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D5.2 Analysis Report on Usage and Sharing of Facilities and Equipment

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List of Participants (Core Institutions)

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2 Dublin	City University	DCU	IR
3	Groupe des Ecoles des Télécommunications	IT	F
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5	University of Geneva	UNIGE	CH
6	Informatics and Telematics Institute	ITI	GR
7 Korea	University	KU	KR

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1 Executive Summary

3DLife aims at stimulating joint research and integrating leading European research groups to create a long-term integration of critical mass for innovation of currently fragmented research addressing media Internet. It fosters the creation of sustainable and long-term relationships between existing national research groups and lays the foundations for a Virtual Centre of Excellence (VCE) in media Internet.

This deliverable reports an analysis on the usage and sharing of institute facilities and equipment by the members of the 3DLife consortium during the period from January 2010 to December 2012.

Chapter 2 describes all the institute facilities and equipment made available by the consortium members. Chapter 3 reports on the sharing activities of the facilities and equipment. Finally, chapter 4 concludes this report with a small analysis of the institute facilities and equipment available and on how they are shared.

2 Available Shareable Facilities and Equipment

This chapter lists all the shareable facilities and equipment made available by member institutes of the consortium and provides an analysis of these facilities and equipment.

2.1 List of Available Shareable Facilities and Equipment

The different partners of the consortium provide in total 45 shareable facilities and equipment, which can be divided over the following categories: 6 units from the category *Display and Projection Systems*, 8 units from the category *Scanners and Digitizers*, 9 units from the category *Human Interface Devices*, 19 units from the category *Cameras / A/V Media Recording and Processing* and 3 units from the category of *Miscellaneous*.

2.1.1 Display and Projection Systems

3D Projector, BARCO BARON 808S

Institute: ITI

Description: A 64" Barco Baron Display "Virtual Table". 64 inches rear projection system allowing stereo. High resolution 8" CRTs with electro-magnetic focus.



Stereographics CrystalEyes pairs

Institute: ITI

Description: Wireless, high-definition stereo glasses with active LCD shutter, up to 160 fps with long range infrared emitter.



ICIDO CAVE system

Institute: ITI

Description: 2.8 x 2.0m screen, 2 DLP projectors SXGA (2500 ANSI lumen).



TiME Lab Digital Cinema

Institute: HHI

Description: The HHI TiME Lab digital cinema located in Berlin provides a facility to present very high resolution video (up to 6000x2000 pixels, 180° viewing angle) and 3D spatial audio (using a wavefield synthesis system) in a very immersive way.



Stereo Screens

Institute: IT

Description: The computer graphics group located in Paris provides a collection of stereo screens for experimenting stereo rendering techniques and interactions.



42" Auto-Stereoscopic Display Trideltity MP4210va

Institute: HHI

Description: This auto-stereoscopic display allows the 3D visualization of content without the need to wear glasses. It features full HD resolution and supports up to 5 different views.



2.1.2 Scanners and Digitizers

Digital Y-US1 Yamaha Piano

Institute: ITI

Description: Digital Y-US1 Yamaha Piano with the Mark III disklavier system which allows to simultaneously record MIDI type information.

VIVID700 3D scanning system portable laser scanner

Institute: ITI

Description: Captures 40,000 data points in 0.6 seconds, electronically zoom able lens, with remote turntable.



faceLAB Eye-Tracker

Institute: QMUL

Description: faceLAB eye-tracking system with a binocular set of 60Hz cameras with firewire connection, an InfraRed source, a dedicated PC with faceLAB software package installed on it.



Vitronic Vitus Pro Color 3D Body Scanner

Institute: UNIGE

Description: The 3D full body scanner VITUS generates a complete three-dimensional image of the human body in 20 seconds. Body dimensions can be quickly and objectively determined based on the obtained 3D data. The technology is based on the light sectioning principle (triangulation).



NextEngine Desktop 3D Laser Scanner

Institute: DCU

Description: NextEngine's 3D Scanner captures objects in full color with multi-laser precision. Object size is limited to approx. 30cm in height.



VICON motion capture system (3 institutes)

Institute: UNIGE, QMUL, DCU

Description: Vicon MX system records the movements of objects and translate that movements onto a digital model. Main components of the system are the high precision cameras.



2.1.3 Human Interface Devices

Essential Reality P5 dataGlove

Institute: ITI

Description: Lightweight, 6 degrees of tracking, with blend-sensors, 5 independent finger measurements, 0.5 degree resolution.



Immersion Tech CyberTouch

Institute: ITI

Description: Tactile feedback with six vibro-tactile stimulators: one per finger, one



on the palm, fully programmable.

Immersion Tech CyberGrasp

Institute: ITI

Description: Lightweight, force-reflecting exoskeleton with five fully programmable actuators.



Immersion Tech CyberGlove

Institute: ITI

Description: Twenty two (22) sensor glove: Two (2) bend sensors on each finger, Four (4) abduction sensors. Sensors measuring: Thumb crossover, Palm arch, Wrist flexion, Wrist abduction. Left and Right hands.



Wireless Inertial Measurement Units (WIMUs)

Institute: DCU

Description: Units consist of Tri-axial Accelerometers ($\pm 10g$), Tri-axial Gyroscopes ($\pm 1200^\circ/\text{sec}$), Tri-axial Magnetometers ($\pm 6\text{gauss}$), and Wireless Transmission (2.4GHz radio)



Ubisense Spatial Localisation Systems

Institute: DCU

Description: Ubisense spatial localisation system that facilitates the real-time 3D localisation and tracking of small wireless tags to within a 15cm degree of accuracy. Ubisense systems are deployed on a tennis court, 3 computer labs, and 1 social area.



MTx 3DOF orientation Tracker

Institute: UNIGE

Description: Provides drift-free 3D orientation as well as kinematic data: 3D acceleration, 3D rate of turn and 3D earth-magnetic field.



Sensable Technologies Phantom Desktop (2 institutes)

Institute: ITI, UNIGE

Description: Six degree-of-freedom positional sensing with precision positioning input and high fidelity force-feedback output.



2.1.4 Cameras / A/V Media Recording and Processing

Large anechoic room

Institute: IT

Description: The large anechoic room (125 m³) has a reverberation time lower than 30 msec at 125 Hz. Mounted on trapezes with high quality material cones, this anechoic room possesses excellent anechoic characteristics which permit high quality recordings and 3D audio rendering experiments.



Audio recording studio

Institute: IT

Description: The recording studio allows for 16 tracks professional quality recordings. It is fully equipped for high quality sound recording using multiple sensors (softwares, mixing tables, directional and omnidirectional microphones, KEMAR® headset or/and cameras).

Loudspeakers for 3D audio

Institute: IT

Description: 3D audio system with a large number of dedicated loudspeakers including a set of 12 passive TANNOY® loudspeakers for realistic 3D sound rendering



Point Grey Bumblebee cameras

Institute: ITI

Description: Two lens stereo vision camera system, 1/3" progressive scan CCDs, 640x480 and 1024x768 color models.



Point Grey Flea2 Firewire cameras

Institute: HHI

Description: Multiple cameras with Firewire IEEE-1394b interface, 1/3" progressive scan CCDs, 1032x776 color models.



Allied Vision Pike F-210C Firewire cameras

Institute: HHI

Description: Multiple cameras with Firewire IEEE-1394b interface, 1" progressive scan CCDs, 1920 x 1080 color models.



Unibrain Fire-i Firewire Digital Camera

Institute: DCU

Description: 4 cameras with Firewire IEEE-1394b interface, 1/4" CCD progressive scan, 640 x 480 resolution



OmniCam panoramic camera

Institute: HHI

Description: The Omnicam is a camera system and mirror rig for the real-time acquisition of immersive, high-resolution 360° video panoramas. Further information can be found on:

<http://www.hhi.fraunhofer.de/en/departments/image-processing/applications/omnicam/>



Audiovisual Studio

Institute: ITI

Description: Sony DSR-500WLS camera, Sony DSR-40P DCR, Sony SRP-V200 Digital mixer, Sony Trinitron video monitor, Pinnacle video-editing workstation



Unibrain Fire-i Firewire Digital Camera

Institute: ITI

Description: 6 cameras with Firewire IEEE-1394b interface, 1/4" CCD progressive scan, 640 x 480 resolution



Nikon D90 Camera

Institute: QMUL

Description: 12.9 Megapixel 4.5 frames per second continuous shooting, 3D Tracking AF(11 pt), ISO 200-3200 range, Movie Capture at up to 1280*720, Vignetting control in camera, ultrasonic sensor cleaning, Live View with Face Priority AF



Point Grey Digiclops Firewire camera

Institute: DCU

Description: Three-camera Stereo Vision system, Sony 1/3" progressive scan CCDs, 4mm focal length, 640x480 or 1024x768.



Raytheon Thermal IR-2000B Camera

Institute: DCU

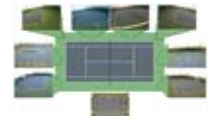
Description: The thermal camera is sensitive to wavelengths in the range 7m-14m, analogue video output



TennisSense Infrastructure

Institute: DCU

Description: Data gathering infrastructure for use as a test-bed for sports and health research. Infrastructure includes 9 IP cameras positioned around a tennis court, with pan, tilt and zoom capabilities. Seven of these cameras are AXIS 215 PTZ units have inbuilt microphones for audio capture, have a wide angle lens (140 degree) and include fast digital PTZ functionality by subsampling from a high-resolution sensor. Two of the cameras are AXIS 212 units, they have very high zoom functionality, as well as physical pan and tilt (but no audio). The infrastructure also includes a Ubisense spatial localisation system that facilitates the real-time 3D localisation and tracking of small wireless tags to within a 15cm degree of accuracy.



Video Camera, Monitor, DVD player and Video editor

Institute: UNIGE

Description: System consist of professional recording and assembling tools such as: Digital video camera, Sony 14"/12" monitor, Sony 735 DVD player



12 Pixelink Cameras

Institute: QMUL

Description: PL-B742 is a high performance 1.3 mega pixel color camera designed for a broad range of industrial imaging applications. This camera is based on the Cypress IBIS5 CMOS global progressive scan sensor with a 2/3" optical format and 27 fps output. Factory calibrated Digital Pixel Correction and on-board Flat Field Correction (FFC) provides image quality similar to high-end CCD cameras.



Sets of Microsoft Kinect Cameras (3 institutes)

Institute: DCU (3 devices), QMUL (3 devices), ITI (8 devices)

Description: Three (3) Microsoft Xbox Kinect Cameras



2.1.5 Miscellaneous

EyeSee360 GoPano Mirror System

Institute: HHI

Description: GoPano is a mirror optic for capturing seamless 360-degree panoramic images when attached to a still or video camera. For a list of compatible cameras and a full description of the system visit <http://www.eyesee360.com/gopano>



CPU-GPU Servers

Institute: UNIGE

Description: For high performance computing:4 Tesla C1060 GPU processors, 8 Quadcore Xeon CPU, 32 GB memory



Head Capture Rig

Institute: HHI

Description: The head capture rig provides a flexible setup to perform high-resolution multi-view capturing of human heads, allowing e.g. for very high quality 3D reconstructions. The installation consists of a 180° half-circle aluminium frame, 12 18MP Canon D550 digital still cameras and lenses (which can be mounted flexibly on the rig), three professional-grade synchronizable flash lights, a capture PC, and multi-camera capture software. The cameras are connected via USB to a PC, and can be controlled / live-previewed using the provided software. Synchronous image acquisition can be performed either by software, or using radio based remote triggers.



2.2 Analysis

Table 1 summarizes the number of shareable facilities and equipment per category and institute. From the table it can be derived that the average of shareable units per institute is 7.5 and that the average shareable unit per category is 9. ITI shares the most facilities and equipment with the number of 13 units and the most shared facilities and equipment are from the category *Cameras / A/V Media Recording and Processing*. From the list in section 2.1, it can be seen that there is an overlap of facilities and equipment provided by multiple partners. These facilities and equipment are VICON motion capture system that is provided by 3 institutes, Sensable Technologies Phantom Desktop that is provided by 2 institutes and sets of Microsoft Kinect cameras that is provided by 3 institutes. The overlap in facilities and equipment offers a greater flexibility for the partners to cooperate with each other, since they are less dependent on a single point of service for the three mentioned devices.

Table 1 Number of shareable facilities and equipment per category and institute

Institute / Category	Display and Projection Systems	Scanners and Digitizers	Human Interface Devices	Cameras / A/V Media Recording and Processing	Miscellaneous	Total
QMUL	0	2	0	3	0	5
DCU	0	2	2	5	0	9
IT	1	1	0	3	0	5
HHI	2	0	0	3	2	7
UNIGE	0	2	2	1	1	6
ITI	3	1	5	4	0	13
Total	6	8	9	19	3	45

3 Sharing Activities

This chapter reports all the sharing activities that took place during the project in the period of January 2010 until December 2012 and provides an analysis of these activities. During the period of 36 months, a total amount of 17 sharing activities of facilities and equipment took place.

Table 2 illustrates the sharing activities of facilities and equipment by the project partners. Although there were only 17 sharing activities as mentioned in the previous section, in many sharing activities facilities and equipment have been shared with more than one partner. This means if we count each facility/equipment shared per partner we arrive at the number of 48 sharing activities in total. Using this calculation we can conclude that there was an average of 8 sharing activities per partner, DCU has shared the most facilities and equipment and HHI and UNIGE have used the most facilities and equipment.

Table 2 Number of sharing activities of facilities and equipment by the project partners. The rows illustrate the sharing institutes and the columns are the using institutes.

Institute	QMUL	DCU	IT	HHI	UNIGE	ITI	Total
QMUL	0	1	1	1	3	1	7
DCU	3	0	3	6	3	4	19
IT	2	2	0	2	2	0	8
HHI	1	2	1	0	1	1	6
UNIGE	0	1	2	0	0	0	3
ITI	1	1	1	1	1	0	5
Total	7	7	8	10	10	6	48

4 Conclusion

In this deliverable, an analysis on the usage and sharing of institute facilities and equipment by the members of the 3DLife consortium during the period from January 2010 to December 2012 was provided. It has been shown that there were 45 facilities and equipment provided by the consortium institutes and that 48 sharing activities took place during the project period. KU has not been mentioned in this deliverable mainly because it was not possible for them to share their facilities and equipment due to the geographical distance between them and the rest of the partners.