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1. ITN-DCH project

The "**Initial Training Network for Digital Cultural Heritage: Projecting our Past to the Future**" (ITN-DCH) is a **Marie Curie fellowship projects** in the area of the e-documentation / e-preservation and CH protection funded by the European Union under the FP7 PEOPLE research framework. The Project started on the 1st of October 2013, its consortium comprises **14 full partners and 9 associate members** covering the entire spectrum of European CH actors, ranging from academia, research institutions, industry, museums, archives and libraries. The project aims to train **20 fellows** in the area of CH digital documentation, preservation and protection in order to create them a strong academic profile and market-oriented skills which will significantly contribute to their career prospects. ITN-DCH targets **all aspects of CH** ranging from tangible (e.g. books, newspapers, images, drawings, manuscripts, uniforms, maps, artefacts, archaeological sites, monuments) to intangible content (e.g., music, performing arts, folklore, theatrical performances) and their inter-relationships.

2. Carnuntum Workshop

Georgia Stavropoulou, ESR 5
(Catholic University of Leuven, Belgium)

The 2nd ITN-DCH Workshop took place in the roman city of Carnuntum in Austria, a region of great archaeological importance, not only for being one of the largest European sites investigated by non-invasive archaeological prospection but also for its impressive reconstructions that have attracted significant interest and have developed cultural awareness of a broader public.
The purpose of the workshop was twofold; to

offer useful training activities to the fellows but also to inform them about many different aspects of the project's case study. Thus, the time was divided between talks on a wide range of subjects and scientific visits to the Carnuntum archaeological park, the Museum Carnuntinum, the Carnuntum archive and digitalization lab Kulturfabrik. Additionally, as an exercise, the fellows were divided in 3 groups of diverse expertise and backgrounds in order to document a small monument each. Given the tight schedule and the limited options of equipment and software, this event was a very good opportunity to evaluate the dynamics of each group, see how well we can perform and collaborate under pressure of time and test our presentation skills.

I personally enjoyed the talk of the director of the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology, Wolfgang Neubauer. His long years of experience in the field

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of documentation of cultural heritage gave us an insight into some of the situations that we, as young researchers of the field, will possibly have to face in our future careers. Apart from this, I believe that the greatest benefit of this workshop was that I gained a deeper understanding of how different disciplines can be combined for the documentation of a monument – from the integration of material characterization into an augmented reality application to the explicit dependence of a virtual reconstruction on the quality of data collection.

Rossella Suma, ESR 16
(University of Warwick, United Kingdom)

From the 22nd to the 27th of March, I participated in the ITN-DCH project 2nd Workshop at the archaeological site of **Carnuntum**, in Austria, which has been selected as **second case study** for the ITN-DCH project. The Archaeological Park is very important as a practical example of interconnection between archaeology, digital technologies and applied engineering.

The workshop was organised by the partner **7reasons Medien GmbH** and it has involved all the actors that have made this project a reality. On Monday we had the chance to attend different talks from a number of scientists and researches that throughout the years have made it possible that of Carnuntum is now one of the most visited archaeological site in the Austria.   We had the chance to hear presentations from the curators of the museum, the archaeologists that have been conducting excavations, and all the researchers working on remote sensing technologies. The total effort was impressive, since the area is more than 10 square kilometres and the work has involved an extensive number of people from different disciplines. The result of this common effort is excellent.

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During the workshop there were presentations by the project partners, informing us on the state of the art in the DCH. In particular, I founded very appealing the presentation by Pedros Santos, from Fraunhofer about a novel Structure from Motion acquisition technique and the presentation from Luc Van Gool. Last but not least different presentations were given from 7reasons, which was the hosting partner and one of the main actors in the creation of all the digital media support in Carnuntum. This digital media has made it possible to bring to the general public the history and the knowledge that otherwise would have been known by a few.

On Monday afternoon a guided tour was organised to the Archaeological Park Carnuntum by a local archaeologist, while on Tuesday afternoon there was a visit to the Museum Carnuntinum.

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On Wednesday afternoon, we visited the digitisation lab at the Kulturfabrik in Hainburg and we assisted in different demonstrations of the available equipment and the documentation techniques currently being used for the artefacts from Carnuntum Archeologicals excavations. Later on we also visited the historic castle of Hainburg.

For the duration of the workshop all the fellows were assigned a task aimed to give a small demonstration of our capabilities and skills, dividing us into small groups and giving us the possibility to experiment on work group dynamics. I think it was a great idea that has enabled me to better understand the other fellows work in detail.

All in all the experience has been very positive, giving, again, the possibility to build a stronger network amongst all the fellows and gain a deeper knowledge of the other partners and host institution's work.

3. ITN-DCH Secondment

George Bruseker, ER1 (FORTH, Greece)

Thinking Icons, Images and Three Dimensions: lessons learned from the Maya for the Byzantine

In February of 2015, ER1 George Bruseker and ESR8 Nicola Carboni travelled to Bonn, Germany to do a secondment at the **German Archaeological Institute Commission for non-European Archaeology (DAI-KAAK)** working with Dr. Jennifer von Schwerin and her project team on the MayaArch3D Project.

The goal of the secondments was to set up a mutual knowledge exchange between the fellows and institutions. Both fellows are working on different aspects of semantic representation and the possibilities to markup the complex social and symbolic aspects of cultural heritage data - as well as the argumentation that founds such data - and relate this information to three and four dimensional models of these phenomena. KAAK's cutting edge work in linking up traditional archaeological data with two dimensional and three dimensional data sources in an integrated environment provided an excellent training opportunity for George and Nicola to examine a strongly linked data set and see

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the challenges of semantically mapping such relations. KAAK and its fellows got a chance to learn more about CIDOC-CRM and to receive a boost in their efforts to move to a semantic based data structure and perspective.

DAI hosted the fellows on their premises, facilitating a convivial, collegiate and caffeine fuelled environment for knowledge exchange. Particularly interesting conversations were conducted on the nature of building modelling and segmentation, virtual reconstruction and iconography and iconographic representation and argumentation. The value of the network to make new and unexpected horizontal connections showed itself once again as the conversations on the complexities of the epistemic moves required to assert iconographic motifs and themes provided useful material for consideration and reflection in considering the cultural heritage assets of Byzantine culture such as the complex iconographic cycles elaborated in one of the project's case studies, the Asinou church.

Another iconic event that occurred during the secondment was the famous German Karneval. This meant that the fellows were able to take a break from semantic modeling to wander the streets of central Bonn on Rose Monday. It was a city transmogrified into a phantasmagoric topos of merry revellers quaffing the crisp, clean local Kölsch beers and enjoying the exotic flavours of a currywurst while the iconic Haribo gummy bears rained down from above, launched from the passing floats of ancient Karneval associations - a truly tangible experience of this uniquely European intangible heritage.

4. CIDOC-CRM Oxford Meeting

Nicola Carboni, ESR 8 (CNRS, France)

Between 09/02/2015 and 12/02/2015, fellows ESR8 Nicola Carboni from CNRS and ER1 George Bruseker from FORTH went to the CIDOC-CRM "32nd joined meeting of the CIDOC CRM SIG and ISO/TC46/SC4/WG9 and the 25th FRBR - CIDOC CRM Harmonization meeting" at the Oxford University e-Research Centre, in Oxford, UK.

The meeting started the first day with a general introduction to CIDOC-CRM and its extension, in order to provide the institute staff with a general understanding of the subject. Furthermore, everything was video-recorded and made publicly available as an episode of the Cultural Heritage Programme Podcast[1]. After the registration of the podcast a round-table discussion was arranged, in order to let all the participants contribute to the conversation. Several different experts in knowledge representation, as well as in museology, text encoding, archaeology and library science were present. The program focused on the resolution of several CRM issues, as well as on the upgrade and extension of some parts of the ontology. Important subjects were discussed from the very first day, analysing the process behind the design of mass production versus singular objects, the nature of an object's colour and the question of causality and responsibility in money exchange events in the museological context.

The meeting continued over the next days with discussions that ranged over the other extensions, going more in-depth into FRBRoo, CRMinf, CRMSci and CRMArcheo. On Wednesday, their last day, the fellows were fortunate enough to attend the presentation of CRMBa, a building archaeology

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[1] http://culturalheritage.ox.ac.uk/CIDOC_CRM

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extension developed during her PhD by Paola Ronzino.

The time at the meeting passed very fast, challenging the knowledge of the fellows and fascinating them with more intriguing new problems like the issues faced with co-reference statements or in specifying the ontological nature of subject taxonomies.

A meeting is not only work, but it is also networking. This very important aspect was accomplished mostly after the meetings, when the participants would relax and continue the conversations in a typical local venue that Oliver Garrett[2] describe as "something that refuses to be bottled, standardized, or easily replicated": the pub. Such a traditional British establishment was the perfect spot for enjoying, in a less formal atmosphere, further discussions on the history of the CRM, as well as on several other topics, resulting at the end of the evening in a better understanding of the ontological arguments behind the CRM.

[2] Oliver, G. (2012). The Oxford companion to beer. New York: Oxford University Press

5. Underwater 3D Recording & Modelling

Matthew Luke Vincent - ESR 11(Universidad de Murcia, Spain)

The 1st **UNDERWATER 3D RECORDING & MODELING** conference was held at the Villa Fondi di Sangro in Piano di Sorrento, Italy from April 16th to the 17th, 2015. It was jointly organized by Fabio Menna, Erica Nocerino, and Fabio Remondino (Bruno Kessler Foundation), Silvio del Pizzo (Parthenope University of Naples), Fabio Bruno (University of Calabria, Italy). This was the first event in what should be a series of bi- or tri-annual workshops on the applications of photogrammetry and 3D modelling in subaquatic environments. The workshop was supported by ISPRS and CIPA with sponsorship by 3D Research s.r.l., Prisma Ambiente s.r.l., Campi Flegrei Diving Center s.r.l., the Marine Protected Area of Punta Campanella, and the Piano di Sorrento Municipality.

The workshop was attended by 86 individuals from 14 different countries (Australia, Austria, Belgium, China, France, Germany, Greece, Italy, Netherlands, Spain, Switzerland, Turkey, USA-Hawaii). Of the 40 submitted abstracts, 35 were selected for publication, 21 for presentation, and 15 for posters.

Three keynote speakers set the tone for the topics throughout the conference. Mark Shortis (RMIT University, Australia) started the conference off discussing "A Review of Calibration, Validation and 3D Measurement Techniques for Underwater Stereo-Video Systems." Later in the day, Pierre Drap (CNRS, France), presented "Deep Underwater Surveys by Photogrammetry for Underwater

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Archeology and Marine Biology." Finally, Guido Gay (Gaymarine, Italy) presented "A solo-handled sail yacht exploring seabed beyond -1000m depth." The workshop papers were published in The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences (http://www.isprs.org/publications/archives.aspx).

The workshop started with the opening ceremony on the morning of April 16th, Antonino Miccio, the director of the Marine protected area of Punta Campanella and also on behalf of the mayor of Piano di Sorrento, welcomed the participants, wishing them insightful and fruitful discussions about the use of new 3D technologies in helping marine protected area management and monitoring. Fabio Menna, workshop co-organiser, then presented CIPA and the various commissions of ISPRS with particular focus to Commission V and, as such, opened the workshop.

No workshop would be complete without the usual social events. The first night of the conference opened with a social dinner at the nearby Ristorante la Ripetta, where the conference attendees virtually took over the restaurant and enjoyed the local tastes of Southern Italy.

The workshop followed the next day with a guided boat tour of Punta Campanella and the near-by Protected Marine Area.

The workshop was a success, as was noted by the attendance right up until the last paper was presented. Of course, any conference is a good opportunity for networking and connecting with researchers interested in similar topics. The number of attendees and enthusiasm of participation demonstrates the importance of the topic of this conference. The challenge of underwater photogrammetry and 3D modelling is clearly still a developing field and a strong area of interest for many researchers, as demonstrated by this project. One can expect that future conferences will be equally well received, and as such a tentative future conference will be scheduled for either 2017 or 2018.

6. MCAA Arrives in Greece

Emmanouil Alexakis - ESR15
Elisavet Stathopoulou - ESR4
(NTUA, Greece)

The **Marie Curie Alumni Association** (MCAA) organized on Friday 24th of April the "MCAA arrives in Greece!" event, taking place at the Biomedical Research Foundation of the Academy of Athens. This one-day event was decided to be held in Athens due to the high number of Greek researchers working within the Marie-Sklodowska Curie Actions all over Europe as well as the need to motivate Marie Curie Fellows carrying out their research within Greek universities and research institutes to initiate the MCAA Greek Chapter.

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More than 30 participants attended the meeting, which included poster sessions, social lunch and presentations given by the organizing committee.

Emmanouil Alexakis (ESR15), Elisavet Stathopoulou (ESR4) and George Bruseker (ER1) were invited by MCAA to attend the event and communicate their work within the ITN-DCH project. They presented their research activity through the posters. ITN-DCH received a lot of attention by the other participants and the fellows had fruitful discussions with other MCAA members from Greece and other countries.

Apart from ITN-DCH dissemination and networking, the attendance to this special event was of great interest for the fellows, as they were informed about the latest activities of MCAA, available grants, rights, legal issues etc. In the absence of a MCAA local chapter in Greece, they volunteer to participate as funding members of the organizing committee.

7. 6th International Workshop 3D-ARCH 2015

Ellie Stathopoulou - ESR 4 (NTUA, Greece)

The 6th International Workshop 3D-ARCH 2015 "3D Virtual Reconstruction and Visualisation of Complex Objects" *(http://www.3d-arch.org)* took place in the town of Ávila in Spain, from 25th till 27th of February. 3D-ARCH event is a well known event co-organised by ISPRS and CIPA and attracts a high number of scientists in the field of photogrammetry, computer vision, architecture, archaeology and cultural heritage. Elisavet Stathopoulou (ESR4) presented an article titled "HDR imaging for feature detection on detailed architectural scenes", answering several interesting questions and conducting fruitful discussions. This article was the research result of a group of people of the Photogrammetry Lab of NTUA (Georgia Kontogianni, Elisavet Stathopoulou and their supervisor Andreas Georgopoulos) and was published in ISPRS Archives.

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8. CAA2015 Conference

Anaïs Guillem - ESR 6 (University of Ljublijana, Slovenia)
Diego Bellido Castaneda - ESR3 (ARCTRON 3D, Germany)

The 43rd **Computer Applications and Quantitative Methods in Archaeology** 'Keep the revolution going' explored a multitude of topics, showcases ground-breaking technologies and best practice from various archaeological and computer science disciplines with a large diversity of case studies from all over the world. It took place at the University of Siena in Italy from March 30th to April 3rd 2015 with the collaboration of the National Research Council.

The ITN-DCH network was represented by Arctron3D with Martin Schaich and Diego Bellido Castaneda (fellow ESR3), FORTH with Maria Theodoridou, KAAK with Dr. Jennifer von Schwerin, UL with Anaïs Guillem (fellow ESR 6), and UM with Matthew L. Vincent (fellow ESR11).

ArcTron3D, as exhibitor at the CAA conference, had an exhibition stand. There the company presented the photogrammetry software aSPECT3D and its airborne, terrestrial & high resolution 3D services for Archaeology & Cultural Heritage. The 3D data post processing for virtual and augmented reality were shown, and the zSpace and Oculus Rift caught the attention of many participants who "were transported" to different places as the Vianden castle (Luxemburg). Some videos explained also the different projects of the company, including the ITN-DCH project. Diego Bellido Castaneda participated in the stand of Arctron3D and had the opportunity to make the ITN-DCH public to the interested visitor in more detail.

Dr. Jennifer von Schwerin (DAI) presented 'A 4D WebGIS for the Documentation and Analysis of Complex Archaeological Sites' in the 4F session 'Geomatics approaches in Latin America Archaeology :
the state-of-the-art in Spatial Archaeology'.

Anaïs Guillem and Diego presented their work in the following session: 'Interdisciplinary methods of data recording, management and preservation'.

Also Maria Theodoridou, Martin Doerr, Edeltraud Aspoeck, Anja Masur, presented 'Mapping archaeological databases to CIDOC-CRM'.

The poster of Matthew L. Vincent entitled 'OpenDig: Applying CIDOC-CRM and CRMarchaeo to in-field Data Recording' was exhibited during the time of the conference and triggered several discussions and contact for further work.

This week was fruitful for all and gave us an opportunity to disseminate the work done within the ITN-DCH network to the international community of CAA. Many useful contacts were established for the future. CAA was full of learning, visits and experience building for all of us.

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9. Online Interactive Application: Discovering Asinou Church

Simon Senecal - ESR 13
Louis Cuel - ER2
(Miralab, Switzerland)

At the initiative of three Fellows, the development of an application began to disseminate different research outcome from the ITN-DCH team. A **secondment** involving **3 fellows** in the company **7-Reasons** has been planned to develop this application under the form of a web-based 3D navigational interactive viewer.

Considering the requirements of the previously stated WPs, the fellows set up a pipeline applied experimentally on the **1ˢᵗ case study**. The principle aspect of this accomplished was to designed and implement a 3D interactive environment embeddable online, allowing peoples to can navigate through coarse 3D model and be guided to some specific information, and / or extra resources. In order to best disseminate the information, we decided to use a **web-based platform**. This has to be a 3D Viewer with linking capabilities.

Data research and modelling

The processing workflow and metadata creation was completed as followed. First, we needed some additional **metadata** on the church that we could not find on our ITN server. We made a structure – **point cloud** and **meshes** out of it for different purposes (**Photogrammetric** model and **Geometrical model**). We then made a CAD geometrical model, based on our interpretation. To mainly show the faces of the church and its architectural form along the time.

Development of the 3d Viewer / implementation

We have made our own real time viewer with Unity3D engine for the 3D Viewer including the following specific features:

- **3D online navigational model** able to run on a PC and on a smartphone

- Extra resources **linking capabilities** (http link, ftp….)

- **Huge point cloud viewer**

- **Managing Services** (As requirement of WP5)

we integrated the unity WebPlayer onto the Website made for the first case study:

- http://case-study1.itn-dch.net
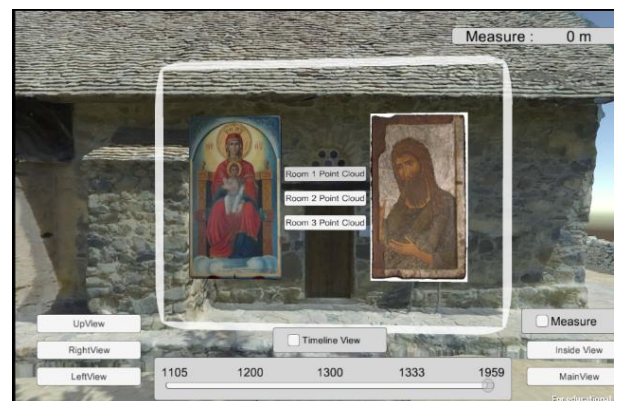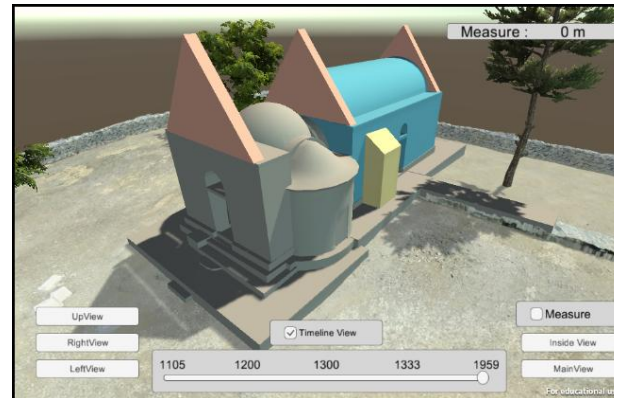
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10. Forthcoming meetings & events

1st International Conference on Science and Engineering in Arts, Heritage and Archaeology (SEAHA), University College London, 14-15 July 2015

The EPSRC Centre for Doctoral Training in Science and Engineering in Arts, Heritage and Archaeology (SEAHA) is an 8-year initiative (2014-2022) to establish an infrastructure to meet challenges set by the heritage sector, industry and government.

The SEAHA conference is in **cooperation** with the **ITN-DCH project**, aiming to bring together and exchange knowledge and best praxis experiences. The fellows from three different fellowship projects on Digital Heritage take part to the event (SEAHA, ITN-DCH & Heritage Consortium).

The conference will focus on heritage science research, innovation and best practise in the interpretation, conservation and management of cultural heritage. Heritage science is a cross-disciplinary field connecting science and the humanities, therefore, the conference aims to provide a platform for **scientists, engineers, professionals, entrepreneurs, and policy makers**, to engage and discuss emerging trends in the field.

http://www.seaha-cdt.ac.uk/seaha-conference-2015/

25th International CIPA Symposium, 31 Aug – 5 Sept., 2015, Taipei, Taiwan

The International Committee for Documentation of Cultural Heritage (CIPA) will held its next symposium in Taiwan, heading back to Asia after the 2009 event in Japan. The congress direct is Dr. Alex Ya-Ning Yen from the China University of Technology (CUTe). Four organizations will support and work with CUTe to prepare this important event; they are, namely, Taiwan Heritage Society, Taiwan Geographic Information Society, Chinese Society of Photogrammetry and Remote Sensing and Architectural Institute of Taiwan.

http://www.cipa2015.org

The **ITN-DCH** is **actively participating** with one workshop (see webpage of the event) and with 8 fellows contributions/papers.

Int. Conference Digital Heritage 2015, 5-9 October 2015, Granada, Spain

The second edition of the large heritage conference will be held in Granada in October 2015.

Several **ITN-DCH Fellows** are working in the **organization** of this event.

http://lrv.ugr.es/DH2015/