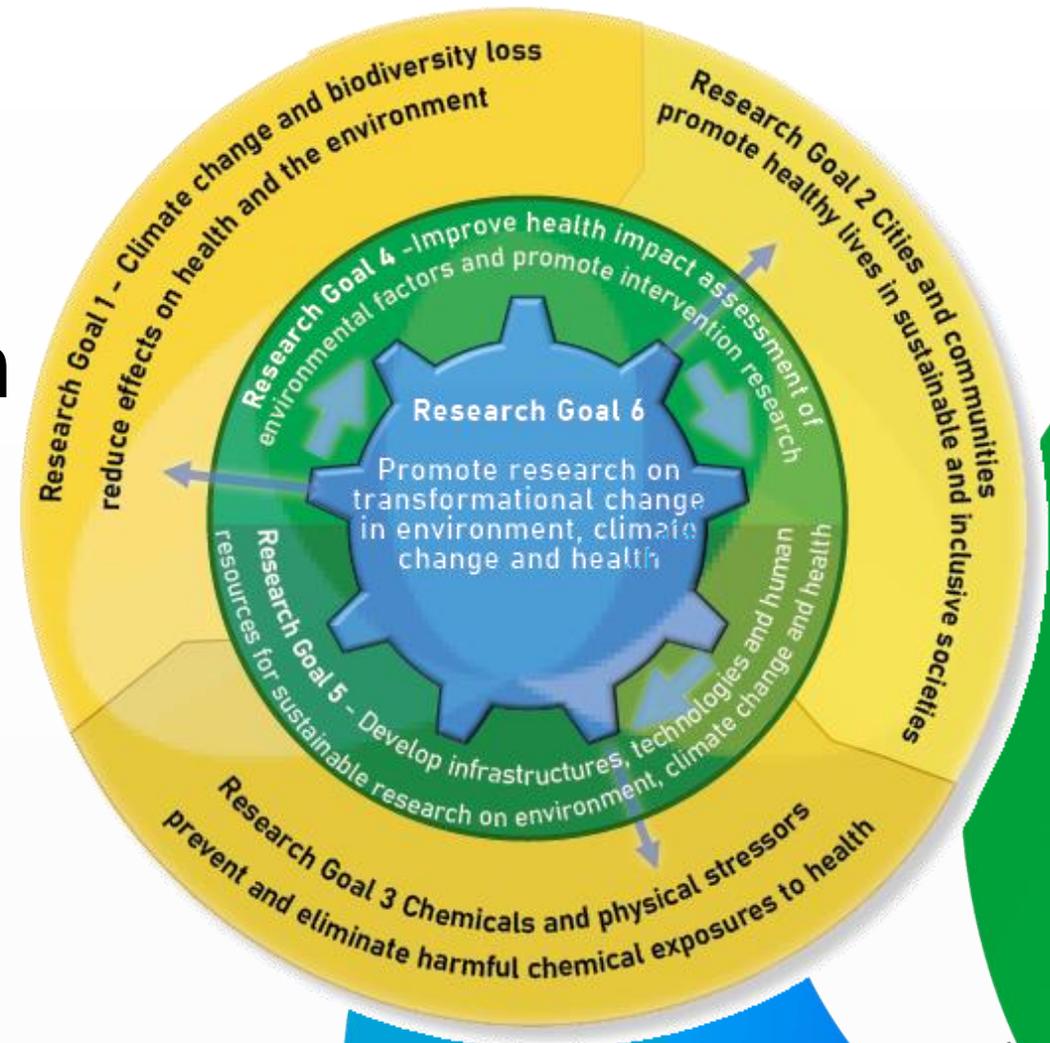


Chemical strategy: international research and expertise

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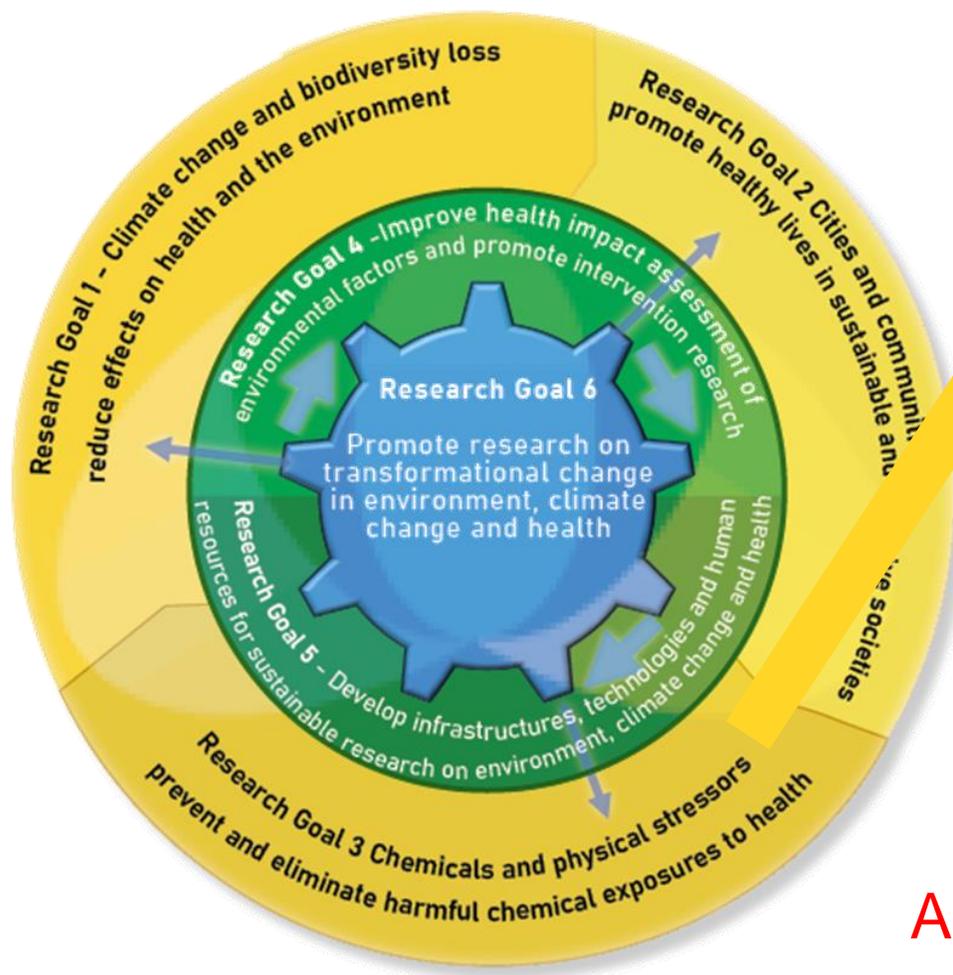
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RG 3. Chemicals and physical stressors – prevent and eliminate harmful chemical exposures to health

RG3.1 Exposure to chemicals including legacy chemicals, emerging chemicals and mixtures

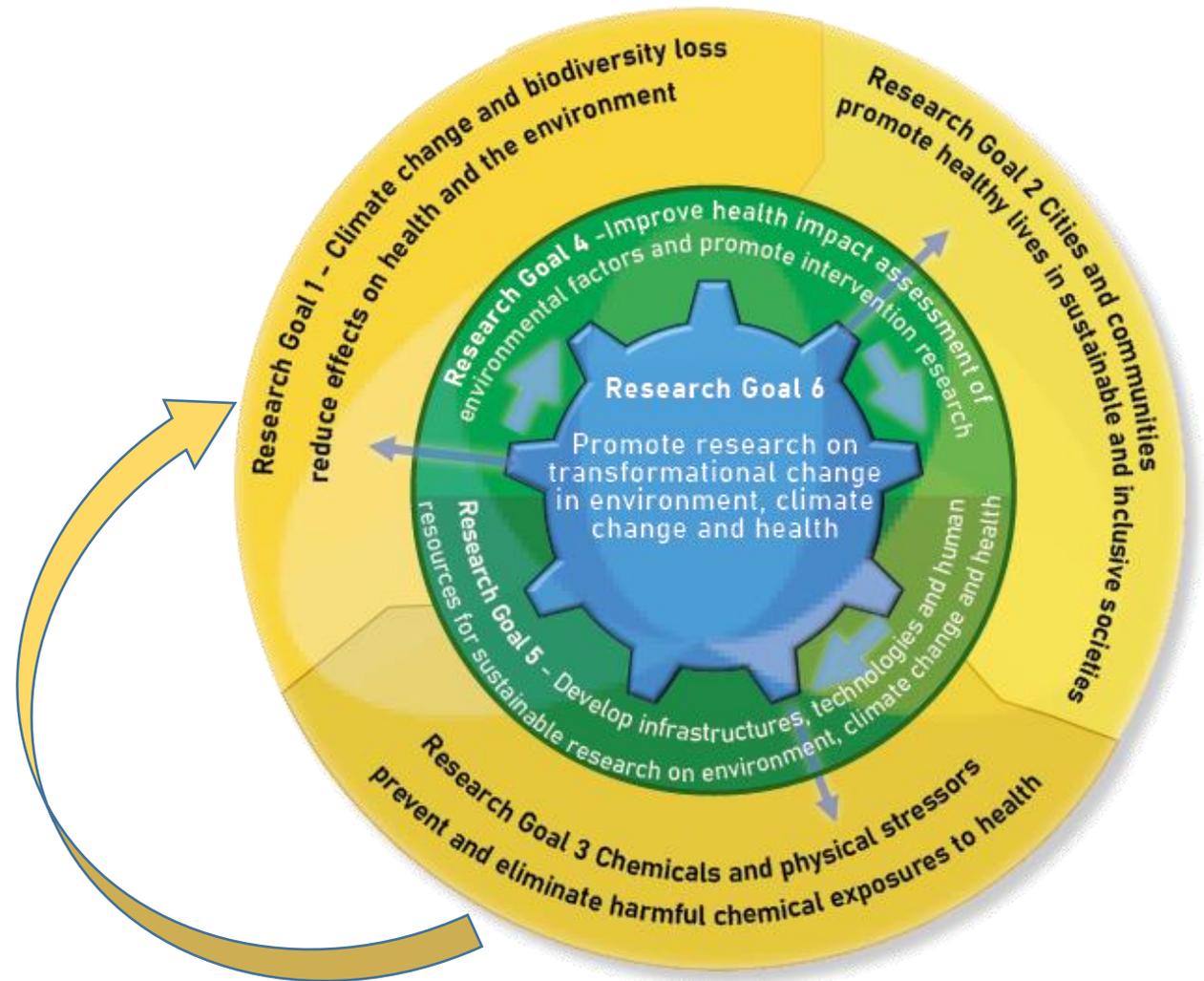
RG3.2 Health effects of anthropogenic chemicals.

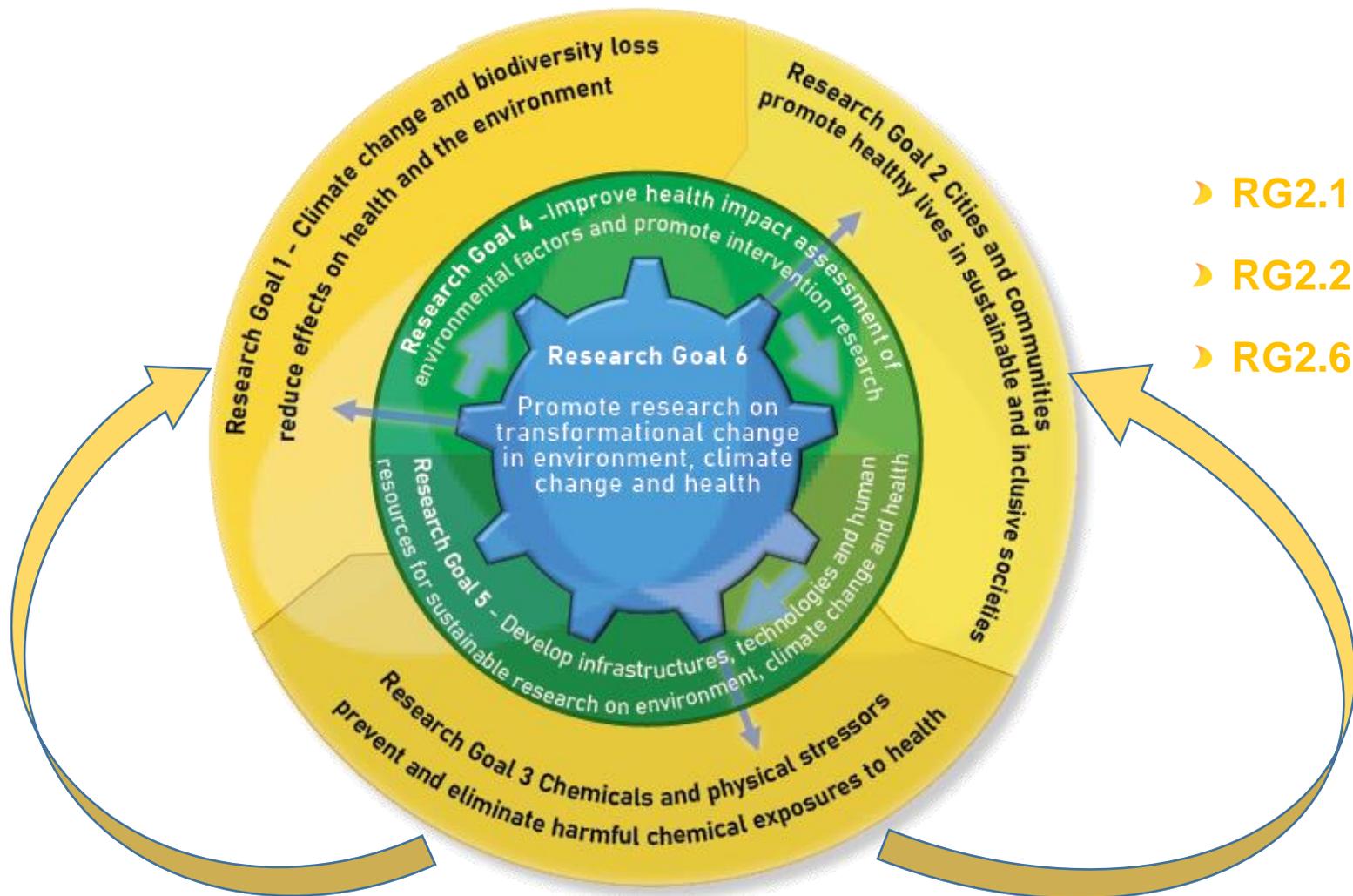
RG3.4 Water contamination

RG3.5 Food and soil contamination

A chemical research strategy is much wider than this!

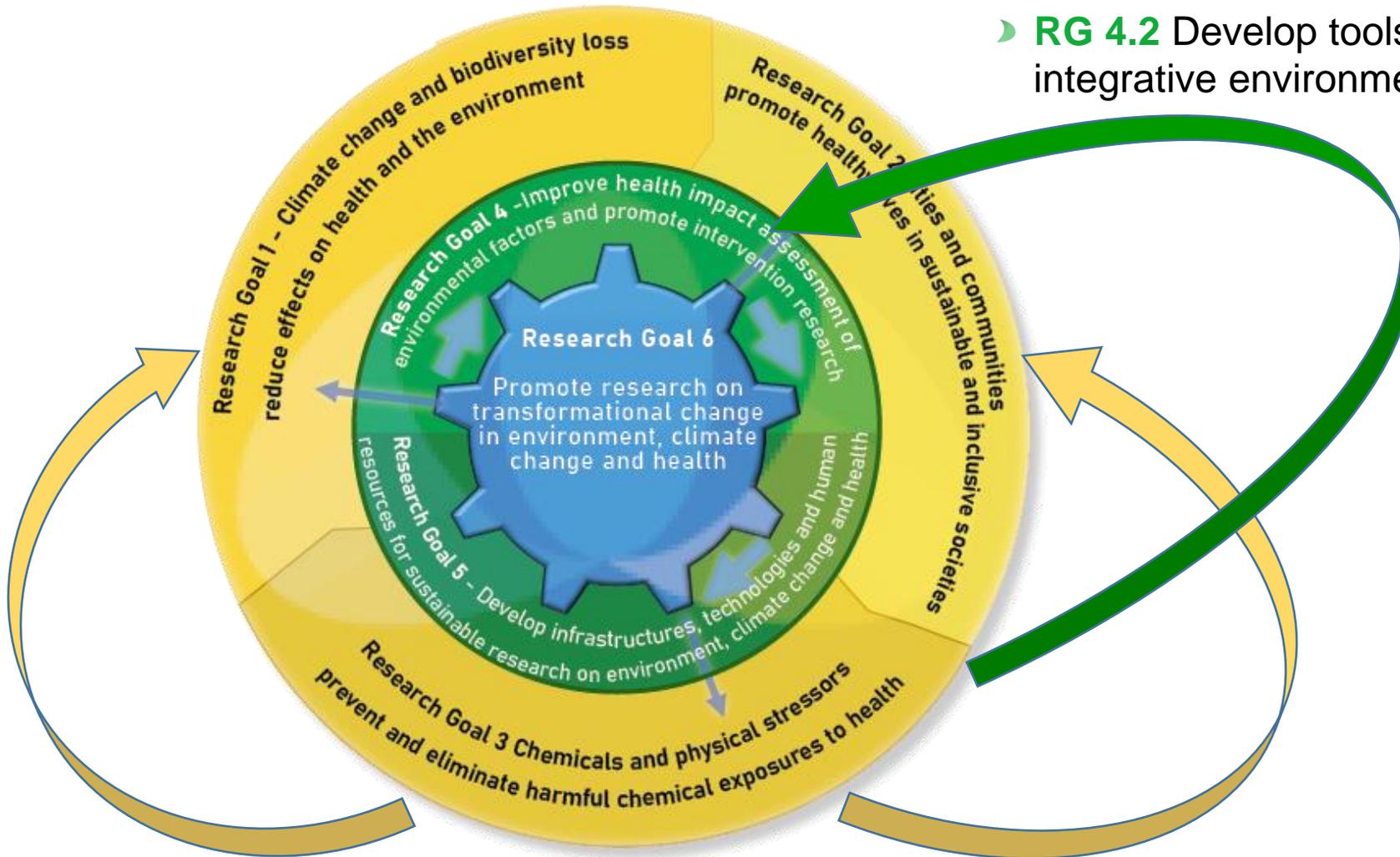
- › **RG1.4** Biological agents, environment and human health
- › **RG1.5** Food, ecosystem services and farming
- › **RG1.6** Global pollution



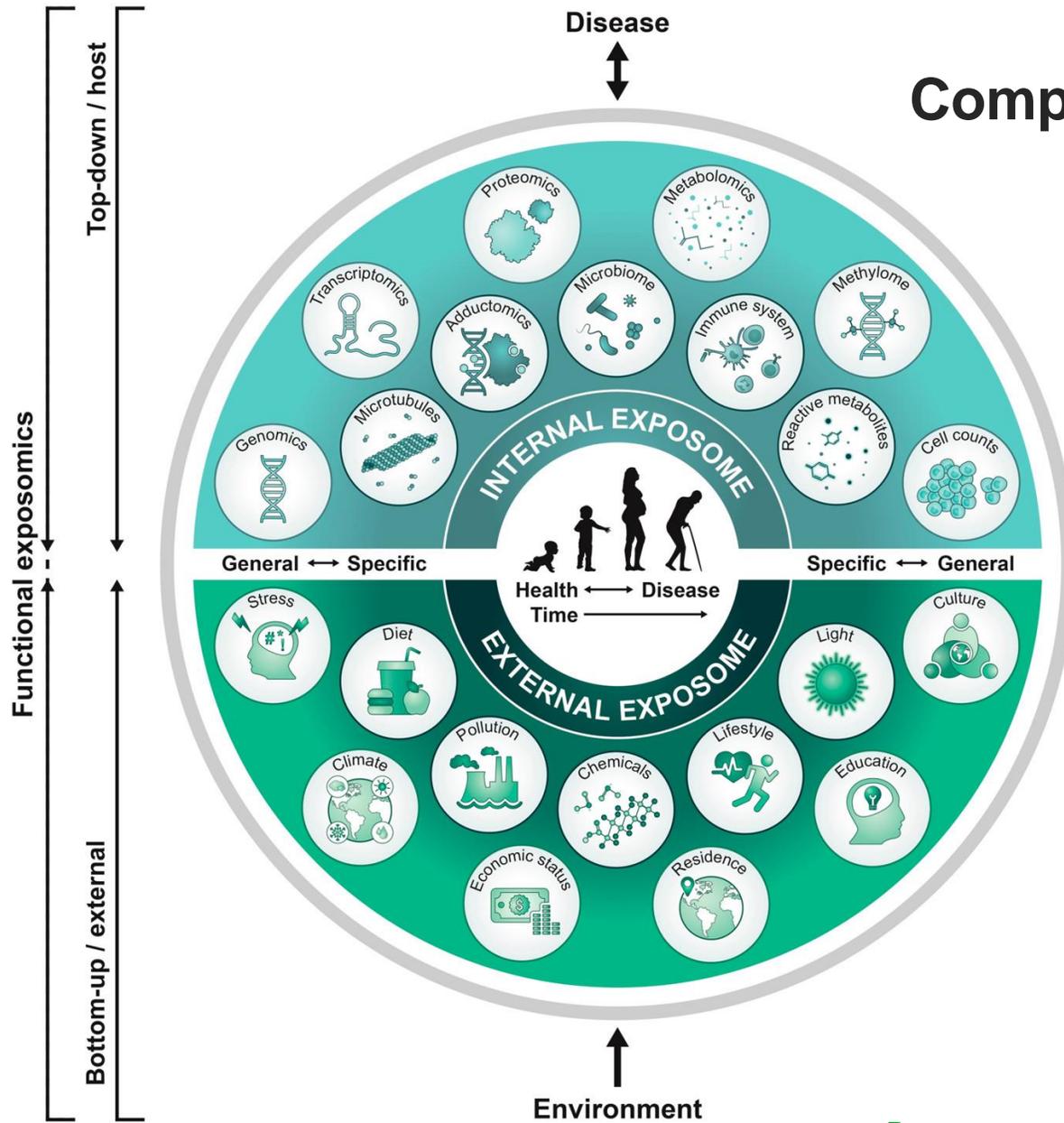


- › **RG2.1** Healthy Urban Environments
- › **RG2.2** Air pollutants indoors/outdoors
- › **RG2.6** Waste and contaminated sites

- ▶ **RG 4.2** Develop tools and methodologies for integrative environmental health risk assessment



Complexity of human exposome research



<https://doi.org/10.1021/acs.estlett.1c00648>

RG3.1 Exposure to chemicals including legacy chemicals, emerging chemicals and mixtures

Objective: Advance the scientific knowledge on environmental pollution exposures to promote characterisation of what constitutes a toxic-free environment.

Research needs

- Identification, occurrence and assessment of exposure to novel and emerging environmental pollutants.
- Development of methods and tools for assessment of potential exposure to chemicals proposed for use in the technosphere or as substitutes of hazardous chemicals.
- Data on micro-/nanoplastics and nanoparticles exposure sources, pathways, fate, and levels.
- Further research on the exposome, chemical mixtures, both intentional and unintentional.
- Research applying abiotic matrices to comprehensively mirror the environmental and human exposures.
- Exposures of people with various socioeconomic status should be studied to better understand societal driven differences in exposures to anthropogenic chemicals.
- Exposure data should be collected on particular types of chemical mixtures related to specific usage.
- Research gaps regarding mixture effects on chemicals existing in daily consumer products.
- There is a clear need for longitudinal data on low-dose and chronic exposures.
- Further development of exposure modelling linking sources to internal exposure.

Tentative research call areas

***Title:** Developing methods for assessing internal exposures to non-persistent chemicals.*

***Title:** Mixture variations in environmental and human exposure to anthropogenic chemicals due to spatial and socioeconomic status as a base for improved exposure assessments.*

***Title:** Improve exposure modelling from sources to internal dose.*

Joint research call area for RG3.1 and RG3.2

***Title:** Advancing knowledge on real-life mixtures of chemicals in the EU and beyond*

RG3.2 Health effects of anthropogenic chemicals.

Objective: Advance health and environmental effect sciences through deeper and broader understanding of what constitutes safe chemicals and which are the leading chemical risks.

Research needs

- New effect biomarkers should be developed for early detection of emerging environmental and health risks from anthropogenic chemicals and of chemical mixtures prioritizing 3R methods
- There is a need for additional studies on certain priority outcomes such as immunotoxicity, neurotoxicity, endocrine disruption, metabolism and obesity and on new areas of research on mental health and infectious diseases in relation to environmental exposure
- Absorption, distribution, metabolism, and excretion (ADME) data and new toxicokinetic models are needed to better understand the link between external and internal exposure
- Health data should be collected on the risks of chemicals in general but in particular on pesticides and on plastics, micro- and nano-plastics and chemicals in plastics.
- Research based on large cohort studies using biomarkers and other methods for accurate cohort assessment are required.
- Mechanistic studies are needed to assess new Adverse Outcome Pathways (AOPs), in particular mitotoxicity and toxicity related to epigenetic dysregulation.
- There is a need for longitudinal health data on low-dose and chronic exposures and interdisciplinary approaches considering multiple and also non-chemical stressors, incorporating new approaches such as interactions of the exposome with the microbiome.

Tentative research call areas

Title: *Expanding environmental effect and health studies into novel areas of endocrine disruption, immunotoxicity and neurotoxicity.*

Title: *Expanding the ADME knowledge of emerging contaminants as such and as mixtures to improve risk and safety assessments*

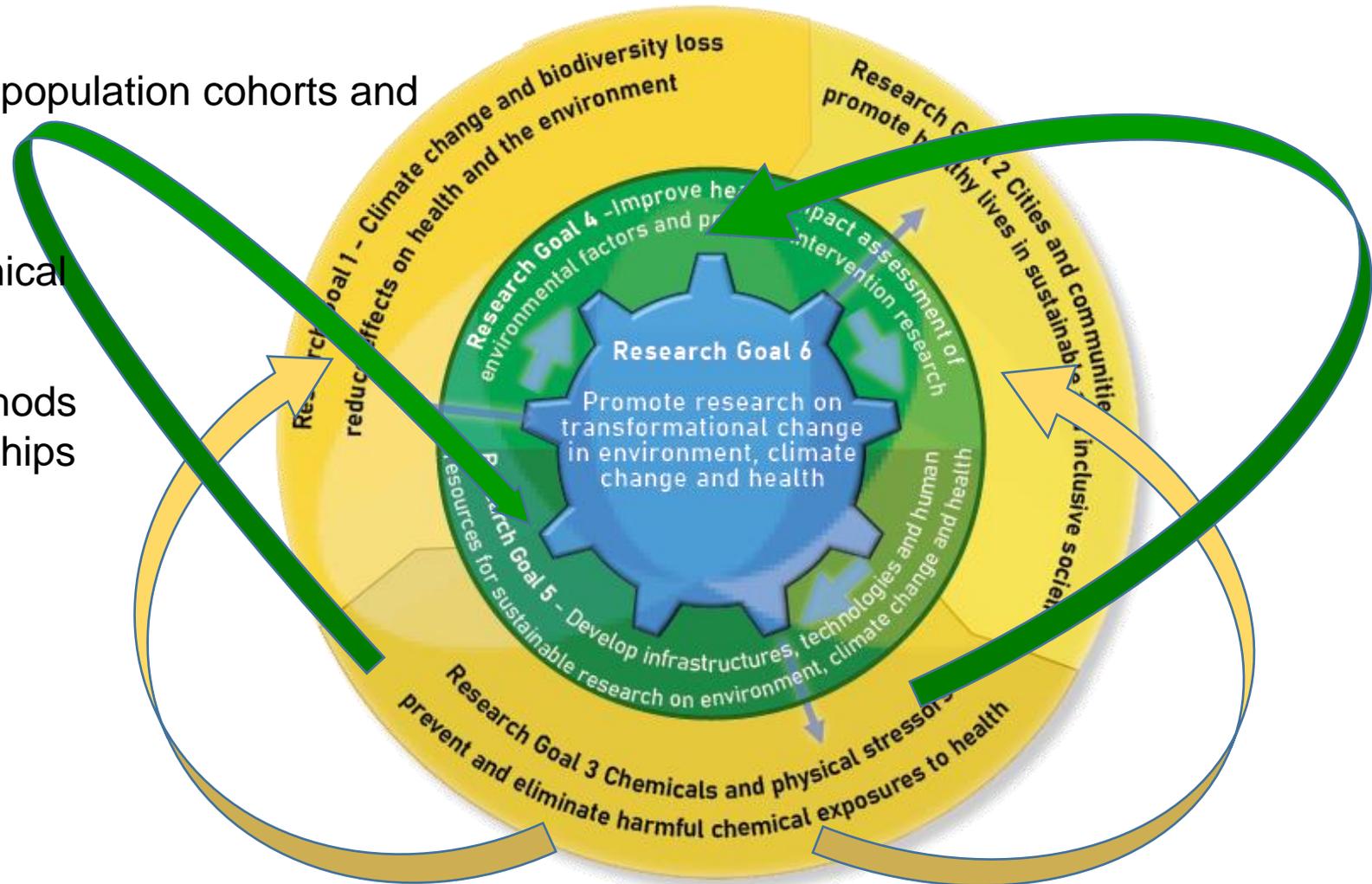
Title: *Development of a large cohort infrastructure to evaluate long term health effects of pesticides using exposome approaches*

Title: *Large scale development of Adverse Outcome Pathways (AOP) and AOP networks and tools to link chemicals to AOPs*

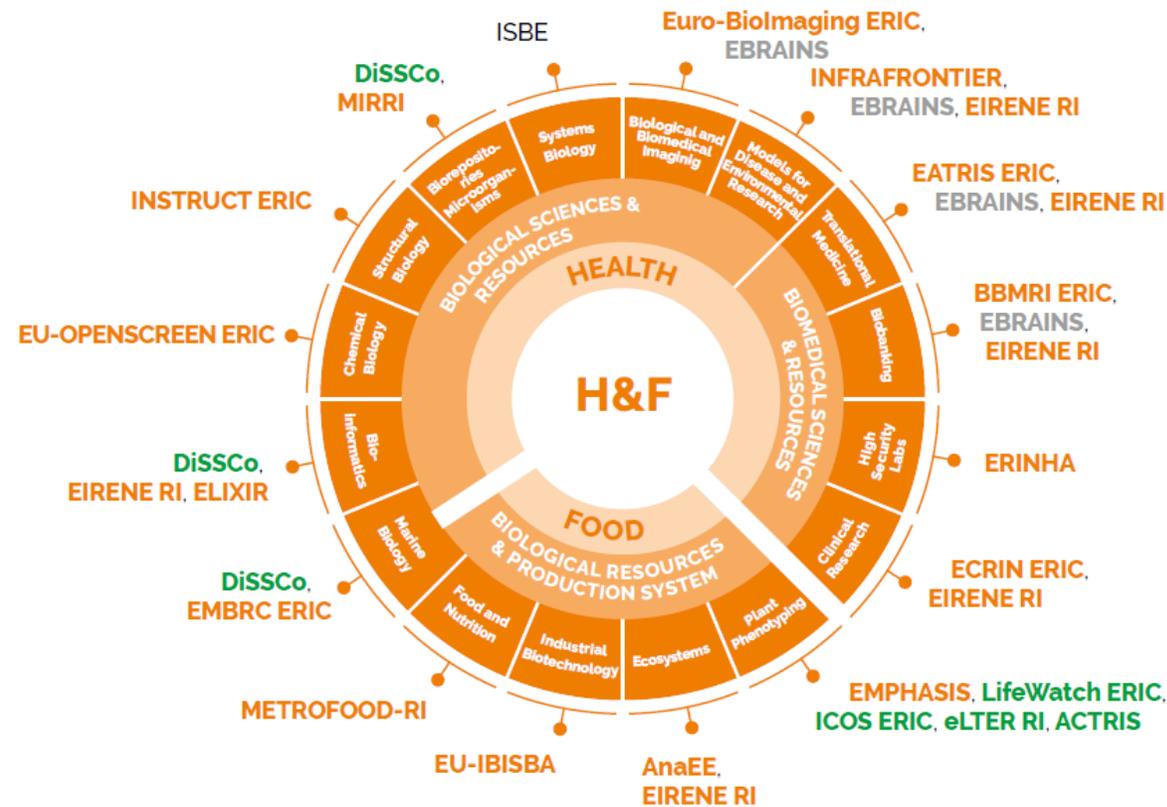
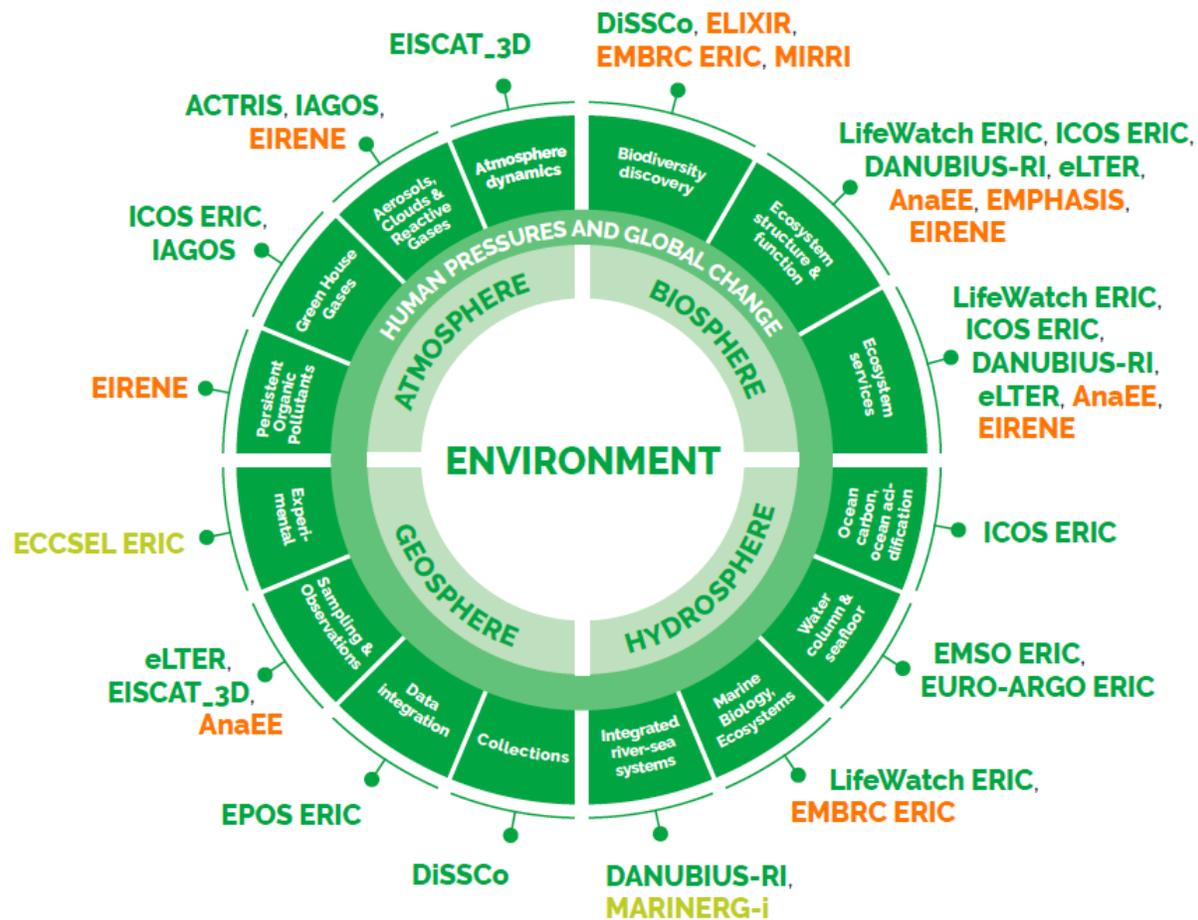
Joint research call area for RG3.1 and RG3.2

Title: *Advancing knowledge on real-life mixtures of chemicals in the EU and beyond*

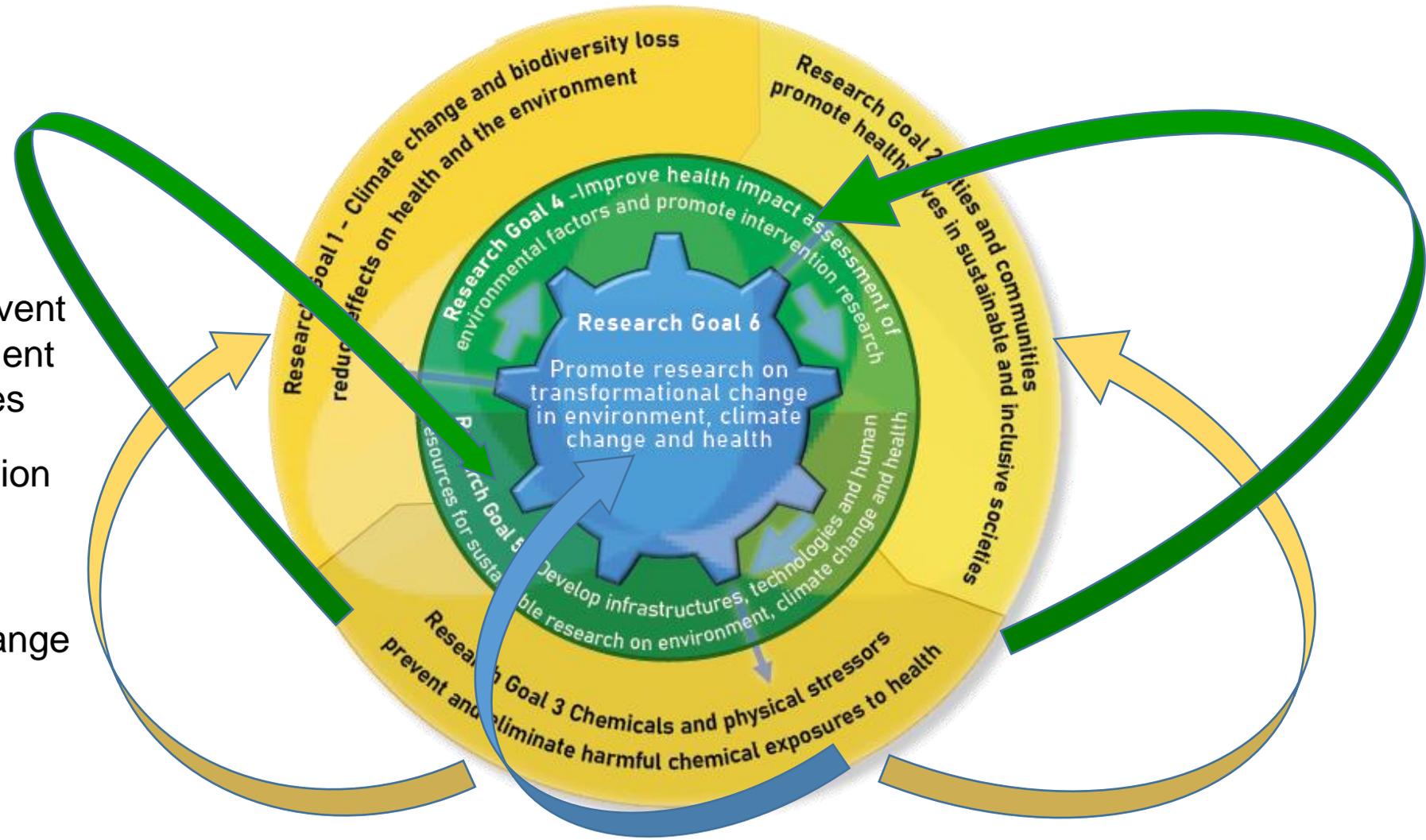
- › **RG5.1** Well-designed and maintained population cohorts and related biobanks
- › **RG5.2** Development of laboratory capacities for assessment of the chemical exposome and its functional impacts
- › **RG5.3** Innovative big data-based methods and tools to characterize interrelationships between environment and health



Cross-cutting nature



- › **RG6.1** Preparedness to prevent and combat future environment and health threats/challenges
- › **RG6.5** Science communication and science–policy–society dialogue
- › **RG6.6** Transformational change in education, training and research



Chemicals are everywhere

The origin of anthropogenic chemicals

Primary implications of chemical pollutants

Additional implications of chemical pollutants



Thank you for your attention

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