



# Foresight Competence and Responsible Innovation in Industry: interrelations and policy implications

**Łukasz Nazarko**

[l.nazarko@pb.edu.pl](mailto:l.nazarko@pb.edu.pl)

Białystok University of Technology (PL)

**Rafael Popper**

[rafael.popper@manchester.ac.uk](mailto:rafael.popper@manchester.ac.uk)

University of Manchester (UK)

University of Turku (FI)

Futures Diamond (UK)

Technology Partners (PL)

# Research info

- **Related Projects:**

- Future-Oriented Technology Assessment as an instrument supporting Responsible Research and Innovation
- Public Participation in Developing a Common Framework for the Assessment and Management of Sustainable Innovation (CASI)

- **Methodology:**

- survey of 100 large Polish enterprises (production and services) – a pilot study
- survey and stocktaking of 500+ European sustainable innovations

- **Profile of participants:**

- high-level management, R&D staff, product development specialists
- innovators - including business, government, research and civil society stakeholders

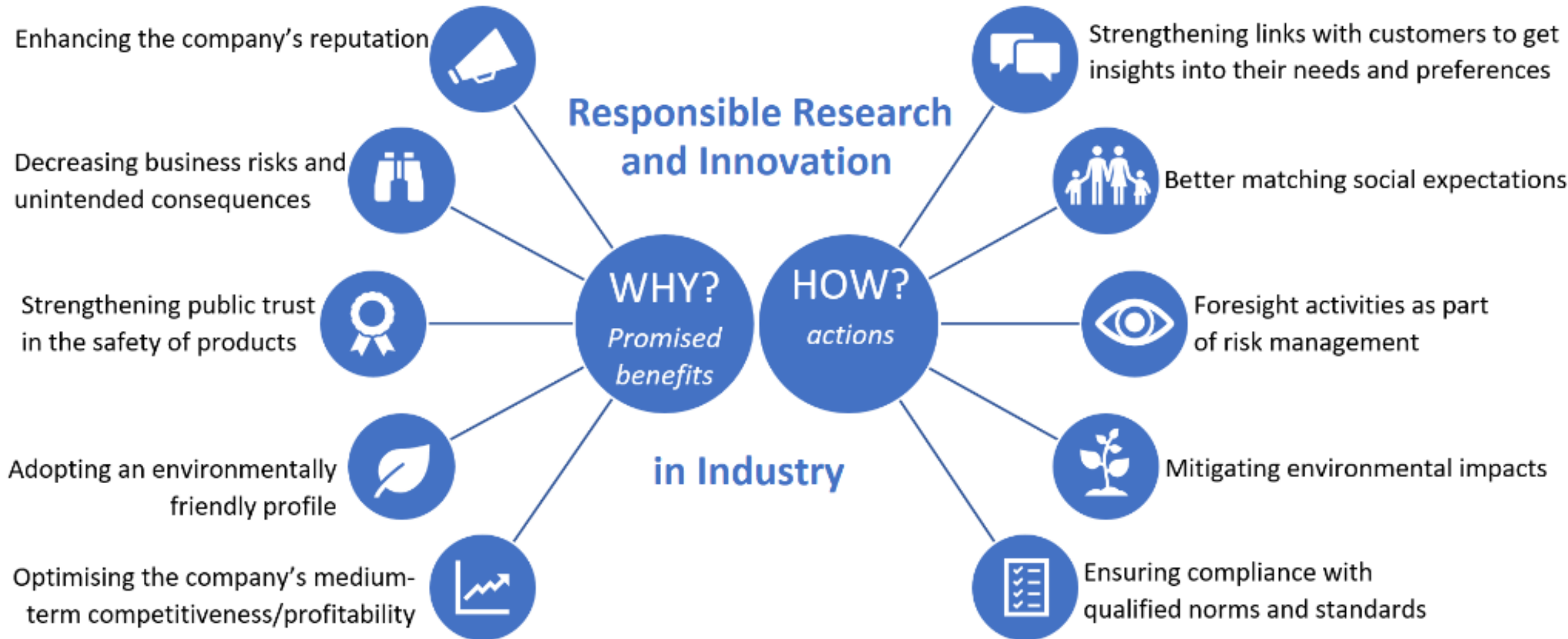
- **Time:** years 2020-2021 (+ stocktaking ongoing)

- **Research questions:**

- Are companies with stronger foresight capabilities more responsible innovators?
- What is the relation of the Grand Challenges-related innovation priorities of Polish enterprises with the sustainability oriented Policy Agendas derived from pan-European mapping?
- How to support enterprises in building embedded foresight and RRI competences?



# RRI in business – promised benefits and proposed actions



# Diagnosing RRI and Foresight capabilities

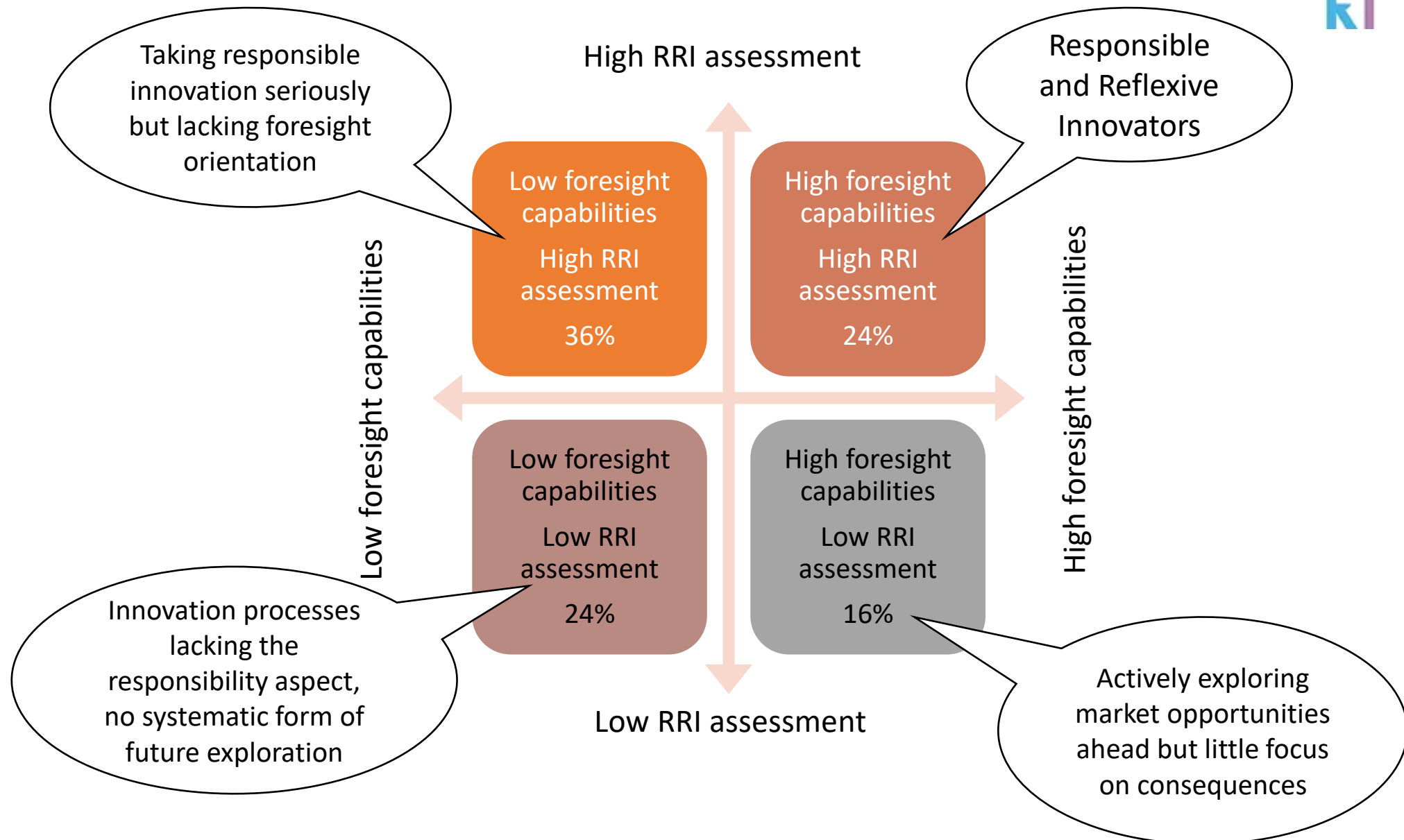
## **Foresight capabilities:**

1. Use of foresight tools in the enterprise's operation (PEST, STEEP, TEEPSE critical issues analysis, environmental scanning, horizon scanning, scenarios, Delphi, cross-impact analysis, simulations, modelling, roadmapping)
2. Acknowledgement of the need to increase staff competences in the application of future-oriented methods and tools

## **RRI assessment:**

1. Company activity helps tackle Grand Societal Challenges (climate change, demand for energy, shrinking natural resources, water deficit, ageing society, privacy, security, etc...)
2. Involving stakeholders in the product development
3. Reflecting on the possible impact of new products on the environment and society
4. Ability to change after receiving feedback from stakeholders, including withdrawing the product from the market or aborting the new product development
5. Building scenarios of product life cycle

# Four types of companies?



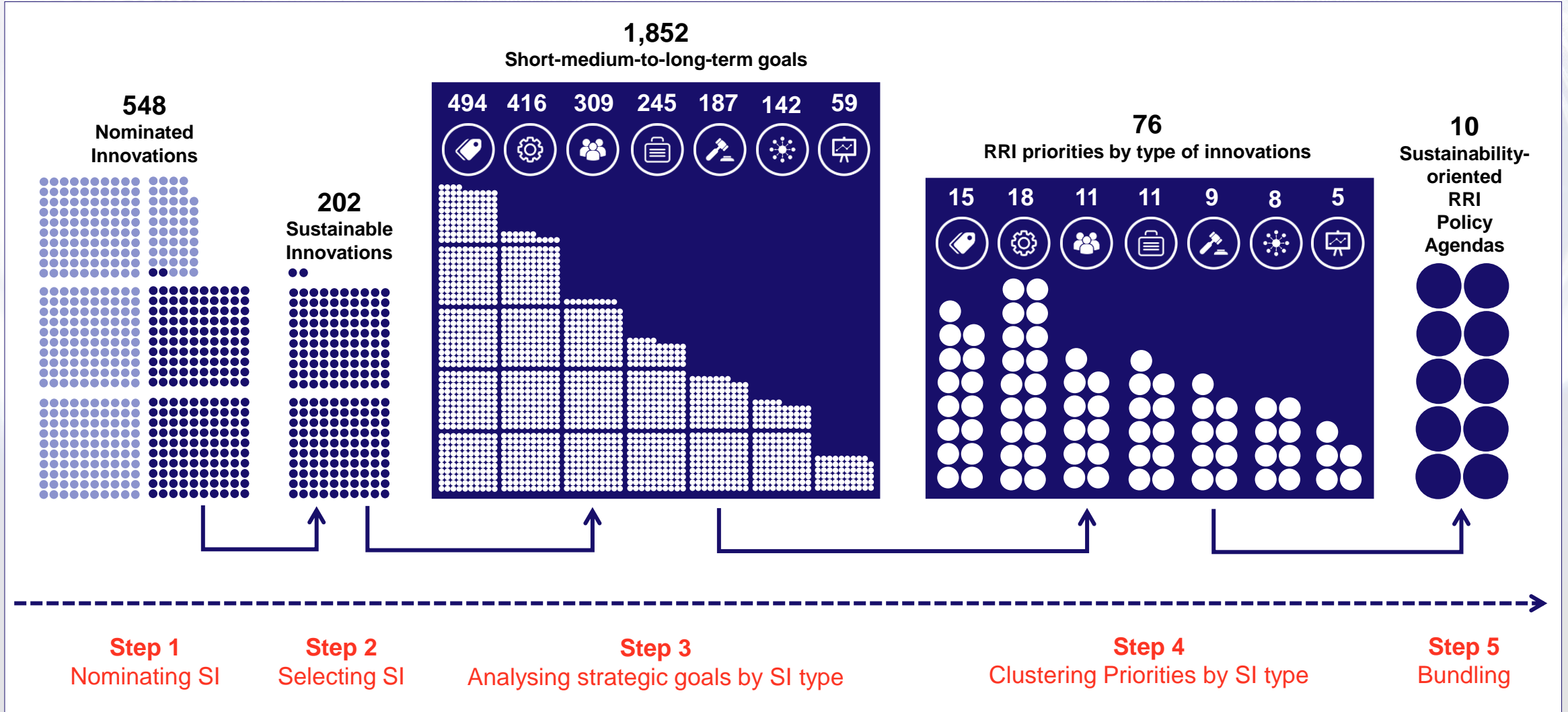


## **Towards a Sustainability-oriented RRI Policy Agenda**

**CASI**



# From Innovator's goals to Sustainability-oriented RRI Policy Agendas



# Priority Areas by type of Innovation

**76**  
RRI priorities by SI type



**10**  
RRI Agendas

**38 SI selected from 194**  
Product innovations

1. Energy
2. Waste
3. Air quality
4. Water
5. Public transport
6. Carbon footprint
7. Construction
8. Pollution
9. Regional development
10. Emissions
11. Electric vehicles
12. Food production
13. Green roofs
14. Heating and cooling devices
15. Recycling



**48 SI selected from 121**  
Service innovations

1. Energy
2. Circular economy
3. Waste
4. Emissions
5. Renting and sharing services
6. Public transport
7. Electric vehicles
8. Rural areas
9. Knowledge sharing
10. Water
11. Communication of hazards
12. Organic food
13. Air/land/water quality
14. Cultural heritage
15. Traffic
16. Air and noise pollution
17. Advice to citizens
18. Goods distribution to shops



**48 SI selected from 75**  
Social innovations

1. Organic food
2. Lifestyles & consumption patterns
3. Community life and development
4. Construction waste
5. Local quality of life
6. Public awareness & participation
7. Children's interest and skills
8. Conscious use of resources
9. Transport
10. Water access
11. River and stream water quality



**22 SI selected from 62**  
Organisational innovations

1. Water saving
2. Strategies for businesses
3. Engaging customers
4. Emissions
5. Waste management
6. Local communities
7. Surplus of resources
8. Food supply chain
9. Smart grid
10. E-waste recycling
11. Business practices



**25 SI selected from 46**  
Governance innovations

1. Energy saving policies
2. Multi-stakeholder engagement
3. Climate change
4. Engaging citizens
5. Public transport networks
6. Emissions
7. Air quality
8. Renewable energy
9. Reliable data



**16 SI selected from 31**  
System innovations

1. Energy saving policies
2. Renewable energy
3. Natural resources
4. Food waste
5. Quality of life, water and air
6. Endangered species
7. Food industry
8. Integrated applications & systems



**5 SI selected from 19**  
Marketing innovations

1. Organic food
2. Sustainable shopping practices
3. Eco-labels/businesses
4. Sustainable communities
5. Waste stream to landfills





# Sustainability-oriented RRI Policy Agenda

Promoting foresight for sustainability governance and intelligence

Deploying responsible environmental and resource-efficiency strategies

Creating sustainable biofuel and renewable energy solutions

Advancing recycling and circular use of waste and raw materials

Embedding sustainability in cultural and holistic education models

Strengthening eco-community empathy and crowd-funded development

Developing sustainable urban and rural infrastructures for the bioeconomy

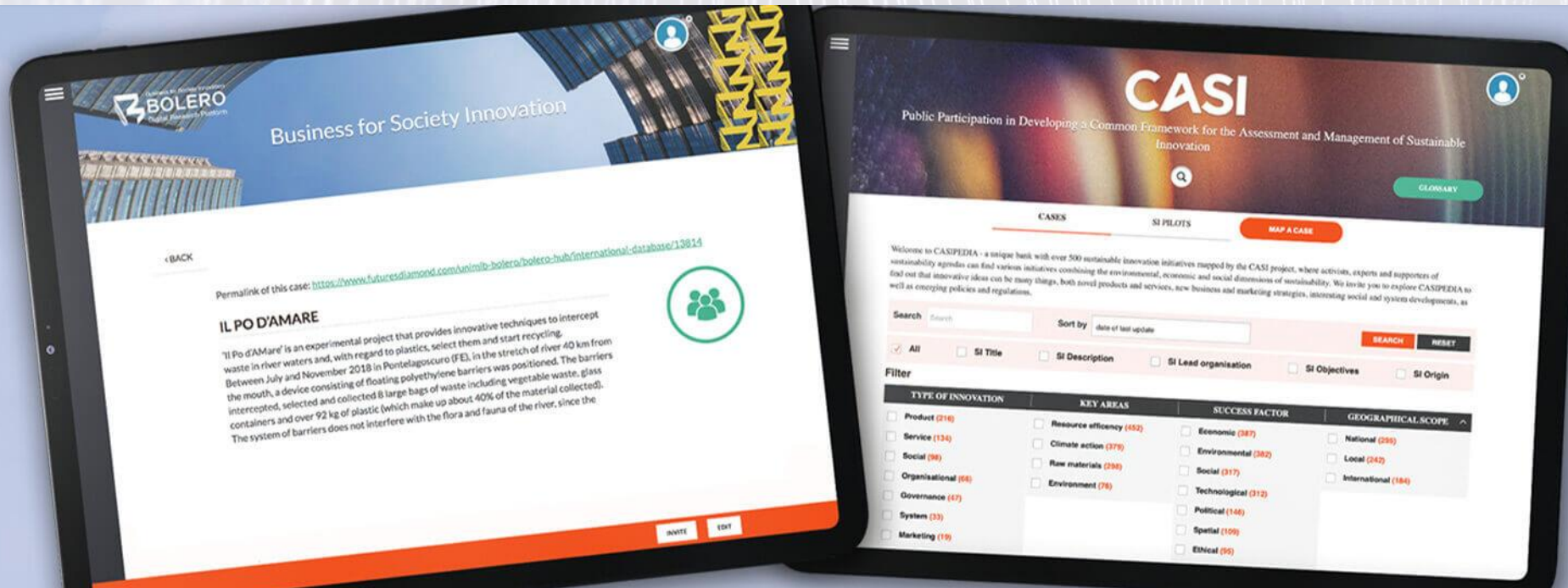
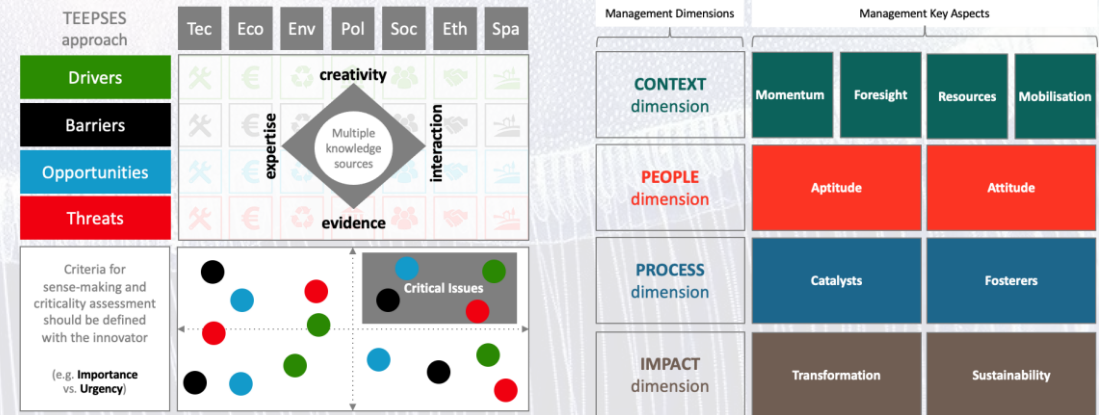
Fostering eco-local-agriculture and bio-resources efficiency

Implementing sustainable transport and smart mobility innovations

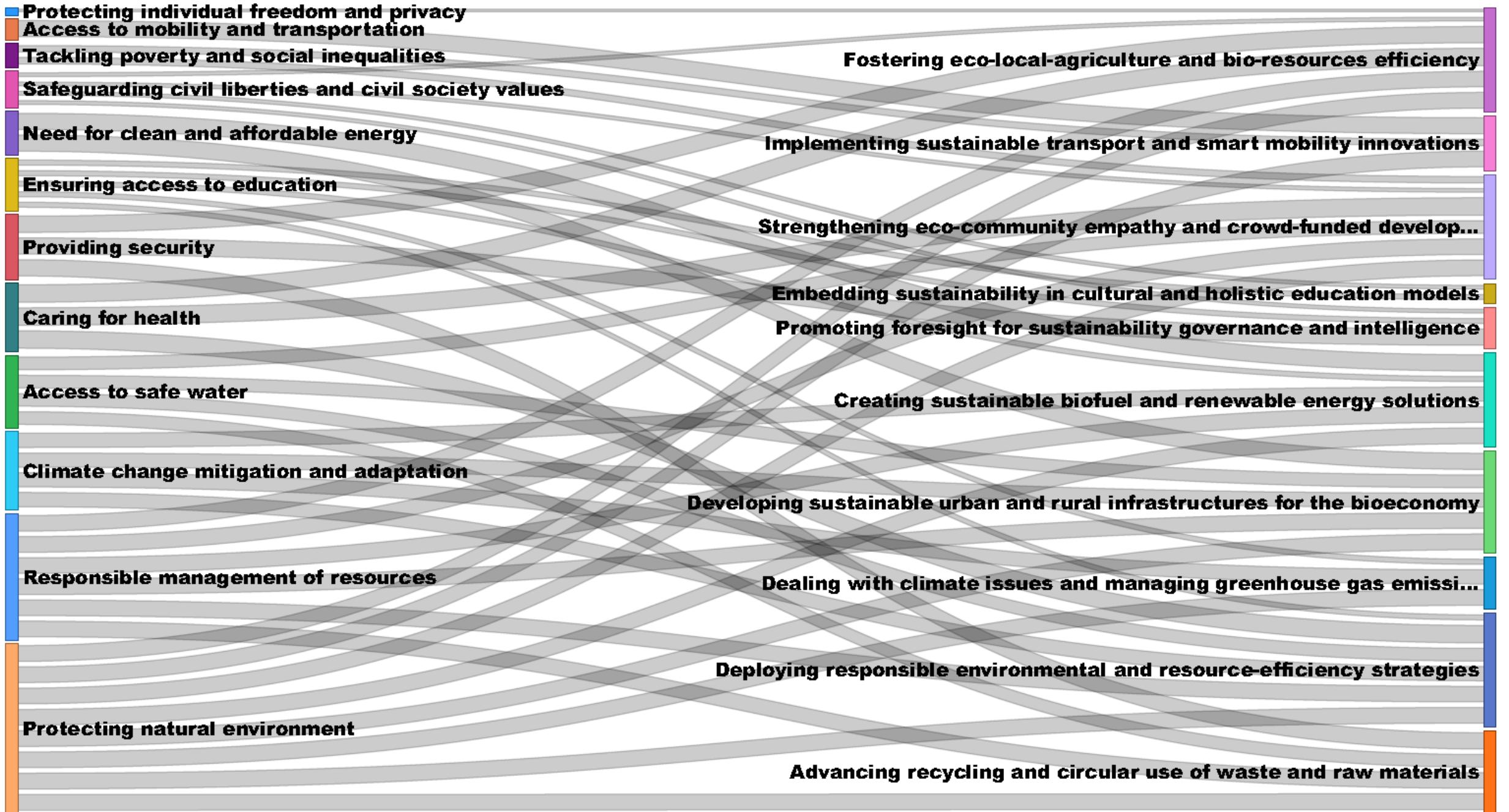
Dealing with climate issues and managing greenhouse gas emissions

# How to support enterprises in building embedded foresight and RRI competences?

- By linking SMEs goals to SDGs
- By supporting SMEs and innovators to systematically engage in:
  1. Sustainability assessment and management
  2. Critical Issues Analysis
  3. Action Roadmapping



POLICY AGENDAS: relevance to Polish enterprises



# Conclusions

- Are companies with stronger foresight capabilities more responsible innovators? **Not necessarily**
- What is the relation of the Grand Challenges-related innovation priorities of Polish enterprises with the sustainability oriented Policy Agendas derived from pan-European mapping? **Multi-directional, oriented mostly at environmental challenges (much less on socio-economic ones)**
- How to support enterprises in building embedded foresight and RRI competences?



# Areas of future study

- Extend the study to a larger population of enterprises. Perform cross-sectoral and cross-country studies.
- Design novel empirical studies that could bridge the theory and practice of responsible research and innovation?
- Study the understanding and perception of responsibility in innovating enterprises?
- Confront the (Europocentric?) RRI paradigm with approaches in other world regions.
- Test the relevance of tools like key responsibility indicators (responsibility KPIs), innovation responsibility scorecard, RRI index

# References

- Dian, N (2009) *Foresight Styles Assessment: A Theory Based Study in Competency and Change*, Journal of Futures Studies, vol. 13, no. 3, pp. 59-74.
- Kononiuk, A. Sacio-Szymańska, A. and Gáspár, A. (2017) *How do companies envisage the future? Functional foresight approaches*, Engineering Management in Production and Services 9(4): 21-33, <https://doi.org/10.1515/emj-2017-0028>
- Nazarko, L. (2019) *Responsible Research and Innovation in Industry: from Ethical Acceptability to Social Desirability*, [in:] P. Golińska, M. Sychala (Eds.), Corporate Social Responsibility in the Manufacturing and Services Sectors. EcoProduction (Environmental Issues in Logistics and Manufacturing), Springer, Berlin, Heidelberg, [https://doi.org/10.1007/978-3-642-33851-9\\_7](https://doi.org/10.1007/978-3-642-33851-9_7)
- Popper, R., Popper, M., Velasco, G. (2017) *Towards a more responsible sustainable innovation assessment and management culture in Europe*, Engineering Management in Production and Services, vol. 9, no. 4, pp.7-20. <https://doi.org/10.1515/emj-2017-0027>
- Popper, R., Popper, M., Velasco, G. (2020). *Sustainable Innovation Assessment and Management Framework: Principles, Methodology and Practice*. In: Martini, M., Hölsgens, R., Popper, R. (eds) Governance and Management of Sustainable Innovation. Sustainability and Innovation. Springer, Cham. [https://doi.org/10.1007/978-3-030-46750-0\\_1](https://doi.org/10.1007/978-3-030-46750-0_1)
- Robinson, D.K.R. (2009) *Co-evolutionary scenarios: An application to prospecting futures of the responsible development of nanotechnology*, Technological Forecasting and Social Change, Volume 76, Issue 9, <https://doi.org/10.1016/j.techfore.2009.07.015>
- van de Poel, I., Asveld, L., Flipse, S., Klaassen, P., Kwee, Z., Maia, M., Mantovani, E., Nathan, C., Porcari, A., Yaghmaei E. (2020) *Learning to do responsible innovation in industry: six lessons*, Journal of Responsible Innovation, 7:3, 697-707, <https://doi.org/10.1080/23299460.2020.1791506>
- van der Laan, L., Erwee, R. (2012) *Foresight styles assessment: a valid and reliable measure of dimensions of foresight competence?*, Foresight, Vol. 14 Issue: 5, pp.374-386, <https://doi.org/10.1108/14636681211269860>

# Thank you!

L.Nazarko@pb.edu.pl

rafael.popper@manchester.ac.uk

