WP 3 - DELIVERABLE 3.2.2
WORLDWIDE TECHNOLOGIES PERISCOPE

INDEX

TABLE OF ACRONYMS

T2I	Technology Transfer and Innovation S.C.A R.L.
IDA	Istrian Development Agency Ltd.
AGRRA	Agencija Za Ruralni Razvoj Zadarske Županije
INVESTINFISH	Boosting INVESTments in INnovation of SMEs along the entire FISHery and aquaculture value chain
F&A	Fisheries&aquaculture
FLAG	Fisheries Local Action Groups

EXECUTIVE SUMMARY

This report deals with the results achieved in the framework of the INVESTINFISH project, regarding the Worldwide technologies periscope for SMEs in the fishery& aquaculture sector (action 3.2) for the scouting of the best-advanced technologies or products available at EU level from R&D projects, R&D players, Innovation brokers.

The first part of this document presents an overview of what are considered to be the disruptive technology of innovation linked to the fisheries and aquaculture sector. Subsequently, it has been chosen to focus on individual innovations in the sector: the fisheries sector more linked to the issues of sustainability, cost reduction and the concept of blockchain while, for aquaculture, more linked to a context of Genetic and Artificial Intelligence aimed at a general efficiency of the sector and greater security.

At the end of the document is then presented the database created through the collaboration of all partners.

INVESTINFISH PROJECT

INVESTINFISH - “Boosting INVESTments in INnovation of SMEs along the entire FISHery and aquaculture value chain” is a project funded by the Italy – Croatia CBC Programme under the Priority Axis 1 “Blue Innovation”, Specific Objective 1.1 (S.O.1.1) “Enhance the framework conditions for innovation in the relevant sectors of the blue economy within the cooperation area”.

INVESTINFISH sees the cooperation of n. 6 Partners from 5 Different Regions: T2I (LP – Italy – Veneto), Sviluppo Marche (PP1 – Italy – Marche), D.A.Re. Puglia (PP2 – Italy – Puglia), Punto Confindustria (PP3 – Italy – Veneto), Istrian Development Agency (PP4 – Croatia – Istria), Zadar County Rural Development Agency (PP5 – Croatia – Zadar).

INVESTINFISH main objective is strengthening of competitiveness of F&A production system through promotion of investment programs aimed at acquisition of innovation services. INVESTINFISH implements pilot actions providing some IT-HR F&A SMEs with a roadmap to innovation instruments & services, boosting creation of marketable innovative products and/or processes that will improve the SMEs potential market positioning.

Expected benefits for enterprises are: accelerate time to market, increase linkages with innovators, increase F&A enterprises R&D expenditures in new & greener components/technologies/services, to boost HR-IT competitiveness. INVESTINFISH intends also to offer to the F&A sector to substitute the value chain concept with value network, proposing a shift from traditional value chains towards more collaborative value networks.

THE BLUE SECTOR YESTERDAY AND TODAY

According to Christensen, 1997, the term “disruptive technology” describes “new technologies that still lack refinement, often have performance problems, are just known to a limited public, and might not yet have a proven practical application”. This term can mean drastic alteration or destruction of existing things or elements of society. Moreover, therefore it has the potential to change the way people work, do business and engage in the global economy. Personal computers, smartphones and light-emitting diode (LED) lights are recent examples of technologies that were disruptive when first implemented.

In the fisheries and aquaculture sector, disruptive technologies have the potential to change fishing activity by providing fishers with more information so that fishing is safer (e.g. weather forecasting), more precise (e.g. satellite positioning) and more predictable. Emerging technologies for gathering information and storing it safely have the potential to improve compliance with regulations and traceability, so that the sustainability and management of fish resources will improve substantially.

New disruptive technologies affecting the sector include:

- mobile internet (e.g. providing real-time market prices for fish),
- “Internet of Things”, or interconnectedness among systems, devices and advanced sensors (e.g. electronic fish tags),
- advanced robotics (e.g. automatic fish filleting).

Disruptive technologies can offer new ways for the fisheries and aquaculture sector to do business so that it is more sustainable and more resource and energy efficient while creating new decent work opportunities. The use of this technologies in fisheries and aquaculture may not be widespread now, but it can change the processes, profitability and sustainability of the sector.

FISHERY

The demand for fish and fish product is strong and continuing to rise but the growth is entirely with farmed fish and the World Bank forecast zero growth in the catch industry up to 2030. Everything points to an industry which is mature or even post-mature in its lifecycle but with a lot of potential life left in it, but only if it can meet the challenges through innovation and change. These challenges fall to three main headings:

1. Innovation in sustainability,
2. Innovation to meet technical and operational demands including cost reduction,
3. Innovation in the market and marketing (blockchain).

INNOVATION IN SUSTAINABILITY

Seafood products are some of the most traded food items in the world with USD 143billion in value terms in 2016. At the same time, the ecological footprint of fisheries and aquaculture can be considered as significant. Almost a third of global fish stocks are over-exploited and aquaculture practices have shown a strong emphasis on the need for ecological balances. For this reason, both aquaculture and fisheries need to be managed in a more sustainable way. Sustainability that goes beyond simple ecological factors and thus seeks to improve operational efficiencies.

Sustainable development is particularly relevant to fisheries since it implies increasing the benefits from aquatic resources without decreasing the resource or stock beyond some optimal and sustainable level. The concept of sustainability has always been the basis of fisheries management. It includes the sustainability of the biological resource, its value and the social benefits deriving from it. It also implies an assumption of reversibility. Exploitation will inevitably affect the abundance, spawning biomass and species composition of a fishery resource, and the need to conserve options for future generations implies that such effects should be reversible within some practical time-frame. [1]

According to FAO's report, in the aquatic environment, sustainability does not mean constancy. Since the seventies, short-term variations in marine resources due to fishing and natural fluctuations have been recognized as important factors in assessment and management. Moreover, in wild stocks, the loss of species (and more especially local races) through bad fishing practices, environmental change or species introduction (including escapes of cultured species), is a real and persistent danger.

COST REDUCTION

Other innovation areas include hydraulic power applications; stronger materials for fishing gears increasing size and efficiency; better electronic aids for navigation, bottom mapping, fish finding, gear deployment and communication; and improved fish preservation technology. Many of these technologies have also become inexpensive and compact enough to be available to almost any size vessel.

[1] http://www.fao.org/3/u7260e/u7260e07.htm

This has also made it possible, in some cases, to improve fishing selectivity and product quality, but on the other hand has led to higher fishing mortality, spreading overfishing throughout the world. (Garcia & Newton 1997).[2]

Other innovations aimed at reducing costs can be mentioned:

- improved information on vessel distribution (through satellite vessel monitoring systems, VMS);
- accelerated submission of catch data (e.g. through the VMS or the Internet);
- facilitation of global or regional information systems (e.g. on resources or IUU) and comparable research programs on similar ecosystems;
- improved understanding on underwater habitat (e.g. with autonomous underwater vehicles and improved scanning instruments), species distribution and migration and related environmental conditions (through archival tagging).

Communication and foresight, the ability to escape have also increased thanks to technological innovations. In addition, fuel efficiency has been improved and fishing has become globally more fuel efficient than any land-based meat production system (Tyedmers et al. 2005). However, this does not eliminate the need for increased efforts in the face of rising fuel costs. It should also be noted that although the improved technology is available, it may not necessarily be applied unless both fishermen and government officials are willing to adopt it. This may require much greater incentives, particularly for technologies that improve reporting, monitoring and management capacity.

BLOCKCHAIN

Blockchain is a technology, relying on well-established cryptographic principles and operating as a distributed repository that provides a way for information to be recorded and shared through a peer to peer community. In this community, participants maintain access to their data on the Blockchain. Blockchain can play a role towards:

- Transparency and traceability
- Trust in data, facts and processes for the whole supply chain
- Smart contracts to enable automation and reduce cost of transactions
- Auditability, thanks to the immutability features of the Blockchain

[2] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2935129/

- Tokenization, the feature of transforming and transporting value, will allow to incentivize and engage stakeholders.

AQUACULTURE

Aquaculture is a centuries-old activity that emerged and developed in full integration with the rural areas' traditional practices and farming systems. Over time, farmers' innovations led to the development of quite complex aquatic food systems such as fish polyculture or Integrated Agriculture.

Innovations in aquaculture include technologies that diversify economy and food production, improve production efficiencies at the hatchery or farm levels while mitigating environmental impact; technologies that mitigate the occurrence of animal diseases or parasites, or that reduce or eliminate the use of antibiotics to treat animals; advances in offshore or land-based recirculation technology; novel feed ingredients; reductions in carbon footprint through improved energy efficiency or regeneration and social programs designed to improve living and working conditions at the farm or processing levels. Important efficiency gains can also be reached by reducing wastes and losses during production and post-harvest.[3]

Aquaculture technology innovation was adopted to:

- develop and reform sector economy;
- diversify livelihood and food production;
- improve resource management efficiency;
- combat environment degradation;
- adapt to climate change.

Moreover, aquaculture technology innovations helped traditional aquaculture to better practice or establish an emerging sector for blue economy growth in many countries

Innovative practices with regard to species domestication or new species introduction have been observed to address the local market demand, or to develop stock enhancement (culture-based fisheries and sea ranching). The biological characteristics of a species, indeed, can determine its adaptability to diverse rearing systems and influence traits such as robustness or resilience, reproduction in captivity, trophic level of feeding and feeding plasticity. Genetic technologies can be used to modify commercially important traits of aquaculture species.

Genetics and genomics are thus an area where innovation has huge potential and this potential is being further advanced by improved understanding, over recent decades, of the –omics in which our increased

[3] http://www.fao.org/3/na401en/na401en.pdf

knowledge of the biological functioning of organisms is enhancing our capacity to further adapt these organisms to our food production systems. Genetic-related innovations in aquaculture include selective breeding: this allowed a fast growth, specific pathogen resistance (SPR), the ability to grow on plant-based feeds, cold tolerance, stress resistance or feed efficiency. Moreover, the successful cryopreservation of gametes (sperms and eggs) and embryos offers new commercial opportunities with unlimited production of seed along with potentially healthier and better conditioned fish and genetic management of bloodstock.

Another essential innovative feature from an aquaculture perspective are **Feeds**: this, indeed, are the main factor and source of performance, profit and environmental impact. Innovations in this area include oil from microalgae as a fish oil alternative that contains the levels of high-quality omega-3 fatty acids (DHA and EPA) required by most fish species. Large agribusinesses are developing fish feeds by a process that places bacteria in fermentation tanks and feeds them methane. Fish feeding innovation, e.g. computer-aid distribution, functional feed, such as medicated feeds, first feed and feeds by growth stages etc., can thus lead to major gains and in salmon farming (De Verdal et al, 2018) calculated that a 2–5 percent improvement in feed use efficiency would save 42.9–107 million USD per year.

One of the latest innovations in the field is **Digital and Information and Communication Technology (ICT) and Artificial Intelligence** (AI). A computer assisted aquaculture decision making system can help to decide the proper culture cycles with input-based growth performance under climate and environment changes. There is bioeconomic modelling for improving aquaculture performance, a User-Friendly Tool for Investment Decision Making in Aquaculture (UTIDA), assisted farmers to optimize the performance of aquaculture under different hypothesis. Recent developments of ICT applications include air-based drones or aquatic robots, aquatic sensors and video cameras for inspecting equipment and moorings, real-time monitoring of water quality, environment and fish, and assisting in the optimization of land-base and sea-cage farm operations.

THE TECHNOLOGICAL PERISCOPE

The desk research was the starting point of the **INVESTINFISH technological periscope database**: in this regard, the website of the possible main innovation actors in F&A sector was considered as the first source of data. From these pages the main information concerning the contact points and projects and product results were extrapolated. The Database structure was the following:

Title	
Description	
Sector (F or A)	
Stage of Development/Maturity (i.e. already on the market, technology validated in the relevant environment, laboratory tests finished, etc…please specify)	
TRL (EC definition)	

Technology/ies used (i.e. AI, Blockchain, Machine Learning, other -please specify)	
Why it is useful	
How it can be implemented in SMEs	
Contact	
Link	

Table 1 - Worldwide technologies periscope database

We think it is necessary to define on this occasion the definition and the different degrees of TRL (Technology Readiness Level).

The term Technology Readiness Level (acronym TRL), which can be translated as Technological Maturity Level, indicates a methodology for the evaluation of the degree of maturity of a technology, originally

developed by NASA in 1974[1] and subsequently modified. It is currently used by various American and European bodies, such as the US Department of Defense, NASA, the European Space Agency, the European Commission and others.

It is based on a scale of values from 1 to 9, where 1 is the lowest (definition of basic principles) and 9 is the highest (system already used in the operational environment).

TRL 1	Basic Principles Observed
TRL 2	Technology concept formulated
TRL 3	Experimental Proof of Concept
TRL 4	Technology Validated in Lab
TRL 5	Technology Validated in relevant environment (industrially TRL 6. Relevant environment in the case of key enabling technologies)
TRL 6	Technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 7	System prototype demonstration in operational environment
TRL 8	System complete and qualified

TRL 9	Actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

Table 2 - TRL DEFINITION

DATABASE SCOPE

The main purpose of this database is the identification of a possible innovation that can be exploited by companies engaged in fishing and aquaculture. Through this periscope, will be possible to scout one of the best-advanced technologies or products available at EU level both from R&D projects, R&D players, Innovation brokers.

This will make it possible to obtain a first indication of the innovation and technologies that can lead to a more competitive environment for fishery and aquaculture in their reference environment and, above all, who to contact for the possible purchase of services aimed at innovation.

DATABASE RESULTS

Title – N.1	Bumble Bee's Natural Blue® by Anova®
Description	Bumble Bee uses a SAP Cloud Platform Blockchain service, which allows consumers to follow their tuna caught in the Western and Central Pacific Ocean from boat to plate. According to German software company SAP, this technology provides seafood companies with the ability to trace their products throughout the supply chain. Consumers then can scan QR codes with their smartphones to learn about the provenance of their tuna and the responsible practices developed by this fishery, allowing them to make better consumption decisions.
Sector (F or A)	F
Stage of Development/Maturity	PRODUCT ALREADY IN THE MARKET
TRL (EC definition)	**8**
Technology/ies used	BLOCKCHAIN
Why it is useful	Blockchain creates transparency and traceability across the food supply chain. It supports the consumer's need to know and reinforce their faith in the brands trust. Moreover, Blockchain is the safest possible way to share data between parties because it is incorruptible and verifiable.
How it can be implemented in SMEs	Blockchain technology can stores data and creates a tamper-proof supply chain history, which can be shared and seen by each participant.
Contact	Anova Food, LLC - 280 10th Avenue - San Diego, CA 92101

	Phone: 813.902.9003 Fax: 813.902.9062
Link	http://anovafoodusa.com/natural-blue/

Title – N°2	FarmMOJO for Aquaconnect
Description	FarmMOJO is a farm advisor mobile app for Shrimp farmers to improve the farm productivity and traceability. This tool helps them to manage the Pond water quality, feeding information, Growth rate in one place rather than keeping them in multiple farm ledgers. FarmMOJO uses machine learning technology to provide insights to the farmers and suggests appropriate advice for better productivity and disease predictability.
Sector (F or A)	A
Stage of Development/Maturity	PRODUCT ALREADY IN THE MARKET
TRL (EC definition)	7
Technology/ies used	Mobile App
Why it is useful	AI-based advisor that allow to know values like salinity or ammonia levels in pond and gives suggestions on whether those level are higher or lower for the sea life to survive. It captures what is going on in the aquaculture

	farm and advises the farmers. Because of this, they don't need middlemen and can get more in revenue.
How it can be implemented in SMEs	Most farmers cannot afford a water treatment plant, as per the regulations for fish cultivation. If water quality is maintained, it is good for the animals, they grow organically and is not needed to add too many minerals or antibiotics, helping in the managing of water quality and having a better productivity and avoiding water pollution.
Contact	Aquaconnect, Type II/17, Dr.VSI Estate, Thiruvanmiyur, Chennai - 600041 Tamilnadu, India Toll Free: 1800 123 1263 Mobile: +91 72999 10993 Email: info@aquaconnect.blue
Link	https://aquaconnect.blue/

Title – N°3	UMITRON CELL / EYE / FAI
Description	Umitron is a data company for aquaculture that provides customers automated analytics of fish behavior and recommendation to optimize timing and amount of feed. Umitron provide three different services/product: • UMITRON CELL (remote feeding service)

	• UMITRON EYE (data service for aquaculture insurance by smart camera) • UMITRON FAI (real time fish appetite detection powered by machine learning algorithms)
Sector (F or A)	A
Stage of Development/Maturity	PRODUCT ALREADY IN THE MARKET
TRL (EC definition)	7
Technology/ies used	MACHINE LEARNING - IoT - IA
Why it is useful	Improve operational costs by optimizing fish feeding and enabling work style reforms, reduce business risks by analyzing environmental data and Increase sales with sustainably-grown, value-added fish. **UMITRON FAI** World's first real-time ocean-based fish appetite detection system. UMITRON FAI uses efficient machine learning and image analysis techniques to extract relevant data from video streams that can then be used to accurately quantify fish appetite. FAI software has already been rolled out to existing customers to optimize their feeding operations.
How it can be implemented in SMEs	The FAI algorithm takes in the same visual information that humans would and then scores fish appetite and presents it in an easy to understand chart. When used in tandem with a smart feeder such as UMITRON CELL, the feed time intervals and amounts can be automatically adjusted with minimal human interference. Farm operators can utilize FAI to fine-tune their feeding schedules, ensuring fish are always satiated. This is easily done via their smartphones with the UMITRON app, where they can check and remotely adjust feed settings based on the FAI feedback.

Contact	
Link	https://umitron.com/en/index.html

Title – N°4	**UNDERSEE**
Description	UNDERSEE is a Portuguese startup who has developed an ICT tool that enables precision aquaculture with underwater sensors and numerical models that deliver data in real time to the could. UNDERSEE water is composed by a plug-and-play system and 3G or SATCOM communications, and is easy to adapt to existing structures such as aquaculture cages, buoys, bridges or boats.
Sector (F or A)	A
Stage of Development/Maturity	R&D project – technology validated in the relevant environment
TRL (EC definition)	6
Technology/ies used	Internet of Thing (sensors) - cloud - mobile app
Why it is useful	UNDERSEE cloud dashboard, users can easily access several features, such as real-time water parameters, historical data of water quality, and automated decision-making tools based on early warnings.
How it can be implemented in SMEs	Buying the IoT tool. With the UNDERSEE water service, the aquaculture producer can remotely – by app - check the most important water parameters that

	allow monitoring of water quality and control of the appropriate water conditions in aquaculture.
Contact	IPN - Instituto Pedro Nunes, Coimbra, Portugal undersee@undersee.io
Link	http://undersee.io/

Title – N°5	**FISHCOIN PROJECT**
Description	Fishcoin is a peer-to-peer network that allows independent industry stakeholders to harness the power of blockchain using a shared protocol so that data can be trusted, transparent and secure. Fishcoin is a blockchain based traceability and data ecosystem designed specifically for the global seafood industry. It creates an incentive for data capture in various forms beginning with key data elements captured and communicated by fishermen and fish farmers at the point of harvest for the purpose of traceability.
Sector (F or A)	F
Stage of Development/Maturity	PRODUCT ALREADY IN THE MARKET
TRL (EC definition)	7
Technology/ies used	Blockchain - series of decentralized open source tools

Why it is useful	It is very useful to encourage small producers to record and share their data and information.
How it can be implemented in SMEs	Becoming a member
Contact	team@fishcoin.co
Link	https://fishcoin.co/

Title – N°6	**THE EYES ON THE SEAS**
Description	Cutting-edge technology platform that combines satellite monitoring and imagery data with other information, such as fishing vessel databases and oceanographic data, to help authorities detect suspicious fishing activity.
Sector (F or A)	F
Stage of Development/Maturity	R&D project - technology validated in the relevant environment
TRL (EC definition)	6
Technology/ies used	technology platform - satellite monitoring - data

Why it is useful	This application could create a market incentive for fishing vessels that operate in good faith and in accordance with international and national laws.
How it can be implemented in SMEs	The technology could be implemented by Governments around the world in order to encourage information-sharing among authorities and countries and can be used for enforcement and tracing seafood's route to market.
Contact	The Pew Charitable Trusts in collaboration with Catapult
Link	https://www.pewtrusts.org/-/media/assets/2015/03/eyes-on-the-seas-brief_web.pdf

Title – N°7	TIDE SIMULATOR FOR OYSTER FARMS IN THE DELTA PO
Description	In the Sacca di Scardovari, in the heart of the Po Delta (Rovigo), since 2016 the precious and delicious pink Tarbouriech oysters have been bred, cultivated and marketed, shellfish already very famous in the Thau basin, in France. Its characteristics are exceptional, the taste is delicious, the pulp rich, crunchy and fleshy, the shell is pink, without impurities. It is known that the cultivation of oysters in France takes place thanks to the spectacular tides of the Atlantic Ocean which allows the molluscs to grow alternating between air and sun and their permanence in the water and out of the water until fully ripe. We know that in Italy there are no tides like the French ones that create a rise and fall of the water by several meters. The desire, however, to breed the precious mollusk also in Italy and complete the already precious cultivation and

	marketing of molluscs typical of our areas (mussels, clams, fasolari) has pushed to import from France and to perfect an important system that simulates the tides. The pioneer of this idea is the entrepreneur Alessio Graguoldo who started the first experiments with oysters in Italy in 2007 who perfected the quality of the mollusk thanks to research and genetic experiments to obtain an excellent quality. He then perfected the innovation of the suspension system to which the oysters are attached to the ropes which then allow the metering of water and air with precision, alternating periods in immersion with periods of exposure to air and sun simulating the alternation of tides. All the immersion and emergence movements of the ropes are powered by clean energy: solar panels and wind power plants. The decidedly particular and exclusive cultivation system was conceived by Florent Tarbouriech, producer of the famous pink oysters in the Thau basin, the largest lagoon in the region. Languedoc-Roussillon in the south of France; area also known for its large production of wines, the most popular of which are Vin de Pays d'Oc and the sparkling Crémant de Limoux.
Sector (F or A)	The system is designed for the aquaculture sector, in particular for the breeding and production of oysters.
Stage of Development/Maturity	The system was imported from France but perfected and innovated in Italy thanks to R&D which allowed to create a power plant from renewable and completely green sources for an excellent integration with the Po Delta Park which must be protected and respected. The system is currently already developed, applied and functioning.
TRL (EC definition)	**7**
Technology/ies used	Mechatronics
Why it is useful	The system that allows the lifting system to operate is indispensable for the growth of oysters that must mature by alternating air, sun and water with

	great precision, which in nature is determined by the tides. Without this type of plant, oysters could not be bred and marketed in Italy. Now the Po Delta has completed its important variety of shellfish cultivation; mussels, clams, fasolari and oysters.
How it can be implemented in SMEs	The plant can be implemented in small and medium-sized aquaculture companies that want to complete the variety of shellfish already present in the area so as to offer the market greater quantities of oysters that are in great demand in Italy and abroad. Currently the quantities available are not sufficient to meet market demands.
Contact	Greguoldo Alessio
Link	No website

Title – N°8	PRIZEFISH "Piloting of eco-innovative fishery supply–chains to market added–value Adriatic fish products"

Description	PRIZEFISH project idea builds on the rationale to implement a cross-border, territorial and socio-economic developmental change in the cooperative renewable exploitation of Adriatic fishery resources and consequently in the long-term benefits on the Adriatic marine ecosystems. PRIZEFISH builds on knowledge that were capitalized on abundant synergies with several previous and ongoing cooperation projects in the fishery sector. Its overall objective is to tackle the dual territorial challenge for Italian and Croatian Adriatic fishing SMEs and Producer Organizations (POs) to be more sustainable and to increase their economic competitiveness in the seafood markets, by developing and piloting innovative fishery products with added-value given by ecolabels fulfilling requirements of environmental, economic and social sustainability.
Sector (F or A)	F
Stage of Development/Maturity	A 3-pillar approach is being applied: High content of research & innovation, Industry-driven and market penetration and Capitalization in fishery-based communities) and 3 main Specific Objectives: SO1. Key-enabling technologies for environmental-economic sustainable Adriatic fishery, to improve the framework conditions of Adriatic fishery. SO1 Action - Piloting of sustainable and eco-certified fishery productions. SO2. Enabling SMEs to produce eco-labelled added-value Adriatic seafood, to enhance the competitiveness of the Adriatic fishery industry to become more sustainable, better managed and more efficient than today. SO2 Action-Innovating tools and processes for added-value Adriatic fishery products. SO3. Increasing Adriatic SMEs and POs competitiveness to penetrate fishery EU/non-EU markets, filling the gap between fishery production and marketing of eco-labelled products.

	SO3 Action-Building up value chain and marketing of Adriatic eco-innovative fishery products.
TRL (EC definition)	2
Technology/ies used	Certification and standardization systems. Development of a certification scheme for an ecolabel brand fully Adriatic, the Adriatic Responsible Fishery (ARF), that would combine environmental protection with the social dimension and economic aspects. The purpose of Adriatic Responsible Fishery (ARF) is to provide a framework for the recognition of fisheries management 7 best practices and to foster the adoption of measures capable of achieving and maintaining appropriate level of stocks over time. The ARF programme will focus on the value of certification in driving improvement in the marine environment and in enhancing traceability and transparency throughout the supply chains. However, besides the direct benefits of certification and market recognition, the ARF standard and assessment process will provide a tool to diagnose and identify improvement needs at a more general level, irrespective of eventual certification. Notably, management authorities could begin to use the ARF standard as an independent, credible ground truthing approach before making wide-sweeping adjustments to enhance efficiencies for all fisheries, not just those seeking certification
Why it is useful	It tackles the dual territorial challenge for Italian and Croatian Adriatic fishing SMEs and Producer Organizations (POs) to be more sustainable and to increase their economic competitiveness in the seafood markets, by developing and piloting innovative fishery products with added-value given by ecolabels fulfilling requirements of environmental, economic and social sustainability.
How it can be implemented in SMEs	Through the fulfilment of the standard that will be identified in the ARF

Contact	University of Bologna (UNIBO) ITALY – Lead Partner Contact person: Alessia Cariani Tel.: +39 32 06 951 145 E-mail: a.cariani@unibo.it http://www.cirsa.unibo.it/en
Link	https://www.italy-croatia.eu/web/prizefish

Title – N°9	SUSHIDROP _ SUstainable fiSHeries wIth DROnes data Processing
Description	SUSHI-DROP will develop customized unmanned underwater vehicles, equipped with acoustical and optical technologies in order to implement a non-invasive mean to assess environmental status of habitats, fish stocks population and, in general, to monitor the biodiversity of marine ecosystems. It is planned to assess the accuracy of the opto-acoustic surveys in deriving single-species abundance indices (in numbers or weight) for direct input into stock assessments, and to evaluate the benefits brought by these new

	technologies with respect to the classical procedures based on fish sampling. Moreover, a dedicated open-access database system will be created to collect, maintain and share the scientific data acquired by the AUVs.
Sector (F or A)	F
Stage of Development/Maturity	The first design stage of the Autonomous Underwater Vehicle (AUV) has been completed (February 2020). The drone shall be based on a modular architecture to allow a rapid reconfiguration of the system to deal with different survey scenarios. In the following, some technical specifications: Weight in air: 250 kg Maximum thrust: 2.5 m/s with a 6-propellers configuration Max Operative Depth: 300 m Operative autonomy: 8 hours The drone shall be equipped with a guidance, control and navigation system based on innovative algorithms, which will allow to follow autonomously the trajectories, without the human supervision. The selected multibeam sonar will gather bathymetric and water column data to provide the characterization of the underwater habitat explored. The AUV will have also an innovative shape compared to what you see in the world of AUV robots, the first survey is scheduled for early June 2020.

TRL (EC definition)	2
Technology/ies used	Autonomous Highly Technological Machines
Why it is useful	It promotes investment in technology transfer and innovation services among the F&A enterprises and it can have as an effect a positive environmental impact.
How it can be implemented in SMEs	SMEs can be both purchasers of the AUV once in production and before enterprises producing the spare parts and components of the newly designed AUV can benefit from this design of new technology.
Contact	University of Bologna (UNIBO) ITALY – Lead Partner UNIBO acts in the project through the Laboratory of Marine Biology and Fishery located in Fano. Contact person: Luca De Marchi E-mail: l.demarchi@unibo.it
Link	https://www.italy-croatia.eu/web/sushidrop