SMALL AND MEDIUM PORTS IN TRANSITION

Enhancing collaborative forms in the Mediterranean Marinas and Small and Medium Ports towards sustainability, open innovation and competitiveness

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Interreg Mediterranean Psamides

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1. The context

In the Mediterranean area Marinas and Small and Medium-sized ports (SMP) play a fundamental role in articulating coastal and maritime tourism, connecting the hinterlands and communities. Indeed, coastal and maritime tourism are a significant sub-sector of both the wider Tourism sector and the Blue Economy.

The Blue Economy can be understood as the set of human activities depending on the sea and/or underpinned by land-sea interactions in the context of sustainable development[1]. It includes different sectors such as: coastal tourism, maritime transport, living resources, ocean energy, port activities, shipbuilding and repair and non-living resources. All these activities provide 4.5 million direct jobs[2] in the EU. The blue economy is being a lever for the development of innovation and new practices in the coastal world, such as the emerging blue energy sector or blue bioeconomy.

As stated by the European Commission, "Blue Growth is the long-term strategy to support sustainable growth in the marine and maritime sectors. Seas and oceans are drivers for the European economy and have great potential for innovation and growth. It is the maritime contribution to achieving the goals of the Europe 2020 strategy for smart, sustainable, and inclusive growth"[3].

There is not a unified definition of what a SMP and a Marina is. In this paper we are delimiting a Marina as a port area oriented to recreational boating and nautical tourism (yachts and small boats), whereas small and medium-sized ports activities include cargo handling (up to 50 million tons of goods according to the EU statistical definition), passenger ships (below 135,000 passengers per year), fishing as well as recreational services.

Europe boasts close to 37,000 km of navigable coast. There are over 4,500 marinas in Europe, which offer 1.75 million berths for a total boat park of 6.3 million vessels[4]. Today, 70% of boat charter takes place in Europe, with a significant part being held in the Mediterranean Sea. Irrespective of marinas and SMP's size and location, they are increasingly becoming epicentres of economic and social interactions. They generate economic growth and create job opportunities. Marinas and recreational ports are sectors with an annual turnover of more than 45 billion euros, 15 billion of which represent the European market. The outlook for the future is also encouraging, with a growth rate of 6% per year globally[5].
The different recreational boating, cruise activities, fishing and the rest of the industrial and tourist activities linked to the ports represent an important factor of competitiveness in the Mediterranean area.

However, this growth in the marinas and SMP is causing an increasing environmental, competitive, operational and management pressure.

EU initiatives and strategies such as the European Green Deal (2019) which reaffirms the EC's ambition to increase its climate targets and make Europe the first climate-neutral continent by 2050, are exerting even more pressure on SMPs.

This context of reaching the European Green Pact's goal of climate neutrality by 2050 has revealed that marinas and SMP have difficulties to face these pressures due to a low smart specialisation, limited levels of technology use, lack of data availability, outdated infrastructure, absence of effective collaboration between ports and its community ecosystem as well as a low level of investments.

It is essential to strengthen the role of ports as integrating elements for territorial synergies, evolving from their basic role as infrastructures to real hubs providing services to all citizens, with a great capacity to produce synergies for economic, industrial, logistic, tourist and social development, while ensuring the environmental and economic sustainability of port infrastructures and of the activities they perform.

[1] Union of the Mediterranean, 2014. Ministerial Conference on Blue Economy [http://ufmsecretariat.org/wp-content/uploads/2015/11/2015-11-17-declaration-on-blue-economy_en.pdf]
[2] https://ec.europa.eu/oceans-and-fisheries/news/2021-eu-blue-economy-report-emerging-sectors-prepare-blue-economy-leading-part-eu-green-transition-2021-05-20_en
[3] https://s3platform.jrc.ec.europa.eu/blue-growth
[4] Coastal and Maritime Strategy, 2017 (EU) [https://ec.europa.eu/oceans-and-fisheries/system/files/2021-03/swd-2017-126_en.pdf]
[5] European Union, 2021. Protecting the environment and oceans with the Green Deal [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/protecting-environment-and-oceans-green-deal_en]

2. PSAMIDES objectives

PSAMIDES project aims at optimising and making more efficient the operation of the Small and Medium-sized ports (SMP) and the marina's management by implementing innovative tools to manage tourism flows, better controlling costs, providing more services to customers and stimulating ports ecoinnovation and competitiveness thus reducing environmental negative externalities from tourist activity.

Specifically, PSAMIDES searches to:

— Create a blue growth community of small-and medium-sized ports. While adopting a transnational approach, PSAMIDES seeks to enable small and medium sized ports to create an integrated business ecosystem that provides support to innovation and helps them overcome the current limitation of funds and personnel so that they can identify, by themselves, the most effective solutions in each case.

— Improve blue growth governance. PSAMIDES endeavours to create an effective multilevel governance to enable the management experiences to be capitalised, which could be reproduced in hundreds of ports in the MED area.

PSAMIDES has tested different technological solutions covering two areas:

— **The service-oriented technologies to optimise Ports Management model** operation as well as to monitor user habits (intelligent management of moorings occupancy, remote ships supervision, port community systems, intelligent infraestructures and smart sensors):
  - Berth occupation sensors
  - Automated boat recognition system
  - Remote water and electricity service pedestal
  - IOT Port Management

— **The environmental-oriented technologies towards sustainable management** by enhancing the level of energy self-sufficiency through net energies; environmental solutions in waste and water management:
  - Plastic trap device
  - Port automation with cameras
  - Photovoltaic pavement
  - Marine weather report and alerts

3. Trends and challenges

Technology like big data, automation and artificial intelligence, as well as new values such as transparency, social innovation and collaboration, are driving profound changes in all areas of the economy. Small and medium ports are not exempted.

Currently, SMPs are especially confronted to specific challenges linked to Marina operation management, new tourism behaviour, circular economy and the need of a greener Port at management and operation level (need of adoption of new ICT tools, diversification of telematic services and simplification of services requests), congestion (promotion of the use of the port throughout the year), adapting to new tourism consumption trends (promotion of sport and nautical services, improved security) as well as the need of improving collaboration between ports, optimisation of supply and operations (boarding-disembarkation, tourism information, tourism mobility) and a more sustainable ship repair industry.

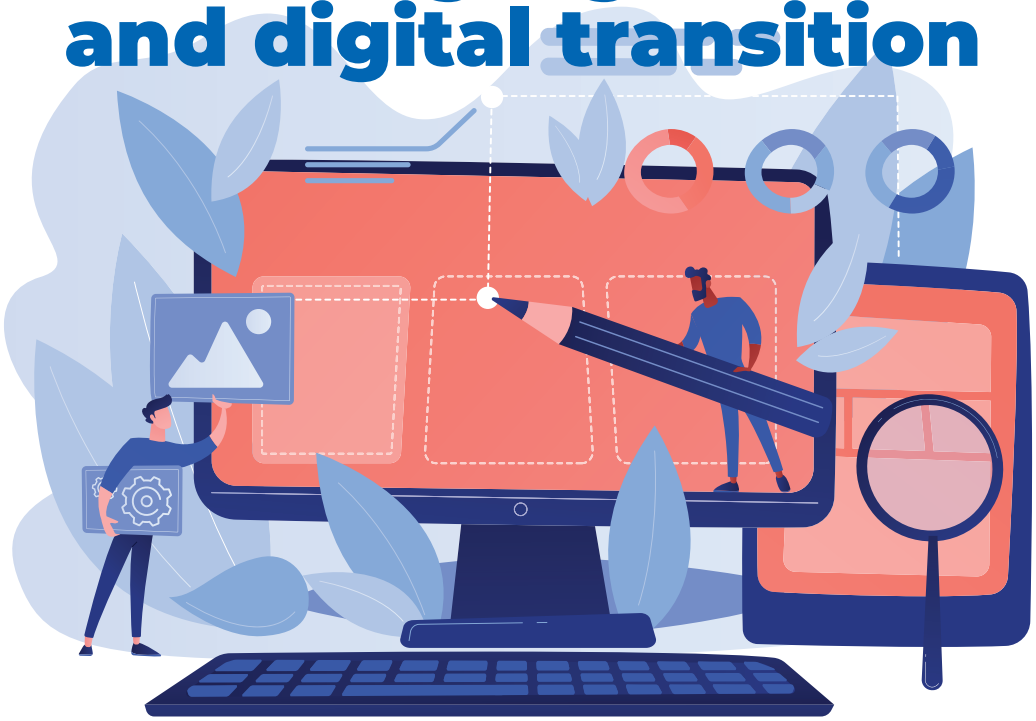
PSAMIDES is organised around three focus areas addressing the pressures and difficulties faced by small and medium-sized ports towards a green, digital, collaborative, and innovative transition:

- **Green and digital transition**
- **Open and collaborative innovation**
- **Multilevel governance**

Different measures have been tested in these focus areas for securing lasting and positive changes. Ten case studies are presented to illustrate the solutions implemented providing concrete and valuable conclusions and recommendations. The conclusions mainly come from the comprehensive evaluation[6] conducted during the project by the Faculty of Maritime studies (University of Rijeka) and the Institute of Modern Technology Montenegro.
It is crucial for policy and decision makers to work with effective tools and solutions for guiding SMP towards an innovative, sustainable, resilient, competitive, and collaborative development.

[6] The evaluation used qualitative (questionnaires and interviews) and quantitative techniques (collection of technology operations data processed in Grafana platform developed by NOVELTIS). For more details see D 3.2.2. Assessment report package (Annex I-Analysis of collected results from tested technologies in Mediterranean ports; Annex II- Report on conducted e-interviews_ part I; Annex III. Report on conducted e-interviews_ part II; Annex V - Statistical analysis over collected technology operations data) [Psamides - Deliverables database (interreg-med.eu)].

3.1 Fostering a green and digital transition



The ecological and energy transition, the digital revolution and the post-pandemic socio-political context have introduced significant changes driving the transformation in SMPs.
In this context, several actions need to be conducted.

Defining a smart and green port strategy

The Smart Port concept has been developed to provide a more efficient technology-based model for the sector aligned with the values of sustainability and collaboration.

This concept of Smart Port has been used to refer to a port model that uses technology to automate processes, connecting the various stakeholders and collect data for better decision-making. Moving towards a Smart Port model means evolving towards a more efficient and sustainable port. However, greening and transforming ports into Smart is an enormous job. Thus, environmental and digital transformation need to be twinned when it comes to practical implementation.

Securing data availability

Data has become an extremely valuable resource for organisational, managerial and planning decision-making to anticipate and/or correct real situations or scenarios. But data need to be collected, processed, analysed, extracted and monitored. Many technologies have been developed to solve this necessity. Properly exploited, data collected on port operations and environmental quality allow ports having a better knowledge and understanding of users' behaviour and uses' changes, port operation and its impacts, facilitating a deeper analysis and decision-making.

Offering new services for customers

Moving away from the old model of port asset management towards models that are more closely linked to a user profile that is a consumer of services and experiences. Developing and implementing customer service-oriented strategies based on sustainability and innovation is a key pillar for the global transformation of the SMP. New services demanded by users are related to the accessibility of information such as mooring booking, energy and water consumption monitoring and payment, local/regional tourist information, temporary housing uses link to nautical uses, etc. The successful implementation of new services will increase the user's satisfaction and the competitiveness of the SMP.

3.1.1 PSAMIDES case studies

Characterising the berth occupation by sensors

Implementing a system that can automatically detect and record boat arrivals and departures, presenting graphically the berth occupancy, facilitates and improves the port management and operational efficiency. PSAMIDES has implemented and tested through the Port of Cristo (Balearic Islands, Spain) and Port of Heraklion (Crete, Greece) this solution by installing 10 ultrasonic wireless berth occupation sensors located differently (front, lateral). This system allows obtaining accurate and reliable vessel position information on real time and efficiently manage the mooring capacity and the flow optimisation.

Main learnings	Globally, the sensors worked well and replaced the « walk around» control that needed to be done twice a day in season to check the berth occupancy. This freed some precious time for other tasks. It clearly showed berth occupancies and entries/exits in real time. It enabled an easy calculation of the occupancy rate, allowing a more dynamic management of resident and transit berths. The efficiency was much higher when the sensors were linked by IOT to the overall port management system.
Recommendations	The pitfalls to avoid when implementing this solution are the following: — The hull must be facing the sensor directly. — Catamarans are not easy to detect. — In case of strong lateral currents, the hull can move sideways and escape from the range of detection. — The distance from the sensors to the boats must not exceed 2.5 m. — The vision of the sensors must not be blocked by crossed mooring lines or growing vegetation. — The sensors must be positioned at least 70 cm above water level to avoid collisions by the boats, but they should also be concealed to limit the risk of vandalism.

Overall, this technology has proved efficient and is recommended by the Psamides Project Consortium.

Automated boat recognition system

Another system that allows managing berth occupancy within the port area, is by using an automated boat recognition based on video images. The aim is to detect and recognise the vessel's arrival or departure at the port entrance. HD cameras watching horizontally the port entrance were tested in two PSAMIDES ports, Port of Cristo (Balearic Islands, Spain) and Port of Sant Carles de la Ràpita (Catalonia, Spain). The aim was to capture information for any entrance and boat's departure (boat name, register number as well as length, breadth, colour, shape, etc.). The image analysis and the processed data improves the port management and operational efficiency of the mooring capacity and also the users' behavior and habits (boats' use).

Main learnings	This technology was supposed to allow boat recognition through a reading of the identification number of boats entering and leaving the ports. The data analysis should have given access to the speed of each boat, its length and its berth number. Eventually that should lead to a better berth management and a moralisation of behaviour while sailing in and out. In reality the efficiency was too low to be really operational. The boats identification numbers are not totally standardised and sometimes appear on one side only which impaired readability. The sea agitation also reduced accuracy of readings. In case of boats crossing each other, the furthest could not be identified. The speed measurements were sometimes totally erratic.
Recommendations	The pitfalls to avoid when implementing this solution are the following: — If the port entrance is wider than 100m, the accuracy of readings goes down dramatically. — In case of fog or rain, or at night, the detection rate goes down quickly. — Finally, this technology serves the needs of the Port Authorities but it does not bring an added value to the users.

Overall, this technology was considered as not fully operational as tested. Putting cameras on both sides of the port entrance would probably significantly improve reliability. The AI behind the cameras needs some more work.

Less consumption with more information

Provide more and better customer services based on innovative solutions while reducing some negative environmental impacts has becoming a priority in SMP to be more competitive and sustainable. To monitor the vessels consumption of energy and water in real-time, three Mediterranean ports of PSAMIDES project, Port of Andratx (Balearic Islands, Spain) and Port of Blanes (Catalonia, Spain) and Port of Heraklion (Crete, Greece), have installed service pedestals to accomodate all basic utility connections for the boats (electricity and water). The pedestals integrate hardware and software enabling ports monitoring consumption remotely and on real time. On the user's side they could monitor their consumption and pay remotely allowing to raise-awareness and reduce costs.

Main learnings	The towers worked properly and enabled to measure the number of active users and the quantity of water and electricity consumed by each boat. The benefits were a fairer invoicing of each user, a reduction of consumption, which become more responsible and an easy tracking of leaks or abnormal consumptions. The technology did not show weaknesses once the connection with the port authority has been mastered. The only threat would be a cyber-attack that would cause a loss of information or false information or even.
Recommendations	The recommendation when implementing this solution is the following: — Equip all berths with these towers to ensure an equal treatment of users.

Overall, this technology has proved efficient and is recommended by the Psamides Project Consortium.

Ports on the technological and digital highway

The dual need to optimise port management and the creation of new services to customers is efficienly covered by the implementation of a IoT port management system. The Internet of Things (IoT) is a system of interconnected computing, mechanical or digital devices with the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Thus, the IoT's goal is to have devices that self-report in real-time, improving efficiency and bringing important information. In PSAMIDES, the Port of Sète (Occitanie, France) and the Port of Herklion (Crete, Greece) have tested and implemented the IOT Port management system that integrates wireless sensors in the marina and inside the boats. In both cases, the system gathers data on boat's arrivals and departures, electricity consumption, temperature, humidity levels, water leaks and fire detection inside the vessel. All that resulting in a better knowledge and efficient management of the port, allowing to make better decisions and influencing on business efficiency and port attractiveness and competitiveness.

Main learnings	IOT system tested in Heraklion was simply a way of transporting information to the Port Authority, whereas the system tested in Sete was also generating its own measures and controls, thus adding value to the port management. The system tested in Sete offered 2 sensors, one on the pier and one on the boat, which totally eradicates false negatives due to catamarans or boats drifting. The sensor on the boat delivers a wealth of useful information : alarms in case of boat heel, intrusion, smoke, shock. Alarms come as messages on a dedicated smatphone app, both for users and for the Port Authority. It is user friendly for users and interactive, thus creating a community of boaters.
Recommendations	This new technology may have some downsides and the recommendation when implementing it are the following: — For the employees of the port, it is a radical change that requires, training, change management and time to adapt. — The battery lifetime needs to be improved. — The interconnection with the Port central management system is paramount to deliver the full benefits and it has required a lot of work and dedication. — For users it can be perceived as a bit intrusive in their privacy since it detects even the time of presence on board. It requires a good communication with all stakeholders.

Overall, this technology has proved efficient and particularly innovative and it is recommended by the Psamides Project Consortium.

Closing the loop by reducing sea pollution

Plastic trap devices are used as efficient ways to improve port water quality and reduce sea pollution nearby the port. It consists in a sea bin that generates a light current at the water surface and filters the floating debris (plastic, natural and/or artificial waste. The waste collection capacity (size, composition, etc.) mainly depends on the method used, device size, collecting or filtrating materials used. Such devices are mainly used to clean closed or partially closed water areas where floating waste accumulates (e.g. ports, marinas, etc.). PSAMIDES has tested, through Port of Cristo and Port of Colonia Sant Jordi (both in the Balearic Islands, Spain), the installation of 3 plastic trap devices. Both ports have focused on reducing waste and raise awareness about reintroducing and reusing waste (plastic) in a sustainable way to potentially generate added value products.

Main learnings	The 3 devices managed to capture 336 kg of debris, of which 30 to 45% were microplastics that are very hard to eliminate otherwise. These equipments resulted in a very significant reduction in the number of floating plastics in the ports. The installation is very easy.
Recommendations	This new technology may have some downsides that should be considered when implementing it: — The small volume of the net (3 kg) requires emptying twice a day in season. — It catches as much organic elements as plastics. — There is even a risk to eliminate fry and part of the port's fauna. — The efficiency is very local and there would be a need of one device per row to be really efficient. — Last but not least, the continuous pumping consumes a lot of electricity.

Overall, this technology was considered as moderately mature and smarter solutions should be sought.

Speeding up the port automation process

Managing port routine operations in a more efficient way makes technology the essential tool for port service management and maintenance allowing anticipating and reducing uncertainty. Advance tools such as high-resolution cameras to identify, manage and monitor berth occupancy, sea surface pollution (floating waste, polluting liquids, etc.), port security as well as people and freight appear vital. PSAMIDES has tested through Port of Cristo (Balearic Islands, Spain) and Port of Sant Carles de la Ràpita (Catalonia, Spain) a port automation with cameras, a continuous surveillance system to monitor and detect different states or situations reporting directly to the port management. This solution entails artificial intelligence to identify and interpret images as well as collect data in real time obtaining different patterns that contribute to better operational decisions.

Main learnings	The technology provided a very efficient assessment of the berth occupancy. The AI picture treatment was able to reliably detect the empty spaces. That helped improve the berths management and the service to users. Furthermore, it allowed to spot water pollutions, be it floating plastics or hydrocarbon slicks. Hence it was possible to trace the origin of these pollutions. The cameras also constitute a deterrent against vandalism. Maintenance costs were low.
Recommendations	This new technology may have some limits that should be considered when implementing it: — Reduced accuracy in bad weather and at night. — The limited surveillance area (600 to 800 m^2), which implies several cameras for large ports. — The need for external expert assistance to cope with the complexity. — The reluctance of some users to be under scrutiny all day long and finally the sensitivity to cyber attacks.

Overall, this technology has proved efficient and is recommended as an alternative to berth occupation sensors by the Psamides Project Consortium.

Producing and consuming energy in the Port

Solar panels installed on the ground and walkable by pedestrians, are at the forefront of innovation and sustainability. This technological solution applied in the ports provides an opportunity in terms of self-sufficiency in energy generation, as well as in its consumption and storage. In PSAMIDES, Port of Andratx (Balearic Islands, Spain) and Port of Sant Carles de la Rapita (Catalonia, Spain), have installed and tested solar pavement in the port area, in a floating port dock in the former.
The goal has been to test the power generation from renewable sources for self-consumption in a marine environment using open spaces for pedestrians with minimal visual impact. The pilots have focused on how produce energy from renewable sources towards self sufficiency, control the economic costs and the feasibility for expaning on a larger surface.

Main learnings	The test went well in Andratx but it was more chaotic in Sant Carles de la Rapita, where some solar panels on the floor were broken and were not waterproof anymore. In theory the concept is excellent because the Mediterranean ports get a lot of sunshine. The paving of the piers uses a space that is rather abundant in ports as opposed to roof surfaces. It is simple to install, to use and to maintain and should last 10 to 20 years. The production of electricity from solar irradiation helps the ports get greener and should decrease their annual electricity cost.
Recommendations	The tests showed some important drawbacks that should be considered when implementing it: — These specific panels cost 10 times more than the traditional roof panels, which ruins the chances to ever produce competitive energy. — The dirt and salt that accumulates rapidly on the panels require a very frequent cleaning to safeguard the yield of electricity. — It is an alternative source of energy and despite batteries continuous bad weather will lead to a minimal production. — Some panels appear to be too fragile to be walked on or did not resit vandalism.

Overall, this technology was considered as moderately mature. Cost and robustness need to improve dramatically before the Psamides Project Consortium cand recommand it.

Marine weather for port authorities and users

Weather forecast is very important for the port authorities because a number of protective measures need to be taken in advance if the wind and waves coming from certain directions are bound to exceed the acceptable limits. The climate change is bringing additional risks coming from the sea. The objective is to give Port Authorities warnings for agitation or submersion in the port. Marine weather forecasting is also very useful for users who need to know the wind and wave conditions when leaving the port and on route. In PSAMIDES the Port de Sète (Occitanie, France) and the Port of Blanes (Catalonia, Spain) tested a web based marine weather forecasting platform. It was was intended both for the Port Authority and for users as an animated map on a flat screen and as a pdf table showing the evolution of key parameters for the next 4 days. Automated alerts were also set on certain thresholds of wind speed, wave height or sea water level, that the ports thought could be dangerous.

Main learnings	The alerts were targeted to the Port Authority and would send a mail 2 days in advance, if certain thresholds of wind or waves were to be trespassed. It is designed to give the staff enough time to protect the more fragile equipments before harsh weather creates havoc in the port. The animated screen is a new way of looking at the wind movements and it helps understand better the situation and the trend, providing increased security.
Recommendations	This new technology may have some downsides that should be considered when implementing it: — The technology could not be displayed on a flat screen in Sete for lack of space for the public in the Port Authority. — The users only saw the pdf tables and they saw little difference with some of the weather services they used already. One of the lines did not show the right values during the test. — The users in Blanes found this new way to look at the weather rather useful and interesting. — Due to the good weather during the season, the alerts did not need to issue any warning during the test.

Overall, this technology has proved useful to reduce the risk of both users and ports and it is recommended by the Psamides Project Consortium.

3.2 Encouraging open and collaborative innovation

The innovation is key to achieve the sustainability, competitiveness, efficiency and security of the SMP. However, they have difficulties to attract and implement innovation due to small-sized structures. They need to generate economies of scale and a well-structured ecosystem to provide innovation. Indeed, it is essential to facilitate an effective innovation process that should be characterised by:

Boosting strategic alliances with universities, research centres, clusters and other public and private institutions. The aim is to bringing knowledge of advanced technologies closer to solve specific SMP challenges.

Encoraging an innovation ecosystem around the port contributing to the growth of innovative talent (from ideas to new and/or commercialised disruptive solutions).

Close cooperation between ports at regional, national, Mediterranean and European scale by sharing knowledge, funding programmes, innovations and its implementation processes and results.

Funding talent, ideas, pre-commercial and commercial projects.
Develop funds, programmes, competitions, and prizes to actively promote innovation encouraging the generation of talent and fostering entrepreneurial projects. Making ports into living labs at the service of knowledge and innovation.

3.2.1 PSAMIDES case study

Providing innovative entrepreneurial responses to specific SMP challenges

Bringing innovative solutions closer to the SMP to solve their specific challenges, requires develop specific tools and methodologies. A program for innovation support services connecting SMP needs with technological solutions was built in PSAMIDES project. A Matchmaking event was conceived to offer SMEs, generating innovative products, services and/or methodologies addressing the green and digital transition of SMP, the opportunity to present their product and/or service to their potential clients (SMP). and facilitate contacts between them. The aim was promoting the talent as well as the digital transformation of SMP. Indeed, based on the use of digital tools.
The methodological approach consisted in several steps:

- Defining the scope: goals and targets to match the most relevant value proposition to the specific needs.
- Designing the event format: the matchmaking consisted in both pitch presentations by the SMEs to the SMPs and B2B meetings between both.

Main learnings

This Matchmaking event was successful as it allowed SMP to access to an extensive base of entrepreneurs with an advanced knowledge of a technology that can contribute to solve their specific needs.

For more information see: D4.3.2 Supporting SMEs through matchmaking: tools and methodologies [Psamides - Deliverables database (interreg-med.eu)]

3.3 Building a multi-level governance approach

SMP involve multiple interrelationships among several types of actors from inside and outside the port community. However, there is a general lack of cooperation and common understanding among all of them. Thus, governance is centrally important and can determine the type of progress made towards a green, digital, innovative and collaborative transition.

Effective governance models are based on the indispensable involvement of key actors that can be addressed through different mechanisms such as collaborative public-private partnerships as well as multi-stakeholder platforms.

From this perspective, the port's transition towards more green, digital, collaborative and innovative, is built by co-creating and cooperating with the aim of successfully deal with the challenges which take the needs of all actors into account.

Creating internal management structures (informal or traditional hierarchical structures) which allow the Port and its community to coordinate their innovation and sustainable efforts.

Investing in awareness-raising
Engaging and empowering key actors requires investment in awareness-raising and demonstration measures with the aim of developing integrated sustainable management strategies.

Promoting water sports and diversifying the profiles of users (children, amateurs, high performance, etc.). To this end, it is important to promote sailing schools and nautical leisure centres, link ports as active tourism assets, organize sporting events, integrate nautical training in schools or integrate nautical training centres in ports.

Capacity building process
Building capacity amongst actors both institutional, public and private via training, workshops, knowledge sharing platforms, cooperation partnerships and exchange of experience aiming to facilitate and accept all SMPs transformations.

3.3.1 PSAMIDES case study

Involving users as ambassadors of solutions

Engaging and empowering SMP users to know better their behaviour, needs and consumption patterns requires a governance with a user-centred approach. This governance approach has been used in port of Sète (France) during the pilot implementation of the technological solution (IoT port management system). A sample of 20 boaters (volunteers) were involved since the beginning of the testing period acting as ambassadors to help drive the pilot forward, give feedback about the process and influence over other boaters.

Main learnings

The process launched was intended to raise awareness and build trust among users of the new service implemented. The process also contributed towards increasing stakeholders' sense of responsibility, although there are still some barriers to the use of technological applications.

For more information see: D3.2.2. Assessment report package [Psamides - Deliverables database (interreg-med.eu)]

4. The PSAMIDES vision

The annual EU Blue Economy Report 2022[7] states: "a sustainable Blue Economy enables society to obtain value from the oceans and coastal regions, whilst respecting their long-term ability to regenerate and endure such activities through the implementation of sustainable practices. This implies that human activities must be managed in a way that guarantees the health of the oceans and safeguards long-term economic productivity, so that the potential they offer can be realised and sustained over time".
In full line with these principles, PSAMIDES has tested, in seven small and medium ports of the Mediterranean region, several solutions leading towards an innovative, green and digital transition. Indeed, PSAMIDES has been a network of living labs based on open and collaborative innovation in real life environments.
The lessons learned directly from the ground have provided relevant learnings about what has worked well and less well, what solutions are mature and what solutions need further development.
This information has been detailed in the previous section 3 with the objective to save time and facilitate taking decisions in other SMP.
Additionally, the exercise of testing different solutions has also resulted in a set of general recommendations:

— Governing the transition: governance is a crucial component as directly affect whether – and how – real progress is made toward securing a green, digital and social transition in Mediterranean marinas and SMPs. The achievement of the sustainable, innovative, social and territorial commitments requires a fundamental shift in the coastal and maritime policies that is not possible without active and inclusive collaboration with all actors from inside and outside the port community.
In this respect, it is also crucial to perpetuate the cooperation and collaboration between ports at National, European and Mediterranean level.

— Financing the transition: Mediterranean marinas and SMPs do not have the financial capacity to implement a green and digital transition by testing and developing new methods and techniques within an appropriate perimeter and timeframe to achieve reliable results, including the business models that will allow their implementation and subsequent replication. They must be enabled by easing the access to appropriate financial resources including those provided by Europe and at National level.

PSAMIDES has revealed the crucial role of SMPs in this necessary green, digital and social transition. The experience and knowledge gained in three focus areas delimited by PSAMIDES point to the leading role SMP must play to achieve significant progress towards a sustainable coastal and maritime tourism:
— service-oriented and environmentally oriented technologies at the service of greater efficiency in port operations and management.
— open and collaborative innovation ensuring the capacity and the mandate for both economic (SMEs) and strategic actors and SMP to favour changes.
— embracing a multi-level governance based on a dialogue and active participation which ensure all voices are considered in decision-making processes.

The starting point in many Mediterranean ports calls for diversification of the measures leading towards the optimisation of port infrastructures, their management and the services offered.

[7] European Commission, Directorate-General for Maritime Affairs and Fisheries, Addamo, A., Calvo Santos, A., Guillén, J., et al., The EU blue economy report 2022, Publications Office of the European Union, 2022, [https://data.europa.eu/doi/10.2771/793264]