



# X-Plore

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**[Management Track]**

**(New adapted) Business Plan Report**

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## 1. PRODUCT DESCRIPTION

The ROUV X-Plore is a remotely operated underwater vehicle predefined by the Universitat Politècnica de Catalunya, more specifically by the ETSETB, which our team of engineers has updated and improved in order to be marketed.

First of all, we would like to let you know what is the reason for our vehicle, and that is that X-Plore is designed to be able to measure, by means of a sonar implemented through an ultrasound sensor and a graphical interface in real time, the distance between the vehicle and the seabed, in order to detect anomalous objects capable of contaminating this environment or endangering the living beings that inhabit it, as well as bottles, cans or plastic bags.

Our team is very committed to the environment and to the fight against climate change, and for this reason we wanted to give visibility to this issue through our website and the ROUV functionality.

Another feature of X-Plore is that it has a microSD card capable of collecting and processing all the data measured during the time of immersion in the aquatic environment. In addition, through programming we have equipped the vehicle to show us this data in the simplest way possible and can be easily interpreted by anyone. In this way, the users can extract the card and read the data whenever and wherever they want.

The implementation process consists of making a small circuit to connect the added electronic components (ultrasound sensor, microSD adapter...) to the Arduino board, from where we will control and program the new functions of the submarine. All this will be well protected in an airtight box to avoid water infiltration and damage to the different elements.

Next, the task that requires more time is carried out, this is the graphical interface programmed using Java and Matlab, two of the programming languages that our team knows.

Once the entire implementation process is finished, we have our ROUV X-Plore ready, a green tool that can help us to protect the ecosystem from pollution and climate change, starting with the sea.



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## 2. MISSION & VISION

### Mission

X-Plore's mission is to create a useful product that can help a wide range of customers that need to make a study of the seabed. The potential clients can be from young entrepreneurs that want to know the depth of an area, to students that want to see whether there are any objects (like plastics) that contaminate a specific environment. It can also be used by big companies that want to see how climate change is accelerating the sea level rise. This can be done by comparing the data collected by the ROUV's ultrasound sensor and stored in a microSD card throughout time.

### Vision

Our vision is to help people and businesses fulfill their needs with good quality yet affordable products, with constant improvement and innovation. We want to consolidate our position in the market and be widely recognized by our clients while taking into account their opinions, creating functional and practical devices that respect the environment at the same time.

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### 3. VALUES

It is our duty to offer a good and reliable service to our customers and that implies the need to think and work on our ethical and working values, which will affect the way we see and build our company.

Engineering companies are in charge of making the world a better place and it should be obvious that this also implies making the world more ethical and in our case more environmentally friendly.

As a result of that our company values are as follow:

- **Perfectionism:** We have been working on our product for several months and aim to make it better every day. Our company can offer the best accuracy when it comes to data with our highly trained workers, as well as be devoted to learning as much as they can about what they are doing.
- **Sustainability:** Our professionals care about the big change we can make in our environment, as our product is used in lakes and oceans. That is why we have fully made our ROUV with environmentally friendly resources as well as have cared to affect the minimum possible the lake's ecosystem. It's ours the purpose of protecting the environment from pollution and damaging things.
- **Teamwork:** The huge amount of tasks our project involves can be fulfilled thanks to cooperation and good planifications. Our manufacturing chain can only work if all team members work hard and that is the reason we promote good relationships between coworkers.
- **Trustworthiness:** Even though there is always the possibility that something occurs to our product, as its technology is highly advanced, we ensure that we will fix it as soon as possible. Our products are reliable and have been tested in multiple environments.
- **Passion:** Committed in heart and mind, we are continuously moving forward, innovating and improving.

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## 4. SWOT ANALYSIS

### Internal

- **Strength**
  - Materials always available on the market.
  - Ability to constantly update the product.
  - Immediate customer service.
  - Long warranty thanks to the useful life of the arduino.
  - Good organization to do tasks.
- **Weaknesses**
  - Difficulty shipping outside the EU.
  - Lack of knowledge of the use of more efficient software.
  - Product does not have many applications outside the water.
  - Difficulty for mass manufacturing.

### External

- **Opportunities**
  - Cheap advertising through influencers or on social networks.
  - People's interest in products that help the environment.
  - Enter new markets.
  - The use of the product is required and increasingly necessary, universities could begin to demand it in many laboratories.
- **Threats**
  - Reduced market share.
  - Economic crisis.
  - Increased interest of people in space exploration instead of earth .
  - Competition from companies with a larger budget.

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## 5. MARKETING

The X-Plore ROUV enables customers to minimize the time spent on data accumulation. Many of them need to keep updated on the water pressure in different aquatic environments, or they need to carry out a study of the water to know how it is affecting climate change. In fact, scientists are hired to carry out this entire process, which with the ROUV and its amendments would save them money and days of work, thus assigning these workers to other areas, thus being more efficient.

Our main markets are town halls or government companies, scientists studying lakes, rivers and seas, also companies that raise cognizance about global warming and its consequences. Those can utilize our product for different tasks and to study many environments.

What mainly makes our product different from others is the fact that it is handmade, which implies that we have taken good care of small details such as optimizing the space it takes or getting better data, whereas if it was made by a machine all that wouldn't be that much important as the amount of products built or how to manufacture them. It is also unique as it offers a good description of what water depth is, with all the different seabed irregularities and damaging objects for the ecosystem. It can be moved very easily as it is lightweight and not very big, and we are planning on giving the option to control it remotely soon, which would improve the range of data acquisition.

Our distribution will be mainly focused on European companies with the option to expand to outsider countries in the case our product is needed anywhere else. In order to reach out to everyone we have created a website accessible with the following link [entic.online](http://entic.online) which will help us be heard from all over the world easily. We will then hire a distribution company in order that they will organize all our deliveries because nowadays we are a small company and we cannot do it yet.

As we will see in the costs section where we will detail and analyze in depth the total costs of the project, the launch price of the ROUV X-Plore will be 1699.99€ excluding VAT. In summary, it is a very well adjusted and competitive price with the market. If you are interested in acquiring our product, you should know that you are paying for all the materials, development hours and the amount of workers required, as well as the indirect costs, so it is a very good choice.

In order to reach out to all public we will use our website, where you can find information about how the ROUV has been made as well as lab images and all the contact information. We will also create an instagram and facebook account to reach college students and younger generations committed to the fight against climate change. We will finally contact different important labs to offer the option on buying the vehicle with a small discount as that would help us launch the product in the scientific community.

Finally our slogan, that will be a very useful claim, is *"Solutions for a connected world"*. It defines our brand since we are a technology company and we try to help solve one of the biggest problems we have nowadays, which is pollution and ocean ecosystem damage.



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## 6. PROJECT ANALYSIS: SCOPE & SCHEDULE

### Project Purpose

Project objective is to analyze small aquatic surfaces but when an objective has a special motivation it becomes a purpose, so in this subsection we will focus on it.

Our motivation to accomplish our purpose is the fact that we can discover something new, there's a big chance to do so, because water is constantly changing due to reasons like increase or decrease pollution, or increased flow due to thaw and some more. We think that we can achieve it because every member of our team has specific abilities at some engineering branches, regarding earnings we think that if we make a good work earnings must come sooner or later.

### Project Objective

The main objective of our ROUV is the detection of anomalous objects on the seabed, these objects can be anything from garbage to any metallic object or any other material.

But the objective of the project is to be able to analyze small aquatic surfaces, such as an aquarium, the objective is focused on being able to identify objects that can injure the animals that are there, and it could be carried out almost immediately and would have a duration of 1 year to have meaningful conclusions.

In the long term, the objective of the project could be to explore the seas and oceans in more detail, it is known to all that only 5% of the oceans have been explored, this does not mean that we are going to increase the percentage to 5.1% or moreover, for this more advanced technology is needed, what we mean is that we could explore in more detail those specific areas that large submarines may have missed.

### High level requirements

What we need to accomplish our objective are the following requirements, assuming there won't be delays in the development of B part, first one is to find those small aquatic surfaces where X-plore can be put inside, once we've done previous activity, in case the aquatic surface were public we must ask the city council for permission to use that, if not, we can immediately begin to explore. The second step will be to analyze data and if we reach a relevant conclusion we will try to make a scientific article to publish in a magazine.

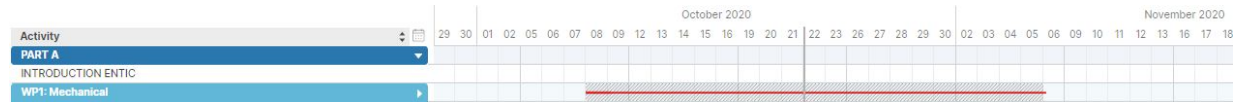
It has been a summary of requirements that we think we might need to carry out our objective.

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### Summary milestone schedule

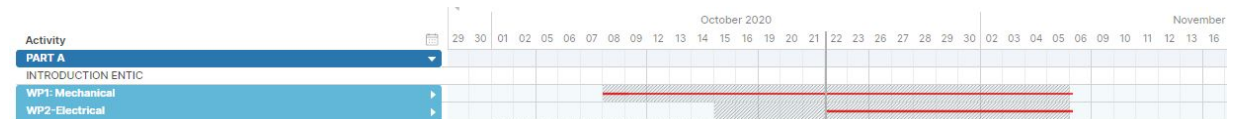
We are going to list general activity from every WP from A part.

- **Assemble the submarine structure (WP1).**



Its duration was almost a month, from 8th October to 5th November.

- **Weld components and Install motors in the structure (WP2).**



Its duration was from 15th October to 5th November.

- **Develop code with Arduino (WP3).**



Its duration was from 1st October to 5th November.

- **Make connections between RS232 and Arduino (WP4).**



Its duration was from 15th October to 5th November.

- **Develop matlab code to process Arduino data (WP5).**



Its duration was from 22th October to 28th October.

Now we are going to list general activity from the B part, but these activities are not completed yet, just planned.

- **Adapt box to place the new sensors (WP7).**



Its duration is supposed to be just one day, it only has 3 sub activities.

- **Learn the operation of the sensors (WP8)**



Its duration is supposed to be three days, from 4th December to 6 th December.

- **Software development for measurement with sensors (WP9).**



Its duration is supposed to be just one day, it only has 7 short sub activities.

- **Make connections between serial ports and Arduino (WP10).**



Its duration is supposed to be five days, from 10th December to 15th December.



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## 7. PROJECT ANALYSIS: QUALITY

The main purpose of this section is to identify which are the requirements and quality standards that are expected for our ROUV project, and to make sure that these are perfectly fulfilled. It is very important to take into account quality aspects when launching the project on the market, on the one hand, due to competition with other companies with similar products in this area, and on the other hand, because security must be provided to the buyer that you are acquiring a totally reliable and efficient product.

In order to analyze the quality of the ROUV X-Plore, we cannot ignore the risks that may occur throughout the project, and we will make use of *benchmarking*, which consists of making comparisons with various products, companies or work processes that show good practices and quality in our same field. Many of these companies use the seven basic quality tools, which are a set of very useful graphical techniques to identify and solve problems related to this topic. They are as follows:

- Cause and effect
- Check sheet
- Control chart
- Histogram
- Pareto chart
- Scatter diagram
- Stratification

Next, we will go on to detail the quality metrics of the project in order to find the main risks or inconveniences that could arise during the process, in addition to being clear about all the concepts to work and the margin of error that we can commit and the way to solve them.

WORK PACKAGE	METRICS	ALLOWED VARIATION	METHODOLOGY
MECHANICAL			
Build the ROUV's structure	Create the structure to avoid damage in internal circuits and to achieve a smooth navigation	+ - 3 cm length for the bottom net + - 0,4 cm length for the PVC pipe	Cut the PVC pipe into 8 pieces (15cm), 2 pieces (10cm), 4 pieces (5cm) Cut the bottom net Add the floaters and assemble the structure
Make holes	Make the holes for the structure, ultrasonic sensor and connections on the command box	+ - 2 mm width for the holes	Make 16 (7,5mm) holes for structure Make 5 (6mm) and 1 (1,5cm) holes for command box Make 2 holes for sensor (6mm)
Seal the box tightly	Secure the box in order not to damage the	There is no margin for errors	Save the circuit boards into the payload box

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	components inside		fixed tightly with plastic screws
<b>ELECTRICAL</b>			
Make connections between motors and switches	Identify the corresponding wires and connect the switches with the motors	There is no margin for errors	Identify the corresponding wires and connect them from the switches in command box to the motors on the ROUV
Place components into the command box	Distribute efficiently the elements into the command box	+/- 3 cm between components	Place the fuse in one corner, the GND pin in other and DB9 in other
Install the DB9 connections	Make the DB9 connections in order to communicate the ROUV with us	There is no margin for errors	Identify the corresponding wires and connect them from the command box to the PCB-base on the ROUV payload box
<b>ELECTRONICS</b>			
Make the pressure sensor circuit	Build a circuit with the sensor and the necessary components on the PCB-base board	+/- 4 mm length for wires +/- 1 mm between welders	Connect sensor pin 2 to 5V, 4 to ground, 1 to Vin- and 3 to Vin+, also with a 510Ω resistor, and amplifier
Make the ultrasonic sensor circuit	Build a circuit with the sensor and the necessary components on the PCB-base board	+/- 4 mm length for wires +/- 1 mm between welder	Connect sensor pin Vcc to 5V, GND to ground, TRIG to D5, and ECHO to D6
Make de microSD reader circuit	Build a circuit with the sensor and the necessary components on the Arduino board	+/- 4 mm length for wires +/- 1 mm between welder	Connect SD pin Vcc to 5V, GND to ground, MISO to D12, MOSI to D11, SCK to D13 and CS to D9
<b>COMMUNICATIONS</b>			
Read the information	Take the data from de sensors and save it	There is no margin for errors	Create serial object, us read method to obtain data from de the serial port, save it and close

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Write into microSD card	Open a file into microSD card and write the data received	+ - 200 ms of delay	Open microSD card, create a file for each sensor, write the data and close files
<b>SIGNAL PROCESSING</b>			
Program de project code	Write the code that performs the ROUV's main functions	There is no margin for errors	Write code in Matlab that read data from the serial port, process information and use it to do the different functions
Graphical Interface	Make the visual environment where we will see the signal of the ultrasonic sensor as a sonar	+ - 200 ms delay	Take the data saved and transform it into a graphic that updates in real time, all of them do it with Matlab

Once we have seen and reviewed all the general and internal quality aspects, we can see that our underwater vehicle has few risks compared to other products on the market, and easily we have been able to solve or deal with them.

To sum up, we can ensure that the ROUV X-Plore is a fully competent research and detection tool of polluting and damaging objects, committed to the environment, which makes use of reusable resources in order to be affordable for the user.



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## 8. PROJECT ANALYSIS: STAKEHOLDERS & COMMUNICATION PLAN

Throughout this chapter we will try to identify the stakeholders, which are those people, groups or organizations that can affect in one way or another and that appear throughout the product production process. They can be both clients, sub-administrators and employees of our own company. Since our project has a clear and ambitious objective, there are many of them, we will analyze them below. We will also carry out a communication plan with them.

- Sellers:**  
 Relation between sellers and our team is very important, they provide us materials to build X-plore and for them our purchase is an important income source, it's clear that they are an important stakeholders.
- Society:**  
 Society is one of the most important elements for any company, is like the relation of water-human, that's why our goal is to improve the quantity of clients, and with ethical esteems. As it is our chief objective, all the promoting and enhancements that we will do in our item will be done to affect this partner (we can say the general public doesn't know about it yet it is surely a partner).
- Government:**  
 As we said before, one of our goals is to gain society confidence, this was the first step to convince governments to collaborate with us, second step will be demonstrate government that our product truly help people and doesn't cause any environmental damage, next step will be to adapt our product in case it violates any safety regulation, and the last one step will be to comply with all taxes required to maintain a business. Government is also a fundamental piece as a stakeholder.
- Customers:**  
 Customers are people who we convince that our product could help them, of course they are key pieces and we could say is the most important stakeholder that we have. Our commitment to them must be total, we must offer a good after-sales service so as not to lose them and gain more customers, another tactic to gain them is to make viral advertising campaigns to promote our product in a cheaper and better way.
- Competitors:**  
 It wouldn't be the first time that a competitor bought the company of its rival to get rid of it and keep its entire market. It could be our case or if we become bigger we could do that. This is why our product must be the best and offer better benefits to our customers than competitors, this is the only way we can generate interest in competitors to buy us for a millionaire amount of money or earn enough money to buy them. That's why we consider competitors an important stakeholder.



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- **Investors:**

Companies which provide us with money by financing our product and thus increase the budget to invest in higher quality and more efficient components. We must insist again that our product should be excellent to generate that interest in companies and they see our product as a source of money in the future.

- **Manager:**

The manager represents the company and exercises management functions, his work is vital for our company.

- **Employees:**

Employees are the base of the production so we have to treat them well offering them employment stability.

- **Sponsors and mass media:**

As we gain popularity some sponsors will try to collaborate with us, but we should be cautious to choose companies that have good reputation in the market else our product popularity could go against us. Finally we conclude that sponsors and social media is a stakeholder that can give us benefits or losses.

To realize how pertinent every stakeholder is in relation with our product we use the stakeholders management assessment matrix:

STAKEHOLDER	UNAWARE	RESISTANT	NEUTRAL	SUPPORTIVE	LEADING
Sellers			C		D
Society				C	D
Government				C/D	
Customers			C	D	
Competitors			C	D	
Investors				C	D
Manager				C	D
Employees				C	D
Sponsors & mass media				C/D	

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As we have set up our main stakeholders, presently it is a great opportunity to consider a suitable methodology and communications plan in order to improve the current ones. We filled the next table:

STAKEHOLDER	REQUIREMENT	CAUSE	FREQUENCY	CHANEL	EVIDENCE	RESPONSIBLE
Sellers	Be good income source for them	Approval	Once a week	Personal meeting.	Status sheets	Manager
Government	Affirm and extend our place of working perspective.	Endorsement and control.	When an achievement is accomplished.	Face to face meeting.	Status sheets	Public relations employee.
Society	Attract them to the product	Approval	Once a week.	Internet or TV	Status sheets	Public relations employee.
Customers	Keep buying our products	Control	Once a week	Internet, social media, tv, radio, street advertising	Templates	Manager
Competitors	Interest in our product	Control	Once we have risk	intermediary companies	Templates	Manager
Investors	Invest in the project	Approval	1 every month once since company establishment	Personal meeting.	Status sheets	Manager
Manager	Represents the company	Control	1 time per day	Personal meeting.	Status sheets and Templates	Owner
Employees	Be controlled and payed	Approval	minimum 3 times in a week	weekly meetings	Templates	Owner
Sponsors & mass media	Contributes to the costs	Control	Once a week	Personal meeting.	Status sheets	Manager

## 9. PROJECT ANALYSIS: RISKS /& RESPONSE STRATEGIES

We are going to analyze the impact and likelihood of some of the most important risks that can occur during the manufacturing and marketing process of our X-Plore ROUV. To do this, we have made the following risk response plan.

### IMPACT

Insignificant
Small
Moderate
Large
Catastrophe

### PROBABILITY

Exceptional
Rare
Possible
Probable
Certain

RISK	IMPACT	PROBABILITY	RESPONSE
Client attrition	Small	Possible	Use Customer Success Managers
Lack of office space	Large	Possible	Consider relocation
Data security	Catastrophe	Small	Network and data encryption
Bad department	Large	Insignificant	Set credit limits
Brand fatigue	Small	Possible	Create creative, entertaining content
Difficult to sell product	Large	Probable	Identify the unique selling point
Health and safety	Possible	Small	Create a health and safety policy
Natural disaster	Catastrophe	Catastrophe	Create plans for responding to natural disasters
Transportation delay	Possible	Small	Be clear of the impact of losses
Machinery failure	Catastrophe	Small	Keep stock of parts

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## 10. PROJECT ANALYSIS: COSTS

Throughout this section we will make an estimate of the costs that it will take us to build a company dedicated to the commercialization of the ROUV X-Plore, carrying out a detailed analysis for each segment of the company's existence:

- Company creation (<1 year)
- Prevision for short term (0 – 3 years)
- Prevision for long term (>3 years)

We have been able to make comparisons with other similar products on the market and we have found that the average price is between 500 and 3000€. As the interval is so wide, we will have to go deeper into our case and the quality and efficiency of our material and staff.

What we are looking for is to create a small company from the beginning and grow and expand the business by making mass productions.

### COMPANY CREATION (<1 year)

The first thing we must do is choose which type of business we want to undertake, and for that reason we have decided on a Limited Liability Company or better known as SL, since it limits the liability to the capital contributed by the associates and so in the event that the company did not work we would avoid responding with our personal assets.

Due to our choice we will have to contribute 16€ to register our business, at least one of the partners must be autonomous and therefore pay said tax (approximately 80€) every month, and have a minimum entry budget of 3000€.

### Direct costs

- Material

Materials List (REUSABLE ITEMS):	€/unit	#	€	Materials List (RECYCLABLE ITEMS):	€/unit	#	€
3 motors set	69	1	69	PVC pipe (1 m)	1,65	2	3,3
Clamps	0,8	3	2,4	PVC elbow	0,4	10	4
Screws	0,2	3	0,6	PVC tee	0,6	4	2,4
Washers	0,1	6	0,6	Floater support (50 cm)	0,1	1	0,1
Power Supply wires	0,5	1	0,5	Plastic net (40x30 cm)	0,3	1	0,3
Link cable	9,4	1	9,4	Command box	5,8	1	5,8
Floaters	0,8	2	1,6	Switches	2,3	3	6,9

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Sealing gland	1,5	3	4,5	Payload box	14,78	1	14,78
Rubber O-ring	0,3	3	0,9	Silicon pipe (10 cm)	0,3	1	0,3
DB9 serial	0,94	2	1,88	Pipe terminal	0,02	1	0,02
DB9 screws & nuts	0,2	2	0,4	PCB prototype board	5,78	1	5,78
Fuse clip	1,02	1	1,02	PCB connector	0,5	1	0,5
Fuse	0,3	1	0,3	Arduino prototype PCB	3	1	3
GND terminal	0,01	1	0,01	8 pins IC socket	0,3	1	0,3
Fuse & term. screws	0,15	2	0,3	16 pins IC socket	0,31	1	0,31
Payload box fixing	3,06	4	12,24	Capacitors (4x330nF 1x45 nF)	0,15	5	0,75
Box fixing screws	0,1	4	0,4	PCB sockets strip	3,14	2	6,28
Electrical connector	0,7	1	0,7	Short PCB pins strip	0,2	1	0,2
PCB jumper	0,97	1	0,97	Long PCB pins strip	0,68	1	0,68
Pressure sensor	10,98	1	10,98	Diode	0,04	1	0,04
Differential amplifier	2,87	1	2,87	Plastic strip	0,02	15	0,3
RS232 transceiver	1,06	1	1,06	Rigid connection wires	0,2	10	2
ARDUINO UNO	17	1	17	Flexible connection wires	0,15	1	0,15
Sensor HC-RS04	4,49	1	4,49	Colour wire	2,3	3	6,9
microSD card	12,99	1	12,99	Package box	0,7	30	21
SD adapter	4,29	1	4,29				
161,40 €				86,09 €			
247,49 €							

- **Tools**

Something to keep in mind to start producing our product is that in addition to the material necessary to build it, we will need the means to build it, that is, tools, machines and furnitures that we will list below. We already had some of them and we didn't have to buy them.

That will be a major cost, although it won't be a problem as all the material can be used over several years with a depreciation percentage of 30%/year when it comes to tools and 20% when it comes to machines and furniture. If the total cost of the tools is 186.2€ and the total cost of the furniture and machines is 1515.7€, then the total cost will be as follows.

$$186.2\text{€} \times 0.3/\text{year} + 1515.6\text{€} \times 0.2/\text{year} = 358.98\text{€/year}$$

Tool box list	€/unit	#	€	Machine & furniture list	€/unit	#	€
Vernier	10	1	0	Right angle USB	3,5	1	0
Cut pliers	19,3	1	0	RS232 BB9 connector	6,8	1	0
Ruler	5	3	0	USB RS232 adapter	9,7	1	0
Pliers	20	1	0	Oscilloscope	197,1	1	197,1
Scissors	6	2	0	Functions generator	109,2	1	109,2
Tweezers	1	1	0	Drill	150,9	1	150,9
Screwdriver	11,2	1	0	Soldering iron	35	1	35

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Screwdriver liliput	8,9	2	0	Laptop	1200	1	0
Pressure gauge	7,1	1	0	Battery	23,5	1	23,5
Wrench	11	1	0	Table	100	5	500
Multimeter cables	5,6	1	0	Chair	100	5	500
Banana cables	6,8	1	0				
Twist tie	4	1	0				
PVC pipe cutter	20,2	1	0				
Soldering wire	3,3	1	3,3				
Stand	11	1	0				
Heat shrink	5,5	1	0				
Piece of wood	0,2	1	0				
PVC adhesive	5,2	1	5,2				
186.2 €				1515,7 €			
1701.9 €							

- **Salaries**

As we have just created the company, only the 5 initial partners will be part of it and therefore we will not have additional workers or their salaries with them. Each of us will be autonomous, and therefore we will have to pay the self-employed tax, which as we have said before will be 50€ per month and a total of 250€.

250€/month x 12months/year = 3000€/year

### **Indirect costs**

- **Sponsors and mass media**

The first year we will use it to advertise ourselves as an emerging company on social networks such as Instagram or Facebook, in addition to our website. Luckily this will not cost us any monetary investment, since we have a web programmer among our partners who would do it for free.

- **Insurance**

Like all workers, we must use part of the budget for personal insurance that covers each of us in the event of an occupational accident since we work with machines, and health comes first. We calculate that it would be about 100 per worker, that is 500 in total.

### **Semidirect costs**

- **Location**

The next thing we need is a place to set up our business. As we have said before, we have a web page from where we will sell our product, therefore for the moment we will look for a small place to store possible deliveries. Looking around the outskirts of Barcelona we have found a place for 300€ per month in l'Hospitalet de Llobregat.

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- **Supplies**

We must also take into account supplies such as electricity and water in the location, which would raise the budget to about 110€ per month.

- **Transport**

As we have said before in the marketing section, we will be using a delivery company to take care of everything when it comes to distributing our product everywhere it is needed. That won't add up though in the total cost sum as it will be at the customer's expense.

### **Total costs in less than 1 year**

Before calculating the total cost at the end of the year we need to calculate the amount of ROUV we will produce during this first year. The first ROUV is the hardest since it takes the time to write all code and design all circuits. That would take 80h/worker to make. The other ROUV will take less time since everything will already be programmed and designed. That would be around 45h/worker.

Taking into account that a worker does 40h/week of work and that they have 30 days of vacation, the amount of time spent each year will be 40h/week x (52 - 6)weeks = 1840h/year.

That means that we will be able to build  $1 + (1840 - 80)/45 = 39$  ROUV's during the first year

The first year we won't sell all ROUV's we build since we will still be a new company, though we expect to sell the ones that remain during the next few years, that is why we will build them anyway. We expect to sell a total amount of 25 ROUV's during the first year.

The total costs of the materials to make 39 ROUV's is  $39 \times 247.49\text{€} = 9652.11\text{€}$ .

Since the product will be handmade and high quality, it will be sold for 1699.99€(without VAT). Therefore,  $1699.99\text{€} \times 25 = 42499.75\text{€}$

At the end of this time period, the total costs of the project would be the following ones:

DEPOSIT	EXPENSE
Associate contribution: 3000€	Location: 4200€
Sells: 42499.75€	Equipment: 1701.9€
	Self-employment: 3000€
	Materials in X ROUV: 9652.11€
	Website: 0€
	Depreciation: 358.98€

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	Supplies: 1320€
Total Deposit = 45499.75€	Total Expense = 20232.99€

The total amount of money gained during this first year will be 25266.01€, but since we are self-employed we will have to pay 15% because of corporation taxes. The remaining will be 21476.74€. This divided into five parts will be 4295.34€/year. This is not a great salary but since it's the first year we can be happy as we gained more than we lost.

### **PREVISION FOR SHORT TERM (1 - 3 years)**

#### **Direct costs**

- **Material**

The materials used to build the ROUV will be the same as the ones listed above, although if asked by the customer, we can make improvements or add new features to the vehicle which would move up the total cost at most 50€, so the costs for material would be 297,49€ during this time period.

- **Tools**

The furniture and machines have a low depreciation value (20%) and therefore we won't yet be in the need to replace it or rebuy it. However the tools have a higher depreciation value and during these 3 years we may have to rebuy some of the tools. The list below contains several tools that might have to be replaced.

Tool box list	€/unit	#	€
Cut pliers	19,3	1	0
Ruler	5	3	0
Scissors	6	2	0
Tweezers	1	1	0
Screwdriver	11,2	1	0
Screwdriver liliput	8,9	2	0
Pressure gauge	7,1	1	0
Wrench	11	1	0
Banana cables	6,8	1	0
Twist tie	4	1	0
Soldering wire	3,3	1	3,3
Heat shrink	5,5	1	0
Piece of wood	0,2	1	0
PVC adhesive	5,2	1	5,2

The total sum will be then  $94.5€ \times 0.3/\text{year} = 28.35€/\text{year}$



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- **Salaries**

We are a company of only 5 workers and, since we are self-employed, the salary will depend on how much time we have been working on the company. The first two years we will have a salary of 150€/month which will increase up to 210€/month after this time has passed, that means that it will cost the company as follows.

5 workers x 150€/month x 12months/year = 9000€/year during the first 2 years

There will always be a corporation tax of 20% every year.

### **Indirect costs**

- **Sponsors**

Since our company and ROUV will help the environment a lot, we will try to get sponsors from city town halls or the government, as well as colleges since it can also be used in the scientific field for data acquisition. We will launch a low budget campaign with a basketball team that has offered us his brand as promotional material which will help us reach all different publics.

- **Insurance**

The insurance used will be the one mentioned before, with a total cost of 100€ per year and worker and therefore 500€ per year in total.

### **Semidirect costs**

- **Location**

After a year in the market we believe that in addition to using the premises as a warehouse and selling only through shipments, we can set up a small reception and sell physically. To carry out this installation we will use 400€ plus the rent of the place 300€ per month.

- **Supplies**

Since the supplies would be the same as the previous time period, there would be electricity and water in the location, which would raise the budget to about 110€ per month.

- **Transport**

The transport will be still at customer's expense, even though we will have an agreement with the delivery company that will bring big discounts and that will lure large public from regions far from the company's country. That will spread the business.

### **Total costs between 1 and 3 years**

This two next year we will try to sell all we produce as well as the 14 ROUV's that we did not sell during the first year. Taking into account that we will still produce 39 ROUV's per year during the next four years. This cost will only be calculated for 1 year as both of them are expected to give a similar amount of profit.

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The total costs of the materials to make 39 ROUV's is  $39 \times 247.49\text{€} = 9652.11\text{€}$ .

During these next two years we will increase the price of the ROUV up to 2299.99€. Therefore,  $2299.99\text{€} \times 39 = 66299.61\text{€}$

DEPOSIT	EXPENSE
Associate contribution: 3000€	Equipment: 1701.9€
Sells: 89699.61€	Self-employment: 3000€
Sponsors: 15000€	Materials in X ROUV: 9652.11€
	Website: 0€
	Depreciation: 28.35€
	Supplies: 1320€
	Location: 7600€
Total Deposit = 107699.61€	Total Expense = 23302.36€

This cost has been calculated only for 1 year out of the two years as we expect for the result to be similar.

The total benefit will then be  $84397.61\text{€} - 0.15 \times 91997.61\text{€} = 71737.98\text{€}$ . We divide it into 5 workers and we get 14347.59€/person per year.

### **PREVISION FOR LONG TERM (>3 years)**

#### **Direct costs**

- **Material**

The materials used to build the ROUV will be the same as the ones listed above, although as we had more and more experience in the market and the customers know us we will try to get a new release with more improvements for our RO UV in order to continue evolving in our objective to fight against climate change. Therefore, we will increase in material 100€, so the costs for material would be 297,49€ from this time.

- **Tools**

Very probably after 3 years the tools, machines and office supplies will be damaged or will have lost efficiency, that is why we will renew it. As we have said before, the machines and furniture have a low depreciation percentage and won't bring us the need to replace them all right after 3 years have passed, but after 5 or 6. Nonetheless, the tools will need to be replaced as they have a 30% depreciation value which after 3 years is almost 100%, they won't work as good as they would

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before. Choosing which machines and furniture we can still use and which we should replace brings up the following table.

Tool box list	€/unit	#	€	Machine & furniture list	€/unit	#	€
Vernier	10	1	0	Right angle USB	3,5	1	0
Cut pliers	19,3	1	0	RS232 BB9 connector	6,8	1	0
Ruler	5	3	0	USB RS232 adapter	9,7	1	0
Pliers	20	1	0	Soldering iron	35	1	35
Scissors	6	2	0	Battery	23,5	1	23,5
Tweezers	1	1	0				
Screwdriver	11,2	1	0				
Screwdriver liliput	8,9	2	0				
Pressure gauge	7,1	1	0				
Wrench	11	1	0				
Multimeter cables	5,6	1	0				
Banana cables	6,8	1	0				
Twist tie	4	1	0				
PVC pipe cutter	20,2	1	0				
Soldering wire	3,3	1	3,3				
Stand	11	1	0				
Heat shrink	5,5	1	0				
Piece of wood	0,2	1	0				
PVC adhesive	5,2	1	5,2				
<b>186.2 €</b>				<b>78.5 €</b>			
<b>1701.9 €</b>							

With the same depreciation values as before(20% for the machines and furniture and 30% for the tools) we can calculate the total cost.

$$186.2\text{€} \times 0.3/\text{year} + 78.5\text{€} \times 0.2/\text{year} = 71.5\text{€}/\text{year}$$

- **Salaries**

After more than 2 years since the start of the company, we will now earn a salary of 210€/month. Our company will grow and therefore we will need another employee to help the team fulfill all demands. The total cost will be then:

$$6 \text{ workers} \times 210/\text{month} \times 12\text{months}/\text{year} = 15120\text{€}/\text{year}.$$

### **Indirect costs**

- **Sponsors**

Now, with a few years of experience, we have decided to make a leap to television and make a television spot. For this we must have a specialized team that will charge us approximately 9550€. It is a large budget investment, but at the same time, we hope to receive more benefits since we will

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be able to reach a much more public. In addition, we also continue working as sponsors for the basketball club as the years before.

- **Insurance**

The insurance used will be the same as mentioned before, with a total cost of 100€ per year and worker, but now as we are increasing the company we have 6 employees more than before, so now the sum of insurance is 1100€ per year in total.

### **Semidirect costs**

- **Location**

After a year in the market we have managed to find a place in the market, the demands have grown and we have to adapt. To do this, we have moved to the Free Zone of Barcelona, where we have a much larger premises where we can carry out the manufacture of the ROUV, store it and even a small reception where it can be sold. The price of the place increases to 2000€ per month.

- **Supplies**

As we have moved to a larger place the cost of electricity and water will increase at approximately 500€ per month.

- **Transport**

The transport will be the same as the previous period, but since we are in another location a little bit far from the urban centre, we will have to pay 5€ more for every delivery ROUV.

### **Total costs in more than 3 years**

After 3-4 years we expect to have optimized the procedure to build ROUV's and will make a fully functional ROUV in only 20h/worker. That brings up to  $(1840)/20 = 92$  ROUV's each year. All ROUV's will be sold since our brand will be known. The price will still increase up to 2500€/ROUV's.

The total cost for the materials will be  $92 \times 247.49\text{€} = 22769.08\text{€}$ .

The gain for all ROUV sold will be  $2500\text{€} \times 92 = 230000\text{€}$ .

DEPOSIT	EXPENSE
Associate contribution: 3000€	Equipment: 1701.9€
Sells: 230000€	Self-employment: 3000€
Sponsors: 30000€	Materials in X ROUV: 22769.11€
	Website: 0€

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	Depreciation: 71.05
	Supplies: 6000€
	Location: 24000€
Total Deposit = 263000€	Total Expense = 59542.06€

We subtract 15% and we get 172939.24€ divided into 6 workers. We get a salary of 28823.20€/year per worker.

This would be a good salary for a startup after 4 years in the business.



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## 11. CONCLUSIONS

X'Plore is a company created from scratch that aims to create a ROUV able to detect anomalous objects capable of contaminating the environment. To do so, it has an ultrasound sensor that measures the distance between the vehicle and the seabed and shows it through a graphical interface in real time, the easier way to understand the data. It also has a pressure sensor and a microSD that stores the information to be viewed anytime and anywhere.

Our enterprise has designed a good quality, functional and efficient product that can be used by a wide range of clients. We want to keep improving our device while maintaining an affordable price, in order to expand our company and to satisfy more customers.

We desire to offer a reliable service that is friendly with the environment, since we want an ethical company that contributes to make the world a better place, even if it is a tiny contribution. That is why we take our values very seriously, which are perfectionism, sustainability, teamwork, trustworthiness and also passion, as we want our clients to see us as a corporation that really makes an effort on their devices and want to deliver the best of us.

Besides, to manufacture the best ROUV we can, we have considered our strengths and weaknesses we might face in order to overcome them. And even though we compete against companies with a larger budget, with good teamwork as well as lots of effort, we know we can live up to the expectations and create a better device than them.

No one will buy a product if they do not know it exists, so we have created a website ([entic.online](http://entic.online)) where clients can find information about us and the contact details in case they want to purchase our ROUV. It contains pictures of the device and also pictures of us, so the customers know who they are buying from. You can also see the values of our company and the description of the product.

It is important to have a clear objective and a good schedule not to work against the clock, and that is why we have used Gantt diagrams. To make sure every task we do has been thought about before, and is not rushed.

We have stated before that we are selling a good quality device, to prove it we have done a thorough analysis on the quality of this project, and we can ensure that X-Plore's ROUV is a fully competent research and detecting tool of polluting and damaging objects.

This project has stakeholders such as sellers, society, customers, competitors..., and we have done a meticulous communication plan that considers all of them, as we value them all equally.

Like every other project, there are risks that we need to take into account when designing a tool such as our ROUV, so we have made a careful analysis about the risks we might encounter and which strategies we can use to counter them.

Now the most important parts by many customers; the cost. We have said since the beginning that we have created an affordable product, and we would like to maintain our opinion. We have deeply analysed the prices of each part of the ROUV, the salaries of our workers and many other costs needed to build a project

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such as this one, and we believe it is a reasonable price that most customers can afford and are willing to pay.

To end this business case report, the last thing left to do is to express the major findings of our work in order to recognize a global vision of the project and the company.

LESSONS LEARNED	What did/did not work well?	What could be improved?
Scope	We had some problems during assembly, but we were able to sort them out	Better knowledge about how to build the sonar before starting it
Time	We managed to build the ROUV in the expected time	Finish the first part earlier to have more time to focus on the sonar
Cost	It has an affordable price	Have some parts of the ROUV cheaper (while maintaining the quality)
Risk	We don't know the exact risks a company encounters	To have real examples of other companies
Communication	Good communication among the members of the team	Have better task distribution to know more clearly who does each thing
Procurements	We found what we needed to buy within a budget and was delivered in time	Looking at more websites to find better or cheaper goods
Human resources	We didn't know exactly how many things we would need to build the sonar	Buy more things (like screws) that we might need more of and are cheap, and we can also keep them if there are leftovers
Quality	It is hard for us to determine the quality of the ROUV's structure	Better knowledge about the quality of some materials
Other	Good values for a company and a nice logo	The slogan could be more original (even though it is accurate)