

# Report on Paradata Complexity



Cyprus  
University of  
Technology



Chair

## Data Acquisition

**Project:** The Lambousa Fishing Trawler

**Project Reference Number in Metadata:**

81e511095c20e02343ca0179a032dea4chf931

**Date of Digitization:** 03/06/2024

**Officer(s) Name:** Panayiotis Panayiotou

**Officer Id number:** 2009661989

**Officer Profession:** Researcher-Architect

**Officer Position:** Research Assistant

**Officer department:** N/A

**Officer telephone:** N/A

**Officer weblink:** <https://digitalheritagelab.eu/>

**Officer email:** p.panayiotou@cut.ac.cy

**Owner:** Limassol Municipality

**Stakeholder:** Limassol Municipality

## **Contractor for Digitization - Institution/Organization:**

UNESCO Chair on Digital Cultural Heritage

## **Specifications for Data Acquisition & Data Pre-Processing:**

The digital documentation of the Fishing Trawler was carried out based on the cooperation agreements between the Municipality of Limassol and the UNESCO Chair within the EU-funded projects:

1. H2020 ERA Chair Mnemosyne (<https://erachair-dch.eu/>) and
2. EU Digital Europe EUreka3D (<https://eureka3d.eu>)

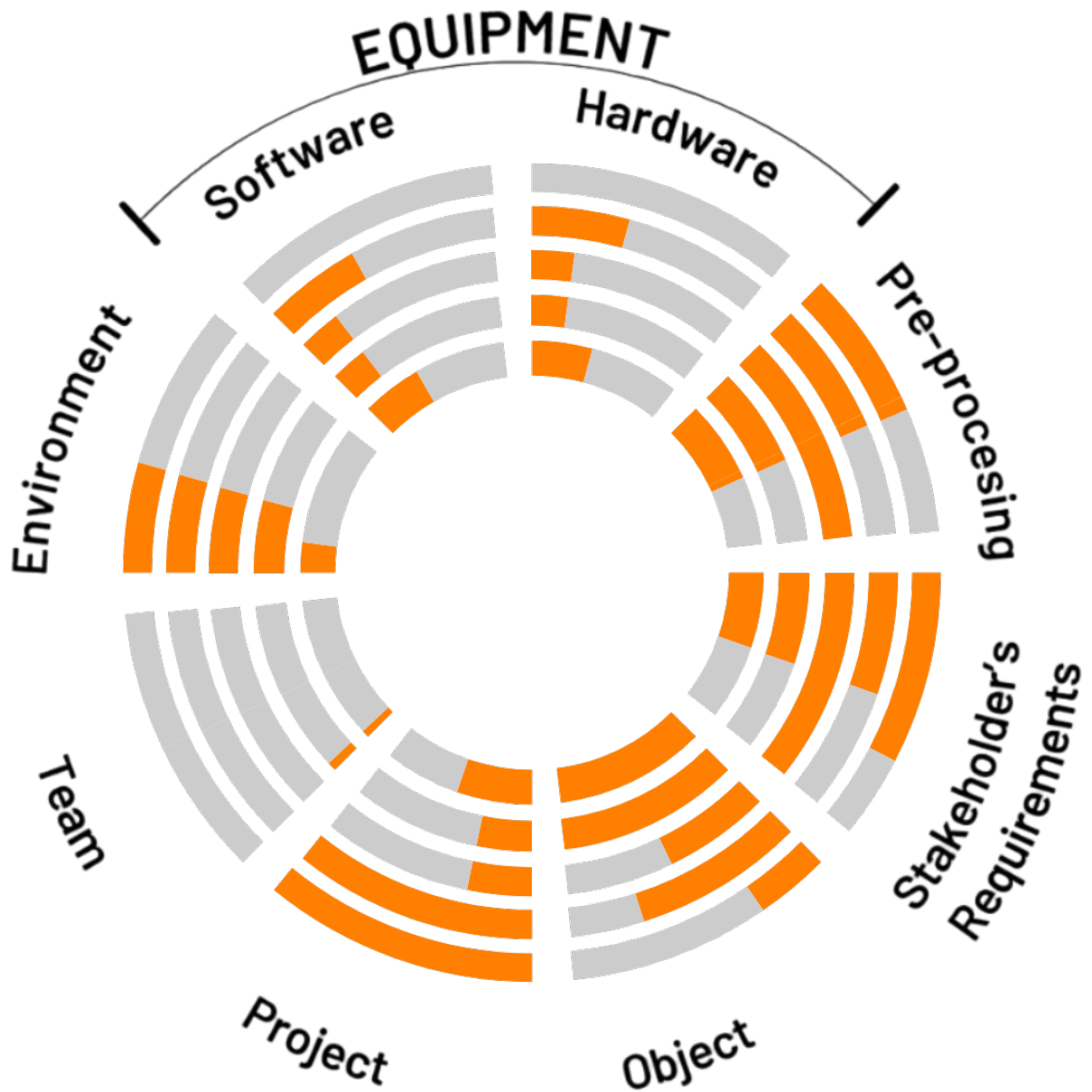
## **Cloud Reference of Project:**

[http://hdl.handle.net/21.T15999/R\\_mXbyY](http://hdl.handle.net/21.T15999/R_mXbyY)

## Reference Image(s) of the object:



# Complexity Chart based on EU VIGIE 2020/654 Study



**Stakeholder's Requirements:**

| Parameter                           | Complexity Value | Layer Information                                                                                                                                                                                           | Description |
|-------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Time period of the data acquisition | 70%              | Start: 2/5/2022                                                                                                                                                                                             |             |
|                                     |                  | End: 31/10/2023                                                                                                                                                                                             |             |
| Budget (entire project)             | 50%              | 0 Euro                                                                                                                                                                                                      |             |
| Purpose of 3D Digitisation          | 100%             | Detailed level                                                                                                                                                                                              |             |
| Location                            | 50%              | Coordinates:<br>34.6655752,<br>33.0295<br>Address:<br>M28H+6QQ -<br>Karnayio, Aktaia,<br>Limassol 3013,<br>Cyprus<br><br>Area: null<br>Village: null<br>City: Limassol<br>District: null<br>Country: Cyprus |             |
| Type                                | 50%              | Terrestrial                                                                                                                                                                                                 |             |

**Object:**

| Parameter                                        | Complexity Value | Layer Information                                                                                                                                                                                                                                           | Description                                                                            |
|--------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| State of Conditions                              | 27%              | In decay                                                                                                                                                                                                                                                    |                                                                                        |
| Materials                                        | 70%              | Wood<br>Metal Alloys                                                                                                                                                                                                                                        | Wood:<br>Pine Timber, Oak Timber, Eucalyptus Timber.<br>Metal Alloys:<br>Steel, Bronze |
| Location                                         | 50%              | Coordinates:<br>34.6655752,<br>33.0295<br>Address:<br>M28H+6QQ -<br>Karnayio, Aktaia,<br>Limassol 3013,<br>Cyprus<br><br>Area: null<br>Village: null<br>City: Limassol<br>District: null<br>Country: Cyprus                                                 |                                                                                        |
| Dimension & Weight,<br>Touchable,<br>Permissions | 100%             | Object Dimensions:<br>Height: Hull: 5.31m,<br>Mast: 13.50m<br>Width: Hull: 6.56m<br>Depth:<br>Length: Hull: 25m<br>Diameter: Mast:<br>0.20m<br>Weight:<br>Permissions/Rights:<br><a href="https://creativecommons.org/licenses/by-sa/4.0/">CC BY-SA 4.0</a> |                                                                                        |

|                |      | Touchable<br>(Yes/No): Yes                                                                                                                                                                                                                                                                                                                                                            |  |
|----------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Remedy Options | 100% | 1 : The Fishing Trawler was in a decayed condition and covered with plastic film. It was cleaned carefully and the plastic film was removed to allow the capturing of the images from the UAV. As regards to TLS, this was done during the Reconstruction of the Trawler and therefore the surrounding scaffoldings had to be removed to allow the capturing of the point cloud data. |  |



**Project:**

| Parameter                                                                                    | Complexity Value | Layer Information                                                                                                                                                                                                                                                                               | Description                                         |                                               |                                                                                              |  |
|----------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------|--|
| Coordinator/<br>Management/ Team/<br>HR Availability                                         | 100%             | Coordinator Details:<br>Name: Limassol<br>Municipality<br>Surname:<br>Profession:<br>Work ID                                                                                                                                                                                                    |                                                     |                                               |                                                                                              |  |
| IPR/Deliverables<br>Data                                                                     | 100%             | <table border="1"> <tr> <td>Organization:<br/>Cyprus University of<br/>Technology</td> </tr> <tr> <td>Person in charge:<br/>Limassol<br/>Municipality</td> </tr> <tr> <td>Coordinator Details:<br/>Name: Limassol<br/>Municipality<br/>Surname:<br/>Profession:<br/>Work ID</td> </tr> </table> | Organization:<br>Cyprus University of<br>Technology | Person in charge:<br>Limassol<br>Municipality | Coordinator Details:<br>Name: Limassol<br>Municipality<br>Surname:<br>Profession:<br>Work ID |  |
| Organization:<br>Cyprus University of<br>Technology                                          |                  |                                                                                                                                                                                                                                                                                                 |                                                     |                                               |                                                                                              |  |
| Person in charge:<br>Limassol<br>Municipality                                                |                  |                                                                                                                                                                                                                                                                                                 |                                                     |                                               |                                                                                              |  |
| Coordinator Details:<br>Name: Limassol<br>Municipality<br>Surname:<br>Profession:<br>Work ID |                  |                                                                                                                                                                                                                                                                                                 |                                                     |                                               |                                                                                              |  |
| Infrastructure,<br>Transportation                                                            | 30%              | Infrastructure:<br>Transportation: Car                                                                                                                                                                                                                                                          |                                                     |                                               |                                                                                              |  |
| Accessibility                                                                                | 30%              | Obstacles:<br>Dirt road within<br>shipyard.<br>Hazards:<br>Ethical Issues<br>(Permissions):<br>Permission is given<br>from the stakeholder<br>for accessing the<br>shipyard.<br>Approachability:                                                                                                |                                                     |                                               |                                                                                              |  |
| Budget (co-<br>financing)                                                                    | 50%              | 0 Euro                                                                                                                                                                                                                                                                                          |                                                     |                                               |                                                                                              |  |

### **Data Formats of the Digitized Object:**

#### OBJ - Data Format Details:

Name: Wavefront file

Acronym: OBJ

Extensions: .obj

Description: OBJ (or .OBJ) is a geometry definition file format first developed by Wavefront Technologies for its Advanced Visualizer animation package. The file format is open and has been adopted by other 3D graphics application vendors. The OBJ file format is a simple data-format that represents 3D geometry alone - namely, the position of each vertex, the UV position of each texture coordinate vertex, vertex normals, and the faces that make each polygon defined as a list of vertices, and texture vertices. Vertices are stored in a counter-clockwise order by default, making an explicit declaration of face normals unnecessary. OBJ coordinates have no units, but OBJ files can contain scale information in a human readable comment line. Object files can be in ASCII format (.obj) or binary format (.mod). This appendix describes the ASCII format for object files. These files must have the extension .obj.

Standard: false

Standard Code:

Link to standard: <https://bit.ly/3Dg4Z7r>

#### E57 - Data Format Details:

Name: LIDAR Point Cloud Data File

Acronym: E57

Extensions: .e57

Description: The raw data file created in the ASTM E57 format, a format used for storing data captured by 3D imaging systems; saves LIDAR (light detection and ranging) data, which was captured by 3D range cameras; enables remote sensing data to be saved in a vendor-neutral format. E57 files can be used for rendering images of real-world objects, such as buildings, atmospheric entities (e.g., clouds), and geological surfaces. This can be useful in construction, surveying, engineering, and research.

Standard: true

Standard Code: ASTM E2807 - 11(2019)

Link to standard: <https://bit.ly/3jdAalZ>

#### STL - Data Format Details:

Name: Stereolithography CAD

Acronym: STL

Extensions: .stl

Description: STL is a file format native to the stereolithography CAD software created by

3D Systems company. STL has several backronyms such as "Standard Triangle Language" and "Standard Tessellation Language". This file format is supported by many other software packages; it is widely used for rapid prototyping, 3D printing and computer-aided manufacturing. STL files describe only the surface geometry of a three-dimensional object without any representation of color, texture or other common CAD model attributes. The STL format specifies both ASCII and binary representations. Binary files are more common, since they are more compact.

Standard: true

Standard Code: ISO/ASTM 52915:2013

Link to standard: <https://bit.ly/3mvQqqp>

#### 3DM - Data Format Details:

Name: Open NURBS Initiative 3D Model

Acronym: 3DM

Extensions: .3dm

Description: A 3DM file is an open source file format which is used for 3D graphics software. Developed by the openNURBS initiative, developed by Robert McNeel & Associates, and specifications and libraries are released for free usage by the company. 3DM files contain graphics, metadata details, and other formatting attributes such as surface, points, and curve information. Some of the software that will open, convert, or process 3DM files include Rhinoceros, SAP VEViewer, Moment of Inspiration, and Right Hemisphere Deep View.

Standard: false

Standard Code: ISO/IEC 14496-16:2006

Link to standard: <https://bit.ly/388WzR4>

#### FBX - Data Format Details:

Name: Autodesk Filmbox

Acronym: FBX

Extensions: .fbx

Description: FBX (Filmbox) is a proprietary file format (.fbx) developed by Kaydara and owned by Autodesk since 2006. It is used to provide interoperability between digital content creation applications. FBX is also part of Autodesk Gameware, a series of video game middleware.

Standard: false

Standard Code:

Link to standard: <https://bit.ly/3yj7Poy>

**Team:**

| <b>Parameter</b>                                                             | <b>Complexity Value<br/>(Professional)</b> | <b>Complexity Value<br/>(Amateur)</b> | <b>Description</b>                                                            |
|------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------|
| <b>Experience</b>                                                            | 0%                                         | 0%                                    |                                                                               |
| <b>User Qualification for<br/>Hardware &amp;<br/>Software</b>                | 0%                                         | 0%                                    | <b>Specialist from Z+F<br/>Company</b>                                        |
| <b>Licenses for mission</b>                                                  | 0%                                         | 0%                                    | <b>UAV License</b>                                                            |
| <b>Infrastructure</b>                                                        | 10%                                        | 0%                                    | <b>Shipyards Area</b>                                                         |
| <b>Transportation for<br/>object and/or team to<br/>the special location</b> | 10%                                        | 0%                                    | <b>Car was used for the<br/>transportation<br/>towards the<br/>shipyards.</b> |

**Weather Conditions:**

| <b>Parameter</b>             | <b>Complexity Value</b> | <b>Description</b> |
|------------------------------|-------------------------|--------------------|
| <b>Rain/Snow</b>             | <b>40%</b>              |                    |
| <b>Visibility/Wind Speed</b> | <b>40%</b>              |                    |
| <b>Air Pressure/Humidity</b> | <b>40%</b>              |                    |
| <b>Temperature</b>           | <b>40%</b>              |                    |
| <b>Air Pollution</b>         | <b>20%</b>              |                    |

## Weather and Environmental Conditions:

| Rain and Temperature                               |                       |           |
|----------------------------------------------------|-----------------------|-----------|
| 26 October 2023                                    |                       |           |
| Meteorological Station: Cyprus, Limassol, New Port |                       |           |
| Max. Temperature (°C)                              | Min. Temperature (°C) | Rain (mm) |
| 28.7                                               | 17.8                  | 0.0       |

| Pollution Level (µg/m³)       |          |              |               |               |
|-------------------------------|----------|--------------|---------------|---------------|
| Pollutant                     | Low (1)  | Moderate (2) | High (3)      | Very High (4) |
| PM <sub>10</sub>              | 0 - 50   | 50 - 100     | 100 - 200     | > 200         |
| PM <sub>2.5</sub>             | 0 - 25   | 25 - 50      | 50 - 100      | > 100         |
| O <sub>3</sub>                | 0 - 100  | 100 - 140    | 140 - 180     | > 180         |
| NO <sub>2</sub>               | 0 - 100  | 100 - 150    | 150 - 200     | > 200         |
| SO <sub>2</sub>               | 0 - 150  | 150 - 250    | 250 - 350     | > 350         |
| CO                            | 0 - 7000 | 7000 - 15000 | 15000 - 20000 | > 20000       |
| C <sub>6</sub> H <sub>6</sub> | 0 - 5    | 5 - 10       | 10 - 15       | > 15          |

| Air Pollution            |                            |
|--------------------------|----------------------------|
| 26 October 2023          |                            |
| Limassol Traffic Station |                            |
| Pollutant                | Date: 9/1/23<br>Time: 8:00 |
| PM10                     | 39.9                       |
| PM2.5                    | 18.3                       |
| O3                       | 4.4                        |
| NO2                      | 80.7                       |
| SO2                      | 4.5                        |

| 9-13 January 2023        |                               |                                |                                |                                |                                |
|--------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Limassol Traffic Station |                               |                                |                                |                                |                                |
| Pollutant                | Date:<br>9/1/23<br>Time: 8:00 | Date:<br>10/1/23<br>Time: 8:00 | Date:<br>11/1/23<br>Time: 8:00 | Date:<br>12/1/23<br>Time: 8:00 | Date:<br>13/1/23<br>Time: 8:00 |
| PM10                     | 39.9                          | 70                             | 49.4                           | 19.3                           | 19.3                           |
| PM2.5                    | 18.3                          | 25.7                           | 17.9                           | 7.4                            | 7.4                            |
| O3                       | 4.4                           | 3                              | 13.1                           | 46.1                           | 46.1                           |
| NO2                      | 80.7                          | 85.9                           | 81.6                           | 40.2                           | 40.2                           |
| SO2                      | 4.5                           | 7.6                            | 3.9                            | 1                              | 1                              |

| Pollution Level (µg/m³)       |          |              |               |               |
|-------------------------------|----------|--------------|---------------|---------------|
| Pollutant                     | Low (1)  | Moderate (2) | High (3)      | Very High (4) |
| PM <sub>10</sub>              | 0 - 50   | 50 - 100     | 100 - 200     | > 200         |
| PM <sub>2.5</sub>             | 0 - 25   | 25 - 50      | 50 - 100      | > 100         |
| O <sub>3</sub>                | 0 - 100  | 100 - 140    | 140 - 180     | > 180         |
| NO <sub>2</sub>               | 0 - 100  | 100 - 150    | 150 - 200     | > 200         |
| SO <sub>2</sub>               | 0 - 150  | 150 - 250    | 250 - 350     | > 350         |
| CO                            | 0 - 7000 | 7000 - 15000 | 15000 - 20000 | > 20000       |
| C <sub>6</sub> H <sub>6</sub> | 0 - 5    | 5 - 10       | 10 - 15       | > 15          |

Air Pollution in Cyprus: <https://www.airquality.dli.mlsi.gov.cy/>

| 9-13 January 2023                                  |                       |                       |           |
|----------------------------------------------------|-----------------------|-----------------------|-----------|
| Meteorological Station: Cyprus, Limassol, New Port |                       |                       |           |
| Day                                                | Max. Temperature (°C) | Min. Temperature (°C) | Rain (mm) |
| 9                                                  | 17.6                  | 8.1                   | 0.0       |
| 10                                                 | 18.1                  | 7.0                   | 0.0       |
| 11                                                 | 18.3                  | 10.6                  | 17.8      |
| 12                                                 | 16.5                  | 10.4                  | 39.7      |
| 13                                                 | 15.5                  | 7.1                   | 3.8       |

Meteorological Stations in Cyprus:  
[https://www.moa.gov.cy/moa/dm/dm.nsf/automaticdata\\_en/automaticdata\\_en?OpenDocument](https://www.moa.gov.cy/moa/dm/dm.nsf/automaticdata_en/automaticdata_en?OpenDocument)

**Software:**

| <b>Parameter</b>                                                                                | <b>Complexity Value</b> | <b>Description</b>                                                     |
|-------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------|
| <b>Licence for Software to be used</b>                                                          | <b>0%</b>               | <b>License was available for both Photogrammetry and TLS software.</b> |
| <b>Precision of multisensor system under different environment conditions</b>                   | <b>40%</b>              |                                                                        |
| <b>Usability - Communication/Transfer of Data/Battery/Available Storage</b>                     | <b>20%</b>              |                                                                        |
| <b>Efficiency - Speed of Data Acquisition in relation to Software &amp; Hardware - Accuracy</b> | <b>20%</b>              |                                                                        |
| <b>Sensor Integration</b>                                                                       | <b>40%</b>              |                                                                        |

**Hardware:**

| <b>Parameter</b>                                                                                | <b>Complexity Value</b> | <b>Description</b>                                                     |
|-------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------|
| <b>Licence for Hardware to be used</b>                                                          | <b>0%</b>               | <b>License was available for both Photogrammetry and TLS hardware.</b> |
| <b>Precision of multisensor system under different environment conditions</b>                   | <b>40%</b>              |                                                                        |
| <b>Usability - Communication/Transfer of Data/Battery/Available Storage</b>                     | <b>20%</b>              |                                                                        |
| <b>Efficiency - Speed of Data Acquisition in relation to Software &amp; Hardware - Accuracy</b> | <b>20%</b>              |                                                                        |
| <b>Sensor Integration</b>                                                                       | <b>40%</b>              |                                                                        |



**Pre-processing:**

| <b>Parameter</b> | <b>Software</b> | <b>Hardware</b> | <b>Description</b>    |
|------------------|-----------------|-----------------|-----------------------|
| <b>Layer 1</b>   | 100.0%          | 10.0%           | <b>PC Workstation</b> |
| <b>Layer 2</b>   | 100.0%          | 10.0%           |                       |
| <b>Layer 3</b>   | 100.0%          | 100.0%          |                       |
| <b>Layer 4</b>   | 100.0%          | 10.0%           |                       |
| <b>Layer 5</b>   | 100.0%          | 10.0%           |                       |