



CE51 TOGETHER

**D.T1.3.3 TRANSNATIONAL TRAINING MODEL ON
ENERGY EFFICIENCY IN PUBLIC BUILDINGS,
INTEGRATING DEMAND SIDE MANAGEMENT**

04.2017



INTRODUCTION

The aim of this publication is to present the transnational training model on energy efficiency in public buildings, which was developed, tested and fine-tuned within the CE 51 TOGETHER project. The project supports implementation of the concept of **integrated energy management** in public buildings through implementation of selected technical, DSM and financial measures in 85 pilot buildings from different EU countries. The measures implemented will lead to significant reduction of energy consumption and change of behaviour of building users.

One of the project tasks was to develop a comprehensive training model that could be used to increase knowledge, capacities and skills of **building owners, managers and decisions makers**, who should then be able to successfully implement sustainable energy measures in their public buildings and to engage building users in this process. The idea was to develop a model that would integrate different relevant topics and that would have "transnational" character, i.e. give some common guidelines and contents that could be later adapted to the training needs of specific countries, municipalities, projects etc.

The TOGETHER transnational training model is based on the **following key principles**:

- Building on existing knowledge and resources (to avoid "reinventing the wheel")
- Building on guidelines from experienced training experts
- Development of a comprehensive training material and tools that:
 - ✓ summarise existing knowledge and adapt it to the specific needs of the target group(s)
 - ✓ support integration of different types of EE measures (technical, financial, behavioural and analytical)
 - ✓ support active engagement of building users in all planned EE improvements
 - ✓ provide not only theoretical knowledge but also address practical aspects related with the implementation of EE improvements in public buildings
 - ✓ Include both comprehensive introduction to the specific topic/module and a set of exercises and guiding questions helping to test new knowledge gained
 - ✓ include references to other existing resources (guidebooks, ppts slides, articles, on-line tools, etc.) that can be used to further increase the knowledge on the specific topics
 - ✓ can be adapted to the specific local conditions and to the needs of specific target groups
- Increasing capacities of the trainers and testing proposed training material before starting the trainings
- For each participating country - assessing trainees' initial knowledge and training needs to adapt common training content adequately



- For each participating country - organising a cycle of 12 local trainings, covering all relevant aspects and topics and ensuring that all the trainees' doubts are resolved and all the questions are answered
- Acknowledging participation in the trainings by issuing relevant certificates
- Ensuring comprehensive evaluation of the trainings to draw conclusions for the future and provide further support to participating public building owners, managers and decision makers

Proposed TOGETHER training model (which is further described in the next chapters) was tested by the project partners and then improved based on the lessons learned in the process. It can be a source of inspiration for other institutions or projects planning comprehensive trainings on sustainable energy issues. Or, in fact, also on any other issues, since the proposed path can be applied to all kinds of training programmes.

TOGETHER TRANSNATIONAL TRAINING MODEL IN A NUTSHELL

The transnational training model on energy efficiency in public buildings, proposed and tested within the TOGETHER project, consists of the following steps:



Preparation

- Determination of the thematic scope of the training programme (what topics should be raised and discussed with the trainees?)
- Collection and analysis of existing thematic resources and tools (what is already available and can be used as a basis for the development of our own training content?)
- Conducting interviews with experienced training experts (what are the most important dos and don'ts during organising trainings?)

Development of training material

- Development of guidelines and templates for the transnational training material
- Development of transnational training material



- Unification of transnational training material

Increasing training capacities

- assessment of initial knowledge and training needs of the trainers
- increasing capacities of the trainers → Master Train-the-Trainer workshop
- improving the training material
- evaluation of capacity building activities and drawing conclusions for local trainings

Organisation of a series of trainings

- assessment of initial knowledge and training needs of the target groups
- translation and adaptation of the training contents and material
- development of the training schedule
- organisation of trainings

Trainings evaluation and feedback

- evaluation of the trainings
- drawing conclusions for the future

TOGETHER TRANSNATIONAL TRAINING MODEL STEP BY STEP

1. STEP 1: Preparation

A. Determination of the thematic scope of the training programme

The first step during the development of any training programme should be the **determination of its goals and thematic scope**. In case of the TOGETHER project, the main aim of the trainings was to increase public buildings' owners, managers and decision makers knowledge and capacities in the field of energy efficiency and different types of measures and solutions that can be implemented and integrated to improve building's energy performance. It was decided that all relevant aspects need to be discussed, including **technical, financial, behavioral and analytical ones**. For each of these thematic areas the partners determined a list of specific topics that needed to be included in the training content and training material. The list is presented below:

Technical aspects - main topics to be discussed:

- Energy audit & energy performance certificates
- Thermal retrofitting of the building
- Change of the heating source



- Installation of RES
- Modernisation of internal installations (heat, electricity, hot water, ventilation, air conditioning)
- Modernisation of internal lighting
- Purchase of energy efficient equipment
- Small investments/repairs (incl. installation of external solar shading)
- Technical performance indicators (for monitoring results of implemented technical measures)

Financial aspects - main topics to be discussed:

- Financing programmes & schemes (including ESCO, PICO, revolving funds, on-bill financing, green bonds)
- Economic & financial assessment of the investment/action
- Development of business plan and budget of the investment/action + ensuring bankability of investment/action
- Tendering procedures, including Green Public Procurement
- Purchasing groups
- Economic/financial performance indicators (for monitoring economic/ financial impact of the investment/action)

Behavioural aspects - main topics to be discussed:

- Behavioural science/psychology related to the consumers habits/practices (incl. consumption patterns, rebound effect, KAP gap)
- Communication with, education and changing behaviours of buildings users (incl. methods, tools, tips, communication campaigns, incentive schemes, Living Lab approach, user driven approach, split incentive approach, systemic approach)
- Communication & networking platforms (e.g. for sharing data on real-time energy consumption)
- Low-cost and no-cost energy saving measures

Analytical aspects - main topics to be discussed:

- Collection and analysis of the consumption data (incl. available methods of energy data collection, available smart metering technologies, conducting data analysis, ensuring data security)
- Standard energy management systems (e.g. based on ISO 50001, EN 16001, EEA) and smart energy management systems (e.g. based on smart meters)
- ICT and BEMS
- DSM performance indicators (for monitoring results of implemented DSM measures)
- Social Audit (in terms of collecting and elaboration of qualitative data related to energy consumption)



Other relevant aspects:

- EU and national legal frameworks, including legal requirements concerning new and renovated buildings
- Building standards (passive buildings, zero-emission buildings, etc.)

The list served as a basis for the development of the training content and the training material. It includes all relevant topics that need to be discussed with the trainees to give them full picture of energy saving potential related to public buildings. It takes into consideration that the target group is very diversified and may include people with different professional background and experience. Therefore, the trainings need to give both basic knowledge on the specific topic and practical guidelines that the trainees can apply in their everyday work and activities. It was also agreed that specific focus should be put on the possibility of integrating different kinds of measures and on the users' involvement in all planned EE interventions.

B. Collection and analysis of existing thematic resources and tools

Once having the training thematic scope determined, another important step is **identification, collection and analysis of already existing material** that can be used as a starting point and a basis for the development of own training content (as well as a reference for more detailed research). Project partners analysed dozens of past and current projects, initiatives and repositories to find most relevant resources on energy efficiency in public buildings, financing EE measures and users' involvement, including **guidebooks, articles, presentations, on-line tools, web materials, case studies, etc.** In total 101 useful resources were gathered and published in an on-line TOGETHER library, available not only to project partners but also other interested people.

The library is available at <http://www.interreg-central.eu/Content.Node/TOGETHER.html> and enables easy access to the resources, which have been divided into 4 main categories (technical, financial, DSM and other relevant aspects) and several sub-categories.



Image 1 and 2. TOGETHER library - repository of existing resources on EE in public buildings

The resources gathered were used to develop TOGETHER training contents and training material. The can be also used as a reference for the trainers that would like to discuss some topics in more detail than envisaged in the common material.

Following the TOGETHER concept, the library is a living tool, where new contents may be added at any time improving this repository of existing thematic knowledge.

C. Conducting interviews with experienced training experts

Preparation of good quality trainings requires not only careful establishment of the training contents, well adapted to the needs of the target group(s), but also planning them in a way that would ensure:

- successful transfer of knowledge and skills,
- active involvement and interest of the trainees,
- interactions between the trainer and the trainees and the trainees themselves;
- encouraging trainees to come up with their own ideas and solutions;
- gaining useful feedback.

If the organisers don't have adequate experience, they can always ask for support from the training experts that would help them to identify the most important dos and dont's, as well as good and bad training practices. And that is what the TOGETHER consortium did. Although all the partners have some training experience, they addressed and interviewed several training experts from different countries to use their tips and guidelines during the development of their own trainings.

The training experts were invited to provide opinions and guidelines concerning:

- proposed thematic content of the TOGETHER training path,

- proposed structure of the TOGETHER training material,
- increasing capacities of the trainers (also by organising a 1-week Master Train-the-Trainer workshop)
- organisation of efficient thematic trainings on EE in public buildings.

They were also asked some more general questions on how to develop a good quality training material, how to organise efficient trainings and how to get useful feedback from the trainees and keep them interested over longer period of time. What is more, they presented some "bad experience" as a useful lesson on what to avoid.

Gathered answers were summarised in a report, which is available at <http://www.interreg-central.eu/Content.Node/TOGETHER.html>. It can serve as a source of useful knowledge also for other institutions and projects planning trainings on energy efficiency issues.

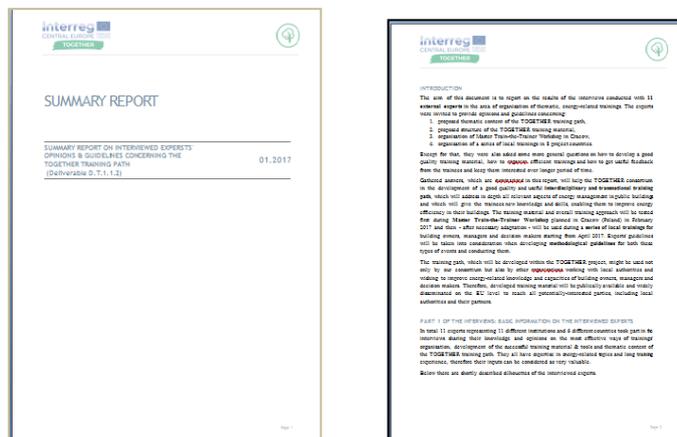


Image 3 and 4. Report on interviewed experts opinions and guidelines concerning the TOGETHER training path

2. STEP 2: DEVELOPMENT OF TRAINING MATERIAL

A. Development of guidelines and templates for the transnational training material

Once having the training thematic scope determined and all initial resources and experiences gathered, the training organisers can start the work on the overall concept of the training material, including design of the contents, structure, templates, etc.

Within the TOGETHER project there were three expert partners responsible for the development of the thematic material:

- University of Maribor was responsible for the technical training material;
- Province of Treviso was responsible for the financial training material;
- City of Zagreb was responsible for the DSM training material.



To support them in the process, as well as to ensure comparability and integration between the three parts of the training material, PNEC developed **common guidelines and templates**, which were disseminated among respective partners. The document set general structure of the material, as well as the scope of each thematic part (specific topics/modules that need to be covered). An emphasis has been put on the practical exercises and case studies, which are at least as important as the theoretical introduction, as well as on building on existing experience and material, which has been gathered in the TOGETHER library. Some important suggestions from the external training experts have been also included.

B. Development of the transnational training material

The next step is using common guidelines and templates, approved by all parties involved, to develop comprehensive training material covering all topics identified. Within the TOGETHER project following training sets were developed:

Technical training set:

Objective: Increasing trainees' knowledge, skills and capacities regarding **technical aspects** related to EE in public buildings, with the specific focus on integration of different solutions, choosing most optimal scenarios, ensuring efficient monitoring and involving building users in the processes.

Training modules:

Module 1: Energy efficiency in buildings

Module 2: How to use energy more efficiently

Module 3: Basic characteristics of energy saving

Module 4: Energy audit and energy performance certificate

Module 5: Energy using products

Module 6: Energy retrofitting of the buildings

Module 7: Installation of RES

Module 8: Choosing most optimal EE improvement scenario for a specific building

Module 9: Integration of technical measures with each other and with other types of EE solutions

Financial training set:

Objective: Increasing trainees' knowledge, skills and capacities regarding **financial aspects** related to EE in public buildings, with the specific focus on the selection of most proper financing schemes, development of good quality project documentation, selection and monitoring of economic/financial indicators, involvement of building users in financing schemes (e.g. EPC contract).

Training modules:

Module 1: EU, national & regional financing schemes



- Module 2:** Alternative financing methods
- Module 3:** Economic & financial assessment of the investment
- Module 4:** Development of financial documentation of the project (budget, business plan, applications for funding, market analysis...)
- Module 5:** Ensuring project bankability, viability and profitability
- Module 6:** Attracting & cooperation with potential investors
- Module 7:** Choosing optimal funding for EE projects
- Module 8:** Tendering procedures and green public procurement

DSM training set:

Objective: Increasing trainees' knowledge, skills and capacities regarding **behavioural and analytical aspects** related to EE in public buildings, with the specific focus on:

- ✓ understanding rationale behind people's behaviours & consumption patterns, finding most effective ways to approach building users and motivating them to change their behaviours and engage in energy-related initiatives...
- ✓ most efficient methods & tools for monitoring energy consumption, standard and smart energy management systems, ICT technologies that may be implemented in buildings to optimise energy use...

Training modules:

Behavioural DSM

- Module 1:** Behavioural & psychological science related to consumers habits & practices
- Module 2:** Methods & tools for communicating and cooperating with building users
- Module 3:** Development of successful educational & information campaigns addressed at building users
- Module 4:** Methods & tools for changing habits and behaviours of building users
- Module 5:** Different incentive schemes for energy saving
- Module 6:** Monitoring of building users' behaviours
- Module 7:** No-cost and low-cost energy saving measures
- Module 8:** Integration of behavioural measures with other EE solutions

Analytical DSM

- Module 1:** Collection, analysis, verification and presentation of the consumption data
- Module 2:** Development of energy-related data bases
- Module 3:** Standard energy monitoring/management systems

Module 4: Smart energy monitoring/management systems

Module 5: Advanced energy management systems (e.g. BEMS)

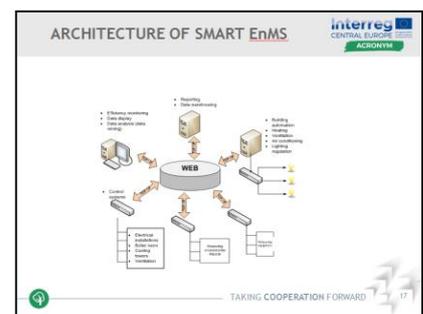
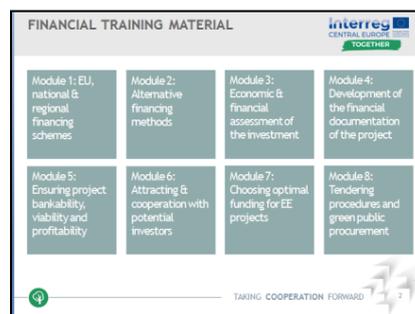
Module 6: Using ICT to analyse and reduce energy consumption in buildings

Module 7: Practical use of monitoring data - development of energy optimisation and adaptation scenarios

Module 8: Practical use of monitoring data - educating and involving building users

The TOGETHET transnational training model highlights the necessity of combining theoretical knowledge with practical skills. Therefore in each case the training module includes:

- theoretical introduction in word
- theoretical introduction on ppt slides
- at least one practical exercise / group works
- check list
- further suggestions for trainers, including:
 - ✓ suggestions on further reference material (link to the TOGETHER library)
 - ✓ suggestions on further relevant topics
 - ✓ suggestions on further exercises/practical application



Images 5-7. Some slides from the TOGETHER training material

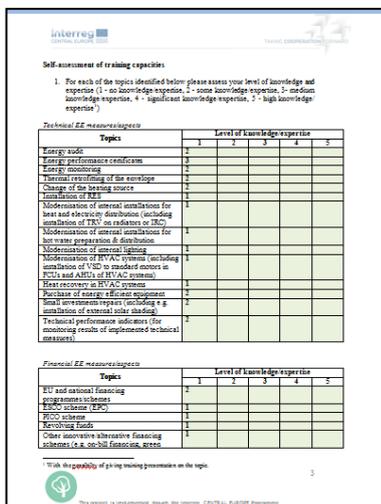
C. Unification of transnational training material

In a situation when the training material is developed by more than one person/organisation, it is necessary that one person is designated to unify it ensuring that the structure, language, phrasings and graphical layout are the same. This was the case of the TOGETHER project, where PNEC - TWP1 leader - was responsible for the unification process.

3. STEP 3. Increasing training capacities

A. Assessment of initial knowledge and training needs of the trainers

The next important step is increasing training capacities of the training organisers, which includes training of the future trainers and testing developed training material in practice. To prepare relevant capacity building activities it is necessary to learn more about the initial knowledge, training experience and training needs of the trainers. This is what the TOGETHER consortium started from. PNEC, TWP1 leader, developed special questionnaire which was disseminated among the representatives of project partners that would be most probably engaged in future training activities.



The questionnaire aimed at:

- assessing training capacities and specific expertise available within the consortium,
- assessing what thematic expertise is lacking and needs to be sought for outside the consortium,
- identification of potential experts that may deliver missing expertise,
- assessing training needs of the partners.

On the basis of this analysis training content and agenda of the Master Train-the-Trainer workshop in Poland was developed. The agenda of this event was adapted to the training needs of the partners, but also took into account their specific knowledge and experience, making them both the trainees and the trainers.

Image 8. Questionnaire for assessing training experience and needs of future TOGETHER trainers

B. Increasing capacities of the trainers → Master Train-the-Trainer workshop

Based on the assessment of initial training capacities a plan for increasing these capacities should be developed and implemented. In case of the TOGETHER project PNEC, TWP1 leader, developed **methodological guidelines for organising and conducting a one-week train-the-trainer workshop**, which took place in Cracow (Poland) on the 20-23rd of February 2017. The guidelines specified organisational details and suggested content of the training, including:

- time, place and language
- information about the target group
- information about the trainers selection
- objectives of the training
- thematic scope of the training
- possible training methods and tools to be used

- suggested content of respective training days.

Based on these guidelines **detailed training agenda** was developed and **call for training experts** was announced. Four types of experts were sought for and selected on the basis of pre-defined criteria: **technical expert, financial expert, behavioural expert and analytical expert**. They were invited to contribute to the workshop agenda with their own ideas and suggestions. It was agreed that:

- the training will be provided both by procured training experts and project partners experienced in specific topics;
- the training will include both theoretical introduction and some practical exercises/group work;
- the trainers will present some relevant case studies and practical examples that could help to better understand the topic and the main benefits and challenges related with implementation of different EE measures;
- the trainers will not only increase the trainees' thematic knowledge but also teach them how to deliver good quality training themselves.

The TOGETHER Master Train-the-Trainer workshop took place on the 20-23rd of February 2017 in Cracow (Poland) and helped to increase partners knowledge and training capacities. All most relevant topics concerning technical, financial, behavioural and analytical aspects were discussed.



Images 9-11. Master Train-the-Trainer workshop in Cracow (Poland) on 20-23.02.2017

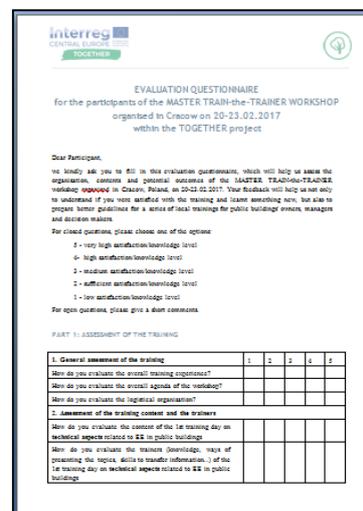
C. Improving the training material

Master Train-the-Trainer workshop was not only an opportunity for improving partners (future trainers) thematic knowledge and training skills, but also for testing the TOGETHER training material developed by three knowledge providers: University of Maribor, Province of Treviso and City of Zagreb. The material was thoroughly discussed and improved based on the results of these discussions and master training experience.

D. Evaluation of capacity building activities and drawing conclusions for local trainings

An important part of each capacity building activity is its evaluation. It helps to highlight most important strengths and weaknesses of conducted activities and draw conclusions for the future. PNEC, as an organiser of the Master Train-the-Trainer Workshop in Poland, developed a special questionnaire, asking the participants to:

- evaluate overall training experience
- evaluate the training contents and the trainers
- evaluate the logistical organisation of the training
- highlight best and worst experience regarding the training
- assess individual increase of knowledge and capacities
- highlight most important lessons learned
- share main conclusions and suggestions for local trainings



The image shows a questionnaire form with the following content:

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TOGETHER

EVALUATION QUESTIONNAIRE
for the participants of the MASTER TRAIN-THE-TRAINER WORKSHOP
organised in Cracow on 20-23.02.2017
within the TOGETHER project.

Dear Participant,

We kindly ask you to fill in this evaluation questionnaire, which will help us assess the organization, content and general success of the MASTER TRAIN-THE-TRAINER training organized in Cracow, Poland, on 20-23.02.2017. Your feedback will help us not only to understand if you were satisfied with the training and learnt something new, but also to prepare better guidelines for a series of local trainings for public building owners, managers and decision makers.

For closed questions, please choose one of the options:

5 - very high satisfaction/knowledge level
4 - high satisfaction/knowledge level
3 - medium satisfaction/knowledge level
2 - sufficient satisfaction/knowledge level
1 - low satisfaction/knowledge level

For open questions, please give a short comment.

PART 1: ASSESSMENT OF THE TRAINING

1. General assessment of the training	1	2	3	4	5
How do you evaluate the overall training experience?					
How do you evaluate the overall quality of the content?					
How do you evaluate the logistical organization?					
2. Assessment of the training content and the trainers					
How do you evaluate the content of the 1st training day on technical aspects related to EE in public buildings?					
How do you evaluate the content (knowledge, view of presenting the topics, skills to transfer information...) of the 1st training day on technical aspects related to EE in public buildings?					

Image 12. Evaluation questionnaire from the Master Train-the-Trainer workshop

Feedbacks gathered helped to develop guidelines for the local trainings organised in respective project countries, as well as to draw conclusions useful for other organisations planning train-the-trainer events. The most important conclusion was that the latter should include both thematic training and the training on the pedagogical aspects (how to share the knowledge efficiently, activate the target groups and increase their practical skills and capacities).

4. STEP 4. Organisation of a series of trainings

A. Assessment of initial knowledge and training needs of the target groups

After the development and finalisation of the training material and making sure that the trainers have adequate capacities, it is time for planning the trainings addressed at the main target group, i.e. public building owners, managers and decision makers. Within the TOGETHER project it was foreseen that 12 local trainings will be delivered in each project country based on the transnational training guidelines and contents, adequately adapted to the local needs. The TOGETHER consortium started fine-tuning the training programme from the assessment of initial knowledge and training needs of the target group(s). Special questionnaire was developed by PNEC, translated by project partners and disseminated among the potential trainees. In the questionnaires they were asked to give information on:

- their initial knowledge and experience regarding energy and respective analysed topics;



- their current practices, activities and decisions influencing energy consumption in public building(s);
- their expectations from the trainings;
- specific topics and skills that are especially interesting and important for them.

The information gathered helped the project partners to better adapt the training content to the specific needs of their target group(s), which in turn helped to ensure that the information and new skills transferred will be useful for them when planning and implementing energy-saving solutions in their building(s).

B. Translation and adaptation of the training contents and material

Together with the assessment of the training needs of their specific target group, the TOGETHER project partners were translating the transnational training material into their national languages and adapting it to the national and local context. Depending on the results of the initial knowledge assessment and the evaluation of the pilot buildings' energy saving potential, it was decided that some topics may have to be further explored in some of the countries.

C. Development of the training schedule

The next step is the development of the training schedule, including dates, places, topics and specific issues raised, adapted to the specific needs of the target group.

Example:

Training no	Date	Location	Topic	Issues raised	Comments
1	15.03.2017	Cracow	Assessment of building's initial energy situation	Energy audit Thermographic pictures Blower door test Microclimate and air quality in the rooms Building users behaviours	
2	...	...	...	...	...
3	...	...	...	...	...
4					



D. Organisation of trainings

The next step is the implementation of the training schedule, ensuring that the topics are discussed by experienced experts and that the trainees are actively engaged, learning not only theoretical knowledge but also its practical application. Their particular situation should be addressed as much as possible and all the questions answered.

In total 12 local trainings are planned in each participating country, covering all relevant topics.

Participation in the course should be confirmed with adequate **certificate**.

4. STEP 4. Trainings evaluation and feedback

A. Evaluation of the trainings

After each training an evaluation questionnaire should be issued, asking the trainees for their opinions concerning:

- overall training experience
- training contents
- training structure
- trainers performance
- logistical organisation

It is the TOGETHER project's suggestion that the questionnaires included also some questions concerning the topic of the next training, e.g. if there are any specific issues or problems that the trainees would like to raise in this context. This should help the trainers to better prepare for the training and adapt its contents accordingly.

B. Drawing conclusions for the future

In each case the evaluation questionnaires should be carefully analysed and conclusions should be drawn for the next trainings. Overall training experience should be summarised and used to prepare recommendations for the future.