DRIVES Framework API and Pilot Plug-in of

Existing Courses

D4.4.1 Integration of Representative Ecosystems with ERFA

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INTRODUCTION

API stands for Application Programming Interface which enables two applications to communicate with each other while running, often used when one application offers a specific service to the other one and vice versa.

In terms of the DRIVES Framework, this is particularly useful for the optimization of the users' workflow if wanted, especially for providers. DRIVES Framework API offers two main functions, which allow to verify the training completion of one or more users or to register users that are not yet in the system.

This document provides overview and technical information on the DRIVES Framework API in the first part and follows with examples of the integration of the existing training courses into the system by partners of the DRIVES Project as well as external entities and projects focused on the skills agenda.

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LIST OF ABBREVIATIONS/GLOSSARY

3D	…	Three Dimensional
API	…	Application Programmable Interface
AM	…	Additive Manufacturing
APTE	…	Association for Promoting Electronics Technology
CAN	…	Controller Area Network
CNG	…	Compressed Natural Gas
CTeSP	…	Cursos Técnicos Superiores Profissionais
CYBERENG	…	ECQA Certified Cyber Security Manager and Engineer – Automotive Sector (ERASMUS+ Co-funded project)
DF	…	DRIVES Framework
ECEPE	…	ECQA Certified Electric Powertrain Engineer (ERASMUS+ Co-funded project)
ECTS	…	European Credit Transfer and Accumulation System
ECVET	…	European Credit System for Vocational Education and Training
EQF	…	European Qualifications Framework
ERASMUS+	…	European Region Action Scheme for the Mobility of University Students
ERFA	…	European Recognition for Automotive
EWF	…	European Welding Federation
GET	…	A method used to request data from a specified resource
GUI	…	Graphical User Interface
HE	…	Higher Education
ID	…	Identity information used to uniquely identify object or record
IPC	…	Interconnecting and Packaging Electronic Circuits (Semiconductors)
IPV	…	Instituto Politécnico de Viseu
JSON	…	JavaScript Object Notation
LIN	…	Local Interconnect Network
MBA	…	Master of Business Administration
MOOC	…	Massive Online Open Course
OpenAPI	…	Standard and language-agnostic interface for RESTful APIs
POST	…	A request method supported by HTTP used by the World Wide Web
R&D	…	Research and Development
SAM	…	Sector Skills Strategy in Additive Manufacturing
SME	…	Small and Medium-sized Enterprises
TU	…	Technical University
VET	…	Vocational Education and Training

1 DRIVES FRAMEWORK API

This document serves as a development specification of the DRIVES Framework API.

DRIVES Framework API will enable 3rd parties (mainly training providers) to implement an interface that will allow communication with DRIVES Framework Online Platform from outside. DRIVES Framework has multiple features. The main goal of the API functionality is to enable the verification of the training completion and issuing of the digital badges. This goes hand in hand with the "clean" registration[1] of the successful trainee who is not present in the system, but the badges are to be issued to the user. Functions are further described within the document.

1.1 DRIVES FRAMEWORK

DRIVES Framework is one of the main outputs of the DRIVES project, more information can be found on the project website[2] in the dedicated section[3], DRIVES Framework itself[4], or a specific report[5] which describes the framework in more detail.

1.2 TECHNOLOGY

DRIVES Framework implements the OpenAPI 3.0 approach embedded in the Liferay Portal, which is used to facilitate the user environment within the DRIVES Framework platform. When the API definition is written, the functionality is automatically generated.

---

[1] Registration where only mandatory information about the registered user is specified in order to simplify the process, in a case of DRIVES Framework, it is an email address, other information is filled by the user after the first log-in.
[2] Project DRIVES. Project DRIVES. Retrieved November 29, 2021, from https://www.project-drives.eu/.
[3] Project DRIVES. Project DRIVES. Retrieved November 29, 2021, from https://www.project-drives.eu/.
[4] Objectives. Drives Compass. Retrieved November 29, 2021, from https://drives-compass.eu/framework-objectives.
[5] Development and Research on Innovative Vocational Educational Skills. (2021). (rep.). Deliverable 4.4.2. DRIVES Framework

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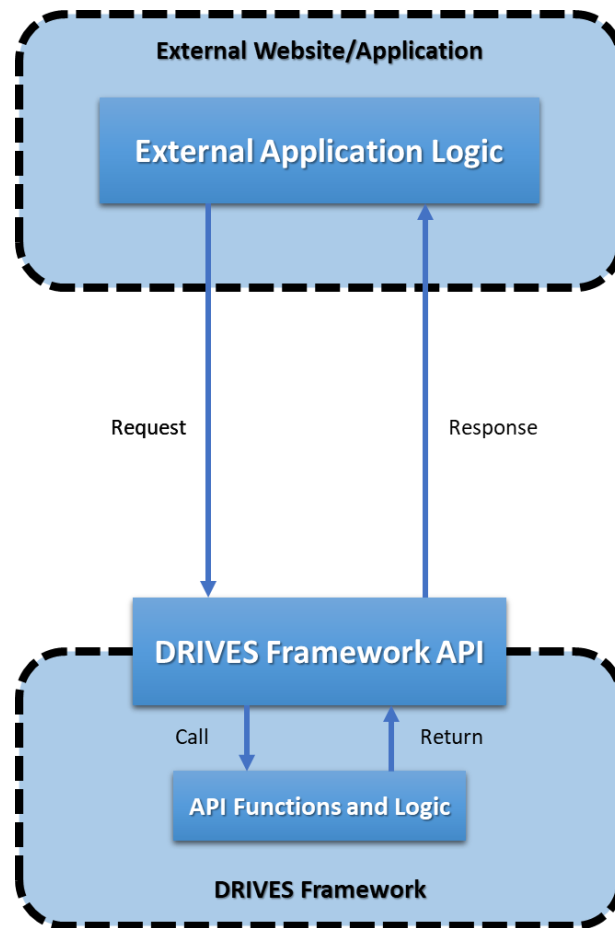
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Figure 1 Depiction of the DRIVES API Concept

1.3 TECHNICAL INFORMATION

This section provides technical information for possible alignment and implementation of the interface of the DRIVES Framework API. This document serves as a supportive material (this also means that it can be updated in the future to assure up-to-date provision of information to the potential users)

Technical documentation is available on the DRIVES Framework platform:

https://drives-compass.eu/api.html

Technical documentation is generated automatically based on the API definition file.

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1.3.1 Authentication

- **API Key** is used for the authentication – training provider can find it in the training provider profile
    - *Provider -> Profile*
    - API Key is sent in the header: "X-API-KEY"
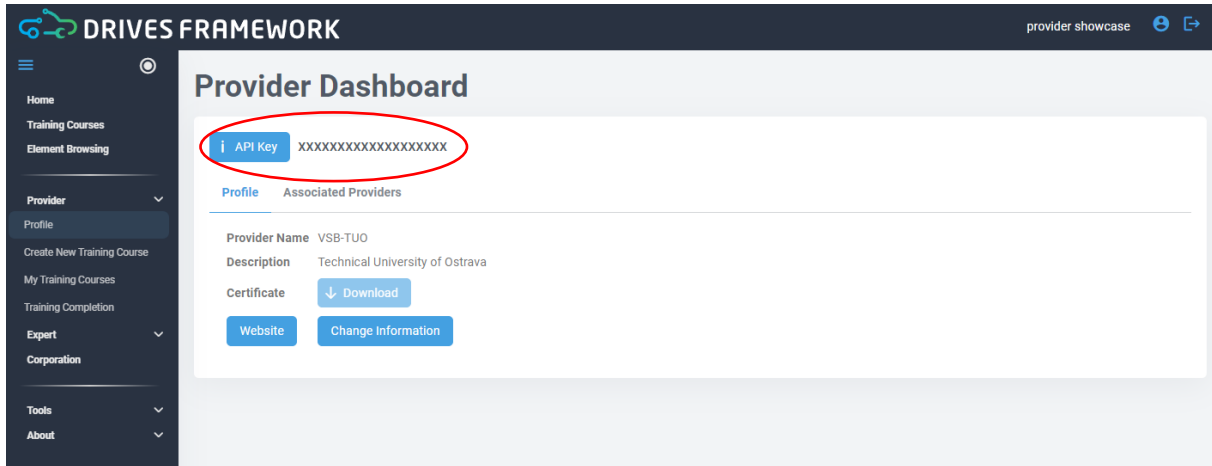   - It is also recommended to send the email address in the "email" header.

Figure 2: Provider API Key Visible in the System

1.4 FUNCTION 1: TRAINING VERIFICATION

API will enable training providers to verify completed training automatically from outside of the platform. The training provider may implement an API interface that will allow confirming the activity from their website or platform. Training verification will issue digital skills badges to successful training completion.

1.4.1 Training Verification – Request

- Method will verify the training completion and badges will be issued to the person.
- **POST** https://drives-compass.eu/o/drives-compass/v1.0/training/verification

- Request body contains (*array of emails of users to be verified; training id that they completed; and verification type*) as seen below:

```
OBJECT
{
    emails: [string]
    trainingId: string
    verificationType: enum          Allowed: ATTENDANCE | EXAM
}
```

- Each user needs to have an account in the DRIVES Framework
- Training must exist
- Training ID can be found in the training management: *Provider -> My Training Courses*
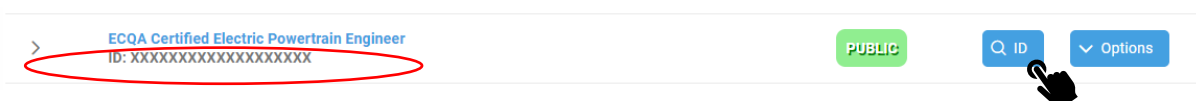

Figure 3: API Key of Individual Training Course (Training ID)

![DRIVES logo]

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1.4.2 Training Verification – Response

- Returned JSON contains an array of JSON objects – each having an email and status information.
  - email : String (user email that was posted)
  - status: enum (verification outcome – OK | NOT_FOUND | ALREADY_VERIFIED)
    - Either OK, or user not found, or the user has the training already verified
- Returned JSON also contains the trainingId : String for which the verification happened and was posted
  - If the training does not exist, this field will indicate

```
OBJECT
{
  results: [{
    email: string
    status: enum                         Allowed: OK | NOT_FOUND | ALREADY_VERIFIED
  }]
  trainingId: string
}
```

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1.5 FUNCTION 2: USER REGISTRATION

The API will enable training providers to register users to the DRIVES Framework in the case that they have not already been registered. This functionality will mainly serve in a scenario where there is a need to verify training for a specific user, but the person is not in the system. The provider will proceed with the user registration from outside and then verify the training so the user can be issued with the DRIVES Digital Badge/s.

1.5.1 User Registration – Request and Response

- Method will register clean user with specified email – depending on the specified additional fields, the user registration will be more complete – user will then receive an email and will finish the registration process.
- **POST** https://drives-compass.eu/o/drives-compass/v1.0/user/register

- Request body contains (*email; firstname; lastname; screenName*):

```
OBJECT
{
  email: string
  firstName: string
  lastName: string

}
```

- Response:

```
OBJECT
{
  email: string
  message: string
  status: enum                          Allowed: OK | ALREADY_EXISTS | ERROR
}
```

Figure 4: User Registration Request and Response

1.6 BADGE ISSUING WORKFLOW

Naturally, it is possible to combine the API functions to achieve full training verification and issuing of the badges.

The provider will specify the needed information and request the verification of the training – response will provide the information of the outcome. If the user is not registered, it is possible to follow up on the registration request and combine this logic. A newly registered user is then reminded about the fact that they have been registered in the system and that the badges are issued to them. Additional account information can be filled in after the user's login.
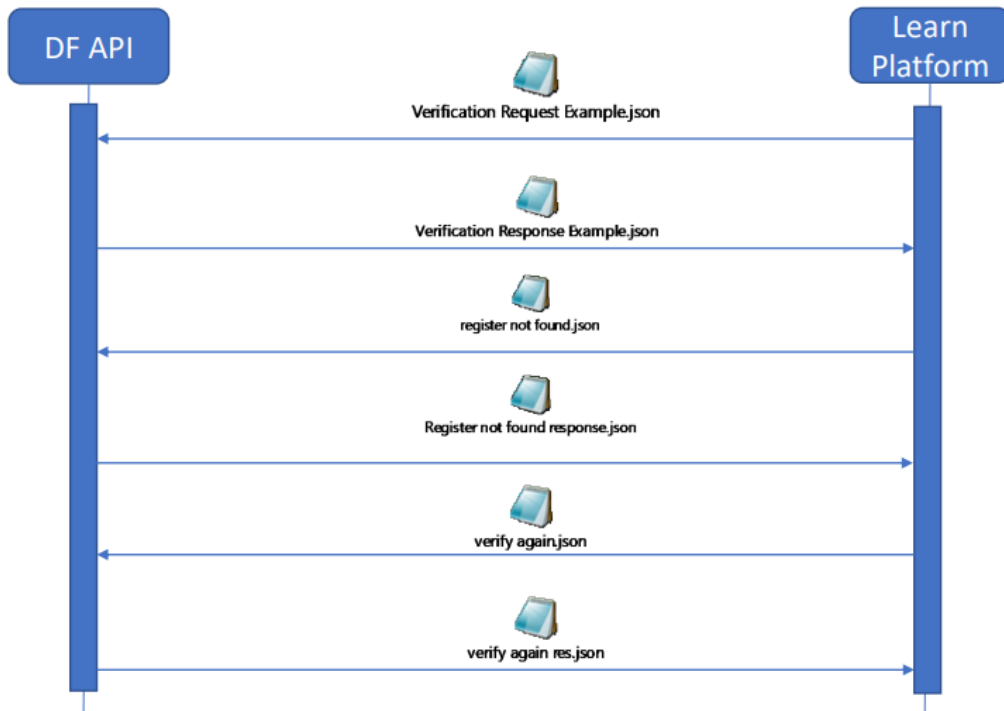
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Figure 5: Digital Skills Badge Issuing Workflow

2 PLUG-IN OF EXISTING TRAINING COURSES

This section describes the plug-in of existing training courses, which will be done by training providers registered in the DRIVES Framework. This training course plug-in will be executed either by

- **manual training plug-in,**
- **automatic training plug-in** (to be facilitated in the further versions of the API)

2.1 MANUAL TRAINING PLUG-IN

The training plug-in can be executed manually via the DRIVES Framework Online Platform utilizing designated forms through GUI (Graphical User Interface). Section 2.1.1 describes this process step by step.

2.1.1 Manual Training Plug-in Process

This section will describe the process of the manual training plug-in in a structured way.

1 **Training Provider** is registered into the DRIVES Framework Online Platform (the **system**)

    1.a **Entity** is not registered in the **system** as a **Training Provider**

    1.b **Entity** registers as a **Training Provider**

    1.c Continue with step **1**

2 **Training Provider** proceeds into the Training Provider Dashboard in the **system**

3 **Training Provider** proceeds for Training Plug-in option in the **system**

4 **Training Provider** is shown the Training Plug-in form

5 **Training Provider** proceeds to fill in Mandatory Information

    5.a **Training Provider** did not fill out all the mandatory information

    5.b Continue with step **5**

6 **Training Provider** proceeds to fill in Optional Information if needed

7 **Training Provider** proceeds to create 1 or more new Training Delivery Method

    7.a **Training Provider** did not create at least 1 Training Delivery Method

    7.b Continue with step **7**

8 **Training Provider** proceeds to map the skills/competence and knowledge elements to the training

9 **Training Provider** selects and maps 1 or more skills/competence or knowledge element

    9.a **Training Provider** did not select at least 1 skills/competence or knowledge element

    9.b Continue with step **9**

10 **Training Provider** selects DRIVES Level of Maturity for each selected skill/competence or knowledge element in step **9**

    10.a **Training Provider** did not select DRIVES Maturity Level for all the selected skills/competence or knowledge elements

    10.b Continue with step **10**

11 **Training Provider** proceeds to save the training

2.1.2 Manual Training Plug-in Showcase

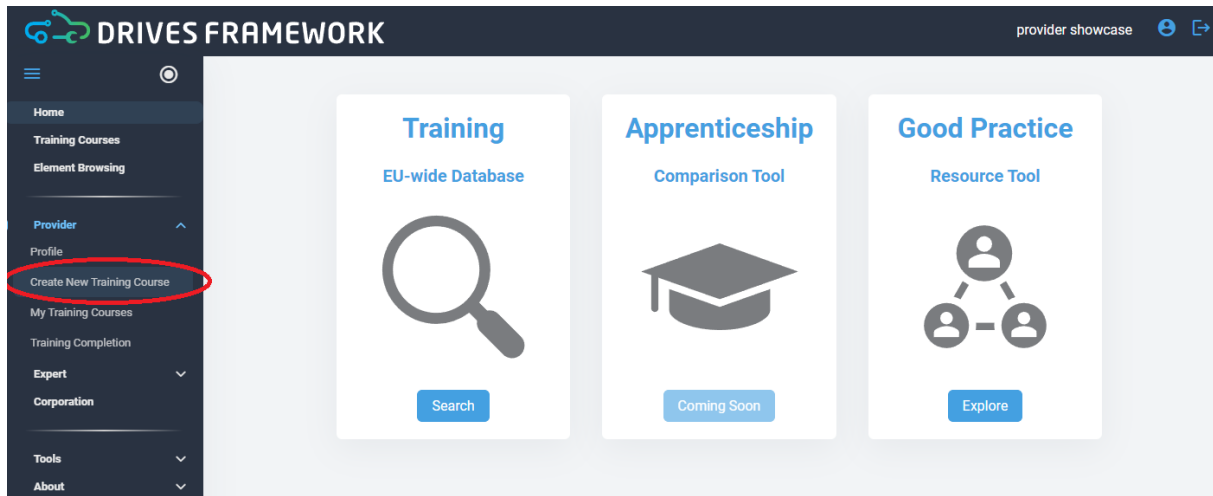This section depicts the process from section 2.1.1.

Figure 6 Main Menu Selection

Figure 7 Specification of Mandatory Training Information

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Additional Information

Weeks

`0`

Hours a week

`0`

Prerequisites

1000 characters remaining

Target group

None ▾

ECTS / ECVET

[None] [ECTS] [ECVET]

EQF

EQF Level ▾

Price

[Free] [Fee]

Organisation Area

0 ▾

Training proof

[None] [Select] [Custom]

Image

[+ Choose]

[→ Next]

Figure 8 Additional optional information

Selected training delivery methods

Type ↑↓	Country ↑↓	City	Address	Start date ↑↓	End date ↑↓	Language ↑↓	Attendants	Price(EUR) ↑↓	Remove
No records found.									

[← Back]   [→ Next]

Figure 9 Creation of Delivery Method

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Figure 10 Specify the Training Delivery Method

Figure 11 Training Delivery Method is Added to the List

Figure 12 Specify and Map Skills/competence and Knowledge of the Training

3 EXAMPLES OF TRAINING PLUG-IN

This section describes the examples of training plug-in into the DRIVES Framework:

- **Internal plug-in** – example content plug-in by the partners of the project DRIVES;
- **External plug-in** – example content plug-in by the external entities;
- **Projects** – example content plug-in by the relevant projects and consortiums.

3.1 EXAMPLES OF TRAINING PLUG-IN AND PLATFORM PILOT - INTERNAL

This section provides examples of training plug-ins from internal providers and DRIVES project partners.

3.1.1 Instituto Politécnico de Viseu

Founded on December 26th, 1979, the Polytechnic Institute of Viseu (IPV) is the district's first and only public higher education institution, thus marking a significant development milestone for the Viseu region.

Today it is an unavoidable reference in the cities of Viseu and the entire central region, assuming itself, since its birth, as a driving force of scientific, technological, cultural, and economic development, namely through its teaching and research activities, cultural, scientific, and technical diffusion, partnerships, inter-institutional protocols and collaborations with companies and other institutions.

The diversified range of training that it offers, expressed in its undergraduate, master's, postgraduate, Professional Higher Technical Courses (CTeSP) and short courses, combined with a strategy of partnerships with the business, educational, cultural, and social fabric of the region, provides its graduates with rapid insertion into working life and, simultaneously, development and progress for the region and the country.

In total, the Polytechnic Institute of Viseu offers 29 undergraduate courses, 29 masters, 13 postgraduate, 6 postgraduate, and 29 CTeSP, making a total of 106 courses.

IPV has developed the first 2-hour mini-course in English for the DRIVES Project to train additive manufacturing technicians. The additive manufacturing course is aimed at any student or worker that has undergone basic training in 3D printing and modeling and wants to learn some basic notions and techniques of additive manufacturing. This training course portrays one of the technological advances made possible by the transition from analog to digital processes. It's free of charge, has no prerequisites, and confers a grade 3 in the EQF classification. This is the link to access the training material: https://classroom.google.com/u/0/c/MzYxMzUyMDUyMzM2?cjc=yrjfjvf.

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The second 2-hour mini-course is on "Queue Theory" in Portuguese, is free of charge, and students need no prerequisites to enter. "Teoria das Filas de Espera" is a branch of applied probability and operations research. It is an essential tool that allows us to analyze and predict the behavior of a wide range of common elements in queues. This course, which confers level 3 of the EQF classification, will present the fundamentals and examples of this theory to enable students to manage time, people, and operations optimally. This is the link to access the training material:

https://classroom.google.com/u/0/c/MzYxMzUyMDUyMzM2?cjc=yrjfjvf.

In the future, we plan to develop training material for the "Anylogic" course in Portuguese, which will aim to be an introductory course to the simulation tool. This is a multifunctional tool that fits several areas within the automotive industry. It will be a free course with no prerequisites.

We plan to develop a beginner's course on "Monte Carlo Simulation", free of charge, with no prerequisites, and in Portuguese. Monte Carlo simulation is a statistical method that uses randomization of data to generate a result for problems that are a priori deterministic. It will also be a free course, with no prerequisites.

3.1.2 Graz University of Technology

Graz University of Technology (TU Graz) is a premier University of Technology in Europe, founded in 1811, and has approximately 12000 students and staff of ca. 2300. TU Graz has strong ties to the industry. TU Graz fields of expertise are:

- Advanced Materials Science
- Human & Biotechnology
- Information, Communication & Computing
- Mobility & Production
- Sustainable Systems

The Graz University of Technology has a strong relationship with the automotive industry and multiple joint research activities with Magna, AVL List GmbH, NXP Semiconductors, Infineon, etc. Therefore, TU Graz has experience in ECVET and ECTS bridging and VET and university study programs.

The TU Graz Life Long Learning institute[6] is the first place for university-level continuing education in engineering and science subjects. The design of the courses focuses on the needs of the respective target groups and developing innovative topics and formats to meet the industry requirements. Also, using up-to-the-minute teaching and learning technologies developed at TU Graz to create flexible learning settings such as:

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[6] Life long learning. Life Long Learning – TU Graz. (n.d.). Retrieved November 29, 2021, from http://lifelonglearning.tugraz.at/.

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- Part-Time Master's Programmes and University Programmes
- Courses and Seminars
- Digital Transformation programms
- Qualification Initiatives

TU Graz Life Long Learning organizes the scientific continuing education into six areas streamlined with the main TU Graz research areas (5 Fields of Expertise) supplemented by continuing education courses in the integrative, cross-sectional area of techno-economic (combining aspects of management, technology, and economics).

The automotive domain-related training provided by TU Graz Life Long Learning will be part of the DRIVES framework and offered EU-wide at the company side of the modern premises of the Graz University of Technology.

3.1.3   FH Joanneum

FH JOANNEUM is one of the leading universities of applied sciences in Austria, with over 40 bachelor and master degree programmes, some 4000 students, and 200 partner universities across the world. The six Departments – Applied Computer Sciences; Engineering; Building, Energy & Society; Health Studies; Media & Design; Management – provide excellent preparation for the world of work. The programs are practice-oriented, project-based, and interdisciplinary. In other words, FH JOANNEUM works in close cooperation with business and industry to put acquired knowledge into practice, develops innovative solutions for topical issues in applied research projects, and forges links to related disciplines.

Further, Research & Development is a core area of activity for FH JOANNEUM. As a university of applied sciences, FH JOANNEUM researches intending to contribute to social development and solve complex problems and issues of our time.

The applied research offered by FH JOANNEUM ranges from the transfer of results from basic research to innovative services and developments. This ensures a close link between research and teaching and high relevance for practical application.

FH JOANNEUM developed a preparatory MOOC introducing the job role of Advanced Powertrain Engineer in the frame of the DRIVES project. This MOOC shall provide an overview on electrification of powertrains including e-motors, inverters, batteries, and transmissions as well as their application in battery-electric, hybrid, and fuel cell vehicles. Engineers who want to broaden their expertise on advanced/alternative powertrain technology, project leaders and system architects who want to broaden their knowledge and systemic thinking, as well as students of automotive mechanical and/or

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electrical & electronic engineering who want to develop a better understanding of advanced powertrain technology, are addressed in this MOOC.

Further, FH JOANNEUM will upload a 2-days training on Effective Power Measurement of Controlled Powertrains with an introduction to electric machines, synchronous and induction motors, batteries, and inverters. The best solution for a given problem is discussed with the training participants and calculated with the help of efficiency maps. The target groups are students and/or experts with knowledge of electric motors and drivetrains.

Additionally, a training on Electric Vehicles, especially on vehicles' driving resistances and energy consumption, basics in longitudinal dynamics combined with Matlab/Octave and Simulink energy consumption simulations will be offered. The training lasts 2.5 days and targets engineering bachelor graduates, master students, and experts with experience in automotive mechatronic system development.

3.1.4   Technical University of Ostrava

The Technical University of Ostrava is connecting technical, economic, natural science, and artistic disciplines in modern study programmes for more than 170 years responding to the real problems of the present.

The Technical University of Ostrava uploaded and will upload requalification courses that are provided to the general public, domains covered are:

- Object-Oriented Programming;
- Programming of Web Applications;
- Maintenance of Windows/Linux Servers;

and more.

3.2   EXAMPLES OF TRAINING PLUG-IN AND PLATFORM PILOT - EXTERNAL

This section provides examples of training plug-in from external providers.

3.2.1   Association for Promoting Electronics Technology

APTE, the Association for Promoting Electronics Technology, has 88 members, well-known members of the electronics industry, academia, engaged in promoting electronics packaging education. APTE was founded in 2002, as a Non-Governmental Organisation, by a group of well-known specialists from the electronics industry, R&D institutions, and academia. APTE promotes electronic packaging

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education and technological transfer to offer solid support to innovative SMEs in the field of training and continuing education of human resources in electronics. In addition to science, engineering, microelectronics, organic electronics, and packaging, the training also covers the areas of business, economics, and project management, disseminating information in the field of electronics.

APTE is active in the International Symposium for Design and Technology of Electronic Packages (SIITME), TIE Students Professional Contest, numerous workshops related to electronic technology, and high school initiatives for promoting electronic technology.

Currently, APTE received the ISO 9001 and ISO 14001 certification for Quality Management System. The evaluation for certifying is proceed by TÜV (Technische Überwachung Hessen GmbH), international certification body.

To continuously contact the newest standards regarding the electronic industry worldwide, APTE became a 2014 IPC (The Institute for Interconnecting and Packaging Electronic Circuits) member. The contact to IPC allowed, receiving the needed information, to build up a professional education and training environment, strong support for creating a proper human resource, mandatory to enhance the competitiveness of the electronic industry in the European Union.

APTE offers annually a comprehensive set of short courses on electronic packaging technologies. This year's course series consists of individual modules taught by teaching staff of Electronics Telecommunication and Information Technology Faculty, "Politehnica" the University of Bucharest. The individual modules are designed to serve the needs of the electronics industry:

- IPC Standards
- Training and Certification
- Professional Development
- Traceability in electronic packaging
- Basic and advanced courses on electronic packaging, thermal management, signal integrity
- "Hands-on" courses for electronic modules assembling operators
- Basic and advanced courses in embedded systems
- Technological information, technological trends analysis
- Business plans, electronics market studies, and analysis
- Advice to understand the new EU structural funds 2020, funding schemes.

The group around APTE within the Automotive Skills Alliance, where Continental is involved as well is working on the job role, skills concepts, and training offer to be updated in the DRIVES Framework.

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3.2.2 Battery Associates

Battery Associates (B.A) is an impact-led company working towards sustainable battery innovation. Battery Associates adopt a multidisciplinary approach to solve battery challenges and offer cutting-edge solutions worldwide for the battery sector.

B.A plugged one course into the DRIVES Framework called "Battery MBA" - **BatteryMBA**, more information can be found in the brochure: C3 - BatteryMBA Flyer Sept-Dec 2021 (filesusr.com).

3.2.3 EDUCAM

EDUCAM is the knowledge and training center in the automotive sector and related sectors, such as bodywork, metal trade, and metal recovery. EDUCAM initiates and stimulates (talent) development and training among employees and organizations.

EDUCAM will synchronize the training offer and occupational profiles and skills/competencies linked within. Courses that are already present in the platform are (14 e-learning courses or tests):

- E-learning - Introduction to electricity
- E-learning - Introduction to schema reading and fault tracing
- E-learning - Emissions
- E-learning - Engine management
- E-learning - Sensors and Actuators
- E-learning - CAN-bus
- E-learning - LIN bus
- Depollution HEV ED1 - E-learning
- E-test Electro Competent
- Extension - HEV1-Reloaded - E-learning
- Extension - HEV2-Reloaded - E-testing
- Intro to composite materials - E-learning
- CNG: regulation and technology

More courses will be added and synchronized.

3.3 EXAMPLES OF TRAINING PLUG-IN AND PLATFORM PILOT – PROJECTS

This section provides examples of training plug-in from internal providers and project DRIVES partners.

3.3.1 DRIVES Project

As defined in the DRIVES goals, it is necessary to synchronize DRIVES Framework with all developed training courses and defined job roles. Thus all MOOCs and training interaction courses and job roles are present in the DRIVES Framework platform.

3.3.2 ALBATTS Project

The Alliance for Batteries Technology, Training and Skills (ALBATTS) is a European-funded project to contribute to the electrification of transport and green energy in Europe by designing a blueprint for competencies and training schemes of competencies in the future in the battery and electromobility sector.

ALBATTS will accomplish defined goals by bringing together the demand and supply side of skills related to this sector. Including enterprises developing the batteries for the electromobility value chain, European workers disrupted or were highly affected by the change brought about with transfer to electromobility, educational providers, decision-makers, and the general public.

Project ALBATTS will contribute and plug-in developed training modules and job roles. Multiple new skills/competence and knowledge are being identified already and will result in new working groups that will facilitate findings of project ALBATTS.

3.3.3 CYBERENG Project

The CYBERENG[7] project consortium identified, in cooperation with the SoQrates working group[8], job role training for cybersecurity engineers and managers in the automotive domain. The goal of the European-funded project, under ERASMUS+ funding, is the definition of training materials for skills/competence and knowledge enhancement for engineers working in cybersecurity-related engineering projects within the automotive domain.

The main objectives are an industry acknowledge skill set training for cybersecurity engineers and managers and a Europe-wide certificate. This target is ensured via the collaboration and knowledge exchange on the cyber security topics between the involved universities and companies.

The design of modern vehicles requires considering cybersecurity-related norms and regulations (such as ISO/SAE 21434 / UN Regulation No. 155 - Cybersecurity and cybersecurity management system) and implementing security-related design patterns. Therefore, the CYBERENG training includes but is not limited to:

- Develop an understanding of the need for automotive cyber security;

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[7] Cybersecurity engineer and manager. CYBERENG. Retrieved November 29, 2021, from https://www.project-cybereng.eu/.
[8] Soqrates initiative. SoQrates Initiative. Retrieved November 30, 2021, from https://soqrates.eurospi.net/.

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Erasmus+ Programme
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- Consideration of cybersecurity risks early on and at crucial development stages;

- Identification and addressing of potential threats and attack scenarios;

- Appropriate methods of attack surface reduction;

- Layered cybersecurity defenses (defense-in-depth);

- Identification of trust boundaries;

- Inclusion of security design reviews in the development process;

- Integrity and security testing methods;

- SW-level vulnerability testing strategies;

- Validation strategies of security systems at the vehicle level.

CYBERENG developed skills sets – job roles will be plugged into the DRIVES Framework as well as the developed training courses.

3.3.4   ECEPE Project

ECEPE[9] is a European-funded project to define skills/competence and knowledge training materials for electric powertrain engineers. The project is funded under the ERASMUS+ program and includes five partners from 4 countries delivering the training in 4 different languages. The training introduces the e-powertrain engineering domain, its main challenges, and the rationale behind the technologies of electric powertrains. Different concepts, such as the full-electric vehicle, plug-in hybrid, and hybrid are being described and development activities along the entire product lifecycle (including lifecycle management, development processes of embedded automotive systems, production, and disposal). The training aims to establish a basis of skills required by those companies, which are developing electric powertrain solutions of the future, and establish adequate training for future electric powertrain engineers. The target audience for this type of training is related to higher education of students participating in any automotive-related courses program. The training mechanism, the concept of work-based learning combined with online training, is taken into account, and skills definitions and training materials of the ECEPE project reflect that.

For the ECEPE training, different viewpoints on electric powertrains have been evaluated to establish tailored solutions for upskilling of engineers with different background education (lifecycle management, SW engineering, mechanical engineers, and electronic engineers).

ECEPE developed skills sets – job roles will be plugged into the DRIVES Framework as well as the developed training courses.

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[9] Electric Powertrain Engineer. Project ECEPE. Retrieved November 30, 2021, from https://www.project-ecepe.eu/.

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3.3.5 SAM Project

SAM project is a Sector Skills Strategy in Additive Manufacturing which aims to tackle the current European need for developing an effective system to identify and anticipate the right skills for the Additive Manufacturing (AM) sector demands in response to the increasing labor market needs, thus, contributing for the intelligent, sustainable and inclusive growth of the AM sector.

The consortium, composed of 16 partners of which EWF is the coordinator, is strongly committed to supporting the AM sector's growth, innovation, and competitiveness. All partners have expertise in manufacturing technology and/or in providing education, and all of them are recognized players in the field. SAM project encompasses industrial representatives from the AM sector, organizations involved in the areas of Vocational Education and Training (Vocational Education and Training (VET)) and/or Higher Education (HE), and umbrella organizations.

SAM Project will work in the Additive Manufacturing working groups and will transfer skills/competence concepts as well as job roles into the DRIVES Framework platform database. As of now, 11 job roles are present:

- Metal AM Engineer – 4 specializations: PBF-EB, PBF-LB, DED-LB, and DED-arc
- Metal AM Designer – 2 specializations: PBF and DED
- Metal AM Operator – 4 specializations: DED-LB, PBF-LB, PBF-EB, and DED-arc
- Metal AM Coordinator

Job roles are mapped with corresponding skills/competencies and knowledge.

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8	Soqrates initiative. SoQrates Initiative. Retrieved November 30, 2021, from https://soqrates.eurospi.net/.
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