Skills Alliance for Industrial Symbiosis - A Cross-sectoral Blueprint for a Sustainable Process Industry (SPIRE-SAIS)

EUROPEAN YEAR OF SKILLS

SPIRE-SAIS FINAL CONFERENCE, 23 MAY 2024
TU Dortmund – International Meeting Centre

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

SPIRE-SAIS Final Conference Program

09:30 AM	Meet&greet
10:00 AM	Opening Antonius Schröder, TU Dortmund University, Project Coordinator Felix Rohn, European Commission
10:30 AM	**SPIRE-SAIS: The Pathway to Deliver Impact on Future Skills and High-Value Jobs** SPIRE-SAIS in a Nutshell (15') - Antonius Schröder, TUDO, Project Coordinator SKILLS4Planet Training Platform (30') - Jorge Muract, Worldsteel
11:30 AM	**Implementation and Rollout of the European Blueprint** SPIRE-SAIS Policy Recommendations (10') – Andrea Tropeoli, Simona Pace RINA
11:40 AM	**Step into Action: Shaping the "Circular" Future of Industrial Symbiosis and Energy Efficiency** (50') Moderator: Miikka Nieminen, EUROFER Speakers: Aurela Shtiza, IMA Europe Christian Leroy, European Aluminium Klaus Peters, ESTEP Sophie Grenade, IndustriALL Europe
12:30 PM	Lunch
1:30 PM	SPIRE-SAIS Sectoral Blueprint: The European Challenge in **Implementing IS and EE Skills and Jobs in the Future Process Industry** (30') Veit Echterhoff, ThyssenKrupp Monica Perez-Clausen, AGBAR
2:00 PM	**The European Community of Practice:** **Sectoral and Regional Strategies for Future Skills of IS and EE in Industry** Moderator: Clara Behrend, TUDO Sectoral Roll-out: ITC Ceramics Newcomer Training – Irina Celades, ITC Water Junior Program – Naomi Timmer, H20 People Regional Roll-out Emilia Romagna – Daniela Sani, ART-ER Basque Country – Felix Bayon, Sidenor H4C European Community of Practice – James Woodcock, International Synergies
3:00 PM	Coffee Break
3:15 PM	**Future Skills – Pitches of Other Findings and Perspectives** Moderator: Antonius Schröder, TUDO Community of Practice Industry 5.0 - Daniela Angione, InnoGlobal BRIDGES 5.0 - Steven Dhondt, TNO P4Planet - Raquel Almeida, ISQ RACE - Jan Eggert, EIT RawMaterials ChemRegions - Anni Siltanen, ECEG greenSME - Clara Behrend, TU Dortmund University IS2H4C – Michael Kohlgrüber, TU Dortmund University
4:25 PM	Questions & Answers – Feedback from the Audience
4:40 PM	Looking forward: Large Scale Skills Partnership Energy Intensive Industries and Pact for Skills – Felix Rohn, European Commission
4:55 PM	Wrap-up and Next Steps
5:00 PM	Cocktail

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Opening of the Conference

Antonius Schröder, Project Coordinator – TU Dortmund University

Paolo Zancanella, Project Officer – EACEA European Commission

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TU Dortmund University

www.international.tu-dortmund.de/en

- The Ruhr Area is Germany's most densely populated area with almost 6 million people from over 150 nations
- Benefits: safe environment, multicultural, relatively cheap cost of living, great location in Europe
- Dortmund has nearly 600,000 inhabitants and a vibrant history

Dortmund Yesterday
Coal – Steel - Beer

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Dortmund Today
Micro-Electronics – Logistics - Services

technische universität
dortmund


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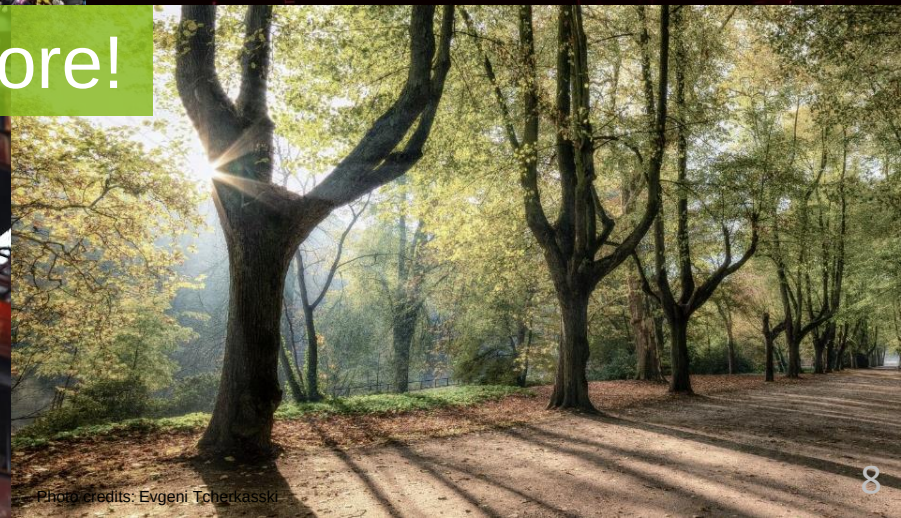
Photo credits: Jonas von Werne

All of this is Dortmund


Photo credits: Magnus Terhorst

…and so much more!


Photo credits: Julian Guttzeit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THE EUROPEAN CAPITAL OF INNOVATION AWARDS 21

The European Capital of Innovation

WINNER

DORTMUND

Photo credits: Roland Gorecki/Stadt Dortmund

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Photo credits: Jürgen Huhn

- Founded in 1968
- Now: approx. 34,000 students, 11% international
- 2 campuses: Connected by the world's first fully automatic monorail
- Adjacent technology park: the largest in Germany
- University Alliance Ruhr: Opportunity to cross-enroll in classes at Ruhr University Bochum and/or at the University of Duisburg-Essen

We are TU Dortmund University with 17 Departments…

Mathematics
Physics
Chemistry & Chemical Biology
Computer Science
Statistics
Biochemical and Chemical Engineering
Mechanical Engineering
Electrical Engineering and Information Technology
Spatial Planning
Architecture and Civil Engineering
Business and Economics
Educational Sciences & Psychology
Rehabilitation Sciences
Humanities & Theology
Cultural Studies
Arts and Sports Sciences
Social Sciences

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Sozialforschungsstelle Dortmund
Zentrale wissenschaftliche Einrichtung

TU Dortmund University

Social Research Centre – sfs

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Sozialforschungsstelle Dortmund
Zentrale wissenschaftliche Einrichtung

Social Research Centre sfs at a Glance

- sfs is one of the largest and most traditional institutes of social sciences in the field of labour in Germany, founded in 1946
- Now a central scientific unit of the TU Dortmund University
- 50 scientists are involved in research, consultation, and evaluation, focusing current topics regarding the social innovations and the world of labour
- The modern research profile aims at actively connecting science and practice
- sfs is consulting companies, politics, and associations in regional and transnational networks
- About 20 research projects per year at sfs

Research Areas:

- Organisational Development in the Network Economy
- Services Research and Gender Studies
- Labour and Education in Europe
- Labour Policy and Health
- Sustainable Development of Technologies and Organisations

➢ Social Innovation as a cross-cutting theme

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Antonius Schröder, Project Coordinator – TU Dortmund University
SPIRE-SAIS Blueprint in a Nutshell

SPIRE-SAIS FINAL CONFERENCE, 23 MAY 2024

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Skills Alliance for Industrial Symbiosis (SAIS) A Cross-sectoral Blueprint for a Sustainable Process Industry (SPIRE)

EU Programme: ERASMUS+ "New Skills Agenda"

- Duration: January 2020 – December 2023
- Funding: 4 Mio Euro
- 24 Partners + 13 associated partners
- Already 25 funded sectoral blueprints

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Key components of SPIRE-SAIS:

- Build on existing SPIRE coordination, projects and activities
- **Cross-sectoral approach, covering all the SPIRE energy intensive industry sectors**
- Sector associations as central communication and dissemination intersection

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Industry Driven Long-term Skills Strategy

Mission

Industry driven proactive adjustment of the future skills demands developed by the industry and for the industry.

Main objectives

- Proactive skills adjustments.
- New training and curricula requirements.
- Political support measures.
- Successful sectoral upskilling schemes.
- Efficient management of knowledge.
- Improve recruitment and retention.
- (Social) Key Performance Indicators (KPIs).

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PROJECT PARTNERS AND COUNTRIES

Industry sector associations: A.SPIRE, ESTEP, IMA Europe, European Aluminium, Water Europe, ECEG

Companies: Covestro (Chemicals), Sidenor, Ferriere Nord (Steel), MYTILIENOS (Aluminium), SGSB/AGBAR (Water)

Education/training providers & RTOs: Scuola Superiore Sant'Anna, Fundation Circe, ITC, ISQ, International Synergies, H20people

Research institutions: TU Dortmund University, CSM/RINA, Visionary Analytics, IMNR, Łukasiewicz-IMN

Regional institutions: ART-ER

Associated partners: EIT Raw Materials, thyssenkrupp Steel Europe, CEFIC, CEMBUREAU, ITQ (Universitat Politècnica de València), Carbon Market Watch, Circle Economy, University of Deusto, Cerame-Unie, Carbon Market Watch, Skillman, ArcelorMittal Global R&D, Mota Ceramics Solutions MCS, ARGO, IndustriALL

Industry Driven Consortium

- 24 partners
- 13 associated partners
- 12 countries
- 10 industry sectors

Cement | Ceramics | Chemicals | Engineering | Non-ferrous metals

Minerals | Pulp & paper | Refining | Steel | Water

Central Objective:

- Proactive skills adjustment with the industry for the industry

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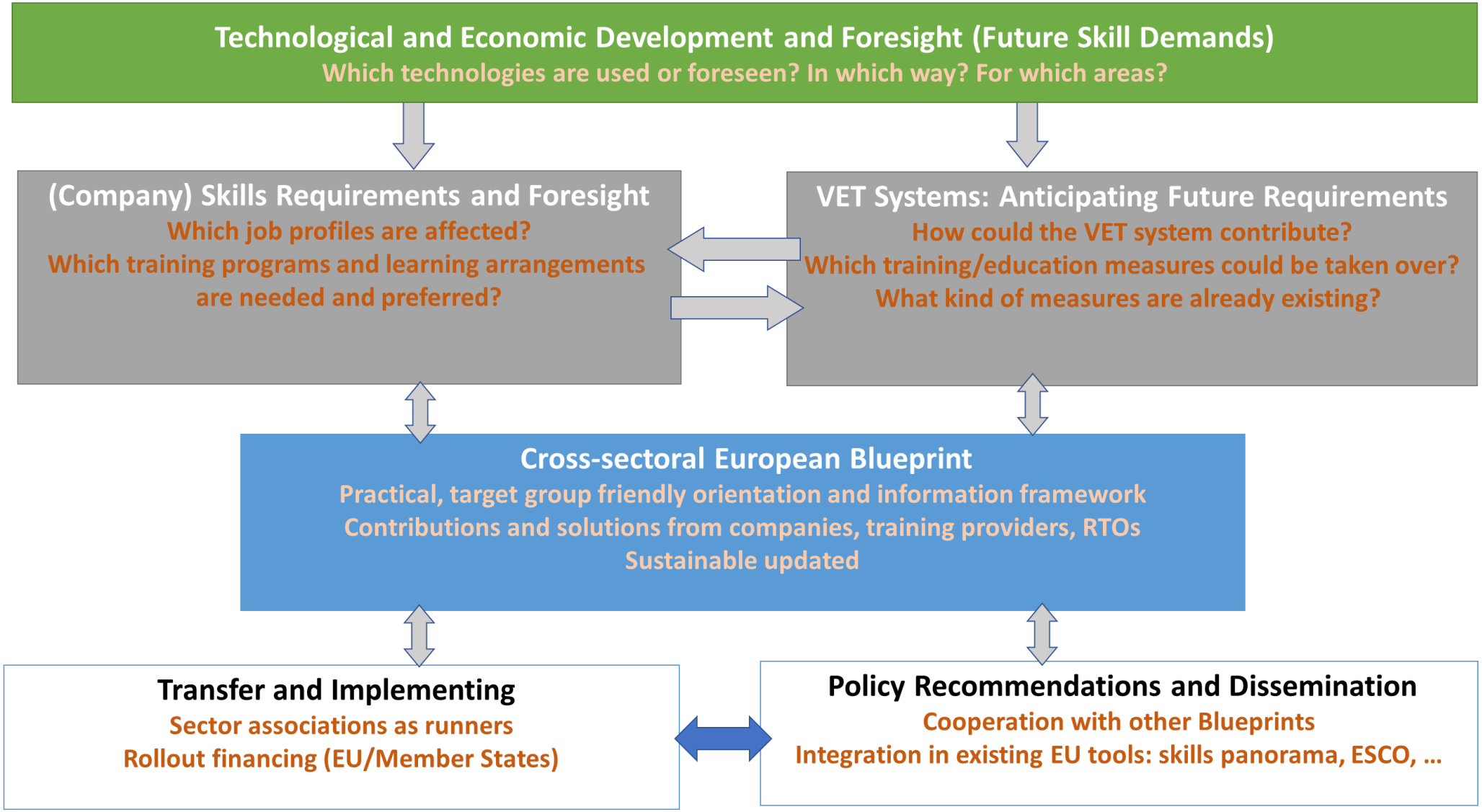
Approach



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SPIRE-SAIS Roadmap

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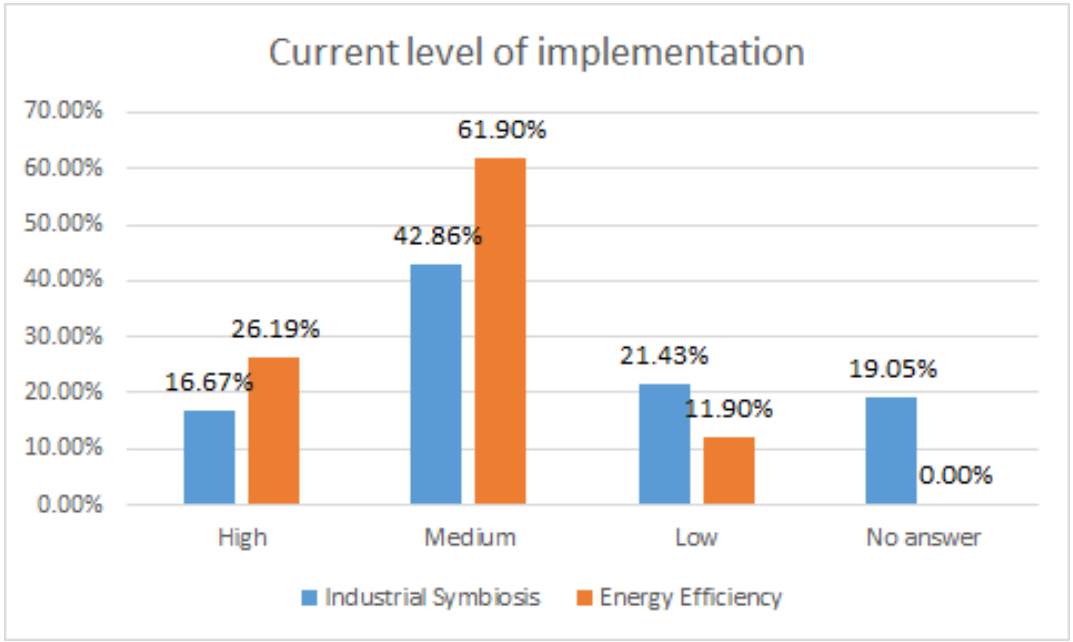
Technological and Economic Demands and Skills Requirements

- The current **level of implementation and skills** is higher for EE rather than for IS
- Beneath internal and industrial actors:
  public actors are also main actors of IS (41%) and EE (48%)
- The **main barriers for EE/IS**:
  - cost of investments
  - regulatory issues
  - outdated plants, infrastructure and equipment
  - cooperation challenges, integration of regional stakeholders, working across different sectors
  - skills gaps.
- Mainly **no specific training programs (57% EE, 74% IS)**
  existing training measures are primarily **non-formal/unstructured**
  but a high training needs: EE 69%, IS 81% (very) large need for training
- **Middle and high level of skills needs** to be updated:
  - Specific job-related technical / professional skills
  - Transversal skills (esp. digital, green and personal skills)
  - Management skills
- IS is leading to **new jobs/professions** and higher workforce performance
- **Difficulties in filling vacant jobs**: 72% (very) difficult



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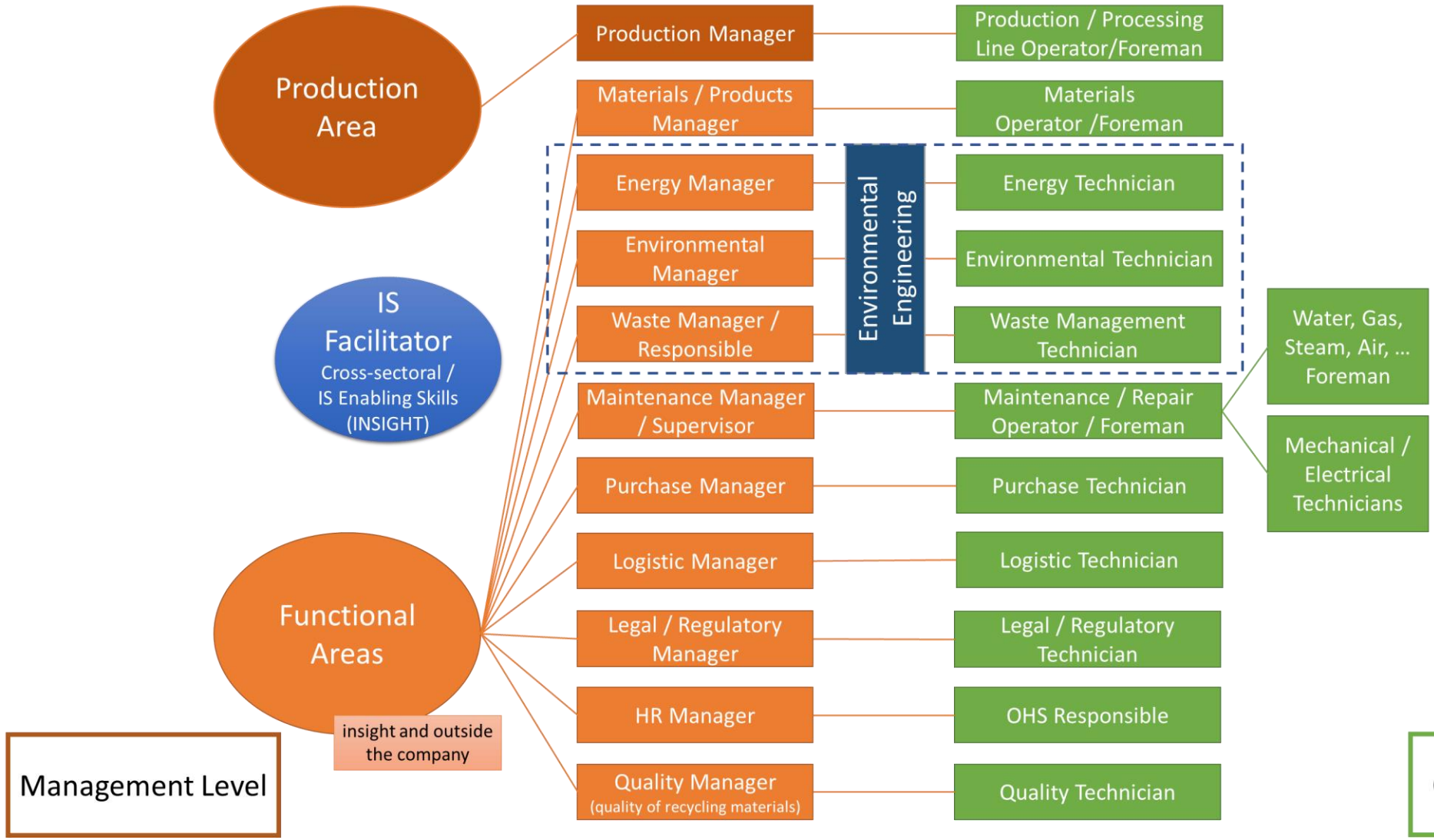
Cross-sectoral Generic Job Profiles



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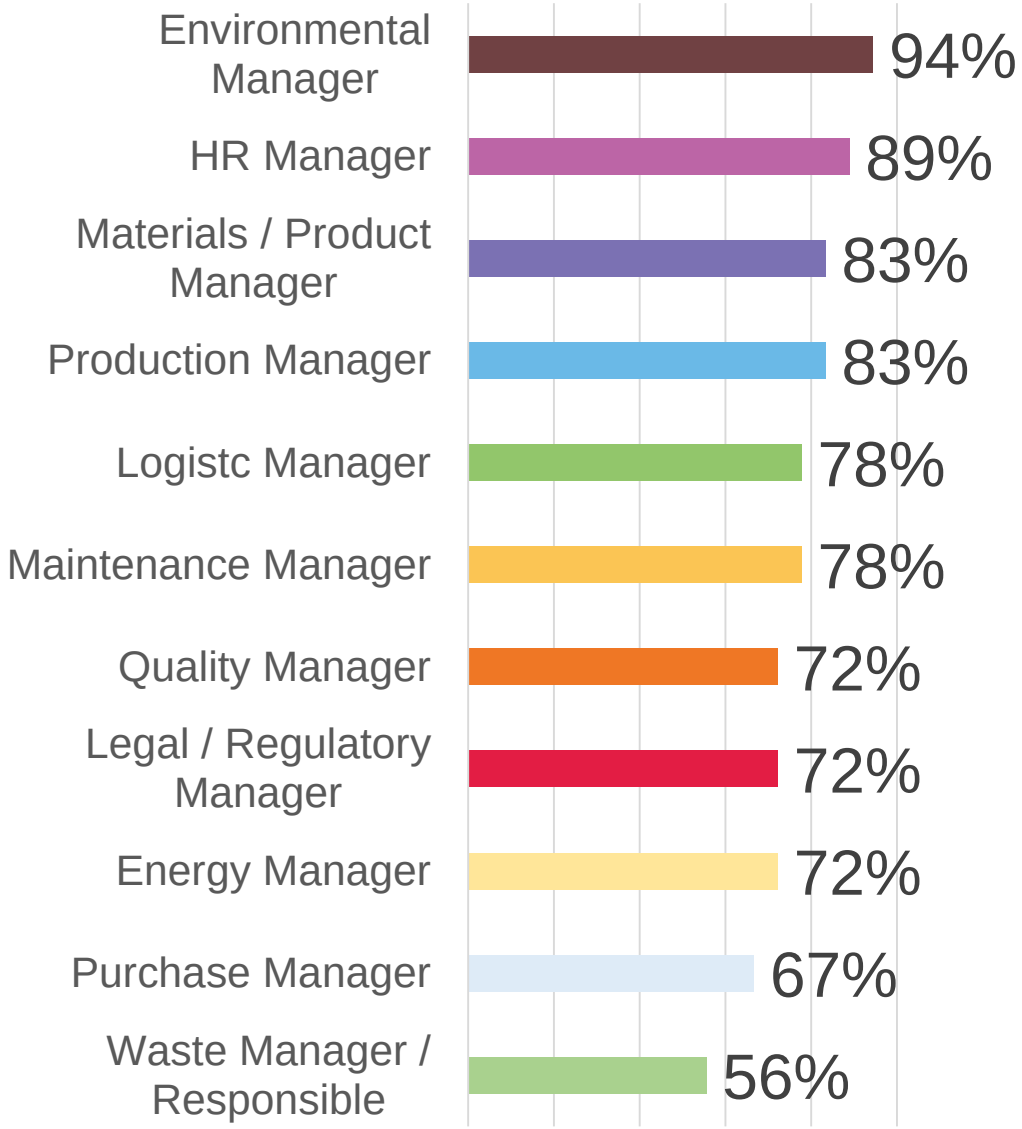
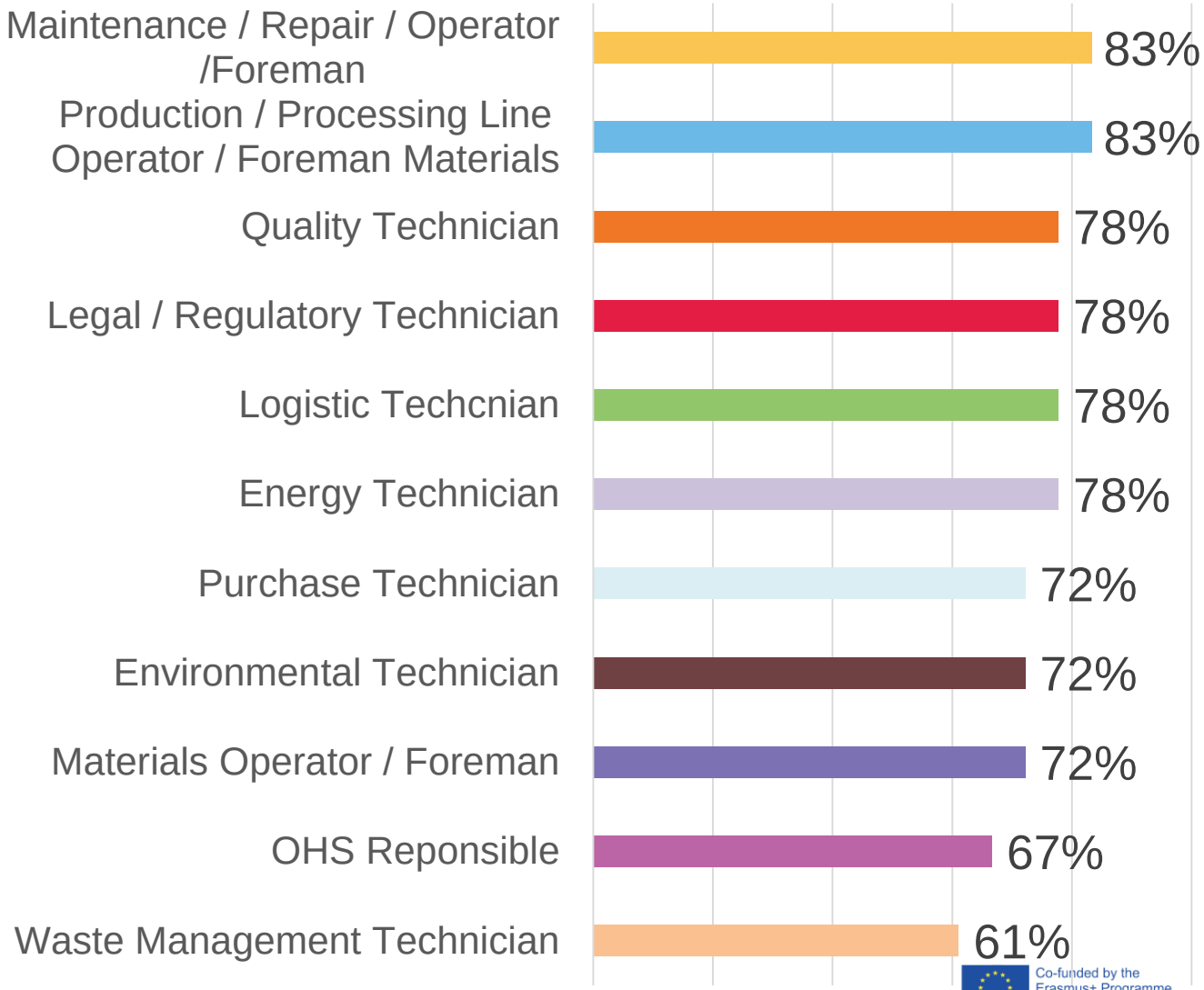
Prominence of manager profiles



Prominence of operator profiles



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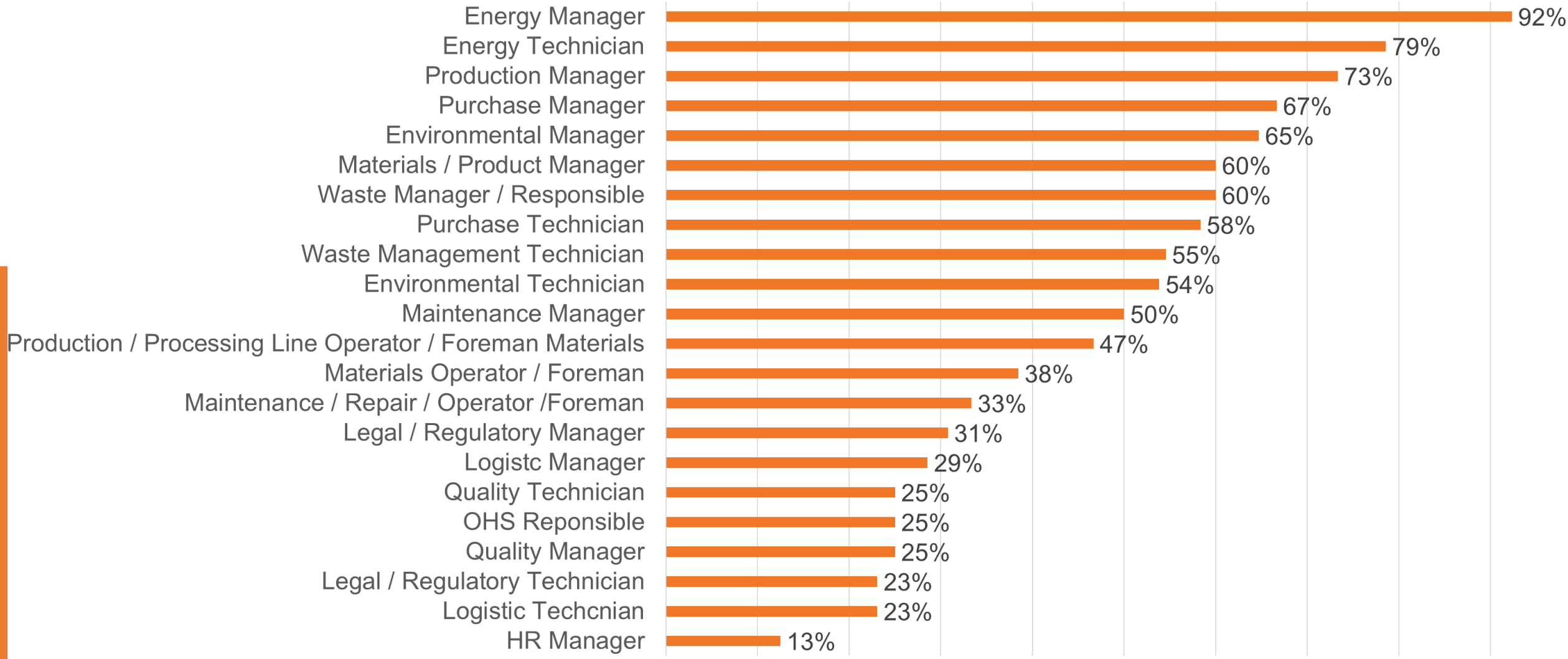
The most important profiles for Energy Efficiency



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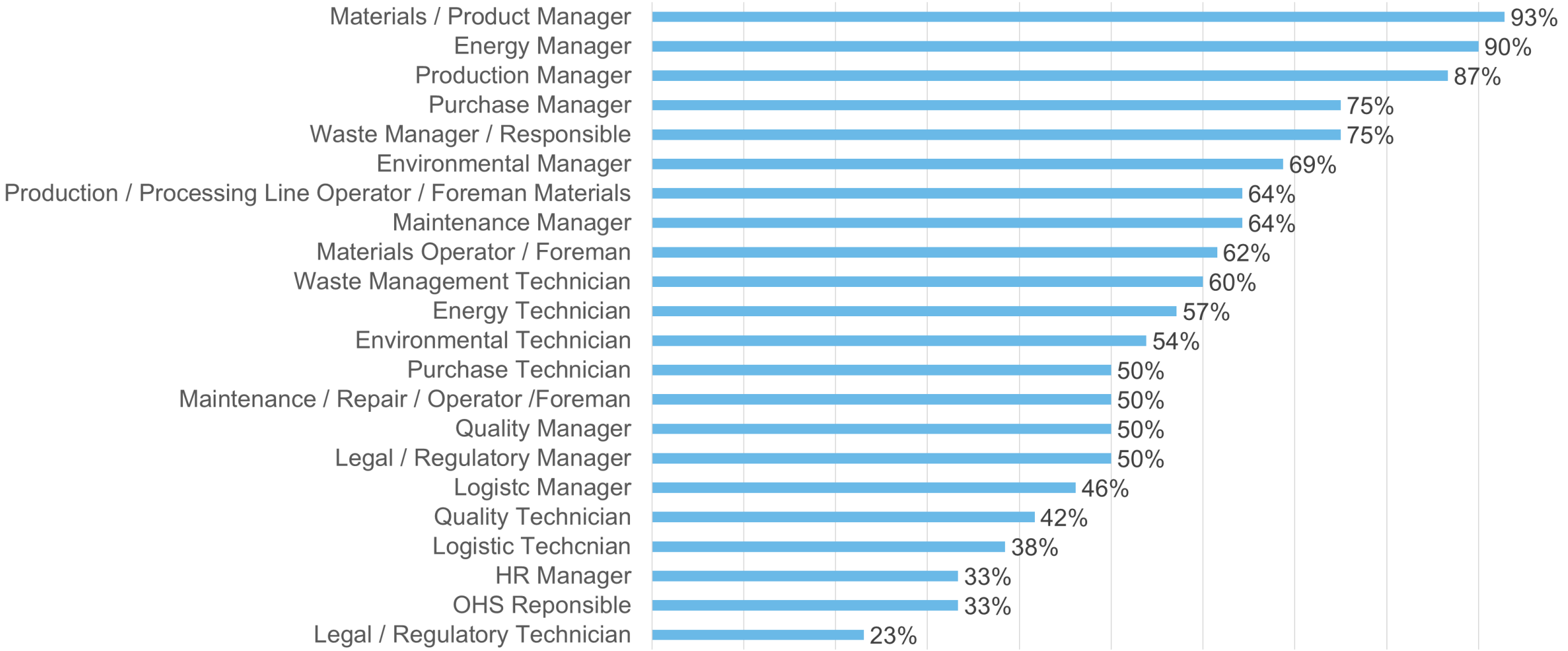
The most important profiles for Industrial Symbiosis



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Skills Classification

Technological

Management and Operator

Industrial Symbiosis

- **IS basic understanding** (core concepts, resource, re-use and recycling, methodologies)
- **System optimisation & process analysis**
- **Field experience (in IS)**
- **Product life cycle thinking assessment** (incl. eco-design of product, technology and processes)
- **Sustainable resource management** (incl. waste management - reduction and prevention, water conservation, environmental monitoring)

Energy Efficiency

- **Understanding energy use & costs** (incl. manufacturing principles to reduce energy consumption)
- **Energy management of equipment and parts**
- **System optimisation & process analysis**
- **Energy data collection & analysis** (selection and use of monitoring equipment for energy consumption, developing and installing analysis systems for energy use, monitoring and investigating, complex information processing and interpretation)
- **Field experience (in EE)**

Individual / Personal

- **Environmental awareness** (of consequences of energy and materials use)
- **Collaboration** (incl. team-based approach, multidisciplinary thinking and acting, effective communication, ...)
- **Initiative taking & entrepreneurship** (incl. strategic thinking, working autonomously, decision making)
- **Complementary, systematic, critical thinking**
- **Creativity**

Regulatory

Management

- **General regulatory awareness** (incl. legislation, compliance)
- **Legislation on waste management & CO2 emissions**

Business related

- **Business knowledge** (commercial, economics, complex financial analysis, financial planning/management, accounting and audit)
- **Identification of potential opportunities** (considering emerging trends, entrepreneurial mindset, integrate energy efficiency findings into cross-business plans, business cases)
- **Fostering cooperation** (incl. networking, encourage collective decisions, negotiation)
- **Business model transformation**
- **Project planning and management**

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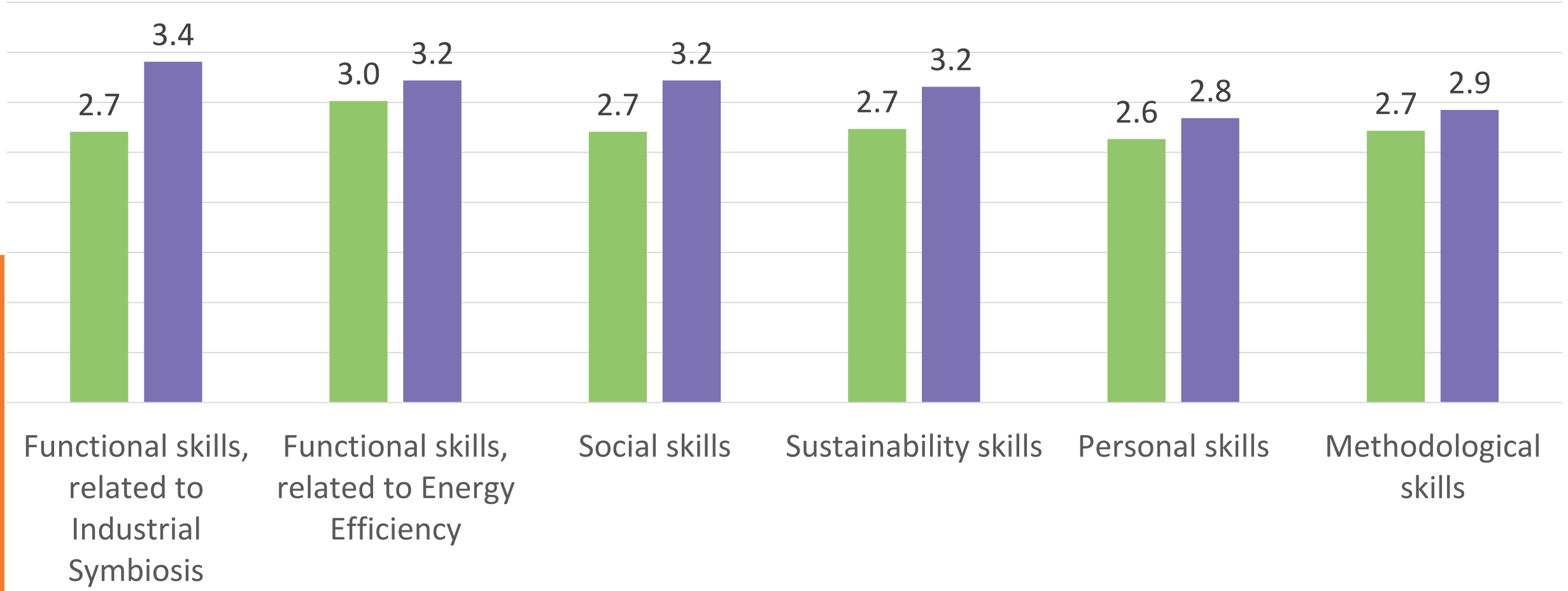
Manager Skill Needs (Survey 2024)

0: Novice
1: Awareness / Basic Actor
2: Practioner
3: Expert
4: Master



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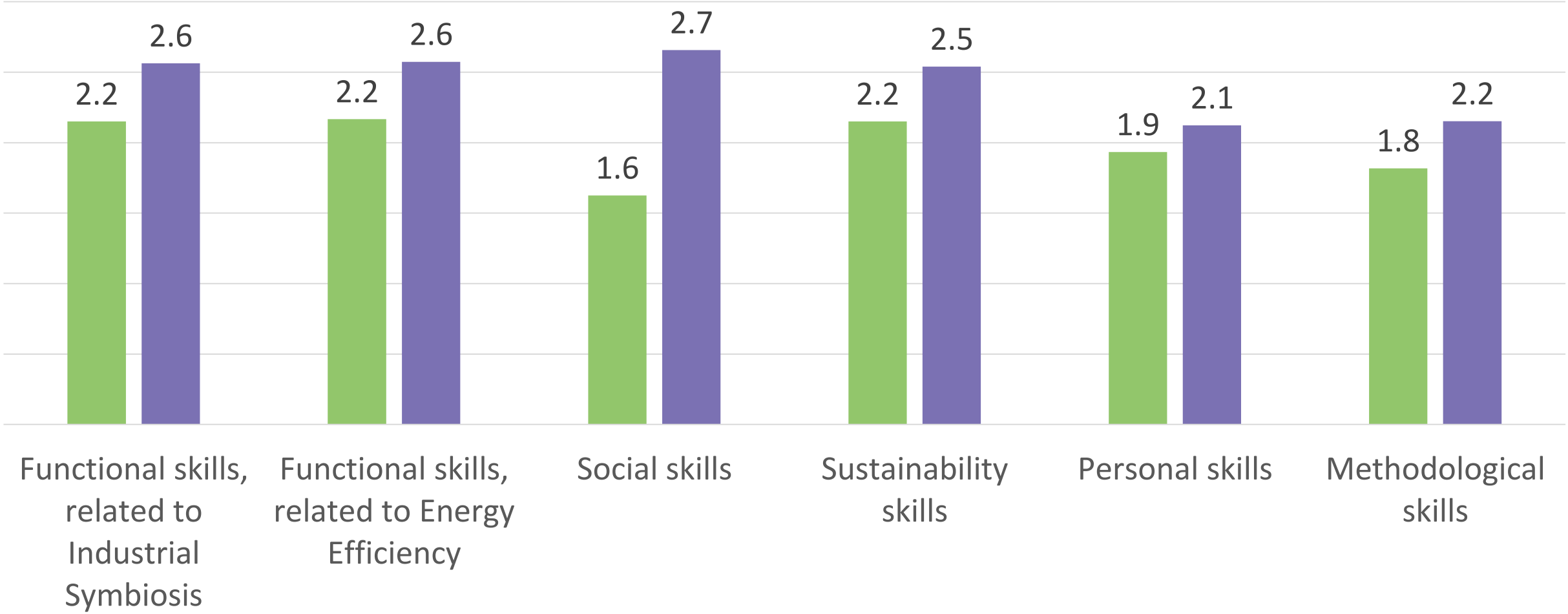
Operator Skill Needs (Survey 2024)

0: Novice
1: Awareness / Basic Actor
2: Practioner
3: Expert
4: Master



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VET System Support

Key gaps and barriers across countries:

- **Educators' readiness:** Teachers often lack competencies on how to teach green skills effectively.
- **Poor evidence base:** Robust assessments of relevant educational programmes' effectiveness are necessary to replicate the good practices.
- **Course structure and tools:** Establishing a cross-sectoral IS/EE module that could be integrated in different occupational trainings could be helpful. Ideally, it should be accompanied by easily accessible didactic materials and guidance for education providers on how to deliver it best.
- **A uniform skills recognition system:** Green skills are not easily verified and certified, which discourages learners (as they rarely receive a formal certificate upon completion of training) and hinders skills tracking and forecasting.

Other important barriers:

- **Lack of coherent policies:** The responsibility for green skills delivery is usually split between many stakeholders (educational, industrial, and environmental ministries, regional governments, VET schools, civic organisations, etc.) and not guided by a single overarching strategy.
- **Insufficient funding:** Funding tends to be fragmented and short-term.

(Analysed VET Systems: DE, ES, IT, PL and PT)

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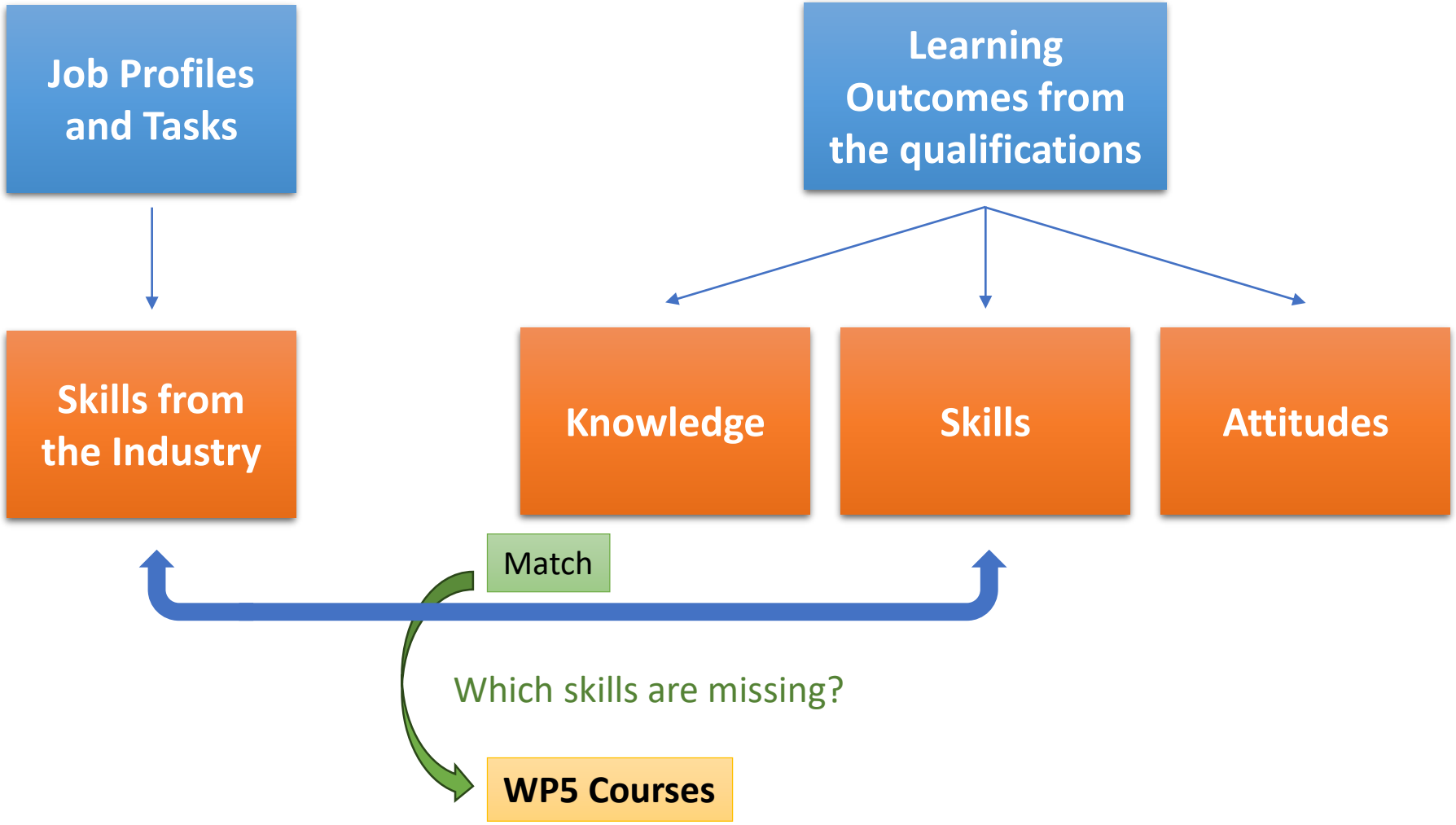
VET System Support



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Occupation and VET Systems Related Skills Matrix

Job and skills	Description of the job in EU frameworks	Job & Qualification in country	National Frameworks	Integration in EU Framework Categories	IS and EE skills readiness
• Job profile alternative • Job profile titles • Skill needs • Skill level	• ESCO group label • ISCO group code • ESCO occupation level and code • ESCO alt. Labels • ESCO skills	• ESCO group label in country • Job labels in country • Qualification label	• National qualification framework labels of occupation and qualification • list of national VET programmes delivering those • duration	• Europass certificate • ISCED info • EQF info • ESCO integration of qualification	• Skill needs • Skill levels • Skills sufficiently addressed by qualification • Integration of skill in qualification, • Addressed in VET programme, learning outcomes indicated

Selected Profiles:
Energy Manager
Environmental Manager
Waste Managing Technician

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SPIRE-SAIS Skills Matrix - Contents

	Job and skills					Description of the job in EU frameworks							
SPIRE-SAIS label	Job profile (WP3 input)	Alternative job profile titles	Skills Needs	Level of the skill		ESCO group label	ESCO group code	ESCO occupation label	ESCO occupation code	ESCO Alternative labels	ESCO Skills relevant for IS	ESCO Skill alternative labels	ESCO Skill reusability levell
				Current level	Future level								
Energy Manager	Energy manager	Energy excellence manager				Professional services managers not elsewhere classified	1349	Energy manager	1349.12	energy demand forecasting manager	conduct energy audit	conducting energy audit // analysing energy consumption //	sector-specific
			IS basic understanding							environmental compliance manager	promote sustainable energy	promoting sustainable energy // encouraging use of	sector-specific
			System optimisation & process analysis							energy monitoring manager	identify energy needs	energy need identifying / identify energy needs / energy needs	sector-specific
			Field experience (in IS)								analyse energy consumption	analysing energy consumption // energy consumption analysing //	cross-sector
			Product life cycle thinking assessment							green policy manager	define energy profiles	determine energy profiles // calculate energy profiles	sector-specific
			Sustainable resource management							energy procurement manager	advise on utility consumption	give advice about utility consumption // advice giving	sector-specific
			Understanding energy use & costs							energy policy manager	advise on heating systems energy efficiency	giving advice on heating systems energy efficiency //	cross-sector
			Energy management of equipment and parts							energy manager	advise on sustainable management policies	encourage sustainable management // advocate	cross-sector
			System optimisation & process analysis							environmental sustainability manager smart energy specialist	develop energy policy	developing energy policy // energy policy maintaining // maintaining energy policy // develop energy policy // energy policy developing // maintain	sector-specific
			Energy data collection & analysis							energy and sustainability manager	carry out energy management of facilities	carry out energy management of facilities //undertaking energy audit of facilities // carrying out	cross-sector

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SPIRE-SAIS Skills Matrix - Contents

	JOB & QUALIFICATION (in DE)			German National Frameworks				Integration of EU Framework						
SPIRE-SAIS label	ESCO group label (in DE)	(Alternative) Job Labels (in DE)	Qualification label (in DE) [Berufsausbildung]	KldB 2010	DQR (GQF)	Programmes providing this qualification	Duration	Certificate in Europass Format	ISCED Info	EQF	ESCO	Skill needs	Skill level	
													Current level	Future level
Energy Manager														
												IS basic understanding		
												System optimisation & process analysis		
												Field experience (in IS)		
												Product life cycle thinking assessment		
												Sustainable resource management		
												Understanding energy use & costs		
												Energy management of equipment and parts		
	Energiemanager / Energiemanagerin	Energiemanager / Energiemanagerin / Manager / Managerin / Fachwirt für Energiewirtschaft / Geprüfte Fachwirtin für Energiewirtschaft	Geprüfter Fachwirt für Energiewirtschaft / Geprüfte Fachwirtin für Energiewirtschaft	32537	6	Geprüfter Fachwirt für Energiewirtschaft und Geprüfte Fachwirtin für Energiewirtschaft	3 (or more) + 2 years of work	Link (EN)	655	6	Yes	System optimisation & process analysis		
												Energy data collection & analysis		
												Field experience (in EE)		

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National Level: Germany

IS and EE Skills Readiness							
Skill needs	Skill level		Whether this skill is sufficiently addressed in the DESCRIPTION OF QUALIFICATION? (YES/NO/partly)	How this skill is integrated in the DESCRIPTION OF QUALIFICATION?	Whether this skill is sufficiently addressed in the particular QUALIFICATION PROGRAMME? (YES/NO/partly)	How this skill is integrated in the particular QUALIFICATION PROGRAMME?	Relevant learning outcomes indicated in the particular QUALIFICATION PROGRAMME?
	Current level	Future level					
					Name of the programme: Geprüfter Fachwirt für Energiewirtschaft und Geprüfte Fachwirtin für Energiewirtschaft		
IS basic understanding			No	Not mentioned	No	N/A	N/A
System optimisation & process analysis			No	Not mentioned	No	N/A	N/A
Field experience (in IS)			No	Not mentioned	No	N/A	N/A
Product life cycle thinking assessment			No	Not mentioned	No	N/A	N/A
Sustainable resource management			No	Not mentioned	No	N/A	N/A
Understanding energy use & costs			Yes	"Assessing processes and cash flows related to energy management and evaluating their significance and influence	Yes	As in the qualification framework	Certified energy management specialists can independently administer fields related to energy management in energy companies ..., in energy associations and in energy-intensive industrial enterprises. In this context, they motivate, support and manage staff.
Energy management of equipment and parts			Partly		Partly		
System optimisation & process analysis			Partly	"Applying calculation and controlling mechanisms, creating variance analyses, identifying and assessing vulnerabilities and risks and	Partly	As in the qualification framework	
Energy data collection & analysis			Partly	"Assessing processes and cash flows related to energy management and evaluating their significance and influence	Partly	As in the qualification framework	

SPIRE-SAIS Training Framework

Generic IS Training

Thematic Indepth / Advanced Training Courses

- Financial Assessment
- Critical Raw Materials
- H2
- others

Sector Specific Illustrations / Specifications

Job Profile / Function Related Courses

- Production Areas
- managerial operational
- Functional Areas
- IS Facilitator

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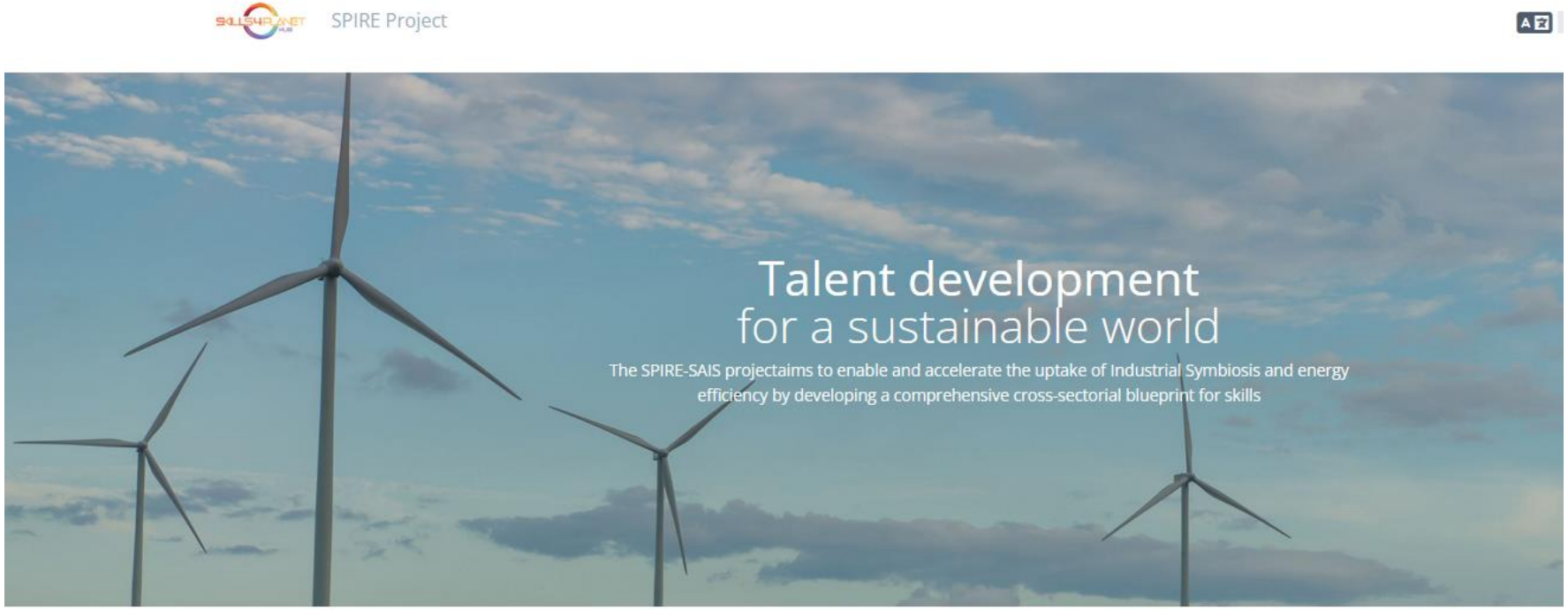
Online Training Platform: SKILLS4Planet



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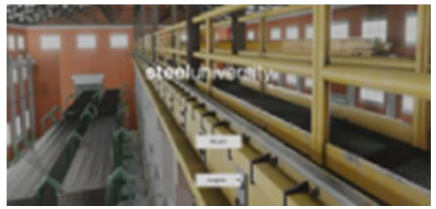
SKILLS4Planet OnlineTraining Platform

Hosting system for engaging and immersive digital learning solutions

- Game-based learning and simulations
- 3D Animated Videos
- Interactive 3D Models
- E-learnings
- VR/AR solutions
- Webinars

Basic Oxygen steelmaking simulation



Virtual Reality (VR) games for safety training

3D Interactive model of Blast Furnace

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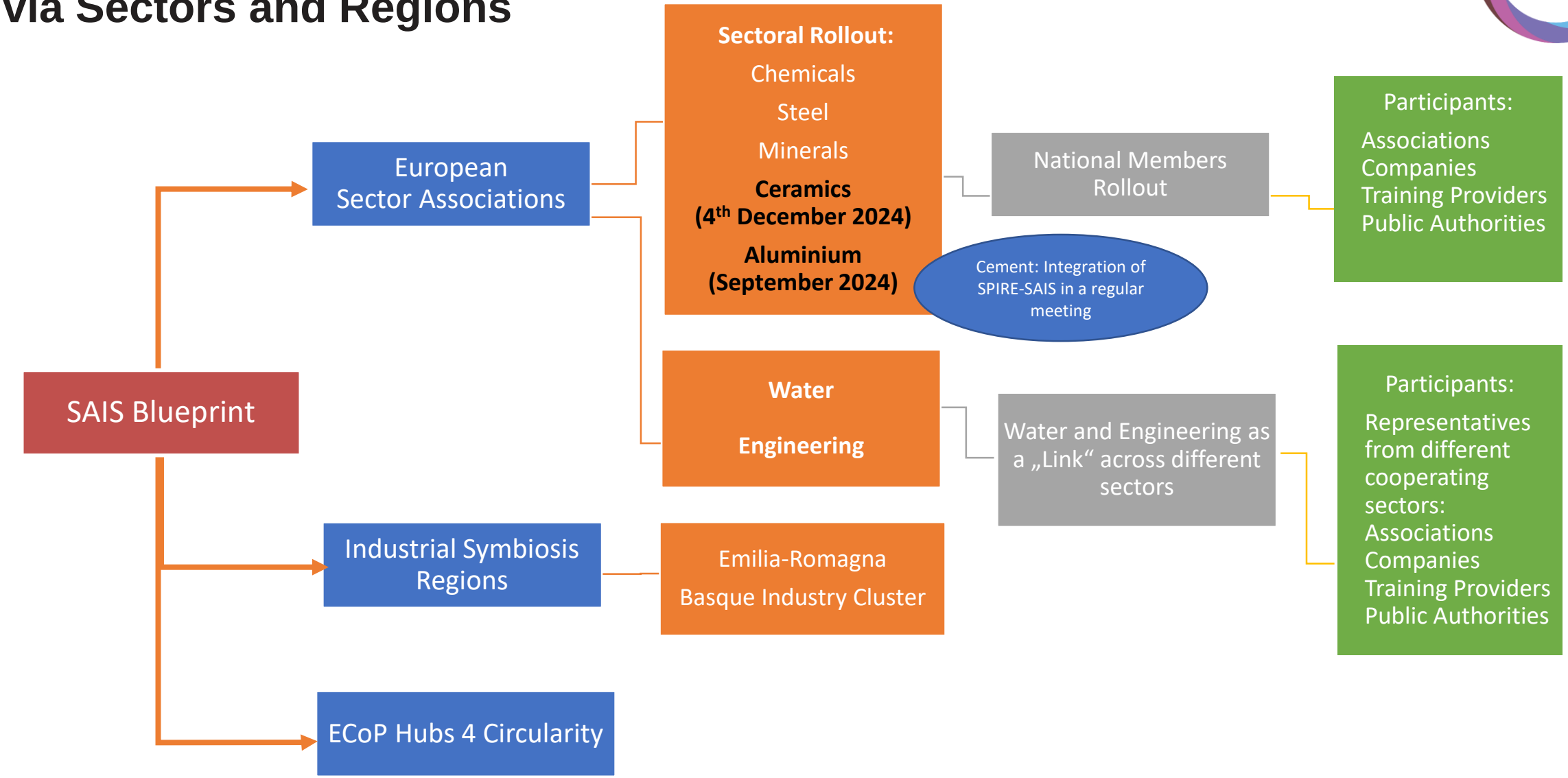
Open Coordination of the Rollout via Sectors and Regions



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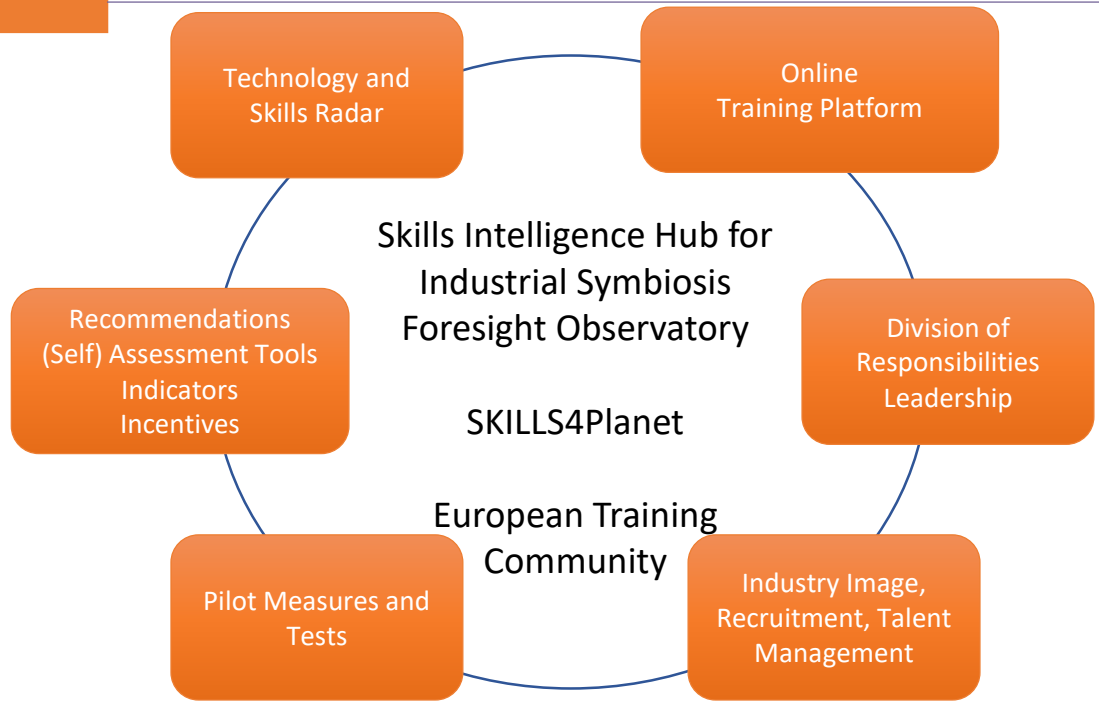
SPIRE-SAIS European Governance Structure



A.SPIRE
Pact for Skills: Large Scale Partnership Energy Intensive Industries

Foresight Observatory Technology and Skills Radar aligned with *PWG Societal Innovation Foresight Team*	⟷	Skills Intelligence Hub SKILLS4Planet Online Training aligned with *ESSA / Hubs for Circularity Online Platform*	⟷	Training Community of Practice for Sectoral-National-Regional Training Eco-Systems aligned with *Steering Committee Sector Representatives* *Hubs for Circularity Online Platform*

Connection with other European Activities in Relation to Skills

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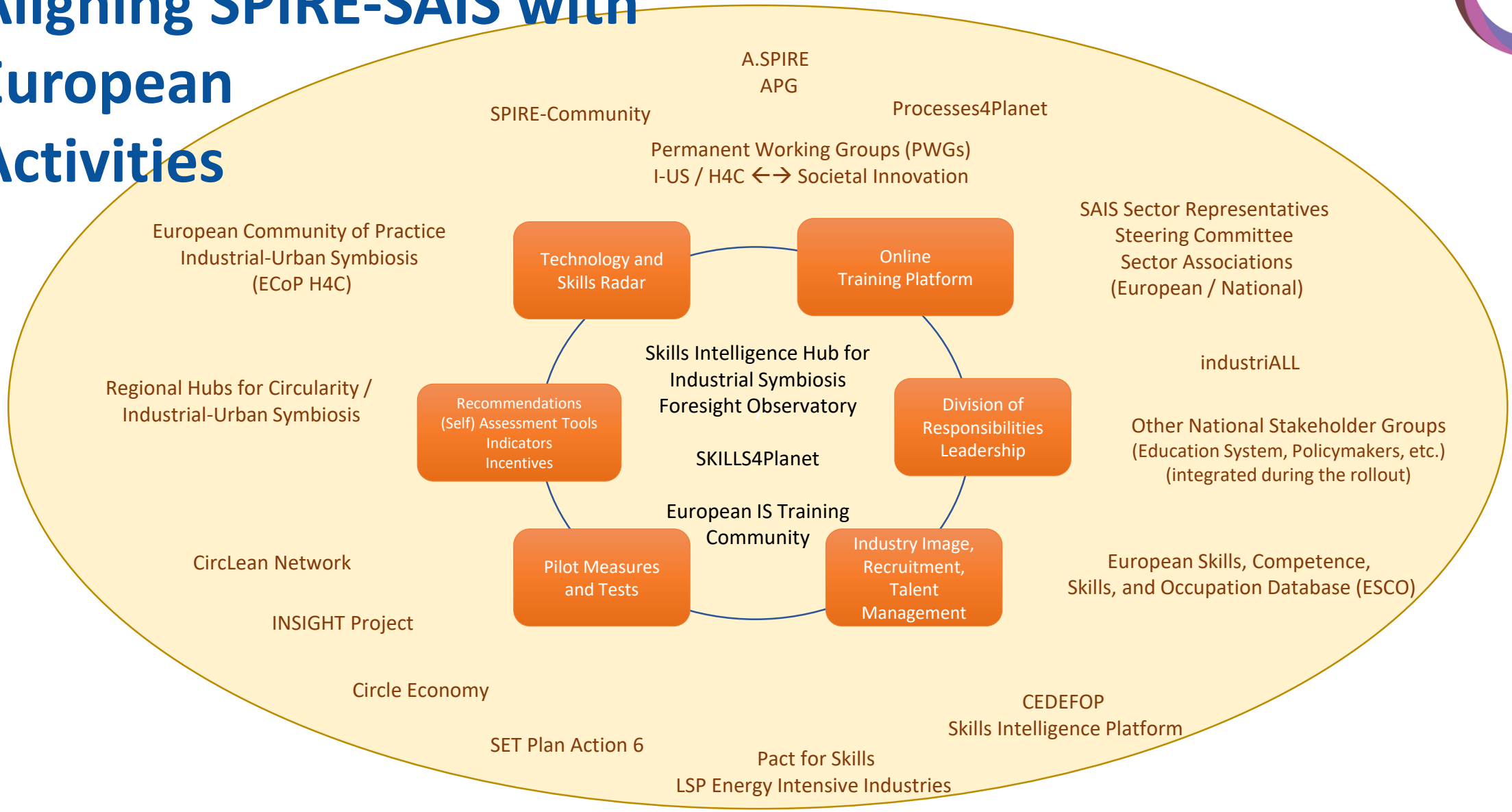
Aligning SPIRE-SAIS with European Activities



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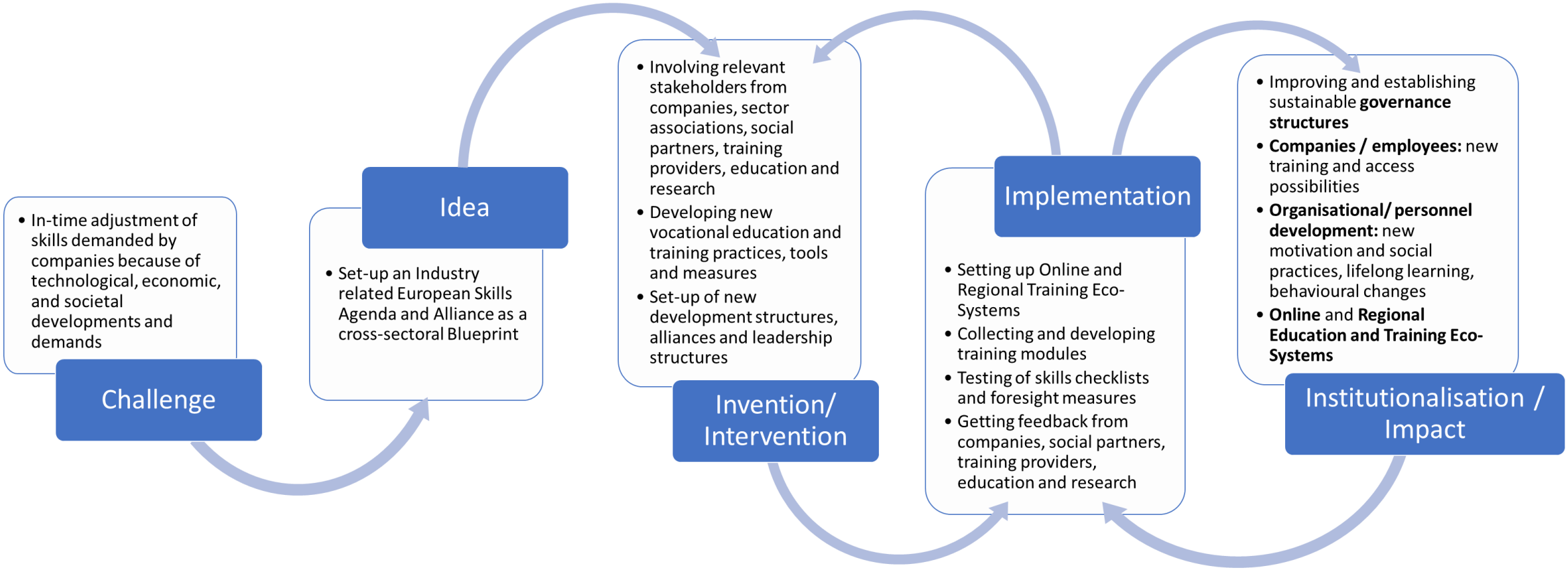
Skills Alliance and Strategy Building as a Social Innovation Process



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SKILLS4Planet Training Platform

Jorge Muract, worldsteel / steeluniversity

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Implementation and Rollout of the European Blueprint
SPIRE-SAIS Policy Recommendations

Andrea Tropeoli, RINA

SPIRE-SAIS FINAL CONFERENCE, 23 MAY 2024

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Step into Action: Shaping the „Circular“ Future of Industrial Symbiosis and Energy Efficiency

Miikka Nieminen, EUROFER (Moderator)

Aurela Shtiza, IMA Europe

Christian Leroy, European Aluminium

Klaus Peters, European Steel Technology Platform ESTEP

Sophie Grenade, IndustriALL Europe

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SPIRE-SAIS Sectoral Blueprint: The European Challenge in Implementing IS and EE Skills and Jobs in the Future Process Industry

Veit Echterhoff, thyssenkrupp Steel Europe
Monica Perez-Clausen, AGBAR

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The European Community of Practice: Sectoral and Regional Strategies for Future Skills for IS and EE in the Industry

Moderator: Clara Behrend – TU Dortmund

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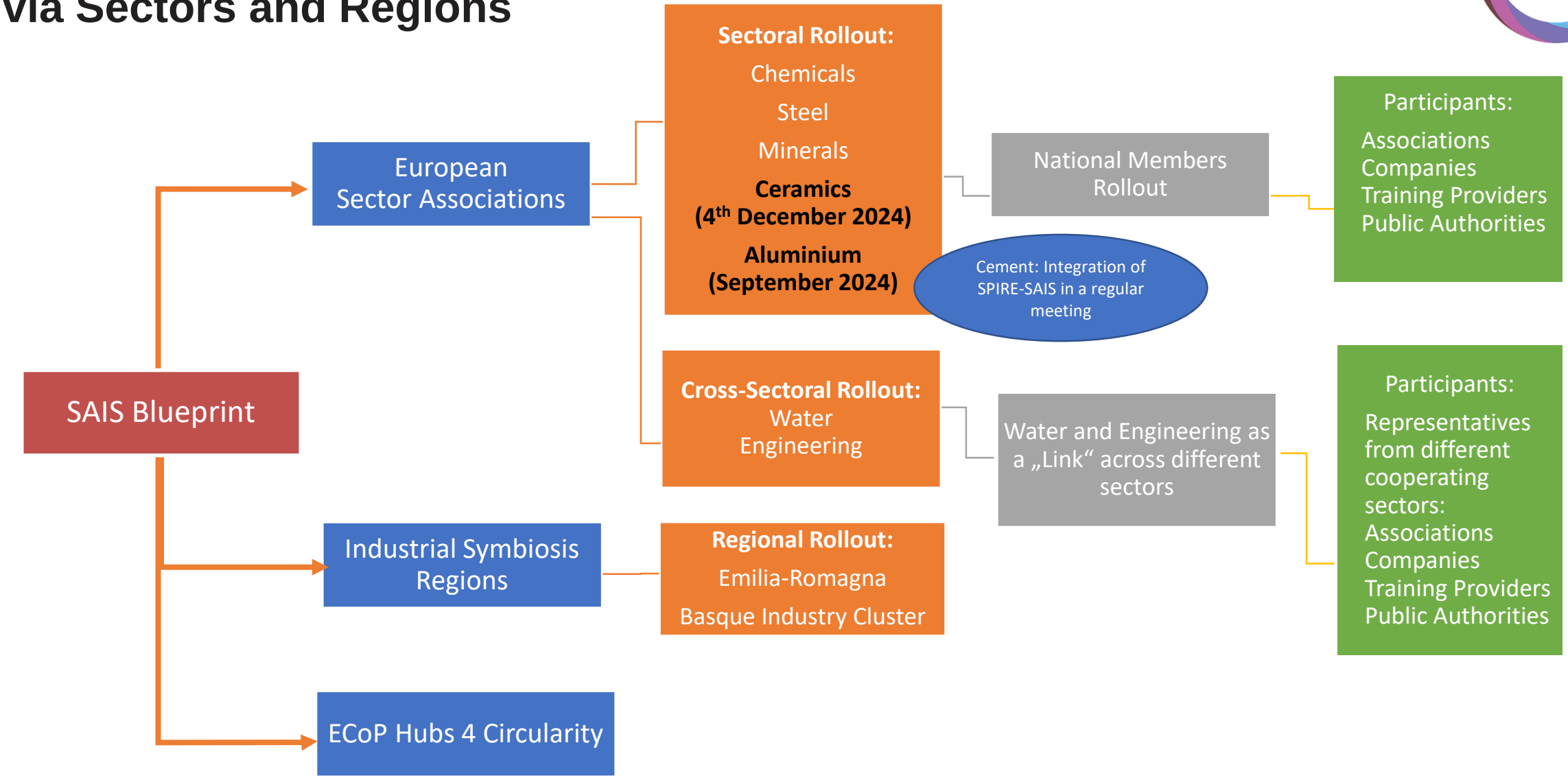
Open Coordination of the Rollout via Sectors and Regions



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Common Topics

- Awareness for Industrial Symbiosis
- Transversal skills, soft skills AND technical skills (for resource management and collaboration)
- Recruitment and retention needs differ between sectors and regions
- Industrial Symbiosis is an opportunity
  - Challenge: replicate practices & apply valuable IS solutions
- EU policies often evolve and change faster than training offers

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The European Community of Practice: Sectoral and Regional Strategies for Future Skills in the IS and EE Industry

Moderator: Clara Behrend, TU Dortmund University

Sectoral Roll-out:

ITC Ceramics Newcomer Training – Teresa Ros, ITC

European Junior Water Programme – Naomi Timmer, H20 People

Regional Roll-out

Emilia Romagna – Daniela Sani and Paola Valandro, ART-ER

Basque Country – Félix Bayón, Sidenor

H4C Community of Practice – James Woodcock, International Synergies

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Future Skills – Pitches of Other Findings and Perspectives

Community of Practice Industry 5.0 - Daniela Angione, InnoGlobal

BRIDGES 5.0 - Steven Dhondt, TNO

A.SPIRE/P4Planet - Raquel Almeida, ISQ

RACE - Jan Eggert, EIT RawMaterials

ChemSkills - Anni Siltanen, ECEG

greenSME: Strengthening manufacturing SMEs for sustainability - Clara Behrend, TU Dortmund University

IS2H4C – Michael Kohlgrüber, TU Dortmund University

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An initiative of the European Commission

Looking forward:
Large Scale Skills Partnership Energy Intensive Industries and Pact for Skills

Felix Rohn, European Commission
Antonius Schröder, TU Dortmund University

SPIRE-SAIS FINAL CONFERENCE, 23 MAY 2024

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From Sectoral Blueprints to the European Pact for Skills / European Year of Skills 2023/24

Large Scale Partnership for

Find out more:

Energy-Intensive Industries (LSP EII)

The **Pact for Skills** is comprising 14 industrial ecosystems and more than 2,500 members

The **LSP EII** is one of the ecosystems and is focussing on Energy-Intensive Industries:

- it is based on and further developing two sectoral Alliances:

SHARE-SAIS

ESSA EUROPEAN STEEL SKILLS AGENDA

Composition of LSP EII

- sectors represented so far: Steel, Minerals, Water, Engineering, Logistics, Non-Ferrous Metals (Aluminium), Ceramics, Raw Materials, Welding, Chemicals, Cement
- Blueprint members and new members
- 41 signatories: 8 companies (also training providers), 12 industry associations, 1 union, 1 industry park, 6 training providers, 13 consultancies and research institutions (most of them are also training providers)

PACT FOR SKILLS Leader

An initiative of the European Commission

EUROPEAN YEAR OF SKILLS

https://pact-for-skills.ec.europa.eu/about/industrial-ecosystems-and-partnerships/energy-intensive-industries_en

Already Participating Organisations

1	A.SPIRE
2	ArcelorMittal
3	Cardiff University
4	CELSA Group
5	RINA Consulting - Centro Sviluppo Materiali S.p.A.
6	CIELFFA
7	CIRCE - Centro Tecnológico
8	EIT RawMaterials GmbH
9	The European Steel Association, EUROFER
10	European Federation for Welding, Joining and Cutting
11	Ferriere Nord
12	H2O-People
13	Höchst Industrie Park
14	IDENER
15	IMA-Europe
16	National Research&Development Institute for Non-ferrous and Rare Metals - IMNR
17	IndustriAll European Trade Union
18	INEGI - Institute of Science and Innovation in Mechanical and Industrial Engineering
19	InnoGlobal
20	ISQ - Instituto de Soldadura e Qualidade
21	Asocaición de Investigación de las Industrias Cerámicas (ITC-AICE)
22	Liberty Steel Group
23	EYDE Cluster
24	Pittini Group
25	SCUOLA SUPERIORE SANT'ANNA
26	Sidenor Aceros Especiales SLU
27	TU Dortmund University - Social Research Centre sfs
28	thyssenkrupp Steel Europe AG
29	University of Deusto
30	World Steel Association
31	Fundacion Zaragoza Logistics Center
32	ESTEP – European Steel Technology Platform
33	Institute of Philosophy and Sociology, Bulgarian Academy of Sciences (IPS-BAS)
34	UNESID
35	NEHEM BV
36	CiaoTech Srl.
37	Universidade Lisboa
38	European Chemical Employers Group ECEG
39	European Aluminium
40	APQuimica
41	BASTAS BASKENT CIMENTO SAN. VE TIC. A.S.

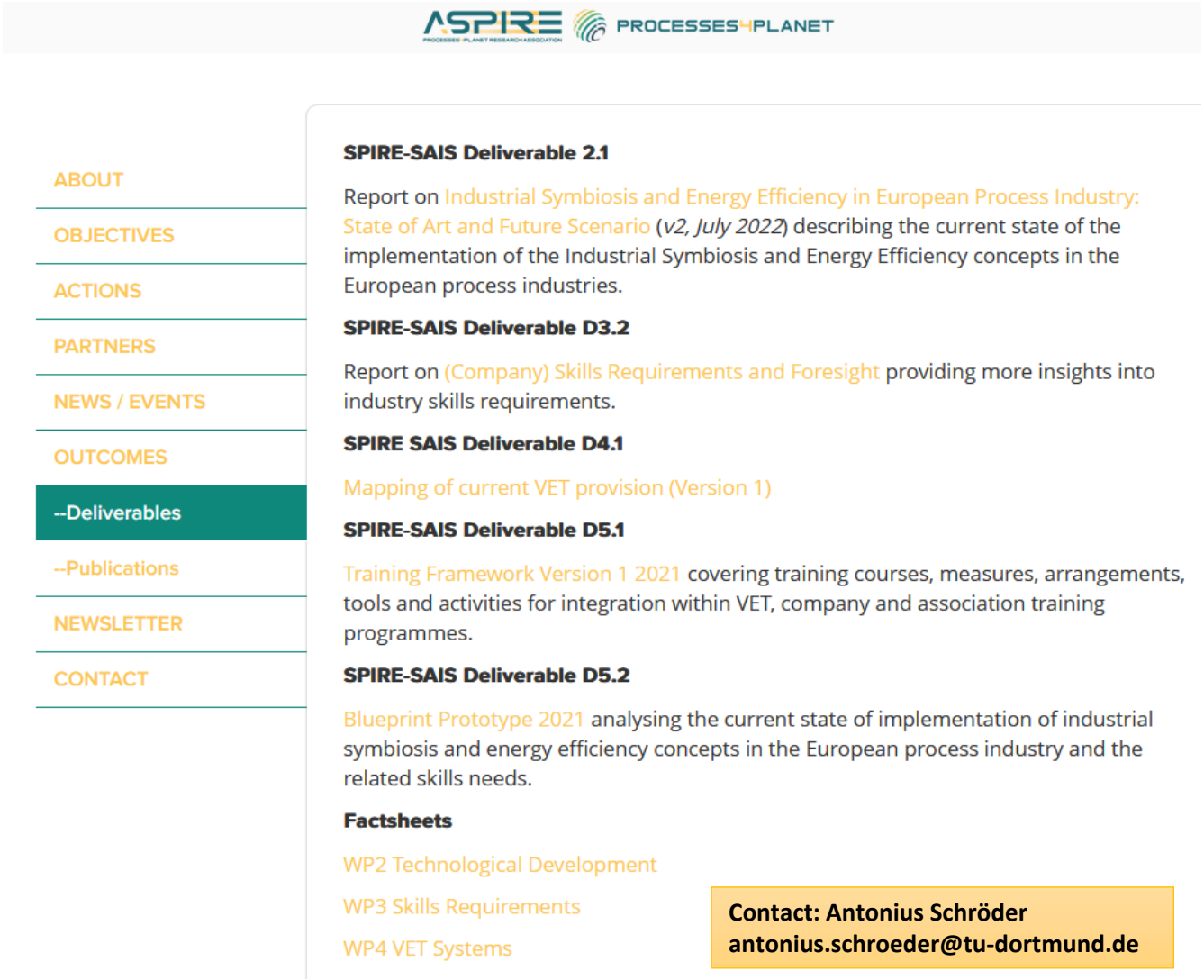
Energy Intensive Industries

The Energy-Intensive Industries ecosystem includes raw materials, chemicals, iron and steel, forest-based products, plastics, refining, cement, rubber, metals and fertilisers.

PACT FOR SKILLS Leader

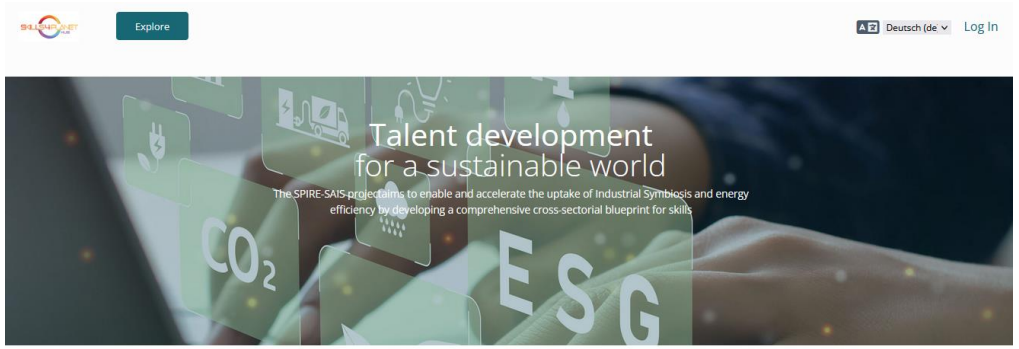
An initiative of the European Commission

Visit our homepage:
www.spire2050.eu/sais



Contact: Antonius Schröder
antonius.schroeder@tu-dortmund.de

Explore SKILLS4Planet:
https://hub.skills4planet.eu/



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