Future Farmer

The Future Farmer is a new kind of agricultural leader who blends traditional farming expertise with cutting-edge technology and sustainability. This role emphasizes data-driven decisions, ecological responsibility, and efficient resource use. With skills in AI, robotics, IoT, and precision agriculture, the Future Farmer oversees complex operations to boost yields, improve supply chain transparency, and reduce environmental impact. Ultimately, they are key to transforming agriculture into a resilient and sustainable industry.

<ESCO Mapping> - <link to ESCO (European Skills, Competences, Qualifications and Occupations)>

ID	NAME	Concept URI
3142.1	agricultural technician	http://data.europa.eu/esco/occupation/1f8314c2-01bd-4af4-babc-04d7034591b8
8341.2	land-based machinery operator	http://data.europa.eu/esco/occupation/1b8c75a9-407b-4554-a7d6-df391672c6b1
3512.4	ICT technician	http://data.europa.eu/esco/occupation/3e7bf729-4442-4b9f-ad5e-83111963795c
6114.1	crop production manager	http://data.europa.eu/esco/occupation/1b5ccfe7-1cc3-4f02-974c-f852d3faf57e
3142.1	agriculture technician	http://data.europa.eu/esco/occupation/1f8314c2-01bd-4af4-babc-04d7034591b8
2511.9	ICT business analyst	http://data.europa.eu/esco/occupation/fe0fa514-b48d-4a53-9757-a283c0baacf0
1223.2	research and development manager	http://data.europa.eu/esco/occupation/73ceb2f9-18e3-4cfe-9c06-e9fb31ece440
1213.2	policy manager	http://data.europa.eu/esco/occupation/64e38ce7-3901-4261-bfee-77c7a77397f2

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Context

EQF Levels	**5 / 6 / 7**
Departments	**Production** **Logistics** **Quality Assurance** **R&D (Research and Development)** **HSE (Health, Safety and Environmental)** **IT & Digital**
Profile Sectors	The Future Farmer profile is relevant across the entire agri-food value chain. This includes primary production (arable farming, livestock, horticulture, aquaculture), the agri-tech sector (machinery, software, and sensor manufacturers), input industries (e.g., sustainable fertilizers, biopesticides), food processing and distribution, advisory and consultancy services, research institutions, and regulatory and policy-making bodies.

Green Competences

Name	Type	Description	Level	ESCO
Sustainable Resource Management	Skill	The ability to manage natural resources such as soil, water, and biodiversity in a way that ensures their long-term health and availability, minimizing waste and environmental degradation.	Foundation (1): Applies established practices to optimize the use of water, soil, and energy in daily farm operations, such as following a nutrient management plan or using basic water-saving irrigation techniques. Intermediate (2): Analyzes farm-level resource efficiency, implements and monitors improvement projects (e.g., precision irrigation, integrated pest management), and reports on environmental impacts and cost savings. Advanced (3): Designs and leads integrated, farm-wide or regional sustainability strategies, incorporating advanced models for resource optimization and contributing to the development of best practices for the sector.1	http://data.europa.eu/esco/skill/691c7db6-bad8-4a09-a3c4-4bf799375a35
Climate Change Adaptation and Mitigation	Knowledge	Understanding the impacts of climate change on agriculture and knowing the strategies, practices, and technologies	Foundation (1): Follows established climate-resilient protocols, such as planting drought-tolerant crop varieties or implementing soil conservation techniques to prevent erosion. Intermediate (2): Evaluates climate-related risks and opportunities for a specific farm, implements targeted	http://data.europa.eu/esco/skill/04012dd1-478d-4eec-9951-dd623bfe86ca

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		available to build resilience (adaptation) and reduce greenhouse gas emissions (mitigation).	adaptation and mitigation projects (e.g., carbon farming, on-farm renewable energy), and measures their effectiveness. Advanced (3): Leads the development of regional climate adaptation strategies, advocates for climate-smart agricultural policies, and innovates new approaches to enhance the climate resilience of entire food systems.	
Circular Economy Principles in Agriculture	Skill	The ability to design and manage agricultural systems that minimize waste by reusing, recycling, and regenerating materials and resources, such as turning agricultural by-products into valuable inputs.	Foundation (1): Participates in on-farm waste reduction and recycling initiatives, such as composting organic waste or separating plastics for collection. Intermediate (2): Develops and coordinates specific circular economy projects, such as implementing systems for nutrient recycling from manure or using crop residues to generate bioenergy. Advanced (3): Champions and designs sector-wide circular economy models, evaluates the economic and environmental viability of new circular technologies, and builds partnerships to create closed-loop supply chains.	**http://data.europa.eu/esco/skill/22c45bf7-e52b-475f-847b-c32a87f65a5d**
Environmental Standards and Certification Management	Skill	The ability to understand, implement, and manage compliance with various environmental regulations and voluntary sustainability certification schemes (e.g., organic, Global G.A.P., carbon footprint labels).	Foundation (1): Ensures daily farm activities adhere to existing environmental regulations and supports data collection for certification audits. Intermediate (2): Manages the entire certification process for one or more standards, prepares all necessary compliance reports, and liaises directly with auditors and certification bodies. Advanced (3): Oversees complex, multi-site or value-chain certification strategies, advises on the selection and adoption of new or emerging standards, and represents the organization in standard-setting bodies.	**http://data.europa.eu/esco/skill/8064ae65-5d1b-44e1-9aaf-246a4285a9a6**

Digital Competences

Name	Type	Description	Level	ESCO
Precision Agriculture Technologies Operation	Skill	The ability to use, calibrate, and maintain a range of precision agriculture	Foundation (1): Operates digital sensors, IoT devices, and basic farm management software for daily tasks, following established protocols and performing routine maintenance. Intermediate (2): Independently configures, adapts, and troubleshoots a variety of digital	New skill, closest: http://data.europa.eu/esco/skill/97272b3e-d497-4420

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		hardware and software, including GPS guidance systems, drones, sensors, and variable-rate application technology.	tools and systems (e.g., autonomous tractors, drone imagery platforms) in diverse agricultural settings to optimize specific operations. Advanced (3): Evaluates, selects, and leads the strategic adoption of advanced, integrated digital systems, overseeing their integration across all organizational processes and training others in their use.	-893d-612b15d377d9 (eagriculture)
Data Analytics for Agricultural Decision-Making	Skill	The ability to collect, manage, analyse, and interpret large, complex datasets from multiple sources (e.g., soil sensors, weather stations, yield monitors, satellite imagery) to derive actionable insights and support strategic and operational decisions.	Foundation (1): Collects, records, and interprets basic operational datasets (e.g., soil moisture levels, yield maps) to support predefined tasks and identify simple anomalies. Intermediate (2): Analyses complex, multi-source data to inform key farm management decisions (e.g., optimizing fertilization strategies, predicting pest outbreaks), and presents findings clearly to peers and management. Advanced (3): Designs and implements data-driven strategies for the entire enterprise, applies advanced analytics or machine learning models for predictive and prescriptive insights, and drives a culture of evidence-based innovation.	**http://data.europa.eu/esco/skill/3ce1fe19-7f9e-4070-941d-651673a5693b** knowledge: **http://data.europa.eu/esco/skill/97bd1c21-66b2-4b7e-ad0f-e3cda590e378**
Agricultural Robotics and Automation Management	Skill	The ability to oversee the deployment, operation, and maintenance of robotic and automated systems for tasks such as planting, weeding, harvesting, or livestock monitoring.	Foundation (1): Monitors the operation of automated systems, performs basic troubleshooting, and ensures systems are functioning according to specifications. Intermediate (2): Manages a fleet of agricultural robots or automated systems, schedules their operations, analyzes their performance data, and coordinates maintenance and repairs. Advanced (3): Develops the strategic plan for integrating robotics and automation into the farm's long-term operational model, evaluates new robotic technologies, and manages the human-robot workflow.	Closest: **http://data.europa.eu/esco/skill/e87ec79a-c9ff-46f5-84fa-7a0f394cdf40** **http://data.europa.eu/esco/skill/00dd3271-077f-4a12-a958-e297fdd724ce** **http://data.europa.eu/esco/skill/5f95f9c9-30ee-4735-ab63-8045ec8f78f8**

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SSbD (Safe and Sustainable by Design Chemicals

Name	Type	Description	Level	ESCO
Lifecycle Assessment of Agricultural Inputs	Knowledge	Understanding the principles of lifecycle assessment (LCA) to evaluate the environmental, health, and safety impacts of agricultural inputs (chemicals, fertilizers) from raw material extraction through production, use, and end-of-life.	Foundation (1): Reads and understands product labels and Safety Data Sheets (SDS) to identify immediate hazards and required handling procedures. Intermediate (2): Compares different products based on their known lifecycle impacts (e.g., carbon footprint, ecotoxicity) and selects inputs that align with the farm's sustainability goals, going beyond simple efficacy and cost. Advanced (3): Conducts or commissions simplified LCAs for key farm inputs to inform strategic sourcing decisions and contributes to the development of SSbD criteria for the agricultural sector.7	New arising from agricultural chemicals: **http://data.europa.eu/esco/skill/7e9b4242-2be7-4b9e-8ca0-46d5cedd3cb9** Life cycle of resources assessment: **http://data.europa.eu/esco/skill/4e87c852-602a-4a0e-b8d8-20709ce14ac5**
Design of Low-Input Farming Systems	Skill	The ability to apply agroecological principles and precision technologies to design and manage cropping and livestock systems that are inherently less reliant on synthetic chemical inputs.	Foundation (1): Implements specific low-input practices such as crop rotation or cover cropping to improve soil health and reduce fertilizer needs. Intermediate (2): Integrates multiple techniques (e.g., biological pest control, data-driven disease prediction models, mechanical weeding) to create a comprehensive Integrated Pest Management (IPM) plan that strategically reduces pesticide use. Advanced (3): Leads the complete redesign of the farm's production system based on SSbD principles, pioneering innovative combinations of technology and ecology to achieve high productivity with minimal reliance on hazardous inputs.	
Safe Chemical	Skill	The ability to transport, store, mix, apply, and	Foundation (1): Correctly uses personal protective equipment	**http://data.europa.eu/esco/skill/8**

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Handling and Application		dispose of agricultural chemicals in a manner that ensures the safety of the operator, the public, and the environment, in full compliance with all regulations.	(PPE), follows all label instructions for mixing and application, and adheres to protocols for safe storage and container disposal. Intermediate (2): Develops and implements a comprehensive chemical safety plan for the farm, trains and supervises other workers in safe handling procedures, and maintains meticulous records for regulatory compliance. Advanced (3): Audits and improves farm-wide chemical safety systems, evaluates and adopts new application technologies (e.g., closed-transfer systems, precision sprayers) to minimize exposure and drift, and acts as a safety leader and resource for the community.	**7da57a8-ae40-41e3-998e-f517daa95c9a**
Evaluation of Bio-based and Alternative Inputs	Skill	The ability to research, identify, and evaluate the efficacy and safety of non-synthetic or less hazardous alternatives to conventional chemical inputs, such as biopesticides, biofertilizers, or natural plant health promoters.	Foundation (1): Shows awareness of common bio-based alternatives and can follow guidelines for their application in specific situations. Intermediate (2): Conducts on-farm trials to test the effectiveness of new bio-based products, analyzes the results, and assesses their economic viability compared to conventional options. Advanced (3): Stays abreast of cutting-edge research in bio-based solutions, builds relationships with innovators and suppliers, and strategically integrates a portfolio of proven alternatives into the farm's overall input management plan.	**http://data.europa.eu/esco/skill/3ecde258-d1c6-4d6a-bfa7-ec4c5e4fc700** could be incorporated into this

Transversal Competences

Name	Type	Description/Context	Level	ESCO
Communication and Collaboration	Skill	The ability to articulate ideas clearly, listen actively, and work	Foundation (1): Communicates clearly with team members	**http://data.europa.eu/esco/skill/ab877a24-335d-46**

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		constructively with diverse individuals and groups to achieve common goals.	and immediate stakeholders in routine situations, sharing information and updates effectively. Intermediate (2): Facilitates group discussions, manages conflicts constructively, and adapts communication style to diverse audiences (e.g., explaining technical concepts to non-technical staff, presenting business cases to investors). Advanced (3): Leads complex multi-stakeholder collaborations, inspires and motivates teams through a compelling vision, and communicates strategic ideas persuasively to influence policy and industry partners.	76-b366-c5c0665 1481a
Problem-Solving and Critical Thinking	Skill	The ability to analyse complex situations, identify root causes, evaluate options, and develop creative and effective solutions, often in ambiguous or rapidly changing contexts.	Foundation (1): Applies standard problem-solving approaches to address immediate operational challenges and troubleshoot routine technical issues. Intermediate (2): Analyses complex, multi-faceted problems (e.g., unexpected crop disease, supply chain disruption), proposes evidence-based solutions, and makes sound decisions in ambiguous contexts. Advanced (3): Anticipates emerging strategic challenges, leads creative and systemic problem-solving processes, and fosters a culture of continuous improvement and data-driven inquiry within the organization.	http://data.europa.eu/esco/skill/4feed491-dc09-4218-814a-0146e13ef4fe http://data.europa.eu/esco/skill/ab877a24-335d-4676-b366-c5c06651481a
Adaptability and Change Management	Skill	The ability to remain effective in the face of change, uncertainty, and complexity, and to lead individuals and organizations through transitions successfully.	Foundation (1): Responds positively to change, learns new tasks and technologies willingly, and adapts personal work methods as required. Intermediate (2): Supports team adaptation during	http://data.europa.eu/esco/skill/3c03ee71-4a23-448f-b79e-81fd75d27dca

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			transitions, facilitates training on new systems or processes, and contributes to the planning and execution of change initiatives. Advanced (3): Leads large-scale organizational change, manages uncertainty and resistance proactively, communicates a clear rationale for change, and champions a culture of innovation and resilience at scale.1	
Management and Leadership	Skill	The ability to organize resources, delegate tasks, motivate individuals, and guide teams towards achieving strategic objectives.	**Foundation (1):** Organizes own work effectively, takes responsibility for assigned tasks, and provides clear instructions to others when required. **Intermediate (2):** Manages projects and small teams, delegates tasks effectively, provides constructive feedback, and monitors performance against goals. **Advanced (3):** Sets strategic direction for the enterprise, develops and mentors future leaders, builds a high-performing organizational culture, and inspires commitment to long-term sustainability and innovation goals.	http://data.europa.eu/esco/skill/b7e752ec-7b2e-46e6-ac24-8b1233609c31
Continuous Learning	Skill	A proactive mindset and set of practices for continuously seeking out new knowledge, developing new skills, and staying current with evolving technologies, market trends, and scientific advancements.	Foundation (1): Actively participates in provided training and seeks help to fill knowledge gaps in their immediate role. Intermediate (2): Independently identifies personal skill gaps, seeks out relevant learning opportunities (e.g., online courses, workshops, conferences), and applies new knowledge to improve performance. Advanced (3): Fosters a learning culture within the team or organization, mentors others in their professional development, and actively scans the horizon for emerging trends to inform strategic learning priorities.	http://data.europa.eu/esco/skill/9bf266a6-188b-4d17-a22f-2f266d76832b

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Sector Specific

Name	Type	Description/Context	Level	ESCO
Agri-Food Business Model Innovation	Skill	The ability to design, evaluate, and adapt business models to leverage new technologies, meet changing market demands, and create new value propositions in the agri-food sector.	Foundation (1): Supports updates to existing business processes under guidance and understands the farm's basic value chain. Intermediate (2): Designs and implements new business models or revenue streams (e.g., direct-to-consumer digital platforms, data-as-a-service offerings, carbon credit schemes) and evaluates their performance. Advanced (3): Leads strategic innovation across the enterprise, anticipates market disruptions, and drives organization-wide business model transformation to secure long-term competitive advantage.	http://data.europa.eu/esco/skill/2fb8480e-de3c-462b-b169-e8bbb344da68
Financial Management and Agri-Tech Investment	Skill	The ability to manage budgets, analyse financial performance, and prepare compelling business cases to secure funding and investment for agricultural technology and sustainability projects.	Foundation (1): Assists with routine budgeting, cost tracking, and financial record-keeping for farm operations. Intermediate (2): Prepares detailed financial analyses, develops business cases with clear Return on Investment (ROI) calculations for new technology adoption, and manages project budgets. Advanced (3): Oversees the complex financial strategy of the enterprise, secures significant investment or grant funding for innovation, and manages a portfolio of agri-tech investments.	http://data.europa.eu/esco/skill/52e53619-fa77-4f72-b237-5e4aae784dc2
Agricultural Policy and Regulatory Compliance	Knowledge	A thorough understanding of the local, national, and international policy landscape affecting agriculture, including subsidies (e.g., CAP),	**Foundation (1):** Applies established policies and regulations to daily operations and maintains accurate records for compliance. **Intermediate (2):** Analyses and implements new or changing regulatory requirements, manages	http://data.europa.eu/esco/skill/5dfd1b83-8b77-444b-94cd-72f8e13472fa

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		environmental regulations, food safety standards, and data governance laws.	compliance audits, and liaises with regulatory bodies on operational matters. **Advanced (3):** Interprets complex policy environments to inform long-term strategy, anticipates regulatory shifts, and actively engages in policy advocacy to help shape a favourable environment for sustainable agri-tech innovation.	
Supply Chain Management and Traceability	Skill	The ability to manage and optimize agricultural supply chains, using digital tools like blockchain to enhance efficiency, transparency, and traceability from farm to consumer.	**Foundation (1):** Understands the farm's position in the supply chain and uses basic digital tools to track inventory and shipments. **Intermediate (2):** Implements and manages digital traceability systems, collaborates with supply chain partners to improve logistics, and analyses data to identify and resolve bottlenecks. **Advanced (3):** Designs and leads the transformation of entire supply chains, leveraging advanced technologies to create fully transparent, resilient, and sustainable value networks.	http://data.europa.eu/esco/skill/f929c89e-c363-4132-a918-e021d57b307c

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