Project no. **INCO-CT-2007-043642**

Project acronym: **FORCA SPECLAB**

Project title: **Reinforcement of the Research Capacities of the Spectroscopy Laboratory for Archaeometry**

Instrument: **Specific Support Action**

Thematic Priority: **International Cooperation INCO**

FINAL PROJECT REPORT

Reporting period: from: **1st April 2007** to: **31st May 2009**

Date of preparation: **10th July 2009**

Start date of project: **1st April 2007** Duration: **26 months**

Project coordinator name: **Biljana Minčeva-Šukarova**

Project coordinator organisation name: **Ss Cyril and Methodius University, Faculty of Science and Mathematics, Skopje, Republic of Macedonia**

Project website: **www.archaeometry.ukim.edu.mk**

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-Publishable final activity report-

The principal objective of the project is to reinforce and strengthen the research capacities of the Spectroscopy Laboratory and to contribute to the sustainable research development at the level of the institution, the country and the region. In order to achieve this, the first key issue is purchasing one micro-Raman spectrometer as the upgrade of the Spectroscopy Laboratory that is presently equipped with FTIR (mid and far) spectrometer, an IR microscope, and accessories for diffuse and specular reflection. Micro-Raman spectroscopy is one of the most suitable and up-to-date non-destructive techniques in the characterization of materials and artefacts and is at present regarded as the state of the art in the field of archaeometry. In addition to this, two young researchers will be employed in the laboratory and trained in the prominent spectroscopic laboratories in the EU countries in the applicative research on non-destructive methods of analysis.
Another important issue is the support from the appropriate laboratories in the EU countries which have long term experience in the application of non-destructive techniques. This comprises above all: collaboration with the experts in the field of spectroscopy; exchange of knowledge, know how and expertise; visits for exchange research results – dissemination; collaboration between scientists and the end-users of its RTD activities

An important target point is a regional cooperation between the Balkan countries (sharing common or related cultural heritage) in the field of archaeometry. Workshops and a regional conference on the application of non-destructive methods of analysis in Byzantine art work are part of this project. Albania, Bulgaria, Greece, Serbia & Montenegro, and Turkey will be invited to join network (Balkan Archaeometry Network). Forming a database on certain main issues in application of non-destructive methods of analysis will be followed by establishing a web site.

Main objectives:

- ***Upgrading the spectroscopy laboratory for arhaeometry by purchasing one micro-Raman spectrometer*** with the optical fibre probe as the upgrade to the existing FTIR (mid and far) spectrometer.
- ***Hiring of two young researchers to reinforce the human potential.*** They will be trained in non-destructive spectroscopic techniques on specific topics (pigment analysis and ceramics analysis) in the spectroscopy/archaeometry laboratories in the EU countries.
- ***Collaboration with four respected laboratories for spectroscopy and/or archaeometry*** from the research institutions in the EU countries:
- ***Networking of information and communication activities on a specific topics in archaeometry*** (with emphasis on Byzantine art work)

- **One workshop -** organized with invited participants from the EU and the region (Western Balkan Countries) on previously agreed topics of mutual interest on non-destructive methods of analysis.
- **One regional (Balkan) conference** - organized on the topics of: late Roman, Byzantine and post-Byzantine art work (frescoes and icons) and ceramics with invited scientists from Member States and the Balkan region as lecturers.

- **Balkan Archaeometry Network** – setting a website: forming a database on certain main issues in application of non-destructive methods of analysis on the regional level.

Expected end results: a) purchasing and installation of micro-Raman instrument for non-destructive analysis of archaeological objects; b) employment and training of two young researchers in micro-Raman spectroscopy; c) collaboration with respected laboratories in non-destructive methods of analysis in the EU and in the region; d) organization of workshop and one regional conference in archaeometry; e) establishing Balkan Archaeometry network via website and database.

Work performed and results achieved:

- ***November 2007*****:** (7^{th} month of the project): one micro-Raman spectrometer with the optical fibre probe purchased and installed in the laboratory of the project coordinator institution - the first of such kind in the country.
- ***May 2007 – June 2009*** – two young researchers employed for the project and trained on non-destructive method of analysis in Archaeometry in EU and WBC corresponding laboratories.

- ***EU & WBC Participants in the project***:

1. **LADIR-CNRS, Paris, France,** Prof. Philippe Colomban
2. **Laboratory for Analytical Chemistry, Faculty of Science, University Gent**, **Belgium,** Dr. Peter Vandenabeele
3. **Department of Chemistry, Aristotle University, Thessaloniki, Greece,** Prof. Evangelia Varella
4. **Faculty of Chemistry, University of Sofia, Bulgaria**, Prof. Ivelin Kuleff
5. **Department of Instrumental Analytical Methods, Institute for Nuclear Physics, Tirana, Albania,** Dr.Nikolla Civici
6. **Faculty of Physical Chemistry, University of Belgrade, Serbia,** Prof. Ivanka Holctajner-Antunovic.

- ***Networking:*** **Organization of Workshop and Regional conference on Archaeometry**;

Collaborating institutions from Republic of Macedonia

(1) National Conservation Center, Skopje; (2) Museum of Macedonia, Skopje; (3) Museum of the City of Skopje University Library "Ss. Climent Ohridski", (4) Laboratory for conservation and restoration of paper; (5)Numismatics Museum, National Bank of the Republic of Macedonia; (6) Macedonian Academy of Science and Art (MASA); (7) University Library "Ss. Climent Ohridski", Laboratory for conservation and restoration of paper (8) Institution for Protection of Monuments of Culture and Museum Ohrid; (9)Museum of the City of Prilep; (10) Institute for Old Slavonic Culture- Prilep; (11) Faculty of Philosophy, Institute of Archaeology, Skopje; (12)Faculty of Philosophy, Institute of History of Art, Skopje.

Other EU and regional cooperation

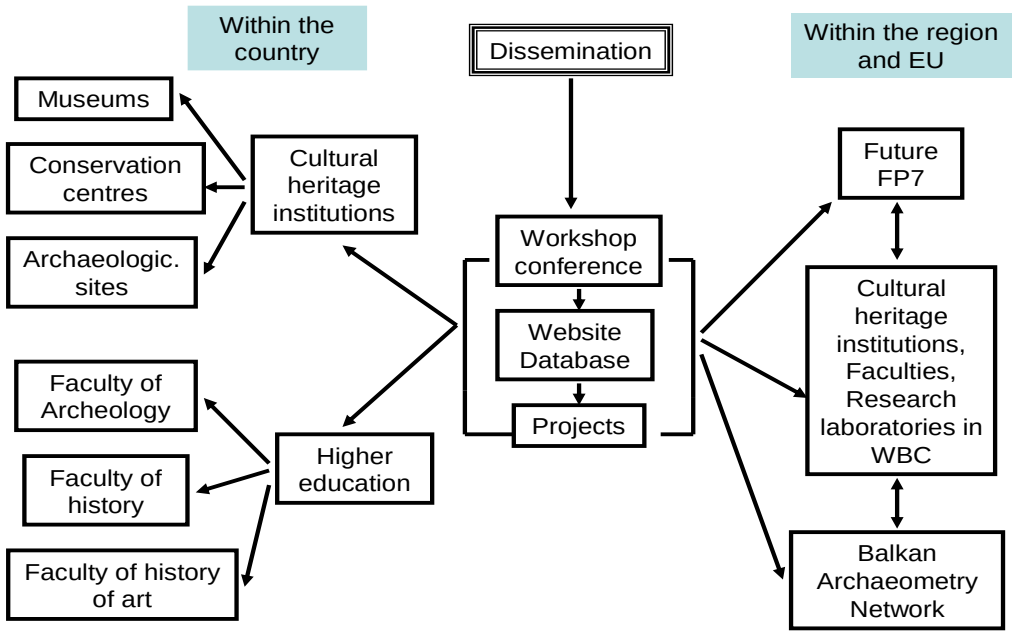
Kultur University, Istanbul, Turkey; (2) Department of Chemistry, University of Genoa, Italy; (3) Institute of Nuclear Physics NCRS "Demokritos", Athens, Greece; (4) Department of Physics, Faculty of Natural Science, University of Tirana, Albania; (5) Institute for Optoelectronic, Bucharest, Romania

Collaborating activities:

- **15th November 2007:** (8th month of the project): **Round table discussion** on establishing network within the cultural heritage institutions in the country and in the region. Proposing future projects within the region and with the laboratories in the EU countries.
- **16th November 2007:** (8th month of the project): **Workshop**: **SCIENCE MEETS ARCHAEOLOGY & ART HISTORY** – Rector Hall, University Ss Cyril & Methodius, Skopje, Republic of Macedonia – participants in the Forca Speclab project from: France, Belgium, Greece, Bulgaria, Serbia, Albania and Republic of Macedonia, as well as from Italy. Audience: specialists working in cultural heritage institutions from Republic of Macedonia; **in** skill related to heritage and cultural activities – with a special emphasis on young researchers involved in archaeometry.
- **18-29 September 2008** (17th month of the project): Symposium: **SCIENCE MEETS ARCHAEOLOGY & ART HISTORY** – Hotel Slavija Spektar – Ohrid - participants in the Forca Speclab project from: France, Belgium, Greece, Bulgaria, Serbia, Albania and Republic of Macedonia, as well as from Italy, Romania, Portugal, UK, Turkey and from Cultural heritage ainstitutions from Rep. of Macedonia. Audience: specialists working in cultural heritage institutions from Republic of Macedonia; skill related to heritage and cultural activities – with a special emphasis on young researchers involved in archaeometry:
- **April 2009 –www.archaeometry.ukim.edu.mk/balnet.php - Balkan Archaeometry Network** – website containing a database of specialists and institutions related to the application of non-destructive methods of analysis on the regional level.

Intention for use and impact: **Highlight** heritage by establishing and promoting networking of scientific and cultural institutions; **develop human resources** in the cultural field; **share methodology, techniques and programmes** between Balkan research institutions and centres with proven high-level S&T capacities, **promote peaceful cooperation** between the countries in the region, **reinforce and strengthen the understanding** between people involved in the collaboration and encourage understanding between cultures and exchanges between civil societies; **support heritage policy through exchange of experience**, transfer of know-how and technical assistance; **contribute to strategic objectives**, regarding European research area; **capacity building** in the heritage sector; **prepare Balkan countries for future scientific project** in the field of Archaeometry.

Plan for using and disseminating knowledge



The information flow from the FORCA SPECLAB to beneficiaries and/or other institutions

-Dissemination and use of the knowledge-

- The knowledge gathered through the activities of the project is organized in such a way to provide lasting impact and is reference for future research, cooperation and implementation activities with the project partners as well to the target public institutions in the Western Balkans region – decision makers on all levels (governments, academia, cultural heritage institutions) and higher education participants. Since the level of dissemination of most of the deliverables (achievements) are public, this can be considered as the knowledge generated at the project.

- Dissemination activities in FORCA SPECLAB project comprised scientific research and application in the use of non-destructive methods of analysis by micro-Raman spectroscopy, through the national, WBC and EU networking.

- An important part of the project is targeted towards dissemination of knowledge and networking activities on a public level, regarding knowledge based society. This includes dissemination of results on local, regional, EU level, with goals to attract young researchers to future research activities, to enable networking with centres of similar or interdisciplinary interest on local, regional and EU level and also to raise awareness of the general public).

- In 26 moths of the project FORCA SPECLAB team has achieved:

  - 6 publications in scientific papers and 1 application note in the specialized HORIBA JOBIN YVON Scientific –Raman on-line publication
  - 11 poster presentations
  - 17 oral presentations

- One Symposium "Science Meets Art and Archaeology (18-20 September in Ohrid) with 42 participants from 11 countries.
- Book of Abstracts + CD from all oral and poster presentation; 14 oral and 25 poster presentation from the Symposium
- 6 Seminars/Workshops/Summer Schools – training
- Balkan Archaeometry Database Network was established. This is milestone since it provides means and facilitates cooperation between scientists, archaeologists, conservators, laboratories, conservation centers working in the field of archaeometry. In the few months of its launch, Balkan Archaeometry database Network has already been positive response by many scientists in the region and in the EU.
- 3 flyers for the project,
- 8 press releases (one radio, 2 TV and 5 press release)
- Final event

- In the near future: 8 poster and oral presentations and 3 scientific publications in scientific journals are expected to be presented on the subject of non-destructive studies on archaeological objects.

(c) Project Logo

Project website: www.archaeometry.ukim.edu.mk

Coordinator:
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PHOTOGRAPHS

Installation of the instrument, Micro-Raman spectrometer
Skopje, 6th November 2007

Round Table Discussion
Skopje, 15th November 2007

Workshop "Science Meets Archaeology & Art History",
Skopje, 16th November 2007

Symposium "Science Meets Archaeology & Art History",
Ohrid, 18-20 September 2009