# D7.2 Novel Solution cockpit linked to TRINITY Digital Access point

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## DISSEMINATION LEVEL

| | | |
|---|---|---|
| **PU** | **Public** | X |
| **PP** | **Restricted to other programme participants (incl. Commission Services)** | |
| **RE** | **Restricted to a group specified by the consortium (incl. Commission Services)** | |
| **CO** | **Confidential, only for the members of the consortium (incl. Commission Services)** | |
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# Table of Contents





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# 1 Introduction

Manufacturing, through the Industry 4.0 concept, is moving to the phase of digitalization. Industry 4.0 supported by innovative technologies such as Internet of Things, Cloud technology, Augmented and Virtual Reality plays an important role in manufacturing education, supporting advanced life-long training of the skilled workforce. Advanced education and networked ecosystems will develop skills and build competences for the new era of manufacturing. Towards that, this report for Novel solution cockpit present how the adoption of digital technologies can contribute to the teaching and training of TRINITY technologies.

In small and medium-sized enterprises (SMEs), that TRINITY aims to support training needs arise from the increased use of modern digital manufacturing tools, cybersecurity new additive manufacturing processes and novel engineering of intelligence solutions. As a result, operators need to develop new skills and competences to work effectively. From an educational perspective, it is especially critical that people with few prior successful experiences in fully applying the key information-processing skills should obtain adequate comprehension to guide them in structural changes. The key challenge in addressing the evolution of future education in the manufacturing sector involves developing skills and expertise as well as pedagogical and technological approaches that match the changing needs of today's and future workplaces. These challenges Novel solution cockpit as a synchronous and asynchronous learning management system will try to address through its services.

As manufacturing industry enters a new era, where novel life-long learning schemes need to keep up with the rapid advances in production related technologies, tools and techniques. Considering the importance of manufacturing as a wealth generating activity for any nation, the promotion of excellence will become a strategic target in the years to come. However, traditional teaching and training have not kept pace with the advances in technology[1]. The current practice is lacking a continuous delivery of engineering competencies and strong multi-disciplinary background.[2] The TRINITY education & training knowledge transfer WP will contribute content and guidance in order to mitigate the gap. WP7 through this training platform will provide modern concepts of training, industrial learning and knowledge transfer schemes can contribute to improving the innovation performance of European manufacturing.

## 1.1 What does TRINITY Training Platform offer?

The novel solution cockpit will serve as the main internal and external training platform for distributing educational material originating from TRINITY. From now on we will use the term TRINITY Training platform as is more understandable to the audience and represents the content and the purpose of the platform. Internal as the consortium will have the opportunity to get trained and familiarized with different modules and services of DIHs. This platform will be available to external stakeholders outside TRINITY consortium. It can be used as a gateway to diffuse training material and content of the internal and external demonstrators' as widely as possible. TRINITY Training Platform will be used mainly to support interested SMEs in digital technologies and aim to increase agility in their production. The TRINITY Training Platform will be accessible by all citizens at large from various devices (tablets, smartphones, computers, etc.) and will be linked to and from Digital Access Point (DAP), content developed by other related on-

[1] Manufuture High Level Group and Implementation Support Group (2006). ManuFuture PlaTeaching Factoryorm - Strategic Research Agenda, assuring the future of manufacturing in Europe. Manufuture PlaTeaching Factoryorm.

[2] The Teaching Factory: A Manufacturing Education Paradigm, G. Chryssolourisa,*, D. Mavrikios a,L.Rentzos



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going initiatives under WP4. Every effort will be made to make the Training Platform active for several years after the end of project

## 1.2 Objectives of TRINITY Training Platform

The main objective, as described in WP7 is to design and specify the TRINITY Training Platform using user-friendly graphical interfaces and to address security concerns for industrial data and communications, and issues related to proprietary rights of the novel solutions.
The subsequent main objectives are:

- Identify the user roles
- Identify the potential users of the platform
- Define appropriate user interfaces
- Specify the upload process of the material including content review and approval
- Define the sign in process
- Define the interaction process with the external users
- Define specific process for collecting feedback

The objectives of the platform follow the proposed functionalities in the proposal. Some more functionalities have been added in order to increase the communication with the external users (SMEs , operators etc.) and the assistance on the training as much as possible (TRINITY Assistant, Forum etc.)

## 1.3 About TRINITY Training Platform

The aforementioned platform is an online learning environment that combines synchronous and asynchronous services. It is called online environment as afford technology-enhanced learning using the Internet or computer devices and the use of several digital tools and infrastructure. Synchronicity refers to the timing of the interaction between students and their teachers. Synchronous learning environments enable simultaneous and direct interaction, while asynchronous learning environments afford temporally delayed and indirect interaction.

TRINITY Training Platform will combine both functionalities and considers this as an extension to traditional face-to-face education as the use of online environments is accompanied by certain advantages and disadvantages. Webinars, for example, use video-conferencing technologies that enable direct interaction to occur between participants and their lecturers without the need for them to be in the same physical location; this geographical flexibility and ubiquity are an advantage of webinars. As a result, TRINITY Training Platform will host webinars devoted to TRINITY DIH services and demonstrators. Also, the synchronous setup of the platform will make possible for the participants to communicate directly with their instructors who are able to provide immediate feedback. Any comments or questions that arise can, therefore, be instantly brought to the tutor's attention.

This training platform will address training needs that have been evaluated and specific training plans have been developed by the TRINITY network to ensure that the technology developed is in fact usable for industries and that their employees will possess the required skills to use and further enhance the results. Training Platform focus on the development, deployment, and testing of the TRINITY education and training knowledge transfer mechanisms. We will use the Training Platform also to gather and promote the TRINITY Internal and 3rd party demonstrations to interested first time users, SMEs, and other stakeholders. Training Platform will link the detailed descriptions provided by Digital Access Point to the training and



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education material. With this we will cover ICT infrastructure, graphical user interfaces, modular education delivery mechanisms, and process of managing the innovation results from the demonstrations. The approach will emphasise on the capacity to attract new users and SMEs to adopt novel and advanced ICT and robotics.

## 1.4 Connection with the work packages

WP7 and more specific Novel Solution Cockpit project is cross-linked with the other work packages.

**Work package 2 - Networking of DIH:** The role of WP2 is to establish a strong network between the regional DIHs, exchange knowledge and results of demonstrations and Co-operate with existing networks of SMEs, large companies, clusters and regional Hubs. Training platform support all these items as is reported at the last section will enhance the exchange of knowledge through the training material, will disseminate the results of the demonstrators and through its functionalities that will presented analytical at the next sections will promote the collaboration with SMEs and etc.

**Work package 3 - TRINITY use case demos:** TRINITY Training platform will host

- Material from the design and execution of the Category demonstrations.
- Dedicated lectures for the demo cases set up at each DIH having a two-fold aim: a) discuss on the technical aspects of the demo cases, b) communication the benefits of the demo cases in terms of their contribution of increasing agility in production.
- Audio/visual guides, programming support, resolving of integration issues, remote assistance, and tele-installation.

The published content will allow the participants to search and find information of demonstrations, developers and results.

**Work package 4 – Digital Access Point:** Material from the design and execution of the internal use case demonstrations will become available in the Training platform linked to the TRINITY DAP. At DAP will be added a tab that will link directly with Training platform the interested stakeholder.

**Work package 6 - Business Planning:** One of the main objectives of this WP is the sustainability of TRINITY network. TRINITY Training platform as a platform that provides the training services and is linked with the DAP will have important role in the future sustainability of the network.



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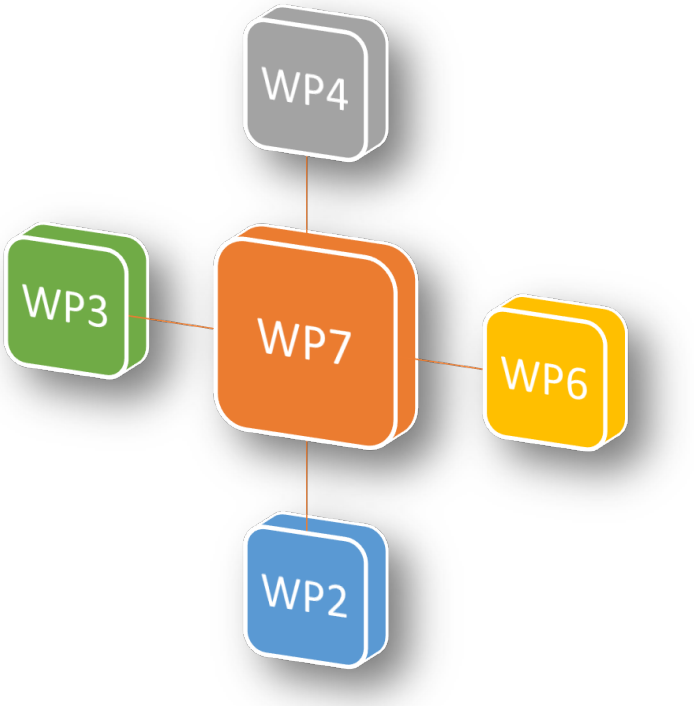


**Figure 1: Connection with the work packages**



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# 2 Requirements of the cockpit

At this section are provided the technical characteristics requirements as have described in the proposal document as also the requirements to use the platform.

## 2.1 Functional requirements

The infrastructure of the TRINITY Training Platform is developed and will be maintained by LMS. It will have to provide both synchronous and asynchronous communication channels.

As synchronous communication is needed when all participants are communicating at the same time using web and tele-conferencing tools, augmented reality tools, live video streaming.
Some examples of synchronous communication that will be used at the platform are:

1. Live chat and other messaging channels
2. Live video streaming ability
3. Chat Rooms that the participants will be able to make questions and discuss several topics

Asynchronous means are needed when simultaneous participation of both ends is not required (e.g. on demand education and training transfer) and is delivered though video/audio playback, text, images, slideshows, as well as content delivered from mobile devices.

1. Email
2. Also, the development of a data repository is required including data anonymisation algorithms to mask sensitive/confidential data.

Moreover, security concerns for industrial data and communications, and issues related to proprietary rights of the novel solutions (e.g. software code, hardware patents, conditions of use, etc.) need to be addressed. The early results of the demonstrators will be disseminated on the platform to raise awareness on the project's ecosystem.

## 2.2 Technical Requirements

The TRINITY Training Platform is based on the open-source WordPress. WordPress is a flexible Content Management/Portal solution that is easy to install, use, extend and maintain. It fosters the creation and maintenance of sophisticated content without requiring extensive technical knowledge using only a web browser. It is used for web sites or intranets and offers superior security without sacrificing extensibility or ease of use. To access the functionalities provided by the portal only a web-browser is required that can support the requirements of WordPress. At the moment of writing, most browsers can successfully visualize the content of all sites created by Wordpress.



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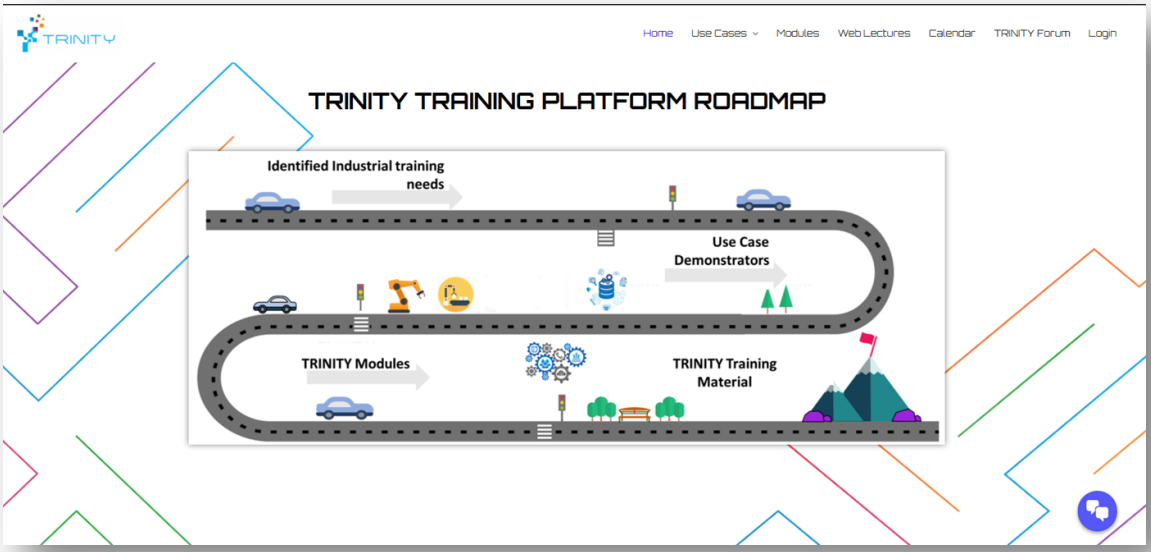


**Figure 2:Visualization of TRINITY Training platform in wordpress**



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# 3 Main Functionalities of the TRINITY Training platform

The TRINITY Training Platform has been designed the previous months in order to provide an interactive training experience to the participants. As has been reported in D7.1 that was submitted on M14 each of the technology provider of TRINITY consortium has collected the competences desired to be acquired by the EU manufacturing industry, through workshops, seminars, face to face meetings, etc.. Based on the competencies provided each responsible partner have been identified the education and training material required by the trainees. All the identified competence needs have been mapped to TRINITY modules. These competence needs will lead the participant to the training options that will be available on the Cockpit based on TRINITY Modules.

Figure 3 presents an example of the mapping of the industrial needs, the TRINITY Use Cases and finally the modules.

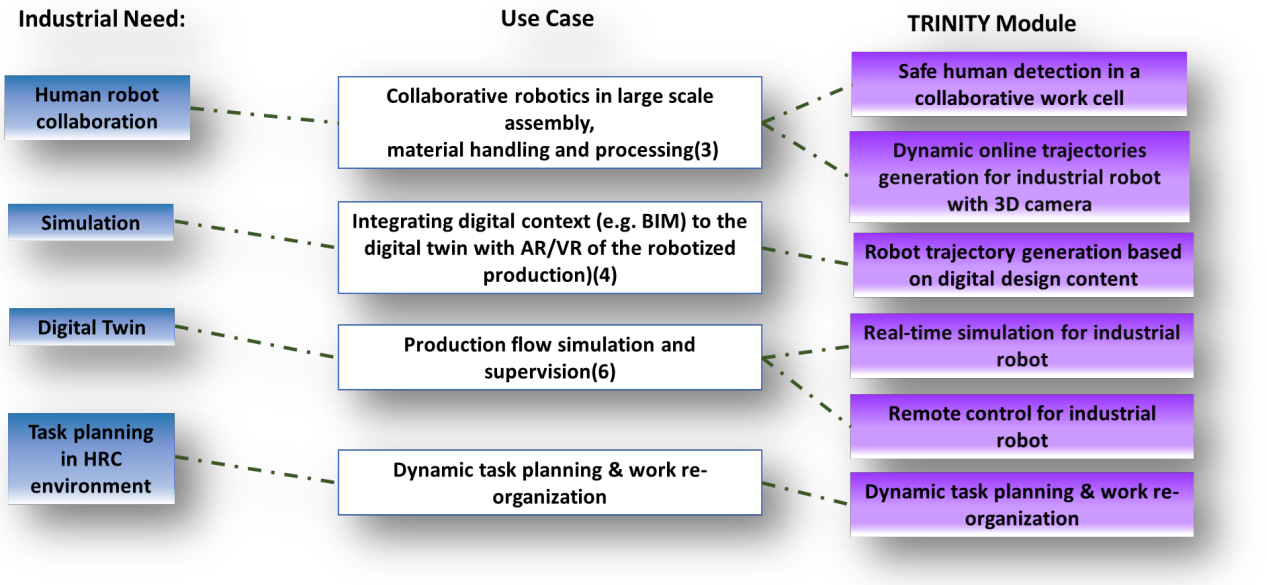


**Figure 3: Connection of Needs, Use Cases and TRINITY Modules**

The available TRINITY Training modules that can cover participant's need will be presented. Each training module will have at least two levels of training. The first level will be focused on the first-time users with low experience on the technology of the module. The courses at this level will be for the First time Users in order to introduce them in the different technologies that the module need to be familiar before use it The second and the next levels will be focused on intermediate and more experienced users with the module technology.

Figure 4 shows a visual description of the training process that will be followed through TRINITY Training platform.



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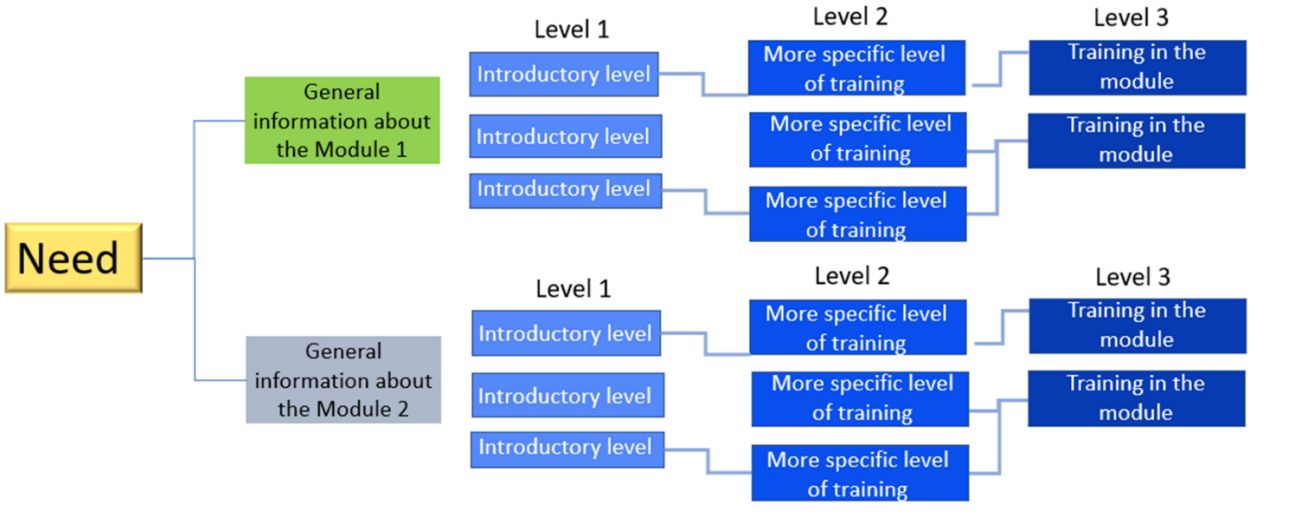


**Figure 4 Training Process**

At previous sections have been described several requirements and functionalities that the platform should address. To address these futures regarding functions and business plan of the platform we propose the following approach. A website that will be built of sections, which will have their sets of functionalities. This will enable to update the sets of functionalities, to add or remove new sections whether it would represent textual or visual information or would have any other advanced functions.

Examples of such modules include plug-ins for calendar etc. The proposed architecture of the platform is presented at the Figure 5. All the tabs and their functionalities will be analyzed at section four.

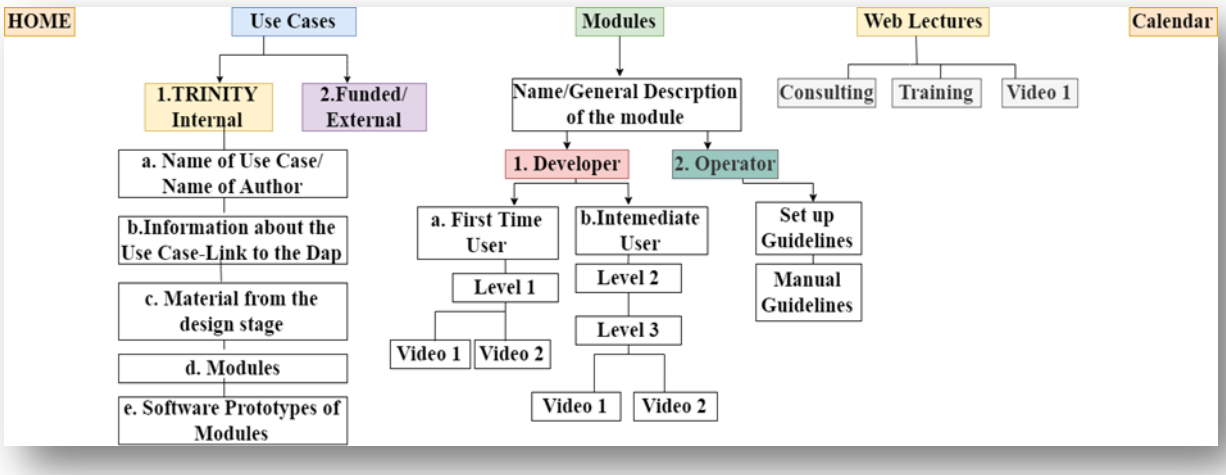


**Figure 5 Tabs and pages breakdown**

Important part of the training platform is the chosen training delivery mechanism. These are responsible for the communication of knowledge and interaction capabilities between the participants and the platform. The expression “Delivery Mechanism” does not imply a linear delivery of the knowledge. Knowledge, and



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particularly competency is constructed by the participants with the help of the IT-infrastructure and the teaching staff. The delivery ICT technology such as dedicated to video conferencing or web service

**TRINITY Assistant:** TRINITY Assistant is a software application that will used to conduct an on-line chat conversation via text, in lieu of providing direct contact with a live human agent. This computer program has been designed to simulate human conversation. The users will communicate with this tool using a chat interface or , just like they would converse with another person. TRINITY assistant interprets the words given to them by a person and provide a pre-set answer:

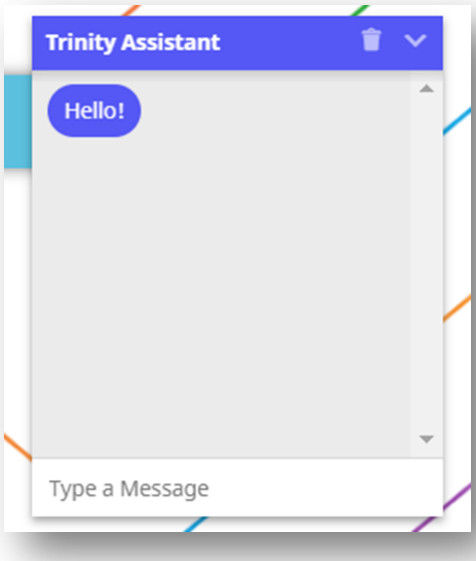


**Figure 6: TRINITY Assistant**

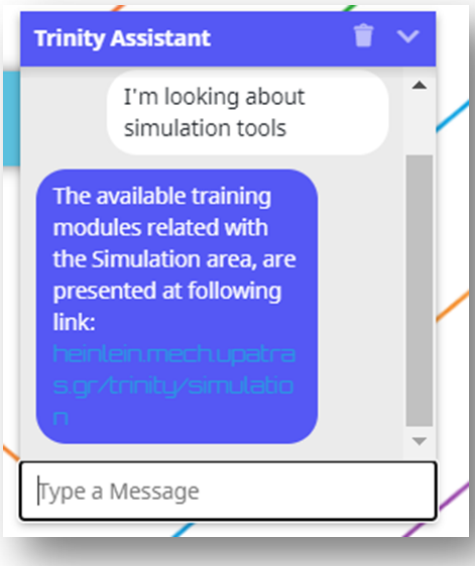


**Figure 7: TRINITY Assistant example**

**Calendar:** Calendar is a flexible events calendar that will increase the functionalities of a common simple calendar by creating opportunities for events submitted by your users, importing events from external calendars, or posting to your blog for every new event.



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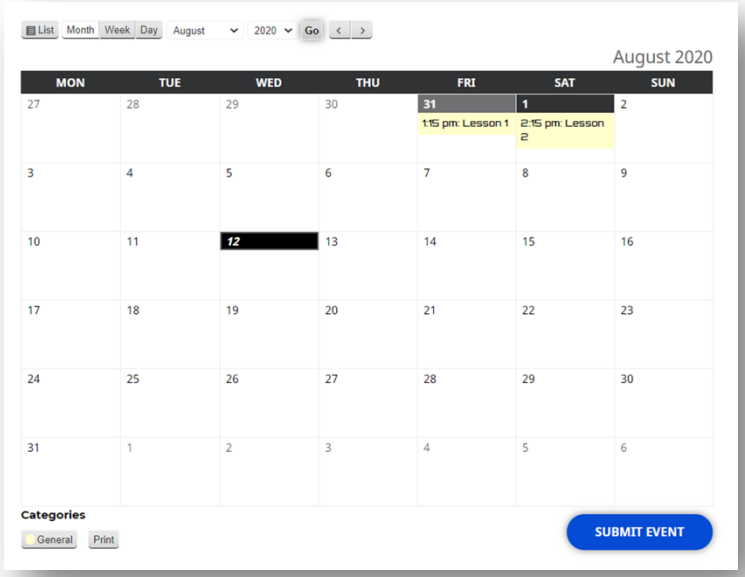


**Figure 8: Calendar interface and example of events**

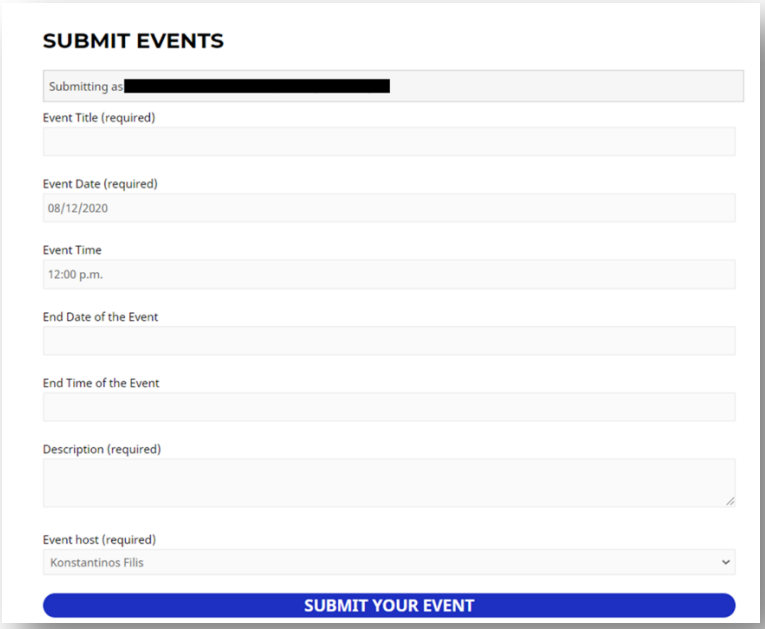


**Figure 9: Submit event process**



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# 4 TRINITY Training platform users

The users of the Training Platform are divided in two categories the Teachers and Learners. TRINITY teachers as are presented at the Figure 10 are the TRINITY DIHs who are also module owners. As learners are considered all the potential users of the platform and stakeholders.

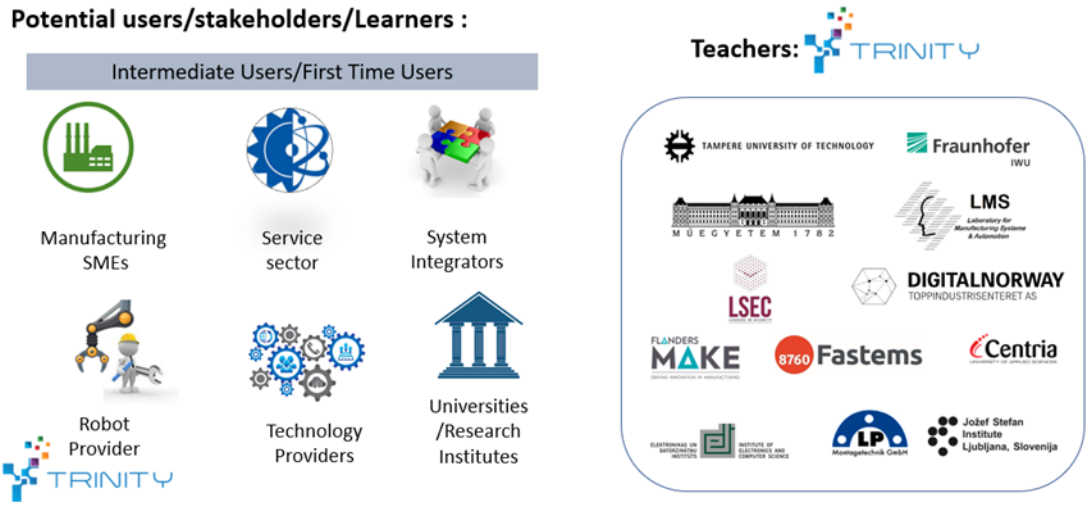


**Figure 10 Trinity Training Platform users**

**Teachers:** Teachers will be responsible to prepare the relevant material for the training platform and to organize the lectures or seminars or workshops. LMS will create specific account for each teacher to access to the platform. Teacher and Learner will see the same interface of the platform. However, Teacher account will be able to edit the module training page in order each of them to upload and edit the respective material. The interface of the module page for the Teachers is presented at the next figure. The red area are the tools that can be used by the teachers to edit the module page. Instructions for these tools and which of them can be used will be prepared and provided to all of them.



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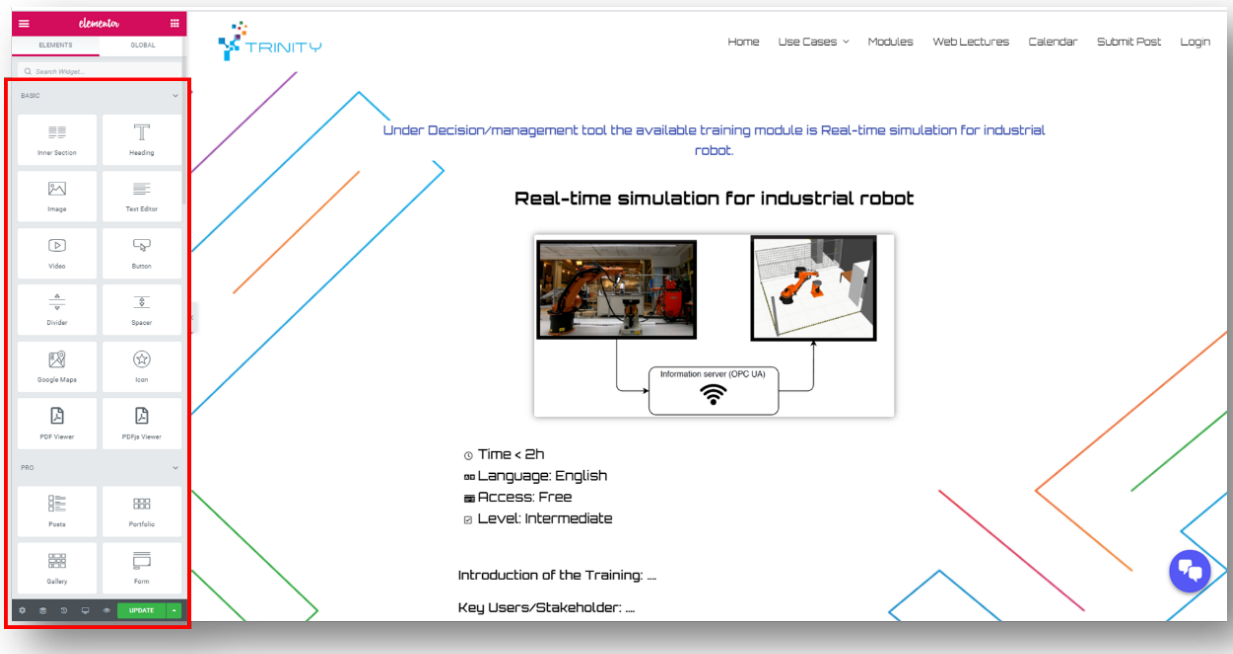


**Figure 11: Module interface for a Teacher User**

## Learners:

Results that collected from the survey under T7.1 specified the categories of users of training material. The main audience who will benefit from the training courses on ICT in manufacturing to be developed in TRINITY project are:

- University/Research Institute/student
- Manufacturing SMEs
- Technology Provider/system integrators
- End Users
- Engineers/IT Personnel

TRINITY Education and Training Material aims to provide new knowledge to SMEs and other companies, to master the new robot technology and to provide access to new technologies, in order industry and SME employees acquire the required skills to use and further enhance the results.

ICT in manufacturing is a cross-over activity and affects nowadays almost all roles in manufacturing companies.
The identified roles of users that the Training platform will interest are

- Developers, as TRINITY Modules and Training material are more oriented toward to them.
- Operators, as we will provide Short manual guides for the demonstrators
- Managers, for this role the Consulting Services that TRINITY offer will more usefull.



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# 5 Structure and Training platform web pages

## 5.1 Tabs of the platform

Pages contain seven main sections, were rather more training material regarding robotic modules and demonstrators can be provided. Each of the section refers to internal links, describing specific information with figures and external links.

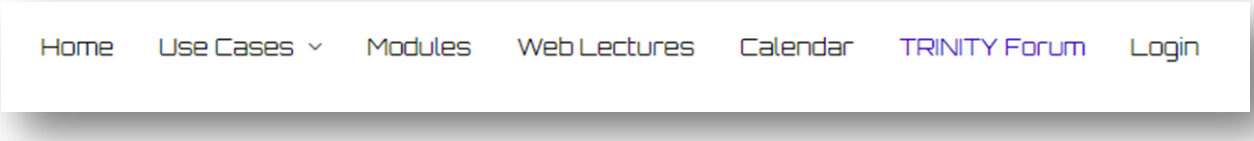


**Figure 12:Main tabs of the Training Platform**

## 5.2 Home

This segment contains most essential information for the platform. A roadmap that appears in front of the participant and gives a first idea about the connection of the Industrial needs → TRINITY Use Cases → Modules and then the training material that is based on the previous. The grey arrows work as buttons and will lead the user directly to the relevant information and material.

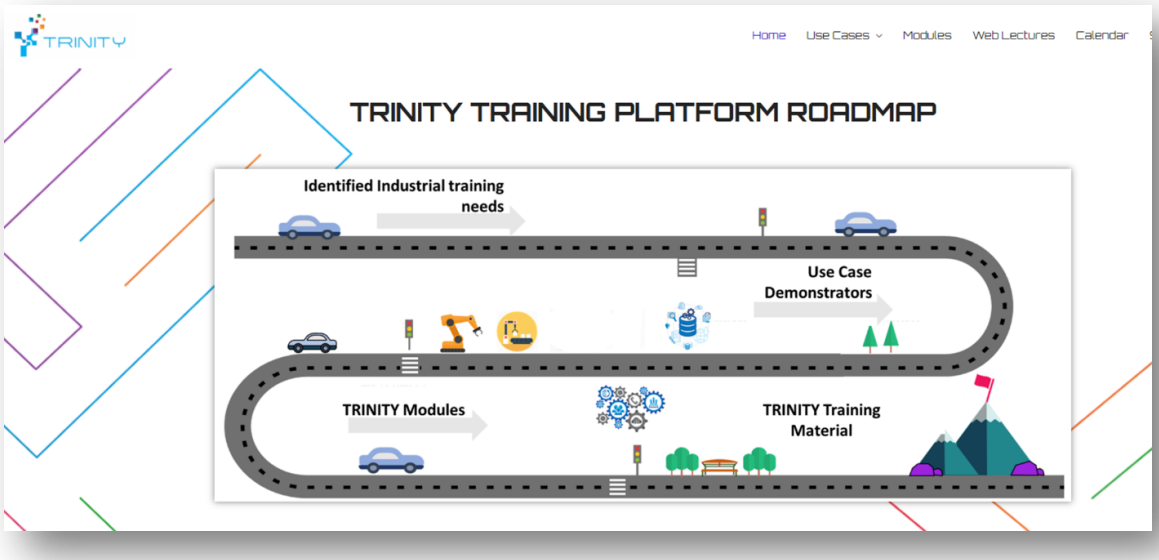


**Figure 13: Homepage – Roadmap (1/4)**

By scrolling down the homepage, the user will be familiarized with the delivery mechanisms that will use for the trainings as are the virtual reality environment, online web lecture and online interactive tools.



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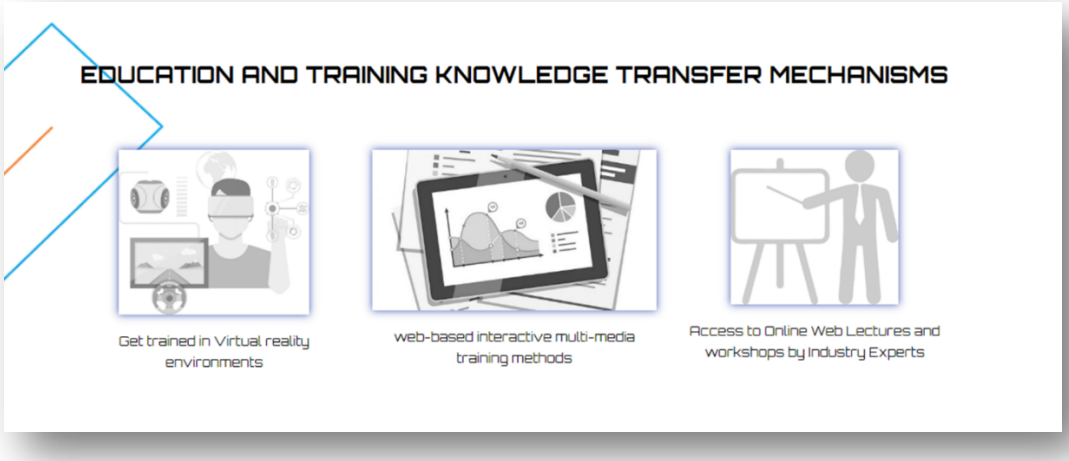


**Figure 14: Homepage Delivery Mechanisms (2/4)**

Then after the introduction of the delivery mechanisms a presentation of the teaching team considered appropriated to be included in the Homepage. A short description of each teacher and the logo of the organization have been reported in order the external users of the platform that they are not aware of the TRINITY network to take an idea who is the main source of the training material. The teaching team is formed from the TRINITY DIHs.

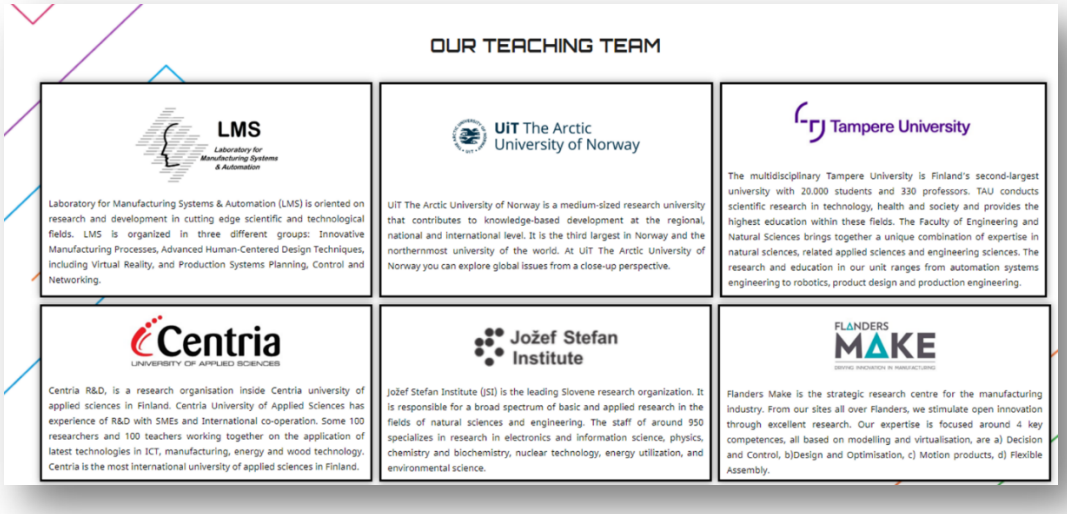


**Figure 15 Homepage - Teaching Team(3/4)**



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**Figure 16 Homepage - Teaching Team (3/4)**

At the end of the homepage additional widgets have been added to provide basic information about the platform and to disseminate the main advantages.


**Figure 17: Homepage - Informative widgets (4/4)**

### 5.2.1 Use Cases

Use Cases section is available in the pages bar. There, users can access one of the most important components on the platform. At the Use Case page, a description of the two different kind of demonstrators is provided. The users of the platform that are not members of the TRINITY project are not familiarized with the terminology of use cases, demonstrators and the difference between Internal and External, so the description of these will help to distinguish the differences of the previous terminology. The Internal and External Use cases with feed and additional information page are provided in separate internal links.



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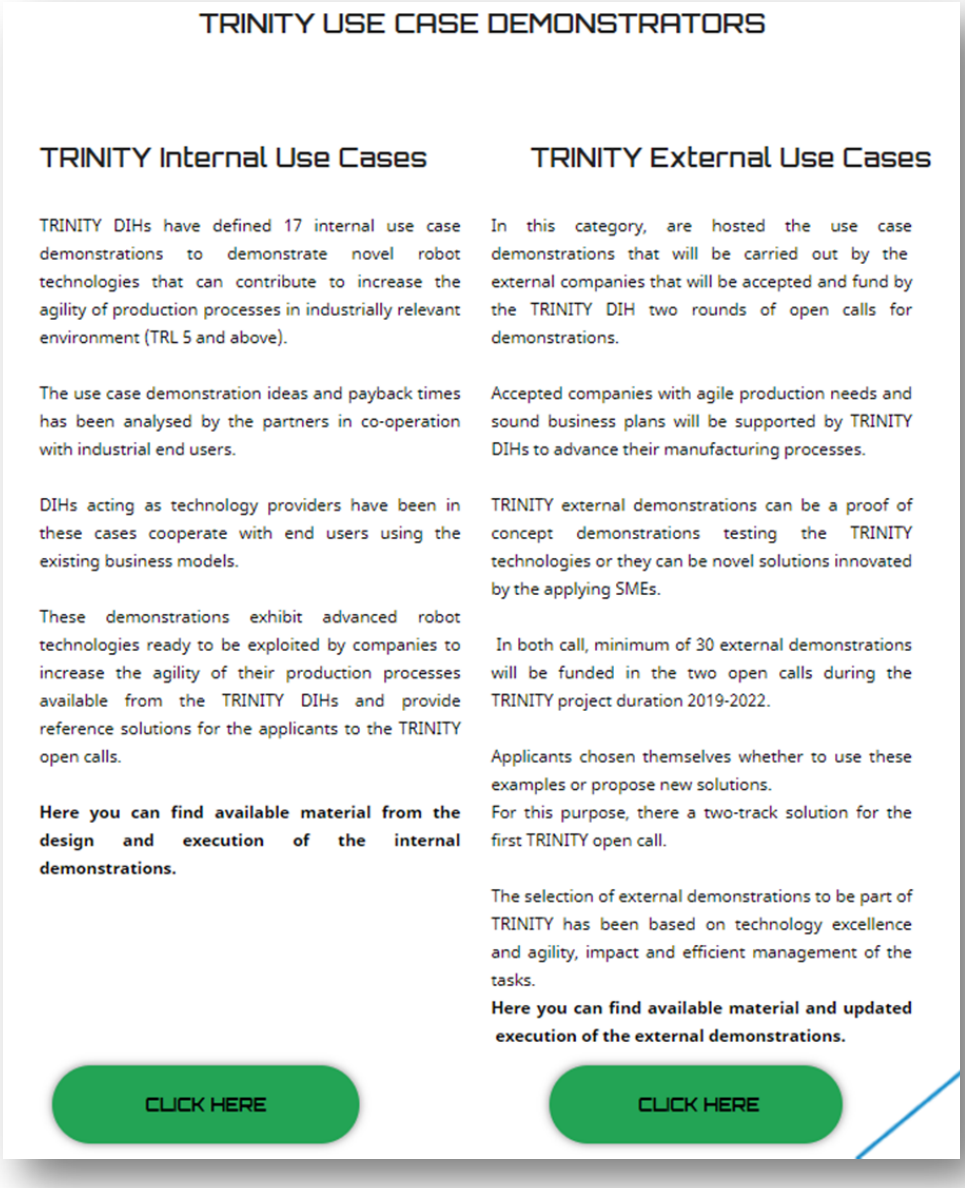


**Figure 18 Use Case demonstrators Page**

### 5.2.2 Internal Use Cases

The purpose of Internal use-case demonstrations is to provide public material from the design and execution of the Use case Demonstrators of TRINITY DIHs as well as lectures about the demonstrators. Internal Demonstrators are provided in the list form topic, photo, and the box “Learn More” that directs to the demo’s more detailed information. Currently the demonstrators are in the preparation phase and they have not provided material as figures etc.



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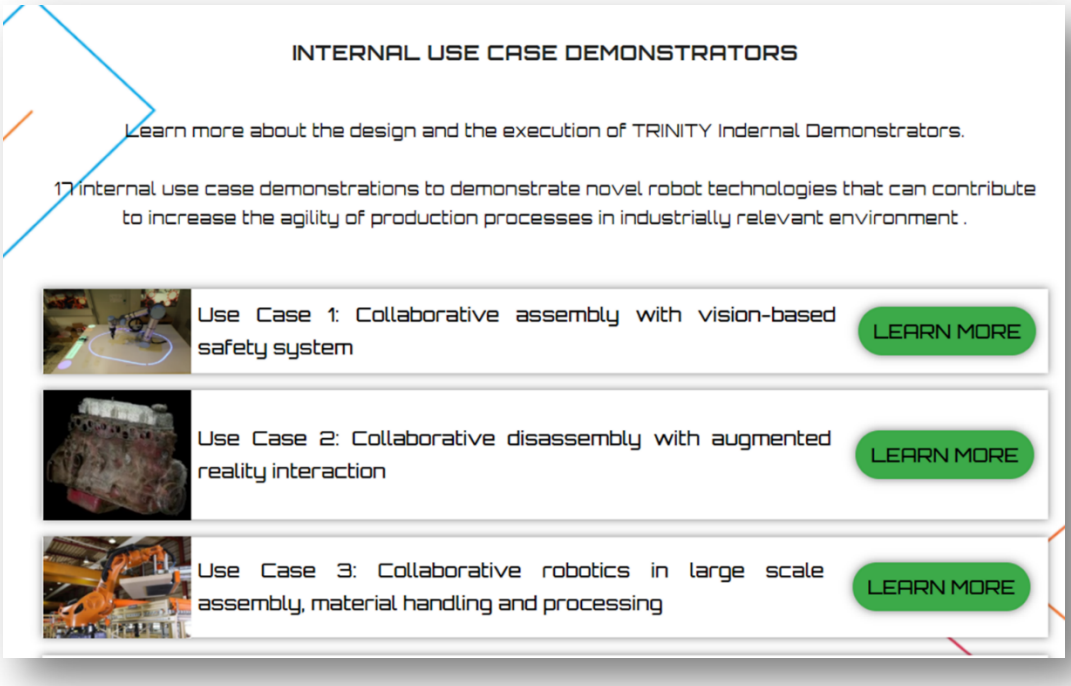


**Figure 19: Snippet of Internal Use Case Demonstrators**

**Internal Use Case page:** More specific approach to the use-case demonstrations are provided within the specific named page. The general overview of the use-case is provided in the relevant page of the DAP with detailed specifications (i.e. software, hardware, contacts etc.). At this page material from the design and execution of this demonstration will become available as also video lectures that will discuss on the technical aspects of the demo cases and communicate the benefits of the demo cases in terms of their contribution of increasing agility in production. Currently, the internal demonstrators are under development, the upcoming months will be prepared the relevant material that will be hosted on the platform. At the figure below is presented an example of the interface of an Internal Demonstrator Tab.



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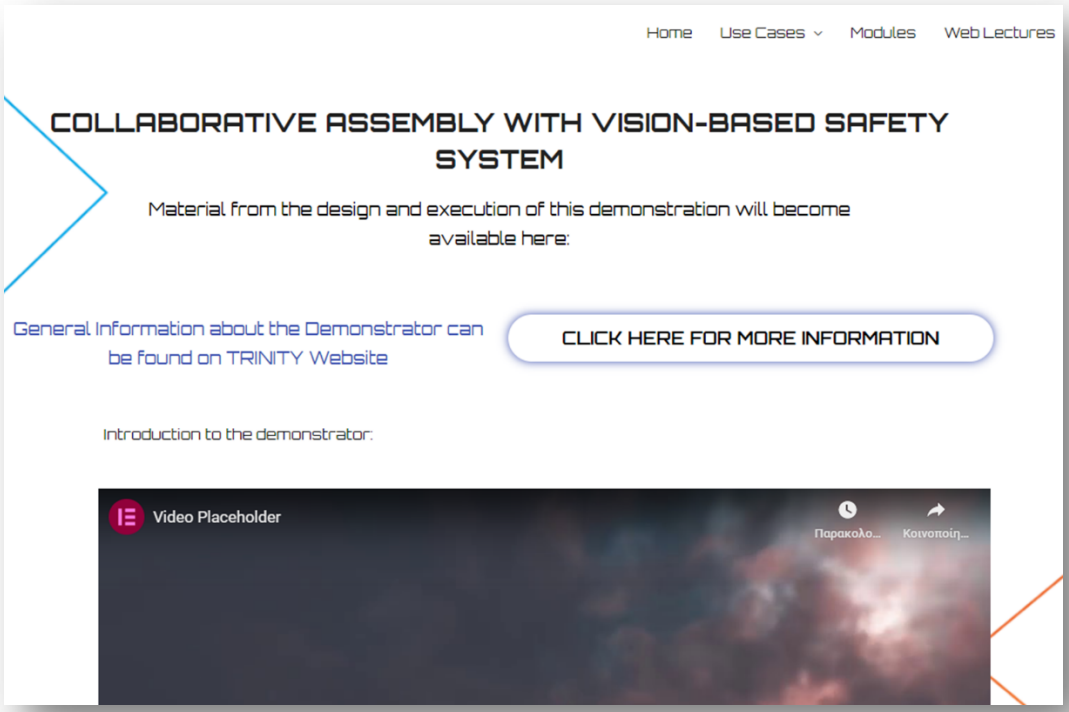


**Figure 20: Example of Internal Use Case demonstrator page**

### 5.2.3 External Use Cases

The purpose of External use-case demonstrations is to provide public material and updates from the execution of the External Demonstrators from first and second open call of TRINITY project. External Demonstrators are provided in the list form topic and the box "Learn More" that directs to the demo's more detailed information. A photo next to the topic will be added the next months. Currently the demonstrators are in the preparation phase and they have not provided material as figures etc.

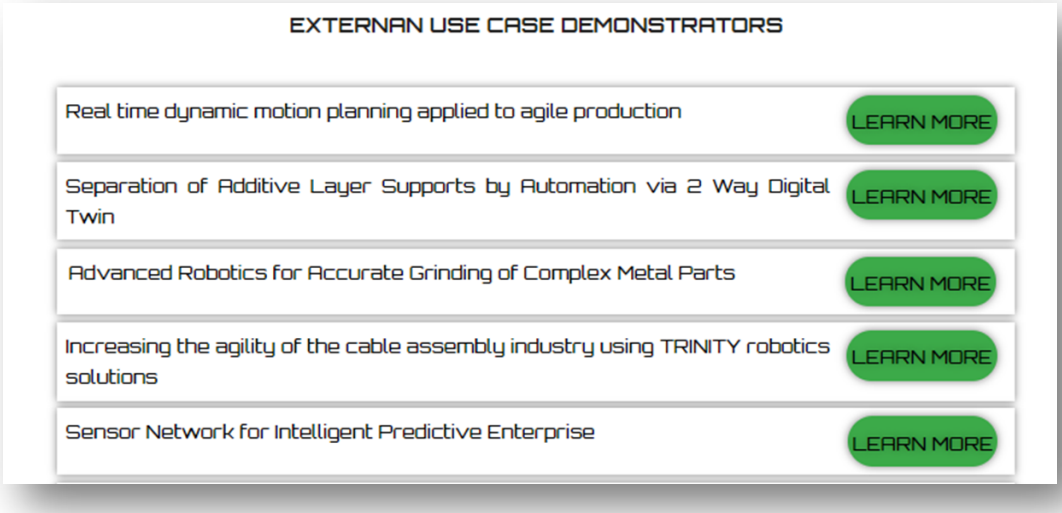


**Figure 21: Snippet of External Use Case Demonstrators**



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**External Use Case page:** More specific approach to the use-case demonstrations are provided within the specific page. The general overview of the use-case is provided in the few sentences, whereas more detailed specifications (i.e. software, hardware, contacts etc.) are available in a presentation format.

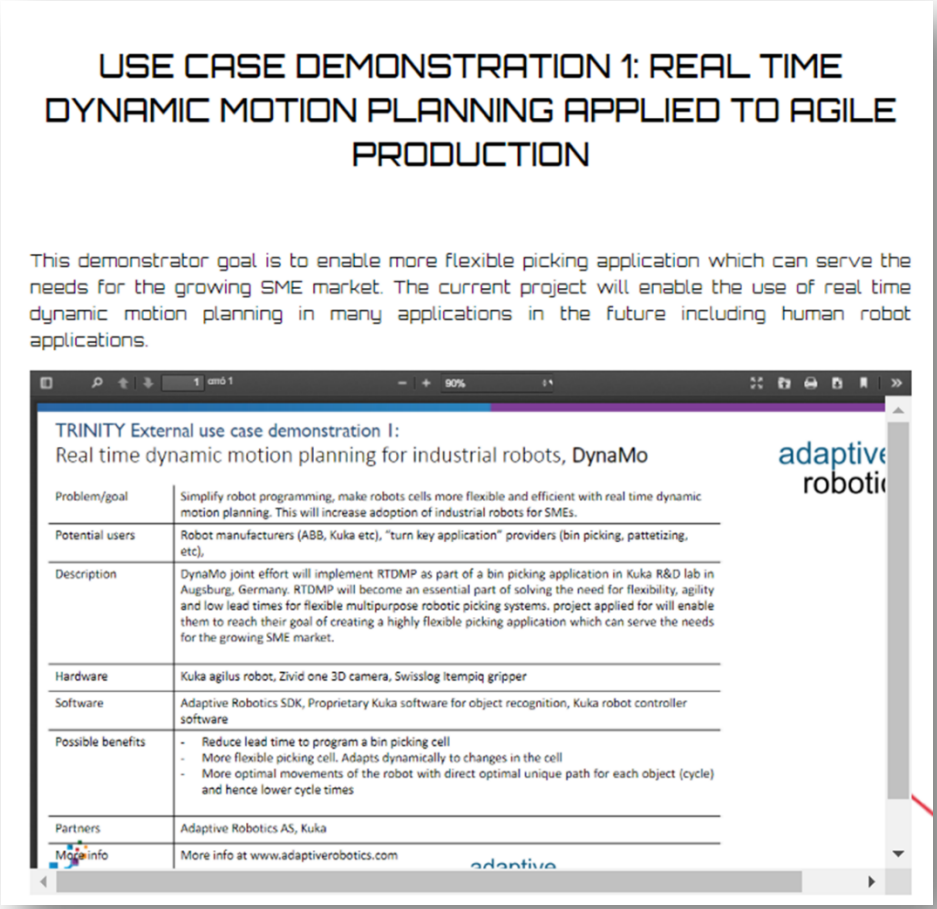


**Figure 22: Example of Internal Use Case demonstrator page**

## 5.3 Modules

Module section is available in the pages bar. Opening it directs users to a new page where there is a list of available technology categories. These categories are based on the results of TRINITY Survey about the industrial needs. The competencies are based on the industries' needs and are cataloged into nine main categories. Choosing any category directs to the page with provided training modules. The users are encouraged to choose one category based on their interest and training needs.



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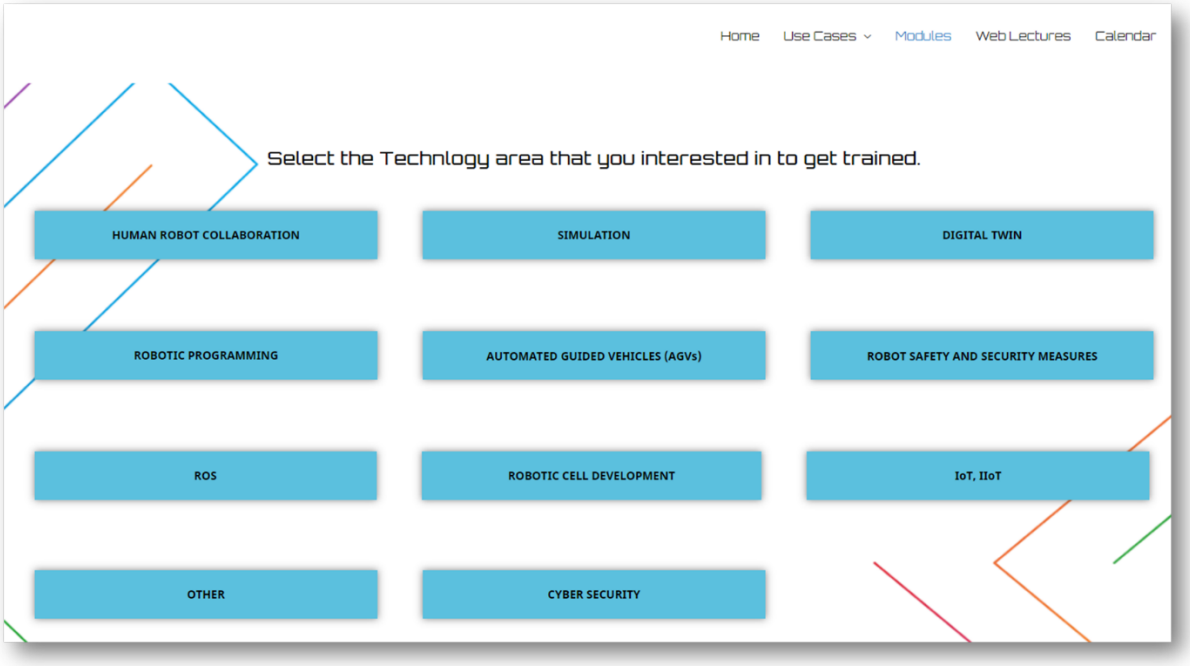


**Figure 23:Modules Main Page**

**Technology Need/ Category Page:** Technology Need/ Category section assists in listing various related technical products that can help to optimize the agile production capabilities to manufacturing companies. Modules are provided in the list form, with relevant content and visualisations provided. Each row has a logo of the organization and topic that works as a button and directs to the module's training material.

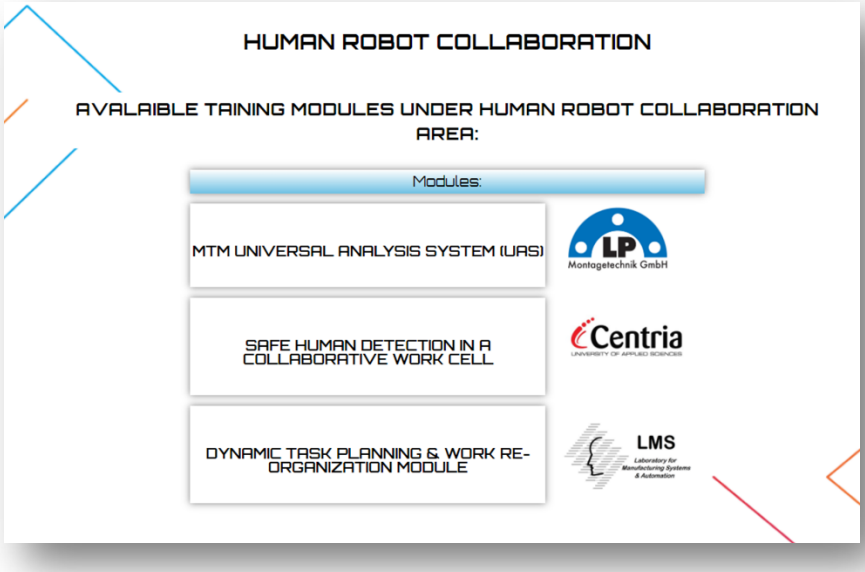


**Figure 24 Technology Category Page**

Users that will choose one of the available training modules, they will be redirected to the training module page. There they will find a figure that represents the module and some important and basic information about the training that will follow. These are the time of the training, which languages are available for the training, if there is a cost for the training and the required level of expertise which is distinguished in first



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time users and intermediate user. At this point it is important to be referred that all the users will have free access at the training, but this is an important benefit for the users and should be pointed out.

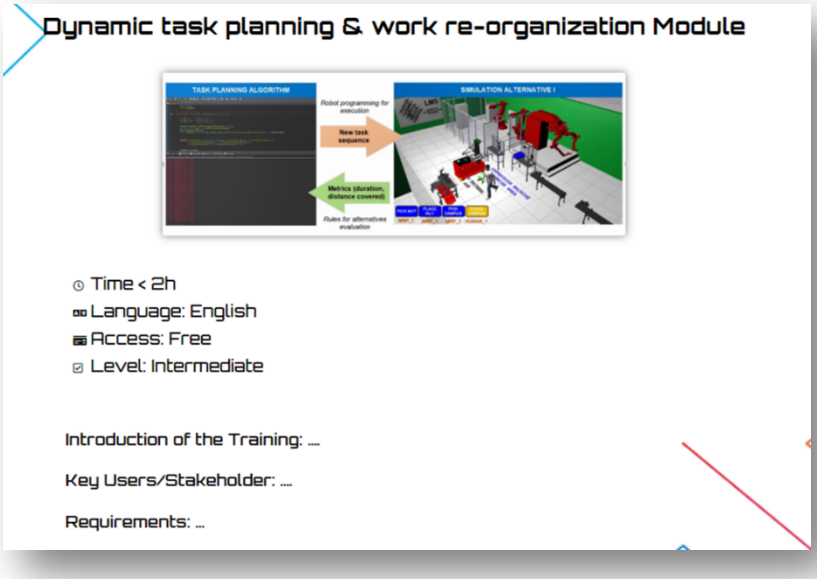


**Figure 25: Training Module Page (1/3)**

Scrolling down the module page the participant will find an introductory summary of the training, the categories of the key Users may focus. Each training based on the module will focused in different users as are developers, operators, managers, or students etc. Also, some of them it might have some requirements in order to attend them, these requirements will based on the background of the user. All these will be reported before the training get started. The figure above and below are examples of the interface of the page. It has been considered at this example that the training consists of videos and Presentations.

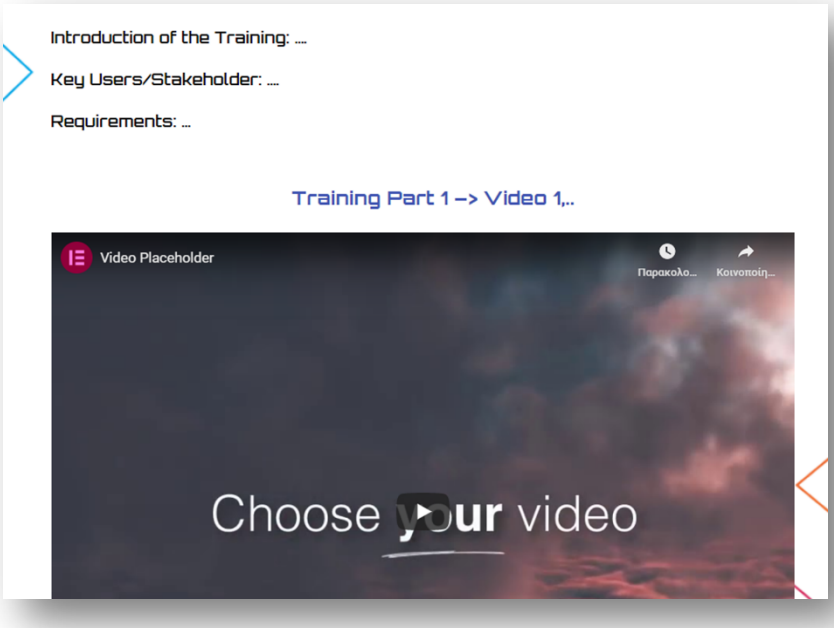


**Figure 26 Training Module Page**



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Each module owner will decide the appropriate delivery mechanism for the training of the module. Here are used as an example the delivery mechanism of Video (Figure25) and presentation (Figure 26).

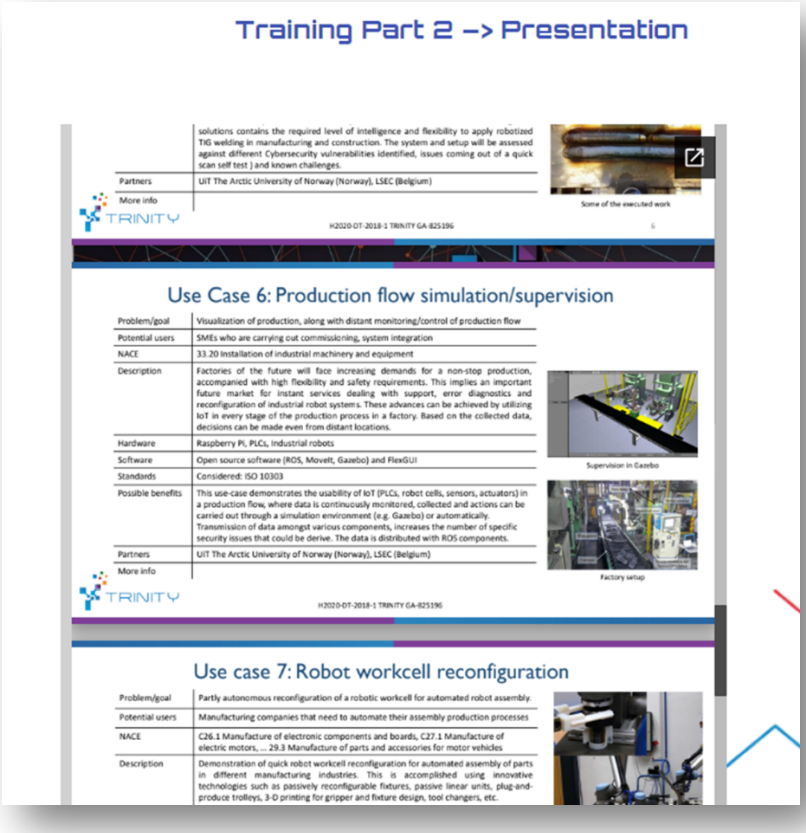


**Figure 27: Training Module (2/3)**

At the end of the page a comment section will be available in order the participants to leave comments or provide feedback about the training. These comments will be public, and the TRINITY partners will be able to response to the participants.

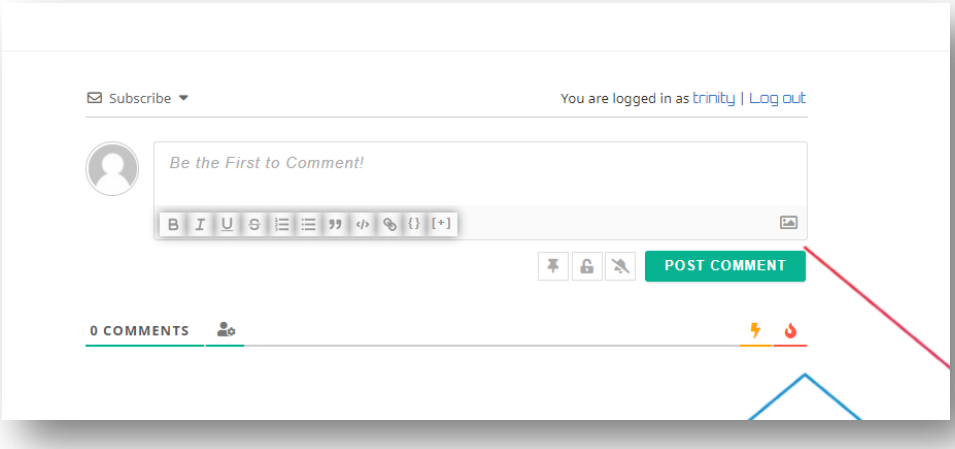


**Figure 28: Training Module Page - Comment Part**



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## 5.4 Calendar

This tab has been added to inform the participant about the upcoming TRINITY events with educational purpose as are webinars, workshops, lectures. Moreover, during the execution of the demonstrations the TRINITY partners will be able to organize though this tab teleconferences in order to provide audio/visual guides, programming support, resolving of integration issues, remote assistance, and tele-installation

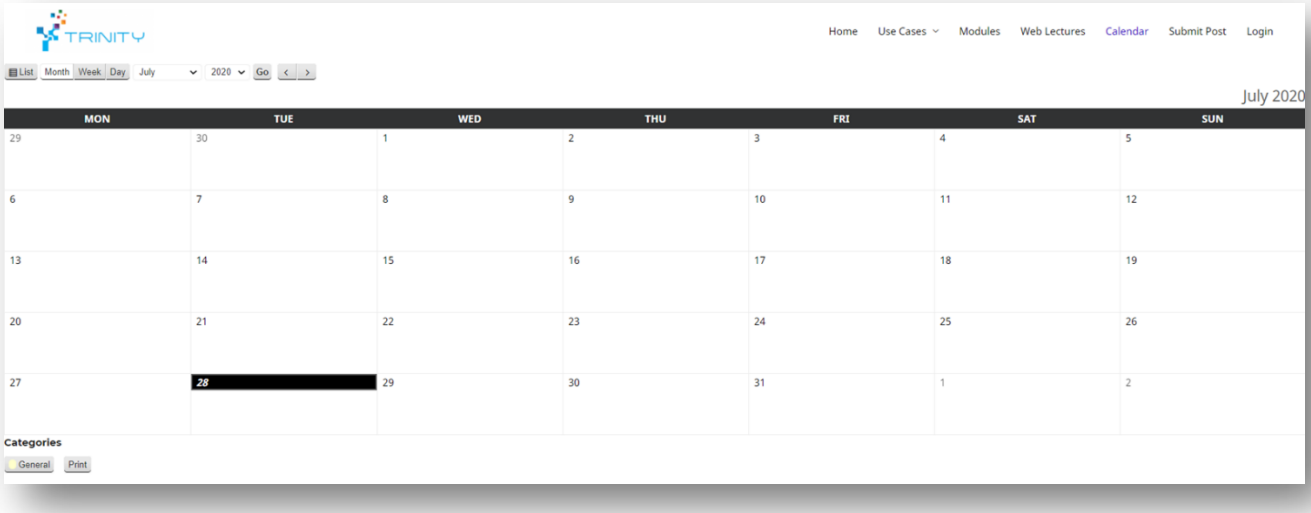


**Figure 29 Calendar Tab**

The calendar application is not a colon calendar that informs about the current date but is developed to provide specific functionalities the TRINITY partners

- Any user will be able to submit events or restrict access to some or all logged-in users.
- Will be allowed to publish events.
- Prevent users from submitting events which conflict with existing events
- Allow logged-in TRINITY partners to edit their events on the front-end.
- Create their event while writing a new post or page
- Create their blog posts automatically when publishing an event
- Import events from CSV or iCal sources, either via file upload or URL (Uniform Resource Locator)
- Schedule imports of events on a schedule from any importable URL
- Advanced search filtered by keyword, date range, category, location, or author
- Use the WordPress REST (Representational State Transfer) API (Application Programming Interface) to share events between sites

This functionality will enable the organization of webinars, online workshops, seminars and lecture

## 5.5 TRINITY Forum

TRINITY Forum is a functionality of the platform that was not required from the proposal document. TRINITY WP7 member decided to add this feature to increase the interaction of the internal DIHs and the external participants. At this forum, the participants will be able and be encouraged to create a topic about a demonstrator internal or external or any other technology that they would like to discuss and express their questions or ideas. At the figure below is presented the interface of the forum with some examples of topics



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that have been created to test the feature. The user will be able very easily to create a new topic clicking on ‘CREATE NEW POST ‘button.

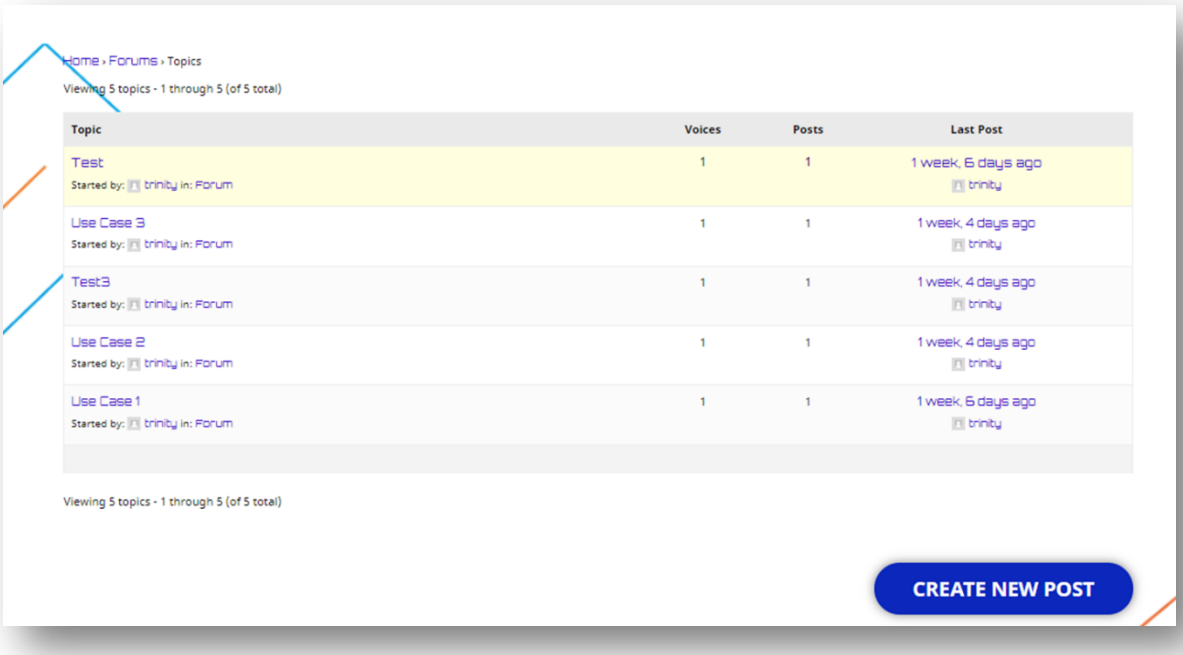


**Figure 30: TRINITY Forum Interface**

Below is presented an example of a topic Use Case 3. The user will be able to report a comment or a question with word limits. Then he/she will be able to edit or delete the post.

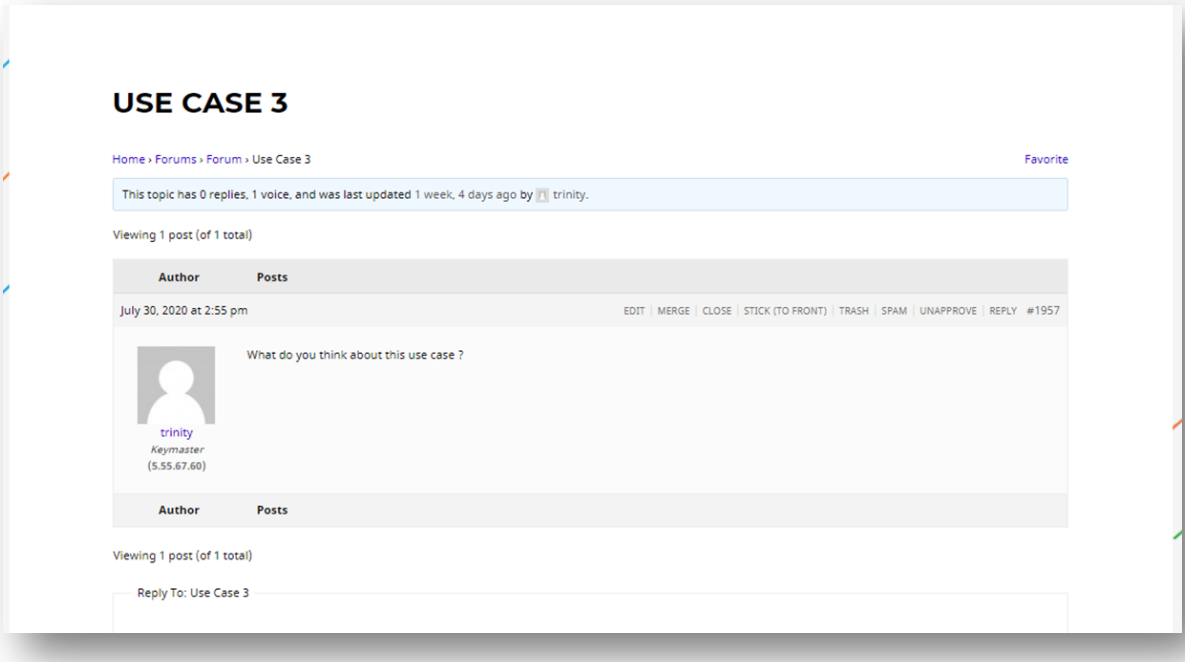


**Figure 31: Example of a topic**

A discussion between the users or an answer can be expound on. At the figure below is presented the answer box.



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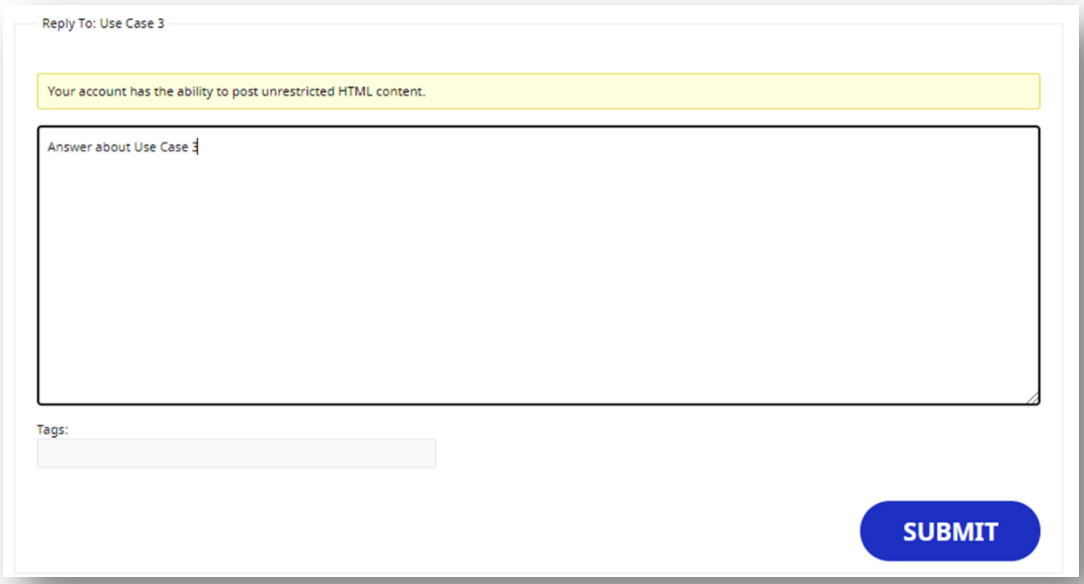


**Figure 32: Topic Answer Box**

## 5.6 Log in

The log in button will be used currently only form teachers. LMS as the user with the main authority in the platform will be responsible to create accounts for the TRINITY partners that will belong in teachers' team. Teacher account will be able to edit the module training page in order each of them to upload and edit the respective material.

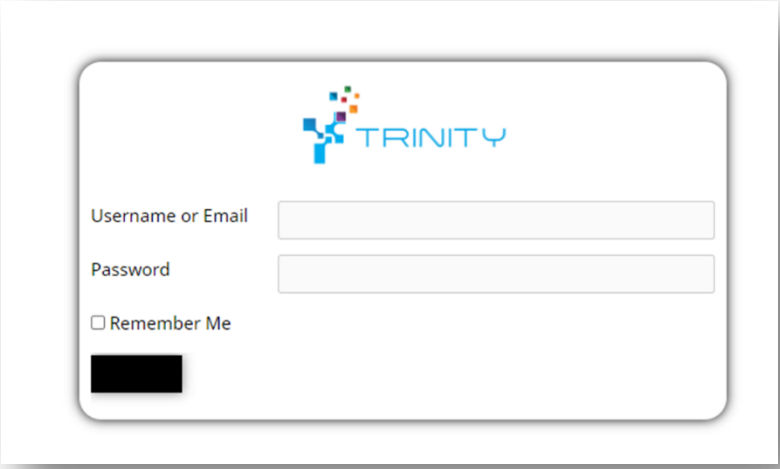


**Figure 33: Log in Page**



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