Twin Transition – Understanding the Why and Building the How

Community for Educational Innovation (CEI)

March 05, 2026

European Commission | CEI

About CEI

Community for Educational Innovation

Created by the Directorate General for Education, Youth Sport and Culture (DG EAC) of the European Commission.

1,400+
Members

96
Countries

57%
Higher education
+ other stakeholders

Connects

Higher education, industry, public sector and civil society

Advances

Educational innovation and entrepreneurial mindsets across Europe

Synergies

Part of HEInnovate and EHESO (European Higher Education Sector Observatory) Strategic Transformation Toolbox.

Thematic strands 2025-2026

2025 - I

Thematic Strand 1
Entrepreneurial Skills and Mindsets in Education

2025 - II

Thematic Strand 2
Bridging the Innovation Gap in Higher Education

2026 - I

Thematic Strand 3
Education for Green and Digital Innovation

2026 - II

Thematic Strand 4
Lifelong Learning for an Innovative Workforce

Report on Thematic Strand 1 available!

To be published in March 2026

Thematic strand 3

Education for Green and Digital Innovation

Webinar topics:

- Twin Transition – Understanding the Why and Building the How (Mar. 05),
- Educating to Thrive in the Digital World (Apr. 29),
- Capacity-building for Leading Sustainability in Education (Jun. 10).

Study visit

- New Bulgarian University, Sofia (July 2026).

Calls for good practices & polls

- Share your **good practices** on Education for Green and Digital Innovation.
- Take our quick semester **poll** and share your insights.

Thematic report

- Summarises thematic strand activities.

Agenda

15:30	Welcome & introduction
15:40	**Intervention 1 –** Towards a green and digital future: Key requirements for successful twin transitions in the European Union, Stefan Muench.
16:00	**Intervention 2 –** Twinning green and digital without widening gaps: A place-based framework from ST4TE, Christina Kakderi.
16:20	**Intervention 3 –** When Machines Think, the Planet Shouldn´t Pay, Morten Dæhlen.
16:40	Interactive debate with speakers
16:55	Closing remarks

Objective

Examine the synergy between digital transformation and sustainability in higher education.

Key objectives

- Requirements for successful twin transitions.
- Place-based frameworks for fair transitions.
- Twin transition interdisciplinary actions.

Stefan Muench

Head of Strategic Intelligence,
Joint Research Centre (JRC)

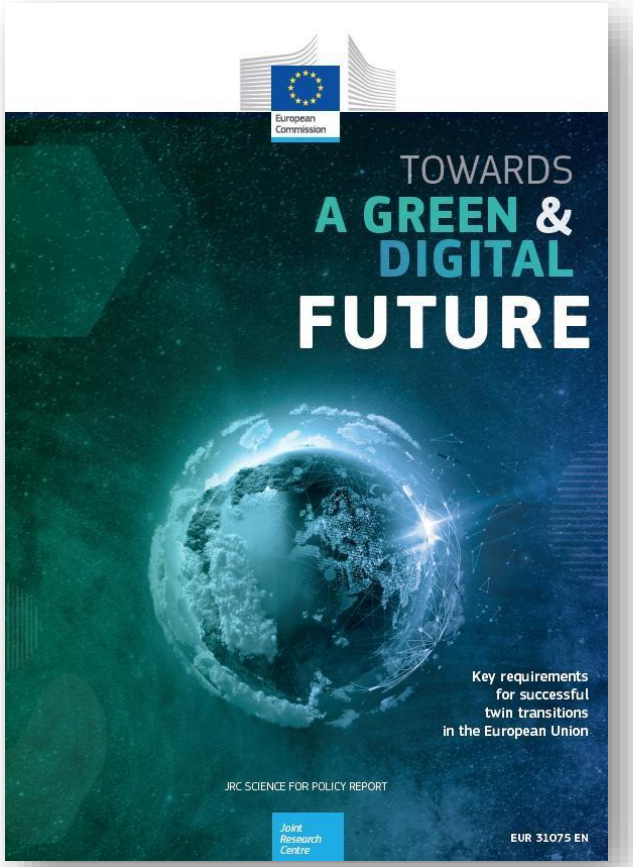
Intervention 1

Towards a green and digital future: Key requirements for successful twin transitions in the European Union

- Specialises in strategic foresight and decision-making under uncertainty, with a core focus on navigating the 'Twin Transition.'
- He has authored several high-level reports on the requirements for successful transitions and future-proof skills within the European Union.
- He holds a PhD in Sustainability Management, Sustainable Development, and Energy Technology Assessment from the Dresden University of Technology.

TOWARDS
A GREEN &
DIGITAL
FUTURE
European
Commission

The JRC report underpins the European Commission's Strategic Foresight Report

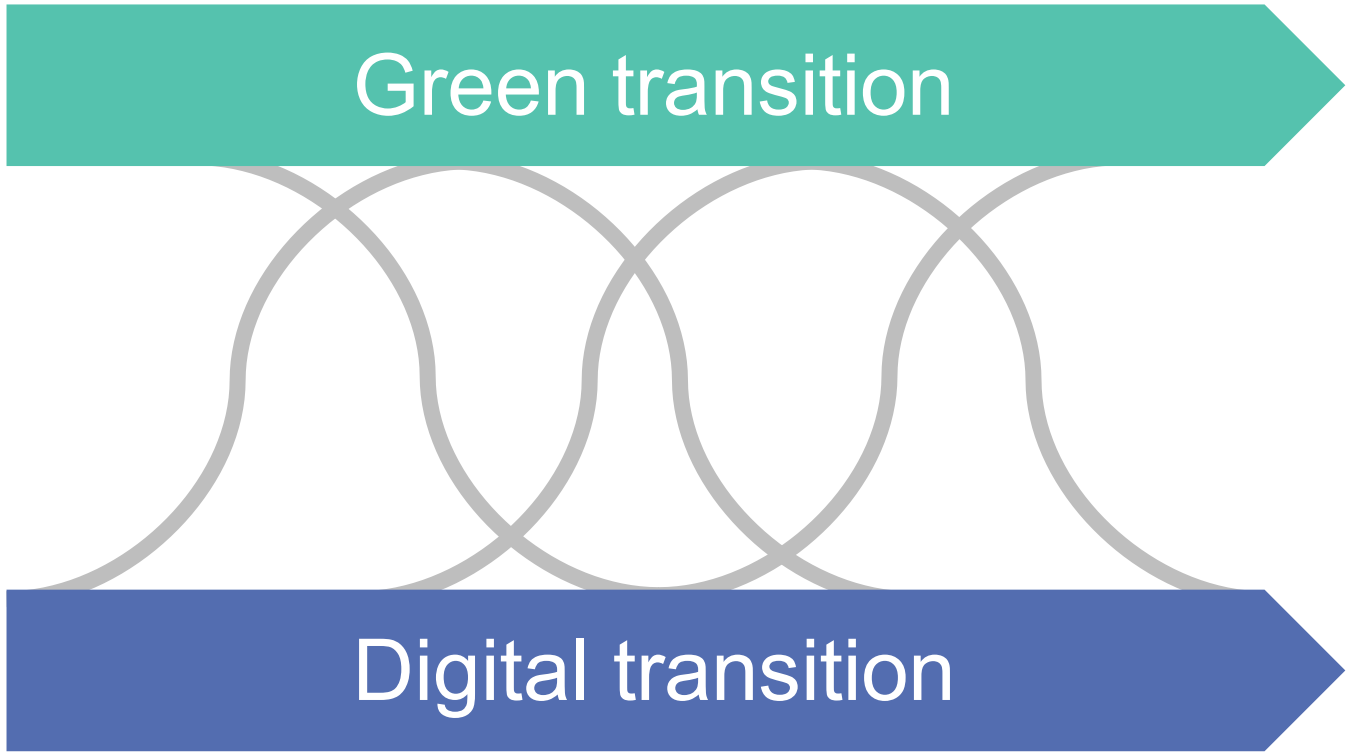


Science for Policy Report

Communication

European Commission

How can the green and digital transitions reinforce each other?

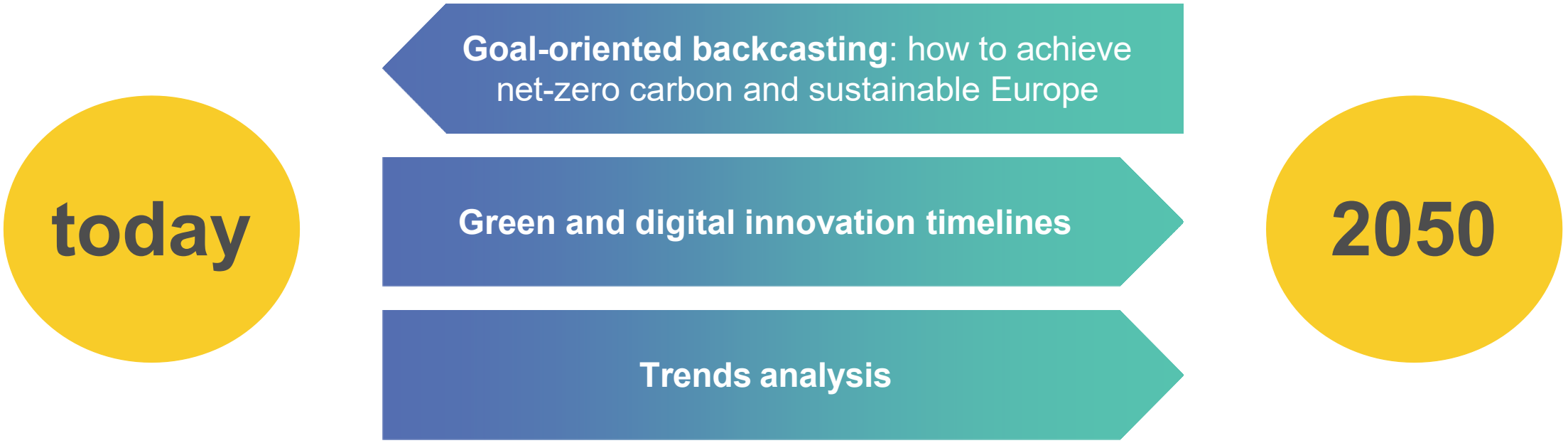


SECTOR FOCUS

- Agriculture
- Buildings and construction
- Energy
- Energy-intensive industries
- Mobility and transport

European Commission

Foresight methods fueled the future-oriented analysis



European Commission

Stakeholders and experts were consulted throughout the process

Over 200 participants

Industry

Cross-cutting

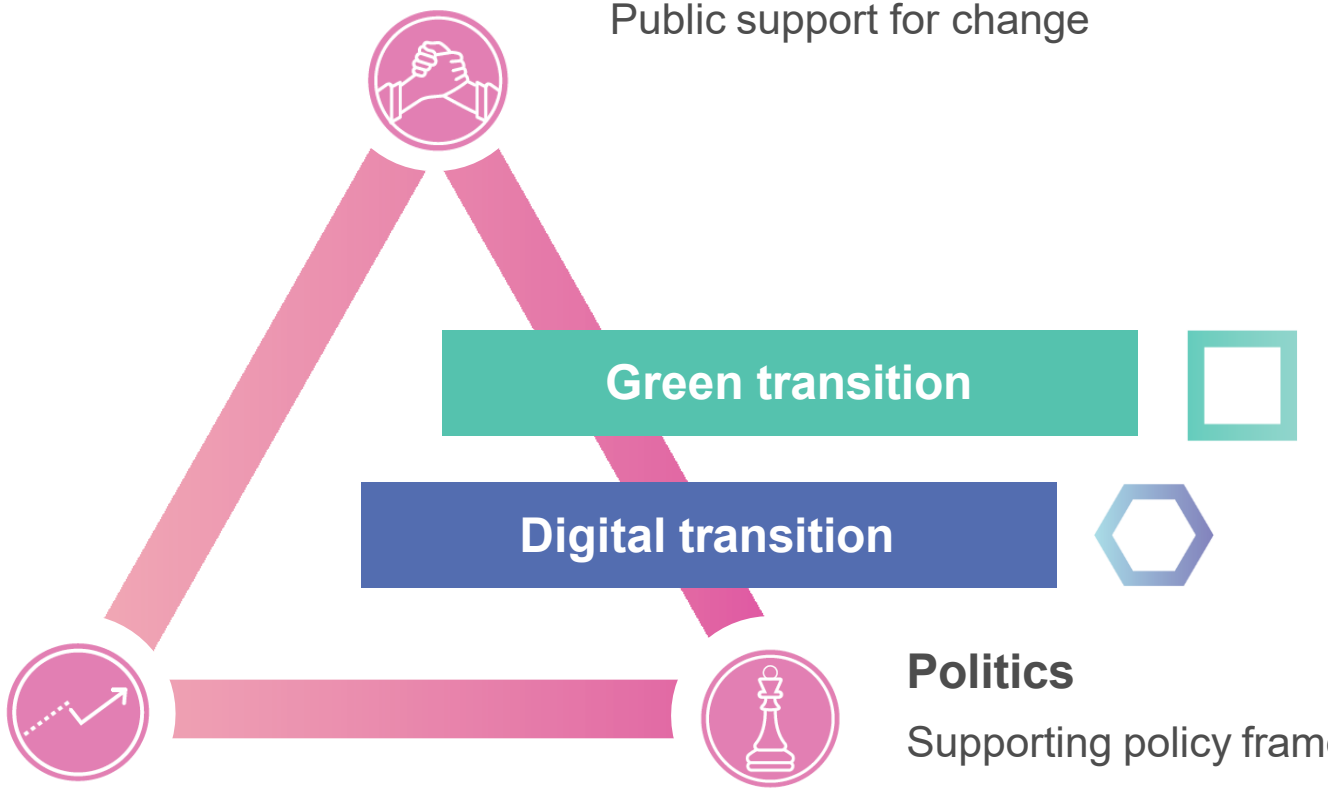
EU institutions, agencies, and bodies

Academia & research

Non-governmental and social partners

Contextual factors can determine success

Society
Public support for change

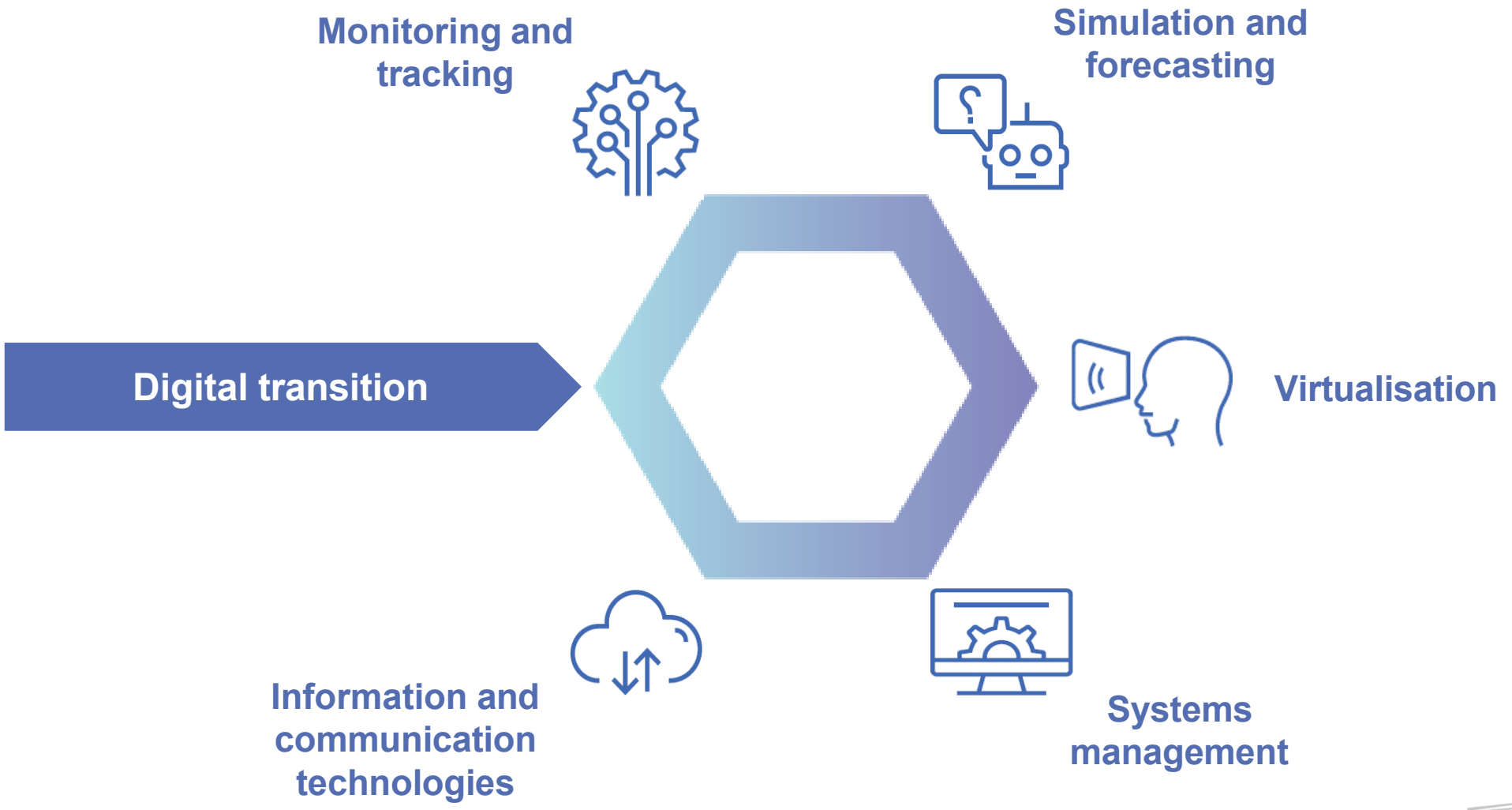


Economy
Business case for required technologies

Politics
Supporting policy framework

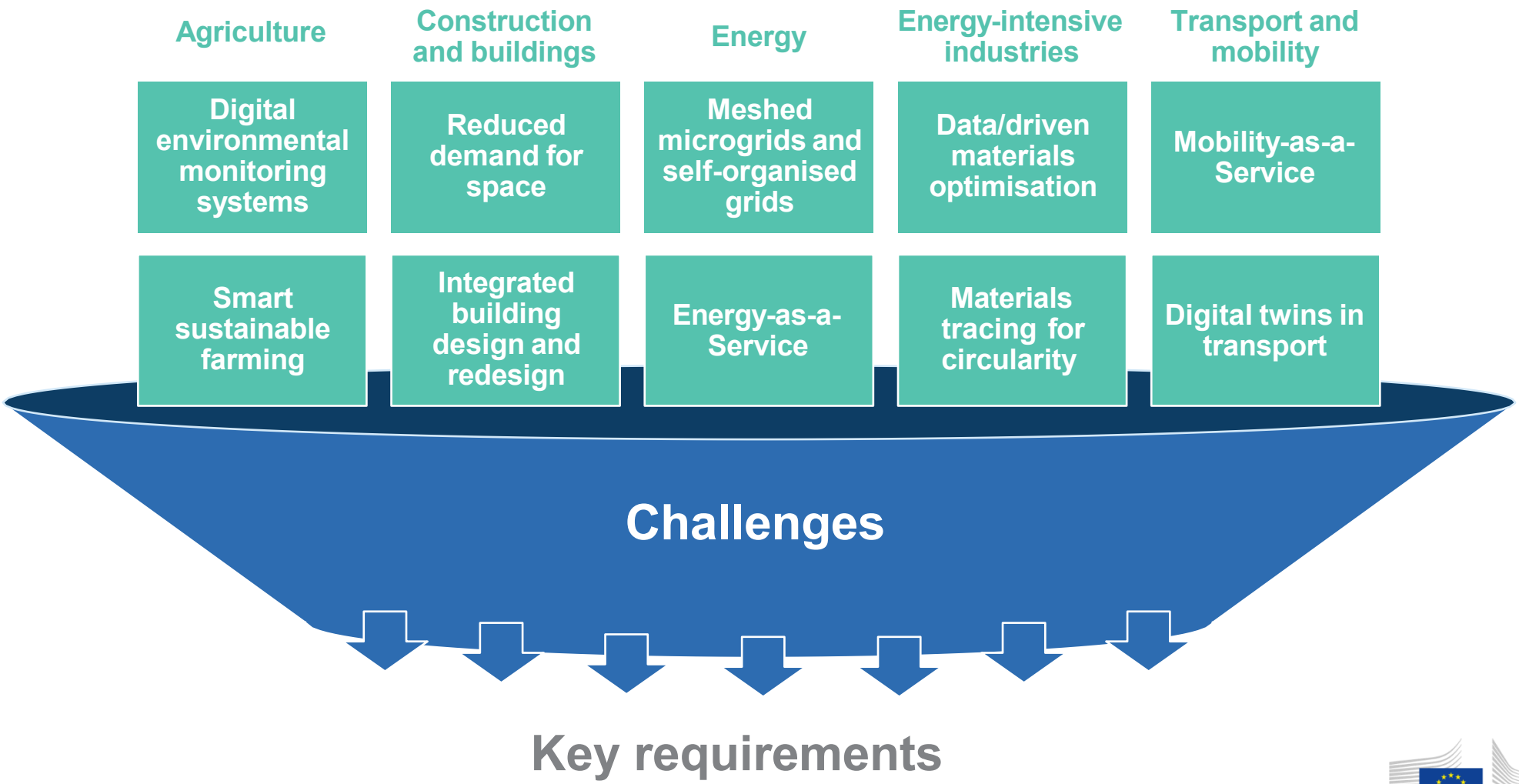
European Commission

Digital technologies can catalyse the green transition



European Commission

Case studies of green-digital solutions indicated cross-cutting challenges



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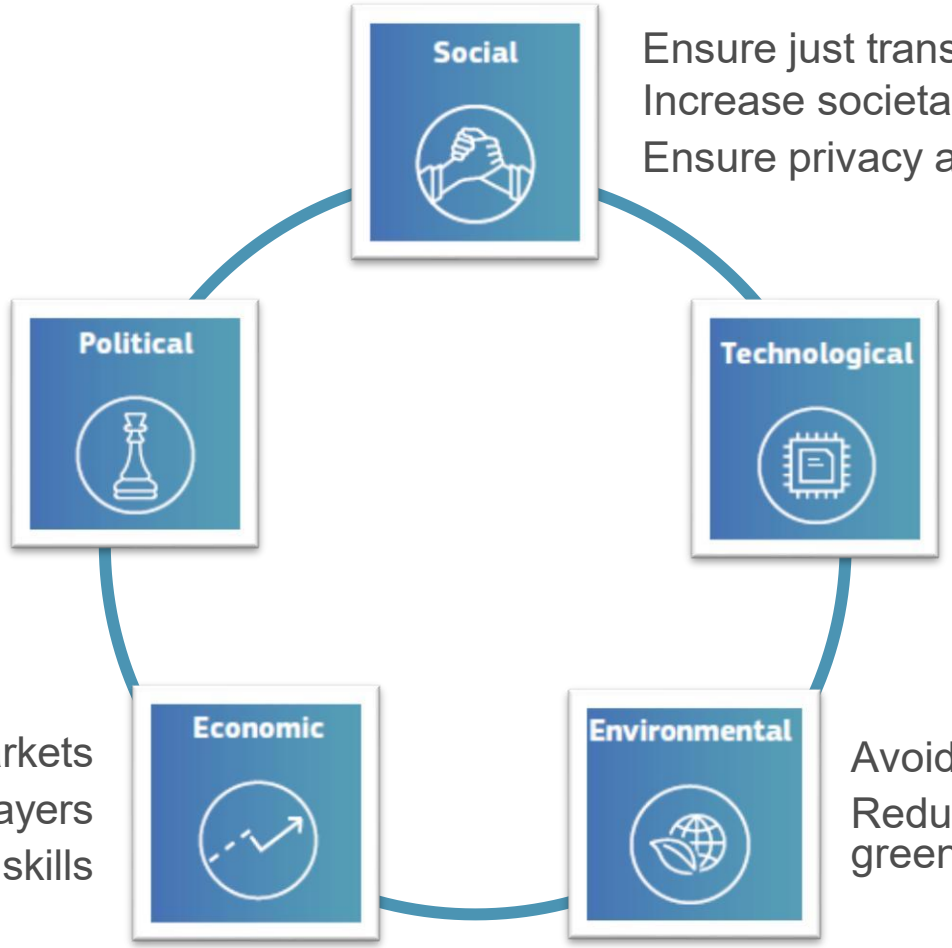
There are key requirements we need to achieve successful twin transitions



Ensure just transitions
Increase societal commitment on need to change
Ensure privacy and ethical use of technology

Implement innovation infrastructure
Build coherent & reliable tech ecosystem
Ensure data availability & security

Avoid rebound effects
Reduce environmental footprint of green and digital technologies

Create enabling markets
Ensure diversity of market players
Equip labour with relevant skills

Implement adequate standards
Ensure policy coherence
Channel investments into green-digital solutions

European Commission

Research on implementing the twin transitions should continue

- Developing green-digital interlinkages requires balancing their advantages & disadvantages
- Call for frugal innovation – where do digital technologies bring the most added value?
- The twin transitions need transdisciplinary research

Thank you

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DO YOU HAVE ANY QUESTIONS?

Christina Kakderi

Associate Professor, Aristotle University of Thessaloniki (AUTH)

Intervention 1

Twinning green and digital without widening gaps: A place-based framework from ST4TE

- Associate Professor of Spatial Development and Innovation Systems and Coordinator of the Horizon Europe project ST4TE.
- Her research bridges academic theory and policy practice, focusing on the socio-spatial dimensions of the twin (green-digital) transition and how place-based innovation can make it fair and inclusive.
- She advises city and regional administrations and EU-level organisations, including the European Commission, on innovation and digital transformation strategies.

From twin transition ambition to inclusive capacity:

lessons from ST4TE for higher education and regional policy

Thematic Strand 3: Twin Transition – Understanding the Why and Building the How

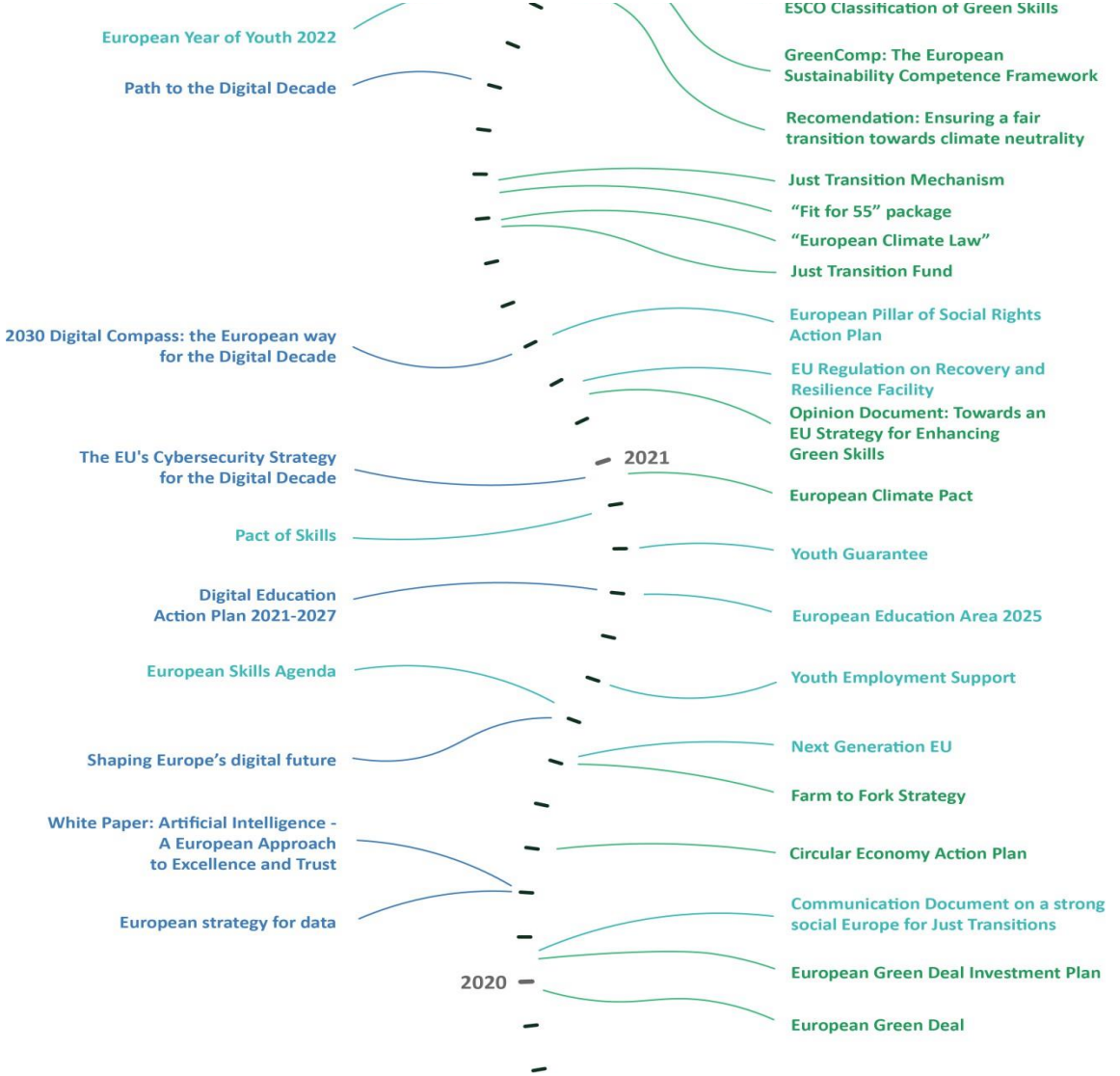
Christina Kakderi

Online, 05 March 2026

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101132559.

A Just Twin Transition Needs Inclusive Capacity: The Human and Spatial Geography

- **European ambition is high,** but implementation remains fragmented.
- **Green and digital policy streams** still often run in parallel rather than as one integrated transition.
- **The main risks are not only technological,** but also territorial, distributional, and experiential.
- **If capacities remain unevenly distributed,** the twin transition will reproduce — not reduce — existing gaps.



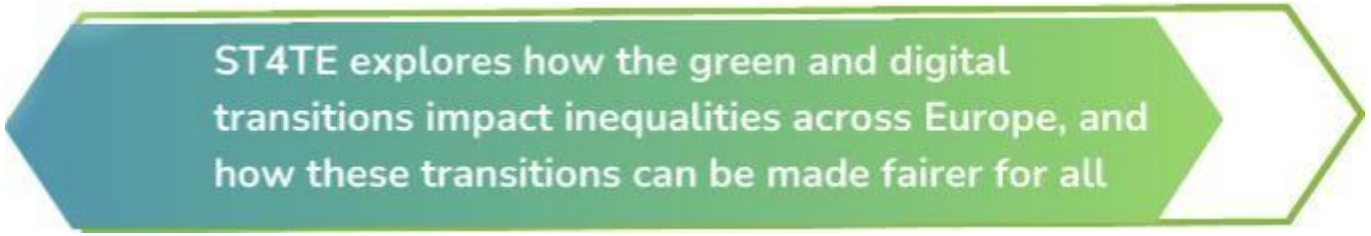
What ST4TE Adds: A Place-Based Diagnostic Lens

- **A Justice Lens:** Examining where green and digital change may widen territorial and social inequalities.
- **Mixed-Methods Evidence:** Integrating macro-level regional mapping and occupational data with 402 in-depth qualitative interviews across Europe.
- **A Diagnostic Contribution:** Identifying the main fault lines of the twin transition and their implications for educational policy.

Presentation Roadmap —

Three Layers of Asymmetry:

- Uneven Spatial Capacity
- Uneven Access to Opportunities
- Uneven Lived Experiences



Uneven Spatial Capacity: The Geography of Advanced Training

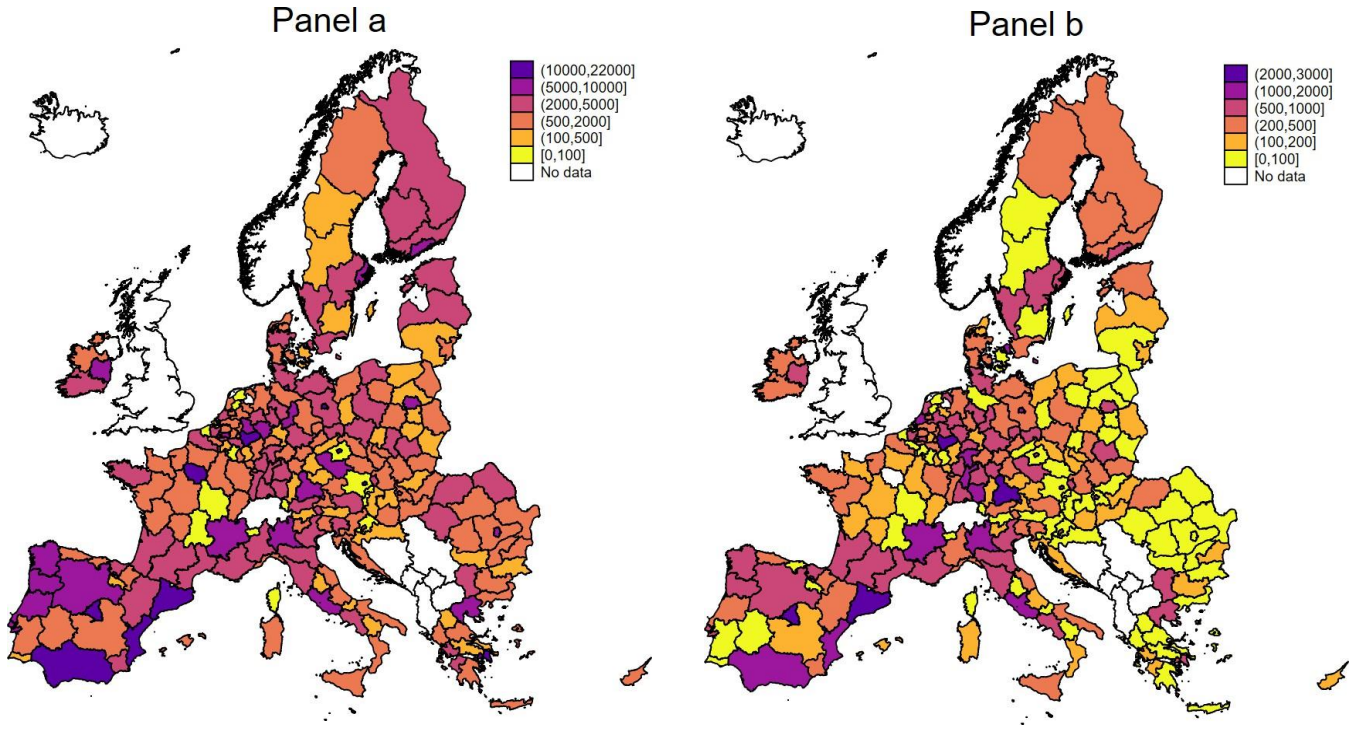


Figure 1: Regional average of the geographical distribution of PhD students (Panel a) and graduates (Panel b), 2020.
Source: Ascanelli, A. et al. (2025. p.15)

- Europe's main **higher-education divide lies in advanced**, not basic, **access**.
- **Doctoral training** is much more **concentrated** than undergraduate education.
- PhD students and graduates cluster in a limited number of **research-intensive regions**.
- This spatial concentration shapes where advanced twin-transition capabilities can emerge.

A just twin transition requires not only broad access to higher education, but a wider territorial distribution of advanced training and research capacity.

Uneven Research Ecosystems: Universities Do Not Play the Same Regional Role

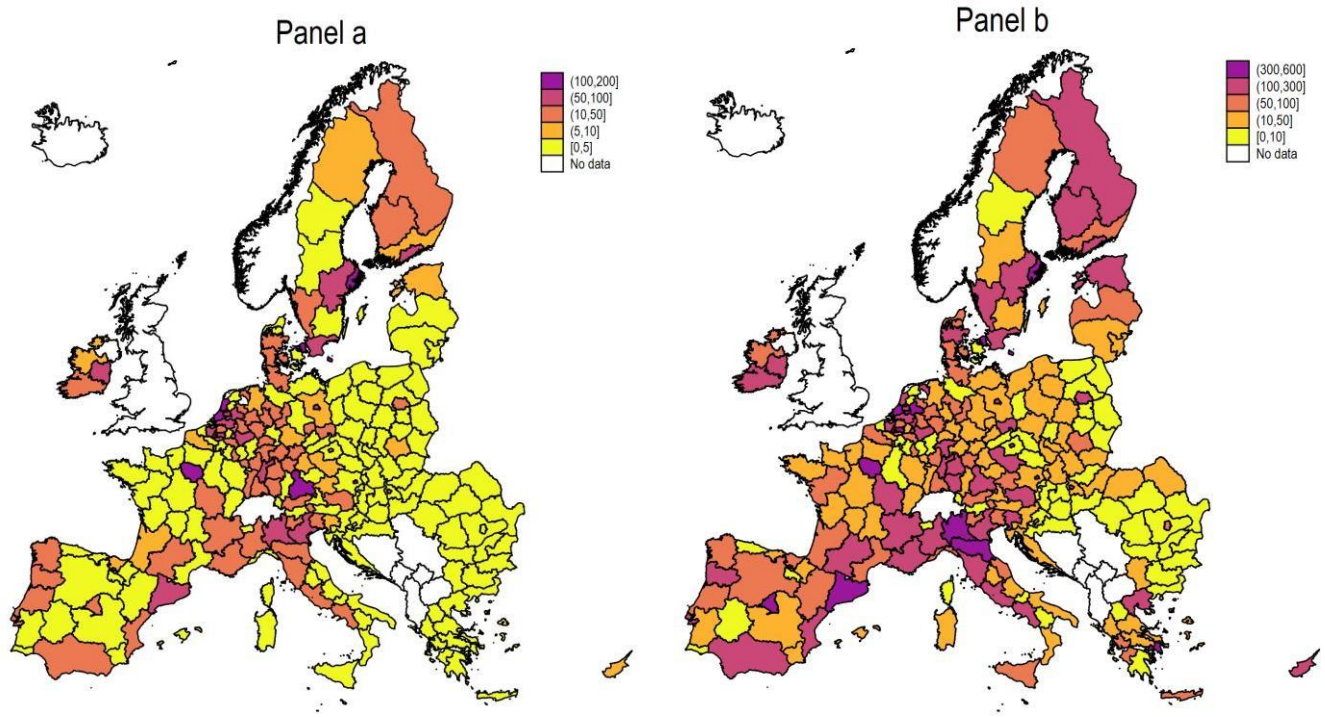
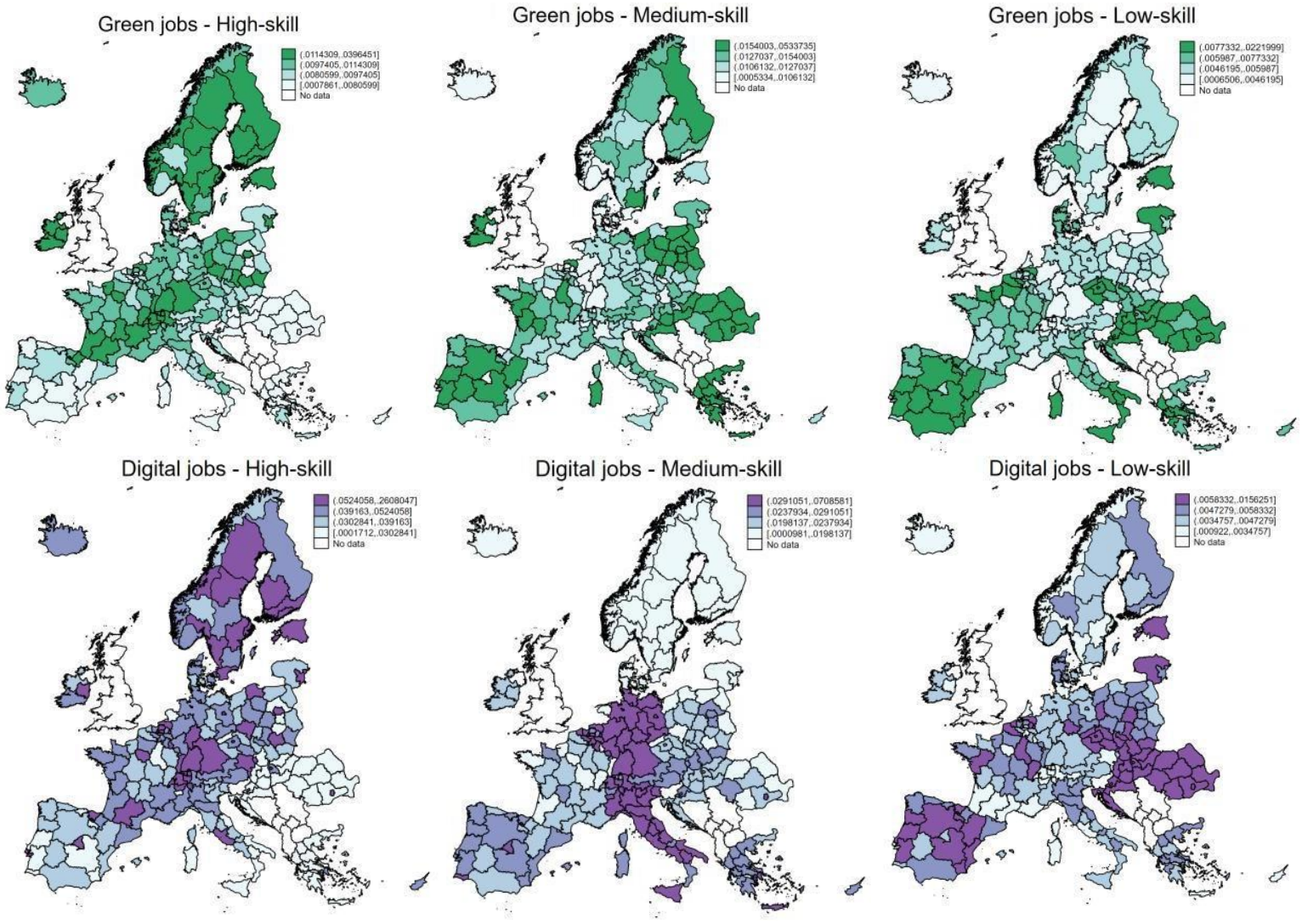


Figure 2: ERC project (panel a) and project in collaboration with companies (panel b), 2021. Source: Source: Ascanelli, A. et al. (2025, p.21)

The twin transition depends not only on the presence of universities, but on the uneven distribution of research intensity and innovation-system connectivity across regions.

- Higher education institutions are not only providers of skills; they are also key nodes in regional innovation systems.
- **Frontier research capacity is highly concentrated.**
- Collaboration with firms is more geographically diffuse, but it is still **skewed toward stronger and more innovation-intensive economies.**
- This creates a layered university landscape: some institutions mainly widen access to education, while others also anchor high-end knowledge creation and research-led regional transformation.

Uneven Opportunities: Green and Digital Jobs Follow Different Regional Pathways



- Green and digital jobs follow different regional-skill pathways across Europe.
- **Green jobs** are broader across skill levels and more geographically dispersed, though often tied to lower- and medium-skilled sectors in parts of Southern and Eastern Europe.
- **Digital jobs** are more skill-selective and spatially concentrated, especially in high-skilled metropolitan and innovation-intensive regions

Transition opportunities are uneven: green pathways are broader, while digital pathways are more concentrated and selective

Figure 3: Regional distribution of green jobs by skill group. 2022.
Figure 4: Regional distribution of digital jobs by skill group. 2022.
Source: Ascani et al. (2025, p.46-47)

Unequal Access to Opportunities: Twin Jobs Emerge on Uneven Ground

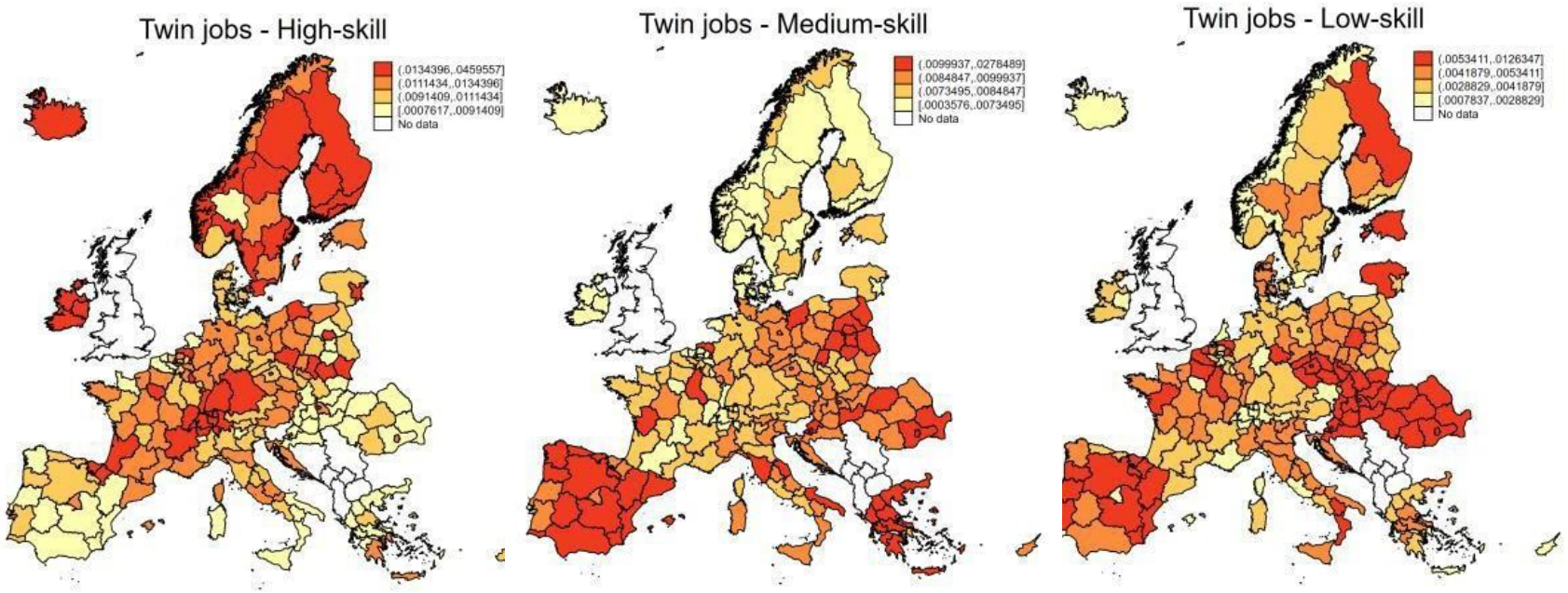
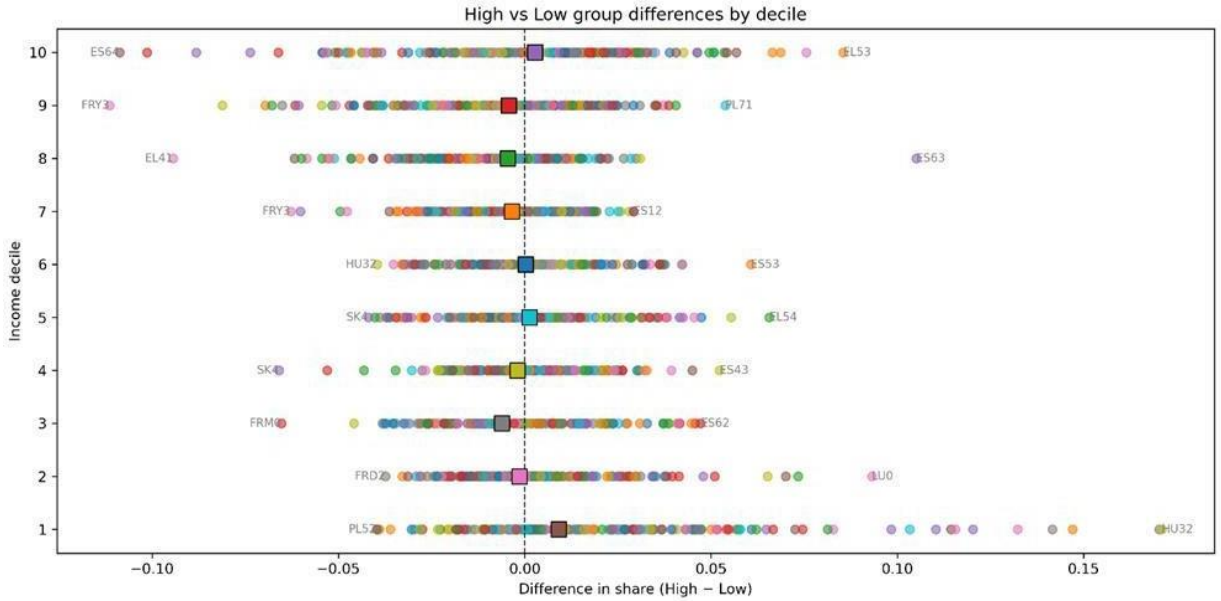


Figure 5: Regional distribution of twin jobs by skill group. Source: Ascani et al. (2025, p.49)

The twin transition is emerging through uneven regional forms of hybridisation, with a clear skill-based core-periphery pattern

- Twin jobs do not erase the green–digital divide; they recombine it unevenly across Europe.
- High-skilled twin jobs cluster in Northern and Western Europe, while lower- and medium-skilled twin jobs are more prevalent in parts of Southern and Eastern Europe.
- **:** Beyond core 'twin' roles, universities must support **'Enabling Occupations'** - the administrative and technical support roles that facilitate technology adoption

Unequal Rewards: Transition-Linked Jobs Are Not Equally Positioned



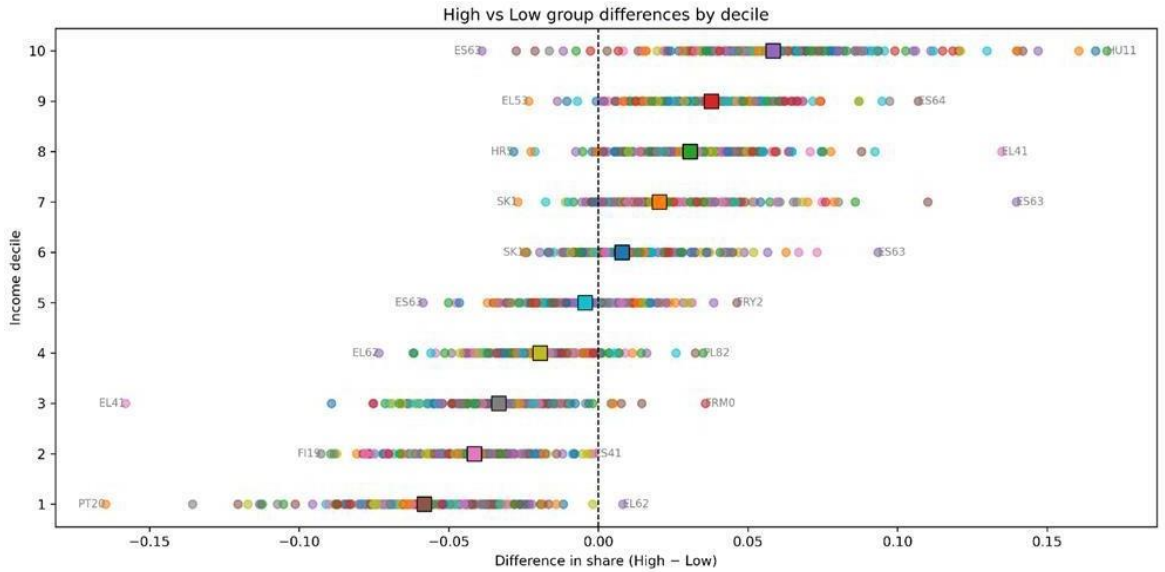


Figure 6. Differences in income distribution between high- and low-green exposure occupations by decile (regions)
Figure 7. Differences in income distribution between high- and low-digital exposure occupations by decile (regions) Source: Ascani et al. (2025, p. 38)
Source: Ascani et al. (2025, p. 38)

- Transition-linked jobs are not equally positioned in the labour market.
- Green exposure is more broadly distributed across income deciles.
- Digital exposure is more concentrated in higher-income segments.
- So the issue is not only who enters the transition, but who captures its higher rewards.

Unequal Job Quality: Flexibility and Security Remain Stratified

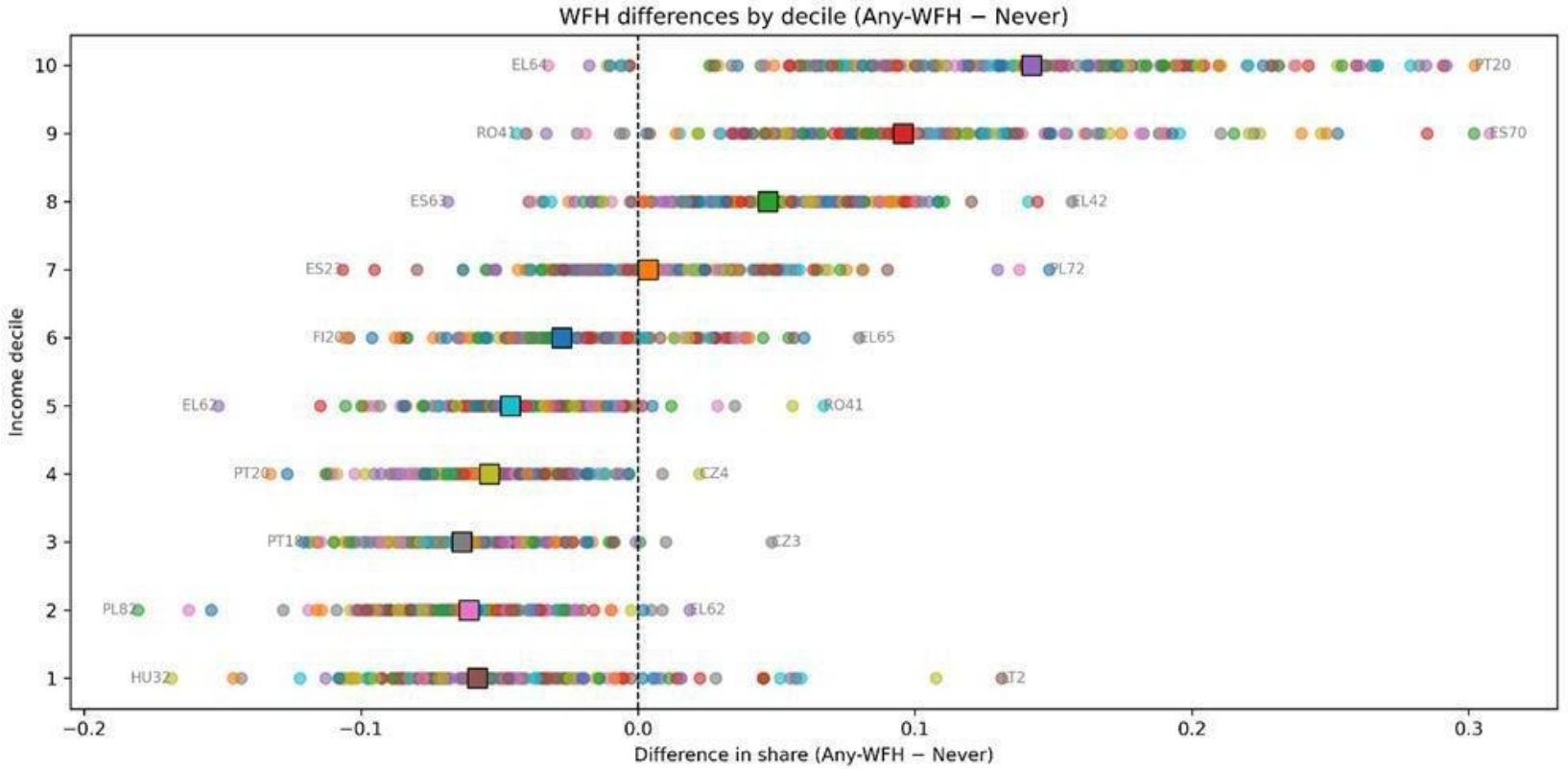


Figure 8: Work-from-home differences in income distribution by decile (Any-WFH vs Never, regions). Source: Ascani et al. (2025, p. 36)

- The issue is not only whether transition-linked jobs exist, but what kind of jobs people can access.
- Work-from-home access is concentrated in higher income deciles, while workers without WFH access are concentrated lower down.
- Temporary workers are also concentrated in lower deciles, pointing to unequal access to stability and security.
- So even within the transition, flexibility, autonomy, and security remain unevenly distributed.

Uneven Lived Experience: Choice vs. Compulsion

Green Transition

- More often experienced as **choice**
- **Value-driven** / moral
- Lifestyle and responsibility

Digital Transition

- More often experienced as **compulsion**
- Fast-moving / hard to opt out
- Dependency and pressure

Policy may speak of one "twin" transition, but lived experience remains fragmented

What Universities Must Do: Build Capacity, Anchor Regions, and Translate the Transition

- Universities shape who can participate in the transition — not only through degrees, but through postgraduate training, micro-credentials, reskilling, and lifelong learning.
- They must act as regional anchors, especially in weaker regions, linking local labour markets, firms, public actors, and place-based development needs.
- They must also translate ambitious transition goals into usable local pathways, connecting green and digital agendas across curricula, partnerships, regional missions, and public engagement.

A just twin transition needs universities that distribute capabilities more widely and make participation more inclusive across people and places

Website: st4te.eu

LinkedIn: /st4te

Reports used:

- Ascanelli, A., Barbieri, N., Basilico, S., Gilli, M., Marzucchi, A., C Rizzo, U. (2025). *Milestone 8: Mapping of regional supply of education and science programmes* (Working paper). ST4TE—Strategies for Just and Equitable Transitions in Europe, Horizon Europe Grant Agreement No. 101132559.
- Ascani, A., Barbieri, N., Basilico, S., Gilli, M., Marzucchi, A., Rizzo, U., C Sciavicco, G. (2025). *D1.3: The geography of the green, digital and twin occupations in Europe: Mapping digital and green occupations and twin skill readiness in EU regions* (Deliverable, ST4TE—Strategies for Just and Equitable Transitions in Europe, Grant Agreement No. 101132559).
- Ascani, A., Barbieri, N., Basilico, S., Dimarco, G., Marzucchi, A., Palma, A., C Rizzo, U. (2025). *The impact of twin transition on income inequality and employment quality* (ST4TE Deliverable D2.2, Horizon Europe Grant Agreement No. 101132559).
- Kakderi, C., Kalantzi, E., Latinopoulos, D., C Panori, A. (2025). *D1.1: A review of green, digital and twin transition policies* (ST4TE Deliverable D1.1, Horizon Europe Grant Agreement No. 101132559). ST4TE—Strategies for Just and Equitable Transitions in Europe.
- Svenberg, S., Davidsson, A., Strid, S., C Hultman, M. (2025). *D2.5: Report on twin transition and intersectional inequalities* (ST4TE Deliverable D2.5, Horizon Europe Grant Agreement No. 101132559). ST4TE—Strategies for Just and Equitable Transitions in Europe.

DO YOU HAVE ANY QUESTIONS?

Morten Dæhlen

Professor at the University of Oslo

Intervention 1

When Machines Think, the Planet Shouldn´t Pay, Morten Dæhlen

- Professor in computational mathematics/informatics, primarily working on interdisciplinary issues related to artificial intelligence, machine learning, scientific visualisation and knowledge representation.
- In recent years, Dæhlen has especially engaged in research related to the digital and green transition (the twin transition) and how the health sector can utilise recent advances in methods and algorithms in artificial intelligence.
- Dæhlen has also served as Head of Department of Informatics (2005-2012) and Dean for the Faculty of Mathematics and Natural Sciences (2013-2020) at UiO.

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When Machines Think, the Planet Shouldn´t Pay

Artificial Intelligence – at the Core of the Twin Transition Challenge!

Professor Morten Dæhlen
University of Oslo, Department of informatics
Co-director, The Norwegian Centre for Trustworthy AI

Twin Transition – Understanding the Why and Building the How
CEI, Webinar March 5th 2026

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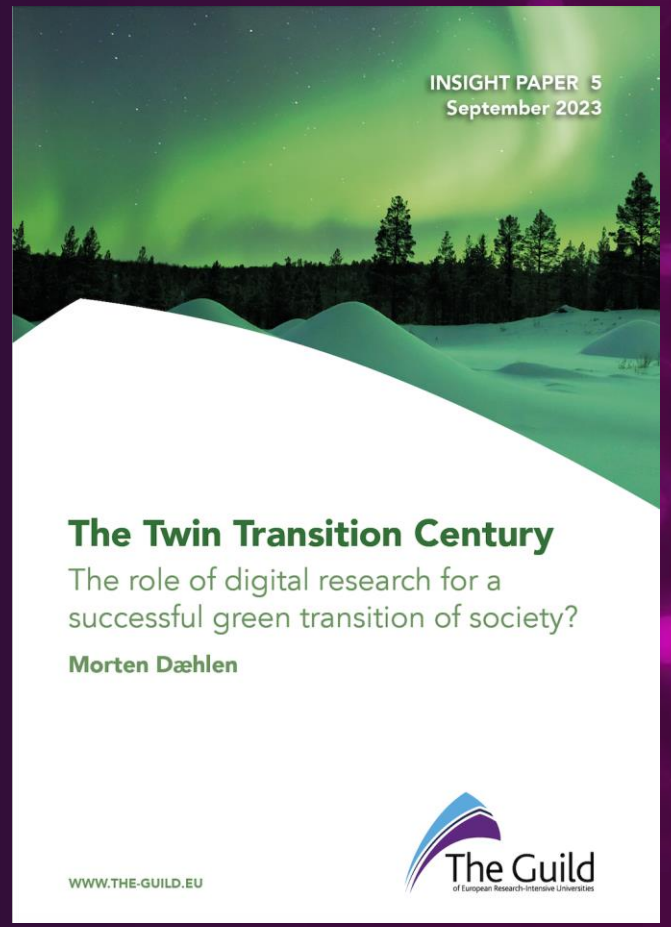
What should be our digital research and innovation agenda to achieve a successful green transition of society?

How can we ensure that the «digital part of the world» becomes greener?



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The twin transition

is about how the dynamics and strength of the digital transition affects the green transition of society, and how these two transitions mutually influence each other and should be combined in the coming years.

The digital transition

of society consists all processes at all levels in society producing and applying infrastructure, services, applications and human behavior that depend on digital representation of knowledge and computer power.

The green transition

of society is about reducing greenhouse gas emissions, preserving and restoring nature, reversing environmental degradation and ensuring that the energy of the future comes from renewable sources.

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The Physical Reality of Artifcial Intelligence

Hunt for Critical Minerals
from a vulnerable nature

Thirst of the Machines
where fresh water is scarce

Energy Hunger

- Increased baseload power demand
- Delayed green transition

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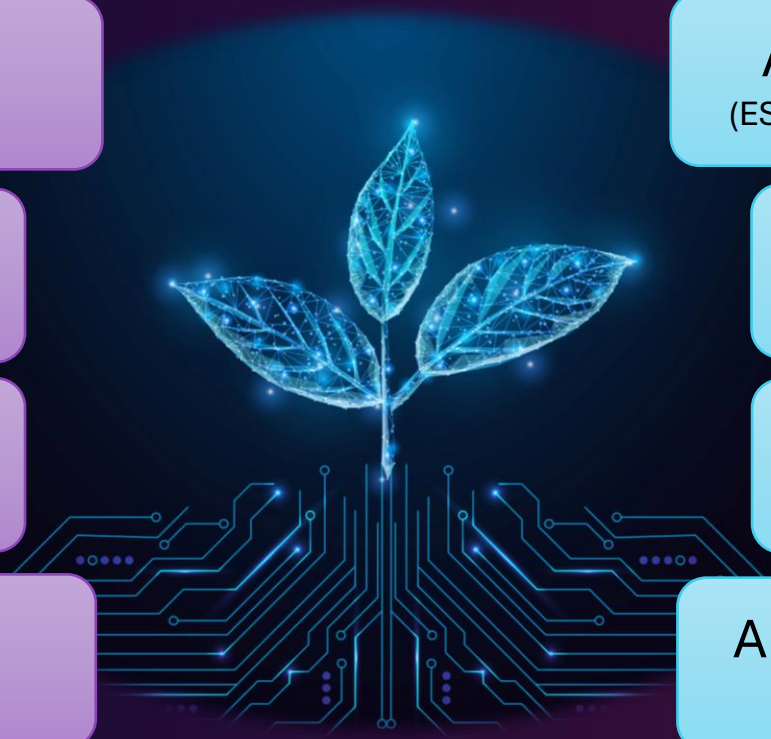
Technology and Governance
Pathways to Sustainable AI

From Large to Small, Edge Intelligence

Neuromorphic and Optical Computing, and even Quantum

Data Sharing, Data Refinement and Data Reduction

Re-think Data Centres in an AI-powered Green Economy?



AI-aware ESG Frameworks
(ESG = Environmental, Social and Governance)

Standardized Metrics
and Key Performance Indicators

Prioritize the Earth's health
alongside human/user needs

A Comprehensive Tax System
handling Digital Resources (Data)

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AI - a Catalyst for the Green Transition

- Smarter Energy Grids towards the Age of Renewables
- Precision Agriculture, less Waste, more Food
- Reinventing Mobility, on Land, at Sea, in the Sky
- Smarter Healthcare, that prevents rather than reacts
- Smart Infrastructures, buildings, neighbourhoods, ships, etc..)
- Proactive Stewardship of the Earth´s Ecosystem
- Equity in an AI-Powered Green Economy
- Discovering New Materials for energy efficiency
- A Force Multiplier for Scientific Discovery

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The BIG question

Can AI help decouple (economic) growth from (over)use of Earth´s resources?

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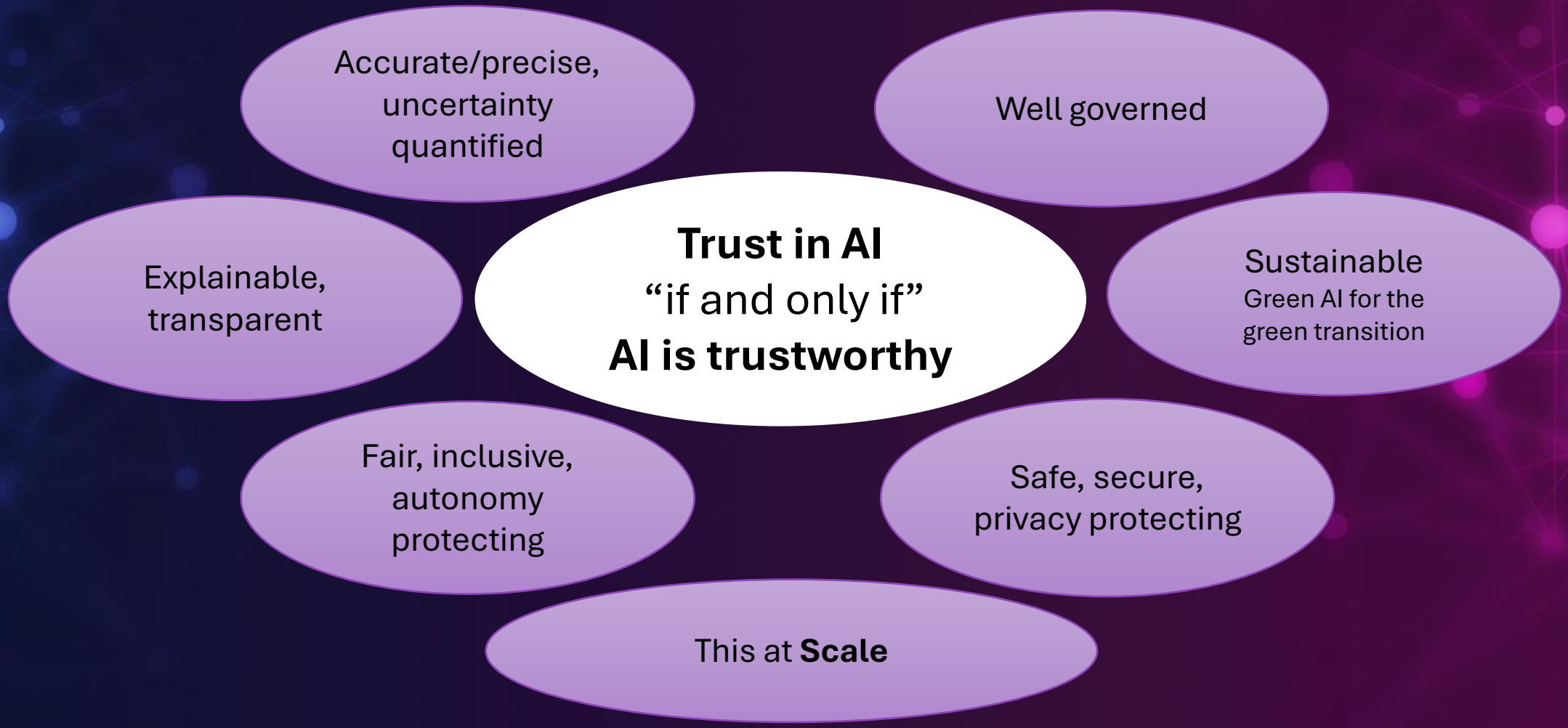
TRUST – The Norwegian Centre for Trustworthy AI

Aims/Guidelines for Trustworthy AI



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Thank you for your attention

TRUST - Pushing boundaries by joining forces!

DO YOU HAVE ANY QUESTIONS?

Mentimeter

What should be the top priorities for embedding the twin transition into education?

Please select up to 4 choices

Go to

www.menti.com

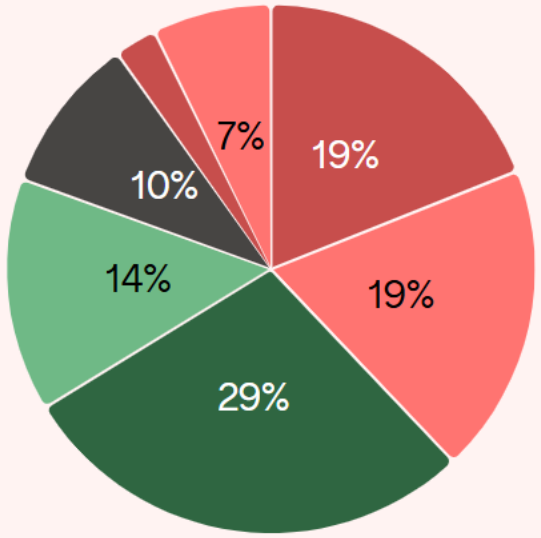
Enter the code

8547 5973

Join at menti.com | use code 8547 5973

Mentimeter

What should be the top priorities for embedding the twin transition in education?



19%	Redesign curricula around GreenComp and DigComp frameworks,
19%	Adopt challenge-based and interdisciplinary teaching methods,
29%	Train educators in green and digital competences,
14%	Engage students in regional green and digital initiatives,
10%	Align institutional research, teaching, and operations around a coherent twin transition strategy,
2%	Implementing assessment and monitoring methods,
7%	Build inter-university networks to share good practices.

13 / 15

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Webinar3.1Poll1

Choose a slide to present

Debate

15-minute debate

If you prefer, write your question in the chat box.

Use the ‘raise your hand function’ to ask your question directly.

Upcoming activities

March	April 29	June	July
Report thematic strand 2 From Research to Impact - Bridging the Innovation Gap in Higher Education	**Next webinar** Educating to Thrive in the Digital World	**Call for Good Practices** Share initiatives, projects or policies bridging research with real-world innovation.	**Study visit** New Bulgarian University, Sofia (Jun. 2026).

Thank you!

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cei@ppmi.lt

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