

Innovation Challenge Italy – Croatia 2016

Call for solutions

Deadline 31 May 2016



The initiative

The **innovation challenge** is the first initiative arising from the collaboration of the Italian Maritime Technology Cluster of Friuli Venezia Giulia and the Croatian Maritime Industry Competitiveness Cluster.

The aim of this initiative is to enhance the development of innovative ideas related to real needs of the territories through the involvement of strategic players like big enterprises, SMEs and research actors.

We believe this could represent **a first step toward a smart collaboration in the maritime** field with specific focus on most relevant and actual innovation topics.



Objectives

- Encouragement of new ideas
- Stimulate an answer to innovation needs expressed by the main maritime industries
- Involve SMEs and research players in order to provide tailored technological ideas
- Enhance collaboration within maritime actors of the two countries

Steps

1. Identification of innovation needs and priorities of big companies (March – April 2016)
2. Call for ideas for SMEs and research players with reference to innovation needs and priorities (May 2016)
3. Evaluation of the ideas by the big companies (June 2016)
4. Search for further development opportunities for the selected ideas (June 2016 - ongoing)

Actors involved

Big enterprises

- Express main priorities and needs in terms of most challenging innovations
- Contribute to possible collaborations for joint innovation paths with SMEs

SMEs and Research

- Participate to the Call for ideas and present innovative ideas and solutions
- Collaborate with big enterprises for development of joint innovation paths

The challenges

Big companies involved



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Question topics

Where is the innovation applied?

What is the current solution?

What is the desired innovation?



Tools (HW-SW)

Challenge #1

Shipyard software solutions

Where is the innovation applied?

The innovation is applied in shipyards

What is the current solution?

The software solution in use is covering shipyard's departments and facilities. It covers both production and design but also planning, warehouse and other administration dept. Implementation Project started in September 2015 and is planned to be finished in September 2016. Full implementation will be finished within 2 years from the project start.

What is the desired innovation?

The objective is to find **software solutions** able to improve shipyard efficiency and productivity.

Challenge #2

Data integrator

Where is the innovation applied?

Shipyard design office

What is the current solution?

Shipyard design office today uses different software solutions in order to perform different tasks. Data exchange between these applications is mainly manual or with limited connectivity. This becomes difficult to maintain with respect to design changes.

What is the desired innovation?

Tool to [integrate data](#) from different data sources, some sort of data integrator

Challenge #3

Plate bending aid

Where is the innovation applied?

Shipyards fabrication

What is the current solution?

Most of complex plate bending and forming is performed by conventional method of bending and measuring by some kind of physical template.

What is the desired innovation?

Use of **modern measurement techniques** in real time with data preparation integrated into CAD software that yard is using.

Challenge

#4

*Ship equipment
prices database*

Where is the innovation applied?

The innovation can be applied in the cost estimation process for estimation of material costs in a shipbuilding process.

What is the current solution?

Material cost estimation is based on previously purchased equipment and budgetary offers received during the cost estimation process.

What is the desired innovation?

Continuously updated database of commonly used, standard ship equipment with indicative prices.

Challenge #5

Virtual and augmented reality and 3D scanning

Where is the innovation applied?

The 3D Scanning system will be used in the shipyard in phase of re-design of plants in a refurbishing phase. The virtual reality system could be applied in:

- shipyard*: in phase of design
- on-shore*: for people's training
- on board*: for entertainment or ship management

What is the current solution?

No solutions about Virtual reality and 3D Scanning are actually used in the vessel or in the shipyard.

What is the desired innovation?

We are looking for different **hardware and software solutions** for:

- *Optimize the design phase*: **Virtual reality** will be useful for the creation of virtual mock-up instead of physical mock-up
- *Improve the re-design*: **3D Scanning** will enhance the possibility to draw easily secondary plants and structures.
- *Training*: Virtual and augmented reality will be useful for train staff and crew before the ship delivery
- *Entertainment*: Virtual and augmented reality will be useful for offer new services and attraction to cruise-vessels passengers
- *Ship management*: Virtual and augmented reality will be useful for the improving of new solution for a safer and easier management of the ship (maneuvering, combat management, logistic management, etc.)

Challenge #6

Production technology toolset

Where is the innovation applied?

Shipyard design office

What is the current solution?

There is a list of production data that is necessary for production, like scaffolding documentation; data for lifting lugs; energy supply etc.

What is the desired innovation?

Developments of **tools** or applications capable of handling specific data **for production technology**.

Challenge #7

Dimensional control

Where is the innovation applied?

Shipyard dimensional control department

What is the current solution?

During production, dimensional control is collecting large amount of measurements that is used at real time production support and decision making.

What is the desired innovation?

Development of tool that will help dealing with **measurements data** in correlation with for example class requirements or ISO or other relevant shipbuilding standard.

Challenge #8

Center of gravity estimation

Where is the innovation applied?

For initial design

Weight & CG Estimation

Detailed design

Administration of weight data

Production

Weight & CG Tracking ; Weight & CG Monitoring

What is the current solution?

Weight & CG Estimation: estimation based on similar new buildings, estimation based on similar design, estimation based on weight obtained from the manufacturer

What is the desired innovation?

-*Weight & CG Estimation:* development of tools for assessing the weight and center of gravity in the early design stage; estimation based on past weight data using parametric ratio formulas; exchange of information related to the estimate and the realized weight; creation of a common database.

-*Weight & CG Tracking*

-*Weight & CG Monitoring*

Systems, components and materials

Challenge #9

Biometric recognition and people tracking

Where is the innovation applied?

- The systems will be applied in different kind of vessel (from cruises to naval vessels) and in the shipyard.

What is the current solution?

No specific solutions to track people or to have a biometric recognition are used both in the vessel and in the shipyard.

What is the desired innovation?

Various solutions will be studied in order to create applications in the different fields.

- Cruise-ship: **people tracking** for safety (i.e: a tool for localize and control staff and passengers supporting the Safety Officer in case of an emergency / damage scenario), security and new services for the passengers.
- Naval (military) vessel: safety and security issues.
- Offshore vessels: safety and security issues in order to **monitoring position and health** of staff on-board.
- Shipyard: solutions for **monitoring accesses and health of staff and workers in shipyards and on-board** (loss of connectivity on ships during construction).

Challenge #10

Collision avoidance systems

Where is the innovation applied?

This kind of system will be applied on the next generation of unmanned vessels, probably in the military field.

What is the current solution?

Actually we have a basic knowledge about this kind of technology but no real application were be done.

What is the desired innovation?

Solutions enabling the **creation of unmanned systems**. In particular we desire new systems for avoid collisions of autonomous vessels using both hardware and software solutions.

- **HW**: for examples sonar, radar, lidar, etc.
- **SW**: algorithms for the detections of obstacles, for the data processing and for the reaction in order to control rudders and propulsion systems

Challenge #11

Energy recovery

Where is the innovation applied?

This kind of system will be applied on vessels, in particular passengers vessels (i.e. cruise-ship).

Solutions could be applied to all systems and plants on-board. Energy is spent principally by propulsion, HVAC, auxiliary and electrical systems

What is the current solution?

Our client are requiring that 85% of energy stored in the fuel consumed will be used on board. Up today the efficiency of the diesel engine is about 50% and only 15% of the dissipated energy can be recovered.

What is the desired innovation?

We are looking for **systems** that are able to **recover and store the heat dissipated energy**, possibly as electrical energy.

Challenge #12

LNG fuel system

Where is the innovation applied?

The innovation is applied on a 2000 TEU Dual Fuel LNG green feeder container vessel.

What is the current solution?

An LNG fuel system design including storage tank and auxiliary equipment.

What is the desired innovation?

Increasing implementation of **LNG devices** in order to reduce the environmental impact.

Challenge #13

Electric propulsion

Where is the innovation applied?

The innovation is applied on a large five-masted full-rigged sailing ship

What is the current solution?

Electric propulsion is the solution in use

What is the desired innovation?

The application of **electric propulsion** with a reduction of noise and vibration, while retaining high efficiency and flexibility.

Challenge #14

Lightweight materials

Where is the innovation applied?

This kind of system will be applied on vessels, in particular passengers and naval vessels.

What is the current solution?

Actually we are using the state of the art of materials utilized in naval sector, but we are looking for materials, new or not yet applied in this specific sector, in order to achieve a significant weight reduction

What is the desired innovation?

We are looking for **new materials in order to reduce the ship weight** at a competitive cost fulfilling regulations and owner specifications. In particular we are focused on:

- Composites and polymers (regulation issues)
- Metal foams
- Smart glazing and foils covers

Challenge #15

Materials connection

Where is the innovation applied?

Shipyard fabrication, assembly and outfitting

What is the current solution?

All complex ships have different material types and connections of different materials can present challenge

What is the desired innovation?

Toolset or application or catalog for **connecting dissimilar materials**

Challenge #16

Engine resilient

Where is the innovation applied?

On the engine inside vessel engine room

What is the current solution?

Engine resilient mounting using natural rubber compound

What is the desired innovation?

Resilient mounts made of natural rubber are used to install the engines onboard passenger vessels to reduce the noise transfer from the engine to the ship structure.

Natural rubber is the most used material and with known dynamic properties. The problem with the material is its poor resistance to oil contamination and the unpredictable creep behavior that strongly depends on ambient conditions and often forces the operators at frequent realignments of the machine after installation.

A **material** that may overcome these two main drawbacks while maintaining a similar dynamic and noise isolation performance of natural rubber is researched.

Challenge #17

Composite materials

Where is the innovation applied?

On the engine itself inside the vessel engine room

What is the current solution?

Aluminum used for engine covers in areas with high temperature ($T^{\circ} 110^{\circ}\text{C}$ continuous)

What is the desired innovation?

A composite material for structural use in hot condition for engine components. Target is to achieve either weight and noise reductions at the same time as a reduced cost if compared to current aluminum solution.

TARGETS	RANKING
Weight Target	
a) < 12 kg	10
b) <= 8 kg	6
Noise Reduction	
compliance 105 dB	7
High Temperature Resistance	
>= 110°C	10
Mechanical Properties and Mechanical Behaviour. (>xx kg/m²)	
a) 0 plastic deformation under a static load= 2kN distributed over a surface of dimensions 100 mm x 50 mm. Operating conditions (T=110 °C)	9
b) 0 plastic deformation under a static load= 2kN distributed over a surface of dimensions 100 mm x 50 mm. Operating conditions (T>110 °C) → Target is to verify how the actual plastic deformation occur and at which T°	6
Thermal Properties and insulation (0.2<l<0.3 W/m k)	6
Plame Estingush (xx%)	9

Challenge #18

Ballast system pump

Where is the innovation applied?

The innovation is applied on a tanker vessel

What is the current solution?

Actually is in use an installation with one pump per side – double skin ballast tanks and two total.

What is the desired innovation?

An installation with both **pumps** at the same side- double skin ballast tanks

Challenge #19

Vertical keel

Where is the innovation applied?

The innovation is applied on sailing vessels

What is the current solution?

Vertical keel lifting for shelter water purpose- hydraulic system

What is the desired innovation?

[Vertical keel lifting](#) for shelter water purpose- with worm gear, electro system

Challenge #20

Sails

Where is the innovation applied?

The innovation is applied on sailing boats.

What is the current solution?

Actually are in use cross sails.

What is the desired innovation?

We are looking for **sails** that can be handled with five crew member.

Manufacturing process

Challenge #21

Preassembly production

Where is the innovation applied?

The innovation is applied in shipyards

What is the current solution?

Ship section preassembling production organized on ground

What is the desired innovation?

Sections *preassembly production* organized on 2m height erected girders

Challenge #22

Shipyard outfitting

Where is the innovation applied?

Shipyard outfitting

What is the current solution?

Most of outfitting is done by means of heat methods or tools

What is the desired innovation?

Application of methods and tools for **ship outfitting without heat input**

Challenge #23

Portable equipment

Where is the innovation applied?

Shipyard assembly

What is the current solution?

Use of (portable) mobile (cutting, welding, grinding, painting) equipment by each Yard is different. It ranges from flat and easy positions to the curved and hardly accessible positions.

What is the desired innovation?

Investigation into field of [mobile equipment](#) certified for shipyard application

Challenge #24

Mobile workshop

Where is the innovation applied?

Shipyards outfitting

What is the current solution?

There is always need for mobile workshops.

What is the desired innovation?

Development of specialized **mobile workshop** for shipyard conditions aboard ship

Challenge #25

Main engine installation process

Where is the innovation applied?

The innovation is applied in shipyards

What is the current solution?

Main engine installation before accommodation assembling

What is the desired innovation?

Main **engine installation** after accommodation temporary assembling

Challenge #26

Moulds

Where is the innovation applied?

Shipyard – Production process.

What is the current solution?

To build custom GRP components, at the moment traditional technics of CAD 3d Model, CAM building of model, surface manual sanding and mould GRP construction are used.

What is the desired innovation?

The required innovation is to arrange **direct production of moulds**

Challenge #27

Accelerated lifetime testing

Where is the innovation applied?

Components installed on the main engine inside the vessel

What is the current solution?

Internal rules

What is the desired innovation?

[Accelerated lifetime testing](#) is a methodology that is in constant development and based on experience more than solid experimentation.

We are searching for adequate [laboratories with various testing machines](#) like shakers or shock impact drop towers and with consolidated track record on the topic.

Challenge #28

Additive construction technics

Where is the innovation applied?

The solution will be applied on boats.

What is the current solution?

Use of woods, metallic components, plastics.

What is the desired innovation?

Use of [additive production process](#) for components used in the boat construction

Operations

Challenge #29

Engine monitoring system

Where is the innovation applied?

On the main engine inside vessel engine room

What is the current solution?

Not yet available on the market

What is the desired innovation?

In case of a major failure in a 4 stroke engine there is the need to a fast reaction of the engine automation to trigger an emergency shutdown.

The challenge is to design a **monitoring system** that by tracking the changes in engine dynamic behavior can detect moving part breakdowns that may happen in different engine places and have different consequences in the dynamic behavior of the system.

The system must be capable to measure these phenomena with an extreme accuracy so to avoid any false detected failures.

Challenge #30

Remote maintenance

Where is the innovation applied?

The system will enable communication and collaboration between the ship and the shipyard (after-sales department).

First applications of sensors network for predictive maintenance and communication systems and tools for remote maintenance will be implemented on Naval Vessel.

What is the current solution?

Actually there are nor sensor network nor software for services of predictive maintenance, fault detection and remote maintenance on-service.

What is the desired innovation?

Solutions enabling the improvement of a new business model for the after sales services. In particular:

- **Sensors and networks** for the monitoring of onboard systems and components
- Software and solutions enabling the **predictive maintenance**
- **Communication networks**
- Augmented reality solution enabling the **remote maintenance**

Challenge #31

Waste management

Where is the innovation applied?

The solution will be applied basically on passenger vessels.

What is the current solution?

The current solution is composed by:

- an incinerator system
- different systems, in line with the current regulations, for the management of various kind of waste solids and waters

What is the desired innovation?

We are looking for:

- an alternative solution to the incinerator system
- different **systems for the management of various waste waters**

which are cheaper, lighter, environmentally friendly and not producing smell

Challenge #32

Wave & Tide energy converters

Where is the innovation applied?

This kind of system will be applied typically in off-shore plants.

What is the current solution?

Actually we are totally out of the business of the offshore energy generators.

What is the desired innovation?

We are looking innovative and, possibly, not yet commercialized, solutions in order to evaluate the possibility of an entrance in a new business in the field of the [wave and tide energy converters](#).

Call for solutions >>> How to apply

- ❖ Check the **challenges**
- ❖ Fill in the template with all the information and details required
- ❖ Submit the «Innovation idea/ solution » to both the following email addresses:

carlo.kraskovic@marefvg.it

info@marc.hr

*For any technical support or clarification needed please make reference to both email addresses listed above

The **challenges list** and the **template** for the application will be available on the following web pages from 18 th April:

www.marefvg.it www.marc.hr

