



Smart Bridges: Connecting Skills, Business & Europe's Future in the AI Era

RCF Annual Regional Conference, Budva, Montenegro, 09. 10. 20205



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AI4VET4AI Project Overview

AI4VET4AI Challenge: addresses the need for trained workers in the field of AI

AI4VET4AI Objective: support the growth of an AI-skilled workforce in Europe, with a special emphasis on VET teachers and learners.

- Add new innovative teaching content and methods to VET curricula
- 11 European countries and 18 EU NUTS2 regions
- 4 years (June 2023 – June 2027)
- Total grant of 3.946.880,00 €.



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Project Partners

Croatia

Algebra University College
Technical School Čakovec
Croatian Artificial Intelligence Association
Poslovna inteligencija

Slovenia

Faculty of Information Studies in Novo mesto
School Centre Celje
Rudolfovo
Arctur

Serbia

Belgrade Metropolitan University
Association for Women's Potential Affirmation and Networking

Austria

Management Center Innsbruck International Hochschule GmbH
Network Development Hub GmbH

Germany

Technische Informationsbibliothek
Strategische Partnerschaft Sensorik

Greece

AKMI Anonimi Ekpaideftiki Etairia
Rezos Brands

Italy

Universita Degli Studi di Napoli Federico II
Keylon

Spain

Inercia Digital
Camera Commercio Italiana per la Spagna

Netherlands

Universiteit van Amsterdam
AlterContacts

Turkey

S.K.T.A.I.H.L
Southeast Anatolian Exporters' Association

Ireland

Griffith College
Anser



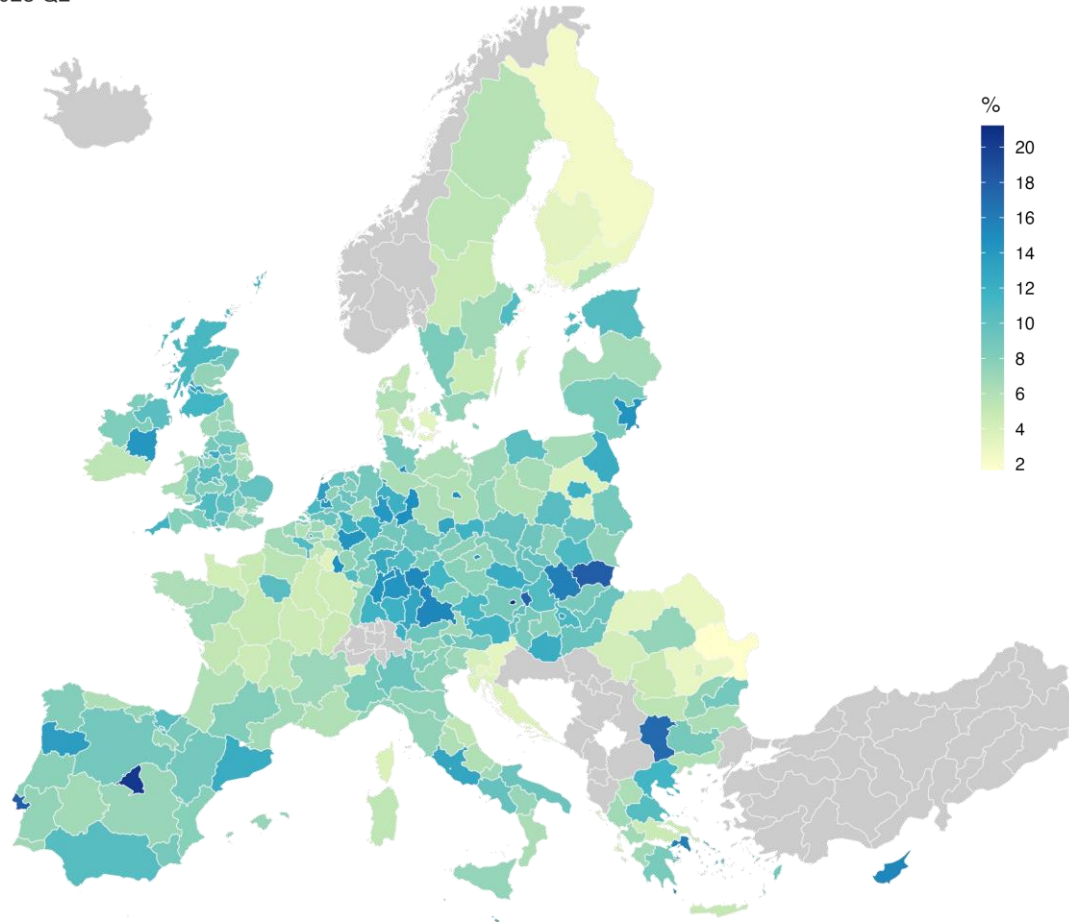
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What are the most important skills required by VET learners to use AI?

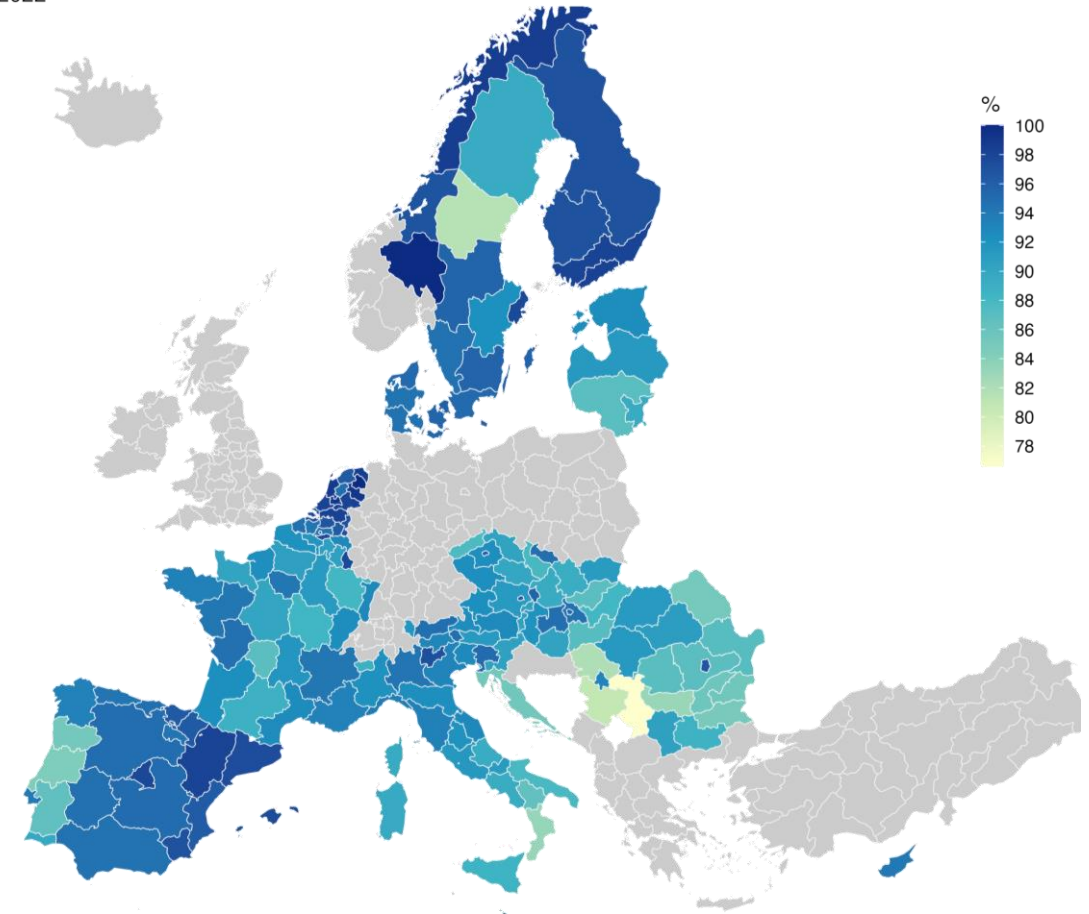
Current State of AI Across EU

Percentage of Jobs advertised are ICT
Year: 2023 Q2



Eurostat Regional Data: isoc_sk_oja1

Households with access to the internet at home
Year: 2022



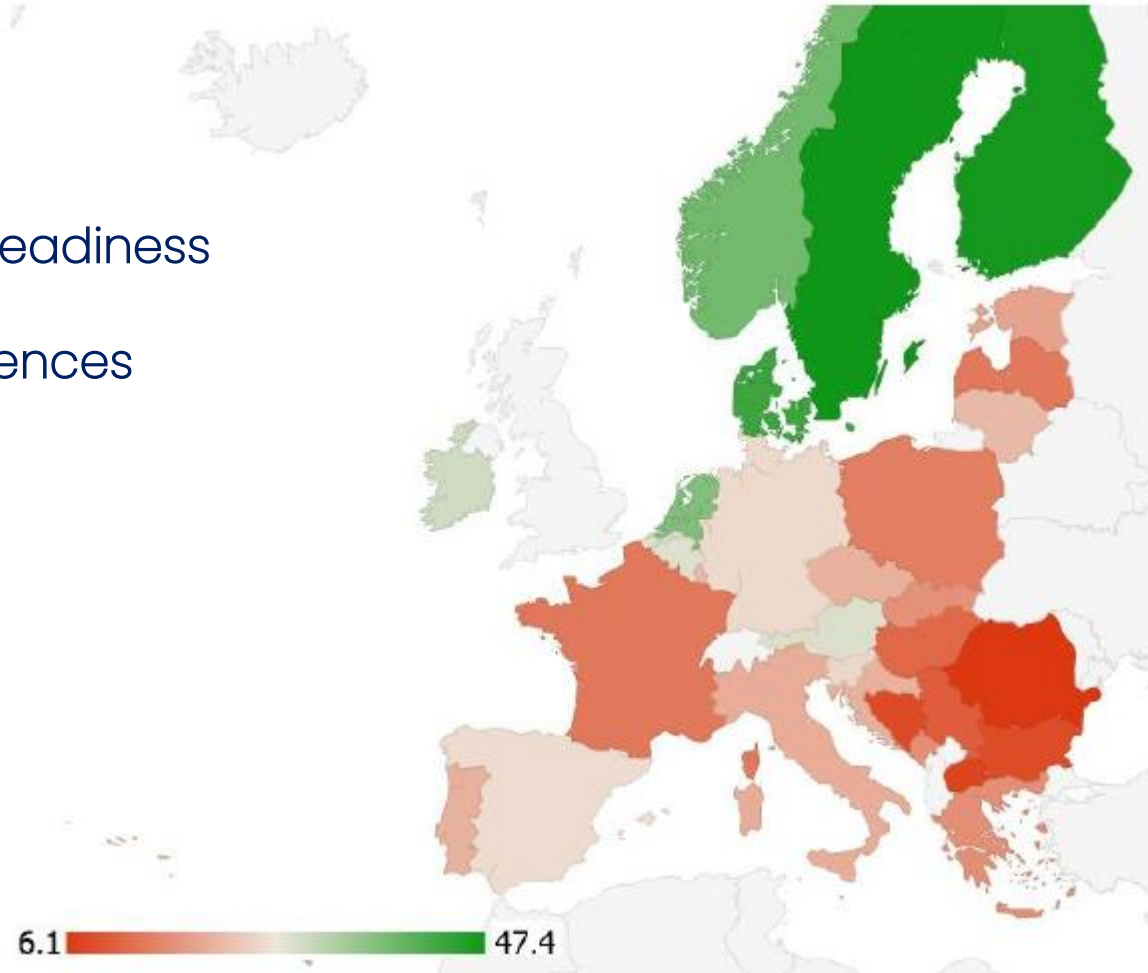
Eurostat Regional Data: isoc_r_iacc_h



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Current State of AI Across EU

- Multiple Measure of Digital Readiness
- Distinct Geographical Differences
- Highlights Opportunities



Mihai, F.; Aleca, O.E.;
Gheorghe, M. Digital Transformation
Based on AI Technologies in European Union Organizations.
Electronics 2023, 12, 2386. <https://doi.org/10.3390/electronics12112386>



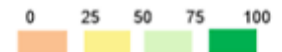
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So what about WB6?



DIGITAL TRANSFORMATION CLUSTER

Economy Rankings (2020-23)				Performance by Indicator (2020-23)						
Position	Economy	Overall Performance		Population with Digital Skills	Internet Use by Individuals	Internet Use for Interacting with Public Authorities	Internet Use for Purchases	Businesses with a Website	Businesses using AI Technologies	ICT Services Exports
1	SERBIA	70		68.4	93.6	67.8	72.2	109.2	17.3	152.9
2	NORTH MACEDONIA	65		63.2	96.1	45.9	54.9	66.6	127.6	121.6
3	MONTENEGRO	64		90.6	95.9	52.1	39.2	109.5	57.1	90.1
4	KOSOVO	58		46.4	110.3	46.9	79.0	51.6	66.3	72.9
WB6 Regional Average		54		61.8	95.8	51.6	54.4	80.6	69.3	88.2
5	ALBANIA	32		43.0	90.5	67.0	35.0	65.3	100.4	28.6
6	BOSNIA AND HERZEGOVINA	31		59.1	88.7	29.8	45.8	81.5	47.3	63.3



OECD (2025), *Economic Convergence Scoreboard for the Western Balkans 2025*, OECD Publishing, Paris, <https://doi.org/10.1787/bc0babf3-en>.



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The EU AI Act

The first comprehensive legal framework on AI, addressing risks and ensuring AI systems are safe, transparent, and ethical.

- Risk-Based Classification:
 - **Unacceptable Risk:** Prohibited AI systems (e.g., social scoring by governments, manipulative AI).
 - **High Risk:** Strict regulations for AI in critical areas (e.g., healthcare, transport, education).
 - **Limited Risk:** Transparency obligations (e.g., chatbots must disclose they are AI).
 - **Minimal Risk:** No specific regulations (e.g., AI in video games).



Current State of AI Across EU

Number of Key Frameworks Developed to Promote Digital Adoption

Example: Digi Comp (v2.2)



FIG.1 The DigComp conceptual reference model

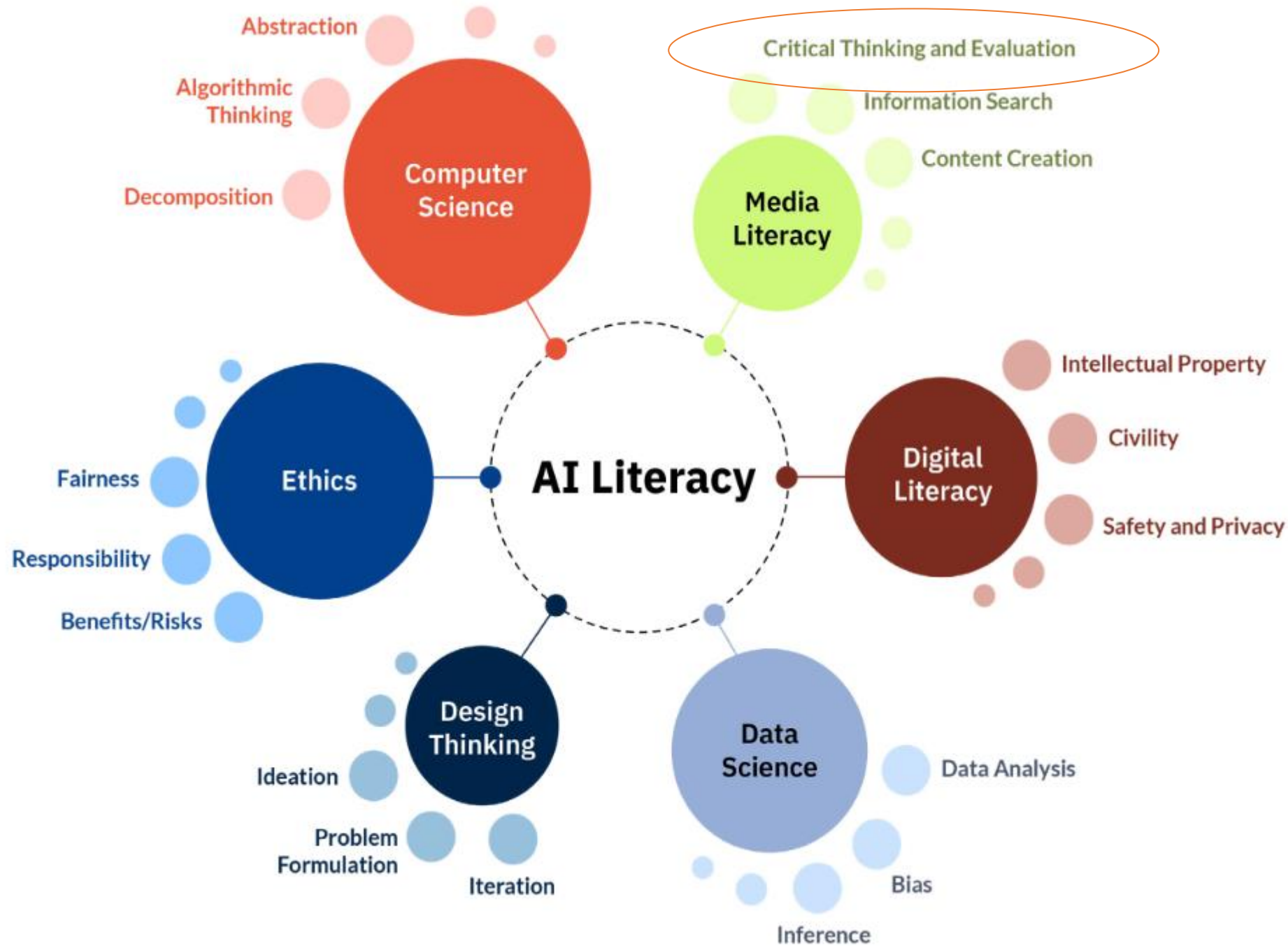
Current State of AI Across EU

Number of Key Frameworks Developed to Promote Digital Adoption

Example: Digi Comp (v2.2)



FIG.1 The DigComp conceptual reference model



Current State of AI Across Europe

- Key Take-Aways:
- The EU landscape is complicated
- National and regional priorities vary
- EU AI Act is a framework that will both inhibit and promote AI adoption
- So where to from here?



Identifying Skills for AI Adoption

OBJECTIVE:

List 75 Skills

APPROACH:

- Systematic Literature Review
- Systematic Data Review
- Future Skills and Occupation Survey
- Expert Opinions



Identifying AI Skills: Systematic Literature Review

Table 4: Literature Review Results

Title	Authors	Skills	Sector	Occupation	Region / Country
Applications of 3D reconstruction, Augmented reality and 3D printing in Modern Surgical Education	Schulze F.E. And Fayed Hassouna M. And Chand M.		R	Medical Students, Junior Surgeons	
Assessment of educational needs and factors influencing the level of digital skills of TR/RTTs – a stakeholder perception	Barbosa B. And Oliveira C. And Bravo I. And Couto J.G. And Antunes L. And Mcfadden S. And Hughes C. And McClure P. And Dias A.G.	Treatment Planning; Management And Research; Computer Programming; Artificial Intelligence Tools Development;	R	Therapeutic Radiographers/Radiation Therapists	Portugal
Using a collaborative approach to identify ways to strengthen enhanced care practices in a general hospital while building research capacity	Daly L. And White P. And Harris E. And Carroll A.F. And Murphy A.		R		
Improved Prediction of Surgical-Site Infection After Colorectal Surgery Using Machine Learning	Chen, Kevin A And Joisa, Chinmaya U And Stem, Jonathan M And Guillem, Jose G And Gomez, Shawn M And Kapadia, Muneera R		R	None	US
AI-Powered Chatbots in Medical Education: Potential Applications and Implications	Ghorashi, Nima And Ismail, Ahmed And Ghosh, Pritha And Sidawy, Anton And Javan, Ramin		R	Medical educators	US
Teaching artificial intelligence as a fundamental toolset of medicine	Ottles, Erkin And James, Cornelius A And Lomis, Kimberly D And Woolliscroft, James O	Data Summarization; Data Visualisation; Statistical Modelling; Machine Learning; Simulation; Optimization; Information Retrieval; Critical Reflection On Information; Information Integration;	R	Medical educators	US
From an Empty, to an Almost Full, and Eventually to a Never Full Glass: The Evolving Challenges of Medical Education	Koufakis, Theocharis And Gouveri, Evanthia And Dourmas, Michael And Papanas, Nikolaos		R	Medical educators	
Development of the “Scale for the assessment of non-experts’ AI literacy” – An exploratory factor analysis	Laupichler, M.C. And Aster, A. And Haverkamp, N. And Raupach, T.	Machine Learning; Deep Learning; Rule Based Systems; Explainability; Data Privacy; Data Ethics; Data Security; AI Tool Selection; Problem		Mixed, non-technical	UK, South Africa, US, Australia, Canada

Identifying AI Skills: Systematic Data Review

- Started with 700 papers
- 150 Sources across 7 types
- Reviewed further 18 sources
- Eurostat, AI watch and CEDEFOP are the most influential.
- EUROSTAT: 7600 data sources
- ESCO and O*NET for skills

2 DATA (63)

3 DATAHUB (23)

4 OBSERVATORY (30)

5 OER (2)

6 PERIODIC (11)

7 REPOSITORY (21)

Additional Analysis

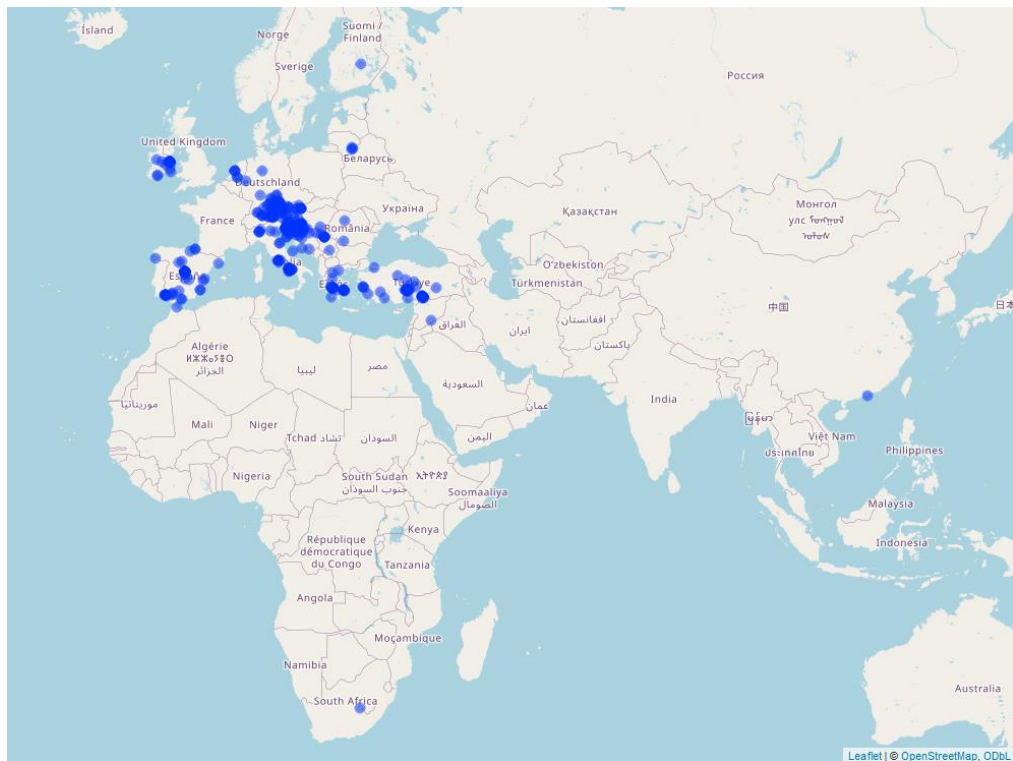
- extracted skills data from 1,500,000 job adverts from Lightcast
- Identified over 200 AI skills demanded by the workforce
- Very specific and often related to proprietary software solutions



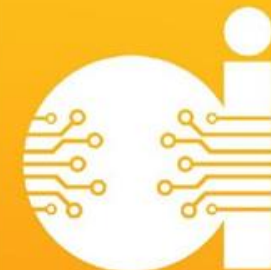
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Identifying AI Skills: Future Skills and Occupations Survey

Four main research methods



- 900+ Responses
- Identified top 5 sectors based on respondents
- Education
- Human Health
- Professional and Scientific Services
- Accommodation and Food Services
- Wholesale and Retail Trade
- 20 NUTS2 statistical regions



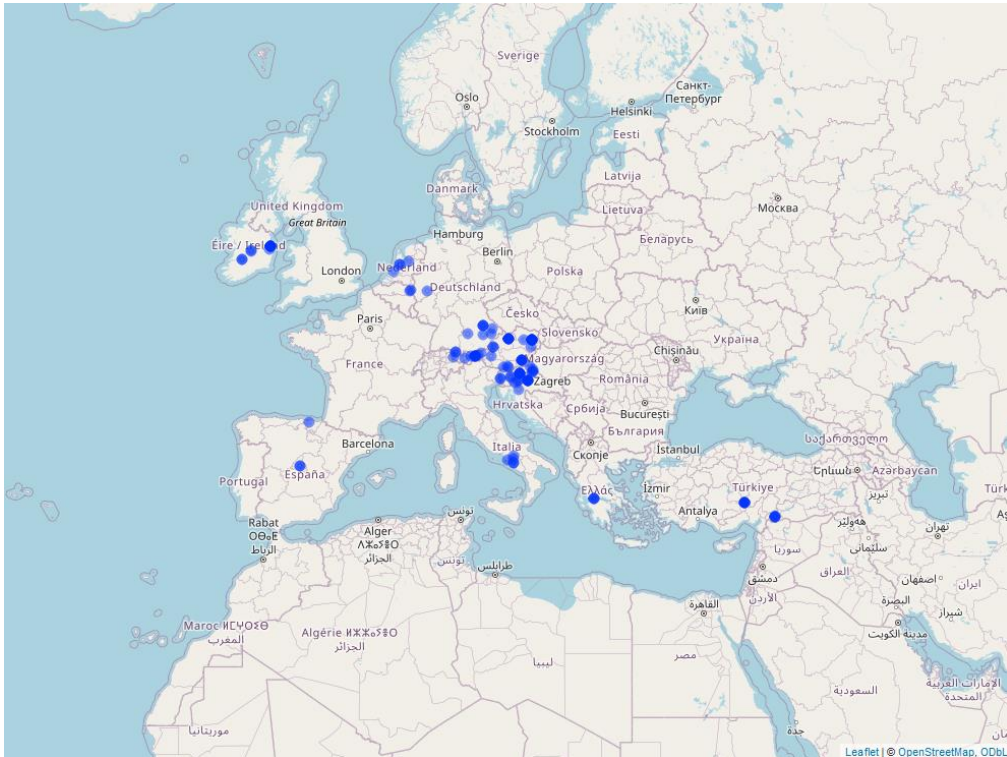
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AI-powered next generation of VET



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Identifying AI Skills: Expert Opinion Questionnaire (Delphi Method)

Four main research methods



- 112 Expert Interviews across 12 countries
- 2 stage interview process
- Stage 1: General understanding of AI applications and the skills required
- Stage 2: Drill down into specific skills requirements

"The" List of Skills of AI Adoption

Table 15: Annotated List of Skills

Skills, Knowledge Domains and Competencies	ESCO 1.2 Codes	Digicomp Cluster	Description / Definition	Source					Sector/s Emphasis
				1	2	3	4	5	
Cross Area - Ethical Literacy	0223; T6.6	5. Problem solving	Understanding and addressing ethical issues and risks related to AI, such as misinformation, diversity, and employment, across AI models, data, and tool implementation in organizations.	Y	Y		Y	Y	Human Health and Social Welfare; Professional, Technical and Scientific Services
Ai Models - Computer Science Prerequisites	061	1. Information and data literacy	Essential concepts, including abstraction, programmability, algorithmic thinking, basic statistics, and IT infrastructure needed for AI comprehension.		Y	Y			Education
Data For Ai - Fundamentals	0612	1. Information and data literacy	Understanding of data structures, data sanitization, and the significance of data for various AI technologies, including the connection between input data and AI model predictions.		Y				
Ai Models - Fundamentals	0619	1. Information and data literacy	Understanding the nature of various forms of intelligence (human, animal, machine); differentiating AI from non-AI technology; grasping how AI functions, makes decisions, represents knowledge; and acknowledging AIs strengths and weaknesses.		Y				
Ai Models - Types	0619	1. Information and data literacy	Understanding the differences between machine learning, deep learning, explainable AI (XAI), and generative AI models, among others, as manifestations of AI concepts and knowledge representations.		Y				
Ai Models - Development	0619	1. Information and data literacy	While not mandatory for AI users, appreciating how AI models are constructed provides a deeper comprehension; it is deemed valuable for specific user groups and applications but not essential for all.		Y				
Ai Tools - Fundamentals	0619	1. Information and data literacy	Understanding the instantiation of AI models in specific (social) contexts in the form of AI tools and assessing which human problems can be addressed with specific AI tools.		Y				

"The" List of Skills of AI Adoption

Humans, Organizations, And Society - Human Interactions In Ai Context		5. Problem solving	Collaborating and communicating with other human stakeholders involved in AI projects, teaching and explaining AI concepts to various stakeholders, and managing the impacts of AI interactions.	Y				
Humans, Organizations, And Society - Organizational Management Of Ai		5. Problem solving	Effectively managing AI tools within organizations, including understanding their impact on processes, developing AI strategies, anticipating economic and legal implications, identifying opportunities, and recognizing potential impacts on organization members.	Y				
Humans, Organizations, And Society - Current And Future Societal Impact Of Ai		5. Problem solving	Comprehending AI's societal implications enables citizens to be aware of AI's influence on democratic societies, anticipate future impacts, and engage in informed debates about AI technology implementations.	Y				
Cross Area - Meta Literacy		5. Problem solving	Being aware of one's own AI literacy level.	Y				
Cross Area - Future Literacy		5. Problem solving	Recognizing the dynamic evolution of AI and envisioning its future impact on AI literacy requirements as well as cultivating the learning skills to adapt to these requirements.	Y				
Communication Skills	0031; S1.4.2	2. Communication and collaboration	The ability to convey or share ideas and feelings effectively.	Y		Y	Y	Human Health and Social Welfare
Image Generation (image formation)	0211; 0619	3. Digital content creation	The creation of new images, often using artificial intelligence, that did not previously exist by understanding certain patterns, styles, or characteristics.		Y	Y		Professional, Technical and Scientific Services
Audio Analysis	0211; 0619	1. Information and data literacy	The skill of examining audio tracks to extract information, such as identifying spoken words, music genres, or the emotional tone of a voice.		Y			Professional, Technical and Scientific Services
Data Curation And Organisation	0322	1. Information and data literacy	The activity of managing and promoting the use of data from its point of creation, to ensure it is fit for contemporary purpose, and available for discovery and re-use.	Y				Education
Navigate Ai Law And Regulations	0421	5. Problem solving	The ability to understand and apply legal and regulatory frameworks pertaining to artificial intelligence.			Y	Y	

“The” List of Skills of AI Adoption

Statistics	0542	1. Information and data literacy	The science of collecting, analyzing, presenting, and interpreting data.	Y			Y	Y	Professional, Technical and Scientific Services
Learning Analytics	0542	1. Information and data literacy	The measurement, collection, analysis, and reporting of data about learners and their contexts.			Y			Education
Prompt Engineering	0611	3. Digital content creation	The art of crafting inputs that elicit the desired output from AI models.			Y	Y		Food and Accommodation Services; Education; Human Health and Social Welfare
Software-In-The-Loop	0611	1. Information and data literacy	A simulation technique used to test software components in a virtual environment.			Y			Food and Accommodation Services
Autonomous Control Systems	0611	1. Information and data literacy	Knowledge of systems that operate independently of human control.			Y			Human Health and Social Welfare
Dialog Systems	0611; 0619	2. Communication and collaboration	Knowledge of computer systems designed to converse with users using natural language.			Y			Food and Accommodation Services
Question Answering	0611; 0619	1. Information and data literacy	A field of study in AI and NLP focused on building systems that answer questions posed by users.			Y			Food and Accommodation Services
Data Analytics	0612	1. Information and data literacy	The process of inspecting, cleansing, transforming, and modeling data with the goal of discovering useful information, informing conclusions, and supporting decision-making.	Y					Education; Professional, Technical and Scientific Services
Computational Thinking	0613	1. Information and data literacy	The thought processes involved in formulating problems and their solutions in a way that a computer can effectively carry out.			Y			Education
Computer Programming	0613; S5.6.1	3. Digital content creation	The process of designing and writing computer programs.			Y	Y		Education
Principles Of Machine Learning (Neural Networks And Deep Learning)	0619	1. Information and data literacy	The foundational concepts underlying the construction and functioning of neural networks and deep learning models.	Y			Y		Human Health and Social Welfare
Rule-Based Expert Systems	0619	1. Information and data literacy	A type of artificial intelligence that uses a set of rules for making decisions or solving problems.	Y					Human Health and Social Welfare



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Most important Skill?

Critical Thinking and Reasoning for AI

- Critical thinking has often been an implicit component of the educational process
- Critical thinking is not a single skill, but a complex nebulous interaction of subskills and character traits
- Internet and social media interactions already “upped the stakes” in terms of requiring critical thinking and reasoning skills
- Rise of AI generated material further amplifies the demand for this skills set
- Need to create explicit, direct instruction, on how to think critically and reason



What skills make a "good" critical thinker?

What next? Lessons Learned and Understanding the Limitations

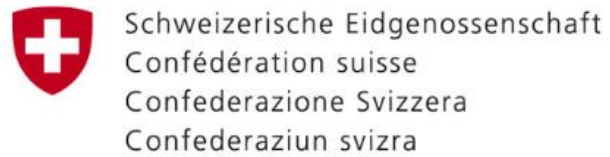
Key Lessons Learned:

- AI LLM's are amazing at supporting the research process

Limitations:

- "Skills" are amorphous and context dependent
- Relationships between skills require detailed taxonomies
- Taxonomies are also changing rapidly!
(See ESCO 1.2)

Next: Curricula development for training skills



Swiss Agency for Development
and Cooperation SDC



Questions?

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