VENUS, Virtual Exploration of Underwater Site

Project type: STREP (Specific Targeted Research Project)
Start date: 1 July 2006
Duration: 36 months
Funding: €2,190,000
Number of partners: 11
Project co-ordinator: CNRS - Centre National de la Recherche Scientifique
Contact: Pierre Drap; e-mail: Pierre.Drap@esil.univmed.fr


http://www.venus-project.eu

Virtual exploration of underwater archaeological sites

- Even deep archaeological sites are jeopardized (trawling)
- Maintain 3D memory
- Automation of data collection in “hostile environment”
- Allow permanent access to the virtual site to archaeologist and general public
- Dissemination, recommendation, best practice

Photo Roland Graille
**VENUS, Virtual ExploratioN of Underwater Site**

### VENUS: Five Objectives

1. Underwater exploration best practices and procedures
2. Underwater 3D survey merging optic and acoustic sensors
3. Managing and revising archaeological knowledge
4. Mixed reality modelling
5. Dissemination

The Mediterranean archaeological context

Photo Roland Graille
VENUS, Virtual ExploratioN of Underwater Site

Knowledge representation

Photogrammetry

Virtual Reality

Underwater exploration

Underwater archaeology

Dissemination

Eleven partners

1. CNRS, France
2. IST, Portugal
3. ISME, Italy
4. SIMVIS, UK
5. UEVE, France
6. LFUI, Austria
7. COMEX, France
8. DRASSM, France
9. SBAT, Italy
10. ADS, UK
11. IPA/CNAN, Portugal
VENUS, Virtual ExploratioN of Underwater Site

The Deep aquarium in Hull
- Good practice
- Web publication
  - General public and experts access to simulators
  - Ensure digital preservation

Virtual Reality Demonstrator
- Immersive and non-immersive

Virtual Reality formalism
- Archaeological Database

Merging 3D Data
- DTM from acoustic sensors
- 3D data from Optical sensor
  - DTM, Mapping + Artifact survey & database access

Underwater Data Gathering
- Both Acoustic and Optical Survey
- Technical and software
- Interoperability among partners

Three missions, one each year to test the experimental procedures and improve them at each stage.
VENUS, Virtual Exploration of Underwater Site

Photogrammetry
Computer vision
Sonar survey
Computer graphic

Knowledge representation

Underwater technologies
Archaeological knowledge

Procedures, best practices and digital data preservation
Splitted in 3 WP:

IST : Technological and software Interoperability
CNRS
LFUI : Underwater photogrammetry calibration
ISME : Automatic guidance and preliminary testing

Objective One

Procedures and best practices for collecting data in an efficient, economic and safe way
Split in 3 WP:

IST: Underwater data gathering, correlating and geofencing
ISME: DTM from acoustic data
LFUI: Underwater photogrammetric tools

Objective Two

Underwater 3D survey merging optic and acoustic sensors
Splitted in 3 WP:

SIMVIS: Archaeological activities and knowledge analysis

CNRS LSIS: Representing structured items of information and reasoning with them

CNRS MAP: Measurement using archaeological knowledge

Objective Three

Representing and managing archaeological knowledge

Knowledge based photogrammetric tool

Survey driven by knowledge
Semantised geometry produced

Knowledge base

Consistency Check
Data fusion
Data revision

Archaeological Community

Communicate with

SimVis / CNRS / LSC etc

Generate

Underwater VE Specification
Splitted in 3 WP:

SIMVIS, IBISC : Modelling and developing an archaeological database engine
SIMVIS, IBISC : Modalities and development of an immersive interface
SIMVIS, IBISC : Demonstrators integration

Objective Four

Mixed reality modeling

Dissemination
Splitted in 4 WP:

- **ADS**: Digital Preservation and Dissemination of Good Practice
- **SIMVIS, CNRS**: Online Dissemination of Research and Tools
- **SIMVIS, IBISC**: Semi-Immersive Dissemination of Research to General Public
- **CNAN**: Dissemination to general public

**Objective Five**

Dissemination to General public, Students, Experts…

Supporting research through the delivery of high quality digital resources

[http://ads.ahds.ac.uk/catalogue](http://ads.ahds.ac.uk/catalogue)

Providing advice and promoting good practice in the use of digital data in archaeology

[http://ads.ahds.ac.uk/guides/](http://ads.ahds.ac.uk/guides/)

Providing teaching resources to support on-line learning environments

[http://ads.ahds.ac.uk/learning](http://ads.ahds.ac.uk/learning)
Splitted in 3 WP:

Year 1: SBAT: Archaeological site of Pianosa, Tuscany, Italy

Year 2: IPA / CNANS: Missions on Roman sites, Portuguese coast,

Year 3: DRASSM: The wreck: La calanque de Port-Miou, Marseille, France

Case Study

The archaeological context
Mission One
Pianosa island, Italy

Photogrammetry
Camera orientation
Approximate
by ROV
navigation data
Both survey with
video camera
and NIKON D2Hs
Archaeological model
of amphorae
VENUS, Virtual Exploration of Underwater Site

调查

1. 光学重建
   - 摄影测量
   - 3D重建
   - 光学重建
   - 光学重建

2. DGPS/USBL
   - 水深测量
   - 多波束测量

3. 立体测量
   - 具体 amore 测量
   - 三维数据

4. 数据库
   - 数据整合
   - 数据整合
   - 数据整合

5. 虚拟现实
   - 三维模型
   - 三维模型
   - 三维模型

步骤1：Photomodeler
   - 坐标
   - 立体测量
   - 光学重建

步骤2：DTM
   - 三维数据
   - 三维数据

步骤3：特定 amore 测量
   - 具体 amore 测量
   - 具体 amore 测量

步骤4：数据整合
   - 数据整合
   - 数据整合

步骤5：全数据库
   - 全数据库
   - 全数据库

虚拟现实生成来自数据库

一个工具用于在实验室中‘阅读’地点，修订，更新……
Let’s begin …