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In silico and Experimental Screening Platform for Characterizing Environmental Impact of Industry Development in the Arctic - an Overview of the Project EXPECT
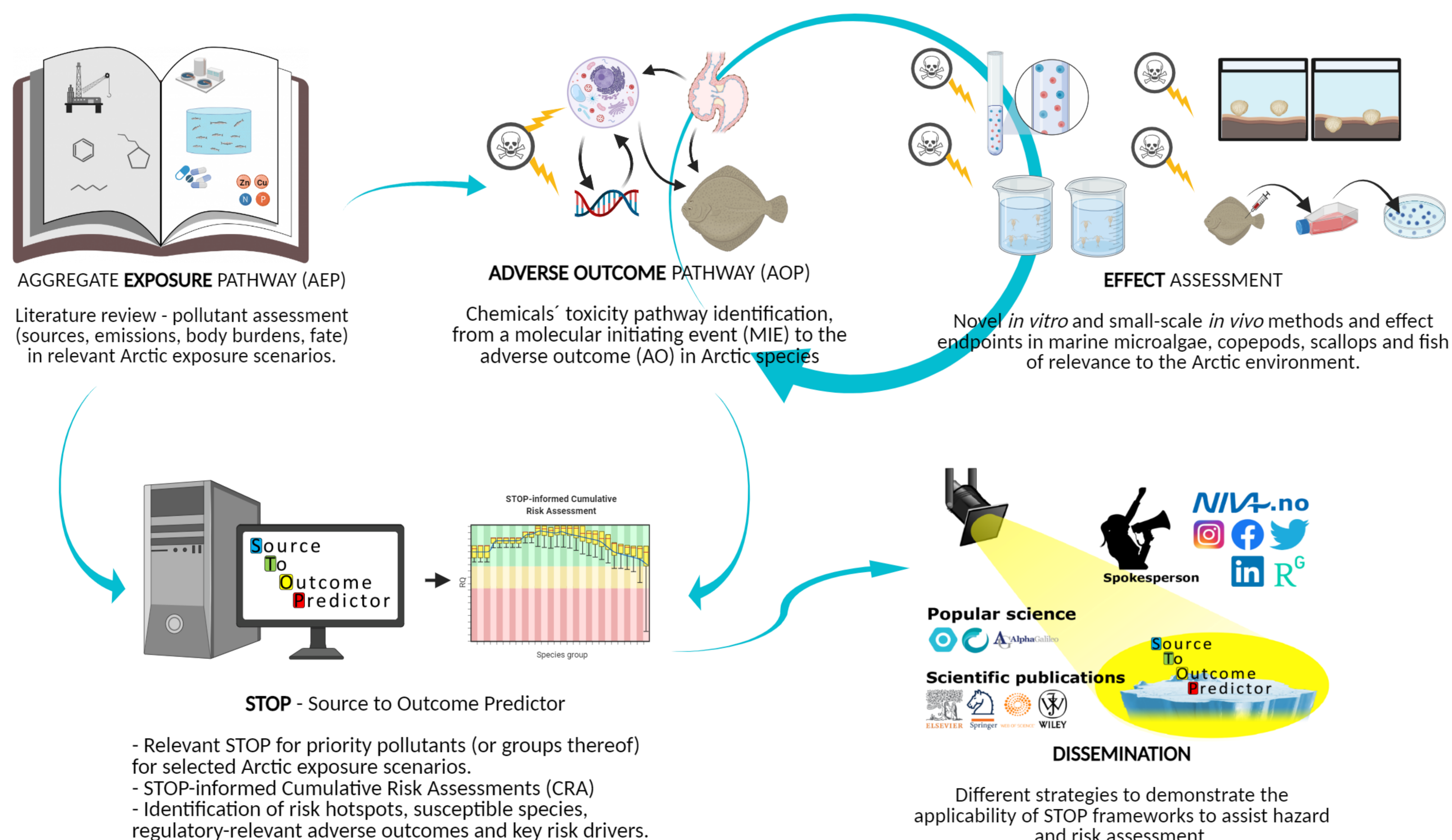
Background

- Climate changes in the Arctic will favour the development of industrial activities, e.g. oil and gas exploration and aquaculture.

- Methods that characterize the pathway from Arctic environmental emissions to biological adverse outcomes for pollutants and their mixtures are urgently needed.

Objectives

- Characterise the most relevant Source to Outcome Pathways (STOPs) and use these to perform Cumulative Risk Assessment (CRA).

- Support sustainable management of existing and future industrial and anthropogenic activity in the Arctic.

Approach

AGGREGATE EXPOSURE PATHWAY (AEP)
Literature review - pollutant assessment (sources, emissions, body burdens, fate) in relevant Arctic exposure scenarios.

ADVERSE OUTCOME PATHWAY (AOP)
Chemicals´ toxicity pathway identification, from a molecular initiating event (MIE) to the adverse outcome (AO) in Arctic species

EFFECT ASSESSMENT
Novel *in vitro* and small-scale *in vivo* methods and effect endpoints in marine microalgae, copepods, scallops and fish of relevance to the Arctic environment.

STOP - Source to Outcome Predictor
- Relevant STOP for priority pollutants (or groups thereof) for selected Arctic exposure scenarios.
- STOP-informed Cumulative Risk Assessments (CRA)
- Identification of risk hotspots, susceptible species, regulatory-relevant adverse outcomes and key risk drivers.

DISSEMINATION
Different strategies to demonstrate the applicability of STOP frameworks to assist hazard and risk assessment

- ✓ *In silico*, *in vitro* and small-scale *in vivo* approaches;

- ✓ STOPs, Aggregate Exposure Pathways (AEP) and Adverse Outcome Pathways (AOP);

- ✓ STOP-assisted cumulative risk assessment;

- ✓ Identification of the main pollutants, toxicity drivers and susceptible organisms.

EXPECTations

We will develop a Source-To-Outcome-Pathway (STOP) to characterise the causal source-exposure-effect-impact relationships for Arctic pollutants and their mixtures
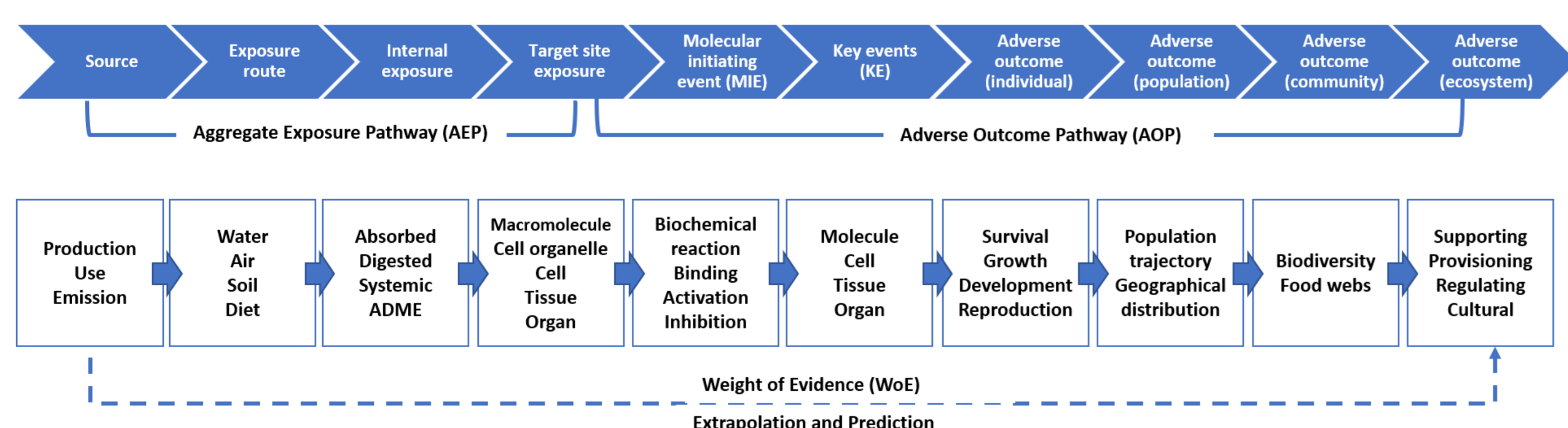
More info

OPEN POSITION - POSTDOC

LOGO DESIGN COMPETITION

EXPECT webpage

NIVA Section for Ecotoxicology and Risk Assessment

NIVA's Computational Toxicology Program (NCTP)

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Key References

Beyer, J. et al. Mar Environ Res, 96, 1–11 • Hultman, M.T. et al. Aquat Toxicol 159, 233–244 • Hultman, M.T. et al. J Toxicol Environ Heal Part A 80, 987–1001 • Petersen, K. et al. J Toxicol Environ Heal Part A 1–14 • Song, Y. et al. Environ Sci Technol 52, 9, 5479-5489 • Tollefsen, K.E. et al. Biomarkers 8, 394–407

Acknowledgments

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