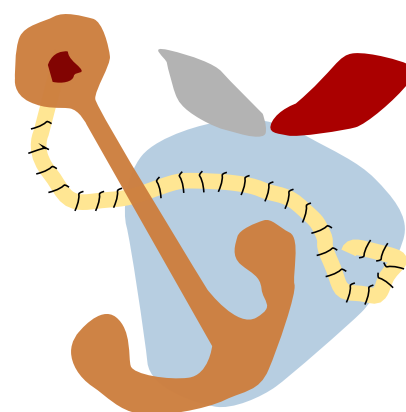# FormaciON. The solution for the internet of things challenge of Centro Jovellanos

AT Virtual Project

CENTRO JOVELLANOS

Contents

1   Framework. AT Virtual Project

1.1 What it is.

AT-VIRTUAL (INTERREG VB Atlantic Area funded by ERDF funds) aims to improve the operability and performance of Maritime Safety Training Centres (MSTCs) in the Atlantic territory by enabling businesses to develop emerging technology-based solutions to MSTCs needs in the field of simulation-based training systems for maritime security operations. This will improve Atlantic Area capacity, preparedness, resilience and incident response to maritime incidents and emergencies in Atlantic waters, while fostering innovation and sustainable growth in businesses.

1.2 Objectives.

AT-VIRTUAL overall objective is to accelerate the digitization of MSTCs in the Atlantic Area, through the introduction of new emerging Industry 4.0 (I4.0) related technologies (Internet of Things, Big Data/Data Analytics, and Vision Technologies) in simulation-based training systems, contributing to more effectively and efficiently tackle of maritime security and safety in the Atlantic Area.

To achieve this, MSTCs will become testing, piloting and demonstration sites of technology solutions to common needs identified in the Atlantic Area. The process of digitization will be carried out through a collaborative hybridization process, facilitating the cooperation between 3 MSTCs and startups who will act as digital enablers, supported by a research organization and I4.0 experts.

It will be developed by using a new advanced platform, which will be ready to be transferred after the project to favour the digitalization processes in new organizations and areas in an outside the Atlantic Area.

AT-VIRTUAL will impact in the current situation by enabling MSTCs the adoption of solutions exploiting the full potentials of latest technologies; the development of new professional fields; and a well-trained and up-to-date work force enabling the sector to become safer and more efficient and sustainable. Also, it will contribute to the consolidation of businesses and startups by promoting the deployment of an I4.0 market with untapped potential so far, contributing to accelerate intelligent growth and innovation in the Atlantic Area.

2   Jovellanos Centre. Spanish Maritime Safety and Rescue Agency.

The mission of Centro Jovellanos is to implement, develop and design comprehensive rescue and maritime safety training systems that are high quality, highly specialised, certified, innovative, and sustainable to ensure the most remarkable levels of professional training.

During training sessions, communications among instructors and participants are essential to coordinate and give guidelines to ensure the proper development and safety of each training.

Training sessions at Centro Jovellanos have a wide range of profiles, conditions, and locations where participants are in the same session.

Nowadays communications during training sessions are solved through different procedures and protocols, most of them face to face. Depending on the type of practice, instructors should move from one location to another or try to catch the attention of participants in environments with difficulties for the visibility and hearing

or interrupt, in a certain way, the grade of immersion of the participant in the environment of the training session giving a message.

3 MSTC Diagnosis Tool

3.1 Methodology

AT-VIRTUAL brought a free self-diagnosis online tool to Jovellanos Centre-Spanish Maritime Safety and Rescue Agency to determine their digitalization maturity level.

With this tool, Tecnalia analysed the current and potential degree of digitalization of the set of processes in different areas.

This diagnosis on the technology used in the Centre was made and the results obtained were:

A digital survey was provided. All questions were answered, so the diagnostic could be performed.

In the methodology used is the self-diagnosis we have identified the different characteristics so that an MSTC is an MSTC 4.0.

Connected: A center that can collect, store and access data in real time of all its elements (machines, processes, people, ...) in a safe, traceable and ubiquitous way. Everything is interconnected and integrated, allowing data to be stored automatically. Hyperconnectivity.

Smart: A center capable of working automatically and autonomously, adjusting to the demands of its environment. Able to predict, prevent or correct accurately reducing errors.

Flexible: A center that reconfigures the processes before changes of the outside in a decentralized way. It can adapt to changes in its service, depending on the needs or demands of clients/customers, etc. thanks to digitalization. Massive personalization.

Social: A center that has self-employed employees, with the capacity to make decisions, motivated and adequately trained to use new technologies and perform tasks of greater added value.

Extended: A center that develops the relationship with the supply chain, partners and customers, working with them in a collaborative manner to improve products, services and processes. Enabling technologies: IoT, Cybersecurity, Cloud Computing, Artificial Vision, Big Data, Data analytics, Simulations, digital twin, Virtual Reality, Augmented Reality, Wearables, System integration, collaborative robotics, etc.

3.2 LEVELS SCORE

Basic from ≥ 1 to ≤ 2   Aware from >2 to ≤ 3,5
Competent from >3,5 to ≤ 5,5 Advanced >5,5

that allow a unified diagnosis.

3.3 Results

Digital Characterization of CENTRO SEGURIDAD MARÍTIMA INTEGRAL "JOVELLANOS"					
Attribute	**CONNECTED**	**SMART**	**FLEXIBLE**	**SOCIAL**	**EXTENDED**
Value	1,91	2,76	5,31	2,14	4,00

4 Challenge 1. Internet of Things (IoT)

4.1 Title of the challenge

System for monitoring and Sending Personalized Messages.

4.2 Description of the need.

The objective of this challenge is focused on designing and implementing a system for monitoring and sending alarms and / or messages of support to mobile devices (smartphone and / or wearables) that students carry during their training practices.

These personalized messages / signals / instructions will be received on the device carried by the student depending on the locations of the devices, assigned roles or specific situations, specifically:

When the teacher (administrator) considers appropriate to launch them manually during the training session. These messages may be in video, text, photo and or vibration format.

When the identified device enters a specific area of the campus.

When defining other types of triggers are defined.

The devices will be assigned to each student based on their role for the practice. The situations where the devices must be serviced will be indoors (training room), inside a swimming pool, where the messages should be, especially, easily interpretable and in outdoor practice areas.

The instructor in addition to sending messages as deemed appropriate, may follow the reception of messages to know the status of the training at any time.

4.3 Requirements

Multi-device: The system for monitoring and sending instructions must be multi-device with controlled access permissions. The essential system will be for Android system, valuing other platforms.

User Friendly system: The allocation and identification devices to a student and to a role, as well as the type of message or instructions sending to them, must be dynamic and friendly.

The messages/signals/instructions must be easily interpretable by the student in any situation.

The final purpose is that every participant has his/her devices depending on the practice. So, the developed solution must admit several devices with which to interact in the future. The pilot project must work with 50 users at the same time.

Challenge IoT. Final Report
Spanish Maritime Safety and Rescue Agency. Jovellanos Centre

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Open: the application must be an open platform to allow it to be expanded with new functionalities in the future.

Functionality: the final solution will establish a communication protocol where to integrate those devices and/or wearables chosen by the startup according to their functionality or operational capacity.

The proponent may use any technology or communication protocol he deems appropriate. However, the proponent must consider that the zones may vary, change classrooms, change outdoor zones, so the solution must be movable (not fixed infrastructure).

Screening: the system will display all the devices and their status.

Durability: the proposed devices must have sufficient autonomy for a training day.

4.4 Expected outcomes.

The proponent will develop a comprehensive system that allows personalized information to be sent to different devices carried by the student depending on the practice or the moment. Also, the implementation of the prototype will be launched.

4.5 Video

https://www.youtube.com/embed/zT6hCT-6m88

5 Selection of the start-up.

5.1 Online open call.

Online open call for digital providers to propose their I4.0 solutions to resolve the defined MSTC challenge was opened from the 1st of October to the 30th of October.

5.2 Validation

All the proposals submitted were checked for eligibility, in accordance with the established criteria, required documentation and the conditions to be considered for the application.

4 of the 5 applications received made the cut on the validation process and were eligible to be selected for the next step of the process.

5.2.1 Assessment.

The 4 proposals that passed the eligibility check were assessed, in accordance with the following evaluation criteria and scores based on a 100 points scale:

- **Coherency** of the proposal for the implementation of the project. (0-10 / Treshold:5)

- **Experience / background of the company** related to the challenge / topic addressed. (0-20 / Treshold:10)

- **Evaluation of the technology**, equipment required and innovation of the proposed solution according to the state of art. (0-20 / Treshold:10)

- **Risk evaluation** that could be introduced in the project. (0-10 / Treshold:5)

- Availability and assessment of **company resources** in relation to the plan proposed. (0-20 / Treshold:10)

- Feasibility of the **budget** regarding the services proposed for the definition and implementation of the solution (according to the timeframe). (0-10 / Treshold:5)

- Other added value to be assessed. (0-10).

5.2.2 Results

Personnel from SASEMAR and Tecnalia, made individual assessments trying to guarantee objectivity in the process. The average score obtained from joining the individual assessments were:

Company A	**87**
Company B	**65**
Company C	**67**
Company D	**57**

The four companies were pre-selected and will take part in the Selection Event of call which is a public competition organized per each call where the contesters will pitch and meet the MSTC as well as a technological seminar about the features and potentials of the technology IoT.

<u>Detailed information</u> about the companies and the assessment is included in the back-office part of the AT-Virtual official webpage.

5.2.3 Selection event

The Selection Event included:

- A business competition for the participants with a 5 minutes **Fast-Track Pitch presentation** of the essence of the company. And,

- A 30 minutes **B2B meeting** where every applicant had the opportunity to defend privately their proposal responding directly to the questions formulated by the MSTC for a better understanding of the solution.

MSTCs judgment were expressed in a scale of 0 to 10, in both categories, accordingly to the following criteria:

<u>Fast-Track Pitch Presentations</u>:

- Substance: clarity and eloquence of the information presented.

- Delivery: Ability to grab and hold the attention.

- Creativity about the contents showed in the presentation.

- Timing: pitches will last 3 minutes as maximum.

<u>B2B Meetings</u>:

- The company responds clear and effectively to all the questions asked by the MSTC.

- Added value information provided

5.3 Selected company.

The final score that determined the selection of the company was calculated by means of the following formula established:

Final Score = 30 % (Assessment score) + 20 % (Pitch Score*10) + 50 % (Interview Score*10)

The final results were:

Company A	91.1
Company B	68.5
Company C	76.1
Company D	73.1

Pibico Compañia de Inteligencia de Negocio y Control SL won IoT call of AT-Virtual to develop a **System for monitoring and Sending Personalized Messages** to give solution to the IoT challenge of Centro Jovellanos – Spanish Maritime Safety and Rescue Agency.

6 Hybridization and development of the prototype.

Timetable 2021	Milestones Achieved	Meetings[1]
February From 22nd	A. First visit of Pibico to Centro Jovellanos. B. Pibico gets familiar and understand the environment and conditions of Jovellanos Training Centre and the details of the challenge faced. C. Pibico explains Jovellanos Team the IoT technology and possibilities related to our needs regarding the solution and the challenge.	1
March	D. Hybridization: Joint work on the possibilities of the solution developed by Pibico to Jovellanos's environment and needs. From paper into reality. E. Process of familiarisation with the standard platform that will be the one used to manage the communications. Training from Pibico to Jovellanos' Team. This platform will be tailored based on the requirements of the challenge. F. Second visit of Pibico to Centro Jovellanos. Hybridization. Design of the final solution. Presentation of possibilities and capabilities of potential IoT tailored devices.	5

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[1] Meeting: Including face to face meeting and virtual meetings.

G. Design of the tailored platform for communications according to the specific needs of the challenge. The idea is to start working with it from the very beginning to adjust the upgrades throughout the development.

H. Design of the tailored IoT devices to be developed according to the specific needs of the challenge.

- Agreement on 4 types of devices: 1. Desktop device, 2. beeper device ,3. outer device.

- Commercial IoT smart plug.

I. Programming and configuration of the servers of the solution.

J. Official naming of the solution: FormaciON.

April	K. Integration of the servers of the solution FormaciON in Jovellanos web servers. L. Development, design and testing of the tailored IoT devices: • Development and testing of the first version of the desktop device: text and light communications. Upgrades detected: i. For outer devices: upgrade the led matrix display to be able to include colours and images in the screen. ii. For all devices but beepers: study the option of including sounds. M. Design, development and testing of the tailored platform according to the needs of the solution to solve the challenge. • Compatibility with servers in Jovellanos and different types of devices.	2

	• Testing with the desktop device already developed and communications with mobile phones and tablets. • Review and upgrades of the development of the platform and devices.	
May	N. Development, upgrades and testing of the tailored IoT devices: • Development and testing of the new version of the desktop device: text, light and sound messages. • Development and testing of the new version of the outer device: text, light and sound messages. • Development of the first version of the beeper device. • Test commercial smart plugs. • Programme the devices for them to be functionals and compatibles with the platform. B. Development, upgrades and testing of the tailored platform according to the needs of the solution to solve the challenge: • Development of all sections of the platform to achieve the functionalities agreed during the process of design. • Include programme messages. • Chronometer. • Timer.	3

		• Email as part of the IoT messages.	
		C. Design and development of the logo of FormaciON. Final version.	
June		D. Development, minor upgrades and testing of the tailored IoT devices. • Major upgrade for beeper devices: Include a button as a trigger element of the device throughout the platform. • Major upgrade for desktop devices: Due to the inclusion of sound, an upgrade of the hardware is necessary as it shows a blurred text. E. Development, upgrades and testing of the tailored platform. F. Start designing the interface of the platform for the final user. G. Star developing user's manual.	4
July		H. Final upgrades in the development of the platform. I. Final upgrades of the devices: new version of hardware for desktop devices. Solving issues due to the new hardware on the functionality. J. Delivery of devices to start testing the whole prototype, platform and devices, at Jovellanos Centre. K. Deliver comprehensive manual of user and developer. L. Testing phase. M. Updates of devices and platform according to the issues detected during tests.	2

	N. Comprehensive integration in Jovellanos web servers.	
August

Until 22nd | O. Testing phase.

P. Updates of devices and platform according to the issues detected during tests.

Q. Official delivery. | 2 |

7   Images of the platform.
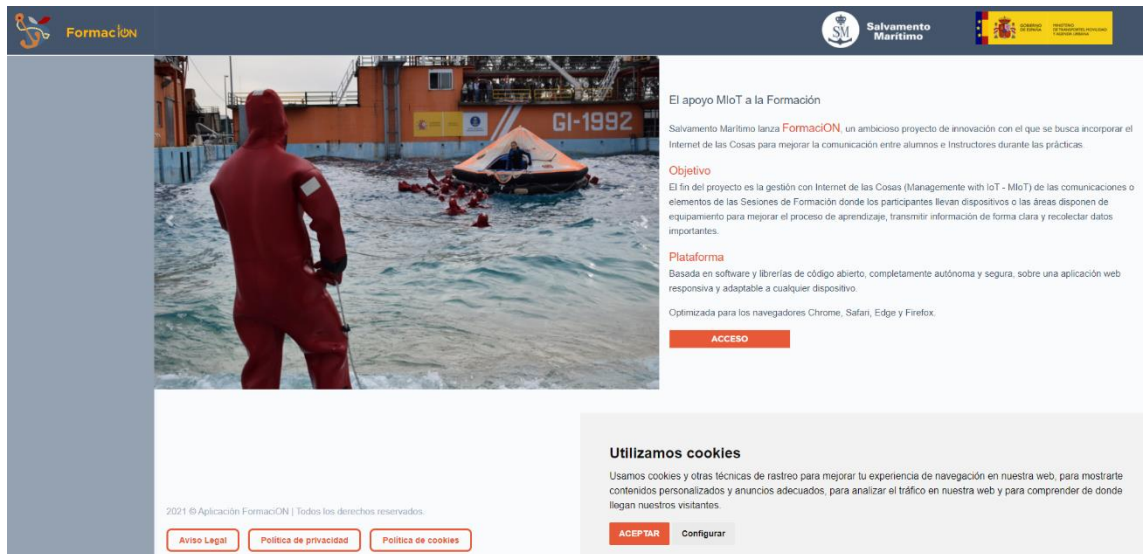
Figure 1 Access to the platform
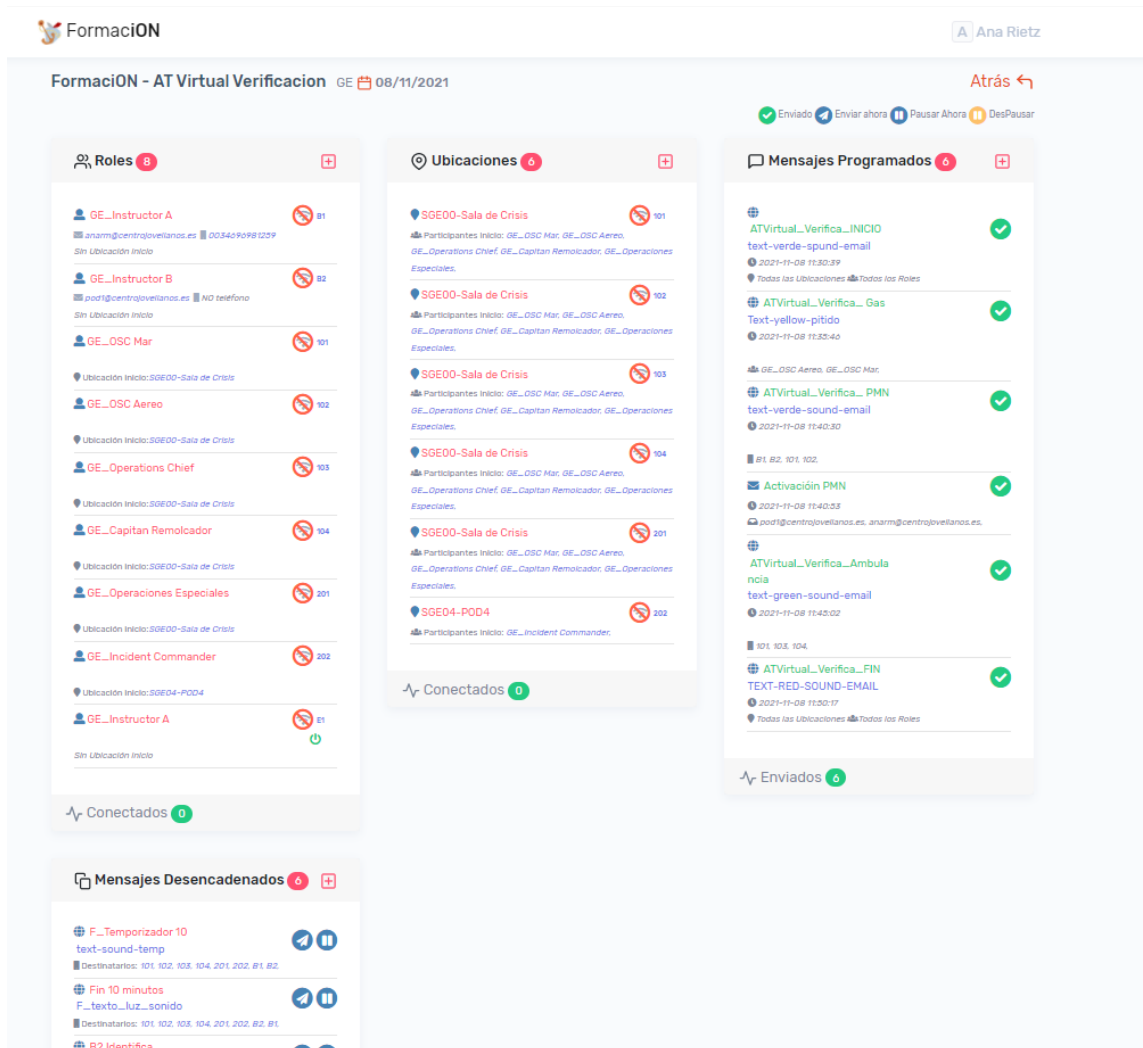
Figure 2 Interface of a training session in the platform for the instructor.

Figure 3 Interface of a training session in the platform for the developer.
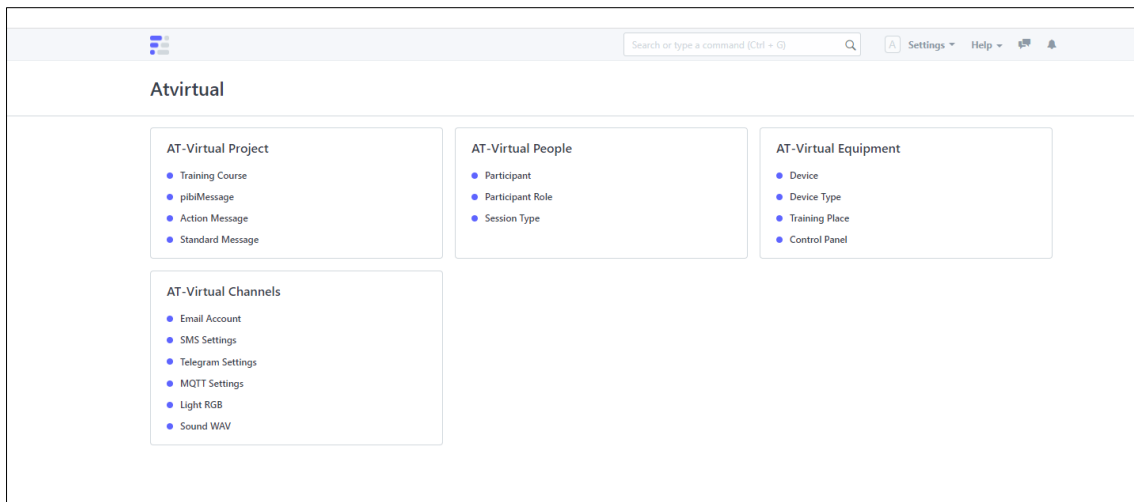
Figure 4 Sections for managing the platform.

8 Images of the devices.

8.1 Tailored device. Desktop devices.

Figure 5 Desktop device. First version. Text

Figure 6 Desktop device. Second version. Text and light

Figure 7 Desktop device. Third version. Text, lights and sound. Hardware upgraded.

Figure 8 Desktop device. Final version. Text, light and sound. Hardware upgraded.

8.2 Tailored device. Outer devices.

Figure 9 Outer device. First version. Text and light

Figure 10 Outer device.Final version. Text, light and sound

8.3 Tailored device. Beeper devices.

Figure 11 Beeper device. Front

Figure 12 Beeper device. Front and back

8.4 Comercial device. Smart Plugs.

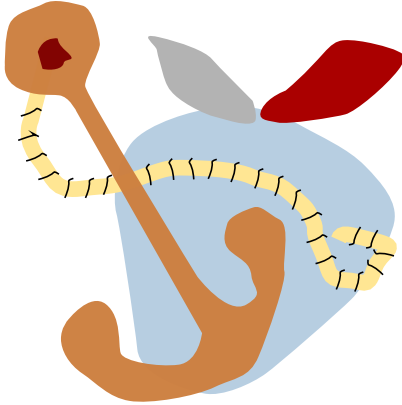*Figure 13 Smart Plug*

9   Other images.

9.1 Logo FormaciON.

Figure 14 Logo FomarciON