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Digital Pedagogy
in the Age of AI

TWIN-IN in brief

Promoting responsible TWIN transitions in European agrifood systems through INnovation and learning alliances

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Promoting responsible TWIN
transitions in European
agrifood systems through
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From Ideas to Impact: Erasmus+ Projects for the Twin Transition





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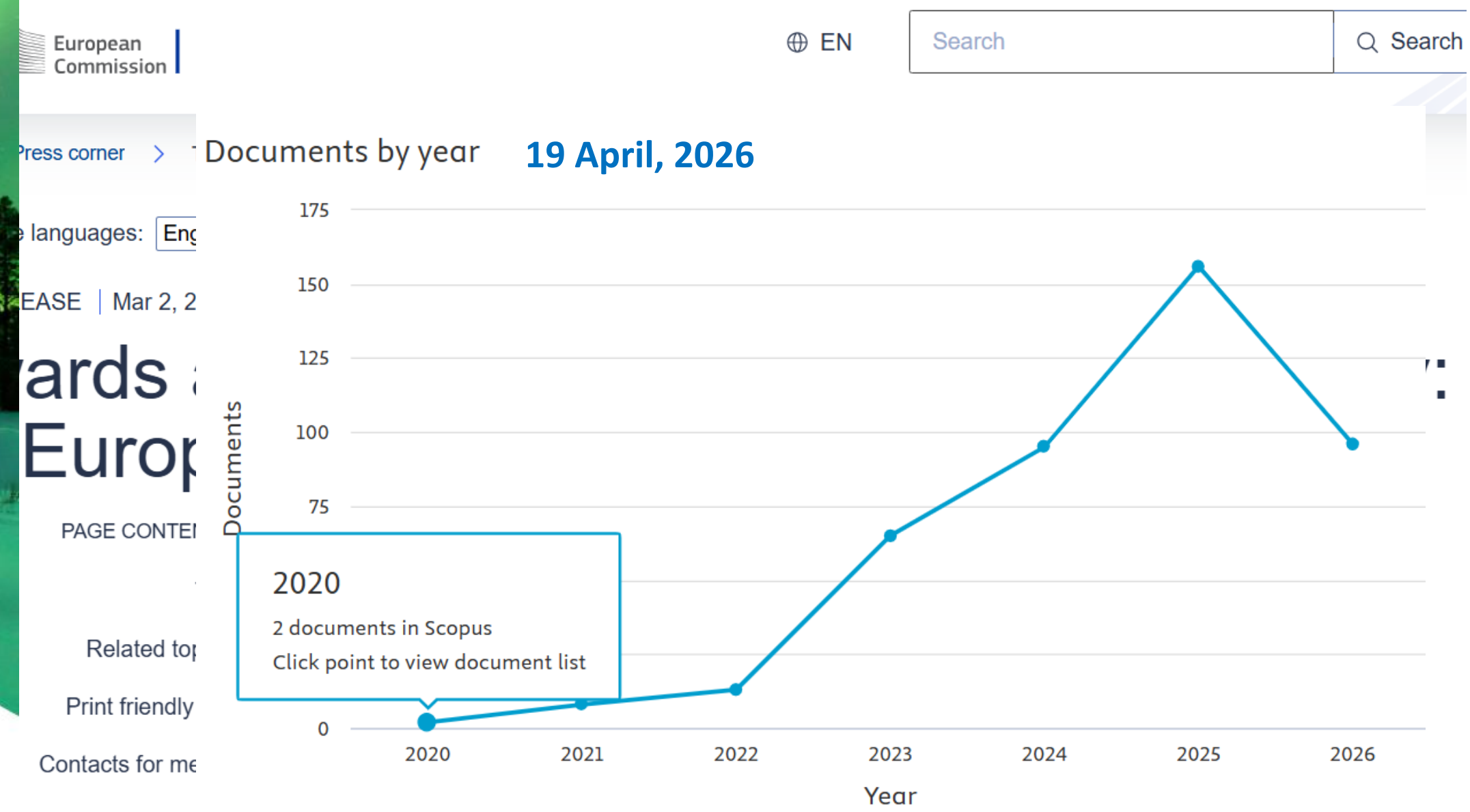
Twin transitions



The Twin Transition Century

The role of digital research for a successful green transition of society?

Morten Dæhlen



sitions" (p.





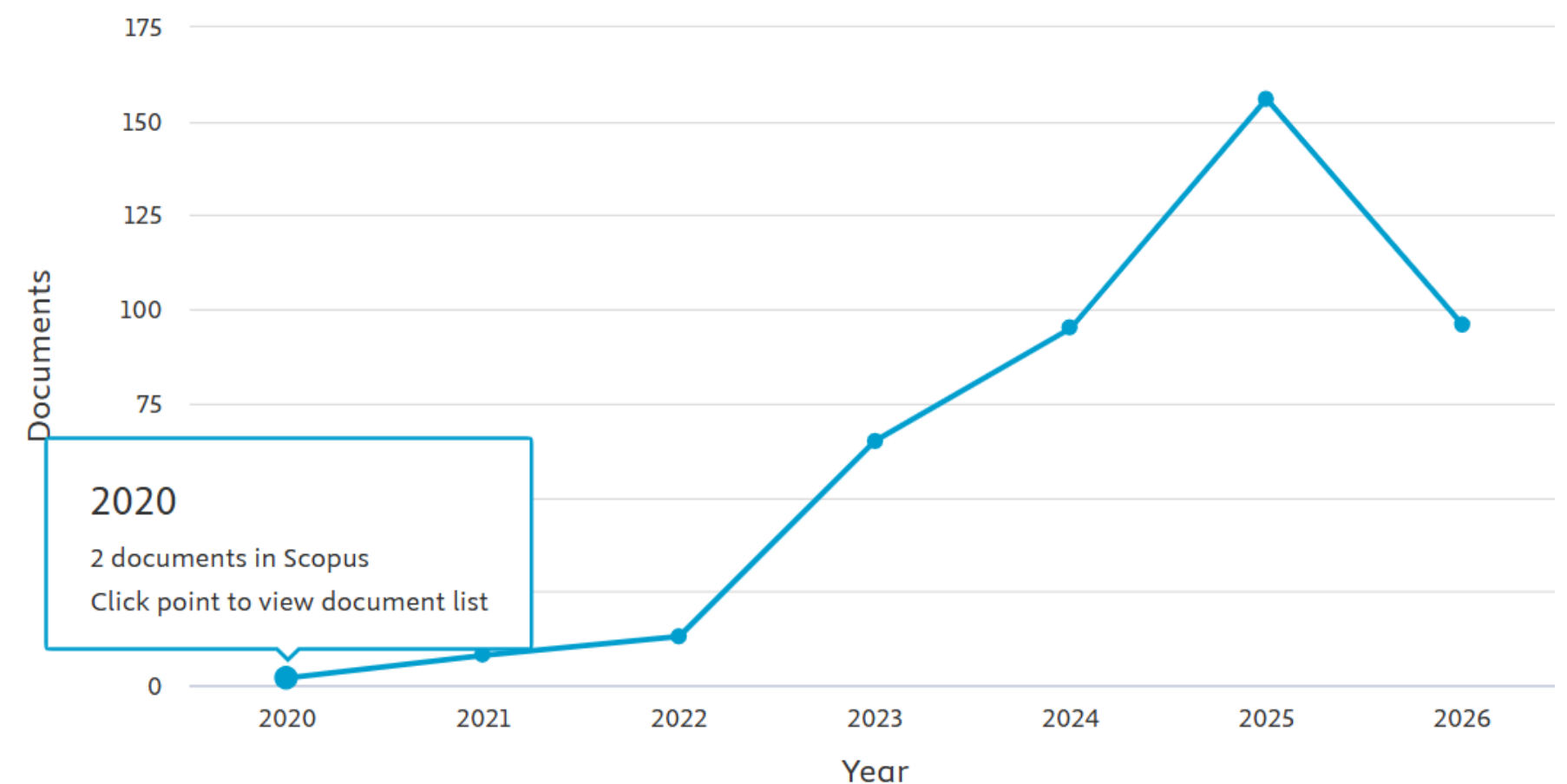
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Twin transitions

- Purposeful paradigmatic shifts of complex systems (that contain social, technological, and natural elements) toward a more sustainable and digitalized future state.
- Digital innovation and the interconnected knowledge and organizational structures enable transitions to new forms of environmental, social, and economic sustainability, while sustainable thinking governs the process of digitalization (Lioutas et al., 2025).

Documents by year **19 April, 2026**





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Characteristics of twin transitions

- Systemic processes
- Future-oriented processes
- High level of complexity
- Uncertainty
- Potential negative societal, economic, and environmental impacts
- Competence- and knowledge-demanding



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The competence-demanding nature of twin transitions



Testing and exploiting innovation



Extracting value from innovation



Envisioning potential agri-digital futures



Changing operational templates and production paradigms



Collaborate with heterogeneous actors



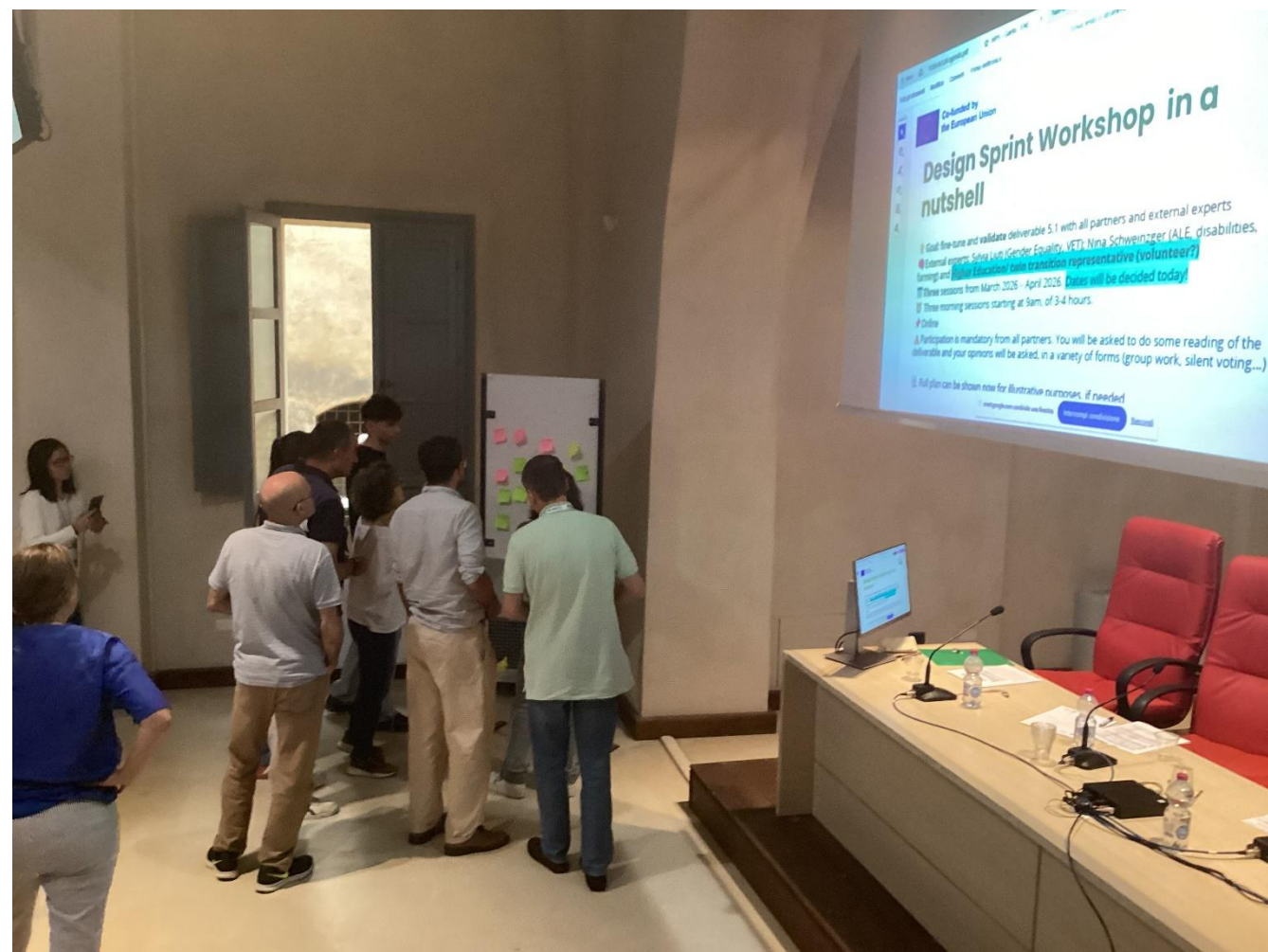
Maintaining resilience



**Need to sharpen
existing and
develop new
competencies**



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The project



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The TWIN-IN project

- **Project start:** 1/1/2025
- **Focus on:** Twin transitions, i.e., paradigmatic socio-technical shifts to a digitalized and sustainable future.
- **Actors involved:** Farmers, Farm advisors, Researchers, Students of Agronomy Departments, Vocational Education and Training providers, AgTech startups.
- **Central objective:** Designing, testing, validating, and optimizing a discovery-based and social learning-enhanced education/training model that will supply learners with sustainability and digital skills (**Twin Transition Schools**).



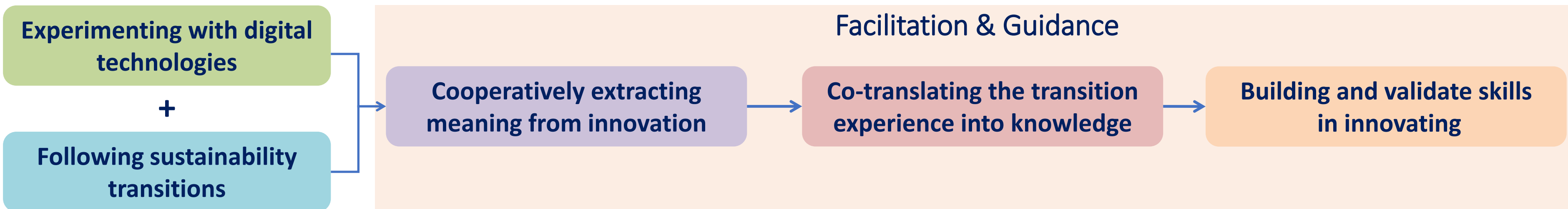


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Twin Transition Schools (1)

- **Aim:** To enhance skills building within problem-based contexts by exploiting transition experiences.
- **Theoretical bases:** Participatory knowledge production, collaborative innovation, and user-centered research approaches
- **Participants:** Actors who engage in twin transition processes.



- **Key feature 1:** Knowledge is distributed across the social actors who co-innovate
- **Key feature 2:** Skills are socially constructed and validated in pragmatic situations



Twin Transition Schools (2)

- Learning-by-innovating
- Following the Experiential Learning Cycle
- Doing and reflecting
- Social sense-making
- Exchange of knowledge and skills
- Applying the new knowledge

Exposing learners to new experiential episodes

Techniques:

- Designing twin transition experiences
- Learners act (with digital tools, toward sustainability)
- Inquiry into real-world problems
- Facilitating engagement

Critically reflecting upon lived experience. Translating experience into new knowledge

Techniques:

- Individual and collective reflection
- Discussion and negotiation of meaning
- Facilitating meaning extraction

Applying newly acquired knowledge and developing new skills

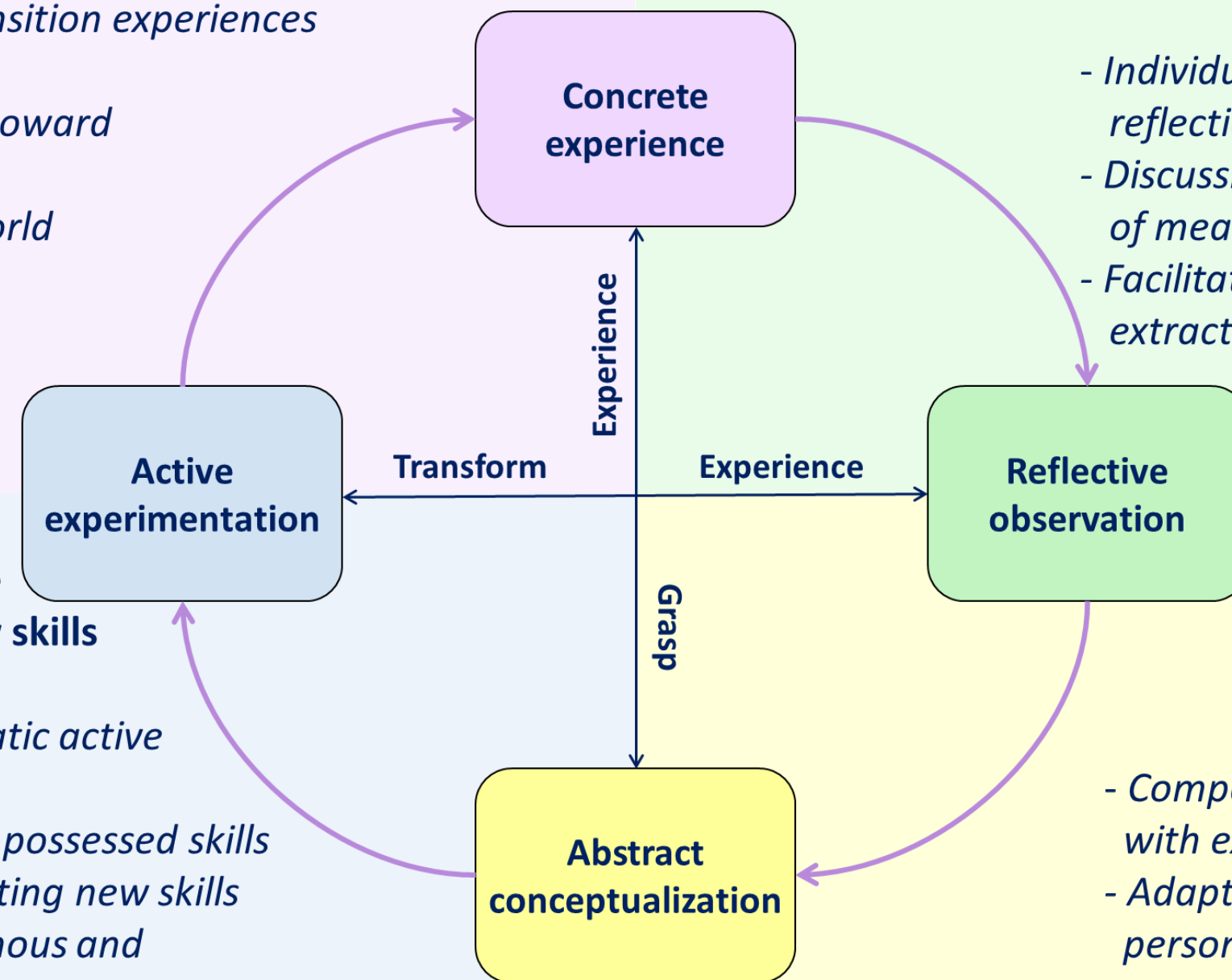
Techniques:

- Performing pragmatic active experimentation
- Amplifying already possessed skills
- Developing and testing new skills
- Becoming autonomous and self-reliant in navigating twin transitions

Understanding the experience. Putting experience into contexts

Techniques:

- Comparing the experience with existing knowledge
- Adapting the experience into personal and entrepreneurial contexts
- Acknowledging gaps in skills





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The TWIN-IN alliance

- Aristotle University of Thessaloniki (GR)
- International Hellenic University (GR)
- Università Degli Studi di Cassino e del Lazio Meridionale (IT)
- Universidad Politecnica de Madrid (ES)
- European Association for the Education of Adults (BE)
- Farming Advisors of Macedonia (GR)
- S.I.A. S.R.L. (IT)
- Academia Romana Filiala Iasi (RO)
- TEAGASC (IR)
- World Farmers Markets Coalition (IT)
- Aide a la Decision Economique (BE)
- Asociatia Producatorilor Locali Produs in Iasi (RO)
- Agricultural Cooperative of Fruits, Vegetables and Cotton of Pella (GR)
- Advanced Agricultural Measurement Systems Iberica S.L. (ES)
- Norges Forskningsrad (NO)





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Our approach



1. Forming a micro-ecosystem



2. Enabling the exchange of key resources



3. Envisioning potential agri-digital futures



4. Identifying the skills needed to navigate these futures



5. Creating niches where actors co-create knowledge and co-shape skills



6. Facilitating the social distribution of knowledge

Being responsible



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Phase 1

Steps

- 1. Identifying and selecting existing competency frameworks directly related to digital and sustainability transitions:**
 - DigComp
 - GreenComp
- 2. Determining indirectly related competencies:**
 - EntreComp
 - LifeComp
- 3. Developing new frameworks:**
 - DeepTech Competencies
 - Resilience Competencies
- 4. Building upon experiences across the world:** Meta-competencies and meta-knowledge



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TWIN-IN's best twin transition practices

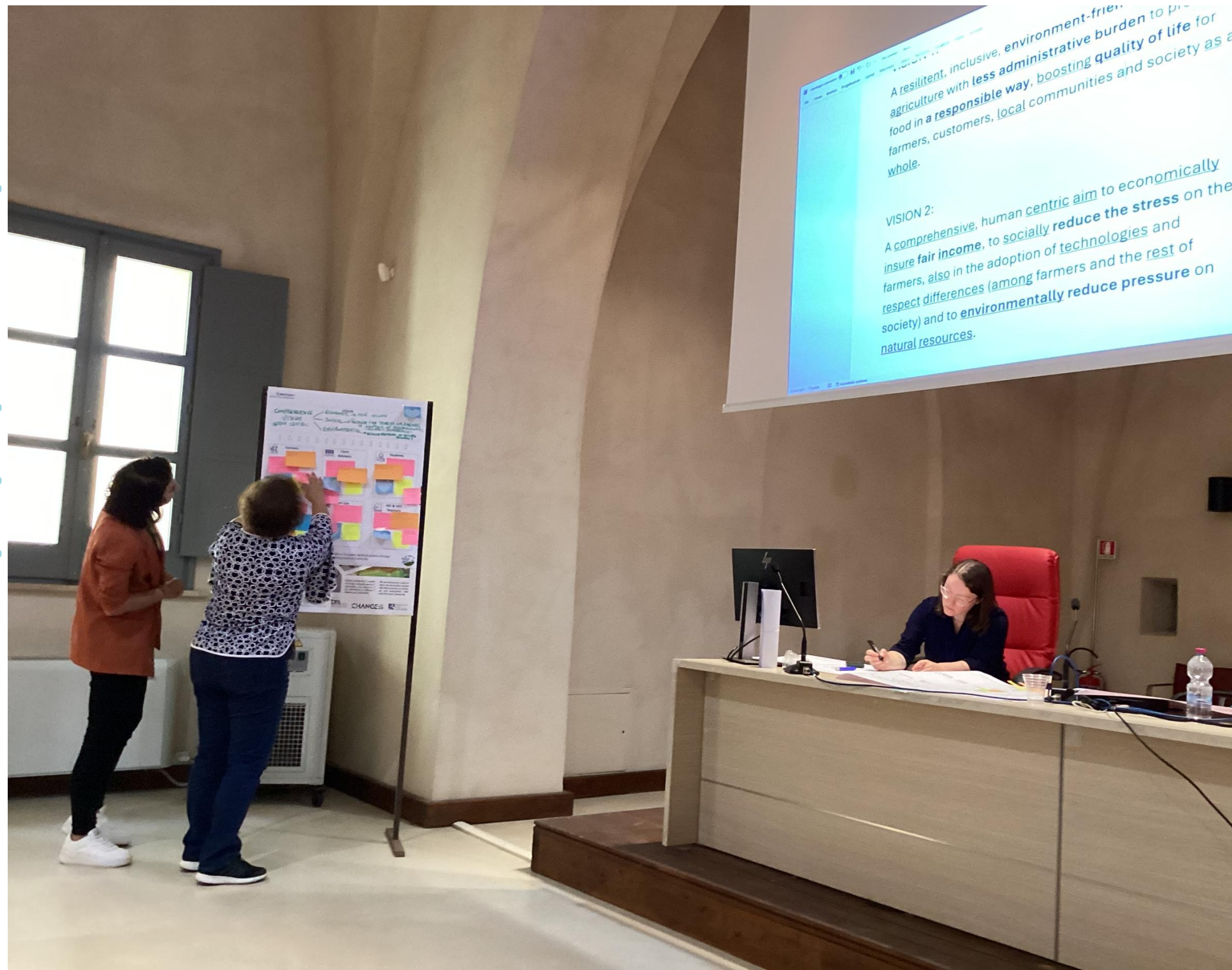




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Phase 2

- 1.
- 2.
- 3.
- 4.



A resilient, inclusive, environment-friendly agriculture with less administrative burden to produce food in a responsible way, boosting quality of life for farmers, customers, local communities and society as a whole.

VISION 2:
A comprehensive, human centric aim to economically insure fair income, to socially reduce the stress on the farmers, also in the adoption of technologies and respect differences (among farmers and the rest of society) and to environmentally reduce pressure on natural resources.

<p>FARMERS</p> <ul style="list-style-type: none"> - well being - flexibility - health protection - creativity - vision - financial literacy - planning - learning through experience - be able to use internet - be able to interpret the results - understand and <u>integrate technologies</u> - care for others and community - identify ideas and resources 	<p>FARM ADVISORS</p> <ul style="list-style-type: none"> - Content creation - flexibility - communication - spotting opportunities - mobilizing others - promoting nature - future literacy - managing digital content - solving technical issues - political agency - understand and <u>integrate technologies</u> - resources <p>MOTIVATING OTHERS</p>	<p>STUDENTS</p> <ul style="list-style-type: none"> - evaluating digital contents - managing learning - critical thinking - learning through experience - vision - understand, explore technology - exploratory thinking <p>Living with AI. (DeepTech)</p>
<p>RESEARCHERS</p> <ul style="list-style-type: none"> - empathy - critical thinking - problem framing - systems thinking - futures literacy - exploratory thinking - spotting opportunities - valuing ideas - planning - experiential learning - identify needs - adopt communication strategies - problem framing <p>responsible thinking</p>	<p>START UPS</p> <ul style="list-style-type: none"> - Content creation - programming - copyright & licences - promoting nature - future literacy - spotting opportunities - creativity - vision - financial and economic literacy - tech. exploitation & <u>integration</u> - planning - ideas & opportunity - resources 	<p>HEI & VET TEACHERS</p> <ul style="list-style-type: none"> - communication - empathy - growth mindset - programming - valuing ideas - mobilising others - system thinking - tech. exploitation - support fairness - integrating through dig. technologies <p>MOTIVATING OTHERS</p>
<p>COMMON</p> <ul style="list-style-type: none"> - sustainability values - embracing complexity - envisioning sustainable futures - acting for sustainability <p>collaboration</p> <p>tech. understanding</p> <p>creating resilience</p> <p>ALL LIFE + RESILIENCE</p> <p>Care for others and Community</p> <p>ADAPTABILITY</p>		



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The TWIN-IN competency framework

Domain	Competences	Skills
Sustainability and Systems Thinking	Embodying Sustainability Values	Valuing Sustainability
		Ethical Commitment and Fairness
		Conceptual Clarity and Understanding
		Promoting Fairness and Justice
		Critical Self-Reflection
		Promoting Nature
	Embracing Complexity	Systemic Thinking
		Coping with Uncertainty and Risk
		Critical Examination of Trade-offs
		Interdisciplinary Understanding
	Envisioning Sustainable Futures	Adaptive Learning and Experimentation
		Future Thinking
Scenario Planning		
Vision Communication		
Acting for Sustainability	Goal Alignment	
	Foresight	
	Promoting Sustainable Action	
	Responsible Innovation Approaches	
	Monitoring and Evaluation	
Entrepreneurship and Value Creation	Ideas and Opportunities	Participating in Collective Action
		Resource Efficiency
		Spotting Opportunities
		Creativity and Idea Generation
		Curiosity and Openness to Innovation
	Resources	Vision and Purpose
		User-Centred Understanding
		Assessment of Ideas
		Mobilizing Resources
		Financial and Economic Literacy
	Into Action	Digital and Material Resource Management
		Intellectual and Intangible Resources
		Planning and Organisation
		Simultaneous Allocation
		Taking the Initiative
Responsible Innovation for Community Benefit	Planning and Management	
	Coping with Uncertainty, Ambiguity and Risk	
	Working with Others into Action	
	Mobilizing Others	
Advocacy for Fairness and Inclusion	Market and Investor Interaction	
	Stability and Commercialization	
	Market and Investor Interaction	



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Baseline competency zones



Sustainability Competence

- Reflecting on sustainability
- Developing sustainability values
- Understanding the complexity of sustainability
- Envisioning potential futures
- Acting pro-sustainably



Digital Competence

- Formulating queries
- Retrieving and storing data
- Interacting through digital tools
- Creating digital content
- Protecting digital devices and data
- Solving problems in digital contexts



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More advanced competency zones



DeepTech Competence

- Technology selection
- Understanding the potential of technologies
- Estimating the costs and benefits of technologies
- Integrating technologies
- Extracting value from technologies



Doing Entrepreneurship Competence

- Capability to generate, refine, and implement ideas
- Capacity to seize opportunities
- Ability to mobilize tangible and social resources
- Capacity to take entrepreneurial action



Higher-order competency zones



Resilience Competence

- Dexterity to cope with challenges
- Capacity to help others
- Recovering after sustainability shocks
- Competency to learn while navigating transitions
- Translate failures and successes into actionable knowledge

Life Competence

- Capability to ensure personal wellbeing in a highly uncertain world
- Aptitude to empathize, communicate, and collaborate with others
- Learning to learn capacity



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Meta-competencies and meta-knowledge



Engageability

Capacity to be involved and committed to the process, motivation, and willingness to invest time and energy in pursuing twin transitions



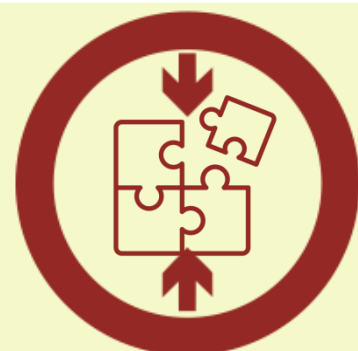
Adaptability

The ongoing capacity to early detect and understand changes, and adjust actions, practices, modi operandi, and behaviors to new conditions



Collaboration capacity

Ability to work and communicate effectively with heterogeneous actors, develop shared visions, build trust-based relationships, and give up power



Meta-knowledge

Capability to acknowledge one's own gaps in knowledge, understand other actors' knowledge, and evaluate the reliability of knowledge



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Some takeaways



Lessons learned so far



Difficulties - Twin transitions

- Twin transition is easier said than done!
- Considerable lack of conceptual clarity concerning the term.
- Lack of ready-to-use practices.

Opportunities - Twin transitions

- Realization of the need to go green.
- Rapid development of digital technologies.
- Policy emphasis.



*We are
researchers and
teachers.
We know how to
teach!*

Developing a new learning model...

is a challenging task, but...

- several adaptable frameworks exist,
- previous Erasmus+ projects offer critical insights,
- field-level actors are willing to improve their skillsets.



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Thank you

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