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Plastics as a systemic risk of social-ecological supply systems

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ISOE – Institute for Social-Ecological Research, Frankfurt am Main

European Conference on Plastics in Freshwater Environments

Berlin, 21-22 June 2016

Junior research group “PlastX“
Systemic approach

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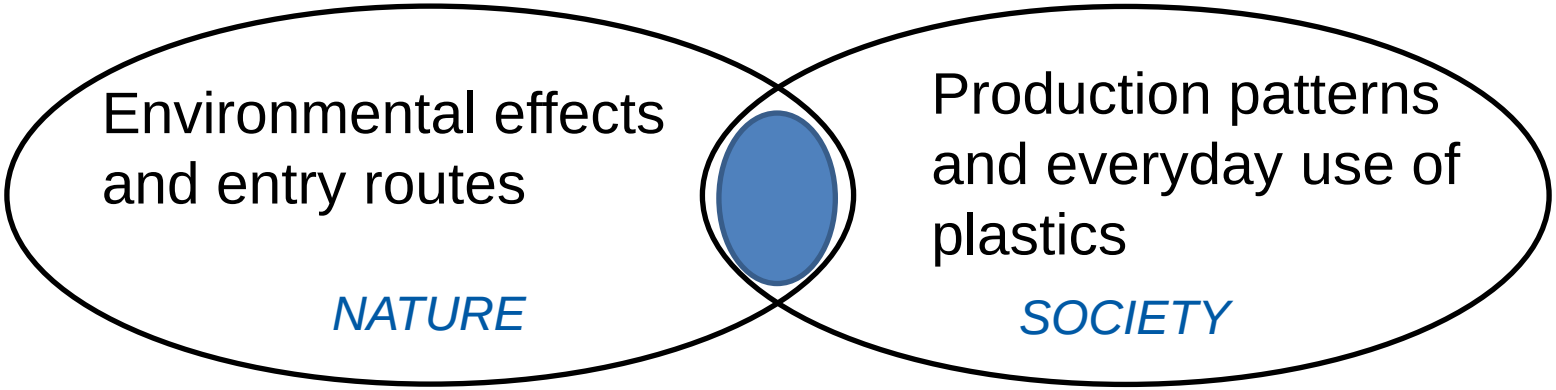
- Systemic research approach: Holistic view of the “plastic system“

Problem: „Plastics in the environment“



➢ **Social-ecological risk perspective**

Conceptual approach: “Systemic risks“

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Social-ecological definition (Renn & Keil 2008)

Systemic risks are…

…side effects of normal system operation

…affect various systems

…complex

…uncertain regarding causal connections

…characterized by ambiguous perceptions

Conceptual approach: “Systemic risks“

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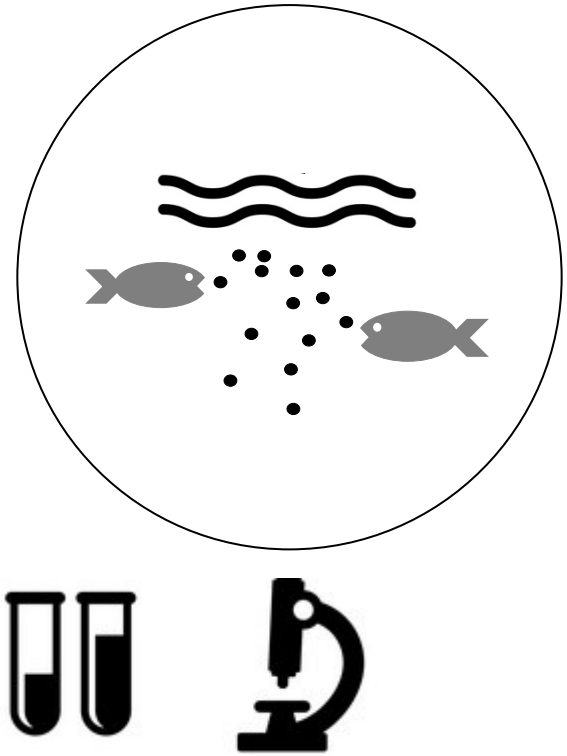

Ecotoxicological risk

Human toxicological risk

Conceptual approach: “Systemic risks“

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Risk communication

Ecotoxicological risk

Human toxicological risk

Conceptual approach: “Systemic risks“

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www.bfr.bund.de

BfR
Bundesinstitut für Risikobewertung

Mikroplastikpartikel in Lebensmitteln

Stellungnahme Nr. 013/2015 des BfR vom 30. April 2015

Statement:

- No particles detected in food
- But lack of methods to assess the phenomenon comprehensively

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Risk evaluation

Ecotoxicological risk
Human toxicological risk

Risk communication

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Risk perception

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Concern About Food Safety Topics

		Compared to 2015
Antimicrobial resistance	66	(–6)
Genetically modified foods	63	(–4)
Plant protection product residues in foods	60	(–5)
Microplastics in foods	52	(*)
Food poisoning, infections[1]	48	(–10)
Food hygiene in gastronomy	39	(–5)
Hormone-like substances in body care products	38	(*)
Unbalanced diet	34	(–3)
Pyrrolizidine alkaloids in teas	28	(*)
Glyphosate in the food chain	28	(*)
Food hygiene at home	10	(–4)

[1] *In 2015 the wording was "food poisoning/foodborne infections caused by bacteria"*

Shown: Percentage "concerned" (4 + 5 on the scale) *Basis: 1,010; figures given as percentages (compared to 2015: percentage points); *not asked in 2015*

BfR Consumer Monitor, 02/2016

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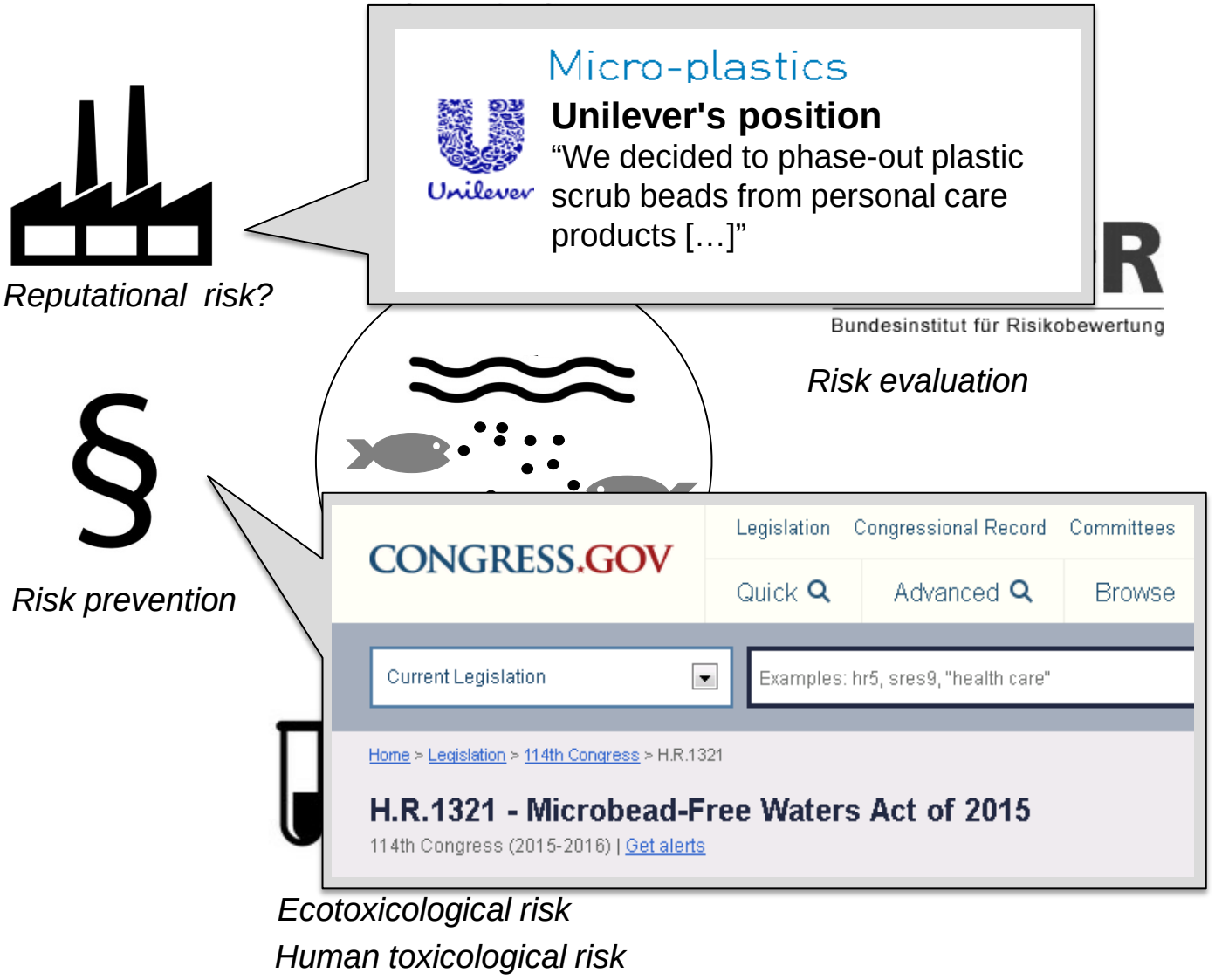

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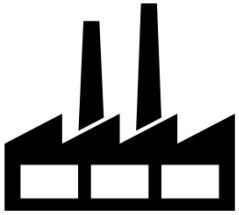
Risk perception



Reputational risk?

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Risk evaluation

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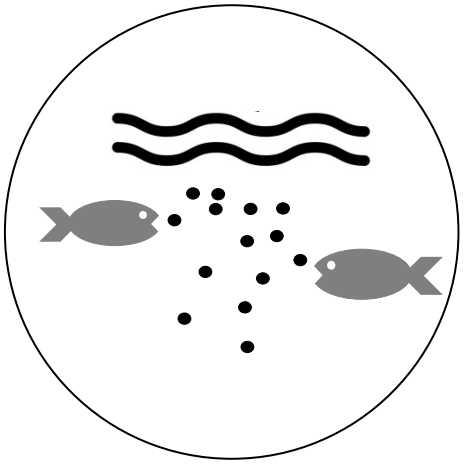
Risk prevention



Ecotoxicological risk
Human toxicological risk

Risk communication

Conceptual approach: “Systemic risks“

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Characteristics:

- **Multiple actors** with different perspectives, understanding and perception of risks
- **Interconnected risks**: Risk amplification, production of new risks, influence on decision-makers

Task for science:

- Take a holistic view of the system in order to
  - Structure and evaluate hints and facts
  - Identify actors and their specific role (risk producers/risk bearers)
  - Develop solution strategies

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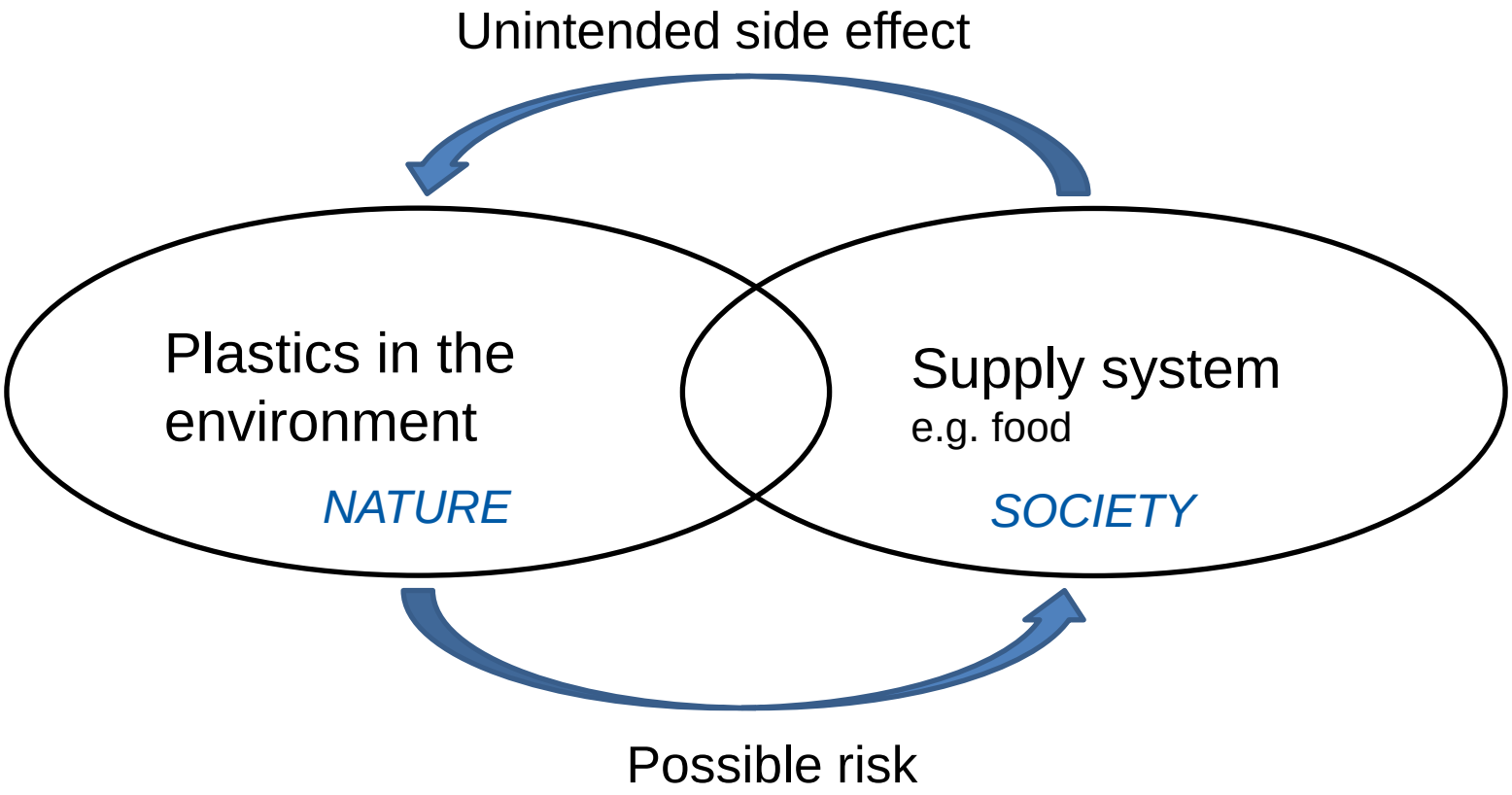
Social-ecological, systemic risk perspective (Keil et al. 2008)



Research areas

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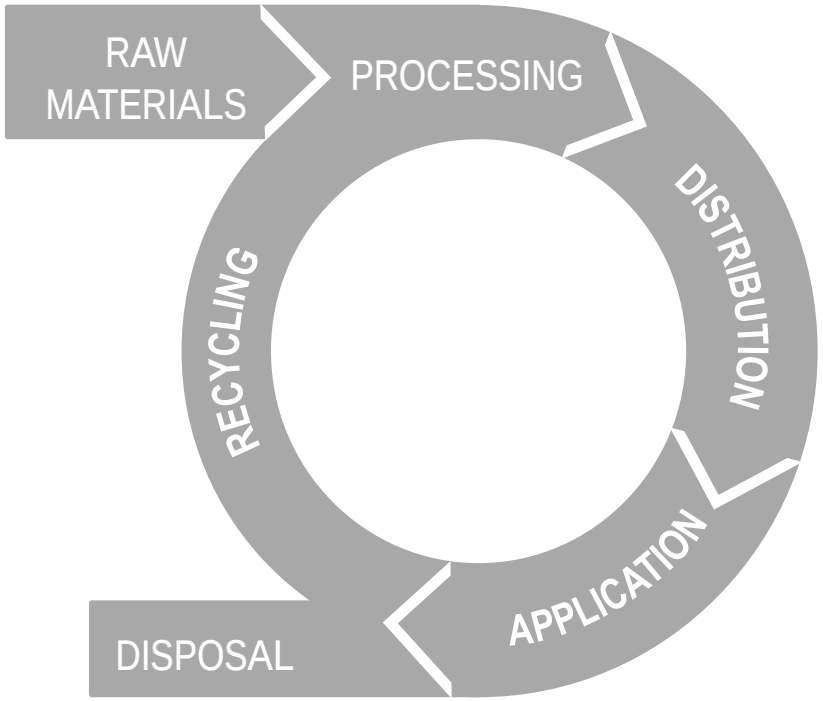

Research areas

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Microplastics in rivers

- Effects of microplastics in freshwater environments
- Evaluation of ecotoxicological risks
- Development of a concept for ecotoxicological risk assessment

Microplastics

How do we cope with plastic waste in the environment?

Research areas

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Microplastics

How do we cope with plastic waste in the environment?

Marine Litter

Research areas

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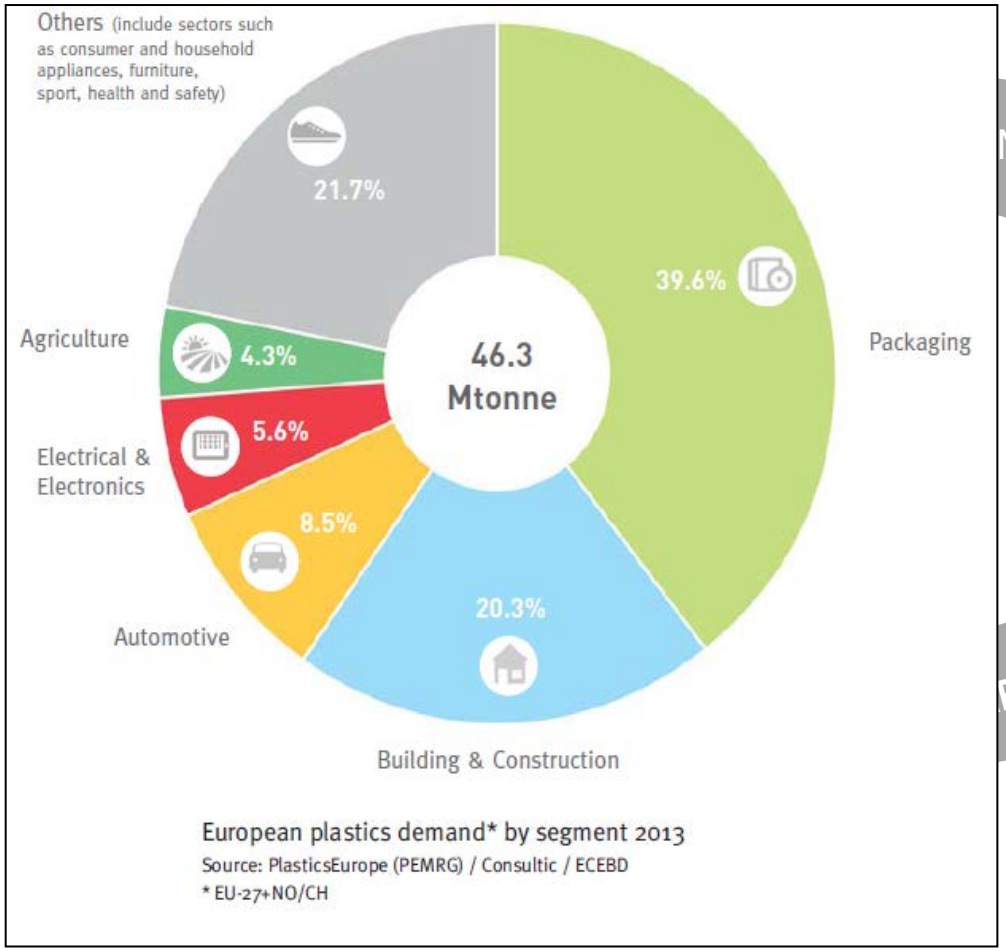

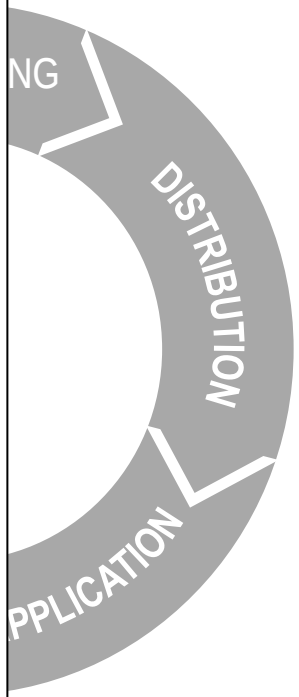

Research areas

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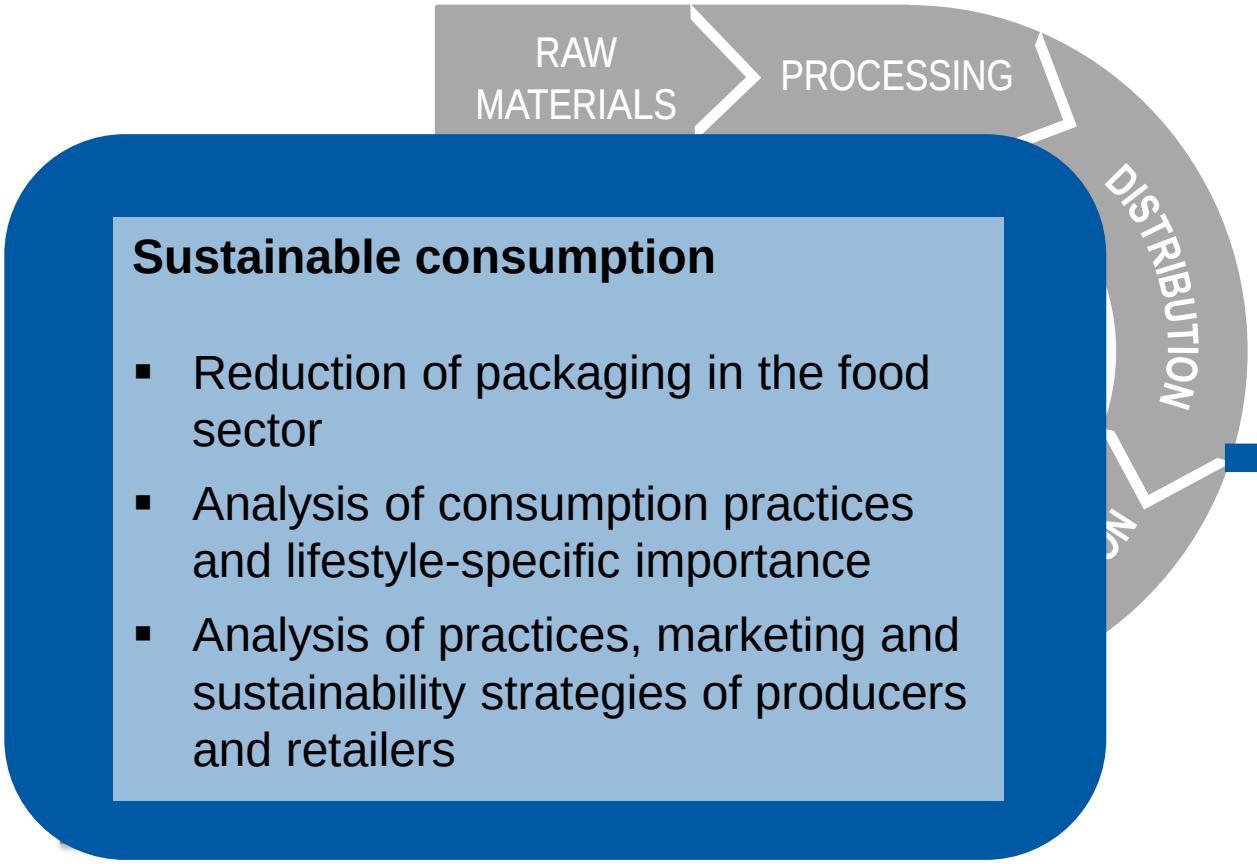

What can be done to reduce plastic usage?

Consumption

Research areas

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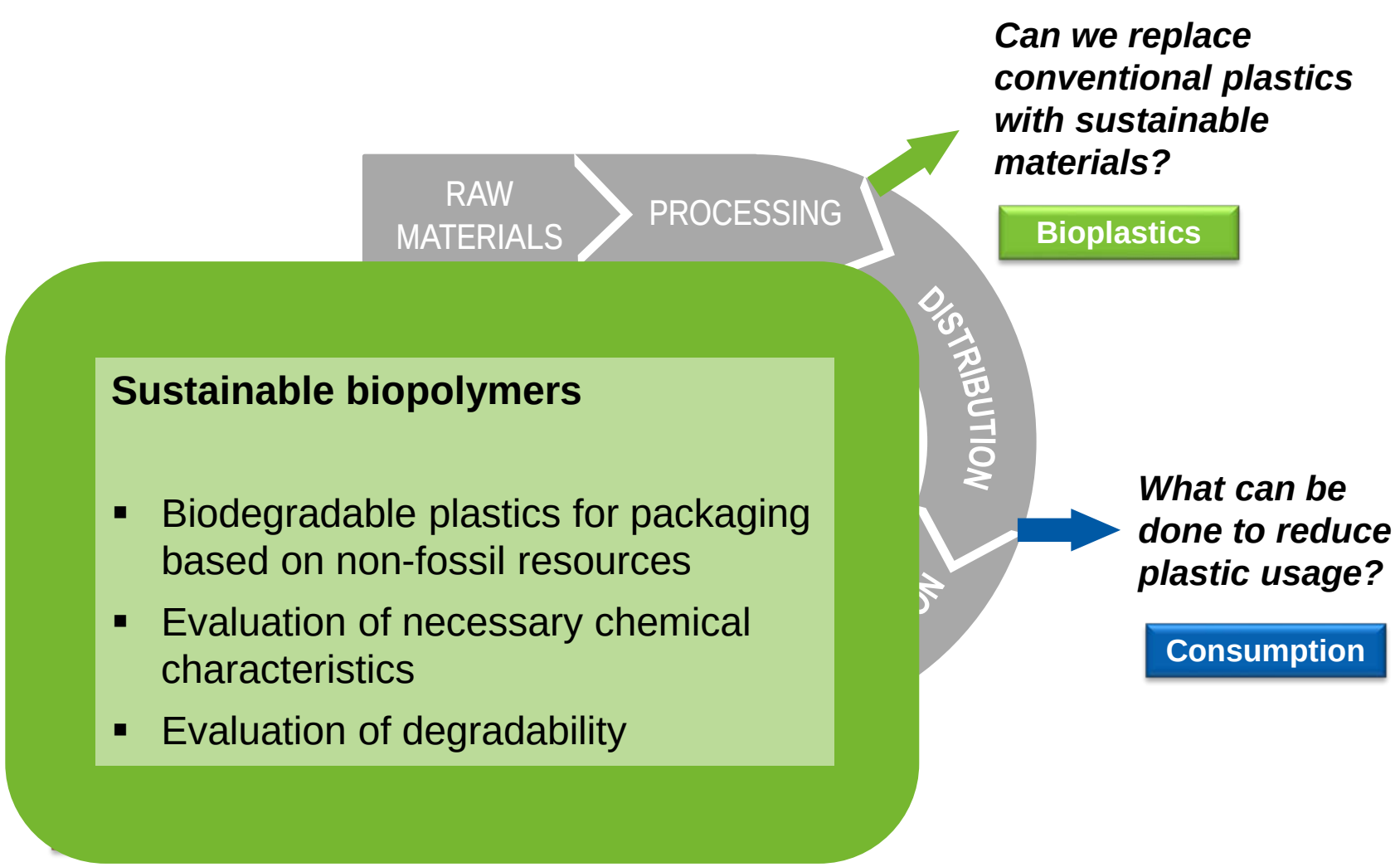

Research areas

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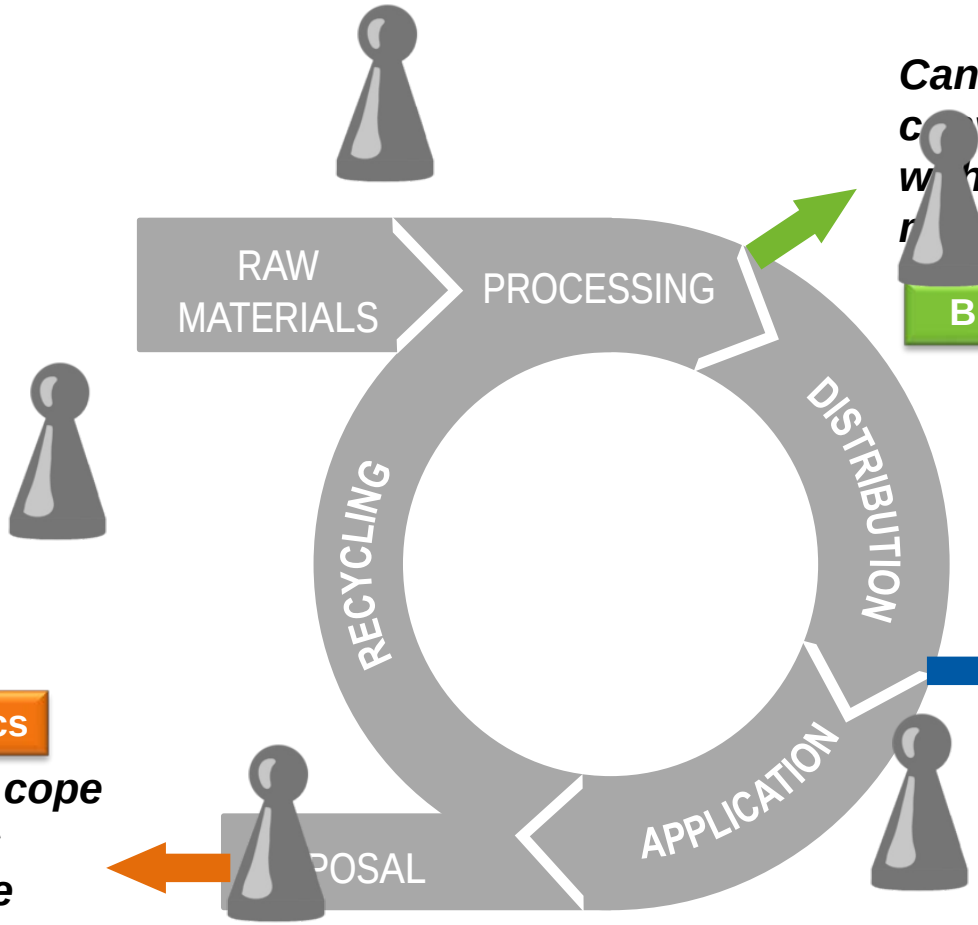

Can we replace conventional plastics with sustainable materials?

Bioplastics

What can be done to reduce plastic usage?

Consumption

Microplastics

How do we cope with plastic waste in the environment?

Marine Litter

Integrative part: “Shared risks”

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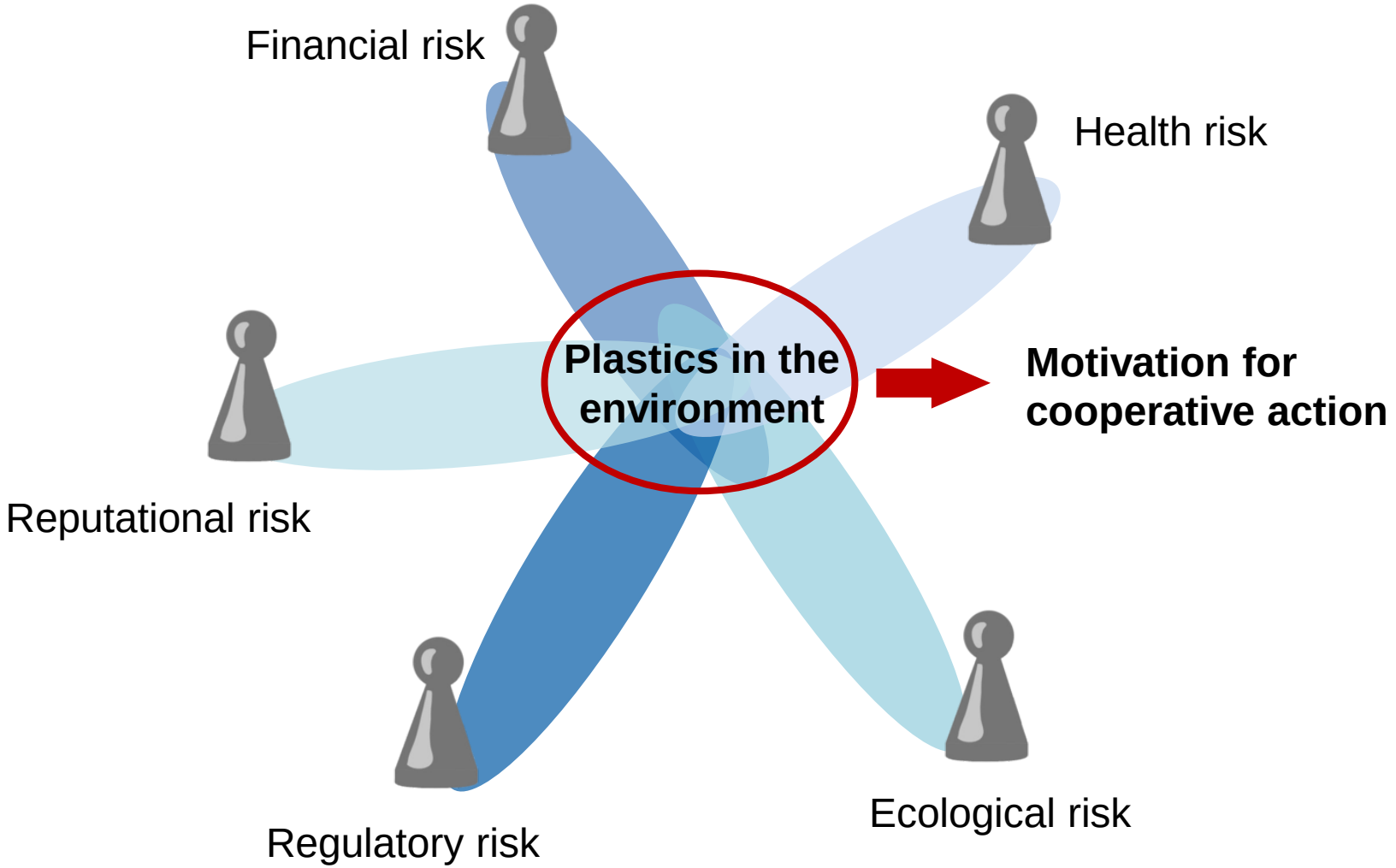

Junior research group “PlastX“

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PlastX

MAX PLANCK INSTITUTE FOR POLYMER RESEARCH

Institute for Social-Ecological Research

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Interdisciplinary team

biology | chemistry | human geography | sociology

Duration

04/2016 – 03/2021

Funding programme

„Research for sustainable development (FONA)“

„Junior research groups in social-ecological research“

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Conclusion

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- Transdisciplinary research approach
  - Integrative, holistic view
  - Interdisciplinary team
  - Involvement of societal actors
- Contribution to societal as well as scientific issues related to plastics
- Comprehensive understanding of the associated risks
- Practical solutions to manage, reduce, and substitute plastics