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Engineering for Society



Creative Digital Teaching and Learning For Green Air Transport and Logistics AVIONIC

Sorin Eugen Zaharia

Adina Petruța Pavel

Mihai-Cristian Flămânzeanu

Teodor-Adrian Gîrniță

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Creative Digital Teaching and Learning For Green Air Transport and Logistics AVIONIC



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- III. Gîrniță, Teodor-Adrian

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Editura JUNIMEA,
Bulevardul Carol I
Parcul Copou, Iași
700 506

C.P. 85, Oficiul Poștal nr 1, Iași
e-mail: edjunimea@gmail.com
revistascriptor@gmail.com

Telefon redacție: 0232 705 837

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SECTION 01

Project Launch



National University of Science and Technology POLITEHNICA Bucharest OCTOBER 17-19, 2022



Mihnea Costoiu, the rector of National University of Science and Technology POLITEHNICA Bucharest, delivering a welcoming speech at the launch of the project



*Her Excellency, the Ambassador Simona Miculescu
Permanent Delegate of Romania to UNESCO
addressed the audience through an online message*

AVIONIC Project was coordinated by National University of Science and Technology POLITEHNICA Bucharest, with University of Strasbourg (France), Polytechnic University of Madrid (Spain) and Menzies Aviation Romania as partners.

The AVIONIC project was launched in the presence of the representatives from the Romanian Presidency, Parliament, Government, Ministry of National Education, Ministry of Environment, Ministry of Foreign Affairs, as well as representatives from partner companies collaborating with the UNESCO Chair.





Air transport digitalisation panel with the CEOs of Romanian airports, Menzies Aviation, and partners in the Avionic project

The project fostered interconnected higher education systems through close collaboration between universities and industry. Co-created content enriched study programmes, while a shared digital learning environment supported virtual and blended teaching methods.

To advance the digital and green transition in higher education, AVIONIC directly addressed the priorities of the Digital Education Action Plan 2021–2027: embedding digital technologies into teaching and learning, and building competences aligned with the digitalisation of air transport.

The AVIONIC project aimed to enhance the quality and relevance of skills for future air transport professionals through interdisciplinary and international study programmes, focusing on digitalisation, sustainability, and social responsibility.

Specific objectives:

- strengthening digital and green skills by updating curricula through collaboration between universities and industry at European level;
- promoting innovative, multidisciplinary teaching by creating a shared virtual environment for international learning;
- equipping students with digital competences, sustainable development awareness, and teamwork skills for the global aviation sector.

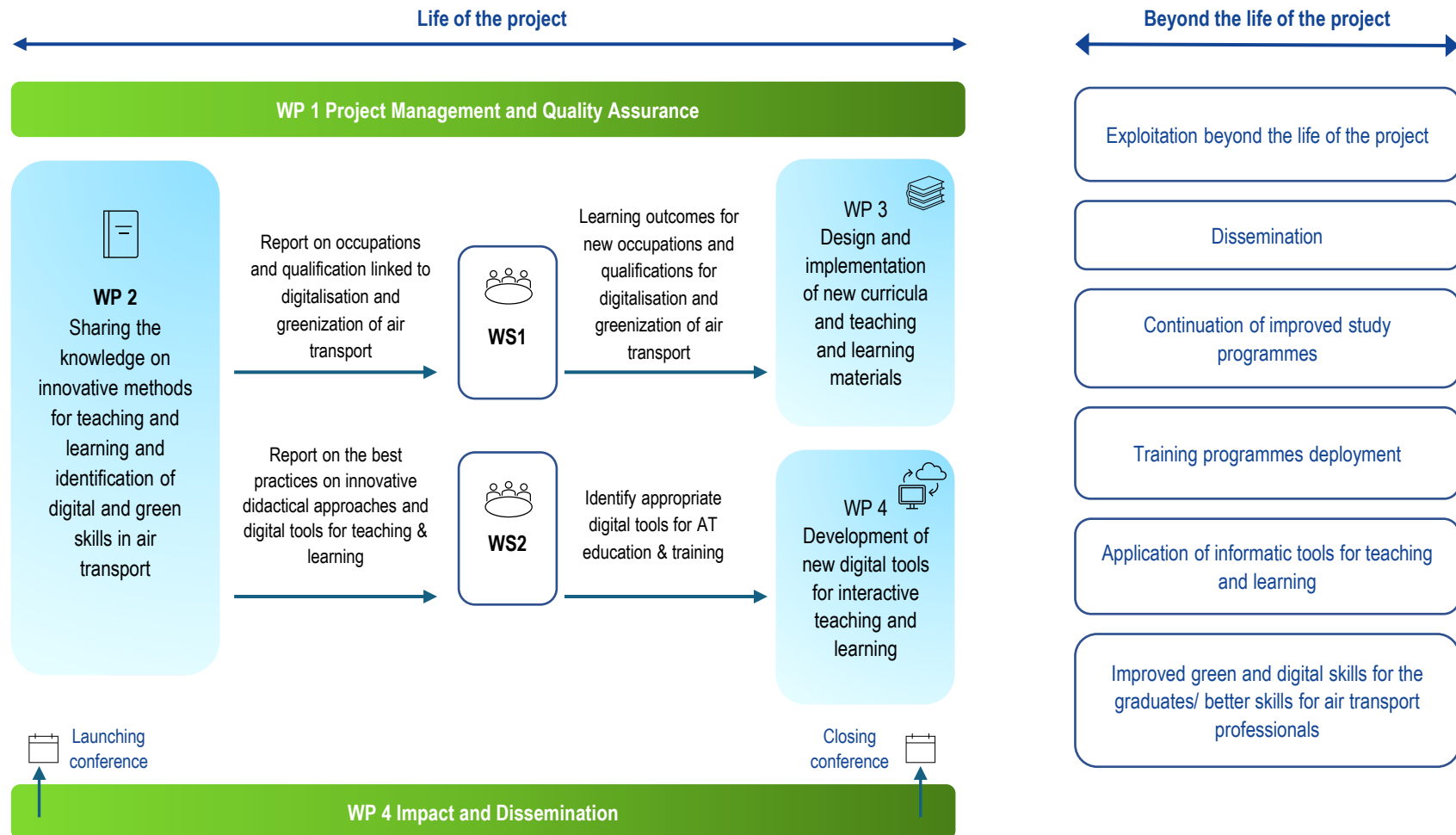


SECTION 02

Management



Overview of the Project Structure and Methodology



Steering Committee 1

OCTOBER 18, 2022

Bucharest, Romania

The agenda of the meeting covered key administrative and strategic aspects of the project, including:

- approval of quality assurance and internal evaluation methodologies;
- endorsement of the Dissemination, Exploitation, and Sustainability Plan;
- agreement on a draft of the project website;
- review of the detailed working plan for Work Package 2.

The meeting concluded with an overview of financial management and budget.



Steering Committee 2

JUNE 8-9, 2023

Strasbourg, France

The meeting agenda focused on reviewing progress and planning across key work packages, including:

- feedback on the report about innovative teaching practices and digital tools;
- status update on the report regarding air transport occupations and qualifications;
- preparations for the upcoming workshop in Madrid.

Steering Committee 3

SEPTEMBER 28, 2023

Madrid, Spain

The 3rd Steering Committee meeting focused on two key areas: modernizing course curricula and developing an interactive digital learning platform tailored to the needs of aviation education. The platform, currently under development, aimed to transform the learning experience through structured course content, learning resources, educational interactive games and video content.

Partners and experts shared examples, insights and feedback to refine both the platform and the course design. Discussions also addressed the integration of digital and green skills, strategies for effective dissemination and coordination of upcoming project milestones.

The meeting reaffirmed AVIONIC's mission to deliver engaging, forward-looking education that prepares students for the future of air transport.



Steering Committee 4

APRIL 11-12, 2024

Strasbourg, France

The steering committee confirmed key tasks across all work packages:

- the analysis of the report on occupations and qualifications generated by new technologies for the digitalisation and sustainable development of the air transport industry;
- agreement on the list of courses to be revised and the methodology for improvement;
- the establishment of dissemination activities and responsibilities;
- the preparation of the first draft outlining the main characteristics of the learning platform.



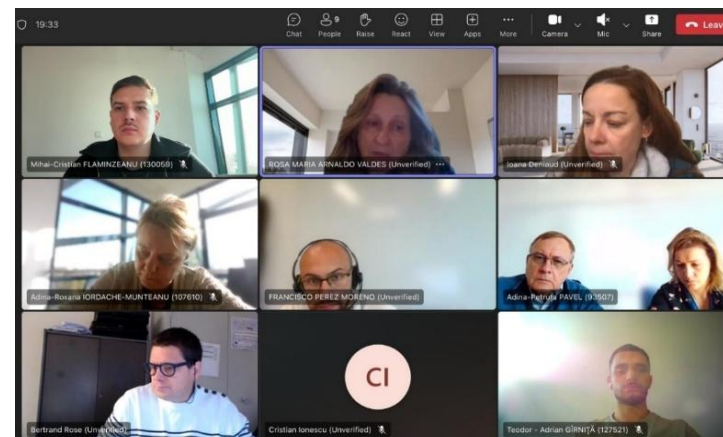
Steering Committee 5

OCTOBER 21, 2024

Online Meeting

During the online coordination meeting on Microsoft Teams, project partners:

- explored the structure and feature set of the AvionicLearn platform, detailing planned interactive applications such as interactive videos, branching scenarios, crosswords, drag-and-drop activities with images and maps, among others;
- mapped out the structure of individual course modules;
- defined key feedback mechanisms - including in-platform quizzes, surveys, and analytics dashboards - to capture learner input and support continuous improvement.



Steering Committee 6

JANUARY 22, 2025

Bucharest, Romania

During Steering Committee 6, the board:

- reviewed and refined new course content aligned with the evolving needs of the sector, as identified in the Report on occupations and qualifications developed in Work Package 2;
- focused on the development of the AvionicLearn platform as a central element of the project;
- outlined a roadmap for future implementation steps, including expansion of content libraries, integration of user feedback, and enhancement of analytics to monitor learning outcomes.



SECTION 03

Green Initiatives



In line with our commitment to sustainability, we have integrated green practices into every aspect of our project activities. We have taken concrete steps to minimize our environmental footprint and promote responsible stewardship of natural resources. For instance, we have minimized paper usage within the project and carried out green actions at each Steering Committee meeting.

We organised two tree-planting initiatives at the University of Strasbourg and a third in Bucharest, and we also tested a new smart recycling tool on campus. These actions highlight our commitment to environmental sustainability and remind us of the lasting impact such initiatives can have within academic communities.



The AVIONIC team planting trees in the Campus of University of Strasbourg in 2023



The tree planted in 2023 has shown steady growth, with vibrant foliage over the past two years

Beyond symbolic actions, our team remains actively engaged in monitoring the impact of our green initiatives. The planted trees are not only thriving but have also become a living testament to the collaborative spirit of the project.



Planting activity, Strasbourg 2024

In 2024, on the occasion of the fourth Steering Committee meeting, the AVIONIC team contributed to a greener campus by planting several shrubs in the courtyard of the University of Strasbourg.

One year after planting, our garden has blossomed beautifully, adding colour and freshness to the landscape. The healthy, diverse plants create a pleasant, welcoming, and harmonious space that enhances the area throughout every season.





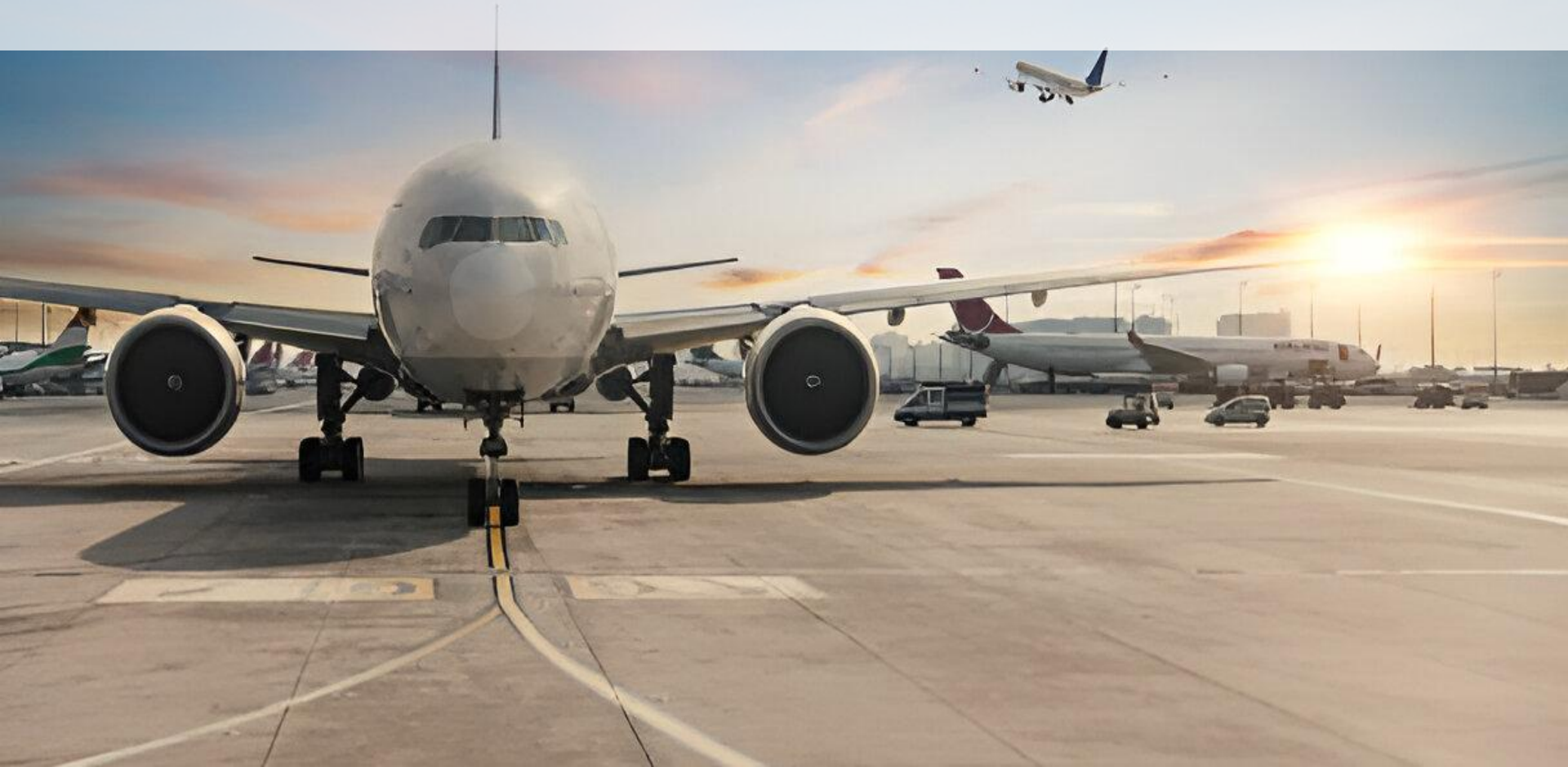
Children from the POLITEHNICA School planting trees in the UNESCO Dendrological Park within the POLITEHNICA Bucharest Campus in 2022, marking the launch of the AVIONIC project.



The Dendrological Park of POLITEHNICA Bucharest in 2025, 3 years after the planting activity.

SECTION 04

Stakeholder Consultations



Meeting with the General Directors of Romanian Airports

FEBRUARY 2, 2023

Braşov, Romania

On February 2nd, 2023, representatives of the UNESCO Chair of UPB met the general managers of Romanian airports.

At this meeting, Prof. Sorin Eugen Zaharia presented the “Creative Digital Teaching and Learning for Green Air Transport and Logistics (AVIONIC)” project, outlining the digital transformations in air transport and emphasising the importance of securing adequate qualifications for the emerging smart jobs.

During the meeting, a survey on the evolution of “smart” occupations in air transport was launched to support the project’s analysis of emerging occupational trends and the qualifications required for these new roles.



The Annual Conference and General Assembly of Romanian Airports Association

JUNE 15-16, 2023

Sovata, Romania

The meeting agenda included topics related to the development of civil aviation in Romania and collaboration with airlines to expand airport route networks. Topics related to future challenges in the air transport industry were also discussed, as well as modern technologies and systems for airports.

Additionally, Professor Sorin Eugen Zaharia delivered a presentation on the “Airport of the Future,” highlighting innovative concepts and strategic directions for transforming airport infrastructure and services to meet evolving industry demands and to prepare the next generation of professionals.



Airspace Integration Week

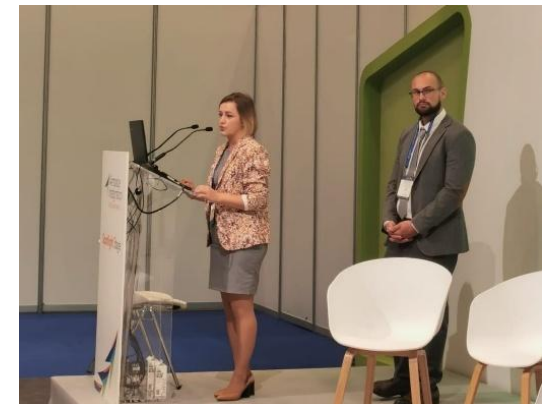
SEPTEMBER 24-29, 2023

Madrid, Spain



The AVIONIC Project team participated in the Airspace Integration Week, held in Madrid from September 24 to 29, 2023. This prestigious international event brought together leading stakeholders from civil, military, and space aviation to discuss the future of integrated and sustainable air- and space-traffic management.

As part of the program, project representatives took part in the panel discussion *MITIGATING CLIMATE CHANGE II: CO2 & OTHER INITIATIVES* and organized a workshop to present the study "Occupations and Qualifications for the Digitalisation and Greenisation of Air Transport," developed within the project.



Meeting of General Directors of Romanian Airports

FEBRUARY 8, 2024

Poiana Braşov, Romania

During the meeting of the general managers of Romanian airports, organized by the Romanian Airports Association (RAA) in Poiana Braşov, the report “Occupations and Qualifications Generated by Digitalisation and Sustainable Development in Air Transport” accomplished within the Erasmus+ Project AVIONIC was highly appreciated. The findings were welcomed by representatives from Romanian airports, ROMATSA, TAROM, Menzies Aviation, and other stakeholders in the air transport sector.



21st ACI Europe LEADERSHIP and Human Resources Forum

OCTOBER 25-27, 2024

Bologna, Italy

An engaging debate took place within the ACI Leadership and HR Forum with human resources directors from major European airports. The discussion centred on the research “Occupations and Qualifications for Digitalisation and Sustainable Development in Air Transport”. The forum provided an opportunity to exchange perspectives on future workforce needs, highlight emerging skills, and reinforce the strategic importance of aligning training with sustainability and digital transformation in aviation.



Seminar organized by “National VET TEAM” Project on Developing New Qualifications in Aeronautics

OCTOBER 29, 2024

Bucharest, Romania

Sorin Eugen Zaharia, the director of the UNESCO department “Engineering for Society” at the National University of Science and Technology POLITEHNICA Bucharest, had the honour of presenting the results of the Erasmus+ AVIONIC project at the Seminar on Developing New Qualifications in the Aeronautics Field, organized under the “National VET Team” project.

The dialogue with representatives from technical high schools, the National Center for Technical and Vocational Education and Training Development (CNDIPT), the National Agency for Community Programs in Education and Vocational Training (ANPCDEFP), and industry partners, was a key milestone for ensuring the long-term sustainability and relevance of the AVIONIC project.



24th ACI Europe LEADERSHIP and Human Resources Forum

MAY 14-16, 2025

Geneve, Switzerland

The AvionicLearn digital platform for teaching and learning was highly appreciated by representatives of European airports who gathered at the ACI Leadership and Human Resources Forum. This innovative platform provides an interactive environment designed to support both students and professionals in air transport, fostering continuous learning and skills development.



Meeting with the General Directors of Romanian Airports

MAY 22-23, 2025

Sibiu, Romania

The Annual Conference and General Assembly of the Romanian Airports Association provided the UNESCO Chair of POLITEHNICA Bucharest with an opportunity to engage in a substantive and forward-looking dialogue with airport administrators, key Romanian airline executives, and aviation equipment providers.

Professor Sorin Eugen Zaharia was honoured to present to the leading stakeholders of Romanian aviation the priorities of the UNESCO Chair for driving innovation in the airport industry, the results of the Erasmus+ AVIONIC project, and the interdisciplinary qualification pathways developed by the Chair.



SECTION 05

Project Workshops



WORKSHOP “IT Tools for Teaching and Learning in Air Transport”

JUNE 8-9, 2023

Strasbourg, France

From 8th to 9th of June 2023, the “IT Tools for Teaching and Learning in Air Transport” workshop was hosted by the University of Strasbourg. The discussions focused on IT-driven pedagogical innovations designed to modernise and internationalise air transport education.

The meeting was attended by representatives of National University of Science and Technology POLITEHNICA Bucharest, Polytechnic University of Madrid, University of Strasbourg, Menzies Aviation, Coddity Company and Istanbul Technical University. This diverse participation ensured a rich exchange of experiences, highlighting both academic and industry perspectives.



The main topics of the workshop included:

- digital learning platforms;
- e-learning content creation;
- integration of smart technologies in aviation education.

Through these sessions, participants identified key opportunities to leverage IT tools in creating modern, engaging, and future-oriented aviation education programmes.



WORKSHOP “Occupations and Qualifications for Digitalisation and Greenisation of Air Transport”

SEPTEMBER 27, 2023

Madrid, Spain

In the third day of Airspace Integration Week Madrid, the Erasmus+ AVIONIC project together with the EELISA Community “Sustainable Air Transport” organized the workshop “OCCUPATIONS AND QUALIFICATIONS FOR DIGITALISATION AND GREENISATION OF AIR TRANSPORT”.

The seminar gave the opportunity for a constructive dialogue between academics, students and employers regarding the new occupations and the corresponding qualifications of the next generations of air transport specialists.



 **Airspace
Integration**
An ATCA & World ATM Inc. Event

WORKSHOP “Learning Information Systems for Aviation”

JANUARY 21, 2025

Bucharest, Romania

On January 21st, 2025, the aviation industry gathered at ROMATSA headquarters for the "Learning Information Systems for Aviation" Workshop, organized by the National University of Science and Technology POLITEHNICA Bucharest, the UNESCO Chair "Engineering for Society" and Romanian Air Traffic Services Administration - ROMATSA R.A.

The objective of the workshop was to present the innovative learning platform AVIONIC Learn, which brings a modern approach to teaching and learning with a focus on sustainability and efficiency in the field of air transport.



This workshop focused on shaping the future, combining knowledge sharing with networking opportunities and transformative insights that empowered participants to advance greener and smarter aviation solutions

WORKSHOP “Learning Information Systems for Aviation”

JANUARY 21, 2025

Bucharest, Romania

The workshop highlighted the integration of IT tools in aviation education, showcasing innovative digital platforms, practical applications, and collaborative approaches. Participants explored future challenges, exchanged ideas between academia and industry, and identified opportunities to advance greener, smarter, and more resilient aviation training systems.



AVIONIC project presentation introducing digital transformation in aviation education



Panel discussions bringing together academia and industry experts, with hybrid participation



Interactive session engaging participants in identifying solutions for future challenges in aviation education and training



Demonstration of the AVIONIC Learn Platform, featuring digital courses, simulations, and assessment tools.

SECTION 06

International Conference Participation



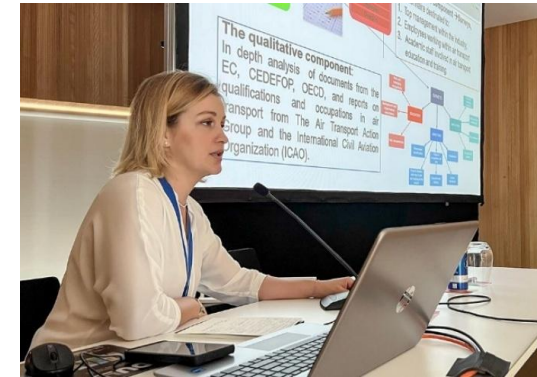
15th Annual International Conference on Education and New Learning Technologies EDULEARN23

JULY 3-5, 2023

Palma de Mallorca, Spain

Our team participated in the 15th Annual International Conference on Education and New Learning Technologies (EDULEARN23), held from July 3rd to 5th, 2023, in Palma de Mallorca, Spain. The event brought together educators, researchers, and professionals from around the world to exchange knowledge, showcase research, and discuss innovations in education and learning.

At the conference, Sorin Eugen Zaharia and Adina Pavel presented progress on identifying competences linked to sustainability and the European Green Deal. Their contribution highlighted how the air transport sector is adapting its training and education models to reduce environmental impact and support sustainable growth. The results were disseminated through the article *Green Skills for Sustainable Air Transport* (by S.E. Zaharia, A.P. Pavel, S. Toma, F. Pérez Moreno, and M. Zamarreño Suárez).



Adina Pavel at EDULEARN 2023

Francisco Pérez Moreno also presented a poster on the development of digital competences essential for the aviation professionals of the future. His work emphasised the importance of integrating digital skills and adaptability into education systems.

Through participation in EDULEARN23, the results of the AVIONIC project were shared with an international audience. The conference provided valuable opportunities to showcase progress, receive feedback, and engage in meaningful exchanges with educators from diverse countries.



Francisco Pérez Moreno, Adina Pavel and Sorin Eugen Zaharia at EDULEARN 2023

INTED2024 International Conference

MARCH 4-6, 2024

Valencia, Spain

Between the 3rd and 6th of March, we participated in the 18th International Conference on Education and New Learning Technologies (INTED 2024), organized by IATED in Valencia, Spain. The event brought together approximately 600 participants from 78 countries and featured parallel oral sessions, interactive presentations, and a dedicated poster area. Within this large-scale international forum, we presented partial results of the AVIONIC project through both an oral presentation and a poster entitled "Adapting Educational Approaches for Sustainable Air Transport" (A.P. Pavel, S.E. Zaharia, A.R. Munteanu).

Engaging discussions with representatives from universities and companies opened promising perspectives for future collaborations in master's programmes and innovative training initiatives within the UNESCO Department. INTED 2024 provided a valuable platform for knowledge exchange, networking, and for showcasing the outcomes of the AVIONIC project.



Adina Pavel at INTED2024



Poster presented at INTED2024

47th WorldSkills International Conference

SEPTEMBER 10-15, 2024

Lyon, France

WorldSkills International Conference and Forum on Vocational Excellence 2024 was a very good opportunity to disseminate the results of AVIONIC and previous Erasmus+ projects coordinated by UNESCO Chair of POLITEHNICA Bucharest.

The WorldSkills International Conference is a global event that brings together leaders in education, industry, and government to discuss the future of skills development and vocational training.



Sorin Eugen Zaharia WorldSkills

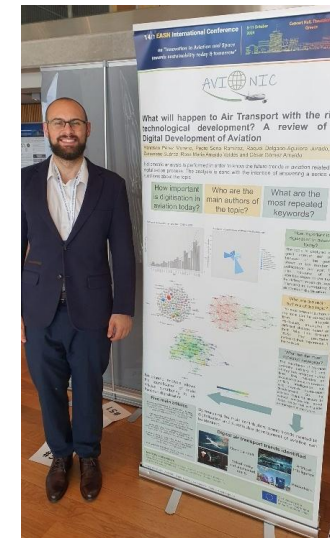
14th EASN International Conference

OCTOBER 8-11, 2024

Thessaloniki, Greece

Presentation of the poster '*What will happen to Air Transport with the rising technological development? A review of the Digital Development of Aviation*' at the 14th EASN International Conference, held in Thessaloniki, Greece, from 8–11 October 2024. The poster showcased the work carried out by UPM.

This study summarised the first stage of the project, which involved an analysis of the state of the art to identify trends in the digitalisation of air transport. Emerging technologies such as artificial intelligence, blockchain, and virtual reality are expected to transform the sector. These trends represent the core focus of the AVIONIC project, which seeks to support this evolution and ensure that future professionals are better prepared.

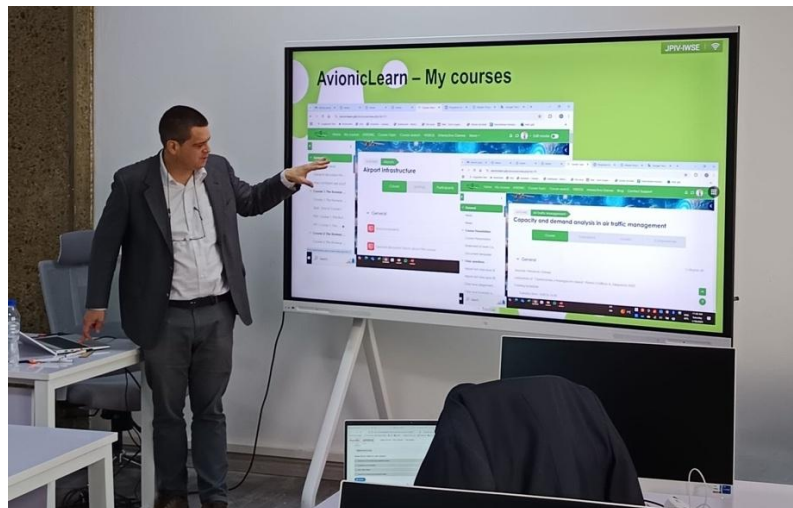


Francisco Pérez Moreno at EASN

From Innovation to Impact: AVIONIC Project Outcomes Shared in East Africa

APRIL 28-30, 2025

Addis Abeba, Ethiopia



Professor Bertrand Rose

The project highlights the power of international collaboration in bridging innovation and capacity-building across borders.

Professor Bertrand Rose from Strasbourg University presented at the Ministry of Innovation and Technology's training centre in Addis Ababa, the Erasmus+ AVIONIC project.

He introduced the AvionicLearn platform, a Moodle-based tool developed to support education in digital twins and predictive maintenance. The platform was extensively used, and the various courses and embedded activities were widely promoted.

This knowledge exchange demonstrated how the outcomes of the AVIONIC project are not only advancing research and education in Europe but also contributing to the professional development of academic communities in Africa.



SECTION 07

Results



AvionicLearn Platform

The AvionicLearn Platform combines advanced digital tools with aviation academic content, creating an ecosystem where research, innovation, and practical knowledge come together to enhance the learning experience.

It is a specialised e-learning platform for aviation students and industry professionals, offering a dynamic mix of courses, interactive applications (such as games and quizzes), curated bibliographies, and engaging videos. By focusing on interactive and digital learning, AvionicLearn transforms complex aviation topics into accessible and engaging content, strengthening both theoretical knowledge and practical skills.

















AvionicLearn Platform - www.avionic.upb.ro/

With its modern and flexible approach, the platform equips learners with the expertise needed to succeed in today's evolving aviation industry.

AvionicLearn Courses

AvionicLearn offers 16 specialised aviation courses designed to meet the evolving needs of students and industry professionals. From airport infrastructure and cargo handling to human factors, digitalisation, and environmental sustainability, each course combines theory with practical applications, using case studies, interactive tools, and digital simulations. These courses reflect industry best practices and bring forward the latest research insights, ensuring learners gain skills that are directly relevant to the future of air transport.

	DE/ANTI-ICING Handling
	Ergonomics and Safety Aviation Safety and Security
	Human factors and air transport system safety Air Traffic Management
	Human Factors and automation in ATM Air Traffic Management
	Introduction to Cargo Handling
	Project Risk Management Project Management
	Safety management Air Traffic Management

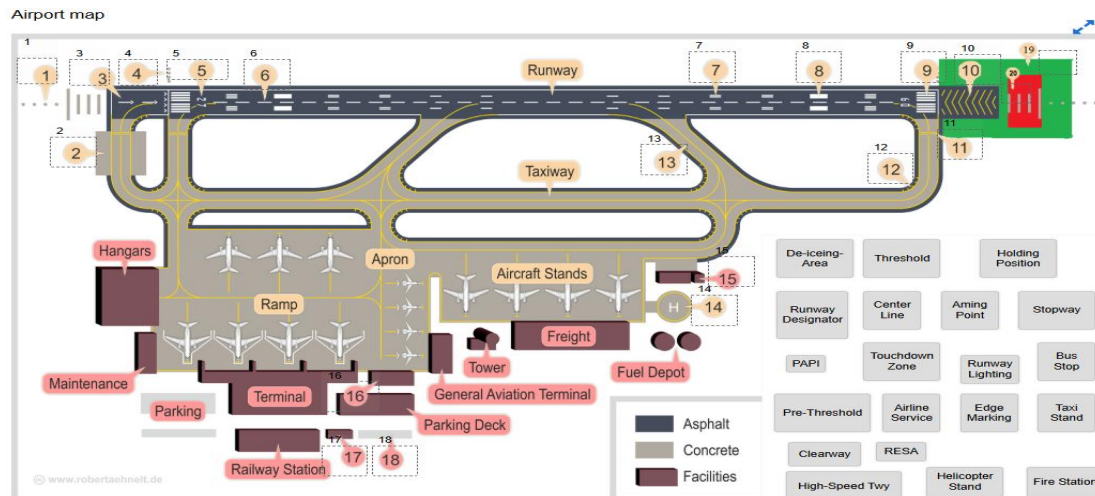
	Air Transport Operations (ATO) General Air Transport
	Airport Infrastructure Airports
	ATM Concepts Evolution Air Traffic Management
	Aviation 4.0 Digitalization
	Aviation and Environment Aviation & Environment
	Capacity and demand analysis in air traffic management Air Traffic Management
	Data Analysis and Statistics Aviation Economics

Courses available of AvionicLearn Platform - www.avionic.upb.ro/

AvionicLearn Interactive Games

The Interactive Games/Apps section offers an engaging learning experience through digital tools that transform traditional education into dynamic, hands-on activities. Explore interactive videos, branching scenarios, and image hotspots that reveal detailed information about airport organisational charts. Drag-and-drop games on airport infrastructure and aviation-themed crosswords further illustrate complex concepts in an accessible, playful manner.

This digital environment is designed to boost critical thinking and practical application of aviation knowledge, providing a collaborative and innovative approach to learning. Whether reinforcing theory or sparking curiosity, this section helps students and professionals master the intricacies of the aviation industry in an enjoyable, interactive format.



AvionicLearn Interactive Games



Students explore a wide range of scenarios - from peak-hour taxi routing to runway incursion drills - while practising decision-making and procedural execution.

The simulator's analysis and debriefing tools provide valuable insights for enhancing operational efficiency. In this way, it helps bridge theoretical knowledge with practical skills in a modern, accessible format.

Footage and visuals from this simulator are integrated into the instructional materials of our digital applications, supporting interactive and applied learning.

An advanced 3D tower simulator is used for educational purposes, offering a versatile virtual environment to model and analyse airport scenarios. It illustrates key concepts such as ground operations, runway sequencing, emergency response, and traffic-flow optimisation.



Reports

The Report on *Best Practices in Innovative Didactical Approaches and Digital Tools for Teaching and Learning* examines modern methods and technologies that are reshaping aviation education. Its purpose is to showcase effective IT tools that enhance student engagement, strengthen knowledge retention, and foster practical skills.

Through the analysis of case studies, digital tools, and pedagogical innovations from leading institutions and training programmes, the report provides valuable recommendations for educators and course developers. It is designed to inspire the adoption of learner-centred approaches that respond to the evolving needs of the aviation industry in the digital era.



Creative Digital Teaching and Learning
For Green Air Transport and Logistics



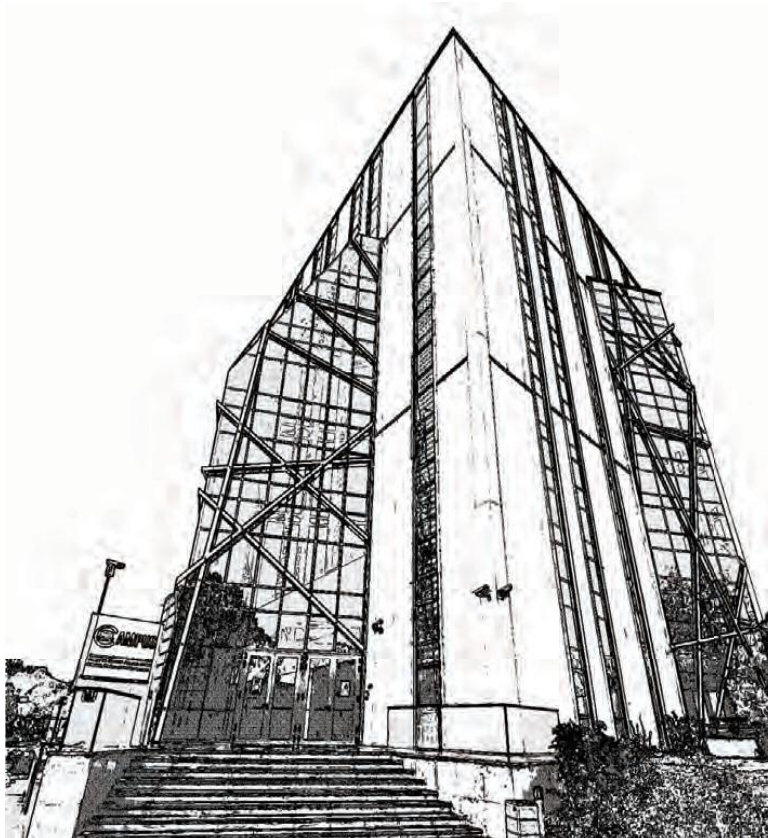
Sorin Eugen Zaharia, Adina Petruta Pavel,
Adina-Roxana Munteanu, Steliana Toma

Occupations and Qualifications
Generated by New Technologies
for the Digitalization and
Sustainable Development of the
Air Transport Industry



The Report on *Occupations and Qualifications Generated by New Technologies for the Digitalisation and Sustainable Development of the Air Transport Industry* analyses how emerging technologies are reshaping the aviation skills landscape. It highlights new and evolving roles driven by digital transformation, automation, and the sector's transition towards environmental sustainability.

The report outlines the qualifications and competencies needed to address these changes, providing guidance for curriculum design, workforce planning, and policy development. Its purpose is to help educators, industry leaders, and training providers anticipate future skill demands and ensure that aviation professionals are prepared to succeed in a technologically advanced and environmentally conscious air transport ecosystem.



Contact

Website: www.avionic.upb.ro
www.unesco.chair.upb.ro

Email: unesco.office@upb.ro

Phone: +4 021 402 9096
+4 021 402 9097

LinkedIn: www.linkedin.com/in/avionic-project-985644254/

Facebook: www.facebook.com/avionic.project/



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