

# THE DEEP MED VR EXPERIENCE

A virtual reality immersion in the depths of the sea



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## COVER LETTER

In July 2019, we carried out with my company Andromede Oceanologie the expedition **"Gombessa V: The Deep Med"**.

First in the world, Gombessa V has for objective to study, illustrate and make known the unknown part of the underwater treasures of the Mediterranean: its deep reefs beyond the limits of traditional scuba diving. It is a real technical challenge in the service of knowledge, but also a human and sports challenge.

Two of our previous expeditions have already been made in virtual reality, "[Antarctica](#)" and "[700 Sharks](#)". These visual and aural experiences, which immerse the spectator in an artificial world, have allowed us to communicate to the public our most committed dives. To discover that, thanks to new technologies, the spectator shares with us our excitement, doubts, laughter and fears, diving into the night in the middle of a pack of hundreds of sharks is one of the highlights of the post-expedition time.

For this new expedition, I wanted to go deeper into the process and further explore the potential of virtual reality. For several years, we have been developing at Andromede Oceanologie a specific

photogrammetry technique that will allow us to reconstruct in 3 dimensions the main part of the luxuriant ecosystems visited during the unprecedented deep dives of Gombessa V. This technique will bring the spectators as close as possible to the life, in the beauty of the infinitely small.

For this new expedition, I am also keen to share the experience we will have inside an extraordinary diving station, whose setting is comparable to a spaceship, and to explain the physiological issues involved in this type of atypical diving, known as "saturation diving".

Finally, I am convinced, particularly on the basis of our previous experiences, of the value of this innovative approach to restoring the former glory of the Mediterranean Sea and to raise awareness of its necessary protection.

Thank you in advance for your interest in this project.

I wish you a pleasant reading.

Laurent Ballesta

## ◎ BACKGROUND NOTE

The Gombessa V expedition is made possible by the unique combination of two types of dives: scuba diving and saturation diving.

**Scuba diving** developed in the 1950s under the leadership of Captain Cousteau. The autonomous diving suit offered divers complete freedom of movement conducive to exploring the seabed but with time of diving reduced to 2 hours. In the early 2000s and with the advent of technology, electronic recyclers developed and have considerably increased the divers' autonomy (up to 6 hours). Despite these improvements, autonomous rebreather divers cannot free themselves from decompression stops, i.e. the time spent at certain depths to reduce the nitrogen and helium levels remaining in human tissues. For example, staying 20 minutes at 100 meters requires 4 hours of decompression time.

**Saturation diving** has existed since the 1960s and has been developed in particular to free itself from stops and avoid decompression sickness.

Originally intended for the exploitation of underwater resources, more particularly hydrocarbons, it consists in keeping worker divers under pressure in a life chamber throughout the duration of their work. Dive times are no longer limited but the diver, when he goes out to work, is permanently connected to his life box by an "umbilical" cable, thus limiting his movements to a few dozen meters. The decompression is only done at the end of the work, in the box, and can last several days. France was a pioneer in saturation diving and has trained thousands of divers from all over the world. The Compagnie Maritime d'Expertises (COMEX) and the National Institute for Professional Diving (INPP), based in Marseille, have invented and patented saturation diving techniques. Today, INPP remains one of the last training centres in the world.

**For the first time**, these two types of diving will be combined in the Gombessa V expedition, which will undoubtedly be a landmark in the history of diving and underwater exploration.



## ◎ SUMMARY NOTE

### Synopsis

In July 2019, the team of diver-photographer Laurent Ballesta spent 28 days at saturation in a pressurized cockpit allowing them to access the 100 m deep zone as they wished, freely and without time limit. They carried out original scientific experiments and brought back rare, incredible images of the **deep underwater landscapes of the Mediterranean**.

With THE DEEP MED VR EXPERIENCE project, we propose to experience this **unique human adventure** that only our four experienced divers can experience. This trip, close to the conditions of space exploration, will offer pure moments of discovery in the heart of our still little known underwater heritage.

### Concept

THE DEEP MED VR EXPERIENCE is an **immersive and interactive virtual reality experience** to discover the Mediterranean Sea at a depth of more than 100 meters.

The course consists of 3 phases that recreate the adventure of the four divers:

- 1- The phase of **the diving station** to measure the challenges of the mission and experience life in a pressurized space.
- 2- The phase of the **descent to the depths** of the Mediterranean.
- 3- The phase **to explore and discover** the fabulous seabed.

**Expected duration:** 15-20 minutes

**Languages:** English

**Writers:** Andrés Jarach & Gil Kébaïli

**Direction:** Andrés Jarach

**Production:** Les Gens Bien - Vivien Lemaignan

**Studio:** Novelab

## ◎ SUMMARY NOTE

### The experience

The Deep Med VR is an in situ installation that combines an **interactive experience** and a **360° film**. A simplified version is available for content platforms.

It is a **multiplayer experience**: like Laurent Ballesta's team, 4 people share a moment in the station and dive in to discover the depths. They can communicate with each other by voice.

The experience is aimed at a **large, international audience** of all ages, eager to explore new territories.

### Distribution

This experience will be declined in several versions specific to the different distribution channels:

- an **installation version** for museums, aquariums and festivals
- a **simplified version** for equipped users
- a **360° documentary version** for content platforms

### Partners

**ANDROMEDE OCEANOLOGIE**, a consulting agency specialized in underwater ecosystems and founded by Laurent Ballesta, co-producers of the project

**NOVELAB**, creative studio specialized in immersive experiences (Notes on Blindness, Spheres...)

**BLANCPAIN** who supports the Gombessa V expedition

**USHUAIA TV**, which has granted us development aid

**The CNC**, which has granted us development aid

**NAUSICAA, Océanopolis and the Oceanographic Museum of Monaco** who have shown their interest in the project

**ARTE**, with whom we would like to collaborate

**HTC Vive**, with whom we would like to develop a partnership

### Creative team

Written and directed by **Andrès Jarach**, author-director of documentaries - linear, interactive, immersive - in particular for Arte and France Télévisions.

co-written by **Gil Kébaïli**, director of the 90-minute film and produced by **Les gens bien productions**.

## ◎ PRODUCER'S NOTE

The DEEP MED VR project is in line with our collaboration with the explorer Laurent Ballesta for nearly 10 years. Partners in its last 4 expeditions, called «Gombessa», we have followed the development of this project since its inception and are now proud to develop with Andromede Oceanologie a complementary and **ambitious immersive experience** of this extraordinary expedition.

While we are now able to go into space to approach the stars, we unfortunately know too little about our seas, oceans and deep seabeds. The DEEP MED VR project thus aims to make people discover **this still secret and little explored Big Blue** sea and share the unique emotion of discovering a new territory.

The expedition will be the subject of a **90-minute film** broadcast in prime time on ARTE and directed by Gil Kébaïli, Laurent Ballesta's loyal collaborator for more than 20 years on the Ushuaïa shows, director and/or co-author of the 4 films retracing his previous expeditions (*The Coelacanth, a plunge towards our origins* (2013), *The Grouper Mystery* (2015), *Antarctica* (2016) and *700 Sharks* (2018)).

In parallel with the film, it seemed relevant to us, with Laurent, to develop an independent VR project, aimed in particular at **museums, aquariums and festivals**, to transmit and popularize to the public the multiple facets of the project:

- the **collective life aboard a «saturation» diving station** and the **physiological implications** that result from it;
- a **scientific mission** that is in line with Commander Cousteau's expeditions;
- a journey to the deepest depths to meet **amazing and unknown species**;
- a strong **ecological message** on the beauty and fragility of the Mediterranean.

The purpose, the innovative format and the heritage character of the project - **a world first!** - very quickly seduced our first French partners (Oceanopolis in Brest, the Oceanographic Museum of Monaco, Nausicaa in Boulogne-sur-Mer, Blancpain...), which confirmed our desire to create an innovative immersive installation, commensurate with the expedition and its meaning in the history of underwater exploration.

While we have in-house expertise in the production and post-production of documentary films, we are still newcomers in the technologies and narrative methods specific to VR. We have therefore sought to surround ourselves with **experienced and recognized professionals** to accompany us in this adventure, which we hope will augur well for new projects in the future.

Laurent, Gil and I first met the author and director **Andrès Jarach**, whose experience in this field is no longer to be

## ◎ PRODUCER'S NOTE

proven. His understanding of the project, his author's eye and his enthusiasm allowed us to translate our desires into a new form of narrative, specific to virtual reality and to design the most appropriate installation for the project: **multiplayer** to be as close as possible to the experience lived by the 4 divers, in **real time 3D** to be fully immersed in the scenery and sensations, in **360° film** to find Laurent at -100m and become aware of the danger and the unique nature of this type of diving.

On Andrès' advice, we also approached the **Novelab creative studio**, which, thanks to the diversity and quality of their work, seemed to us to be the ideal partner to successfully complete our extraordinary project. Their technical skills, their creative opinions but also their great knowledge of the market have enabled us to refine the contours of the experience and its variations.

Planète Méditerranée VR is therefore a complex, multifaceted and audacious project. The **French National Film Centre** has already given us its trust by supporting us in the development of a prototype.

We hope to convince the **ARTE** broadcaster (who will broadcast the 90-minute film in September 2020) and the actors in the virtual headset industry to bet with us on the potential of such an experience.

We will also be able to count on the support of **Blancpain**, Laurent Ballesta's partner since 2013 and main sponsor of the Gombessa V expedition, as well as the participation of French museums and aquariums (Océanopolis, Nausicaa, Musée Océanographique de Monaco), who have already attested their interest for the project.

In order to complete the financing of the project and to promote the experience abroad, we are currently looking for **foreign partners**.

In concrete terms, the support of the various financial partners will enable us to enter a new development phase and produce a **full version of the experience** from the prototype we have developed (currently being finished).

Vivien Lemaignan - *Producer*



## ◉ WRITER'S STATEMENT

I've always dreamed of going to Mars. But it has always been a dream. I am one of those who say to themselves, "I will never go". I have to say, my adventurous mind turns short: I am afraid of heights, I am not athletic, I only travel for work and... I do not dive otherwise than with my children's tuba which always ends up taking water.

When Laurent, Gil and Vivien suggested that I think with them of an immersive work from their adventure, I first thought that it wasn't for me. That it was far from my world... "saturation diving in the Mediterranean Sea for 28 days! ».

And then I saw myself as a child in front of my television in Buenos Aires, Argentina. Every Thursday evening, I followed the adventures of a man in a red hat, lined in Spanish with a French accent. He fascinated me as much as he made me discover: distant underwater depths. This is probably my first documentary memory. Commander Cousteau's films.

So, very enthusiastic, I let myself be embarked on the adventure. In my own way. With a virtual reality experience that offers in a short period of time sensations and emotions that I particularly like: exploration, humour, scientific discovery and wonder... Without any danger!

The meeting with Gil Kébaïli was decisive. Immediately, I understood that we spoke the same language for the project. Gil quenched my fear of venturing into a project without much knowledge of the scientific content or the underwater environment. "That's what to explore! "With his experience as a film director for this kind of project, the exchange quickly took on the appearance of writing. He brought me his years of experience and knowledge of the expedition. And it was with his complicity that we set up the shooting, during the expedition, of the 360° "conservatory images" that only the team's diver-operator, Yanick Gentil, could produce.

Laurent, Antonin, Thibault and Yanick locked themselves in a pressure chamber for 28 days this summer to have a freedom of exploration at a depth of 100m that has never been achieved. They are real adventurers whom I will be able to accompany from a distance. They are photographers, biologists or underwater cameramen.

This voluntary confinement and this physical challenge are at the service of a vast scientific mission to reveal new landforms and to study little-known ecosystems (the coralligenous in particular). It is also a question of understanding what is called the "twilight zone", an area where less than 1% of the light reaches and which could be a refuge zone for many species.

## ◉ WRITER'S STATEMENT

With THE DEEP MED VR, I would like to propose to experiment the whole expedition, to put us literally in their place. We won't be watching our television in Argentina, we'll be with them. We'll have the same experience as them, but without being wet with a single drop of salt water!

In concrete terms, it is a question of modelling the INPP (Institut National de Plongée Professionnelle) saturation diving station in which the 4 divers lived in order to be able to evolve indoors. Feel the pressure, interact with the cabin. Apprehend and test this confined space. This will be the time to measure the challenges of the mission and put ourselves in their shoes, with physiological tests and funny moments.

Then we will leave in the depths where two moments of exploration will be possible:

- In 3D: Becoming very small by changing scale, to the point of sneaking through a coralligenous reef and travelling between polyps;

- In 360° film: Discovering and capturing the living and unusual landscapes of the Mediterranean Sea while evolving in the midst of Laurent's team. Enjoying the documentary power of the images filmed during expeditions. Approaching buried shipwrecks teeming

with life. Discovering how nature arranges itself in the depths to preserve itself from us humans.

I would like us, during the development work, to be able to design a narrative that balances the different elements that make up the experience.

I would like the playful part and the scientific learning part to intertwine naturally. I hope that the interactive moments will also be moments of discovery of the mission, in the same way as the moments of contemplation.

I want a multiplayer experience where participants share sensations and discoveries. Players will be able to communicate with their teammates throughout the course. Not being alone brings a playful side to the experience and reduces the worrying feeling that could arise from confinement or underwater exploration.

I must admit, when I saw the first images of this station (teaser link), it was not the scientific aspect that seduced me first, but the crazy laugh of hearing Laurent Ballesta's flute voice. I immediately realized that the immersive experience could be both funny and captivating. Fun and scientific. I don't see any contradiction in that, quite the contrary.

## ◉ WRITER'S STATEMENT

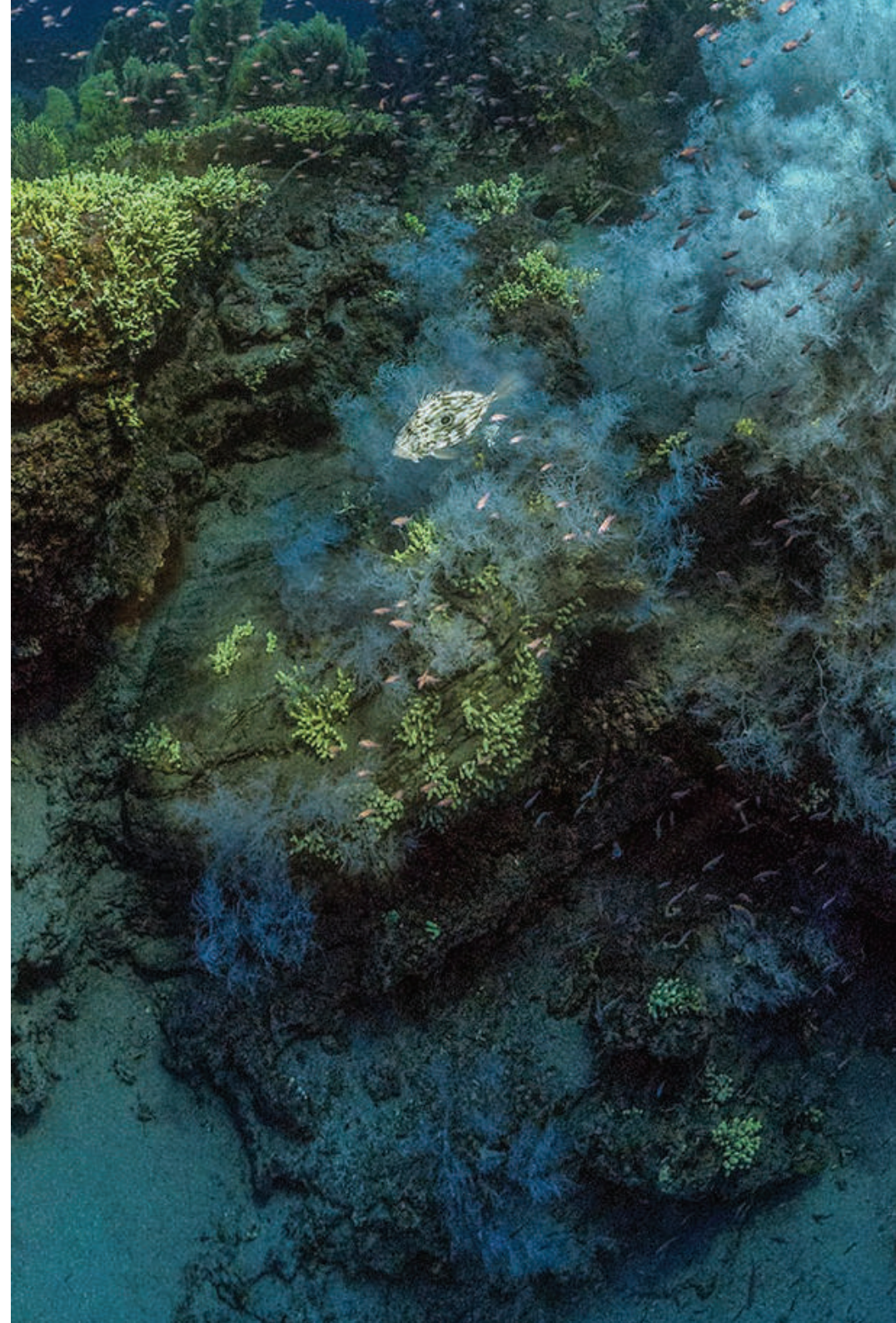
THE DEEP MED VR is therefore for me an experience to live with family or friends. An experience that can be shared even after removing the virtual reality headset.

It is also a tool for popularizing science and raising awareness of the beauty and dangers that we human beings pose to our underwater depths.

I would like Laurent Ballesta to accompany us throughout the experience. First of all, only with his voice, to explain the nature of his mission. Then, once in the water, watch him work. Almost in real life.

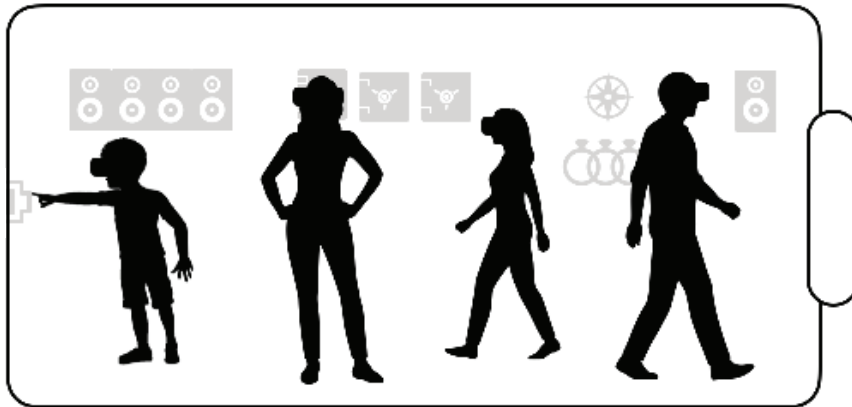
Laurent is for me, a little like the Cousteau of my childhood. A modern-day adventurer. His adventures make me dream. A little like going to Mars, these are adventures that I will never be able to live.... Except in a virtual reality experiment!

Andrès Jarach

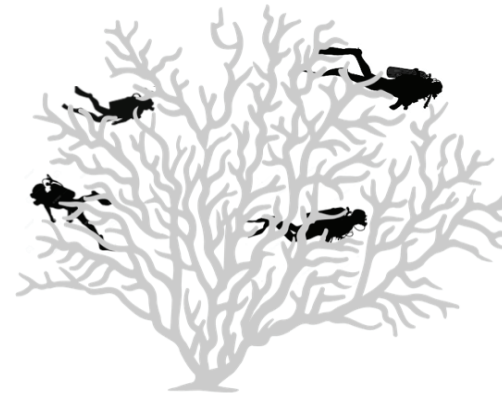
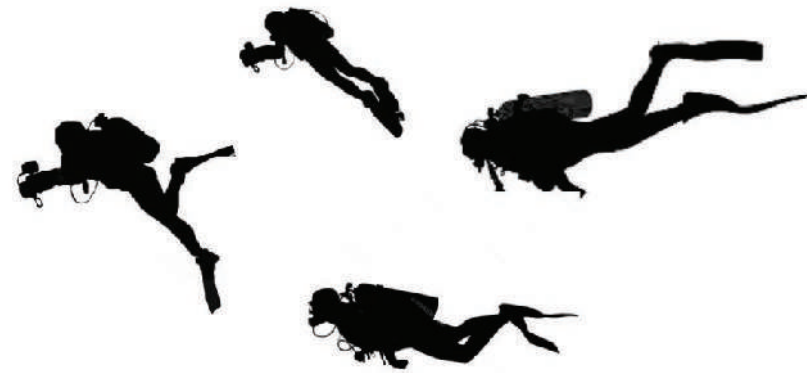
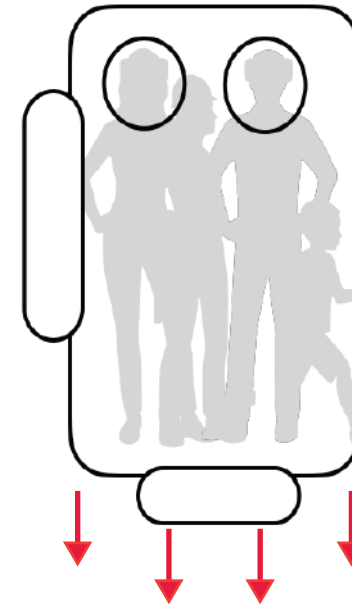


# ◎ THE EXPERIENCE - SCHEMA

## 1 - THE STATION (CGI)



## 2 - THE LIFT (CGI)



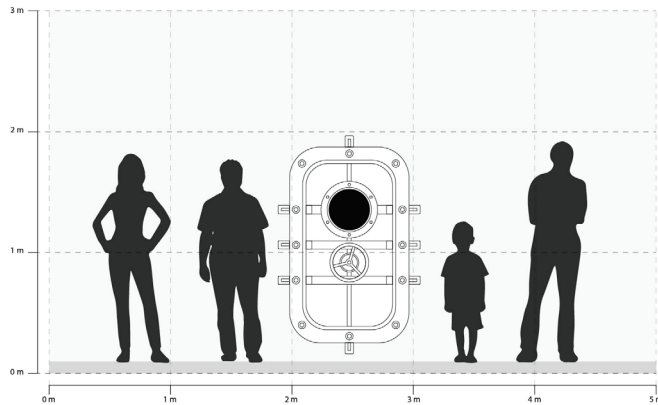
## 3.2 - THE SEABED (360° FILM)

## 3.1 - THE CORAL (CGI)

# THE EXPERIENCE 1/3 SCENARIO

## THE STATION 5-7 min

OUTSIDE THE STATION (FRONT VIEW)



The experience begins in front of the diving station, materialized by a large circular yellow gate. A kind of “Yellow Submarine” just out of the 70s.

You and your three teammates are equipped with a virtual reality headset.

First surprise, you are not in the station but you fly over the Mediterranean Sea. You fly over the blue sea. In the distance, the coast, the magnificent rocky inlets... An infinite space... But the closer you get to the coast, the more visible is the trace

of man. Thousands of boats, crowded beaches...

Title: “THE DEEP MED VR”.  
Fade in black.

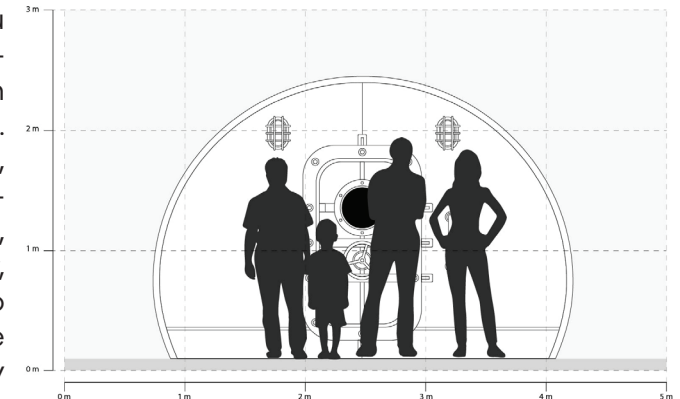
As you look at your bodies, you realize that you are in a red diving suit. And you can guess the silhouettes of the other participants.

A voice welcomes you and tells you the purpose of the experience: to discover the seabed of the Mediterranean at a depth of more than 100 metres. This voice is that of Laurent Ballesta, who will guide you throughout the experience. By giving you instructions, or challenges, by telling you its story, by pointing to a detail, it allows you to both learn and make your experience flow better so that you don't miss any essential moments.

We invite you to enter the station. One after the other, you enter the station by walking through the only door that communicates with the outside world.

You are now four of you in the main room, which is no more than 5 m<sup>2</sup>. A thumping noise makes you startle. It's the hatch that closed behind you. Very quickly, what strikes you is the sound. It is deaf, metallic and constant. You can distinguish gas noises in the compartments in waves. It's a slightly disturbing atmosphere.

INSIDE THE STATION (FRONT VIEW)



To begin, you each have to take turns, using a tool that looks like a portable scanner, to do an ultrasound of your arm. You see small bubbles in your veins. It is

## ◎ THE EXPERIENCE 1/3 SCENARIO

a physiological examination that makes you understand the pressure that your body is undergoing.

Then, by manipulating a “joystick/valve”, you must adjust the gas mixture to be able to breathe in the station. Gas “pschitts” are slightly stressful in this delicate stage.

You then realize that your voice has changed. She is as “slender” as she is funny. You share your impressions with your teammates - you can talk, they can hear you, but your voice is a little... weird, as if you were talking from helium. You laugh and joke when you discover those of your teammates. Their voice is as strange as yours. The tense atmosphere at the beginning changes to a more playful one. And from then on, you know that you can share and communicate with them throughout the experience.

You explore the station together under pressure. It is not huge, but like a space shuttle, it is oppressive, frightening and at the same time exciting.

Laurent accompanies you by sharing his own experience during the 28 days he spent there in July 2019. You realize how important this adventure was to him.

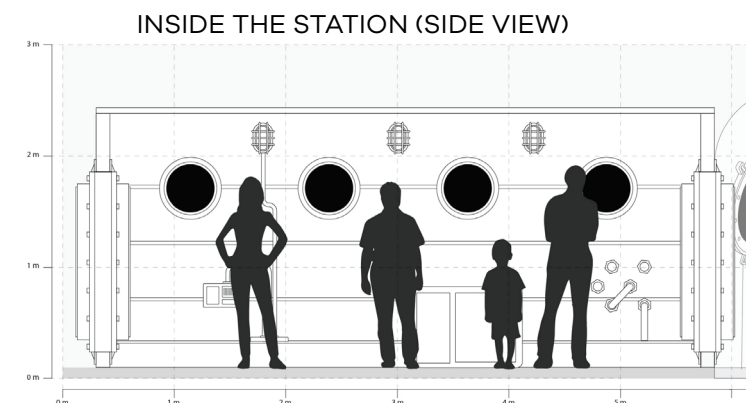
Another hatch is at the end of the room. It will be necessary to understand how to open it in order to be able to access the “elevator”. That is the purpose of this step. It’s a team game. You will have to coordinate the manipulations with your teammates to achieve this. You will be helped by the game master, if you can’t find the solution. It’s a little difficult, but not discouraging.

Before leaving for the dive, everyone must put on their diving mask. As you

## THE STATION 5-7 min

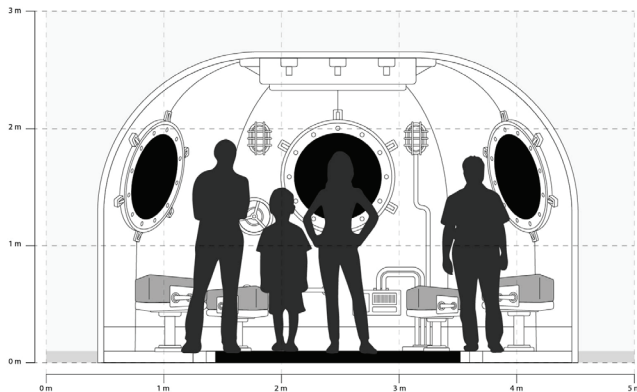
approach your face, the field of vision narrows slightly, simulating vision through a mask. The door can only be opened if all four participants have donned the four masks.

As a team, you finally manage to open the hatch and move on to the “elevator” that will take you to the depths of the Mediterranean Sea.



## ◎ THE EXPERIENCE 2/3 SCENARIO

THE ELEVATOR (FRONT VIEW)



One after the other, the four of you enter an even more confined space. It's the elevator that will lead you to a depth of more than 100 meters. It takes a little agility and team coordination to get through the trapdoor. Between the weird voice and the physical difficulty, it's a pretty funny moment.

The elevator is composed of 3 portholes, 4 ledges to sit down during the descent

and 1 round hatch in the center, on the ground. You each take a seat, leaning against the wall. The door you just passed through also closes in a thumping noise that makes you jump.

Then follow other sounds that indicate that the descent is imminent. You are asked to put the joysticks down and stand in your seats.

The elevator comes down and bubbles pass through the windows. You start the immersion. Once in the water, the descent is smoother and more regular.

All along, if you approach the portholes, you see magnificent creatures of the Mediterranean: a school of jellyfish seems to be moving right next to the shuttle, a lich is approaching one of the portholes, a moon fish is moving away...

## THE ELEVATOR 2-3 min

This is only a glimpse of the Mediterranean fauna. It is condensed in this descent which only lasts a few minutes. It is a calm and sharing moment: *"Look! Did you see it?..." "What was it?..."* Every event is wonderful, but you don't know that what awaits you is even more fascinating.

When you reach a depth of 100 m, the hatch at your feet opens. The water gradually invades the capsule. You look up and see the capsule move away.

For a moment you feel alone in the world. The sound changes... your ears are in the water.

You are in the depths of the Mediterranean Sea.

## ◎ THE EXPERIENCE 3/3

### SCENARIO

It's a pretty dark atmosphere. The first thing you notice is that the sound of your voice has changed again. It is just as strange but different as in the station.

In front of you, a "scooter" that we invite you to catch. It will help you to move away from the capsule and penetrate a coral reef in the Mediterranean.

While you are exploring the coral reef, your size has shrunk surprisingly. You can now sneak between gorgonians, sponges, calcareous algae, starfishes... You realize that you can turn right, left, up, down... it's a fun and wonderful moment because the biotope looks like nothing you've ever seen. An exceptional moment.

Then you come out of the reef. A bank of sardines passes right in front of you and stirs the water. You don't realize it, but in the blue surrounding you, you are back

to normal size and now you will only see unique images shot by the GOMBESSA team. You let yourself be guided.

The depth of the sea is a little dark but in the distance you can see a light. A team of divers is filming a anglerfish, this strange and unattractive animal that is called a monkfish in the fishmonger's house.

It's the GOMBESSA team. Laurent, Antonin, Thibault and Yanick are at work. You approach and follow them for a long time. You are looking at a camera in front of you.

Laurent Ballesta's voice gives you, as you discover new things, advice on how to take underwater pictures. Light, camera positioning, reflexes to have and the ones to avoid. You feel privileged: one of the best naturalist photographers on the planet shares some secrets with you.

## THE SEABED

7-10 min

You will experience extraordinary moments of the adventure of our four divers: their archaeological, scientific and biological discoveries.

You enjoy these natural jewels of temperate waters. You feel like an aquanaut on a planet that no one has ever surveyed before you.

Near you, an anglerfish. You realize she's really not very spoiled by nature...

A little later, you approach a stone fish and learn that it is very dangerous...

Behind you, suddenly a moon fish with its round eyes and ridiculous fins compared to its body brushes against you....

And then, Laurent invites you to experiment another scientific discipline: bio-acoustics, *"the sea is a world without silence."* »



## THE EXPERIENCE 3/3 SCENARIO

You are still in the water and we invite you to listen. You keep looking, but nothing seems to be alive around you. Yet, as soon as you turn your head, you hear the "song" of the different underwater species. And with Laurent's complicity, you draw up acoustic maps according to the species.

After having learned a lot about the Mediterranean funds, it is time to leave and return to the mainland. You are moving away towards the surface. You leave the GOMBESSA team in full work, at a depth of more than 100 meters. They become very small at the

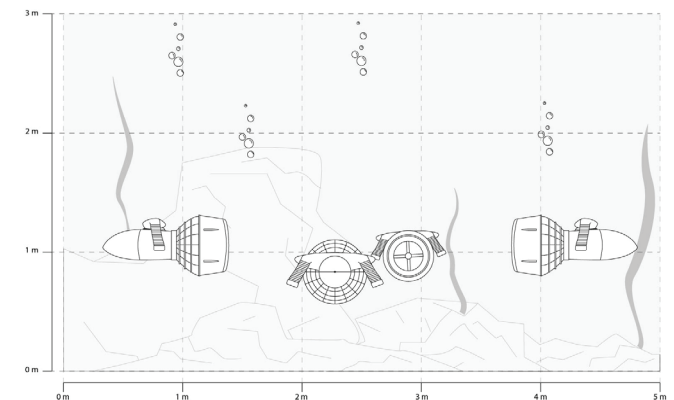
bottom of the Mediterranean Sea.

Before removing the mask/headset, the voice warns you: *"You have just spent 10 minutes at a depth of 100m... Normally, you should make 3 hours of stop before going up!"* ». You remove your helmet at the same time as your teammates. You look at each other... The four of you have wide eyes. You keep in mind that you have just experienced a unique moment.

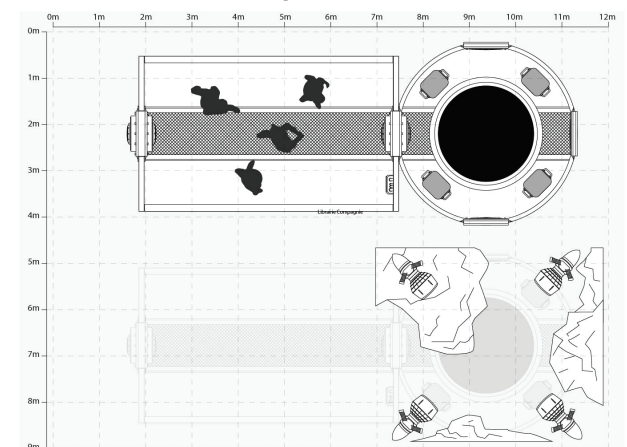
With a normal voice this time, only one word comes to mind: *"Whoa!"*.

## THE SEABED 7-10 min

### THE CORAL (FRONT VIEW)



### TOP VIEW



## ◎ SOUND NARRATION

### VOICE OVER

The narrative of the experiment will be conducted from the beginning by Laurent Ballesta.

He will have the task of guiding the participants as a game master, but also to give information about the expedition. It will be present only when necessary.

We do not want a «chatty» experience, but one that leaves room for communication between participants.

His voice will contrast strongly with the slender voice with which the participants will interact with each other. This choice will ensure that we listen carefully to the scientific content and instructions for the proper conduct of the experience.

Once in the depths, Laurent will be more present to shed light on a particular species, a scientific protocol and advice on underwater photography. During this privileged moment,

the aquanauts will be accompanied by the protagonist of the adventure, who will be able to share with them the discoveries of this extraordinary exploration.

### SOUND ENVIRONMENT

Depending on the stages of the experience, we imagine three distinct sound environments that will provide different emotions:

**-In the station:** after a worrying start, the sound interactions between the participants will «relax» the atmosphere. The voice distortion will be funny. And always unexpected.

The somewhat oppressive sound environment will often remind us that we are under pressure and that the stakes are those of an expedition.

**-In the elevator:** The sound will foreshadow the adventure. It will be the transition. The sound during the descent to more than 100 meters will

evolve, from the stall of the station to the silence of the depth.

**-In the water:** the sound will become «muffled» and will accompany the rising waters. We can still communicate with others, but the voice will have a different tone, a little as if we were talking with our teeth clenched.

We want a documentary sound. Nevertheless, the sound design will combine real and digital audio recording for a greater immersion.

In sound design, we will not refrain from moments when the ambient sound mixes with a few musical notes. It will be there when necessary to accentuate the desired emotion.

In the development phase, we will test and validate different technologies: binaural sound, ambisonic sound recording, underwater sound recording... to provide the best immersive experience.

## ◎ VARIATIONS

We would like to create several versions of this experience: an **installation version** for museums, aquariums, festivals and events (diving show, partner evenings...) requiring a special set-up and scenography as well as the provision of a "game master" to guide participants and ensure their safety.

A **simplified version**, which is the counterpart of the installation experience, accessible via content platforms. Requiring a lighter device, the experience will be for a unique player

who will be able to interact with the station, take pictures during underwater exploration, walk around the coral and become very small.

The journey here will be more intimate than playful. The feeling of confinement, promiscuity, voice changes and interaction between players (especially with the challenges to be met) will be reserved for the installation version.

A **360° documentary film** will also be used for content platforms. This ver-

sion aims to make the experience accessible to as many people as possible. In this version, the user will be immersed in the daily life of the 4 divers, such as the 5th ghost diver on the expedition. He will be invited to follow his teammates on a guided tour of the station and one of their dives over a coral reef.

Written and scripted beforehand, this version will be shot in real time during the mission.

## TECHNICAL NOTE

THE DEEP MED VR is a location-based (LBE), multiplayer (4 players and a game master) virtual reality experience. An experience of this type requires the use of a real-time game engine because users will be able to interact (move, activate elements) in the environment and these interactions will have an impact on the graphic rendering, especially on lighting, volume and stereoscopy.

### VR MULTIPLAYER LBE SYSTEM

In this experience, the user will be able to move around the virtual station by moving physically, interact with real objects (opening doors, opening taps, controlling a scooter handlebar) with other players.

The technology chosen will be a combination of an HMD Vive Pro and an MSI VR One back pack allowing free travel without cables (the headset being connected directly to the computer in backpack mode).

The user's body will be represented and in order to know the position of the hands and feet (necessary for the passage of obstacles), live trackers will be positioned on the user: one at each ankle and wrist and one in the back. In order to minimize interference, the trackers will be wired to the back pack. The headsets and trackers will pick up the infrared grid sent by the different Base Stations of the Vive system.

All tracking information will be sent to a master server and forwarded to other players, allowing the body of other players to be represented in the experience. Particular attention will be paid to the development of a multiplayer tracked test tool as well as to the representation of bodies via a Kinematic inverse system allowing realistic rendering and fluid animations.



### Features

- Vive Pro resolution: 1440 x 1600 pixels per eye, or 2880 x 1600 pixels in total
- HTC Vive Pro Displays: Dual 3.5-inch AMOLED displays at 90Hz
- Field of view: 110 degrees
- Audio: integrated and detachable headphones
- Connectivity: USB-C 3.0, Display Port 1.2, Bluetooth
- Detail of accessories: adjustable head strap
- Controller: two HTC VIVE controllers version 2018 and 2 Steam VR 2.0 base stations

# TECHNICAL NOTE

## GAME-MASTER APPLICATION

The experience will include a Game-Master application (on the computer serving as the master server) that includes various features such as :

- the camera feedback from the different players
- virtual cameras
- the state of synchronization and validation of the different stages of the experiment
- the launch of the experiment for a variable number of players (from 1 to 4).

## INTERACTIONS

### Mixed reality interaction

For this experience, we do not use the controllers of the Vive headset because some movements require to take support with your hands. We therefore chose as a solution to use the native hand tracking integrated in the last Software Development Kit of the Vive Pro. The user will therefore have a realistic representation of his hands when he looks at them. The different interactions will combine hand tracking and interaction with physical elements:

- Gas taps will be physically present in the installation. A sensor will send the open/close signal to a programmable card that will display the exact position of the valve in VR.
- The doors will contain Vive trackers to determine if they are open or not.

- The scooter handlebars will be physically present and will be constrained in their movement in order to control the "underwater discovery" part (left-right). An "accelerator" type controller will send a signal to a programmable board to vary its speed in VR.

### Audio interaction :

Particular attention will be paid to the spatialization of the various audio elements. The microphones integrated into the HTC Vive headset will be used to transmit the voice. A voice modification algorithm will be developed (pitch modification, reverb addition) to highlight the " slender " aspect when opening the valves or the containment aspect.

## GRAPHIC RENDERING

The experiment will have a photo-realistic rendering. Elements such as metallic reflection, transparent windows, a mixture of filmed video and CGI will achieve the desired result. However, some steps will require more attention:

- the rendering and animation of realistic characters (users).
- the effect of wearing the diving mask.
- the underwater sequence: Different visual effects (distortion, light effect) and audio will accentuate this type of rendering.

The graphical elements of the coral reef will be produced

## ◎ TECHNICAL NOTE

using photogrammetric data taken in a diving context. The change of scale (the user is smaller) will require great care in working on the details of the different elements.

### **THE REAL-TIME GAME ENGINE**

In parallel with the production of the pre-calculated elements, we will create a model of the experiment. This means developing the sequence and interactions with temporary files in order to quickly define a prototype, a mandatory step in virtual reality to perform headset tests. For this experience, we will use the Unity game engine

The programming of the structure of the experience (scene sequence, menu, sequencing) as well as the different interactions (door opening, mask taking, etc...) is done in C# via the Visual Studio IDE. These languages are component oriented languages in order to provide a solid structure to the experience.

After integrating the pre-calculated graphic elements (3D models and textures), the creation of materials, lights

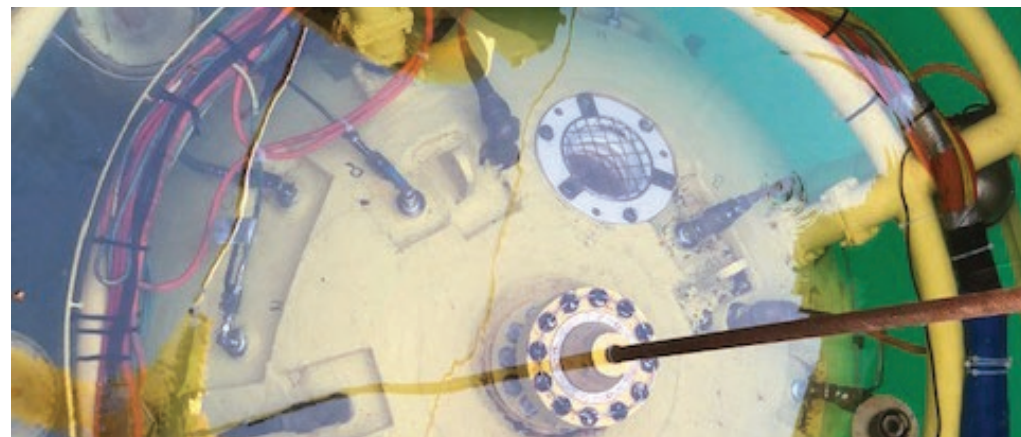
and rendering is done directly in the game engine. The materials (texture behaviour as a function of brightness) can be programmed (HLSL) or nodal using extensions (AmplifyShader) according to the need (interactive, dynamic, static).

Special effects such as the immersion of the elevator in water will be created by technical artists or graphic programmers because these types of elements require special optimization in order to obtain a photo-realistic rendering. We plan to use Unity's native tools such as VFX Graph or Shuriken for particle management.

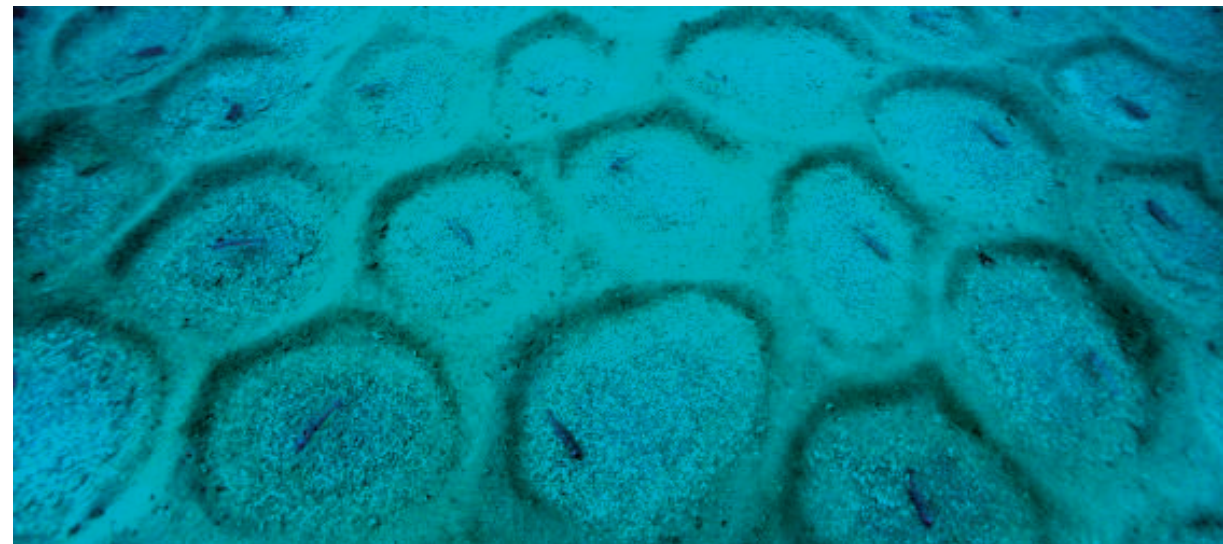
Once these different phases have been completed, the audio is integrated, spatialized and the experience flow is edited according to the sequencer bricks developed or sequencing editing tools such as the «Timeline» tool in Unity.

A «polish» (detail improvement) and optimization phase takes place at the end of production in order to have the most photo-realistic and fluid experience possible. This phase generally overlaps with the test phase.

# ◎ GRAPHIC UNIVERSE / THE STATION

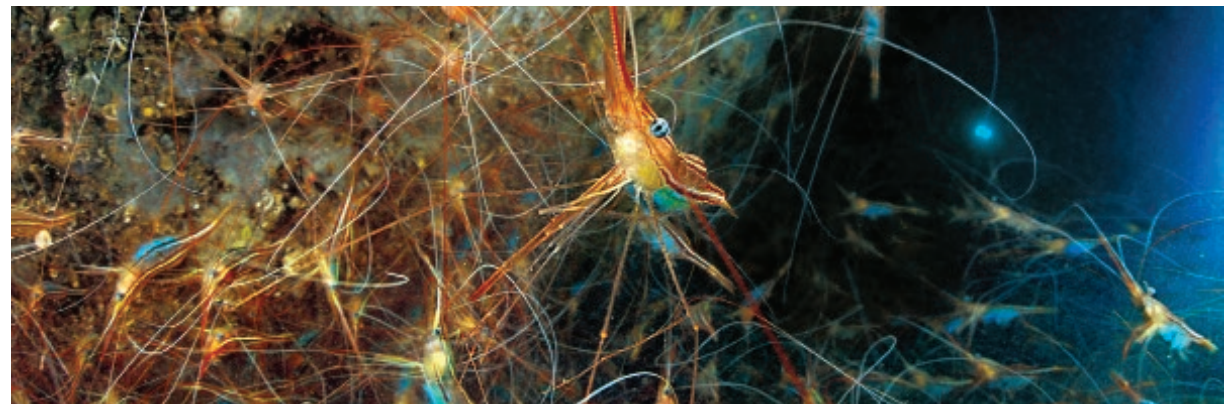
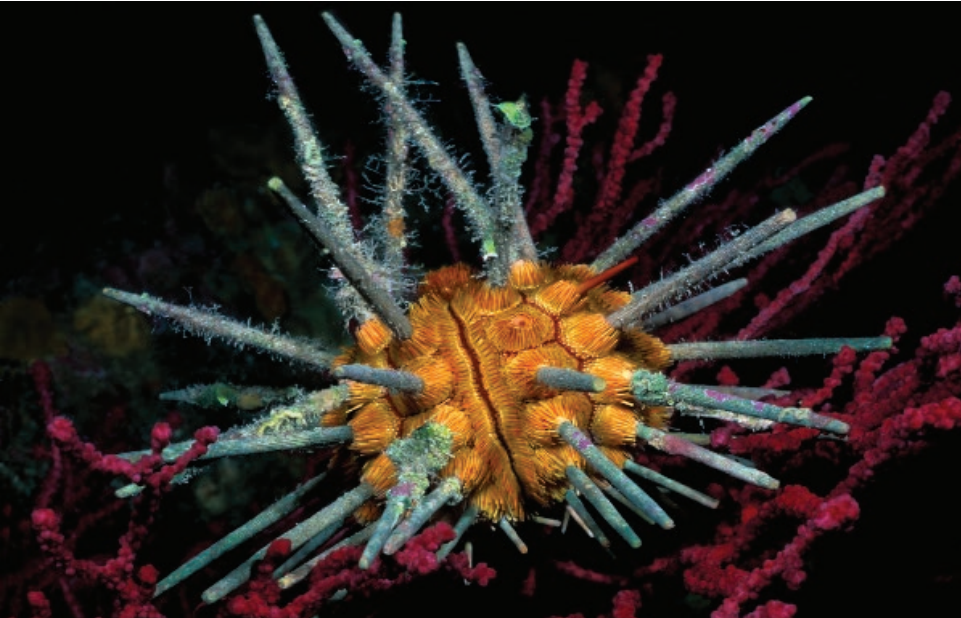


◎ GRAPHIC UNIVERSE / THE SEABED





◎ GRAPHIC UNIVERSE / DEEP SEA SPECIES



## LINKS

In order to present the aesthetic and graphic universe of the Planète Méditerranée VR project, we present two video extracts: :

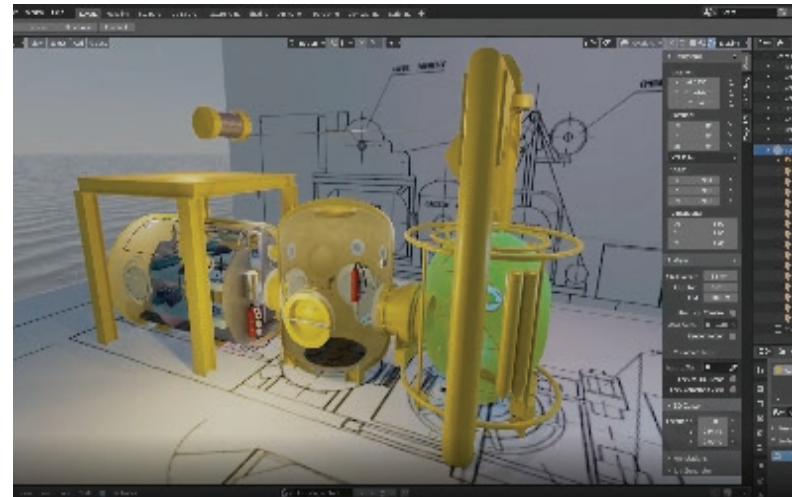
- the **teaser** of the Gombessa V expedition
- a first **3D modeling** work of the diving station

### TEASER EXPEDITION



<https://vimeo.com/430306157>

### 3D MODELING



<https://vimeo.com/430306995>

# ◎ THE TEAM

## Andrés Jarach

### LINEAR DOCUMENTARIES

(selective filmography)

#### **The Teenager, an animal like other** ([link](#))

10 x 4 minutes - Produced by Squaw & Quark Productions - ARTE Créative - 2018

#### **Draw me Saint-Exupery** ([link](#))

52 minutes - Produced by Quark Productions - France 3 - INA. 2017 - Broadcasting abroad: Télé Québec (Canada), Canal + Pologne (ex Planète), RSI (Suisse Italienne), Globosat (Brazil), HRT (Croatia), Current Time TV, RTP (Portugal), Télécomplexe (Greece), Channel 8 (Israel)...

#### **Bacis of Human Being** ([link](#))

52 minutes  
(A delinearized version exhibited on the occasion of the reopening of the Musée de l'Homme 10/2015-06/2016)  
Produced by Les Films d'Ici 2 - Bachibouzouk - MNHN - France 5. 2015.

#### **Modern Dad** ([link](#))

52 minutes - Produced by Quark Productions - ARTE France. 2013

#### **The Green Thumb** ([link](#))

52 minutes - Produced by Les Films d'Ici - MNHN - France 5. 2010

#### **Smoking Kills** ([link](#))

52 minutes - Produced by Quark Productions - France 3. 2004 - France 3 2004/ 2007 - ARTE 2006/2012/2015 - Planet 2008 - LCP 2015  
Broadcasting abroad: TSR and RTSI (Switzerland), YLE/FST (Finland), RTBF (Belgium), DR/TV (Denmark), NRK (Norway), ORF (Austria), Telewizja Polska (Poland), Czeck TV (Czech Republic), Euskal TV (Spain), Globosat (Brazil)...  
INPUT San Francisco - 2005 /  
*Public Award at Ecofilms Festival - Rhodes - 2005*

#### **El gaucho** ([link](#))

90 minutes

Produced by Quark Productions - ARTE France. 2009 DVD release: Naïve. November 2009 - Broadcasting abroad: NHK (Japan), Al-Jazeera (Middle East), TV3 Catalonia (Spain), Mac TV (Scotland)...

*Etoile de la Scam- 2009- / RIDM Closing Film - Montreal - 2008 / Audience Award at Documenta Madrid - May 2010*

### INTERACTIVE DOCUMENTARIES

#### **Continuidad** (interactive essay)

Based on a short story by Julio Cortázar, Continuity of Parks. Music: Müller & Makaroff. Produced by Radio France Nouveaux Médias - France Culture. 2015. Nominated for the Europa Prize, Online category.

#### **Generations 14** ([link](#))

Written and directed in collaboration with Kévin Accart and Éric Thébault. Produced by Cinétévé - France 3 Nord-Est - France Télévisions Éditions Numériques. 2014.

#### **Check-in** ([link](#))

Written in collaboration with Charles Ayats. Produced by Cocottes-minute productions

#### **My Madeleine de Proust** ([link](#))

Produced by Ex-Nihilo - Radio France Nouveaux Médias. 2013

#### **Modern Couple** ([link](#))

Realisation of 7 films «Papa»

Produced by Quark Productions - ARTE France. 2012 -  
*Varenne Web&Doc FIGRA 2013 Award*

### VR - AR

#### **1... 2... 3 Bruegel** ([link](#))

Game VR, based on the painting «Die Kinderspiele» by Pieter Bruegel Co-Author/Director: Gordon, produced by CAMERA LUCIDA - ARTE - CNC - 2019

#### **Sentenced to play** ([link](#))

360° film, based on the painting «Die Kinderspiele» by Pieter Bruegel Co-Author/Director: Gordon, produced by CAMERA LUCIDA - ARTE - CNC - 2018 Busan International Film Festival (Korea) - GIFF (Switzerland) - 360 Film festival (Paris) - FIFA (Montreal).

In production :

#### **Replay Memories** ([link](#))

VR Experience  
Co-Author/Director: Gordon  
produced by CAMERA LUCIDA - NOVELAB - INA

#### **Pierre Gagnaire – Destiny**

360° film, produced by ATLAS V  
College of the Venice Biennale - CNC

En développement :

#### **Biblioquest**

AR Experience  
Co-Author/Director: Gordon  
produced by RED CORNER - CNC

### AUTRES

**2017** - : Member of the CNC's Selective Documentary Commission

**2014- 2016** :Member of the CNC's New Media Commission

**2011 - 2018** : Member of the Audiovisual Commission at SCAM

**2011 - 2018** Documentary workshops in: Ina Expert / La Fémis

## ◎ THE TEAM

### Gil Kébaïli

**700 sharks**, directed by Luc Marescot in collaboration with Gil Kébaïli, 90min, ARTE 2018.

**The secret life of the atolls of Polynesia**, co-directed with Manuel Lefèvre, 52min, ARTE 2018.

**Madagascar, expedition in Makay territory**, co-directed with Evrard Wendenbaum, 52min, ARTE 2018.

**Greenland, the Whispering of Ice**, 52min, ARTE 2018.

**Tibet, the Way of the Winds**, directed by Hamid Sardar in collaboration with Gil Kébaïli, 52min, France 5 2018.

**Antarctica** directed by Jérôme Bouvier in collaboration with Gil Kébaïli. 90min, ARTE 2017.

**Vines and men**, 52min, ARTE 2017.

**A new pact with the forest**, 43min, ARTE 2017

**The Grouper Mystery**, 90min, ARTE 2015

**The true history of the Medusa**, co-directed with Herlé Jouon, 90min, ARTE 2015

**The Coelacanth, a plunge towards our origins**, 90min, ARTE 2013

**Polynesia in the heart**, 110min, Thalassa France 3 2013

**Coastal France**: 24x8min / 4x52min / 11x12min, Thalassa France 3 and France 5 2012

**The desert of the first man**, 90min, Ushuaïa Nature TF1 2012

**We stepped on Iceland**, 90min, Ushuaïa Nature TF1 déc 2009

**The red island with a green heart**, collection ARTE 2009

**The great explorers**, 5x13min, Thalassa France 3 2008.

**Marquises, the teeth of Akai**, 52min, Seasons 2008

**Laos-Cambodia, The Lost City**, 90min, Ushuaïa Nature, TF1 2007

### SELECTIVE FILMOGRAPHY

**The unicorn's landmark**, 90 min, Ushuaïa Nature, TF1 2005

**Alaska, The Last Frontier**, 90min, Ushuaïa Nature, TF1 2003

**Ethiopia, The disasters that threaten us**, 90min, M6 2002.

**Polynesia, The constellation of islands**, 90min, Ushuaïa Nature, TF1 2002

**British Columbia, The Spirit of the Forest**, 90min, Ushuaïa Nature, TF1 2000.

**Kamchatka, From Origins to Lost Worlds**, 90min, Ushuaïa Nature, TF1 1999.

**India «Ganga»**, 2x8min, TF1, 1998

**Namibia-Botswana «Water and sands»**, 90min, Ushuaïa Nature, TF1 1997.

**Le repère de la licorne**, Ushuaïa de 90 min. Sur la banquise avec les Inuit Diffusion TF1 janv. 2005

## ◎ THE TEAM

Novelab



Novelab is a creative studio created in 2013 by AudioGaming, itself specialized in the creation of interactive tools for cinema, television, animation and video games.

Novelab produces quality interactive experiences that have received multiple awards at prestigious festivals such as the TriBeCa Storyscapes Award 2016 for the VR experience «Notes on Blindness», the Sheffield Alternate Realities Award 2016 («Notes on Blindness») and 2017 («Unrest VR»), as well as the Grand Prix VR at the Venice Mostra (2018)

« Spheres »

- <http://novelab.net/en/project-s/#!/spheres>

« Notes on blindness – Into Darkness »

- <http://novelab.net/en/project-s/#!/notes-on-blindness-into-darkness-vr>

« Unrest VR »

- <http://novelab.net/en/project-s/#!/unrestvr>

« Kinoscope. A VR Journey into the World of Cinema »

- <http://novelab.net/en/project-s/#!/kinoscope-a-vr-journey-into-the-world-of-cinema>

« Zaha Hadid Virtual Reality Experiences »

- <http://novelab.net/en/project-s/#!/zaha-hadid-virtual-reality-experiences>

Andromède



Andromede Oceanologie is an innovative company whose purpose is to conduct all types of projects related to the study and enhancement of the marine environment. Andromede's activities are organized into two poles: a design office pole, whose expertise capacities relate in particular to bathymetry, cartography, ecological analysis and marine ecosystem management; a valuation pole, which notably manages the activities of Laurent Ballesta - co-founder of Andromede - and which aims to develop its own media projects.

Among the latest achievements of Andromede Oceanologie, for example, are:

- the MEDTRIX mapping platform, which provides the results of the various coastal water monitoring projects,
- most of the maps of coastal marine biocenoses in the French Mediterranean and the continuous mapping (1:10,000) carried out in 2014 (DONIA expert project available on MEDTRIX),
- coastal pressure/activity mapping (IMPACT project), the community smartphone and DONIA tablet application to support pleasure boating at sea,
- the TEMPO (posidonia) and RECOR (coralligenous) monitoring networks,
- the transplantation of 500 m<sup>2</sup> of herbarium during the extension at sea of Anse du Portier (Monaco),
- the Gombessa Expeditions and their documentaries (The Coelacanth, Antarctica !, The Grouper Mystery, 700 sharks...),
- books of underwater photographs, photography exhibitions...

# ◎ THE COMPANY



**LES GENS BIEN PRODUCTIONS** develops and produces documentary content for television and digital in the fields of discovery, science and adventure.



Specializing in scientific and sporting expeditions, we support the projects of modern-day adventurers eager to push their own limits as much as those of nature, such as the diver-photographer Laurent Ballesta, the naturalist Evrard Wendenbaum or the ethnographer Hamid Sardar. We back their passion and commitment because we feel moved to provide information on the need to preserve the biodiversity of our planet, and to highlight cultures threatened with extinction.



Centered around Vivien Lemaignan and Gil Kébaïli, Les Gens bien Productions feeds on this spirit of adventure, and places boldness, creativity and ethics at the heart of our practice. With a dynamic and human-scale team, we have the full set of skills that enables us to integrate the entire production line of our films, from development to post-production.



Among our productions:

**700 Sharks**, directed by Luc Marescot, written by Laurent Ballesta, Gil Kébaïli and Luc Marescot, 90', ARTE, coproduction Le Cinquième Rêve, Andromède, CNRS Images

**Groenland: les Murmures de la glace**, directed by Gil Kébaïli, written by Evrard Wendenbaum, 52', ARTE

**Madagascar, expedition in Makay territory** directed by Gil Kébaïli, written by Evrard Wendenbaum, 52', ARTE

**Tibet, The Ways of Winds**, directed by Hamid Sardar, 52', France 5, coproduction DCMP

**The Feast of Sharks**, directed by Gil Kébaïli, 26', TF1, coproduction Andromède

**The heirs of Commander Cousteau**, directed by Gil Kébaïli, 26', France 3, coproduction Andromède

**The Grouper Mystery**, directed by Gil Kébaïli, written by Laurent Ballesta and Gil Kébaïli, 52', ARTE, coproduction Les Films d'Ici, Andromède Océanologie

**The Coelacanth, a plunge towards our origins**, directed by Gil Kébaïli, written by Laurent Ballesta and Gil Kébaïli, 90', ARTE, coproduction Les Films d'Ici, Andromède Océanologie, CNRS Images

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