Establishment of Eastern Mediterranean Regional Network: pooling, sharing, development of innovative face-to-face and digital training/mentoring tools for the maritime sector

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D5.4 Become a Digital Expert for a Day – Round 1	
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[1] **R**=Document, report; **DEM**=Demonstrator, pilot, prototype; **DEC**=website, patent fillings, videos, etc.; **OTHER**=other

[2] **PU**=Public, **CO**=Confidential, only for members of the consortium (including the Commission Services), **CI**=Classified, as referred to in Commission Decision 2001/844/EC

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Acronyms and Abbreviations

CPA	Cyprus Port Authority
ECR	Engine Control Room
ER	Engine Room
MP	Mega Pixel
POV	Point of View
SoE	Sea of Experience
VTS	Vessel Traffic Service

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Executive Summary

This document is dedicated to the "Become a Digital Expert for a Day" of the Sea of Experience (SoE) project. This deliverable is a demonstrator, and the developed material is in digital format which is accessible online. The aim of this report is to describe the approach and tools used for the development and production of the 360° videos, as well as their content. In addition, this report contains information on the location and persons that were approach in order to implement the necessary activities. Finally, the timeline of the on-site visits that were conducted to produce the first four (4) videos, as well as an indicative time-plan for the production of the remaining six (6) is included.

The 360 Virtual Visits videos for the 10 profession of the blue economy; deck officer, engineering officer, electro/technical officer, stevedore, harbour master, cook, hotel attendant, naval architect, welder, and marine surveyor are being selected to be in line with the educational activities map (D2.1) that had already been contacted. This is the first version of the deliverable, where the progress of the activity as of April 2021 is presented. In this version, the following four (4) blue professions were considered:

- Welder,
- Naval Architect,
- Stevedore/ Crane Operator,
- Harbour Master.

The content and the production procedure for the remaining six (6) professions will be included in the second version of this deliverable.

This report contains an introduction that describes the scope and purpose of this deliverable, followed by the descriptions of the content created and the user experience. Then, the structure of the videos is described in detail, including the utilities and tools used for development and production. Finally, the locations where each video was filmed, the interviews with professionals that took place, and the clickable material that is included are described.

This deliverable will be used as the baseline for the face-to-face sharing-storytelling (WP4) and the digital sharing- storytelling (WP5). In other words, the report can be used as the centrepiece of several activities, both physical and digital, that will be conducted, and will involve the engagement of experienced teachers and lecturers from the maritime sector that will be selected (with specific criteria) from a database developed by Sea of Experience. The target groups will be students (ages 15-18), undergraduate and postgraduate students, as well as young professionals from the East Mediterranean region.

The 360 virtual visits videos (with the technical requirements and specifications), is prepared by the Cyprus Marine and Maritime Institute (CMMI) WP5 Deliverable 5.4, proposed by the lead beneficiary of WP5 and the lead partner of the consortium. The completed productions are approved by the partnership. The document shall be updated, according to the implementation phase of the project The content is available through the following link: https://www.virtualcyprus.cy/cmmi.virtualcyprus.cy/

1. Introduction

In the context of D5.2 “Become a Digital Expert for a Day”, ten (10) 360-degree and Virtual Reality (VR) videos are being produced. These ten (10) videos will correspond to the ten (10) selected maritime professions, as described in the D2.3 “Identification of teachers’ / mentors’ profile”.

The aim for these videos is to show the real workplace, the working environment, and duties, of the selected maritime professions. In this way, youngsters will have the opportunity to get in touch with experts in these blue careers, that they would not be able to otherwise. The videos are intended to be as realistic as possible, simulating the actual working environment, depicting employees working with the appropriate clothing and protection, and keeping the sound as it is.

This highly innovative digital module of the Sharing- Pooling platform presents multiple applications. For example, a high-school teacher may present 360° virtual visit videos to his/her classroom concerning the daily work routine/ duties and working environment of different professionals increasing the visibility and the attractiveness of blue careers. In addition, a European academic entity outside the EMBN will be able to connect to this platform, be an additional member of the established network, transfer and implement the novel innovative training/mentoring tools in its country and thus more synergies and cooperation will be promoted. The “become of a digital expert for a day” activity is not a substitute to the respective face to face one but rather a complement to it.

As of April 2021, four (4) videos have been developed while the remaining ten (10) will be developed within the next year. This report includes the approach followed regarding the first four (4) professions that were selected. The second version of this deliverable will include the relevant description for the remaining six (6) professions as well as any changes or addition in the existing four (4). The current timetable for the development of the remaining 360° videos is presented in Table 1, yet covid-19 related restrictions may require alterations on this initial planning.

Table 1 Timetable with indicative Scenarios for the 10 Videos

No	Sector	Relevant Professions	Narrative	Type	Country	Delivery Date
1	Maritime Transport	Engineering Officer [E/R]	Familiarization with the E/R and Control Room layouts and the most significant equipment	360 of E/R	CY	February 2022
2	Maritime Transport	Electro/Technical Officer	Familiarization with the role of the ETO and respective equipment onboard [Main Switch Board, Main consumers]	360 of E/R	CY	February 2022
3	Maritime Transport	Deck Officer	Familiarization with the bridge layout and the included equipment (e.g., navigational equipment,	360	CY	February 2022

			communication system etc.) as well as with the deck layout including mooring equipment/ crane / Safety equipment.			
4	Cruise Industry	Cook	Familiarization with the galley of a cruise vessel	360	CY	February 2022
5	Cruise Industry	Hotel/Room Attendant	Familiarization with the hotel, casino, café, restaurant layout of a cruise ship	360	CY	February 2022
6	Port Operations	Stevedore/ Crane operator	Overview of the loading/unloading containership process from dock to stowaway (and vice versa)	360	CY	April 2021
7	Port Operations	Harbour Master/ Terminal Manager	Overview of the loading/unloading process from ship to dock (and vice versa)	360	CY	April 2021
		Harbour Master	Office space layout (incl. VTS)	360	CY	April 2021
8	Shipbuilding/Ship Repair	Naval Architect	Familiarization of the layout of a shipyard during related activities (dry docking, equipment installation)	360	CY/GR	April 2021
9	Shipbuilding/Ship Repair	Marine Surveyor	Inspection/Survey (hull, machinery, equipment, LSA)	360	CY/GR	February 2022
10	Shipbuilding/Ship Repair	Welder	Ship related welding processes	360	CY/GR	April 2021

This report includes all the necessary information regarding the filming process. First, the user experience is explained followed by the development process, including the hardware and software used. Then, the selected locations for the filming process are presented.

2. Description of the 360º videos

The 360-degree videos, known as immersive videos or spherical videos, are video recordings where a view in every direction is recorded at the same time, shot using an omnidirectional camera or a collection of cameras. During playback on normal flat display the viewer has control of the viewing direction like a panorama. It can also be played on a displays or projectors arranged in a sphere or some part of a sphere. 360° virtual visits consist of a photogrammetric scanning and this is the main concept and approach that we have envisioned and developed these videos starting from the aerial views. In its essence, it uses digital pixels of the DSLR images to reconstruct objects in 3D achieving extra high-quality model textures. Latest developments in Computer Vision allowed this technology to reach extreme geometrical detail, while maintaining photorealistic high-resolution colour information.

More specific each of the profession corresponds to a standalone 360º virtual visit video, following a comprehensive approach of the 360 working environment of each profession which includes audio and a detailed view of educational information in an interactive way due to the clickable PopUps. PopUps are informational windows (Hotspots) which are integrated inside each of the 360º Virtual Visit. In each video there is a minimum a set of five clickable popups which are populated in specific area of the working environment to show what are the main duties of each profession following mostly a content:

- 360º film
- An interview from a professional
- YouTube Footages
- Pdfs material from publicly available sources
- Compatible with any VR headset
- Audio (either captured on-site or from similar site when necessary)

The videos commence with the aerial views where the user should be able to choose the point for the profession that direct him/her to the 360º virtual visit video. The 360º virtual visit tour (for each profession) provides a walkthrough environment in different points that are available once the user clicks on the PopUps- informative windows.

2.1. Structure of the content

Each of the ten (10) videos is realized as a 360-degree digital replica of the actual worksite corresponding to each profession. All videos are integrated in a single environment, implemented as a web-application, allowing the user to navigate between all professions. The videos are structured in a three-layer format shown in Figure 1. The three (3) layers are presented and explained below:

Layer 1 – Aerial Views. This layer includes aerial views of the worksites, from which the user can easily navigate through the distinct professions and locations. In this layer, the user can either change his point of view (POV) from the existing to another aerial view or select a profession to explore.

Layer 2 – Professions. This layer includes two or more different POVs for each profession, depending on the complexity of the worksite, from which the user can explore the virtual worksite. In addition, each POV features several labelled pop-up points, offering enhanced information about a process or an element that is included in the digitalized environment. The type of these clickable pop-ups is either video format, .pdfs, or hyperlinks to external websites with relevant information. In this layer, the user can either select to position his/her virtual self on different POVs or select a pop-up point for more details on a specific element.

Layer 3 – Pop-up Points. This layer includes the pop-up points that are available for each profession. Pop-up points include a 360° video showing the worksite while work is in progress, a video interview with a professional describing the profession and their perspective on it, and several videos and other material relevant to different elements on the worksite (e.g., video of container lashing for the stevedore).

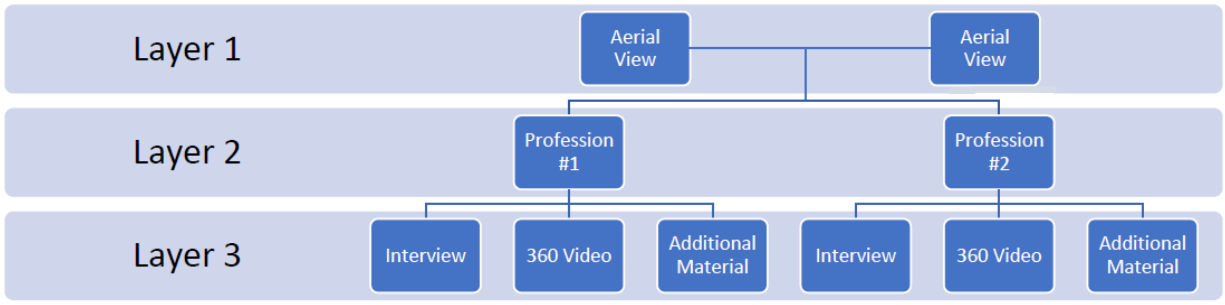


Figure 1 Structure of the content

3. Development and Production

For the development of the videos, 2 digital cameras (Canon 6D), 2 different lenses (1 Samyang 8mm and one Canon 8-15mm), a tripod, an Insta 360 OneX camera, and a GoPro Max camera were used.

The production of the videos initiated in January 2021, when the first opportunity midst the covid-19 restrictions was presented and lasted until April 2021. In addition to providing the physical worksites for the purposes of Sea of Experience, the close collaboration with Multimarine and Eurogate, located at the port of Limassol, was of paramount importance to schedule the dates when the filming was conducted.

To develop the virtual tour and the 360° videos a number of software solutions were used. The 360° pictures that were captured, were colour corrected and expressed as Full High Dynamic through the Adobe Lightroom software. Then, Autopano Giga was used to develop the complete 360° panoramic view. At this stage, Adobe Photoshop was used to make all necessary corrections in picture quality, as well as to remove any unwanted items. The 360° videos that are included for each profession are edited in Adobe Premier Pro. Finally, Panotour Pro was used to implement the virtual tour, including the additional material (layer 3).

3.1. Utilities and Tools used

The software and hardware used for the development and production of the content are included in Table 3 below.

Table 2: Technical Aspects and Specifications Details:

Technical Aspect	Specifications Details
360o Virtual Visits (at a minimum 10 different locations)	Up to 10-15 x 360o Multiresolution Tours per location or equivalent depending on space needs and level of detail *required. All 360o Panoramas (2x1 Equirectangular) done in DSLR Full Frame RAW Format 14.5K / 105MP. 10 x Customized Navigation Interfaces (UI) for 360o Interactivity and integration of Hotspots for each of the ten (10) locations. 5 x PopUps/Info windows (Hotspots) integration inside each of the 360o Virtual Visit/Location.
Encoding and Transcoding platforms for VR and 360° video	**High-quality and high-compression HEVC encoder optimized for 360° video**
	Support for conversion of spherical projection formats
	Ready for tiled and segmented encoding workflows
Equipment used:	1x Canon 6D DSLR 1x Canon 5D DSLR 1x Insta 360 OneX 1x GoPro Max 360°

	Lenses: Canon 8-15mm fish eye Samyang 8mm fish eye
	Drone: DJI Mavic 2 Pro
Software used	Adobe Lightroom with LR Enfuse Adobe Photoshop CC 2019 with 3D Spherical Panorama Adobe Premier Pro CC 2018 Autopano Giga with Papywizard plugin Panotour Pro XML Pano

3.2. Filming Locations

For the first round of videos the objective was to implement the development of the specific films taking into consideration the four (4) blue professions of (i) Welder, (ii) Naval Architect (iii) Stevedore/ Crane Operator, (iv) Harbour Master corresponding to the following domains: Port Operations, Ship Building – Repair – Dismantling and Maritime transport.

The facilities, that the filming process took place, are located at the port of Limassol, Cyprus. The port professions, i.e., harbour master and crane operator, were filmed at the Eurogate Container Terminal of Limassol. The videos, related to the professions of the shipbuilding and ship repair industry, were filmed at the premises of the Multimarine Shipyards Ltd.

The profession of stevedore includes two (2) POVs, one from the crane's operator's console and one from ground level. The profession of harbour master was depicted at the office, including two (2) POVs. For the naval architect's profession, it was selected to show its duties at a dry dock through three (3) different POVs, and the welder's profession, at the welding workshop of a shipyard shown through two (2) POVs.

CMMI keeps close contacts with the Cyprus Port Authority (CPA) as well as with the companies that are located in the Limassol Port. There has been a written communication with all stakeholders which were involved in terms of our intention for the production in the content of the Sea of Experience project and the necessary licenses were acquired to be contacted the whole production of the footage. The main stakeholders were the Cyprus Port Authority[3] as well as EUROGATE Container Terminal Limassol Limited[4] and Multimarine Shipyard Services Ltd[5]. It is worth to mention that before the publication of every material during this period we received a written approval from all the public and private companies that were been involved in this activity.

The timeline of the filming process, including all actions taken to produce the videos, are presented in Table 2 below:

[3] Limassol Port Cyprus - Port Traffic, Port Map, Terminals (portoflimassol.com)

[4] Eurogate Limassol

[5] Multimarine Services Ltd

Table 2 Timeline of the filming process

Date	Action	Company	Location
17.2.2021	SoE 360o VV videos induction visit	Multimarine Services Ltd	Limassol Port
17.2.2021	SoE 360o VV videos induction visit	EUROGATE Container Terminal Limassol Limited	Limassol Port
23.02. 2021	Harbour Master and Stevedore: with a done an aerial view 360° panoramic and footages of the 2 professions	Multimarine Services Ltd	Limassol Port
23.02.2021	Harbour Master and Stevedore: interviews of the 2 professions	Multimarine Services Ltd	Limassol Port
24.02.2021	Harbour Master and Stevedore: with a drone an aerial view 360° panoramic and footages of the 2 professions	Multimarine Services Ltd	Limassol Port
24.02.2021	Harbour Master and Stevedore: interviews and footages of the 2 professions	Multimarine Services Ltd	Limassol Port
25.02.2021	Naval Architect & Welder: with a drone an aerial view 360° panoramic & photography and footages of the 2 professions	EUROGATE Container Terminal Limassol Limited	Limassol Port
25.02.2021	Naval Architect & Welder: interviews of the 2 professions	EUROGATE Container Terminal Limassol Limited	Limassol Port
26.02.2021	Naval Architect & Welder: with a drone an aerial view 360° panoramic & photography and footages of the 2 professions	EUROGATE Container Terminal Limassol Limited	Limassol Port
26.02.2021	Naval Architect & Welder: interviews and footages of the 2 professions	EUROGATE Container Terminal Limassol Limited	Limassol Port
24.03. 2021	SoE _Welder / Naval Architect Adjustments interview and footages	Multimarine Services ltd	Limassol Port
24.03. 2021	Harbour Master and Stevedore: Adjustment's interview and footages	EUROGATE Container Terminal Limassol Limited	Limassol Port

4. Additional Content

Currently, the Virtual Tour is hosted on V.P. Virtual Cyprus Lab Ltd (commercial known as "The 360 Production") servers and the process of transferring the host to APOPSI SA server is ongoing. The content is available through the following link:

https://www.virtualcyprus.cy/cmmi.virtualcyprus.cy/

The next paragraphs provide more specific details on the content that is included in the Virtual Tour.

4.1. 360° Video Recordings

To enhance the experience of the 360° Virtual Tour, one 360° video for each profession was captured and included as a PopUp. These videos aim to provide a fully immersive experience to the user by presenting the simulated work environment during actual operation. These videos are not a substitute for the Virtual Tour, where the user can easily explore the surrounding environment, but depict the fast pace of work during operations.

4.2. Interviews with experts

The interviews contacted in three phases. On the first stage the External Expert Nikolas Karatzias and the 360o production company in collaboration with the CMMI team had an introductory visit to Limassol Port for presenting the plan for the creation of the short films to the companies and talk to the experts would be interviewed. The second phase was conducted with the external experts of CMMI and the CMMI team in the Limassol Port premises during the last week of February. During this phase the film crew and the expert who was contacting the interviews were collaborating together with the respective professionals of the companies in order to cover the aerial view of the port to take photos and footage the specific working environment of the four (4) professions. Within the last phase the crew filming elaborated on the final adjustments after the feedback received from the CMMI and the rest of the Sea of Experience consortium in order to be completed in a comprehensive way.

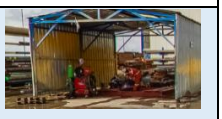
4.3. Added Content

The corresponding content (.pdfs, videos) of the PopUps informative windows can be found in ANNEX 1.

5. ANNEXES

Annex 1: Added Content

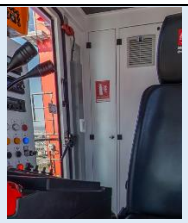
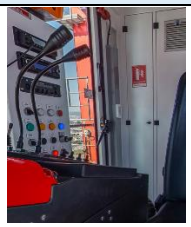
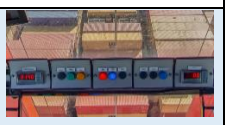
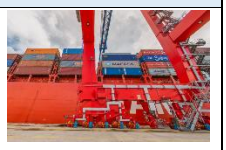
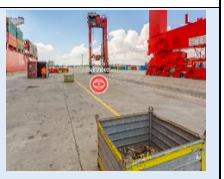
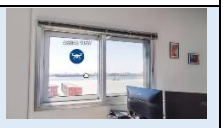
Table 3 Content for the Shipbuilding and Ship Repair Domain

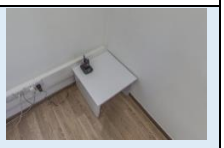
Domain	Profession	PoV	Label	Type of file	Link	Location
Ship Building and Ship Repair	Welder	Welder A	Personal Protective Equipment	Video	link	
Ship Building and Ship Repair	Welder	Welder A	Oxyacetylene welding	Video	link	
Ship Building and Ship Repair	Welder	Welder A	GMAW/MIG welding	Video	link	
Ship Building and Ship Repair	Welder	Welder A	Metal extrusion machine	Label only		
Ship Building and Ship Repair	Welder	Welder B	Underwater welding	Video	link	
Ship Building and Ship Repair	Welder	Welder B	Welding in Vessels	Video	link	
Ship Building and Ship Repair	Welder	Welder B	Welding techniques and materials	.pdf	link	
Ship Building and Ship Repair	Welder	Welder B	Weld quality control	Video	link	
Ship Building and Ship Repair	Welder	On Avatar	*Photo of the interviewee*	Video		

Ship Building and Ship Repair	Naval Architect	Naval B	Hull painting	Video	link	
Ship Building and Ship Repair	Naval Architect	Naval B	Ship dry docking	video time-lapse	link	
Ship Building and Ship Repair	Naval Architect	Naval A	Life-Saving Appliances	Video	link	
Ship Building and Ship Repair	Naval Architect	Naval A	Ship types	Video	link	
Ship Building and Ship Repair	Naval Architect	Naval A	Dry Dock	.pdf	link	
Ship Building and Ship Repair	Naval Architect	Naval B	Azimuth Thruster	Video	link	
Ship Building and Ship Repair	Naval Architect	Below the vessel	Blocks of dry docking	.pdf	link	
Ship Building and Ship Repair	Naval Architect	On Avatar	Photo of the interviewee	Video		

Table 4 Content for the Port Operation Domain

Domain	Profession	PoV	Label	Type of file	Link	Location
Port Operations	Crane Operator	Crane Op. A	Container Lashing	Video	link	

Port Operations	Crane Operator	Crane Op. A	CCTV	Label only		
Port Operations	Crane Operator	Crane Op. A	Fire Extinguisher	Label only		
Port Operations	Crane Operator	Crane Op. A	Phone	Video	link	
Port Operations	Crane Operator	Crane Op. A	Height & Weight Measurement	Label only		
Port Operations	Crane Operator	Crane Op. B	Loading & unloading of the containers	Video	link	
Port Operations	Crane Operator	Crane Op. B	Storage of the containers	Video	link	
Port Operations	Crane Operator	On Avatar	Photo of the interviewer	Video		
Port Operations	Harbour Master	Harbour M. A	Ship Berthing	video	link	
Port Operations	Harbour Master	Harbour M. A	Safety at ports	.pdf	link	
Port Operations	Harbour Master	Harbour M. A	Logistics of a port	Video	link	

Port Operations	Harbour Master	Harbour M. B	Maritime Single Window	. pdf	link	
Port Operations	Harbour Master	Harbour M. B		Video	link	
Port Operations	Harbour Master	On Avatar	Photo of the interviewer	Video		