. Bonfanti	Les risques de non qualité associés à une opération à basse consommation énergétique	Agence Qualité Construction	50	fr	
2010	CIB W 086 Building Pathology	Proceedings 18th CIB World Building Congress May 2010 Salford, United Kingdom	CIB (publication 363)	484	en	
2010		Proceedings Thermal Performance of Exterior Envelopes of Whole Buildings XI, Dec 2010, Clearwater Beach, Florida, USA	Oak Ridge National Laboratory	-	en	http://www.ornl.gov/sci/buildings/2010/
2010	J. Thomas, G. Bonfanti	Les risques de non qualité associés à une opération à basse consommation énergétique	Agence Qualité Construction	50	fr	
2010	CIB W 086 Building Pathology	Proceedings 18th CIB World Building Congress May 2010 Salford, United Kingdom	CIB (publication 363)	484	en	CD of selected papers
2009	CIB W 055/065	Proceedings CIB Joint International Symposium - Construction facing worldwide challenges, Sep 2009, Dubrovnik, Croatia	Faculty of Civil Engineering, University of Zagreb	238	en	http://cib2009.grad.hr/ (abstract booklet)

2009	N.T. Bayazit, G. Manioğlu, G.K. Oral, Z. Yilmaz	Proceedings 4th International Building Physics Conference - Energy efficiency and new approaches, June 2009 Istanbul, Turkey	Beysan Matbaacilik ve Reklamcilik	1017	en	http://www.ibpc4istanbul.itu.edu.tr/
2009	Harrison, H. W., Trotman, P. M. and Saunders, G. K	Roofs and roofing. Performance, diagnosis, maintenance, repair and the avoidance of defects. 3rd edition	BRE	285	en	
2009	Doran, D, Douglas, J and Pratley, R	Refurbishment and repair in construction	Whittles Publishing Limited	480	en	
2008	Ross, K	Learning the lessons from systemic building failures	NHBC foundation	32	en	
2007	David Watt	Building Pathology Principles and Practices	Royal Institution of Chartered Surveyors	320	en	
2007	James Douglas and Bill Ransom	Understanding Building Failures	Routledge	326	en	
2007	Ross, K, Saunders, G and Novakovic, O	Climate change and innovation in house building: designing out risk	NHBC foundation	34	en	
2006	R. Pietroforte, E. de Angelis, F. Polverino	Proceedings Joint International CIB 055/065/086 Symposium. Construction in the 21st Century - Local and global challenges, Oct 2006, Rome, Italy	Edizioni Scientifiche Italiane	440	en	CD
2005	Robert William Houghton-Evans	Well Built? A forensic approach to the prevention, diagnosis and cure of building defects	RIBA Publishing	325	en	
2003	Pye, P. W. and Harrison, H. W.	BRE building elements: floors and flooring - performance, diagnosis, maintenance, repair and the avoidance of defects. 2nd edition	BRE	314	en	
2002	Harrison, H. W. and Trotman, P. M.	BRE building elements: foundations, basements and external works	BRE	264	en	
2000	Barry A. Richardson	Defects and Deterioration in Buildings	Routledge	220	en	
1998	Harrison, H. W. and de Vekey, R. C.	BRE building eements: walls, windows and doors - performance, diagnosis, maintenance, repair and the avoidance of defects		303	en	
1997	Geoff Cook and John Hinks	The Technology on Building Defects	Spon Press	374	en	
1994	M. Salvadori, M. Levy	Why Buildings Fall Down: How Structures Fail	WW norton & Co	334	en	

Standards:

reference	title /source
The intention is to list standards which may help clarifying vocabulary/comprehension issues.	
ISO 15686 -	Buildings and constructed assets -- Service life planning
standard NEN 2767	('condition measuring') (nl)

APPENDIX 3: Questionnaire “Building with eco-technologies” (WP2)

a) Information about the project Elios 2 and questionnaire

Elios 2 is a study on building pathology and new eco-technologies. Building pathology is defined as:
defects, and the study and diagnosis of building defects and damages, building components or construction products
This includes building techniques

One of the missions of the project is to develop an EU-wide knowledge base with information on innovative and sustainable construction materials and techniques. The aim is to share this knowledge among (re)insurers. This could improve their expertise on these materials/techniques, and help them in their risk assessment. Hence, this would improve the insurability of related risks of these technologies and the availability of insurance.

Examples of how to avoid and reduce the risk could include:

- ✓ Manufacturing changes
- ✓ Better design
- ✓ for installation
- ✓ for users
- ✓ for transport
- ✓ for storage
- ✓ Improved technology
- ✓ for performance
- ✓ Training
- ✓ for manufacturers
- ✓ for transport
- ✓ for builders/installers
- ✓ for users
- ✓ Improved documentation
- ✓ installation guides
- ✓ user guides
- ✓ Official certification
- ✓ of product
- ✓ of installers

The Elios 2 project partners are teams of experts from SBi (Denmark), BBRI (Belgium), NHBC (UK), Technical University of Delft (Netherlands) and ARCADIS (Netherlands).
For further details, go to www.ELIOS-ec.eu/ELIOS2/index.html

b) The questionnaire "Building with eco-technologies"

NHBC, on behalf of the European Commission, is asking you to complete this survey to assess insurance risks with new innovative building technologies. This is part of the 'ELIOS 2' project, details of which are given at the end of this questionnaire.

We can assure you that the information in this survey will remain confidential to the ELIOS 2 team within NHBC and the other project partners. It will not be made available to any third parties except in anonymous summary report form.

By completing this survey, you will help industry and Government to understand the risks associated with new construction technologies, especially 'eco-technologies'. This will lead directly to improved standards and training, thereby reducing the risks of using this technology, increasing their use and leading to happier customers. The information from this survey and the ELIOS 2 project will be used to:

- ✓ improve the image of construction;
- ✓ provide more information to allow industry to improve product and build quality;
- ✓ help builders, installers, architects and manufacturers to reduce the costs of using these technologies;
- ✓ improve risk assessment, and potentially reduce the insurance costs, of using eco-technologies, thereby facilitating access to insurance for construction companies.

For more background on the ELIOS 2-project, please see the Appendix.

Eco-technologies are defined as technologies which (are supposed to) contribute to the environmental performance of buildings (and whose use is less environmentally harmful than relevant alternatives).

It is vital that we understand the typical risks of eco-technologies and sustainable products, for example:

- Fire risk of sustainable materials (e.g. the use of straw) or eco-technologies (e.g. a ground source heat pump installation compared to a gas boiler).
- Structural issues (e.g. extra load on a green roof because of buffering of rain water).
- Maintenance issues (e.g. potential leakage of a green roof).
- Installation issues (e.g. photovoltaic electricals, solar hot water integration).
- Performance issues (e.g. higher energy use than expected of a heat pump, due to lack of integral design of the heat pump, the delivery system, the ventilation system, warm tap water system and the construction)

The questionnaire survey

Since your organisation deals with construction technologies, it is assumed you or your colleagues will have collected information on risks, defects and damages associated with building components or construction products/technologies. We would like to ask you a few questions about this work. Filling in the questionnaire will take around half an hour for an expert at your organisation.

If you wish, you may have access to a summary of the responses from all contributing organisations to the study. The final report will be published by the European Commission and those who contribute will have the opportunity to comment on a draft final report.

We would very much appreciate your assistance in completing the questionnaire for your organisation.

Please return the questionnaire in the reply-paid envelope *by* …. Many thanks.

Section 1 – about you and your organisation

Name:		
Job Title:		
Organisation Name:		
Address:	Street	
	Town/City	
	Postcode	
Phone number		

Email address			
Date questionnaire completed	__/__/_____	Would you like a summary of the results?	Yes ☐ No ☐

What type of organisation do you represent? Please tick all that apply

Government organisation	☐
Housing organisation	☐
Architectural practice	☐
Construction company	☐
Manufacturer	☐
Retailer/merchant	☐
Installer	☐
Building inspection service	☐
Certification organisation	☐
Insurance company	☐
Trade association	☐
Professional institution	☐
Other (please specify:)	☐

Section 2 – about your data

1. Does your organisation collect data on:

Specific risks of certain technologies	Yes ☐	No ☐
Defects and damages of a building	Yes ☐	No ☐
Defects and damages of building components	Yes ☐	No ☐
Defects and damages of construction products	Yes ☐	No ☐

Insurance claims relating to construction damages/defects and technical causes	Yes ☐ No☐

2. What kind of damages/defects does the data refer to? Please tick all that apply

Damages/defects/risks during the construction process	☐
Liability of people involved in construction, such as builders, architects	☐
10 year warranty damages/claims (arisen after handover of the building)	☐
'Traditional risks (e.g. fire, storm, water leakage, collapses)	☐
'Non-traditional' risks (e.g. performance not as claimed)	☐
Other (please specify:)	☐

3. Do you collect data on these types of buildings?

Residential homes	Yes ☐ No☐
Other buildings	Yes ☐ No☐

4. How do you collect the data? Please tick all that apply

Technical reports by your own inspectors	☐
Technical reports submitted by external experts	☐
Data from insurance companies	☐
From your own claim records	☐
Other (please specify:)	☐

5. Why, or for whom, do you collect the data? Please tick all that apply

Building inspection services	☐
Insurance companies	☐
Housing organisations	☐
Government organisations	☐
Private initiative	☐
Other (please specify:)	☐

6. Do you have a database for storing this data?

	Yes ☐ No☐
When did you start collecting data?	__/__/____

7. Do you carry out any statistical analysis of the data?

	Yes ☐ No☐

8. Do you publish information about the data on the web, in a newsletter or in other publications?

	Yes ☐ No☐
If yes, please specify the web address and/or name of the publication(s):	

9. Do you make the data publically available?

Only summary data	Yes ☐ No☐

All raw data	Yes ☐	No☐
All raw data, but made anonymous	Yes ☐	No☐

Section 3 – specific data

10. In our study we wish to collect data on the technologies listed below. If you have information on the typical risks, damages or defects related to these technologies, please enter the number of installations in the table below.

Eco-technology	*Do you have information on risks, damages or defects?*	*Approximately how many installations do you have information on?*	*How many of these installations have had defects?*	*On how many of the installations has performance been comprised?*
Energy production				
Photovoltaic panels (PVs)	Yes ☐ No☐			
Ground source heat pumps	Yes ☐ No☐			
Energy conservation				
Double skin curtain wall / façade	Yes ☐ No☐			
Mechanical ventilation with heat recovery (MVHR)	Yes ☐ No☐			
Vacuum-insulated panels (VIPs)	Yes ☐ No☐			
Bio-materials, e.g. Straw, hemp, sheep's wool	Yes ☐ No☐			
Paper based insulation, e.g. Warmcell	Yes ☐ No☐			
Water				
Rainwater harvesting, incl. Catchment basins & Grey water re-cycling	Yes ☐ No☐			
Green or brown roofs	Yes ☐ No☐			
Other sustainability-related technologies				
). Low VOC materials, e.g. paints, kits & glue	Yes ☐ No☐			

Section 4 - technology-specific issues for specific technologies. ***Please duplicate this page once for each technology that you have indicated in section 3 above.***

TECHNOLOGY *(enter here:)*

Possible cause of failure	*Do you have experience of this reason for failure?*	*How many of the installations indicated above have failed for this reason?*	*How might this cause of failure be avoided, to reduce the risk in future?*
Requirement management			
Change in client's requirements	Yes ☐ No☐		
Misunderstanding of the effectiveness of the technology	Yes ☐ No☐		
Poor project management	Yes ☐ No☐		
Inaccurate engineering or architectural data	Yes ☐ No☐		
Delivery issues			
Late delivery	Yes ☐ No☐		
Storage issues	Yes ☐ No☐		
Awkward packaging	Yes ☐ No☐		
Poor transport of product	Yes ☐ No☐		
Installation problems			
Incorrect design for installation	Yes ☐ No☐		
Incorrect installation documentation	Yes ☐ No☐		
Failure in installation	Yes ☐ No☐		
Commissioning failure	Yes ☐ No☐		
Operational failure			
) Product failure once installed	Yes ☐ No☐		
Incorrect user documentation	Yes ☐ No☐		
Misuse of product by end-user	Yes ☐ No☐		
Performance not as claimed	Yes ☐ No☐		
Other reasons for failure			
	Yes ☐		
	Yes ☐		

	Yes ☐		
	Yes ☐		
	Yes ☐		
	Yes ☐		
	Yes ☐		
	Yes ☐		
	Yes ☐		
	Yes ☐		

Section 5 – ELIOS II

11. Do you think a European-wide database on typical risks and building pathology for sustainable construction and eco-technologies would be useful?

	Yes ☐ No☐
Please give reasons:	

12. Other remarks or comments on this questionnaire, or on the ELIOS II project:

Thank you for completing this questionnaire. Your time and effort is greatly appreciated.

- - - - - - - - -

APPENDIX 4: Case study (WP2)

Case Study: Mechanical Ventilation with Heat Recovery (MVHR)

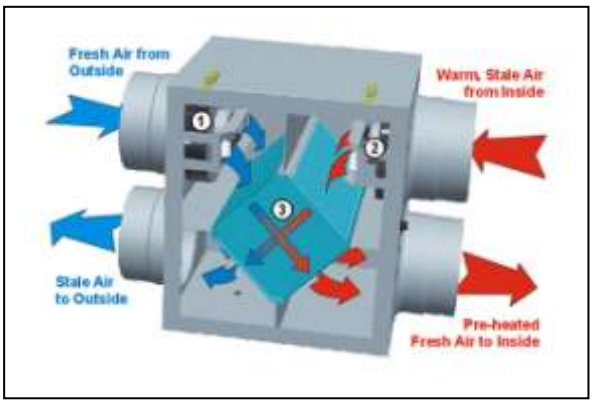
1. Introduction to the technology

Heat loss through unintended ventilation is an increasingly important problem in low energy buildings. The issue is generally addressed though successively higher standards in national building codes (Approved Documents L and F in the UK), but such standards tend to encourage more airtight homes to be built (ie. homes with a lower air permeability).

The transition towards more airtight buildings means that purpose-provided ventilation is increasingly necessary. Ventilation options that are able to recover heat from the outgoing exhaust air are therefore increasingly important, as mechanical ventilation becomes the predominant form of ventilation in new buildings.

Mechanical ventilation with heat recovery (MVHR) is a whole-building, ducted, fan-driven ventilation system which recovers a proportion of the heat from the exhaust air and recirculates it back into the house.

MVHR systems consist of a centrally-located fan and heat recovery unit, with flow and return outlets ducted to individual rooms (or to the external environment) as required. Ventilation air is normally extracted from 'wet' areas such as kitchens and bathrooms, and fresh air supplied to living rooms and bedrooms.



Indoor air quality can also be improved using MVHR. Contaminants, pollution and excess moisture, all of which may affect the comfort or health of building occupants, can be removed or reduced. Excess summertime temperatures can be mitigated to an extent.

2. Available types of this technology

Because MVHR systems tend to be an installed set of parts, rather than an integrated 'system' as such, and because the resulting installation practices vary widely, the number of different types is large. A typical categorisation of MVHR systems is as follows:

- Location of fan and heat recovery unit:
  - loft or cupboard mounted
  - cooker-hood
- Duct type:
  - rigid
  - flexible

- Specific fan power, watts per [litre per second]:
  - normal (eg. 2.0 W/(l/s)
  - low wattage DC (less than 1.0 W/(l/s)
- Heat recovery efficiency:
  - standard (eg. 66%)
  - Passivhaus spec (at least 75%)
  - very high efficiency (greater than 90%)
- Boost control:
  - none
  - manual
  - automatic (via humidity sensors)
- Summertime heat recovery bypass:
  - none
  - manual
  - automatic (via temperature sensors)

Note for project partners: The following sections 3-6 are implicitly covered by the results contained within section 8 below. Content and format to be finalised.

3. The market

TO BE DEVELOPED.

4. Construction/installation process

TO BE DEVELOPED

5. Organisational and quality aspects

TO BE DEVELOPED.

6. Regulatory aspects, technical regulation

TO BE DEVELOPED

7. Strengths, weaknesses, opportunities and threats

This section outlines a discussion of the key drivers effecting MVHR.

Strengths

- MVHR enables good energy efficiency overall, by facilitating airtight buildings.
- Improves indoor air quality, health (eg. asthma), condensation / mould growth and internal temperatures.

Weaknesses

- Architects/designers do not generally include the details of the MVHR system in their designs; installation often has to be improvised on site as a result.
- Very prone to installation issues – difficult to test/certify a full MVHR system in the laboratory/factory, and systems can fail to meet design values when commissioned.
- Can fail unsafe (eg. no visual indication of fan failure, leading to condensation).
- Lack of filter maintenance is a big concern of property developers.

Opportunities

- Progressively tighter mandated air permeability for buildings will drive take-up.
- Widespread take-up of energy efficient housing (eg. Passivhaus) could be enabled by a good awareness of MVHR.

Threats

- Resistance by housebuilders, due to perceived lack of operational understanding by householders.
- Could become discredited if widespread failures occur due to occupant misunderstanding and/or mis-use.
- Over-regulation by governments – especially the emerging tendency to mandate higher ventilation rates for houses.

8. Building pathology, defects, and what can go wrong

8.1. Invitations by NHBC to complete questionnaire

An invitation to complete the online version of the Elios II questionnaire was sent to 275 individuals in the following industry sectors:

Sector	***Number sent***
1 – Insurance	34
2 - Certification Bodies	9

3 - Accreditation Organisations	3
4 - Builders/Installers	42
5 – Manufacturers	71
6 - Trade Associations	23
7 - Professional Institutes	19
8 – Architects	12
9 - Quantity Surveyors	2
10 – Other	0
11 - Building Inspection Services	10
12 - Government Organisation	18
13 - Housing Associations/Commissioner	14
14 – Consultancies	14
15 - Merchant/retailer	4
Total	***275***

In total 40 respondents completed some or all of the questionnaire.

8.2. Responses received

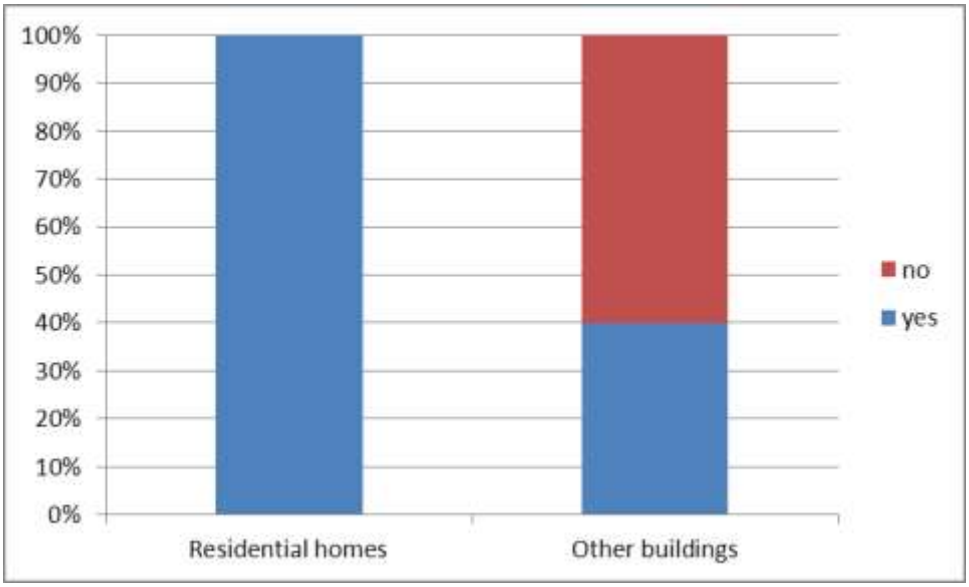
As at 20 June 2012, six responses had been received by NHBC which related specifically to MVHR. This is 15% of the received questionnaires. The industry sectors of the respondents were as follows:

Sector	***Responses received***
1 –Insurance	1
4 - Builders/Installers	2
13 - Housing Associations/Commissioner	2
15 - Merchant/retailer	1
Total	***6***

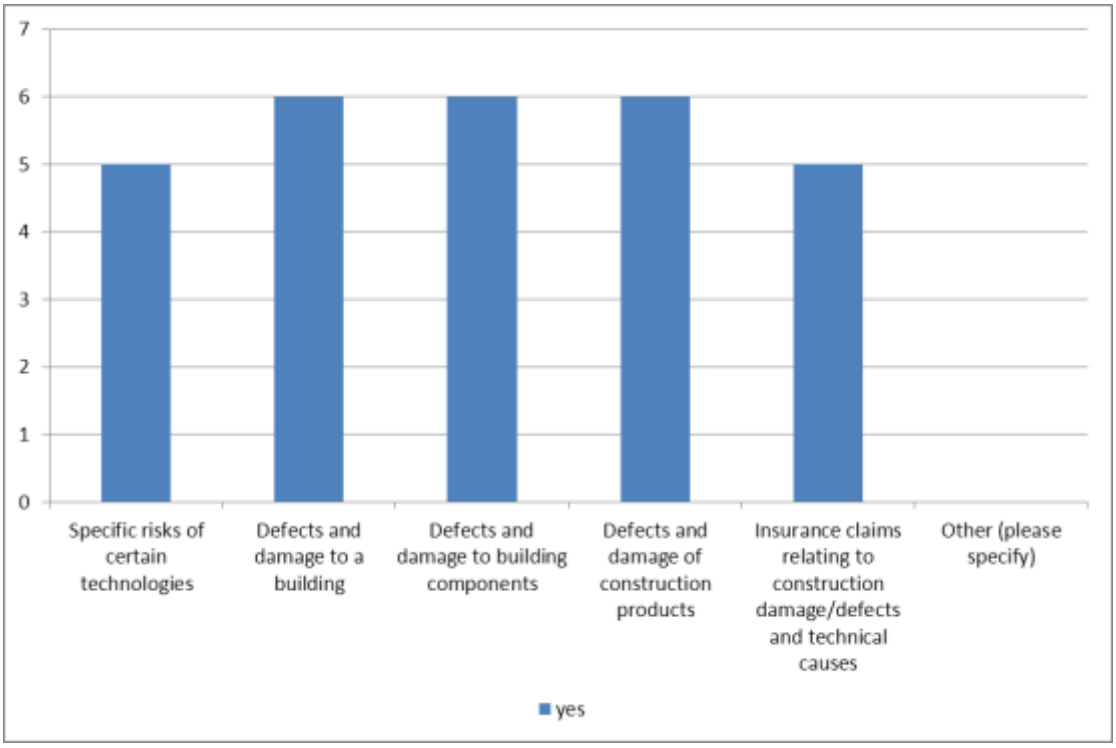
The respondents collectively claimed to have data relating to 594 installations of the technology, of which 33 (6.2%) were said to have experienced failures or defects.

The following graphs and charts only relate to the people who responded about this technology.

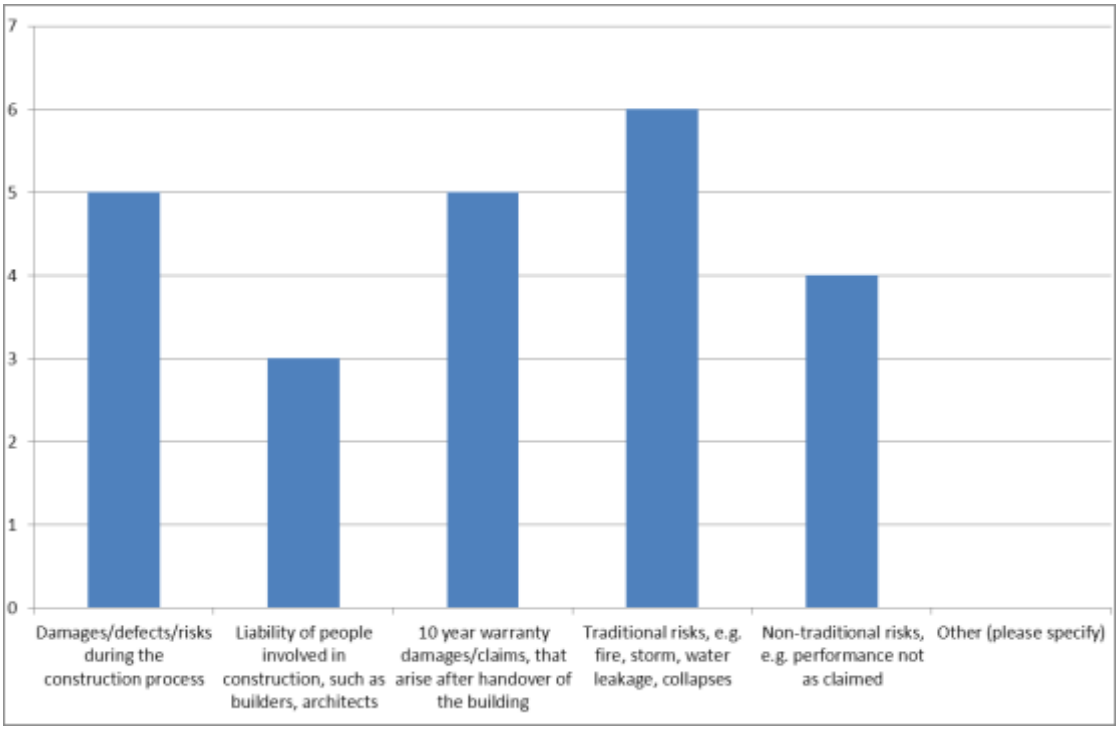
Does your organisation collect or collate its own data on these types of buildings?



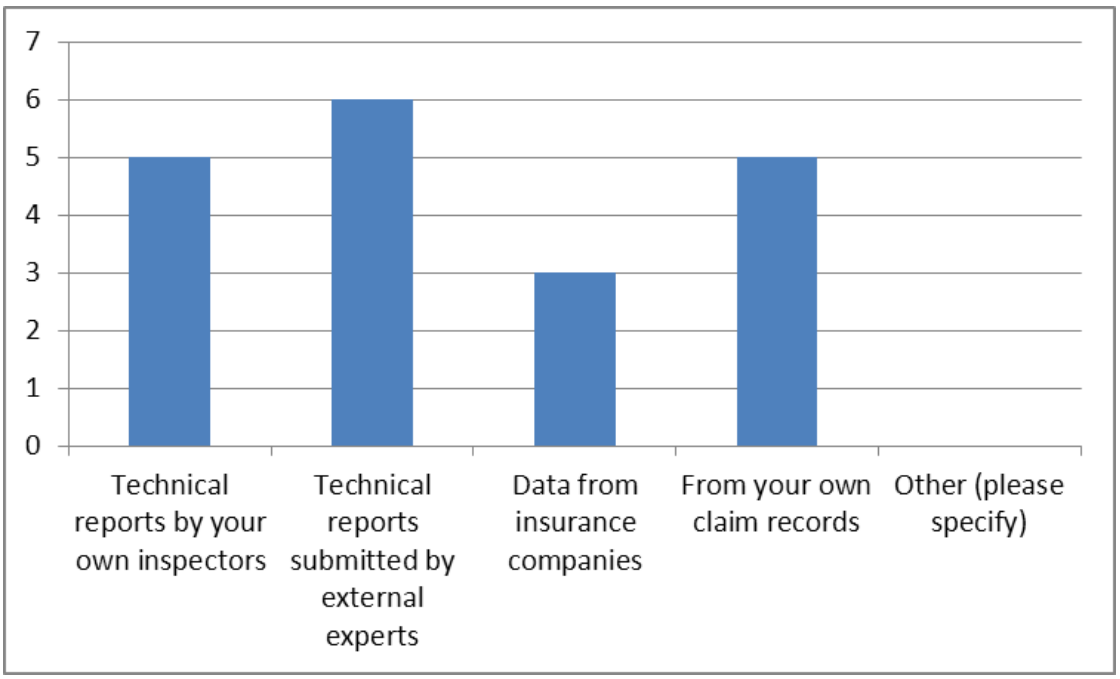
Does your organisation collect its own data on these issues (please tick all that apply)?



What kind of damages/defects do the data refer to (please tick all that apply)?

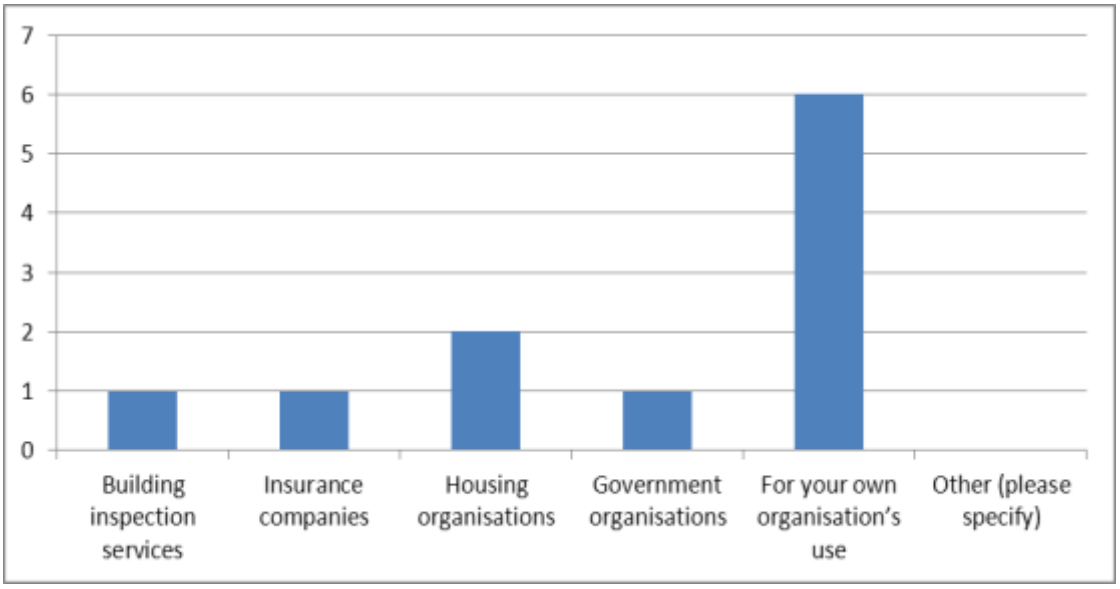


How do you collect the data (please tick all that apply)?



For whom do you collect the data (please tick all that apply) ?

Note that respondents may collect for more than one organisation.



8.3. Summary of responses about databases

About their database:
- Only 2 have a database, 1 did not respond;
- Only 1 provided a date when data collection started – 1st Jan 2007;
- 5 carry out statistical analysis of the data;

About data publication:
- Only 1 makes data available on the web;
- None in newsletters;
- 2 in other publications (names not provided);

About the availability of data, of these 6 respondents:
- 3 publish summary data only;
- None publish raw data in any form;
- None publish raw data, even anonymously;

One comment was passed:

"Where we have research projects funded by third parties, there is often a requirement to disseminate findings, under controlled know how and IP, with commercially sensitive information removed."

8.4. Reasons for failures and defects

The reported reasons for the failures and defects were as follows:

Reason for failure/defect	Number	% of total
1. Requirement management		
a) Change in client's requirements	4	0.7%
b) Misunderstanding of the effectiveness of the technology	10	1.7%
c) Poor project management	20	3.4%
d) Inaccurate engineering or architectural data	5	0.8%
2. Delivery		
a) Late delivery	3	0.5%
b) Storage issues	5	0.8%
c) Awkward packaging	0	0.0%
d) Poor transport of product	0	0.0%
3. Installation		
a) Incorrect design for installation	14	2.4%
b) Incorrect installation documentation	7	1.2%
c) Failure in installation	17	2.9%
d) Commissioning failure	22	3.7%
4. Operational failure		

a) Product failure once installed	7	1.2%
b) Incorrect user documentation	5	0.8%
c) Misuse of product by end-user	5	0.8%
d) Performance not as claimed	7	1.2%
5. Other		
No other reasons were given for failure	0	0%
Total	**37**	

Note that an installation may have had more than one reason to fail.

8.5. Failures/defects commentary

The respondents offered the following general comments and suggestions on the ways in which the failures and defects might be avoided in future:

Reason for failure/defect	Commentary
1. Requirement management	
a) Change in client's requirements	Involve homeowners in decisions
b) Misunderstanding of the effectiveness of the technology	Technology needs to be better understood generally in construction industry. SAP rating and effectiveness of ductwork system unclear. Workmanship & design issues not properly understood - better training required.
c) Poor project management	The interface between designers and overlaying ventilation ducting was very poor. Poorly positioned ducting and fixing resulting in condensation in ducts
d) Inaccurate engineering or architectural data	The duct layouts did not fully consider the structure and practical clash points.
2. Delivery	
a) Late delivery	Missing parts.
b) Storage issues	
c) Awkward packaging	
d) Poor transport of product	
3. Installation	
a) Incorrect design	Always seem to have issues where to locate fan unit - loft space not ideal but

for installation	often used. Better sub-contractor. Several design iterations progressed before final layouts acceptable. Location of air intake and outlets and insulation to ducts [were wrongly designed]. Outlets and extracts not located in best positions. Duct runs too long. Excessive noise. Absence of summer bypass. Needs better regulation & designers to understand limitations.
b) Incorrect installation documentation	[Due to shortcomings in the documentation,] none of the systems installed hit the required design values at point of commissioning; all of them needed re-balancing.
c) Failure in installation	Acoustic noise was a key concern, with noisy ducts in en-suite bathrooms on long duct runs. Operatives on site were not trained. Flexible ducts used for connections not aligned properly. Insulation of ducts not adequate.
d) Commissioning failure	Every unit failed to achieve the design requirement the first time around. Remedial work was required to obtain satisfactory tests. Poor commissioning and balancing, extract / inlet rates not correctly set.
4. Operational failure	
a) Product failure once installed	No significant failures, but issues with warning lights, access to filters, condensate traps and noise. Fans burnt out due to being undersized.
b) Incorrect user documentation	Poor guides - too intensive. We developed a 1-page quick-start user guide, although this is rarely used.
c) Misuse of product by end-user	Filters not cleaned / not easy to access. Tenants can switch it off, leading to condensation. Residents fail to understand what system does and how to control speeds and boost function.
d) Performance not as claimed	As-built flow rates and acoustic performance were not as expected.
5. Other (specified)	Air permeability of home not low enough to make installation work effectively.

8.6 Key findings

In summary:

- The most significant issue is in commisioning, but that may also relate to a mis-understanding of the use the technology.

- Difficulties in commissioning can also be caused by inadequate or over-complex design; installers should not have to improvise important details on site.
- Any issues of late delivery and storage also relate to poor project management. The causes of poor project management are more general than the scope of this project, unless it relates to a mis-understanding of the technology.

Lessons:

- Raise awareness of the effectiveness of the technology, both for designers and for users.
- Suggested methods: case studies and articles.
- Raise awareness of the issues of design, installation and commissioning.
- Suggested methods: better documentation, training.

APPENDIX 5: List of organisations contacted (WP2)

UK

NHBC has sent the questionnaire to 228 people, divided as follows by industry type:

1 – Insurance	27
2 - Certification Bodies	7
3 - Accreditation Organisation	3
4 - Builders/Installers	31
5 – Manufacturers	62
6 - Trade Associations	21
7 - Professional Institutes	11
8 – Architects	9
9 - Quantity Surveyors	2
10 - test data	4
11 - Building Inspection Services	9
12 - Government Organisation	18
13 - Housing Associations/Commissioner	8
14 – Consultancies	11
15 - Merchant/retailer	5
TOTAL	228

Responses so far (14 june 2012) 18 :

1 – Insurance	3
2 - Certification Bodies	2
4 - Builders/Installers	3
5 – Manufacturers	2
6 - Trade Associations	3
8 – Architects	1
13 - Housing Associations/Commissioner	1
Other	3

France / Belgium

BBRI will contact the following organisations:

Belgium:

- Assuralia (and her members)
- Regional Housing associations
- Regie der gebouwen
- SECO
- WTCB

France:

- Agence nationale de l'habitat

- Agence nationale pour l'information sur le logement
- Agence Qualité de Construction (AQC)
- Centre d'assistance technique et de documentation
- Collège national des experts architectes français
- Compagnie française des experts construction
- Confédération des organismes indépendants de prévention, de contrôle et d'inspection
- CSTB
- Fédération Française des Sociétés d'Assurances (and her members)

Netherlands

Arcadis has contacted or will contact at least the following organisations in the Netherlands:

- Woningborg, Housing guarantee fund
- Ten Hagen Stam, publisher on building defects
- Allianz Rotterdam, insurance company
- Zurich insurance company (internationally active)
- ASR insurance company (internationally active)
- Installation consultancy company
- Marsh Risk consultancy

Spain / Portugal / Italy

Arcadis / Techn.University Delft will contact at least the following organisations in Spain:

Spain:

- Intemac (Madrid), division building pathology
- Acciona (Sevilla), Energy Efficieny Installation Group, Eco-efficiency & Sustainability Area, Technology Innovation Division, projectmanager EU project BEEM-Up with partner TU Delft

Portugal:

- University of Porto (Porto), Coordinator W086 Building Pathology
- National Laboratory for Civil Engineering (LNEC), Building Pathology Expert, Former colleague TU Delft

Italy:

- Politecnico de Milano (Milano), Coordinator W086 Building Pathology

Denmark / Sweden / Finland / Poland:

SBi will contact at least the following organisations:

Denmark:

- Building Defects Fund (BSF),
- Building Damage Fund for Urban Renewal (BvB),
- Benchmark Centre for the Danish Construction Sector, Byg-Erfa
- Danish Insurance Association (Forsikring & Pension).

Sweden:

- AB Bostads Garanti
- Ministery of Housing (Boverket)

Finland:
No contacts yet

Poland:

- ITB, Polish Building Research Institute (www.itb.pl)
- Organisation for sustainable construction in Poland (Zrównowazone Budownictwo)

Czech Republic / Poland / Slovenia

TZUS will contact some fellow organisations in:

- Poland
- Slovenia

APPENDIX 6: Insurance Europe Comments (WP3)

ELIOS 2 STUDY: COMMENTS ON THE 5 MAIN TASKS OF THE FORUM

Insurance Europe welcomes the invitation of the European Commission (EC) and the Elios 2 study consortium to contribute to the EC's study on "Facilitating access to insurance by self-employed builders and small building firms so as to stimulate innovation and the promotion of eco-technologies in the European Union".

In response to the EC's request to provide comments related to the five main tasks of the Forum, please see our following contribution.

Provide comments on the approaches and the methodologies followed by the project team for the analysis of the quality marks and the development of an EU-wide knowledge base on quality in construction and building pathology.

National construction practice as well as quality parameters strongly differ within Europe. Not only practical methods but also expectations by building owners are nationally influenced. This is because of historical and cultural reasons and climate differences. A generalization on quality criteria therefore can only cover a limited range of this market field. This project should therefore restrict its aim to find mutual grounds rather than intend to implement universal standards and marks.

Moreover, estimation of risk within the construction sector is individually evaluated. A huge variety of criteria can influence such estimation and forbid a simplified evaluation. Insurers within this field develop internal measurements and parameters applicable to contractual partners. It depends on specifications of each insurer and its position within the insurance market. Differences of expertise and concentration of construction risks lead to differing estimations and insurance cover. A general comparison of risk parameters can therefore hardly be designed. Accordingly, it is important that any approach of quality marks can only serve as recommendations with no implication for liability laws or standardization of contractual practice.

Sharing knowledge about building techniques could however be a good way to learn about methods of work, monitoring systems and certifications in European countries.

Review the operational value of the developed EU directory on quality marks and the EU-wide database on quality and pathology indicators for construction professionals, the (re)insurance sector and public administration/agencies;

According to the considerations above, the implementation of an EU-directory on quality marks should carefully be weighted.

It is necessary first of all to foster a dialogue among the national institutions as a basis for concrete comparison of demands and circumstances of the construction sector in their territories. Therefore the role of this directory should be basically to facilitate this dialogue. This will be useful for instances for cross-border projects, encouraging the mobility of professionals.

The same should be applied for the reinsurance sector and public administration.

Discuss the recommendations of the project team regarding the role, the regulatory framework and the financing of construction insurance within the context of national strategies for sustainable construction and the information needs of construction insurance to cover the risks associated to cross border services and building sustainability performances;

Construction market sector is very heterogenic. National differences and different contributions (demand and needs) of market players need to be considered. "Individually adjusted" insurance cover can make sure that especially small market players are not burdened by generalized covers, which do not include all risks or expose more costs than necessary. This means that a compulsory insurance scheme cannot be an appropriate solution in the construction sector.
The final proposal of the ELIOS study, the creation of European Agency, is a good approach to manage the heterogeneity in the EU. However this Agency should remain as an information-based forum, working for the dissemination of relevant information.

Support the dissemination of the project results and recommendations towards national and professional bodies

The dissemination of the projects and recommendations to national and professional bodies should include entities related to the insurance sector. Constructive solutions must be accompanied by a risk assessment from the insurance point of view. The exchange of experiences will promote the adaptation of the insurance market to the use of new building solutions.

Facilitate data gathering by providing contact persons, information sources, etc.

The collection of data regarding both the assessment and quality brands, as well as the development of sustainable solutions, is essential. The exchange of information between European Countries may be the key to facilitate the development of good practices.
The gathering of data is however difficult according to the remark on No. 1. The comparability and the conformity of data could be a problem. This should be kept in mind, in order not to draw conclusions on incomparable data.