Technological Capabilities and the Twin Transition in Europe

Opportunities for regional collaboration and economic cohesion

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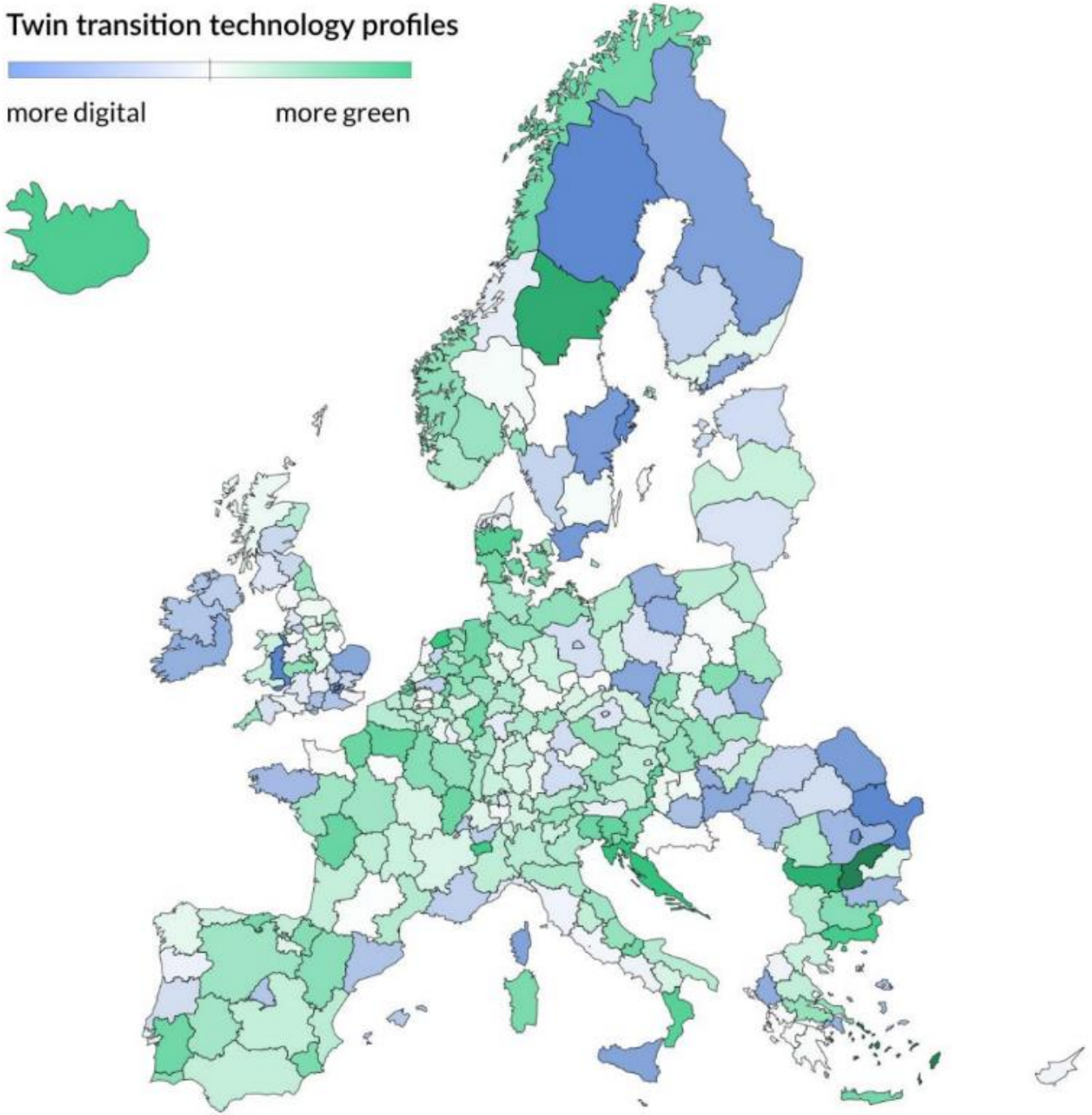
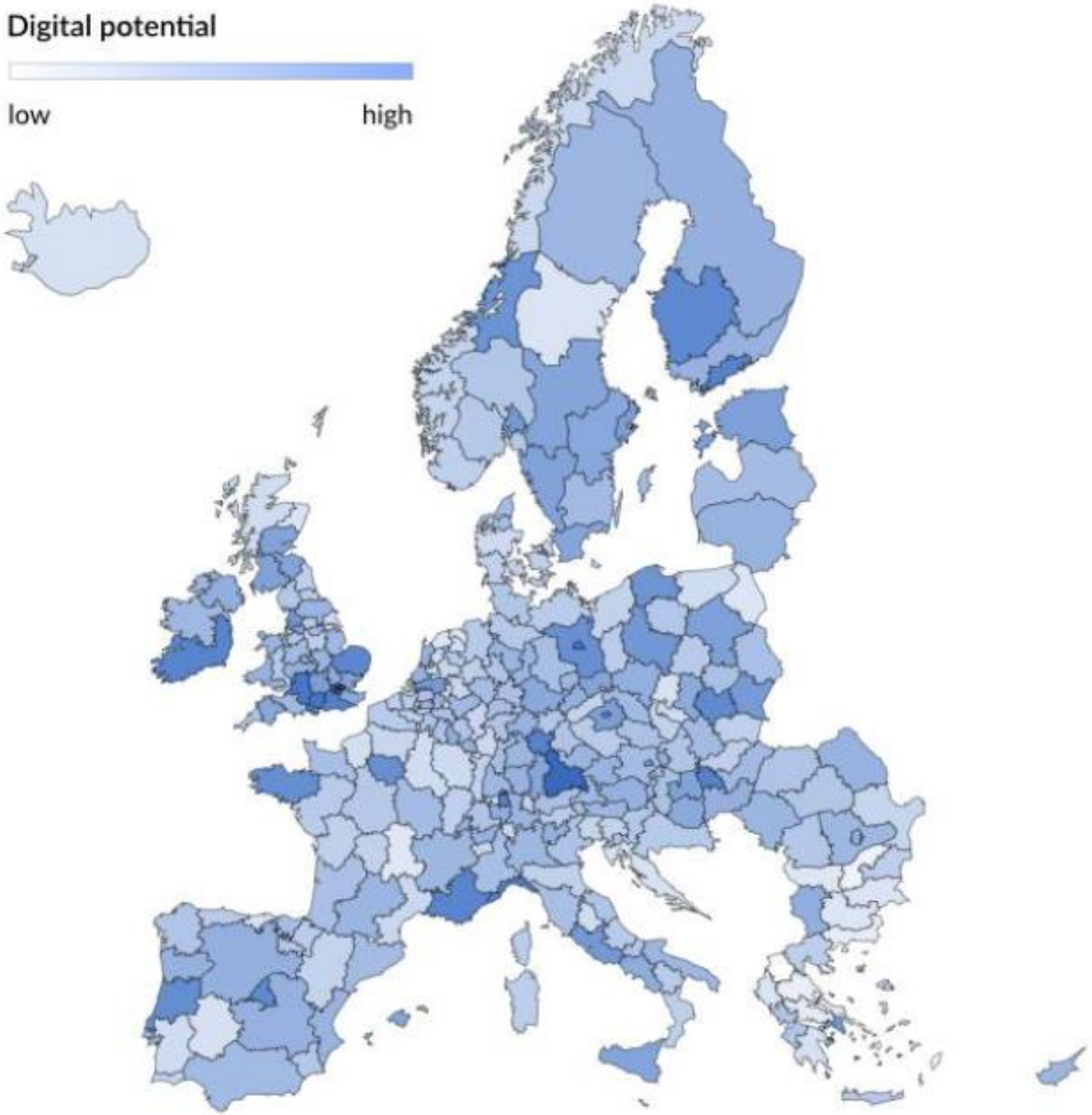
The geography of the twin transition in Europe

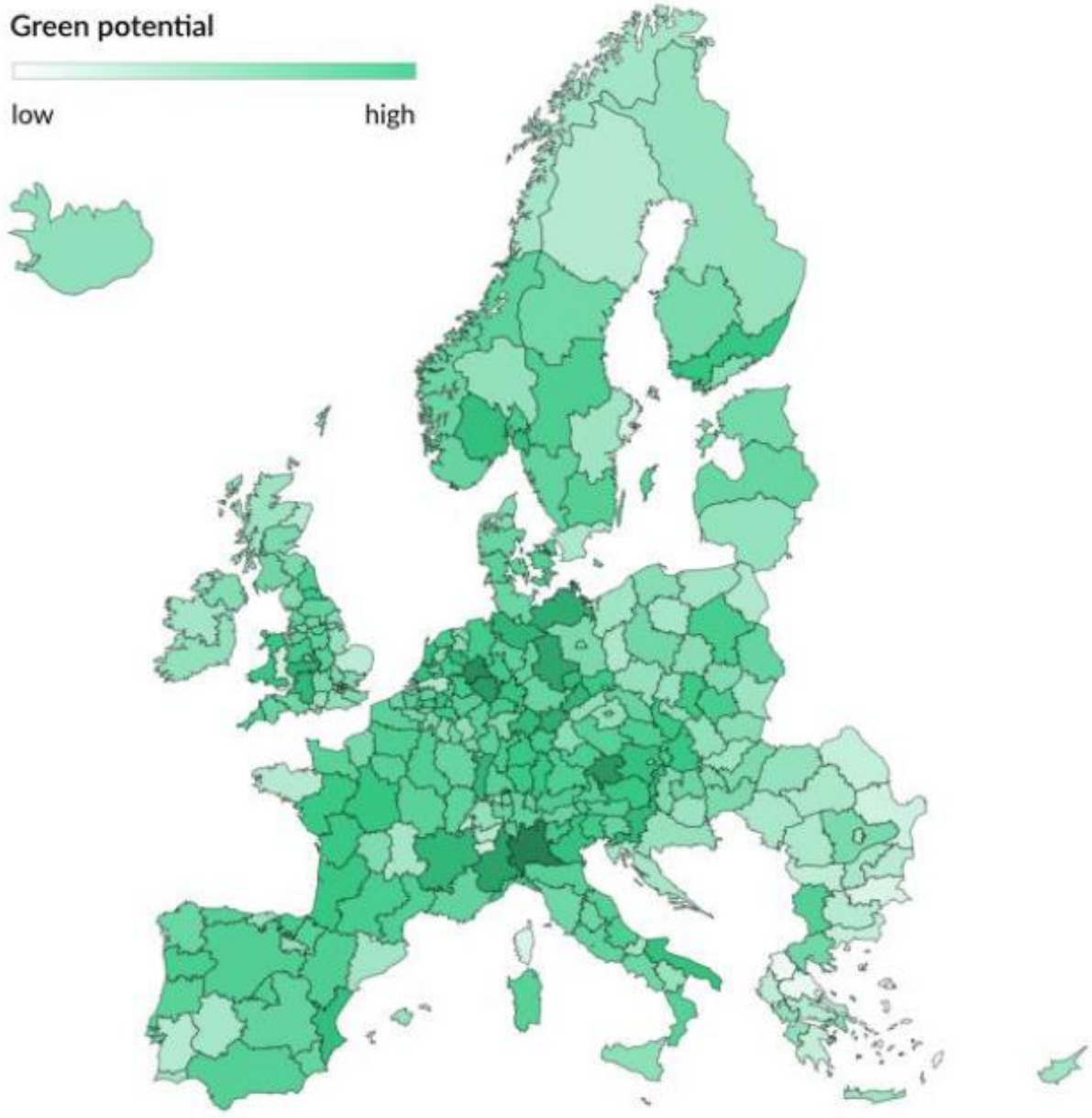
- EU regions have very different strengths in green & digital technologies
- This report maps these capabilities to evaluate internal and inter-regional opportunities
- We need to build on this diversity of strengths to accelerate the twin transition



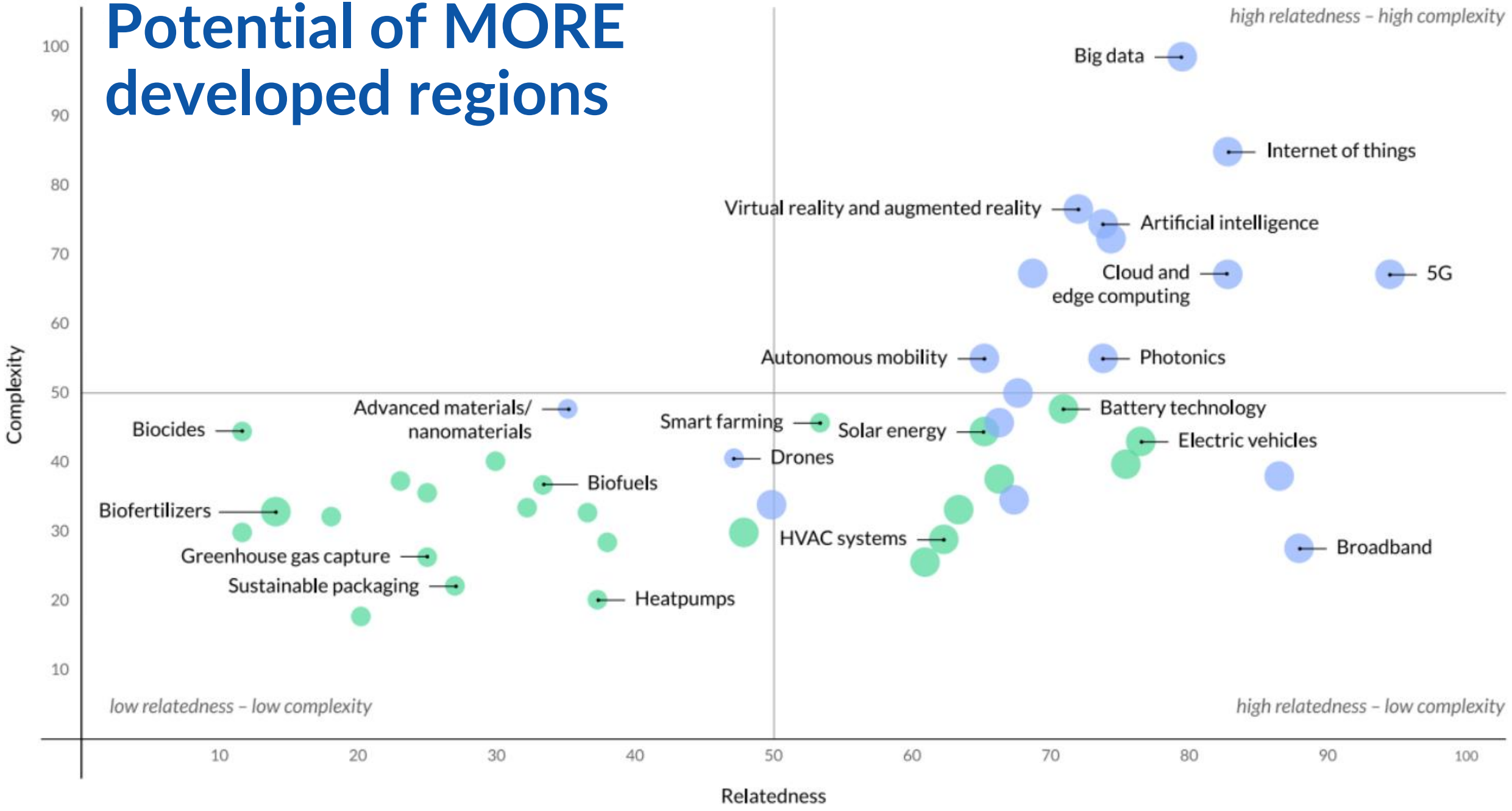
The risk of increasing regional inequality in the twin transition

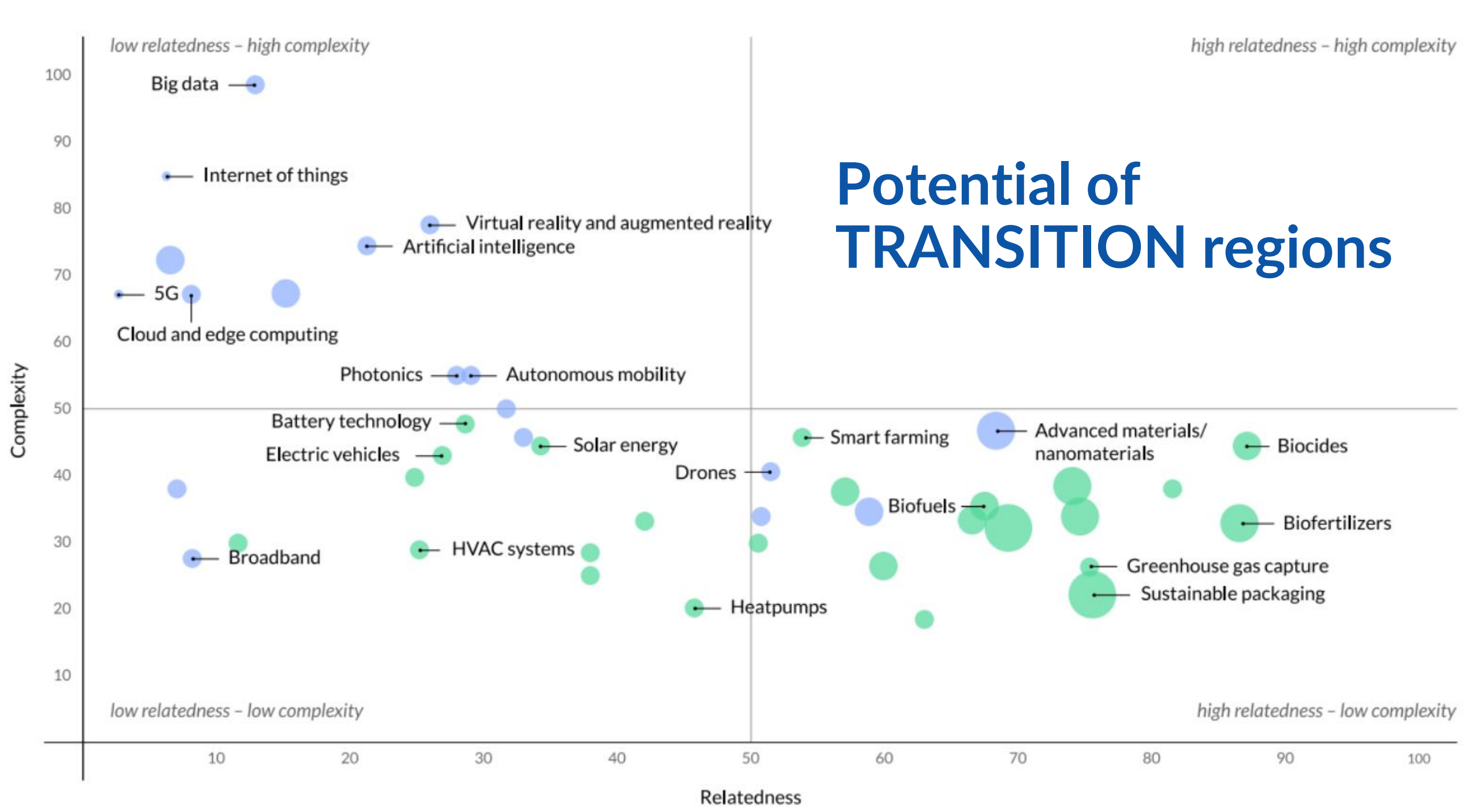
Unequal potential to lead the twin transition





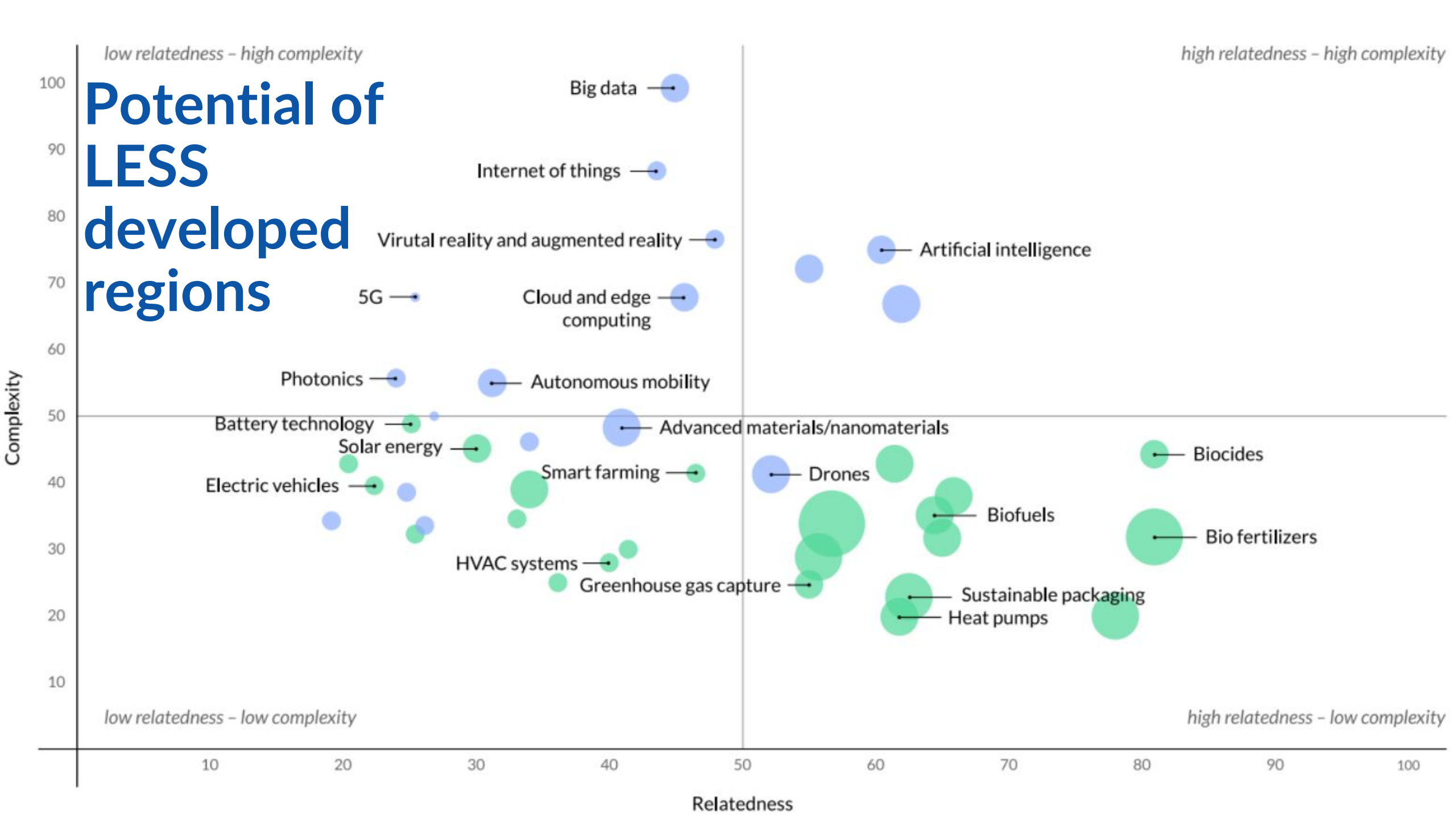
Potential of MORE developed regions



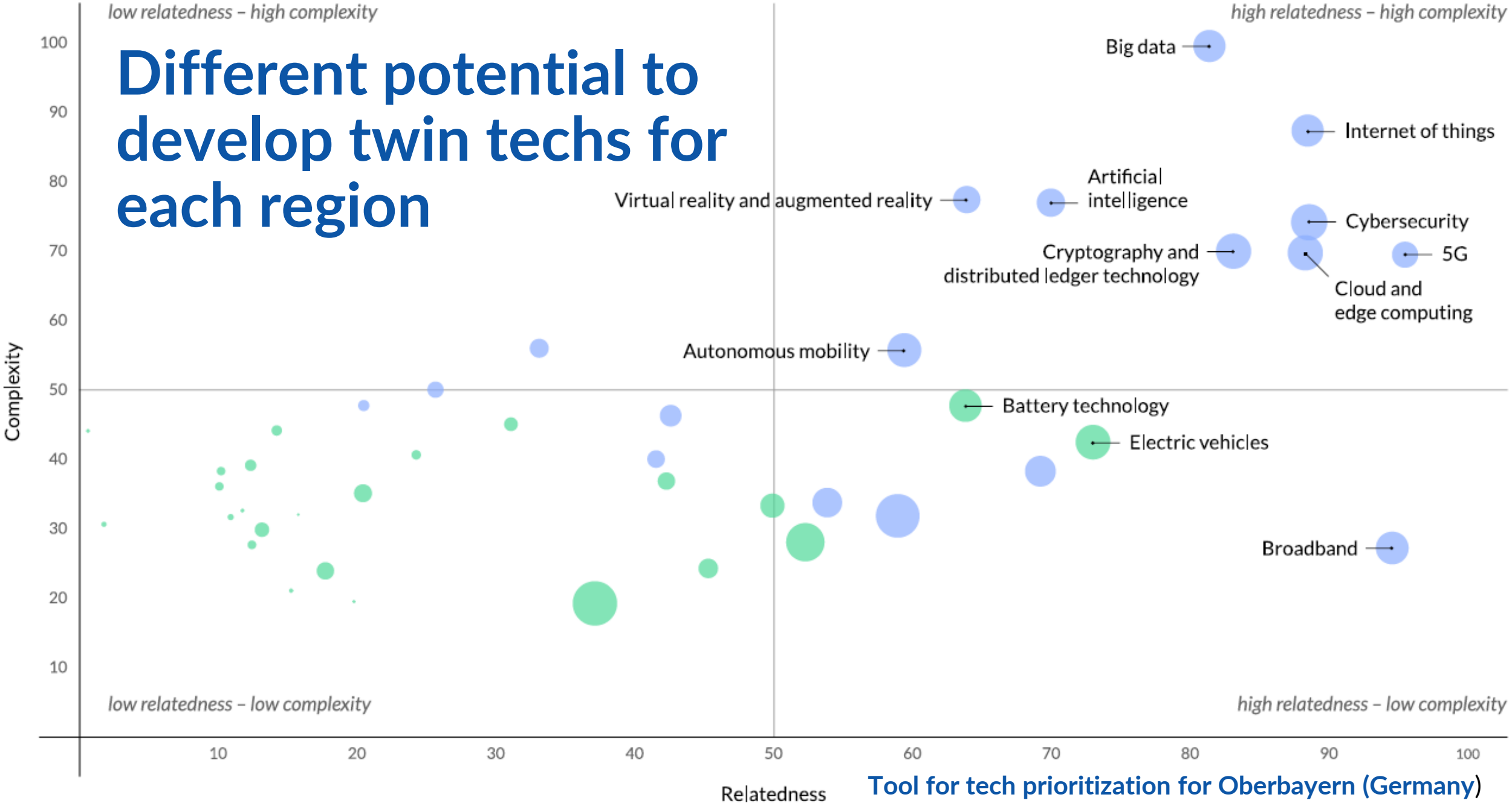


Potential of TRANSITION regions

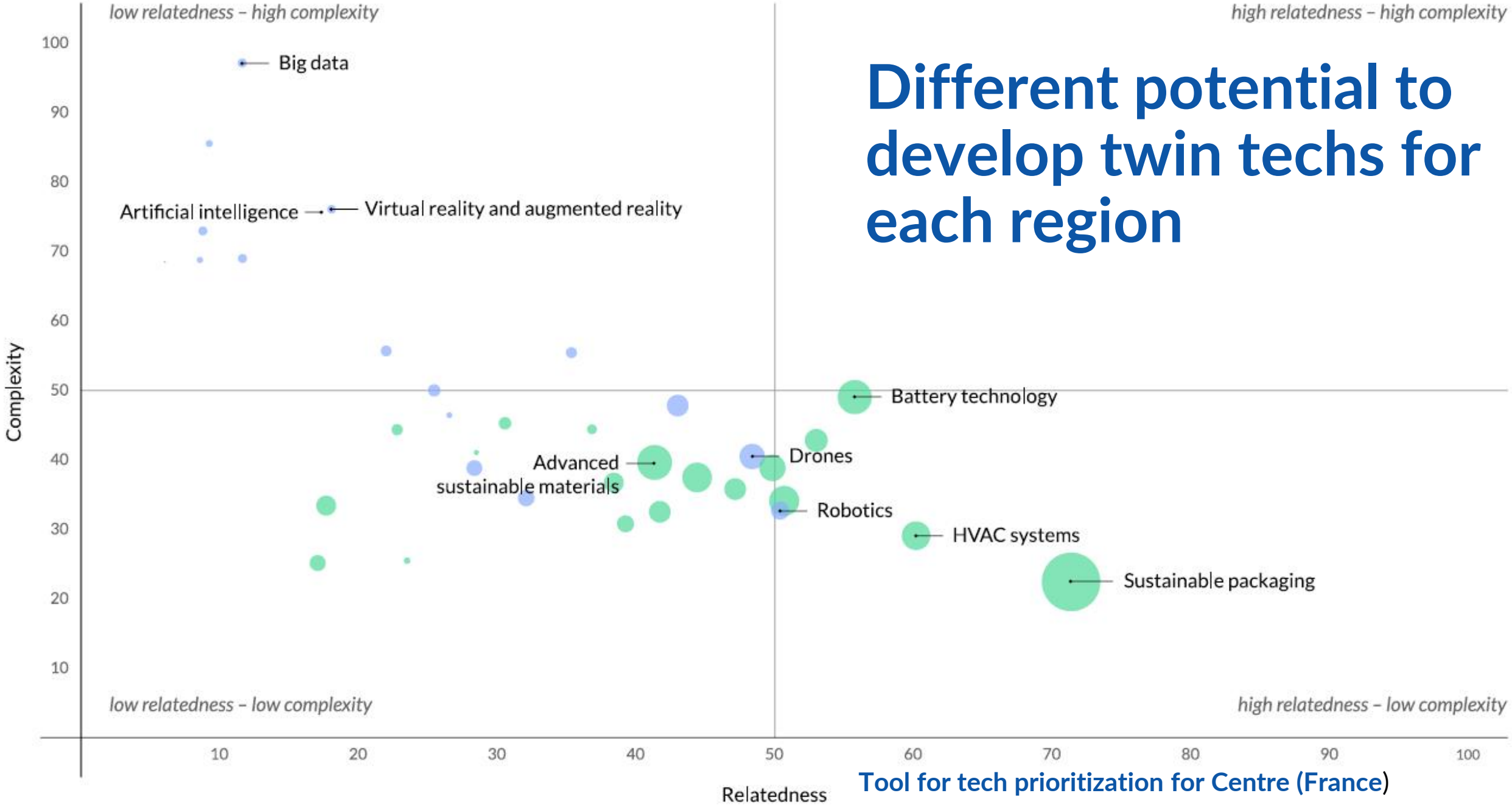
Potential of LESS developed regions



Different potential to develop twin techs for each region



Tool for tech prioritization for Oberbayern (Germany)



Different potential to develop twin techs for each region

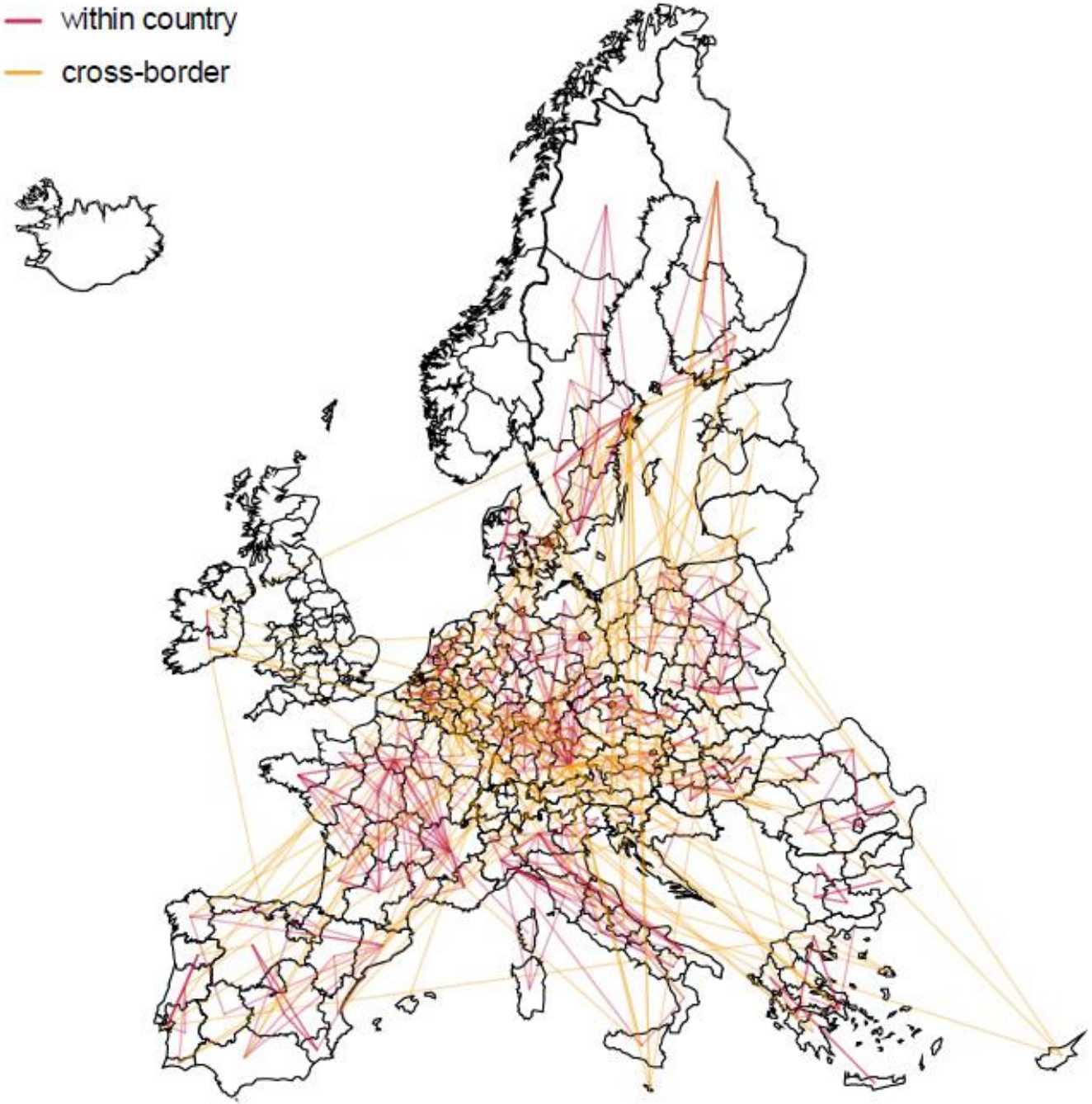
Tool for tech prioritization for Centre (France)

Strong national bias in inter-regional collaborations in twin transition technologies

Inter-regional collaborations in digital technologies

- Connections can be explained by kilometric distance; size of innovative activities; cognitive profile but **especially being in the same country**

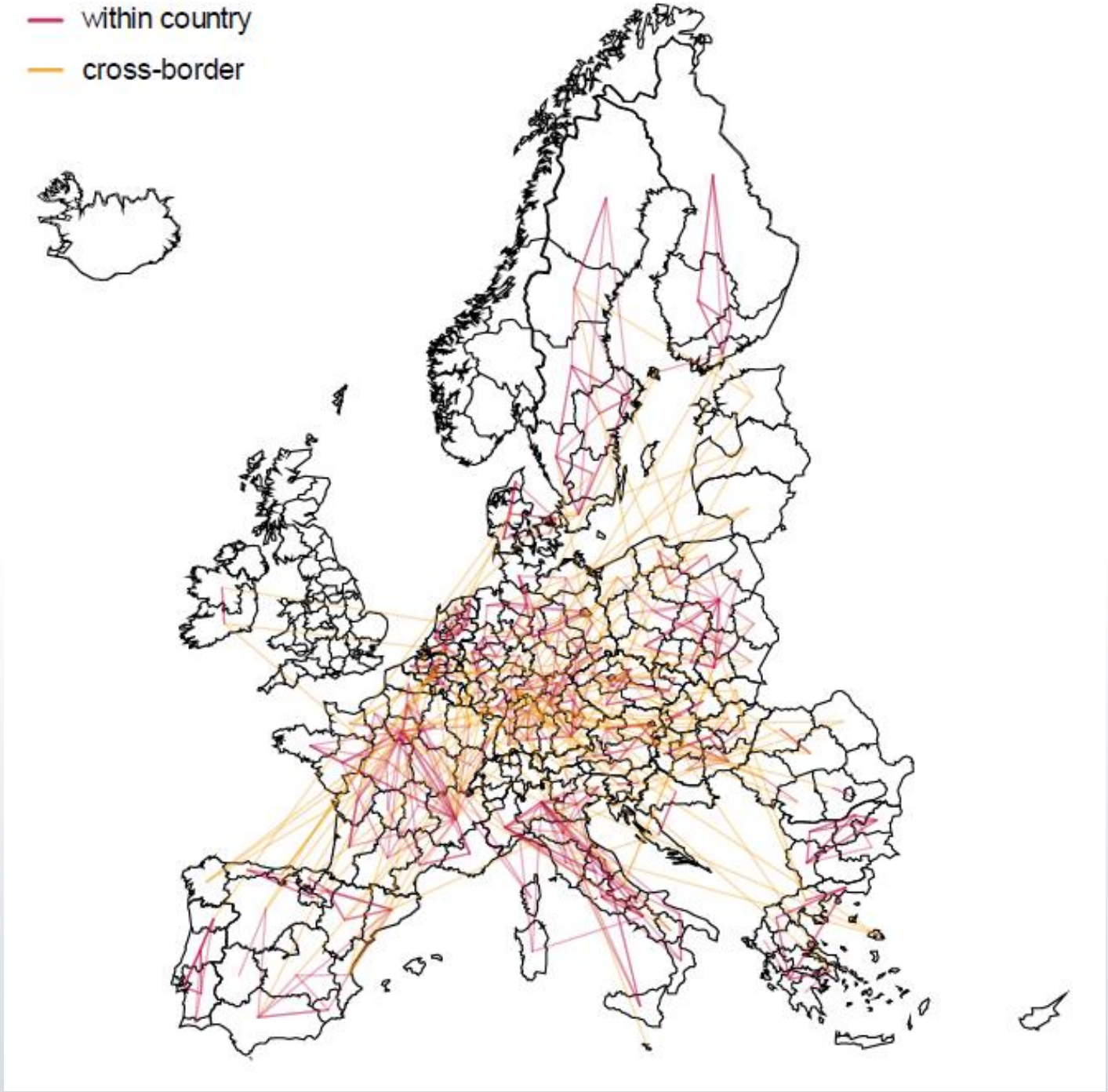
- This is detrimental to both EU global performance & cohesion



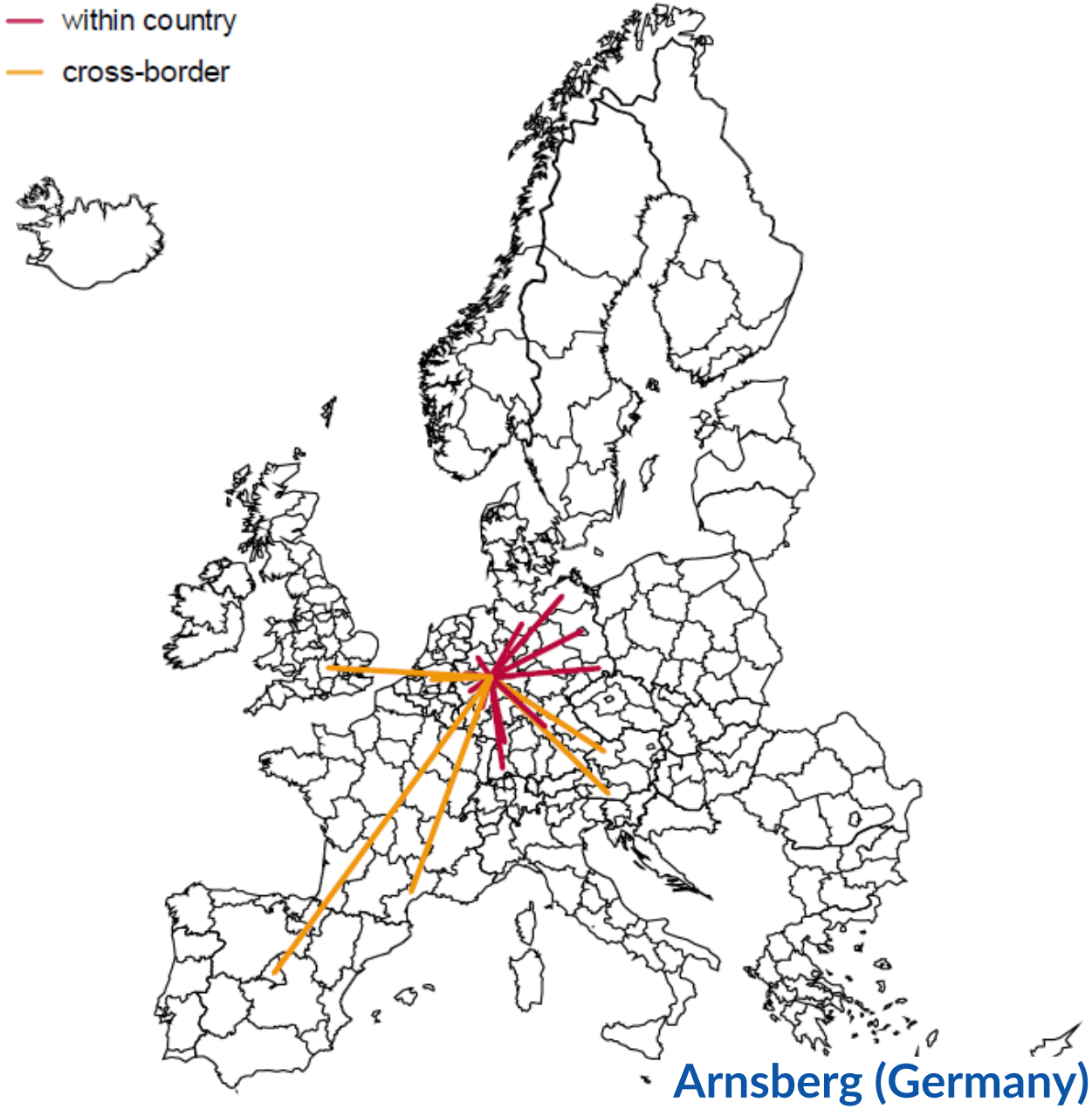
Inter-regional collaborations in green technologies

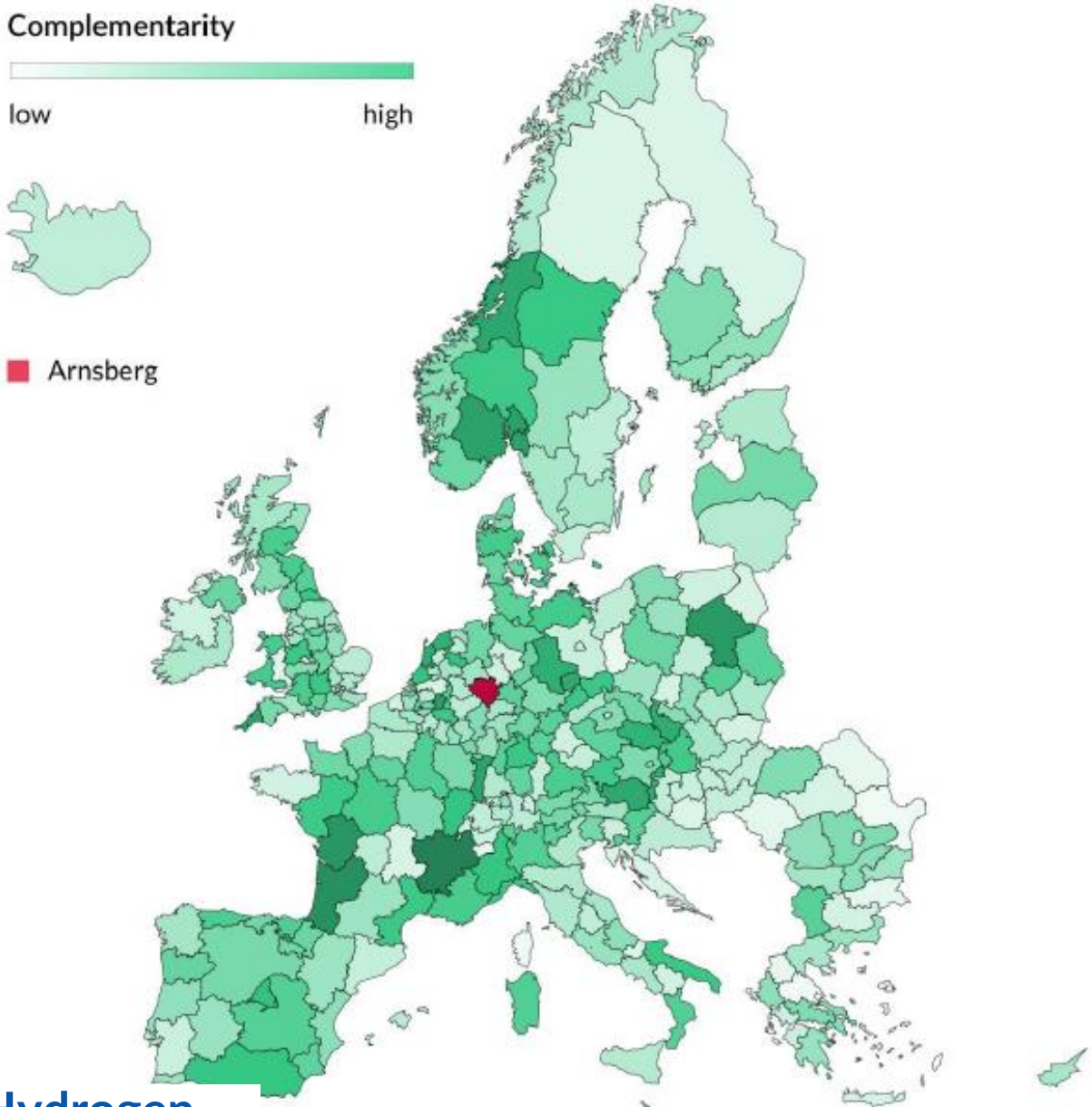
- The impact seems even stronger for green technologies than for digital ones

- A key question is: which connections need to be targeted in **priority**?



Mismatch between actual links & complementarity potential



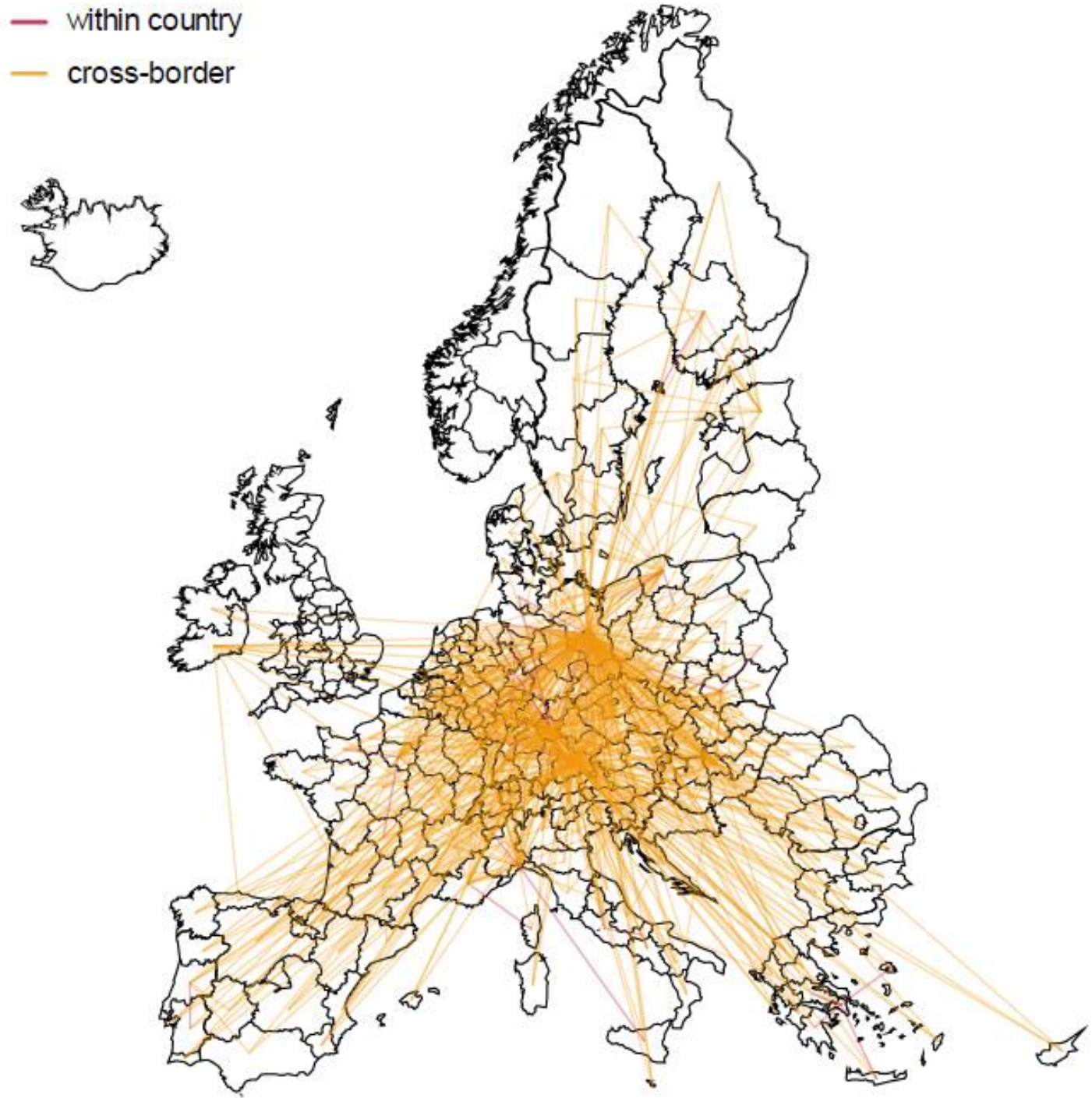


Arnsberg (Germany) - Hydrogen

Untapped potential for collaboration in digital technologies

- We create an ‘ideal’ EU network based on distance; size; cognitive profile but replace being in the **same country** by **complementarity**

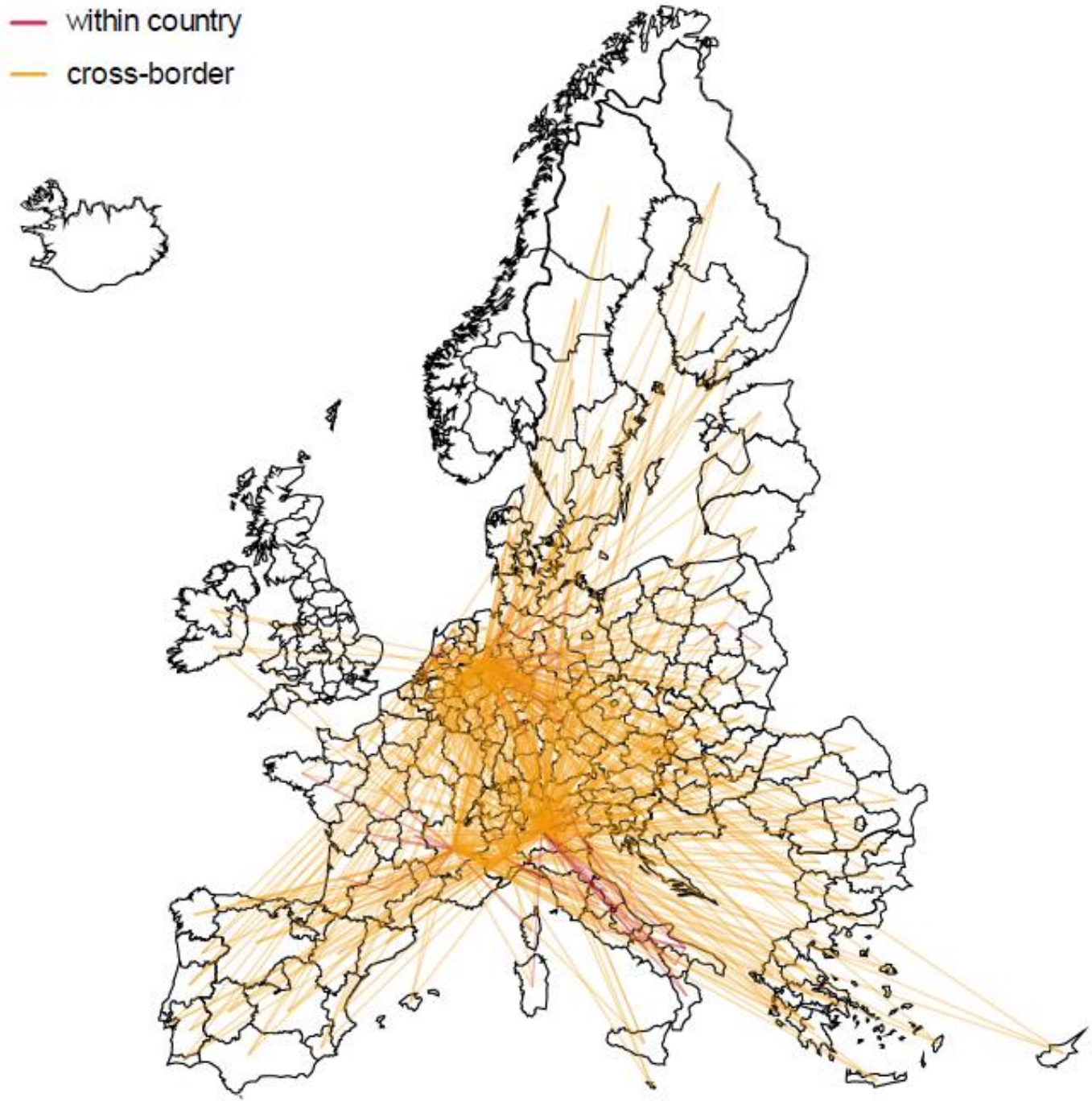
- We compare with the actual link distribution to evaluate **untapped potential** for inter-regional collaborations



Untapped potential for collaboration in green technologies

- This **untapped potential** in digital & green transition technologies is useful to prioritize collaboration under S3 & other EU actions

- As tech prioritization, **link prioritization** is an instrument to accelerate global EU leadership and improve EU cohesion



Summary

- We **map** the **technological capabilities** of EU regions & find a strong **heterogeneity** depending across the different twin transition technologies.

  → *No one-size-fits all policy from both a regional and technological standpoint*

- There is a strong risk of **increased inequality** between EU regions in the era of the twin transition.

  → *Support the technological prioritization efforts of less developed regions*

- There is a very strong **national bias in inter-regional collaborations** in both digital and green technologies

  → *Targeting untapped potential can improve global EU leadership and EU cohesion*

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ADDITIONAL SLIDES

Key challenge(s) for the future of Europe

- Accelerate the development of **green** technologies to mitigate the global impacts of climate change, public health, and improve energy security of EU regions.

- Accelerate the development of **digital** technologies to secure long-term growth, adapt to the future of work & influence the development of systemic risk technologies.

- **Accelerate the twin transition** without increasing **inequalities** between EU regions.

Key twin transition technologies

Digital technologies	Green technologies
Artificial intelligence	Wind energy
Virtual reality and augmented reality	Solar (thermal) energy
High performance computing/quantum computers	Geothermal energy
Cloud and edge computing	Marine energy
Internet of things	Hydropower
Cybersecurity (privacy-enhancing technologies)	Nuclear energy
Cryptography, distributed ledger technology	Biofuels
Robotics	Fuels from waste
Smart grids	Hydrogen fuels
Autonomous mobility	Battery technology
Additive manufacturing (3D printing)	Recycling
Broadband	Water treatment
5G	Carbon (GHG) capturing technology
Semiconductors	Electric vehicles
Advanced materials/nanomaterials	HVAC systems
Big data	Heating pumps
Photonics	Sustainable packaging
Drones	Biocides
	Bio fertilizers
	Smart farming
	Waste management
	Energy conservation technologies
	Green construction/buildings
	Advanced sustainable materials (composite)

Extended gravity model

	Dependent variable: inter-regional connections (log)				
	(1)	(2)	(3)	(4)	(5)
Distance (log)	-0.190***	-0.090***	-0.085***	-0.084***	-0.065***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mass (log)	0.020***	0.022***	0.019***	0.019***	0.077***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0005)
Same country		0.742***	0.746***	0.746***	0.182***
		(0.002)	(0.002)	(0.002)	(0.0005)
Relatedness Density			0.002***	0.002***	0.053***
			(0.00002)	(0.00002)	(0.0005)
Distance in RelDens				-0.001***	-0.012***
				(0.00003)	(0.0005)
Constant	-5.481***	-6.230***	-6.369***	-6.374***	-6.805***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.0004)
Observations	3,471,552	3,471,552	3,471,552	3,471,552	3,471,552
R^2	0.042	0.077	0.080	0.080	0.080

Notes: This table lists the results of OLS regressions. Significance levels: * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001.