ITN-DCH
www.itn-dch.eu
Initial Training Network for Digital Cultural Heritage

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Career Development Plan

Long-Term Objectives:

- Develop innovative data fusion methods and algorithms
- Exploit the intrinsic advantages of raw data, merging image and range information
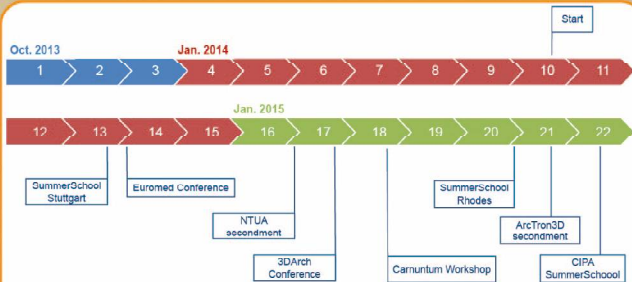- Realize cost-effective tools for cultural heritage digitalization
- Strengthen the integration of photogrammetric and computer vision techniques

Short-Term Objectives:

- Data fusion state-of-the-art
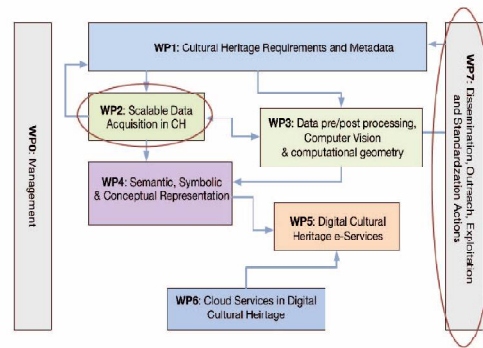- Collaboration in projects related to fusion
- Training in specific new areas

Training Activity

I have actively participated in several training activities of the ITN-DCH project: Summerschool. WorkShop. Conference and Secondment; and some additional like 3DArch Conference.

Oct. 2013 | Jan. 2014 | Start
1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11

Jan. 2015
12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22

- SummerSchool Stuttgart
- Euromed Conference
- NTUA secondment
- 3DArch Conference
- Carnuntum Workshop
- SummerSchool Rhodes
- ArcTron3D secondment
- CIPA SummerSchool

ITN-DCH Project Involvement

- WP1: Cultural Heritage Requirements and Metadata
- WP2: Scalable Data Acquisition in CH
- WP3: Data pre/post processing, Computer Vision & computational geometry
- WP4: Semantic, Symbolic & Conceptual Representation
- WP5: Digital Cultural Heritage e-Services
- WP6: Cloud Services in Digital Cultural Heritage
- WP7: Dissemination, Outreach, Exploitation and Standardization Actions
- WP0: Management

Contribution to: deliverables D 1.1, D 2.1 and D 2.2; Consortium Newsletter & diffusion at the social media.

Research Activity
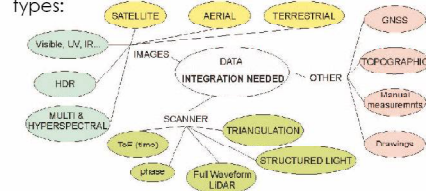### Data Fusion State-of-the-Art

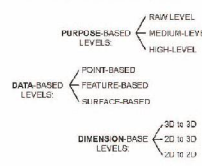Comparative range & image-based:

ACQUISITION – FIELD WORK	Range – TLS	Image - CRP
Portability	Low	High
Network design	Fixed stations	Easy to move station positions, and to have redundancy taking more shots
Target/spheres/markers (several stations)	Required	Not necessary, only to improve orientation
Acquisition time	Depends on the number of stations and occlusions	Low
Ambient light	Independent	Measure the reflected light from objects (color, texture), ambient light need to be controlled
Requirements for 3d (several stations)	Targets and/or control points need to appear in several scan stations	Enough coverage between photos
Radiometric resolution	Low, discrete	High, nearly continuous
Noise (moving obstacles)	High	Low

PROCESSING	Range – TLS	Image - CRP
Basic postprocessing required (to obtain the complete 3d point cloud)	Cloud registration (several stations)	Internal and external orientation Bundle-adjustment Dense matching
Software	Proprietary (mesh registering)	Open source solutions for academic an non-commercial use
Derive 3d information	Directly	Computation required to obtain 3d coordinates
Color mapping/texture quality	Low, discrete	High, continuous
Corner and edge detection, structural parts	No, depends on the footprint and its location	Yes
Scale	1:1	Need to be scaled

APPLICATIONS	Range – TLS	Image - CRP
Reflective objects (shinny, glittering)	Difficult, reflectivity problems	Easier (i.e. marble), or with laser induced targets
Textureless surfaces	Yes	No
Transparent materials	No, unless using spray	Possible, with constraints and considering image sequences (change phenomena)
Suitable for (based on time required)	Complex and irregular surfaces	Line-based surfaces
Humidity, wet surfaces	No, beam absorption	Yes
Underwater applications	Only triangulation scanners (low field of view)	Yes
Fast moving objects	No	Yes

Data types:

SATELLITE | AERIAL | TERRESTRIAL | GNSS
Visible, UV, IR... | IMAGES | TOPOGRAPHIC | OTHER
HDR | DATA INTEGRATION NEEDED | Manual measurements
MULTI & HYPERSPECTRAL | SCANNER | TRIANGULATION | Drawings
ToF (time) | STRUCTURED LIGHT
phase | Full Waveform LIDAR

Data fusion levels:

PURPOSE-BASED LEVELS: RAW LEVEL / MEDIUM-LEVEL / HIGH-LEVEL
DATA-BASED LEVELS: POINT-BASED / FEATURE-BASED / SURFACE-BASED
DIMENSION-BASE LEVELS: 3D to 3D / 2D to 3D / 2D to 2D

Future Work

- ArcTron3D: Secondment
- CIPA SummerSchool: Dissemination
- CIPA Symposium: Paper Presentation
- Stuttgart Univ.: Secondment
- PhoWo: Training

Research:
- Thermal Calibration & Registration
- Data fusion SOTA
- Strengthen pho & computer vision

Home Country | Host Country | Host Organization

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