

# ERASMUS+ ARIS - AI SKILLS FOR ICT PROFESSIONALS

Objetivos, actividades y resultados



Co-funded by the  
Erasmus+ Programme  
of the European Union

# OBJETIVOS DEL PROYECTO

Diseñar un curso actualizado en IA incluyendo tecnología y aplicaciones prácticas, Para dotar de iniciativa a los profesionales TIC y emprendedores & actualizar los conocimientos y capacidades en los puestos de trabajo.

Incorporar métodos de formación modernos y recursos abiertos innovadores, permitiéndole que los estudiantes adquieran las habilidades y se auto-evalúen en tecnología de la IA. Permitir que los formadores de Formación profesional lo integren en su oferta.

Facilitar la integración de las habilidades de IA en los esquemas de certificación de la UE.



Co-funded by the  
Erasmus+ Programme  
of the European Union

# GRUPOS OBJETIVO

## Profesionales TIC

- Estudiantes TIC
- Proveedores de Formacion Profesional
- Agentes sectoriales
- Políticos
- Otros estudiantes europeos



# DETALLES DEL PROYECTO

<b>Acrónimo:</b>	<b>ARIS</b>
<b>Nombre:</b>	Artificial Intelligence Skills For ICT Professionals
<b>Código:</b>	2019-1-BE01-KA202-050425
<b>Inicio:</b>	01-09-2019
<b>Finalización:</b>	28-02-2022
<b>Presupuesto:</b>	€374,710.00



# SOCIOS DEL PROYECTO



- **BUSINESS TRAINING SA** - Lead partner (Belgium)

- [www.businesstraining.be](http://www.businesstraining.be)



- **Lietuvos kompiuterininkų sąjunga** - Dissemination Leader (Lithuania)

- [www.liks.lt](http://www.liks.lt)



- **UNIVERSITAT POLITÈCNICA DE CATALUNYA** (Spain)

- [www.upc.edu](http://www.upc.edu)



- **CONSIGLIO NAZIONALE DELLE RICERCHE** (Italy)

- [www.cnr.it](http://www.cnr.it)



- **EXELIA E.E.** (Greece)

- [www.exelia.gr](http://www.exelia.gr)



Co-funded by the  
Erasmus+ Programme  
of the European Union

# RESULTADOS PRINCIPALES

- Material didáctico para la formación en diferentes tecnologías de IA & aplicaciones prácticas para profesionales TIC
- Unidades de aprendizaje (estructura curricular), manual del profesor y guía para la integración en Formación Profesional
- Recursos Educativos abiertos de tecnología y aplicaciones de IA.
- Curso online abierto & contenidos de tecnología y aplicaciones de IA.
- Certificado Suplementario de habilidades de IA para su integración en esquemas de certificación
- Carta de apoyo para fortalecer y promover la incorporación de habilidades de IA en el marco de e-Competencias Europeo.
- 5 infodays nacionales (uno por socio) para promover el proyecto.



# 1 SEMESTRE: RESULTADOS Y ACTIVIDADES

- Primera reunión en Bruselas
- Plan de Calidad
- Plan de difusión y explotación
- Web y logo del proyecto
- Cuentas en Redes Sociales (Facebook, LinkedIn, Twitter, Youtube)
- Material imprimible (poster y folletos)
- Encuesta de habilidades AI
- Report de habilidades de aprendizaje

Start date: 01-09-2019

End date : 29-02-2020



Co-funded by the  
Erasmus+ Programme  
of the European Union



# PRIMERA REUNIÓN EN BRUSELAS

- La primera reunión del proyecto tuvo lugar el 25 de septiembre de 2019 en la sede de Business Training, en Bruselas, Bélgica. La reunión supuso el inicio oficial del proyecto ARIS. Durante la reunión, los miembros del consorcio definieron los hitos, objetivos y discutieron el plan de trabajo del primer semestre. También presentaron sus organizaciones.







# ENCUESTA DE REQUISITOS DE HABILIDADES DE IA

- La encuesta en línea estuvo activa desde 01/10/2019 hasta 31/12/2019.
- 194 personas con experiencia en tecnología IA e innovación cumplieron el cuestionario.

Country	Obtained number	%
Austria	1	0,52
Belgium	33	17,01
Denmark	1	0,52
Germany	1	0,52
Greece	21	10,82
Italy	51	26,29
Lithuania	38	19,59
Portugal	1	0,52
Slovak Republic	1	0,52
Spain	45	23,20
United Kingdom	1	0,52
<b>TOTAL</b>	<b>194</b>	<b>100</b>





# ENCUESTA DE REQUISITOS DE HABILIDADES DE IA (2)

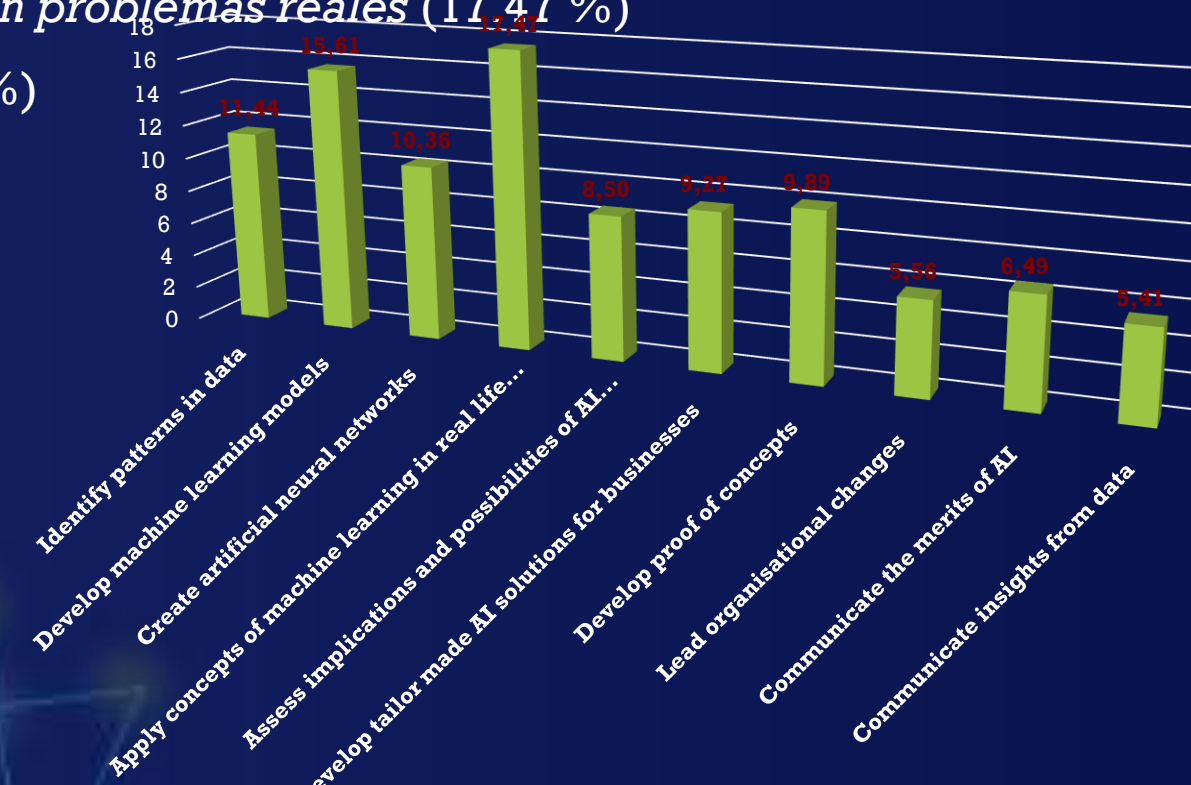
- Los 5 campos más necesarios para trabajar en Inteligencia Artificial y servicios relacionados, en orden decreciente son:
  - *Algoritmos de Aprendizaje Automático (supervised, unsupervised, semi-supervised, reinforcement learning)* (18.91 %),
  - *Lenguajes de programación para la IA (e.g. Python, Java, LISP, C++, Prolog)* (18 %),
  - **Minería de Datos** (15.73 %),
  - **Probabilidad y Estadística** (15.58 %),
  - *Implicaciones éticas, legales y sociales de la IA* (10 %)





# ENCUESTA DE REQUISITOS DE HABILIDADES DE IA (3)

- Las 4 habilidades más importantes para trabajar en el área de la IA, de acuerdo con los participantes y en orden decreciente son:
  - *Aplicar conceptos de aprendizaje automático en problemas reales* (17.47 %)
  - **Desarrollar modelos de Apr. Autom.** (15.61 %)
  - Identifica patrones en datos (11.41 %)
  - **Crear redes neuronales** (10.36 %)





# INFORME DE PRODUCTOS DE APRENDIZAJE

- El primer conjunto de actividades (Intellectual Output) contiene definiciones de especificaciones de los productos de aprendizaje del curriculum del curso ARIS
- La definición de los recursos de aprendizaje se basa en el marco de calificaciones europeo (EQF).
- El proyecto ARIS pretende fortalecer las competencias fundamentales de los profesionales TIC (habilidades de comunicación, emprendeduría digital), en vez de enfocarse en las habilidades técnicas asociadas a la tecnología de la IA.
- Para ello, el curriculum ARIS se dividirá en 4 módulos, según el análisis de requisitos:
  - **Module 1:** Fundamentos de la Inteligencia Artificial,
  - **Module 2:** Aprendizaje Automático,
  - **Module 3:** *Redes Neuronales y aprendizaje profundo,*
  - **Module 4:** *IA para problemas reales.*



# MODULO 1 : FUNDAMENTOS DE IA

EQF Level 4.

**Defines the essential AI characteristics. Addresses the fundamental features of AI applications**

Knowledge	Skills	Competence
<p><b>Knows / Aware of:</b></p> <ul style="list-style-type: none"> <li>- Definitions of Artificial Intelligence</li> <li>- Main topics and areas of Artificial Intelligence</li> <li>- Methods for problem solving using search algorithms</li> <li>- Methods for knowledge representation using logic and probabilistic formalisms</li> <li>- Methods for Machine Learning</li> <li>- Natural Language Processing</li> <li>- Ethical implications of AI</li> </ul>	<p><b>Able to:</b></p> <ul style="list-style-type: none"> <li>- Explain the scope of AI differentiating applications from methods and techniques</li> <li>- Identify a potential application of AI and critically chose the AI sub-field that may be applied</li> <li>- Provide examples of problems that must be addressed with deterministic or probabilistic AI methods</li> <li>- Differentiate the knowledge representation, learning and reasoning components in a given AI system.</li> <li>- Recognize an AI component in a given system</li> <li>- Provide examples of each AI sub-field</li> <li>- Examine a suitable real-world problem and abstract its elements to suit one of the AI paradigms</li> <li>- Explain the ethical implications of an AI deployment and anticipate the ethical dilemmas that may have to be addressed.</li> </ul>	<p><b>Able to:</b></p> <ul style="list-style-type: none"> <li>- Give an account of the main methods used in AI solutions and the main areas where AI has been successful</li> <li>- Autonomously explain the benefits and risks of AI solutions in terms of performance, accuracy</li> </ul>



Co-funded by the  
Erasmus+ Programme  
of the European Union

# MODULO 2 : APRENDIZAJE AUTOMÁTICO

EQF Level 4.

Defines the foundations for Machine Learning. Teaches how to select the right ML model and to implement it in a given domain

Knowledge	Skills	Competence
<p>Knows / Aware of:</p> <ul style="list-style-type: none"> <li>- Typology of Machine learning problems (supervised vs unsupervised, classification vs regression)</li> <li>- Theoretical principles of Machine Learning</li> <li>- Data transformation and visualization</li> <li>- Principles and methods of linear ML for classification and regression problems</li> <li>- Principles and methods of nonlinear ML for classification and regression problems</li> <li>- Principles and methods of unsupervised ML</li> <li>- Evaluation of Machine Learning models</li> <li>- Languages and resources for ML</li> </ul>	<p>Able to:</p> <ul style="list-style-type: none"> <li>- Provide examples of the different ML types of problems</li> <li>- Identify the ML component in a software system</li> <li>- Examine a given problem, identify the component that may be formalize as a ML task and recognize the appropriate typology that is more suitable</li> <li>- Critically identify the strengths and weaknesses of a ML solution vs a hard-wired solution, the potential benefits and challenges in different types of scenarios</li> <li>- Communicate the potential of ML methods critically telling advantages and disadvantages with respect more traditional approaches</li> <li>- For a given problem, formalize requirements of a ML solution, collect the set of methods that may be applied and critically design a plan to test and evaluate the different alternatives</li> <li>- Identify languages and other resources for specific ML applications</li> <li>- Recognize the relevant data by choosing the right visualizations and the right transformation from raw noisy data.</li> <li>- Design a plan for testing a ML solution, evaluate its performance and validate its accuracy.</li> </ul>	<p>Able to:</p> <ul style="list-style-type: none"> <li>- Evaluate the feasibility of implementing a suitable ML algorithm in a novel domain</li> <li>- Provide expertise on a detailed plan to gather the right data, develop the right algorithm taking advantage of existing resources and conducting a suitable validation.</li> </ul>



Co-funded by the  
Erasmus+ Programme  
of the European Union

# MODULO 3: REDES NEURONALES Y APRENDIZAJE PROFUNDO

EQF Level 4.

Defines the foundations for Neural Network (NN) and Deep Learning (DL).  
Teaches how to implement solutions using NN and DL algorithms in a given domain.

Knowledge	Skills	Competence
<p><b>Knows / Aware of:</b></p> <ul style="list-style-type: none"> <li>- <b>Principles of neural networks</b></li> <li>- <b>Perceptrons and Multi-Layer Perceptrons</b></li> <li>- <b>Convolutional Neural Networks</b></li> <li>- <b>Recurrent Neural Networks</b></li> <li>- <b>Optimization algorithms for learning in neural networks</b></li> <li>- <b>Deep learning architectures for image processing</b></li> <li>- <b>Deep learning architectures for natural language processing</b></li> <li>- <b>Languages and resources for NN and DL.</b></li> </ul>	<p><b>Able to:</b></p> <ul style="list-style-type: none"> <li>- Understand the neural metaphor of NNs and differentiate it from the mathematical abstraction.</li> <li>- Explain and communicate different types of NN and identify typical domains where each type is more suitable</li> <li>- Recognize the analogy between learning in the neural metaphor and optimizing a cost function in the mathematical abstraction.</li> <li>- Provide examples of the different types of problems that can be addressed with NN explaining potential benefits and challenges.</li> <li>- Identify the NN or DN component in a software system</li> <li>- Examine a given problem and identify the appropriate typology of NN that is more suitable for it.</li> <li>- For a given problem, formalize requirements of a NN or DN solution, collect the set of methods that may be applied and critically design a plan to test and evaluate the different alternatives</li> <li>- Identify languages and other resources for specific NN and DN applications</li> <li>- Design a plan for testing a NN or DN solution, evaluate its performance and validate its accuracy.</li> </ul>	<p><b>Able to:</b></p> <ul style="list-style-type: none"> <li>- <b>Evaluate the feasibility of implementing a suitable NN architecture and DN algorithm in a novel domain</b></li> <li>- <b>Provide expertise on a detailed plan to gather the right data, develop the right algorithm taking advantage of existing resources and conducting a suitable validation.</b></li> </ul>



Co-funded by the  
Erasmus+ Programme  
of the European Union

# MODULO 4: IA PARA RESOLVER PROBLEMAS REALES

EQF Level 4.

Provides the expertise of the hole software development cycle of an AI solution.		
Knowledge	Skills	Competence
<p>Knows / Aware of:</p> <ul style="list-style-type: none"> <li>- Application of AI for object classification in images</li> <li>- Application of AI for image segmentation</li> <li>- Application of AI for gesture recognition</li> <li>- Application of AI for classification in natural language processing</li> </ul>	<p>Able to:</p> <ul style="list-style-type: none"> <li>- provide detailed examples of successful AI industrial applications</li> <li>- explain and communicate the design and development of use cases and proofs of concept at their different phases to potential users and stakeholders</li> <li>- explain, communicate and anticipate advantages and disadvantages of AI vs non-AI solutions</li> <li>- Critically select existing languages and resources for scenarios where AI has already been proved successful.</li> </ul>	<p>Able to:</p> <ul style="list-style-type: none"> <li>- Analyse strengths, weakness, opportunities and threats of AI solutions for specific industry, mainly on those domains where the technology has already been tested and resources can be reused.</li> <li>- Provide expertise of the hole software development cycle of an AI solution including design, development and validation</li> <li>- Monitor the intervention of AI technology in business models</li> </ul>



Co-funded by the  
Erasmus+ Programme  
of the European Union



# MATERIAL

Para saber más sobre ARIS o para difundir el proyecto, puedes obtener posters y folletos en @ <http://www.aris-project.eu/category/results-outputs/>



**ARIS PROJECT**  
AI SKILLS FOR ICT PROFESSIONALS

**ARIS aims:**

1. to design a comprehensive and up-to-date training course in AI technologies and practical applications,
2. to introduce modern training delivery methods and innovative open-access pedagogical resources,
3. to facilitate the integration of AI skills requirements into the EU certification and standardization schemes.

**ARIS's main objective:**

to form a Strategic Partnership to strengthen the key digital competences in VET provision for ICT professionals by offering an up-to-date curriculum and Open Educational Resources (OERs) in AI to address the existing occupational skills needs and mismatches.

**ARIS target groups:**

- ✓ ICT professionals in need of CVET
- ✓ Students in need of IVET
- ✓ VET providers and employers
- ✓ Sectoral stakeholders
- ✓ Policy-makers
- ✓ Other European learners

**ARIS main results:**

- ✓ Learning outcomes for training provision in the different AI technologies & practical applications for ICT professionals
- ✓ Learning units (curriculum structure), trainers' toolkit, and VET integration guidelines.
- ✓ Open Educational Resources for AI technologies and applications.
- ✓ ARIS Vocational Open Online Course infrastructures & content on AI technology applications for ICT professionalism.

**Start date:** 01-09-2019  
**End date:** 28-02-2022  
**Project Reference:** 2019-1-BE01-KA202-050425

**ARIS project partners:**

Business Training, Consiglio Nazionale delle Ricerche, EXELIA, LIKS, UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

The ARIS project is being co-funded by the Erasmus+ Programme of the European Union

Visit us for the latest news, content and online resources:  
[aris-project.eu](http://aris-project.eu)  
[linkedin.com/company/aris-ai-project](https://www.linkedin.com/company/aris-ai-project)  
[twitter.com/aris\\_ai\\_project](https://twitter.com/aris_ai_project)  
[facebook.com/arisaiproject](https://www.facebook.com/arisaiproject)



**Project partners:**

BUSINESS TRAINING SA  
Lead partner (Belgium)  
[www.business-training.be](http://www.business-training.be)

Business Training

Lietuvos kompiuterinių sąjunga (Lithuania)  
[www.liks.lt](http://www.liks.lt)

LIKS LIETUVOS KOMPIUTERINIŲ SĄJUNGA

UNIVERSITAT POLITÈCNICA DE CATALUNYA (Spain)  
[www.upc.edu](http://www.upc.edu)

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

CONSIGLIO NAZIONALE DELLE RICERCHE (Italy)  
[www.cnr.it](http://www.cnr.it)

Consiglio Nazionale delle Ricerche

EXELIA E.E. (France)  
[www.exelia.fr](http://www.exelia.fr)

EXELIA

The ARIS project is being co-funded by the Erasmus+ Programme of the European Union

Co-funded by the Erasmus+ Programme of the European Union

Visit our project website for the latest news, content and online resources:  
[www.aris-project.eu](http://www.aris-project.eu)



Co-funded by the Erasmus+ Programme of the European Union

# CONTACTANOS

- Persona de Contacto: Thierry Holoffe
- Email: [info@aris-project.eu](mailto:info@aris-project.eu), [info@businessstraining.be](mailto:info@businessstraining.be)

- Mas información:



- [aris-project.eu](http://aris-project.eu)



- [linkedin.com/company/aris-ai-project](https://www.linkedin.com/company/aris-ai-project)



- [twitter.com/aris\\_ai\\_project](https://twitter.com/aris_ai_project)



- [facebook.com/aris.ai.project](https://www.facebook.com/aris.ai.project)



- [youtube.com/channel/UCc71qoPHLZGtCmU7gg61iUg](https://www.youtube.com/channel/UCc71qoPHLZGtCmU7gg61iUg)

