

COST

Domain Committee "Materials, Physics and Nanosciences "

COST Action IE0601

Start Date: 17/04/2007

End Date: 17/10/2011

“WoodCulther – Wood Science for Conservation of Cultural Heritage”

FINAL EVALUATION REPORT

This Report stems from the relevant Domain Committee.

It contains four parts:

- I. Management Report prepared by the COST Office/Grant Holder*
- II. Scientific Report prepared by the Chair of the Management Committee of the Action.*
- III. Evaluation Report prepared by the “ad hoc” Evaluation Panel, established by the Domain Committee, and edited by the COST Office.*
- IV. DC General Assessment prepared by the Domain Committee*

Appendices:

Several Annexes can be downloaded from the websites mentioned where appropriate in the Scientific report (section II).

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter *II.D. Self evaluation* and *III. Evaluation Report*.

Executive summary (max.250 words):

The main objective of COST Action IE0601 “Wood Science for Conservation of Cultural Heritage (WoodCultHer)” was to improve the conservation of wooden cultural heritage by increasing the interaction and synergy between wood scientists and other professionals applying wood science and technology towards the study, conservation and restoration of wooden artefacts of artistic or historic interest.

One of the principal strengths of the Action was that it spanned Wood science and practical conservation of wooden cultural objects, bridging the gap between Universities/research Institutes and Heritage Institutions like Museums. On top of several Management and organizational meetings, the Action organized or co-organized 5 International Conferences, 10 Focused Meetings, 28 STSMs, 5 Training Schools, a COST Strategic Workshop “The Safeguard of Cultural Heritage: a Challenge from the Past for the Europe of Tomorrow “.

The main results stemming from the Action include:

- diffusion and strengthening of high level knowledge and contacts throughout Europe, and worldwide
- starting or developing cooperation in several connected scientific fields, such as examination methods, non-destructive imaging, (micro-) tomography with several radiation types, strain analysis, surface analysis, treatments and restoration techniques, modelling Wooden Cultural Heritage Objects, timber structures, appropriate methodologies for the analysis of wooden artefacts
- training ESRs and other Researchers in advanced fields
- preparing pre-normative documents (guidelines for waterlogged wood, guidelines for assessing historic timber structures), accepted as Work Items by CEN/TC 346

The Action published two books of Proceedings of International Conferences, and a special issue of the Journal of Cultural Heritage.



I.A. COST Action Fact Sheet

Action IE0601 Fact Sheet

Title

Wood Science for Conservation of Cultural Heritage (WoodCultHer)

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Details

Draft Mou:

Mou: 317/06

Start of Action: 18/04/2007

Entry into force: 07/02/2007

End of Action: 17/10/2011

CSO approval date: 20/11/2006

Objectives

Main objective The main objective of the Action is to improve the conservation of our wooden cultural heritage by increasing the interaction and synergy between wood scientists and other professionals applying wood science and technology towards the study, conservation and restoration of wooden artefacts of artistic or historic interest (WCHOs, i.e. Wooden Cultural Heritage Objects). Specific objectives may be identified as follows: General- To put into evidence how the modern scientific knowledge about wood may contribute to Diagnosis and Conservation of wooden Cultural Heritage.- To favour meeting and interaction, at both scientific and practical level, of researchers in the field of wood, specialists in conservation of wooden artworks, manufacturers of equipment and products which might be successfully used for the diagnosis, restoration and conservation of wooden artworks.- To acquire a deeper insight into several fields and processes concerning wood material (e.g. the ageing processes, their factors physical, mechanical, biological, chemical, environmental and their interactions), in order to improve the conservation of wooden artworks.- To develop criteria for evaluating durability of interventions during very long time (centuries).- To develop criteria for ensuring re-treatability (i.e. that present interventions will not impede future interventions, if and when needed). Wood deterioration- To develop new methods for the evaluation of new techniques and products for the conservation of wooden artworks.- To acquire further understanding of the process of bacterial wood degradation in order to develop practical conservation methods to preserve historical wooden structures and remains in the soil.- To further develop micro waves as a conservation method against insect degradation. Diagnostic methods and equipments- To develop and foster the implementation of the use of practical sensors to indicate risk to wooden objects in museums and at historic sites, or during the transportation of artworks. Interactions between wooden artworks and environment- To be able to better evaluate the interactions between individual wooden artworks and environment, also by direct monitoring physical changes and damage processes in objects. Dendrochronology- To stimulate the development of non-destructive high resolution scanners for in situ inspection of wooden objects to identify aging and degradation processes, that also allows tree-ring analyses(dendrochronology) for exact age determination.- To disseminate results which obtained by applying dendro-provenancing techniques, in order to support further historical and technological studies. Non-destructive inspection of wooden objects- To further develop non-destructive methods and equipments, for inspection and evaluation of both movable and non-movable WCHOs. Numerically modelling of risk of damage. To develop and validate mathematical models and computer simulations of short- or long-term phenomena, from the observation of past events and processes, aiming towards prediction of future behaviour.- To develop methods for predicting by simulation the long-term result of present interventions (e.g. present tendency to provide panel paintings with flexible cross-ties or frames). Long-term behaviour and accelerated ageing- To further explore specific subjects such as the properties and behaviour of old wood, the influence of ageing on the properties of WCHOs.- New principles, criteria, observation and evaluation methods need therefore to be developed in order to evaluate expected deterioration of WCHOs in the very long term.- To acquire knowledge and establish methods for studying deteriorations that take place during very long time periods (decades and centuries), and for evaluating the long-term compatibility of interventions, treatments, products, aiming to improve the conservation of wooden artworks.

To develop adequate models of the ageing and deterioration processes, deriving from the observation of past events and processes, aiming towards prediction of future behaviour. Archaeological and archaeo-botanic wood- To improve prevention of bacterial decay of wood in foundation piles and archaeological sites.- To develop methods and standards for evaluating procedures and products for conservation of archaeological and archaeo-botanic wood. Timber structures- To develop specific safety factors for verification of WCHO timber structures.- To develop appropriate load tests for WCHO timber structures.- To produce guidelines about criteria for conservation (and reinforcement, if necessary) of WCHO timber structures.- To produce guidelines and standard documents concerning (for various situations and types of structures) inspection, assessment of load-bearing capacity, use of visual versus instrumental methods, practices and responsibilities.- To develop criteria for evaluating effectiveness and durability (during very long time, i.e. centuries) of interventions performed on WCHO timber structures.- To foster development of national or local grading rules for existing old timber structural elements; to encourage, make available and compare results of test campaigns aimed to determine reliable strength and stiffness values for such timbers. Wooden foundations- To improve knowledge and techniques appropriate for conserving wooden foundations piles under historical buildings.- To increase knowledge on the process of bacterial wood degradation under water (e.g. shipwrecks, foundations piles), and to define strategies to control the soil hydrology or water streaming in open water leading to a reduction or even to stop the wood degrading bacterial activity. Standardization- To put in active contact the European scientific communities dealing with conservation of wooden Cultural Heritage, in order to provide a very strong and wide scientific background, and an informed consensus throughout European countries, for standardization (particularly of CEN/TC346) in the field of wooden artworks.- To contribute to European Standardization in the field (inputs to CEN/TC 346 Conservation of Cultural Property)- It should be emphasized here that since in the field of Cultural Heritage each artwork especially if made of wood is different (materials, wood species, manufacture, history, environment(s), decay/deterioration, interventions,), each artwork needs/deserves a personal care, i.e. individual assessment, evaluation, solutions; therefore the technical standards should specify methods and criteria, not standard solutions to problems.

Parties							
Country	Date	Country	Date	Country	Date	Country	Date
Austria	31/01/2007	Belgium	26/02/2007	Czech Republic	04/10/2007	Denmark	07/02/2007
Estonia	07/10/2009	Finland	25/05/2007	Former Yugoslav Republic of Macedonia	17/09/2007	France	17/04/2007
Germany	31/01/2007	Greece	05/04/2007	Hungary	22/05/2007	Italy	07/02/2007
Latvia	12/06/2007	Malta	24/10/2007	Netherlands	20/04/2007	Norway	20/03/2007
Poland	07/02/2007	Portugal	31/05/2007	Romania	07/02/2007	Slovak Republic	07/10/2009
Slovenia	12/09/2007	Spain	07/02/2007	Sweden	04/06/2007	Switzerland	04/04/2007
Turkey	31/05/2007	United Kingdom	07/02/2007				

Total: 26

Intentions to accept the MoU							
Country	Date	Country	Date	Country	Date	Country	Date

Total: 0

Participating Institutions from non-COST countries	
Japan	Research Institute for Sustainable Humanosphere
New Zealand	Scion (New Zealand Forest Research Institute)
Albania	Agricultural University of Tirana Faculty of Forestry Sciences

Working Groups
<ul style="list-style-type: none"> ➤ WG1 "Wood Properties" - Thomas Nilsson - Leader, George Jeronimidis - Vice-Leader ➤ WG2 "Assessment & Diagnosis" Roman Kozlowski - Leader, Eberhard Lehmann - Vice-Leader ➤ WG3 "Conservation & Restoration" - Helena Cruz - Leader, Tone Marie Olstad - Vice-Leader

Website
http://www.WoodCultHer.org

I.B. Management Committee member list

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**I.C. Overview activities and expenditure****Action IE0601 - budget from 04-Apr-2007 to 20-Nov-2011**

Generated on 11-Jun-2012

Meetings

Meeting Type	Date	Place	Paid part	Cost	Total
Kick-off	18-Apr-2007	Brussels (BE)	32	18289,34	
Joint Management Com	08-Jun-2007	Tervuren (BE)	71	51025,24	
Others	01-Sep-2007	Paris (FR)	6	3489,2	
In conjunction with Wo	08-Nov-2007	Florence (IT)	57	45188,3	
Working Group	19-Feb-2008	Braga (PT)	8	4615,13	
In conjunction with Wo	29-May-2008	Metz (FR)	5	4316,71	
Others	01-Sep-2008	Paris (FR)	9	5895,21	
In conjunction with Wo	05-Nov-2008	Braga (PT)	59	47340,33	
Working Group	16-Feb-2009	Zurich (CH)	8	4922,73	
Working Group	30-Mar-2009	Prague (CZ)	17	12184,27	
Working Group	02-Apr-2009	krakow (PL)	11	10154,28	
Working Group	27-Apr-2009	Cambridge (UK)	18	10084,82	
Working Group	21-May-2009	Florence (IT)	17	15138,45	
Working Group	29-Jun-2009	Hambourg (DE)	9	6281,96	
In conjunction with Wo	07-Oct-2009	Hambourg (DE)	68	59544,7	
Working Group	16-Feb-2010	Oslo (NO)	7	5708,27	
Working Group	18-Feb-2010	Oslo (NO)	15	12940,5	
Working Group	12-Apr-2010	Krakow (PL)	10	8015,63	
Working Group	11-May-2010	Biarritz (FR)	6	3858	
Working Group	26-Jun-2010	Izmir (TR)	2	1672,4	
In conjunction with Wo	20-Oct-2010	Izmir (TR)	55	52218,1	
Working Group	17-Dec-2010	Florence (IT)	7	1470,72	
Working Group	27-Jan-2011	Copenhagen (DK)	5	3205,49	
Working Group	22-Feb-2011	Stansted/London (U	7	3126,07	
Working Group	24-Feb-2011	San Cibrao das Vina	5	4271,97	
Working Group	06-May-2011	Paris (FR)	13	7345,95	
Working Group	16-May-2011	Lisbon (PT)	2	1526,21	
Working Group	30-May-2011	Vantaa (FI) (FI)	2	1609,42	
Others	19-Sep-2011	Paris (FR)	3	1310,02	
Final Evaluation Confer	14-Nov-2011	Paris (FR)	80	54889,28	
					461638,7

STSM					
Beneficiary	Date	From	To	Cost	Total
Dr Michael Grabner	21-May-2007	A-1190 Vienna (AT)	5232 Villige	1000	
Dr Mihalis Cutrubinis	13-Apr-2008	Magurele, jud. Ilfov	Grenoble (F	1000	
Mr Gunnar Almkvist	24-Apr-2008	Uppsala (SE)	Turku (FI)	996	
Dr Paola Mazzanti	19-May-2008	Florence (IT)	34095 Mont	800	
Dr Irena Kucerova	22-May-2008	Prague 6 (CY)	Villingen (C	940	
Dr Paolo Dionisi Vici	31-May-2008	Firenze (IT)	Kalkara (MT)	1200	
Dr Elisabetta Feci	20-Nov-2008	FI (IT)	Lisboa (PT)	1200	
Ms Susanne Saft	01-Mar-2009	Dresden (DE)	Paris (FR)	725	
Dr Paolo Dionisi Vici	10-Apr-2009	Trento (IT)	Oslo (NO)	650	
Mr Constantin Daniel N	20-Apr-2009	Magurele (RO)	Grenoble (F	1100	
Dr Michal Lukomski	20-Apr-2009	Krakow (PL)	Oslo (NO)	900	
Dr Slawomir Jakiela	20-Apr-2009	Krakow (PL)	Oslo (NO)	900	
Ms Maaike De Ridder	30-Apr-2009	9000 Ghent (BE)	5232 Villing	950	
Ms Renate Kühnen	04-May-2009	CH - 3027 Bern (CH)	Florence (IT)	825	
Dr Paolo Dionisi Vici	10-May-2009	Trento (IT)	Oslo (NO)	650	
Dr Giacomo Goli	17-May-2009	Firenze (IT)	Mancheste	980	
Mr Eric FOUILHE	17-May-2009	CREST (26400) (FR)	Mancheste	1000	
Ms Anne Houssay	17-May-2009	Paris (FR)	Mancheste	885	
Dr Paola Mazzanti	26-Jul-2009	50145 (IT)	Reading RG	1020	
Ms Chiara Capretti	31-Aug-2009	Florence (IT)	Stockholm	750	
Dr Magdalena Zborows	07-Sep-2009	Poznan (PL)	San Michele	1200	
Ms Charlotta Bylund M	30-Nov-2009	Gothenburg (SE)	Trento (IT)	845	
Ms Ingrid Wiesner	14-Mar-2010	70191 Stuttgart (DE)	DK-2800 Kg	830	
Dr Jeannette Jacqueline	09-Jan-2011	Pisa (IT)	Pozna 	945	
Dr Naomi Luxford	21-Feb-2011	London (UK)	Krakow (PL)	750	
Dr Francesca Modugno	01-May-2011	Pisa (IT)	London (UK)	930	
Dr Marianne Odlyha	16-May-2011	London WC1E 7HX (Pisa (IT)	1070	
Dr Julien Colmars	23-May-2011	Montpellier (FR)	Florence (IT)	700	
					25.741

Workshops					
Title	Date	Place		Cost	Total
Management Committee	08-Jun-2007	Tervuren (BE)		3.000	
Management Commi	08-Nov-2007	Florence (IT)		3.000	
Joint WG meeting on "V	29-May-2008	Metz (FR)		1.000	
Joint COST IE0601 MC &	05-Nov-2008	Braga (PT)		3.000	
Focused meeting on "C	30-Mar-2009	Prague (CZ)		1.000	
WG Focused meeting	02-Apr-2009	Krakow (PL)		1.000	
WG Focused Meeting o	27-Apr-2009	Cambridge (UK)		1.625	
5th MC and Conference	07-Oct-2009	Hambourg (DE)		3.000	
6th Steering Committee	16-Feb-2010	Oslo (NO)		350	
Focused Meeting	18-Feb-2010	Oslo (NO)		1.400	
Focused Meeting on "M	12-Apr-2010	Krakow (PL)		330	
Joint MC with the 4th Ir	20-Oct-2010	Izmir (TR)		1.500	
Focused meeting "Syne	17-Dec-2010	Florence (IT)		180	
Focused meeting on "S	27-Jan-2011	Copenhagen (DK)		270	
Focused meeting on "A	24-Feb-2011	San Cibrao das Vinas-Ourense (270	
Focused meeting on "N	06-May-2011	Paris (FR)		430	
Focused meeting "Guid	16-May-2011	Lisbon (PT)		150	
Focused Meeting "Stan	30-May-2011	Vantaa (FI) (FI)		120	
MC Final Meeting and I	14-Nov-2011	Paris (FR)		3.030	
					24.655
General Support Grants					
Title	Date			Cost	Total
General	02-Jun-2007			1.000	
General	21-Aug-2009			2.000	
					3.000

Schools					
Type	Date	Place	title	Cost	Total
SCHOOL_LECTURERS	10-Sep-2007	Genova (IT)	Training Sch	2740,95	
SCHOOL_ORGANISER	10-Sep-2007	Genova (IT)	Training Sch	1830	
SCHOOL_STUDENTS	10-Sep-2007	Genova (IT)	Training Sch	3600	
SCHOOL_LECTURERS	16-Mar-2009	Hambourg (DE)	Training Sch	9032,9	
SCHOOL_ORGANISER	16-Mar-2009	Hambourg (DE)	Training Sch	3000	
SCHOOL_STUDENTS	16-Mar-2009	Hambourg (DE)	Training Sch	26300	
SCHOOL_LECTURERS	16-Nov-2009	Villigen (CH)	ADRAM09 T	3509,92	
SCHOOL_ORGANISER	16-Nov-2009	Villigen (CH)	ADRAM09 T	3000	
SCHOOL_STUDENTS	16-Nov-2009	Villigen (CH)	ADRAM09 T	15000	
SCHOOL_LECTURERS	16-May-2011	Florence/Pisa (IT)	Joint MP06	9484,27	
SCHOOL_ORGANISER	16-May-2011	Florence/Pisa (IT)	Joint MP06	1680	
SCHOOL_STUDENTS	16-May-2011	Florence/Pisa (IT)	Joint MP06	28400	
					107578
Honoraria					
Title	Date	Expert		Cost	Total
IE0601 Final MC and Fin	14-Nov-2011	CAMUFFO DARIO		500	
IE0601 Final MC and Eva	14-Nov-2011	DEGLISE XAVIER		500	
IE0601 Final MC and Eva	14-Nov-2011	KODYMOVA JARMILA		500	
IE0601 Final MC and Eva	14-Nov-2011	MULE STAGNO LUCIANO		500	
					2.000
					624612,7

II. Scientific Report prepared by the Chair of the Management Committee of the Action, describing results achieved during the Action operation in this period, ~~in no more than 3 pages (the report is "cumulative")~~ *. All items listed in Sections A, B, and C, below, must be addressed. Additional documentation such as extended scientific reports, proceedings of workshops, seminars or conferences may be provided separately as an annex to this report, and should be referenced in the report.

*** Please note that since this is the Final Report, the previous yearly reports have been omitted, for the sake of avoiding repetitions and confusion. Therefore the pages are more than three, and the report is "unique" and not "cumulative" (L.U.)**

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The main objective of the Action

The main objective of the COST Action IE0601 “WoodCultHer” was to improve the conservation of wooden cultural heritage by increasing the interaction and synergy between wood scientists and other professionals applying wood science and technology towards the study, conservation and restoration of wooden artefacts of artistic or historic interest.

Main activities performed within the Action during its existence period:

Start date: 18/04/2007

End date: 17/04/2011

Extended until: 17/10/2011

COST Action IE0601 formally started on 18/04/2007, and, thanks to a 6 months extension, ended on 17/10/2011. It was assigned to the COST domain MPNS (Materials, Physical and NanoSciences). The rapporteur to MPNS domain, Zsolt Kajcsos (HU), passed away on 27 July 2011 and was replaced in November 2011 by Luciano Mulé Stagno (MT).

The Action’s activity was supported by Science Officers Piotr Swiatek then Caroline Whelan, and Administrative Officer Milena Stoyanova from COST Office.

The activities organized by the Action are summarized in the following Tables

(MC: management committee; IC: international conference; FM: focused meeting; TS: training school; SC: steering committee; STSM: short term scientific mission; (out): country of grantee; (in): country of host laboratory; numbering is internal to the Action)

The activities organized by the Action are summarized in the following Tables

(MC: management committee; IC: international conference; FM: focused meeting; TS: training school; SC: steering committee; STSM: short term scientific mission; (out): country of grantee; (in): country of host laboratory; numbering is internal to the Action):

Table I - MC meetings and international conferences of COST Action IE0601

MC-1	Brussels (BE)	18/04/2007	Kick-off meeting
MC-2	Tervuren (BE)	8-9/06/2007	Get-to-know meeting
MC-3 +IC-1	Florence (IT)	8-10/11/2007	Wood science for preservation of cultural heritage
MC-4 +IC-2	Braga (PT)	5-7/11/2008	Wood science for preservation of cultural heritage: mechanical and biological factors (jointly with European Society for Wood Mechanics)
MC-5 +IC-3	Hamburg (DE)	7-10/10/2009	Wooden Cultural Heritage: Evaluation of Deterioration and Management of Change
MC-6 +IC-4	Izmir (TR)	20-22/10/2010	Interaction between Wood Science and Conservation of Cultural Heritage
MC-7 +IC-5	Paris (FR)	14-16/11/2011	Final conference and session ‘Photon technologies for conservation of wooden cultural heritage’(jointly with COST Action MP0601)

Table II - Focused meetings of COST Action IE0601

FM-01	Metz (FR)	29-31/05/2008	“Preservation-restoration of wooden structures built heritage practical application” (jointly with ICOMOS Workshop)
FM-02	Prague (CZ)	30-31/03/2009	Consolidation, reinforcement & stabilization of decorated wooden artefacts
FM-03	Krakow (PL)	2-3/04/2009	Diagnosis and conservation of wooden cultural heritage: necessary European standardization within CEN TC 346 ‘Conservation of Cultural Heritage’
FM-04	Cambridge	27-28/04/2009	Managing environmental risks to wooden interiors and

	(UK)		collections in historic buildings and churches (jointly with English Heritage and National Trust)
FM-05	Florence (IT)	21-22/05/2009	Structural typologies and conservation of old timber structures (jointly with European Project “Les Toits de l’Europe II”)
FM-06	Oslo (NO)	18-19/02/2010	Allowable microclimatic variations for polychrome wood (jointly with European EEA Project “Establishing standards for allowable microclimatic variations for polychrome wood”)
FM-07	Krakov (PL)	12-13/04/2010	Modelling mechanical behaviour of wooden cultural objects (jointly with COST Action FP0802)
FM-08	Biarritz (FR)	11/05/2010	Deterioration of wooden heritage structures in outdoor exposure: diagnosis and conservation (jointly with IRG WP – International Research Group on Wood Protection)
FM-09	Florence (IT)	17/12/2010	Planning synergy activities between COST Actions IE0601 and MP0601
FM-10	Copenhagen (DK)	27-28/01/2011	Preparing standards for conservation of waterlogged archaeological wood
FM-14	Vantaa (FI)	30-31/05/2011	
FM-11	Ourense (ES)	24-25/02/2011	Preparing standards for assessment of old timber structures
FM-13	Lisbon (PT)	16-17/05/2011	
FM-12	Paris (FR)	06-07/05/2011	Preparing a catalogue of “Non-destructive techniques to study wooden cultural heritage objects”

Table III - Training schools of COST Action IE0601

TS-1	Genova (IT)	10-15/09/2007	Science and technology for the cultural heritage (participation to interdisciplinary multi-Actions TS)
TS-2	Hamburg (DE)	16-20/03/2009	Wood-destroying insects and decay fungi in and moulds on wooden cultural heritage objects and constructions (jointly with HTB/vTI, Hamburg)
TS-3	Villigen (CH)	16-20/11/2009	Advanced radiography methods in wood research (jointly with Paul Scherrer Institute, CH)- ADRAM09
TS-4	Saclay (FR)	27-31/05/2010	New lights on ancient materials (jointly with COST Action MP0601 and IPANEMA)
TS-5	Florence-Pisa (IT)	16-20/05/2011	Wood cultural heritage conservation: advanced X-ray and optical techniques (jointly with COST Action MP0601)

Table IV – Steering Committee meetings of COST Action IE0601

SC-1	Paris (FR)	1-2/09/2007	Preparing proposals for MC – Preparing and organizing Action’s activities
SC-2	Braga (PT)	19-20/02/2008	Preparing proposals for MC – Preparing and organizing Action’s activities
SC-3	Paris (FR)	1-2/09/2008	Preparing proposals for MC – Preparing and organizing Action’s activities
SC-4	Villigen (CH)	16-17/02/2009	Preparing proposals for MC – Preparing and organizing Action’s activities
SC-5	Hamburg (DE)	29-30/06/2009	Preparing proposals for MC – Preparing and organizing Action’s activities
SC-6	Oslo (NO)	16-17/02/2010	Preparing proposals for MC – Preparing and organizing Action’s activities
SC-7	Izmir (TR)	25-28/06/2010	Preparing proposals for MC – Preparing and organizing Action’s activities

SC-8	Stansted (UK)	22-23/02/2011	Preparing proposals for MC – Preparing and organizing Action's activities
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A list of the 28 STSMs performed is given below, in the § “Involvement of Early Stage Researchers in the Action, in particular with respect to STSMs, networking activities,…”

Further details of the above activities, are listed in the following.

Annexes and Minutes can be downloaded from:

http://ottimari.agr.unifi.it/~uzielli/IE0601_Final_Report_Annexes

http://ottimari.agr.unifi.it/~uzielli/IE0601_Final_Minutes_of_MCs

http://ottimari.agr.unifi.it/~uzielli/IE0601_Final_Minutes_Reports_of_SCs

- **MC-2** 2nd Management Committee Meeting & all Working Groups meeting, Tervuren (BE), 8-9 June 2007 [76 participants, 70 COST reimbursements] Report in **Annex 01**
- **MC-3** (3rd Management Committee Meeting and) **IC-1** International Conference on “Wood Science for Conservation of Cultural Heritage”, Florence (IT), 8-10 November 2007 [80 participants, 55 COST reimbursements] Report in **Annex 02**
- **MC-4** (4th Management Committee Meeting and) **IC-2** International Conference on “Wood science for preservation of Cultural Heritage: mechanical and biological factors”, Joint Meeting with the European Society for Wood Mechanics, Braga (PT), 5-7 November 2008 [83 participants, 61 COST reimbursements] Report in **Annex 03**
- **FM-01** “Preservation-restoration of wooden structures - Built heritage practical application”, Metz (FR), in cooperation with ICOMOS International technical days, 29-30-31 May 2008 [250 participants, 6 COST reimbursements] Report in **Annex 04**
- **FM-02** “Consolidation, reinforcement & stabilization of decorated wooden artefacts”, Prague (CZ) March 30-3, 2009 [26 participants, 19 COST reimbursements] Report in **Annex 05**
- **FM-03** “Diagnosis and conservation of wooden cultural heritage: necessary European standardization within CEN TC 346 ‘Conservation of Cultural Heritage’”, Krakow (PL) April 2-3, 2009 (in cooperation with CEN TC 346) [14 participants, 11 COST reimb.] Report in **Annex 06**
- **FM-04** “Managing environmental risks to wooden interiors and collections in historic buildings and churches”, Cambridge (UK) 27-28 April, 2009 (in cooperation with English Heritage and National Trust) [45 participants, 18 COST reimbursements] Report in **Annex 07**
- **FM-05** “Structural typologies and conservation of old timber structures”, Florence (IT), May 21-22, 2009 (in cooperation with European CULTURA Project “Les Toits de l’Europe II”) [30 participants, 15 COST reimbursements] Report in **Annex 08**
- **MC-5** (5th Management Committee Meeting and) **IC-3** International Conference on “Wooden Cultural Heritage: Evaluation of Deterioration and Management of Change”, Hamburg (DE), October 8-10, 2009 [101 participants, 68 COST reimb.] Report in **Annexes 09. 09a, 09b, 09c**
- **TS-2** (COST Outreach Activity) “Wood-destroying insects and decay fungi in and moulds on wooden cultural heritage objects and constructions”, Hamburg (DE), March 16-20, 2009 [9 Lecturers, 24 Trainees] [9 participants] Report in **Annexes 10, 10a**
- **TS-3** “Advanced Radiography Methods in Wood Research (ADRAM-09)”, Villigen (CH), November 16-20, 2009 [11 Lecturers, 15 Trainees] Report in **Annexes 11, 11a**
- **FM-06** “Allowable microclimatic variations for polychrome wood”, Oslo (NO) 18-19/02/2010 (in conjunction with the final workshop of the European Project “Establishing standards for allowable microclimatic variations for polychrome wood”) [68 participants, 15 COST reimbursements]. Report in **Annex 12**
- **FM-07** “Modelling mechanical behaviour of wooden cultural objects”, Krakow (PL) 12-13/04/2010 (in conjunction with COST Action FP0802 "Experimental and Computational Micro-Characterisation Techniques in Wood Mechanics") [33 participants, 10 COST reimbursements]. Report in **Annex 13**
- **FM-08** “Deterioration of wooden heritage structures in outdoor exposure: diagnosis and conservation”, Biarritz (FR) 11/05/2010 (in conjunction with IRG – International Research Group on Wood Protection, Working Group 1.8 “Cultural wooden artefacts”) [notwithstanding Volcanic Ashes ... approximately 20 participants, 6 COST reimbursements]. Report in **Annex 14**

- **TS-4** “New Lights on ancient materials 2010”, at Synchrotron SOLEIL, Saint-Aubin (FR), from 27/5 to 02/06/2010 (in cooperation with COST Action MP0601 “Short Wavelength Laboratory Sources” & with Synchrotron SOLEIL) [COST funded 30 Trainees and 9 Lecturers]. Report in **Annex 15**
 - **MC-6** (6th Management Committee Meeting and) **IC-4** International Conference on “Interaction between Wood Science and Conservation of Cultural Heritage”, Izmir (TR), 20-22/10/2010 [69 participants, 54 COST reimbursements]. Report in **Annex 16**
 - **FM-09** (Planning synergy activities between MP0601 and IE0601), Florence (IT), 17/12/2010 [7 participants and COST reimbursements – meeting followed by heavy snowfall and airports blocked during two days...]. Report in **Annex 17**
- Focused meetings for preparing “Standards for Conservation of Waterlogged Archaeological Wood”
- **FM-10** Copenhagen (DK) 27-28/01/2011 [9 participants 5 COST reimbursements] Report in **Annex 18**
 - **FM-14** Vantaa (FI) 30-31/05/2011 [4 participants 2 COST reimbursements] Report in **Annex 19**
- Focused meetings for preparing “Standards for Assessment of Old Timber Structures”
- **FM-11** Ourense (ES) 24-25/02/2011 [6 participants 5 COST reimbursements] Report in **Annex 20**
 - **FM-13** Lisbon (PT) 16-17/05/2011 [5 participants 2 COST reimbursements] Report in **Annex 21**
 - **FM-12** Focused meeting for preparing a catalogue of “Non-destructive techniques to study Wooden Cultural Heritage Objects (WCHOs)”, Synergy with COST Action MP0601, Paris (FR) 06-07/05/2011 [29 participants 13 COST reimbursements] Report in **Annex 22**
 - **TS-5** “Wood Cultural Heritage conservation: advanced X-ray and optical techniques”, Synergy with COST Action MP0601, Florence-Pisa (IT) 16-20/05/2011 [COST funded 57 participants, including Trainees and Lecturers]. Report in **Annex 23**
 - **FM-24** a small organizational meeting to prepare MC-7 and IC-5, Paris (FR), 19/9/2011 [3 participants, 3 COST reimbursements] Report in **Annex 24**
 - **MC-7** (7th Management Committee Meeting and) **IC-5** Joint Final International Conference of COST Actions IE0601 and MP0601, Paris (FR) 14-16/11/2011 [for IE0601: approx. 100 participants, 80 COST reimbursements] Report in **Annex 25**

The Chairman attended several official COST events, including the following, offering presentations about the Action’s progress:

- 1st COST MPNS Actions Annual Progress Conference (APC), Cologne (DE), 12/09/2007 (replaced by R. Kozlowski)
- 2nd COST MPNS APC, Brussels (BE), 18-19/12/2008,
- 3rd COST MPNS APC, Istanbul (TR), 16-18/09/2009
- 4th COST MPNS APC, Berlin (DE), 8-9/09/2010
- 5th COST MPNS APC, Tartu (EE), 13-14/09/2011
- 6th COST MPNS DC Ended Action Hearings, Brussels (BE), 15/03/2012
- COST MPNS Day in conjunction with COST 541 “ThixoSteel” Final meeting and Workshop, MARRAKECH, Morocco, 03/11/2010, offering a presentation about COST Action IE0601 and its synergy with COST Action MP0601.

The organization of the Action

The Action was formally organized in three working groups: WG1 “Wood Properties”, WG2 “Assessment & Diagnosis”, WG3 “Conservation & Restoration”. Although this division was useful for several organizational aspects, the Action’s activities – due to their interdisciplinary nature – have been mainly carried out through plenary or focused (thematic) meetings.

To make the work more efficient however, the activities have mainly been organised by the steering Committee (SC), formed by the Action’s chairman Luca Uzielli (IT), vice-chairman Joseph Gril (FR), webmaster Marco Fioravanti (IT), leaders and vice-leaders of the three working groups: Helena Cruz (PT), George Jeronimidis (UK), Roman Kozlowski (PL), Eberhard Lehmann (CH), Thomas Nilsson (SE), Tone Marie Olstad (NO). The SC discussed and prepared policies and future activities to be later discussed by the MC, then it organized and steered meetings and other activities according to the guidelines approved by the MC. The dedication of the SC was essential

for the success of the Action.

II.A. Innovative networking

- ***Innovative knowledge resulting from COST networking through the Action. (Specific examples of Results vs. Objectives)***

One important benefit resulting from this Action's activity, is that did help the diffusion between Researchers and Conservators from many European Countries of information and innovative technologies being developed in the framework of advanced Institutions and Research Groups in other Countries, which otherwise would not have been reached in such relatively short time and through direct contacts.

The Focused meetings developed contacts, specific knowledge and bases for further activities.

Some examples follow.

FM-02 "Consolidation, reinforcement & stabilization of decorated wooden artefacts":

- Topical subjects of high interest within our community, from the practical view as well as from a more scientific view, were dealt with, such as: past conservation treatments and their consequences, retreatment, evaluation of today's consolidation methods and materials, decontamination
- To support the network and follow up the subjects dealt with in the meeting, the University of Oslo has set up the website "Research in Wood Conservation": http://www.khm.uio.no/forskning/prosjekter/wood_conservation/ The site refers to our Action, and also links to COST website.

FM-03 "...Standardization within CEN TC 346..."

- The meeting was attended by several members of CEN TC 346
- It has been recognised that COST Action IE0601 can decisively support the development of two items: 'Waterlogged wood: characterisation, managing the sites, planning the recovery and conservation' and 'Guidelines for the on-site assessment of historic timber structures'
- For both items the meeting agreed contact Persons, interested Experts, and preliminary timetables so that maximum progress is achieved within Action's lifetime

FM-04 "Managing environmental risks..."

Both basic knowledge and practical approaches were dealt with. Examples:

- Problems of environment in historic houses and churches, mitigation methods such as humidistatic 'conservation' heating, panel painting frames and limiting access.
- Computer modelling of indoor climate and direct tracing of microdamage in painted wood using acoustic emission and electronic speckle interferometry.
- Bio-deterioration due to water ingress, high humidities, and refuges for insect pests, including critical mould growth conditions and treatment options.
- Allowable fluctuations from modelling and measurement studies.
- The effect of reduced water permeability through paint and gesso layers.

FM-05 "...old timber structures"

The need of developing Guidelines and Standards for assessment and conservation of historical timber structure has been confirmed as a priority task to be developed in this field (also with reference to FM-03). Below are some of the major outcomes and addressing remarks from the meeting. They will be all used as a base for the future European guidelines to be drafted:

- Ancient timber structures are not only a static problem to be managed in order to guarantee structural safety, but they also must be considered as depositaries of many further and important cultural values.
- Within technical information to be recorded, structure dating is a very important issue, both

for the indication of building construction phases and for information that could be contained in old timber elements (i.e. climatology and ecology).

- Assessment of both structure and members is another key aspect for structures conservation and safety. Visual inspection has emerged as a fundamental step of the processes (both for assessment of biological and physical/mechanical damages); however the inspection effectiveness can be significantly improved by means of different non-destructive techniques (e.g. ultrasound, stress waves, sonic tomography, drilling devices) and especially from combination of two or more of them.
- Determination of both MOE of the whole structural elements, and identification of residual cross section of the beams, are two aims satisfactorily achieved by current knowledge, while still open, and necessary of further research work, are: Assessment of actual residual strength of old timber; Definition and Identification of classes of damage.
- The necessity of developing a data base of experimental results, and to set material banks in which collect old timber elements, have been highlighted as two of the most important needs for development of future research works.

FM-06 “Allowable microclimatic variations for polychrome wood”

This meeting was the occasion for bringing together ongoing research and updated knowledge on the subject, and put together researchers from Europe and North-America.

FM-07 “Modelling mechanical behaviour of wooden cultural objects”

This meeting brought together several important approaches to modelling the mechanical behaviour of wooden cultural objects, and also researchers working within COST Action FP0802 "Experimental and Computational Micro-Characterisation Techniques in Wood Mechanics"

FM-08 “Deterioration of wooden heritage structures in outdoor exposure: diagnosis and conservation”

Although hampered by adverse external conditions (volcanic ashes...) and financial shortage, this meeting, held in conjunction with IRG – International Research Group on Wood Protection, Working Group 1.8 “Cultural wooden artefacts” opened new ideas for conservation of wooden Cultural heritage. From the IRG members point of view, there is a need to widen the scope of IRG and to diversify the source of people attending the annual conference. The aspects on how restorers and wood preservers can work together was discussed, in particular for the following points of interest : (1) new biocides for cultural heritage, (2) new method to evaluate and control attack by fungi and insects.

FM-12 “Non-destructive techniques to study wooden cultural heritage objects” organized by COST Action IE0601 in Cité de la Musique, Paris, on 6-7 May 2011, aimed at presenting the main non-destructive techniques applicable for the assessment and/or monitoring of wooden cultural heritage objects, and available for curators and restorers. As a follow-up of this meeting, the establishment of a database has been proposed to facilitate the diffusion and easy consultation of this information. This database is not definitive since many researchers still continue to develop new techniques or applications. In the current version (Appendix A of Introduction), it contains the description of 16 techniques, including information on the performance, set-up schema and typical results. It is structured as follows:

- Method designation, form’s author name
- Fields dedicated to the curator or restorer: what is measured ; what use; limit size of the object; transportable technique; preparation of the object needed; duration of the object immobilisation; duration of data processing; difficulty in data interpretation
- Fields for technical information: space measurement; amplitude; spatial sampling; spatial resolution; spatial incertitude ; time sampling; data storage ; equipment required
- General information: description of the method; schema of the technique; typical results; contact [author]; references

Updates of this database will be made available at following url:

<http://www.lmgc.univ-montp2.fr/~jgril/WoodCultHer-NDtools>

- **Significant scientific breakthroughs as part of the COST Action. (Specific examples)**

Just to mention a few, as examples (mostly papers from MC-5 – Hamburg Conference 2009; several others could be extracted from papers presented in previous and following meetings):

- High content of sulphuric acid causes the ongoing deterioration of alum-conserved wood, boron compounds and electric field were used for the removal of alum from treated wooden objects
- New materials used for the consolidation of archaeological wood – past attempts, present struggles, and future requirements for airy, re-treatable, durable materials
- Destructive and non-destructive methods for the evaluation of pesticides concentration and emissions from wooden art objects
- Factors that influence the speed of bacterial wood degradation
- Electronic Speckle Pattern Interferometry (ESPI) and Speckle Decorrelation for in-situ surveys of wooden objects to detect problematic areas on the paint surface
- Acoustic Emission (AE) monitoring to trace the fracture intensity of the wood especially due to the microclimate variations in the environment
- Structural conservation of panel paintings: the “Panel Paintings Initiative” was introduced within the Action. This is a multiyear project and a collaboration of the Getty Conservation Institute, the Getty Foundation, and the J. Paul Getty Museum. It is a response to the growing recognition that significant collections of paintings on wood panels may be at risk in coming decades due to the waning numbers of conservators and craftspeople with the highly specialized skills required for the conservation of these complex works of art.
- Preliminary study on the vibrational behaviour of tailpieces in stringed instruments
- 3D-confocal-microscopy: New advantages for non destructive Measurements
- Characterization of archaeological waterlogged wood by pyrolytic and mass spectrometric techniques
- Potential of reflected light microscopy as a non-invasive identification tool on wooden cultural artefacts
- Follow-up of a panel restoration procedure through image correlation and finite elements modelling
- Hygromechanical response of a painted panel in a church: monitoring and computer modelling
- Monitoring actual deformations of an original painted panel by Beato Angelico in the San Marco Museum, Florence
- From wood protection to preservation of historic monuments: the commitment of [a Pharmaceuticals industry] to cultural heritage conservation

Several STSMs were carried out to acquire and diffuse specific knowledge among Research Institutions (see list of STSMs above, and reports at

http://ottimari.agr.unifi.it/~uzielli/IE0601_Final_Reports_of_STSMs). Just to mention a few:

- STSMs 11 and 12, for verification of implementation on the field of modern instrumental techniques for monitoring of damage in painted wood
- STSMs 6, 9, 13, 14, 22, for testing and diffusing knowledge of a new technique and equipment (the Deformometric Kit) for monitoring climate-related deformations dynamics of panel paintings

- **Tangible medium term socio-economic impacts achieved or expected. (Specific examples)**

Some important outcomes of the Action are expected to produce significant socio-economic impacts. These achievements include:

- Preparatory document for discussion at CEN (European Committee for Standardisation CEN) /TC 346 (Conservation of cultural property Technical Committee). The two documents prepared by the Action which deal with Waterlogged Archaeological Wood were pre-adopted as potential future new work items at CEN/TC 346 April 2012 meeting in Copenhagen.
- Preparatory document for discussion at the European Committee for Standardisation,

Conservation of cultural property Technical Committee (CEN/TC346). At its 9th meeting held on 29-30 March 2012 in Venice (IT) CEN/TC 346 included in its work programme - among others - the Working Groups WG9 dealing with waterlogged wood, and WG10 dealing with historic timber structures, both intended to start working on documents prepared by our COST Action.

- A database of non-destructive techniques applicable to conservation of wooden cultural heritage prepared by Cité de la Musique, Paris, as a follow up of FM-12 (see <http://www.lmgc.univ-montp2.fr/~jgril/WoodCultHer-NDtools>).

- The organization of a COST Strategic workshop “The Safeguard of Cultural Heritage: a Challenge from the Past for the Europe of Tomorrow” held in Florence (IT) on 11-13 July 2011, jointly with COST Office, University of Florence and Florens Foundation [see <http://www.cost.esf.org/events/Cultural-Heritage>]. COST strategic workshops are instruments typically dedicated to launch new fields of research and relevant topics. The Florence workshop was proposed to stimulate discussions highlighting the cultural, social and economical importance of cultural heritage, to strengthen a European “research area” in this field by suggesting research topics for the 8th EC framework program, and to inform political stakeholders on the necessity to support research and European co-operations. Further details in **Annex 26** (http://ottimari.agr.unifi.it/~uzielli/IE0601_Final_Report_Annexes).

- ***Spin off of new EC RTD Framework Programme proposals/projects. (List)***

The following information has been provided by some MC Members.

Most likely, several others, of similar levels, have been carried out in other Countries. However information was not provided to the MC Chair.

1. The following European project was submitted in 2008, but was not successful: 7th Framework Programme - Theme 6: Environment - FP7-ENV-2008-1 Work programme topic ENV.2008.3.2.2.1. ‘Framework conditions to enhance most promising prototypes’, Proposal full title: ‘Universal acoustic emission sensor for non-invasive tracing damage in cultural heritage objects’ (acronym: UNIS) - Name of the coordinating person: Dr. Lukasz Bratasz, Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences
2. The same proposal was re-structured, extended and submitted also by Dr Lukasz Bratasz within the new call FP7-ENV-2010, Work programme topic ENV.2010.3.2.1-1. ‘Non-destructive diagnosis technologies for the safe conservation of movable cultural assets’, Proposal full title: ‘Universal tool-box of technologies for non-destructive tracing of damage in cultural assets’ (acronym: UNIT).
3. EC FP7 Project “The implementation of research potential of the Latvian State Institute of Wood Chemistry in the European Research Area” (WOOD-NET) 2008 –2011(No. 203459), Thematic priority TP3: Biological wood damage of cultural heritage sites: organisms, biodeterioration, prevention. (Head of TP3 Ilze Irbe (Latvia), participants from the COST action U. Noldt (Germany), C. Bjordal (Sweden))
4. Project “Fungi and Beetles in Buildings on Islands of Baltic Sea” 2010–.2013. The project is part-financed by the European Union Central Baltic INTERREG IVA programme 2007–2013 archipelago and Islands Sub-programme. (Kalle Pilt (Estonia) –the project manager should describe more... Ilze Irbe – external expert.).
5. NIKU (Norway) - EEA funded project 2008 -2011: Advanced methods of materials engineering in diagnostics of art works after renovation by means of shaped, high-energy laser radiation pulses (MATLAS).
6. A cooperation between Warsaw University of Technology (WUT), Faculty of Materials Science and Engineering, Military University of Technology (MUT), Institute of Optoelectronics, Academy of Fine Arts (AFA), Inter-Academy Institute for Conservation and Restoration of Works of Art, Poland and Norwegian Institute for Cultural Heritage Research (NIKU). NIKU became a part of this project due to contacts established within the COST-action. For more info: <http://www.matlas.eu/1,matlas.informacje.o.projekcie.html>
7. John Havermans (TNO, NL): Due to COST IE0601, it was made possible to write and submitted a proposal for the FP7 framework: Novel Advanced Conservation Treatments for Underwater Archaeological Heritage. Initiated and coordinated by TNO (Dr John Havermans, the Netherlands), the following members of IE0601 participated: SHR (The

Netherlands); KTH (Sweden), and University di Firenze (Italy).

- ***Spin off of new National Programme proposals/projects. (List)***

The following information has been provided by some MC Members.

Most likely, several others, of similar levels, have been carried out in other Countries. However information was not provided to the MC Chair.

Switzerland. Eberhard Lehmann (MC Member, PSI, CH), Kilian Anheuser (MC, Musée d'Art et d'Histoire / Musée d'Ethnographie, Geneva, CH) (Financing from Swiss Ministry was given, on the basis of recommendation from COST Action IE0601)

- National research project (completed) "Cultural heritage in unstable environments: when are wooden objects at risk?" funded through a COST grant by the Swiss ministry for education and research. Project ID SER C08.0022, CHF 95'000, 1.1.2009-31.12.2010. Project partners Dr Kilian Anheuser (Musée d'Art et d'Histoire, Geneva, principal investigator), Prof Dr Peter Niemz (Wood Physics Department, ETH Zurich), Prof Dr Parviz Navi (Architecture, Timber and Construction Department, Berne University of Applied Sciences, Biel, and Dr Eberhard Lehmann (Paul-Scherrer-Institute, Villigen)
- National (ongoing) research project "Cultural heritage objects - physical, mechanical and structural properties of aged wooden assemblies" funded through an ETH Individual Investigator's Research Award. CHF 164'000 (PhD student grant), 1.5.2010-30.4.2013 Project partners Prof Dr Peter Niemz (Wood Physics Department, ETH Zurich, principal investigator), Dr Kilian Anheuser (Musée d'Art et d'Histoire / Musée d'Ethnographie, Geneva)
- Swiss_Activities_in COSTIE0601 as follows (SNM: Swiss National Museum; MAHG: Musée d'Art et d'Histoire, Geneva; ETHZ: Wood Physics Department, ETH Zurich; FHB: Architecture, Timber and Construction Department, Berne University of Applied Sciences, Biel; PSI: Paul-Scherrer-Institute, Villigen):
- The research project "Studies on wood preservatives distribution and structural changes in wood tissue in the decontamination of museum objects contaminated with chlorinated wood preservatives and pyrethroids (Untersuchungen zur Holzschutzmittelverteilung und zu Strukturänderungen im Holzgewebe bei der Dekontaminierung von mit chlorierten Holzschutzmitteln sowie Pyrethroiden belasteten Museumsobjekten) was submitted on 26/03/2009 to Swiss federal Government by a joint group of Swiss Institutions (mostly members of our Action) dealing with Wood Research and with Conservation of artworks in Museums. The application mentioned that such research project was in the field of COST Action IE0601. Having been asked by the Swiss "COST" Governmental Office (Dr. Eva M. Klaper - Secrétariat d'État à l'éducation et à la recherche - Service COST - Hallwylstrasse 4 - CH-3003 Berne), the Chairman of IE0601 (supported by the Steering Committee's positive advice) confirmed that such project actually fitted into our Action's field of interest.
- The research project: 'Managing museum collections basing on computer modelling of the impact of microclimate variations on historic objects' is implemented between December 2009 and November 2011 by a research consortium of the National Museum in Krakow (the coordinator), the Institute of Catalysis and Surface Chemistry Polish Academy of Sciences in Krakow and the National Museum in Warsaw. The project is funded by the Polish Ministry of Science and Higher Education within a scheme supporting research projects in thematic areas specified by COST actions – for this project Action IE0601.
- The research project: 'Wooden historic objects impregnated with polymers: structural changes, risk assessment, preservation strategy' is implemented between August 2009 and July 2011 by the National Museum in Krakow within a funding scheme of the Polish Ministry of Science and Higher Education supporting research projects in thematic areas specified by COST actions – for this project Action IE0601.

Malta Dr. Claire Baluci (MC Member, Heritage Malta, MT). Organisation of a research and training course at EQF Level 7 (post-graduate) in Wood Conservation Science funded through European Social Funds (ESF 1.31) – organized together with COST colleagues at the University of Florence (DEISTAF)

Turkey Mine Tanac Zeren (MC, Dokuz Eylul University, Faculty of Architecture, Izmir, TR)

- National Project: started on 15th of June 2007- ended on 15th June 2010. Title: Conservation Methods of Timber Structural Elements in Traditional Turkish Houses. Coordinator: Mine Tanac Zeren

The Netherlands Rene Klaassen (MC, TNO, Delft, NL)

- Initiating a focus meeting in Venice Rene Klaassen and Nicola Machioni, on decay in wooden foundation piles, 2010. Not successful.
- Submission EU project November 2010. Rene Klaassen was coordinator. Title: New technology for ECO friendly timber piling. Acronym: WoodPoles. Call: ENV 2011 – ECO – Innovation. Funding scheme: collaborative Project. Not approved.
- Participation in Fabbi (EU) project by Rene Klaassen October 2011, by lecturing about wood decay under water in a two day workshop
- Participation in the whole Fabbi (EU) project by a Jos Creemers as insect decay expert (2010 – 2013).
- The Netherlands André Jorissen (MC, TNO, Delft, NL)
- • Science4Arts meeting organised by NWO (Dutch science foundation) and the Getty institute. The meeting was organised on January 10, 2011, in Amsterdam. Title of the meeting: Expert meeting to develop a research agenda for the structural conservation of panel paintings and related works of art Title of my contribution: Modelling the behaviour of wood - moisture related wood properties. Writing, together with Paul van Duin (conservator Rijksmuseum, Amsterdam), Bart Ankersmit (Cultural Heritage Foundation in the Netherlands), Roger Groves (Delft University of Technology) and Henk Schellen (Eindhoven University of Technology) a project proposal for NWOW (Dutch science foundation) on decorated panels. Title of the project proposal: Climate effects on decorated wooden panels. (later approved and financed).

Belgium prof. André DE NAEYER (MC, Artesis University College, ANTWERPEN, BE)

- 1. Research project 2008-2009 / Artesis budget : 30.000 Eur “ Remains of the decorated wooden loggia from the renaissance palace De Moelenaere in Antwerp, Belgium - Analysis, history and integration in the new City History Museum MAS in Antwerp” (Cooperation between 4 local institutions : Artesis Univ. College, Dep. Arch. Sciences, Master program Conservation Built Heritage; Artesis Univ. College, Dep. Conservation & Restoration; University Antwerp, Dep. Chemical Sciences; City of Antwerp, Section Museum and Heritage Conservation; Contacts and exchange of experiences with Victoria and Albert Museum, London). OUTPUT : internal reports and architectural drawings , Antwerp 2009 – not published
- 2. Research project 2010-2012 / Artesis budget 50.000 Eur “ Transition from wooden to stone constructions, and vice versa, in the traditional urban house in the Brabant Duchy, Belgium between 1400 and 1800 “. OUTPUT : preparative documents in the students course syllabus ‘The traditional urban house in Flanders’ by prof. A. DE NAEYER, Antwerpen, 2009-2010. Final report will be published in due time (2014) in ‘Relicta’ by Flemish Institute of immovable heritage (= VIOE , Brussels)
- 3. Students master thesis at the Artesis Univ. College – Conservation of Built Heritage promoter : prof. A. DE NAEYER) (thesis not published) (D. STEVENS, M. VERBEECK ‘ Bouwhistorische studie Brouwershuis, Antwerpen’, 2010 – K. GORT ‘Getijdenwatermolen Bergen-op-Zoom’, 2010 – K.VAN HULLE, H. VANDERSTRAETEN ‘Karmel O.L.Vrouw in Gent’, 2010)
- 4. Start of doctoral research thesis at Artesis Univ. College – Dep. Architectural Sciences
- ‘Pieter De Bruyn (1931-1987) : meubelen , interieurs en gebouwen uit de periode 1954-1987’ by arch. P. WAUTERS 2009-2014 (promotor : prof. C. KIEKENS)
- 5. Research project 2010-2012 / Artesis budget 50.000 Eur “ Transition from wooden to stone constructions, and vice versa, in the traditional urban house in the Brabant Duchy, Belgium between 1400 and 1800 “ OUTPUT : preparative documents in the students course syllabus ‘The traditional urban house in Flanders’ by prof. A. DE NAEYER, Antwerpen, 2009-2010. Final report will be published in due time (2014) in ‘Relicta’ by Flemish Institute of immovable heritage (= VIOE , Brussels)
- 6. Students masterthesis at the Artesis Univ. College – Conservation of Built Heritage promoter : prof. A. DE NAEYER) (thesis not published): D. STEVENS, M. VERBEECK ‘ Bouwhistorische studie Brouwershuis, Antwerpen’, 2010 – K . GORT ‘Getijdenwatermolen

Bergen-op-Zoom', 2010 – K.VAN HULLE, H. VANDERSTRAETEN 'Karmel O.L.Vrouw in Gent', 2010

- 7. Start of doctoral research thesis at Artesis Univ. College – Dep. Architectural Sciences; 'Pieter De Bruyn (1931-1987) : meubelen , interieurs en gebouwen uit de periode 1954-1987' by arch. P. WAUTERS 2009-2014 (promotor : prof. C. KIEKENS)

II.B. Inter-disciplinary networking

- ***Additional knowledge obtained from working with other disciplines within the COST framework. (Specific examples)***

The main scientific research area was wood science: wood anatomy, degradation, physical & mechanical properties, modelling wooden objects. Other areas important to the Action were: examination methods, non-destructive imaging, (micro-) tomography with several radiation types, strain analysis, surface analysis, treatments and restoration techniques and structural engineering.

The action being in itself interdisciplinary, significant inter-disciplinary networking took place both inter- and intra-Action. Examples:

- Conservation of WCHOs: interactions between micro-environmental fluctuations, wood movements, damages to wooden objects and to paint layers (several papers presented at MC-5 Hamburg International Conference, the whole FM-04 Focused meeting)
- Study and conservation of historic timber structures (keynote paper at MC-5 synthesizing what should be known for inspecting, evaluating and repairing historic timber structures)
- Advanced techniques for analyzing non-destructively WCHOs (e.g. Radiation methods, dealt with in papers from MC-5, in TS-3)
- Recent knowledge about wood destroying organisms and their effects, and mostly about how to put in practice such knowledge (e.g. TS-2, specifically dedicated to such subject; several papers presented at MC-5, concerning both basic knowledge and applied procedures for inspection, prevention and post-damage intervention on WCHOs; starting of standardization activity, to draft appropriate guidelines, within FM-02 and FM-03, to be followed in 2010 by further specific meetings)
- STSMs in the Action allowed in more cases on site co-operation between scientists and conservators (e.g. at the Viking ship museum, Oslo, Norway, and in Hedalen church, Norway)

Also the synergy with COST Action MP0601 "Short Wavelength Laboratory Sources" should be mentioned here.

Strongly supported by the late Rapporteur Dr. Zsolt Kajcsos and by the Science Officer Caroline Whelan, this synergy produced several fruitful interdisciplinary events (TS-4, TS-5, FM-12, IC-5), and opened several co-operation possibilities not yet fully exploited.

Basically, MP0601 can provide portable, affordable x-ray sources for the high spatial and spectral resolution studies of Wood structure, Wood degradation, WCHOs (Wooden Cultural Heritage Objects), whereas IE0601 can provide specific knowledge and extended user base.

- ***Evaluation of whether the level of inter-disciplinarity is sufficient to potentially provide scientific impacts. (Specific examples)***

It is the principal strength of the Action that it spans Wood science and practical conservation of wooden cultural objects, bridging the gap between Universities/research Institutes and Heritage Institutions like Museums.

Developing interdisciplinarity was one of the main purposes of this Action. The level of interdisciplinarity has provided strong scientific, technical and practical impacts. Examples stem from almost all of the activities carried out.

Obviously at meetings participants would present papers concerning their own discipline; however

programmes were structured in such a way that interactions were unavoidable and recommended. Programmes of the International Conferences are among the best examples.

Selected comments from individual MC Members follow:

- New contacts and refreshing of old contacts with the Action's participants; collaboration and ideas for the future projects (Ilze Irbe, MC, Latvia)
- New knowledge and insight into wood research. Through IE0601, new contacts were made throughout Europe regarding the material 'wood'. ... new contacts were made via another related Action, FP0802, 'Experimental and Computational Micro-Characterisation Techniques in Wood Mechanics'. ... presented and published about analysis of archaeological wood. ... are involved in modelling of supports for the Wasa ship, and we at KHM have discussed mechanical strength of archaeological wood with them. We hope to continue collaboration in various projects regarding wooden cultural heritage. (Susan Braovac, MC, Norway)
- Knowledge about professionals and their competence which has been useful when selecting lecturers from the COST-group to the biannual International Course on Wood Conservation Technology in Norway (ICCROM/The Directorate for Cultural Heritage in Norway)
New insight into the relationship between wood scientists and conservators and wood science and conservation. (Tone Marie Olstad, MC, Norway)
- The prime benefit is cooperation and exchanging knowledge with international and national colleagues in the field. Besides as different disciplines often cooperated, synergy was established between two COST Action, D42 and IE0601. Another benefit was to participate in the COST strategic workshop on SAFEGUARD OF CULTURAL HERITAGE: A CHALLENGE FROM THE PAST FOR THE EUROPE OF TOMORROW (Florence, 11-13 July, 2011) and to participate in the training school on Wood Cultural Heritage conservation: advanced X-ray and optical techniques. Experience and knowledge gained will result in further cooperation between TNO and members of COST IE0601. (John Havermans, MC, The Netherlands)
- Heritage Malta's participation in this COST Action has led to an increased awareness and broadened knowledge about wood technology for the characterisation, preservation and protection of cultural heritage artefacts. Benefits achieved include strengthened cooperation between specialists and conservators at both a national and European level, which has led to innovative and multi/inter-disciplinary networking. A clear example of such collaboration is the successful organization of a research and training course in wood conservation science together with professionals from the University of Florence (DEISTAF) which aimed to provide graduates with advanced training in the field of conservation science related to wooden artefacts of importance to the Cultural Heritage. This course involved training in areas related to the physical, chemical and biological aspects of wood conservation science, as well as the integrated use of diagnostic techniques, where the main focus was on advanced studies on appropriate methodologies for the analysis of wooden artefacts. Such training was aimed to improve trainees' knowledge on wood nature, properties and behaviour, and on currently available scientific methods, as well as to elaborate appropriate methods for the ascertainment of the composition and authenticity of wooden objects/structures, and for evaluating their needs for restoration/conservation. This was only possible through collaboration with experts identified through COST Action IE0601. (Claire Baluci, MC, Malta).
- By the instrument of ESR (Earlier Stage Researcher) Jana Gelbrich could interlink with colleagues internationally and contribute with her knowledge of the German „Deutsches Schiffahrtsmuseum“ – Knowledge built up at COST could be translated to daily practice – Special benefit to German situation: due to that COST action, the different expertises of wood research, archeological research, conservation research could be brought together and learned to understand each other views. This new network will stay active even after ending of the action. (Holger Militz, MC, Germany).
- New and deeper views on the need for cooperation between specialists in wood, physics, chemists, art, etc. at protection of wooden artefacts. Personal and professional contacts with scientist from other European countries. Knowledge that the most significant research projects and results from them can be obtained only by international cooperation. (Ladislav Reinprecht, MC, Slovakia).
- Please, be aware that Switzerland is spending governmental money for dedicated projects under the umbrella of COST actions. (Eberhard Lehmann, MC, Switzerland).

- This COST action made exchange of information and comparison of techniques on European level possible and successful. The results of this action were integrated in the colleges and seminars at the master program 'Conservation of Built Heritage' and generated new research projects and cooperation between institutions. (André De Nayer, MC, Belgium).

- **Evaluation of whether the level of inter-disciplinarity is sufficient to potentially provide socio-economic impacts. (Specific examples)**

As mentioned above, the level of inter-disciplinarity was significant, and the spin-off information and activities were and still are producing actual and future socio-economic impacts.

Just to mention a few:

- the pre-normative documents provided to CEN/TC 346
- the High level Training Schools implemented, diffusing knowledge and contacts among many Countries
- the STSMs performed, starting and strengthening international co-operation
- methods for treatment of WCHOs, for evaluating past conservation treatments and their consequences and for re-treatment and decontamination
- conservation heating, allowable RH fluctuations, new heating approaches to balance the climate need for the WCHOs and the visitors/staff/congregation.

II.C. New networking

- **Additional new members joining the Action during its life.**

Here follows the progression of members joining the Action during its lifespan:

Year 1: 24 Countries signed the MoU (AT, BE, CZ, CH, DE, DK, ES, FI, FR, MK, GR, HU, IT, LV, MT, NL, NO, PL, PT, RO, SE, SI, TR, UK)

Year 2: 26 Countries (24 signed the MoU, 2 expressed intention to sign: EE, SK)

Year 3: 28 Countries (24 signed, EE, SK expressed intention, 2 non-COST approved: NZ, AL)

Year 4: 29 Countries (24 signed, EE, SK expressed intention, 3 non-COST approved: NZ, AL, JP)

Contacts had already started during previous years, and were however active even with EE and SK, and with the three non-COST Institutions:

- Japan – Prof. Shuichi KAWAI – RISH – Research Institute for Sustainable Humanosphere
- New Zealand – Dr. Christopher LENTH – Scion (New Zealand Forest Research Institute)
- Albania – Dr. Hektor THOMA – UBT, Agricultural University of Tirana, Faculty of Forestry Sciences

- **Total number of individual participants involved in the Action work. (Number of participants. Give % of female and of Early Stage Researcher participants)**

The following Table V highlights the European dimension of the Action by showing how the involvement in activities was well spread among countries.

Table V - European dimension of COST Action IE0601 activities

Action's countries	host of meeting				STSM	
	MC/IC	FM	TS	SC	(out)	(in)
Austria AT					1	
Belgium BE	2				1	
Switzerland CH			1	1	1	3
Czech Rep. CZ		1			1	
Germany DE	1		1	1	2	
Denmark DK		1				1
Estonia EE						
Spain ES		1				

Finland	FI	1				1	
France	FR	1	4	1	2	3	4
Greece	GR						
Hungary	HU						
Italy	IT	1	2	2		10	5
Latvia	LV						
Macedonia	MK						
Malta	MT					1	
Netherlands	NL						
Norway	NO	1		1		4	
Poland	PL	2				3	2
Portugal	PT	1	1	1		1	
Romania	RO					2	
Sweden	SE					2	1
Slovenia	SI						
Slovakia	SK						
Turkey	TR	1			1		
United K.	UK	1		1		2	5

Obviously, the total number of persons having attended the activities promoted by the Action cannot be obtained just adding up participants to individual events, because many persons (including MC members) attended more than one event.

The following Table VI gives the numbers and their breakdown for the International Conferences. Further numeric data can be seen at the beginning of this report, where the Actions activities are listed.

Table VI – Number and breakdown of participants attending the International Conferences of COST Action IE0601

	IC-1	IC-2	IC-3	IC-4	IC-5
	Florence 8-10 Nov 2007	Braga 5-7 Nov 2008	Hamburg 7-10 Oct 2009	Izmir 20-22 Oct 2010	Paris 14-16 Nov 2011
Total individual participants	85	84	101	69	91
Early Stage Researchers	16	16	22	12	26
Females	27	25	36	33	44
From non-COST Countries	2	8	5	2	3

The following Table VII gives the same data for the three Training Schools directly organized by the Action (see above).

Table VII - Number and breakdown of participants attending three of the Training Schools of COST Action IE0601

	TS-2 Hamburg 2009		TS-3 Villigen 2009		TS-5 Florence-Pisa 2011	
	*	**	*	**	*	**
Participants	24	9	15	15	31	26
ESRs	21 (88%)	-	8 (53%)	2	10 (32%)	4
Females	16 (67%)	3	9 (60%)	2	19 (61%)	7

* Trainees ** Lecturers, Chair, Rapporteur

- ***Involvement of Early Stage Researchers in the Action, in particular with respect to STSMs, networking activities, and Training Schools. In addition, justification should be provided if less than 4 STSMs were carried out during the year.***

The 28 STSMs funded by the Action are listed in the following, and their Scientific Reports can be downloaded from:

http://ottimari.agr.unifi.it/~uzielli/IE0601_Final_Reports_of_STSMs

Table VIII - COST Action IE0601 "WoodCultHer" - List all STSMs performed

# in total	# in year	Name	from	to	Start	STSM Topic
1	1-1	Michael GRABNER	AT	CH	21/05/2007	Neutron radiography for dendrochronology
2	1-2	Mihalis CUTRUBINIS *	RO	FR	13/04/2008	Nuclear techniques for conservation/restoration of wooden cultural heritage objects
3	1-3	Gunnar ALMKVIST *	SE	FI	24/04/2008	Methodology for chemical microanalysis and evaluation of chemical degradation in waterlogged wood
4	1-4	Irena KUCEROVA *	CZ	CH	22/05/2008	Quantitative Neutron Imaging (QNI) Software Learning
5	1-5	Paola MAZZANTI *	IT	FR	19/05/2008	Improving mathematical modelling on deformations and tensions in poplar wood subjected to RH changes
6	1-6	Paolo DIONISI VICI *	IT	MT	31/05/2008	Installation of a Deformometric Kit on a Maltese Panel Painting
7	2-1	Elisabetta FECCI *	IT	PT	20/11/2008	Termites attacks on ancient timber structures: diagnosis, identification and methods of control
8	2-2	Susanne SAFT *	DE	FR	01/03/2009	Numerical Simulation of the strength of historical pianoforte
9	2-3	Renate KUHNEN	CH	IT	04/05/2009	Measurements of hygroscopical deformations in panel paintings
10	2-4	Constantin Daniel NEGUT *	RO	FR	19/04/2009	Nuclear Techniques for Conservation of Painted Wood Cultural Heritage
11	2-5	Michal LUKOMSKI	PL	NO	20/04/2009	Implementation of the portable ESPI to characterisation of damaged areas in painted wood
12	2-6	Slawomir JAKIELA	PL	NO	20/04/2009	Implementation of the acoustic emission analysis to direct monitoring of damage in painted wood
13	2-7	Paolo DIONISI VICI *	IT	NO	10/04/2009	Monitoring Dimensional Changes in Archaeological Wood with Climate Fluctuations - Part 1
14	2-8	Paolo DIONISI VICI *	IT	NO	10/05/2009	Monitoring Dimensional Changes in Archaeological Wood with Climate Fluctuations - Part 2
15	2-9	Maaïke DE RIDDER *	BE	CH	14/06/2009	Changes in density and moisture content of archaeological waterlogged wood
16	2-10	Eric FOUILHÉ	FR	UK	18/05/2009	Violin identity chart
17	2-11	Anne HOUSSAY	FR	UK	15/05/2009	Violin identity chart
18	2-12	Giacomo GOLLI *	IT	UK	18/05/2009	Violin identity chart
19	3-1	Paola MAZZANTI *	IT	UK	26/07/2009	Laboratory tests set up comparison and in-depth analysis of collected data on CSS

20	3-2	Chiara CAPRETTI *	IT	SW	31/08/2009	Analysis of decay inside waterlogged archaeological wood by microscopes
21	3-3	Magdalena ZBOROWSKA *	PL	IT	07/09/2009	Non-destructive analysis of archaeological wood
22	3-4	Charlotta BYLUND MELIN	SE	IT	30/11/2009	Methods for measuring the hygroscopic behaviour and deformation of wood
23	3-5	Ingrid WIESENER	DE	DK	21/03/2010	New approaches to the impregnation of waterlogged archaeological materials
24	4-1	Jeannette LUCEJKO *	IT	PL	09/01/2011	Chemical analysis of wood degradation: comparison of Py-GC/MS and wet analysis method
25	4-2	Naomi LUXFORD *	UK	PL	21/02/2011	Implementation of Acoustic Emission for veneer and marquetry furniture
26	4-3	Francesca MODUGNO *	IT	UK	01/05/2011	Controlled Environment Dynamic Mechanical Analysis for Testing Wood used in Heritage Objects
27	4-4	Marianne ODLYHA	UK	IT	16/05/2011	Correlation of mechanical behaviour with mass spectrometric investigations of varnished wood
28	4-5	Julien COLMARS *	FR	IT	23/05/2011	Transfer of knowledge on the modelling of panel painting

* ESR

Of the 28 STSMs, 19 were carried out by ESRs (Early Stage Researchers), and 16 by females.

	Year 1	Year 2	Year 3	Year 4
Number of STSMs	6	12	5	5

STSMs n. 16, 17, 18 were all carried out in the same time in a highly specialized luthier's laboratory, where the beneficiaries learned new sophisticated techniques for characterizing the influence of wooden components on violin's acoustics (almost a Training School !)

STSMs n. 6, 9, 13, 14, 22, were carried out for the testing and diffusing knowledge of a new technique and equipment (the Deformometric Kit) for monitoring climate-related deformations dynamics of panel paintings.

Thanks to special additional COST Office funding, 18 ESRs from several European Countries (CH, DE, FI, FR, IT, MT, MK, PL, RO, SK, TR) were able to attend the Final Conference IC-5 of the Action.

- ***Involvement of researchers from outside of COST Countries. (Number of participants from non-COST Countries approved by the CSO. Give % of such participants from countries with reciprocal agreements. Specify their contribution)***

IC-1 International Conference (Florence, 2007)

Three Participants from non-COST Countries attended IC-1, as invited experts, and gave the following presentations:

- J. Angelo Beraldin, from Canada, presented "Diagnosing wood artworks surface through state-of-the-art high-resolution optical 3D imaging techniques", a subject in which his group is at top level throughout the world
- Eiichi Obataya, from Japan, Effects of ageing and heating on the mechanical properties of wood; a subject which is being studied in depth by Japanese colleagues (he also presented a paper about this subject in our Final Publication)
- Hektor Thoma, from Albania, dealt with an "Overview of conservation problems for wooden artworks and structures in the Albanian context"; later, his institution was approved as non-COST participant in the Action.

IC-2 International Conference (Braga, 2008)

Several of the Participants in IC-2 (two invited Speakers, others offering Oral or poster presentations) came from Countries being not COST members (Algeria, Canada, Iran, Japan, New Zealand). Some of them were from Institutions who were later approved for participation to our Action as non-COST Countries.

Among others, the following participations were especially noticeable:

- Stefan Michalski, from Canada, presenting “The rationale of the ASHRAE guidelines for climate control in museums, especially as determined by collections of wooden objects”, one of the most significant subjects for our Action
- Junji Sugiyama, from Japan, presenting “Non destructive imaging for wood identification”
- Shuichi KAWAI, Misao YOKOYAMA, Miyuki MATSUO, Junji SUGIYAMA, presenting “Research on aging of wood in RISH”
- Especially meaningful was considered the presence of Director and Researchers from RISH (Research Institute for Sustainable Humanosphere) Kyoto University (Japan), an Institution from non-COST Country, since our MC had voted in favour of their application to participate in our Action.

IC-3 International Conference (Hamburg, 2009)

Five Participants from non-COST Countries attended IC-3 (Hamburg, 2009) International Conference: 1 from Egypt, 2 from Japan, 1 from New Zealand, 1 from Russia.

- Participants from Egypt (Abdel Rahman MEDHAT) and Russia (Margarita KISTERNAYA) were supported by COST Office’s “Near Neighbour Country” budget. Both presented a Short Oral.
- Participant from New Zealand (Dr. Adya SINGH – from SCION, approved by CSO) was an Invited Speaker, and provided a high-level Keynote lecture on “Role of electron microscopy in understanding deterioration of wooden objects of cultural heritage”. Since he had been invited by the Action, COST Office agreed to have his reimbursement paid on the ordinary Action’s budget.
- Two Participants from Japan (Dr. Miyuki MATSUO and Dr. Misao YOKOYAMA – both from RISH, approved by CSO) attended the Conference, on their own funds. Dr. Matsuo presented a Short Oral, Dr. Yokoyama presented an Oral. The contributions from both concerned properties of “old” wood, and were inline with those provided in previous years by the participants themselves as well as their affiliation Institute.

IC-4 International Conference (Izmir, 2011)

Two Participants from non-COST Countries attended IC-4:

- Margarita Kisternaya, from Russia, presenting “ Achievements and problems in preventive conservation of wooden architectural monuments” (she also presented a paper about this subject in our Final Publication)
- Misao Yokoyama, from Japan (RISH), presenting “Wood from Japanese historical buildings: comparison between naturally aged wood and thermally treated wood”, again, a subject which is being studied in depth by Japanese colleagues.

IC-5 International Conference (Paris, 2011)

Misao Yokoyama, from Japan (RISH), presenting “Mechanical characteristics of aged Hinoki (*Chamaecyparis obtusa* Endl.) wood from Japanese historical buildings. Hygroscopicity of wood aging”, and Eiichi OBATAYA, also from Japan, presenting “ Effects of ageing on the acoustic properties of wood”; again, a subject which is being studied in depth by Japanese colleagues. Margarita KISTERNAIA, from Russia, presenting “Main defects of timber in architectural monuments in Russian North”, a subject with which she is dealing since long time.

- **Advancement and promotion of scientific knowledge through publications and other outreach activities. (Number of publications and other outreach activities that resulted from COST networking through the Action. Complete list should be given in an annex)**

The activities supported by COST funding were international conferences (ICs) combined with Management Committee (MC) meetings, focused meetings (FMs), training schools (TSs) and short term scientific missions (STSMs). The ICs (Table I) gathered annually 70 to 100 scientists covering all areas, with approximately 50-60% of them attending all ICs. Abstracts, articles and presentations from the various meetings were made available on the website of the Action, and, in the case of two ICs, the Florence and Braga meetings, final proceedings were produced [1, 2].

FMs (Table II), with a variety of addressed subjects, gathered specialists to identify state-of-the-art and research needs. All sorts of communication formats were used to produce the highest level of scientific interactions in various contexts. During TSs (Table III) trainees gathered to learn from experts in a given place and time, while STSMs were a flexible way to encourage individual scientists to visit and train in laboratories in other countries. Both TSs and STSMs were efficient means to diffuse and strengthen high level knowledge and contacts throughout Europe, and worldwide among researchers from several countries.

TS-2 "Wood-destroying insects and decay fungi in and moulds on wooden cultural heritage objects and constructions" Hamburg (DE)16-20/03/2009, was strongly supported by COST as an Outreach Activity, and was very successful both in number of attending Trainees and Lecturers, and in quality of scientific content.

Whenever possible, interactions with other networks or institutions were organised at the occasion of the collective activities (IC, FM or TS). These are indicated by italics in Tables II to IV. It included common activities with COST Action MP0601 "Short Wavelength Laboratory Sources" or COST Action FP0802 "Experimental and Computational Micro-Characterisation Techniques in Wood Mechanics".

Refereed publications directly in charge of the Action were the following:

- [1] L. Uzielli (ed), Wood Science for Conservation of Cultural Heritage – 1 – Proceedings of the International Conference held in Florence (Italy), 8-10 November 2007, Firenze university press, Florence, 2009. ISBN: 978-88-8453-382-1 (<http://www.fupress.com/Archivio/pdf/4099.pdf>)
- [2] J. Gril (ed), Wood Science for Conservation of Cultural Heritage – 2 – Proceedings of the International Conference held in Braga (Portugal), 5-7 November 2008, Firenze university press, Florence, 2010. ISBN: 978-88-6453-165-6 (<http://www.fupress.com/Archivio/pdf/4502.pdf>)
- [3] Final Publication of the Action – a Special issue of the Journal of Cultural Heritage. Individual papers are already online on Elsevier's Science Direct (<http://www.sciencedirect.com>). The special Issue should be assembled and published in July 2012.

The three above publications include the following numbers of refereed papers:

Publication	Proceedings Florence 2007	Proceedings Braga 2008	Final Publication JCH 2012	Total
Number of refereed papers	34	56	32	122

The final publication reflects many of the activities within the Action.

The SC worked as scientific committee and editorial board for the preparation of the present issue, organised into 7 sections. Section 1, Basic wood science for conservation (4 papers), presents background information on wood in view of conservation needs, with a special focus on aging processes. Section 2, Examining wooden cultural heritage objects (83 papers) details the most useful techniques for diagnosis and assessment of wooden cultural heritage objects, including

advanced radiation and analytical chemistry. Regarding the application to timber structures, Section 3 (4 papers), a number of guidelines is given for intervention on buildings in general or roof connections in particular, and assessment of biodegradation in open-air museums and other historical monuments. Section 4 on painted wood (5 papers) combines fundamental study of the relation between climate-induced stress and wood properties, and also a proposal to study the gesso damage mechanism; the section includes on-site monitoring of wood movement and paint damage, and conservation measures to control the painting deformation. For waterlogged wood, Section 5, (5 papers) the process of bacterial degradation has been given special attention, together with recommendations for in-situ preservation of foundation piles or shipwrecks. In Section 6, musical instruments (5 papers), a variety of techniques applicable to the study and conservation of musical instruments are described: documentation of sound, monitoring of mass and deformations, X-ray tomography, mechanical analysis of the static and vibrational response of a soundboard. Finally, in Section 7, treatment and retreatment of wooden objects (6 papers), a summary of the famous Vasa case is followed by reviews of consolidation techniques, but also assessment of undesirable effect of previous treatments and methods for their identification and removal.

The titles of the individual papers can be downloaded from the following site:

http://ottimari.agr.unifi.it/~uzielli/IE0601_Final_Publications

The final publication of COST Action IE0601 “WoodCultHer” is dedicated to the memory of Professor Zsolt Kajcsos (1946-2011) who provided a very friendly, effective and forward-thinking support to the Action as Rapporteur to the COST Materials, Physics and Nanosciences (MPNS) Domain Committee. Professor Kajcsos was working at the KFKI Research Institute for Particle and Nuclear Physics, Budapest, Hungary. The entire COST community is grateful to Professor Kajcsos for his invaluable contribution and dedication to science and to the COST project. He is a great loss for Europe’s academic and scientific community, where he will certainly be missed.

http://www.cost.eu/library/newsroom/Tribute_Professor_Kajcsos



Other achievements

The already mentioned Strategic Workshop resulted in the following publication:

- M. Fioravanti and S. Mecca (Eds.), The Safeguard of Cultural Heritage – A challenge From The Past for the Europe of Tomorrow, Firenze University Press, 2011, ISBN: 978-88-6655-058-7 (<http://www.fupress.com/eng/scheda.asp?IDV=2173>)

The already mentioned work concerning the pre-normative document on assessment of historical timber structures resulted in the following publication:

- Cruz. H. et al, Guidelines for the on-site assessment of historic timber structures, submitted to Journal of Architectural Heritage.

The already mentioned data-base presenting the main non-destructive techniques applicable for the assessment and/or monitoring of wooden cultural heritage objects, and available for curators and restorers (follow-up to FM-12) is being published as “Supplementary material” to the Final Publication. Updates of this database will be made available at following url:

<http://www.lmgc.univ-montp2.fr/~jgril/WoodCultHer-NDtools>

Lecture notes from Training Schools have been distributed to Trainees, and are in the process of being made available on the Action's website.

Other papers and documents (e.g. Power-point presentations) presented at the ICs, FMs and TSs have been made available on the Action's website (www.woodculther.org), which unfortunately has been unavailable for a long time, due to hacker's attack and other technical reasons.

Lists of publications connected or referring to COST Action IE0601 can be found and downloaded from the following url:

http://ottimari.agr.unifi.it/~uzielli/IE0601_Final_Publications

- ***Activities and projects with COST network colleagues.***

This issue has been widely dealt with previously in this report.

- ***The capacity of the Action members to raise research funds.***

See the above listings of granted spin off national projects and the applications to the EC 7th Framework Programme.

- ***Assessment of the results obtained compared to the objectives***

The above mentioned results are perfectly matching the main objectives of the Action, also mentioned above.

- ***Progress with respect to timetable***

No problems with respects to general timetable have been encountered.

The schedule of the Action, as expressed in the chart contained in the MoU, has been fully respected, and the planned activities have been scheduled and accomplished.

The general schedule of COST Action IE0601, included in the MoU

Gantt chart	YEAR 1	YEAR 2	YEAR 3	YEAR 4
	0 2 4 6 8 10 12	0 2 4 6 8 10 12	0 2 4 6 8 10 12	0 2 4 6 8 10 12
Management Committee	Administrative opening COST Mngt KickOff Installing WGs		Mid term evaluation	Closing final MT
Operational and Technical	Operational and technical meetings WG1 Operational and technical meetings WG2 Operational and technical meetings WG3 Operational and technical meetings (WG4 ??)			
Dissemination	Web-site operational			
	Workshop	Workshop	Workshop	Conference
Exchange Researchers (STMS)	Call	Call	Call	
Training Schools (TS)	TS	TS	TS	
Meeting Planner (guideline)	MC MC WG	MC WG MC WG	MC WG MC WG	MC WG

IV. DC General Assessment prepared by the Domain Committee

Action IE0601 has been successfully concluded. The Action's main aims were to improve the conservation of wooden cultural heritage and to increase the interactions between people of various disciplines working in the field.

This very well managed Action started with the participation of 24 countries and ended with 29 (3 non-COST). The number of participants ranged from 69 to 102. At the end of the Action 25% of the participants were ESRs and over 40% female, who moreover, occupied key roles within the Action.

10 Focused meetings, 5 Training Schools, 28 STSMs, 5 International Conferences, and the COST Strategic Workshop "The Safeguard of Cultural Heritage: a Challenge from the Past for the Europe of Tomorrow" were organized and all were well attended. Two books and a special issue of the Journal of Cultural Heritage were published. Guidelines for waterlogged wood and for assessing historic timber structures were also produced and accepted as Work Items by CEN/TC 346. It also resulted in several papers in scientific journals and the rate of publication increased as the Action progressed.

The Action managed to bring together scientists, conservators, curators working in Museums, Universities, the private and the public sector. This was one of the stated main aims of the Action at inception. Moreover it developed a very strong synergy and collaboration with Action MP0601 which allowed people working in Wood conservation to collaborate with scientists working in the synchrotrons field and together they explored the use of short wavelength sources to examine cultural heritage objects. Several international collaborations have been formed directly as a result of this Action and these will continue and there are plans to submit more proposals.