# Integration of lines of evidence to facilitate prioritisation of plastic leachates for toxicity testing

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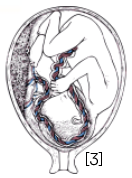
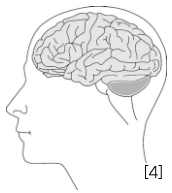
# Motivation (1)

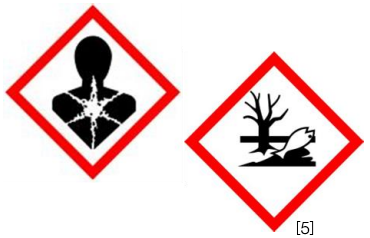

Plastics

Micro and Nanoplastics

Chemicals added to plastics


- Plastic production to double by 2050
- ~10% get recycled
- Many chemicals can be released
- Evidence including biomonitoring data suggest widespread exposure and a potential for (eco)toxicity of leaching chemicals*



* UNEP (2023)

# Motivation (2)

- Findings from the PlastChem project*
  - ~ 18 000 plastic chemicals
  - >25% thereof known to be P, B, M and/or T
  - ~ 66% lack hazard data
  - Plastic composition unclear for most plastics

- Efficient hazard-based identification of chemicals of concern is required to confine risks from plastic chemicals**



* Wagner et al. (2024); ** Hader et al. (2025)

# PlasticLeach project

Project leader: Hubert Dirven (Department of Chemical Toxicology, Norwegian Institute of Public Health, Norway)

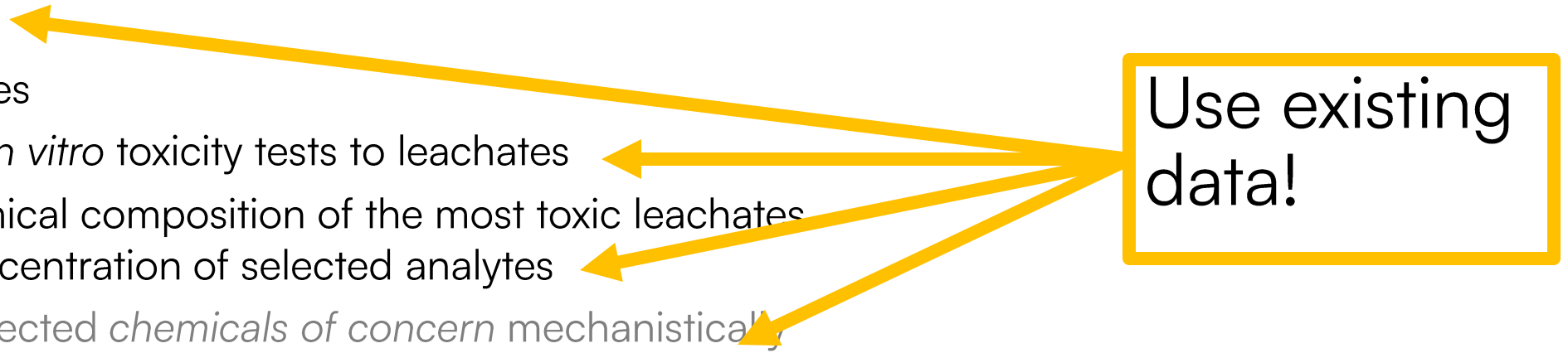
**Objective:**

- Screening level identification of the most hazardous chemicals released from different types of plastic
- Characterise their hazard mechanistically

**Approach:**

- Select plastics
- Prepare leachates

1. Apply selected *in vitro* toxicity tests to leachates
2. Determine chemical composition of the most toxic leachates
   - Quantify concentration of selected analytes
3. Characterise selected *chemicals of concern* mechanistically



# Workflow for prioritisation of plastics and *in vitro* tests

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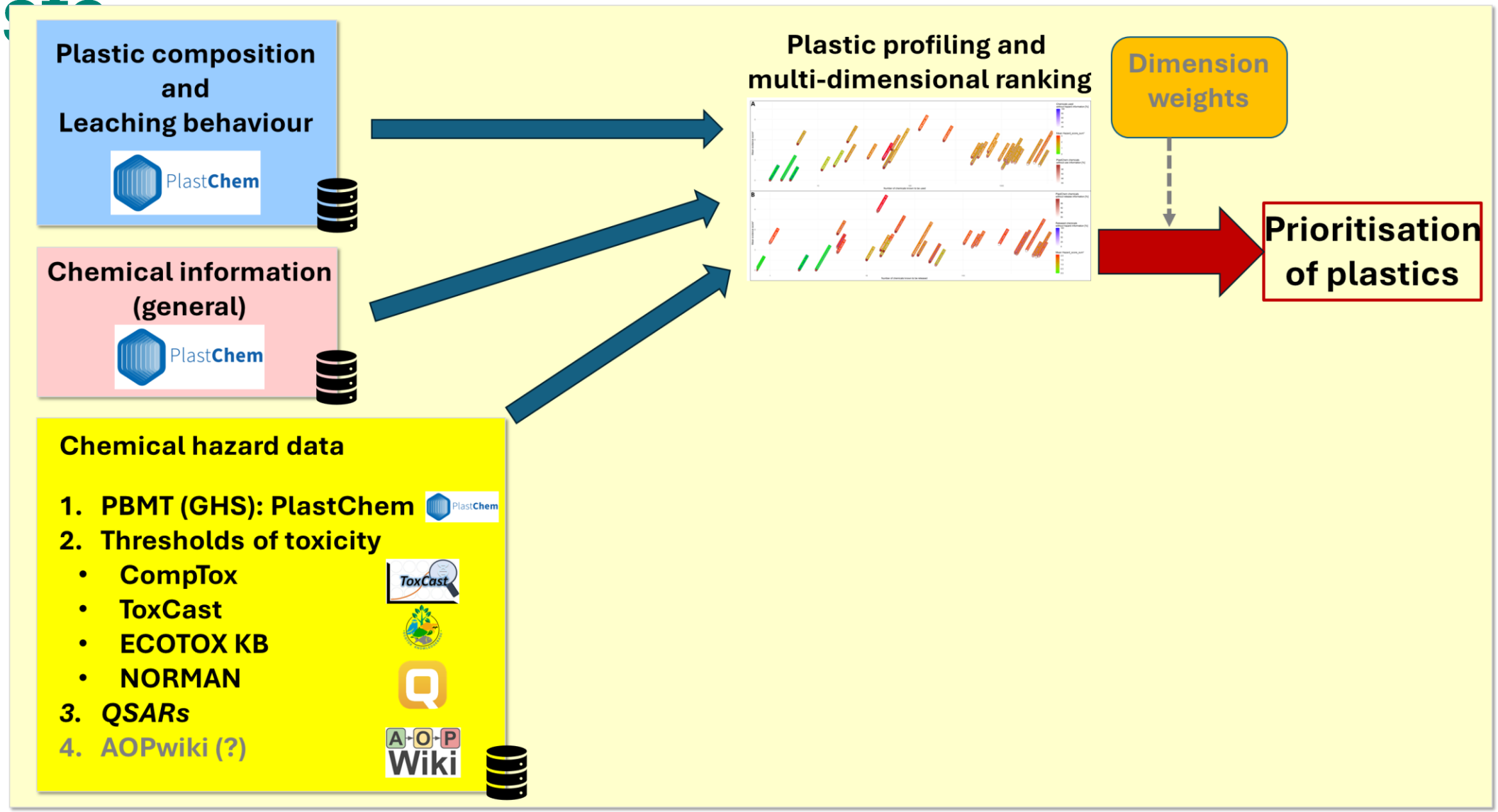
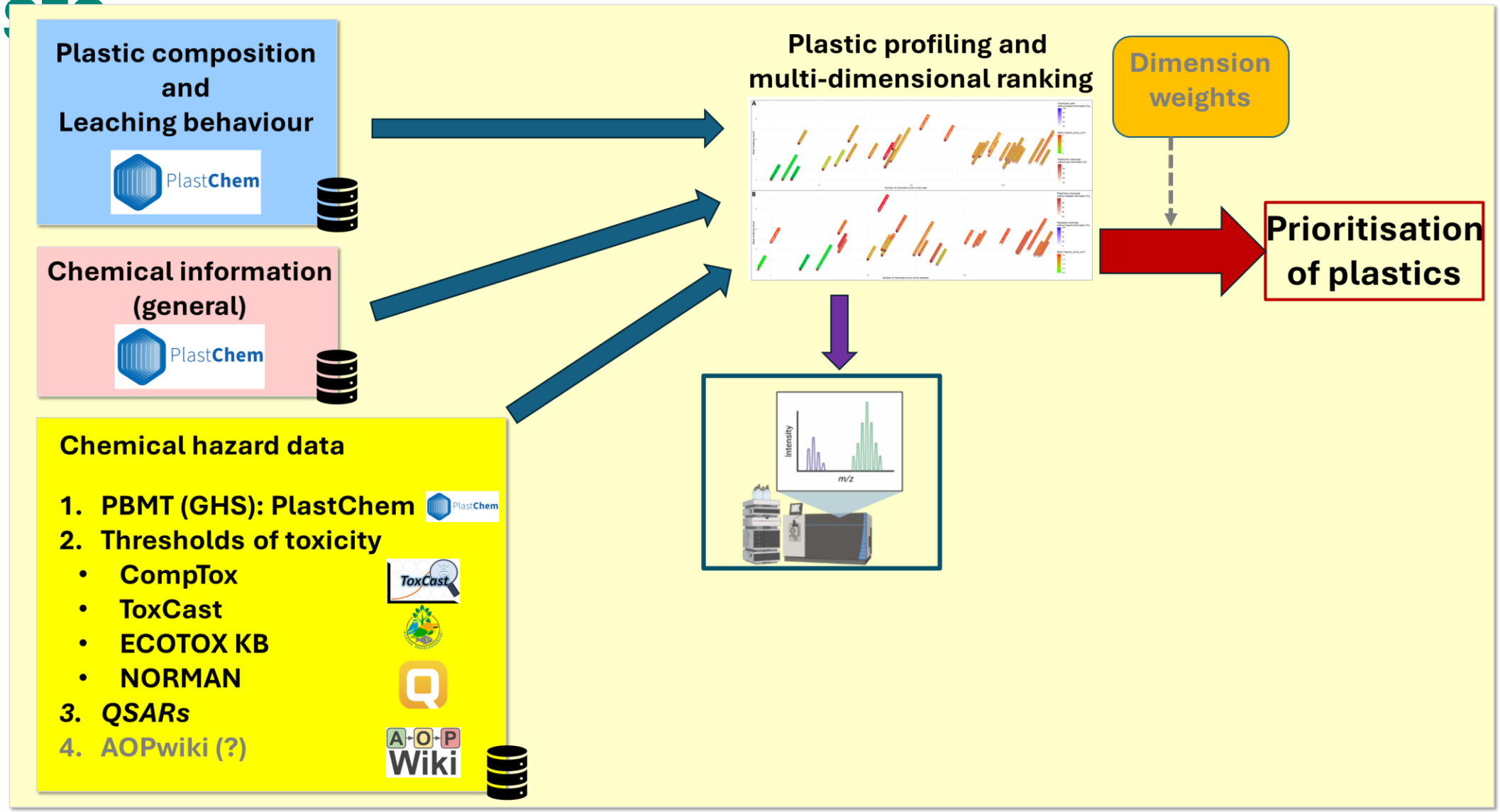
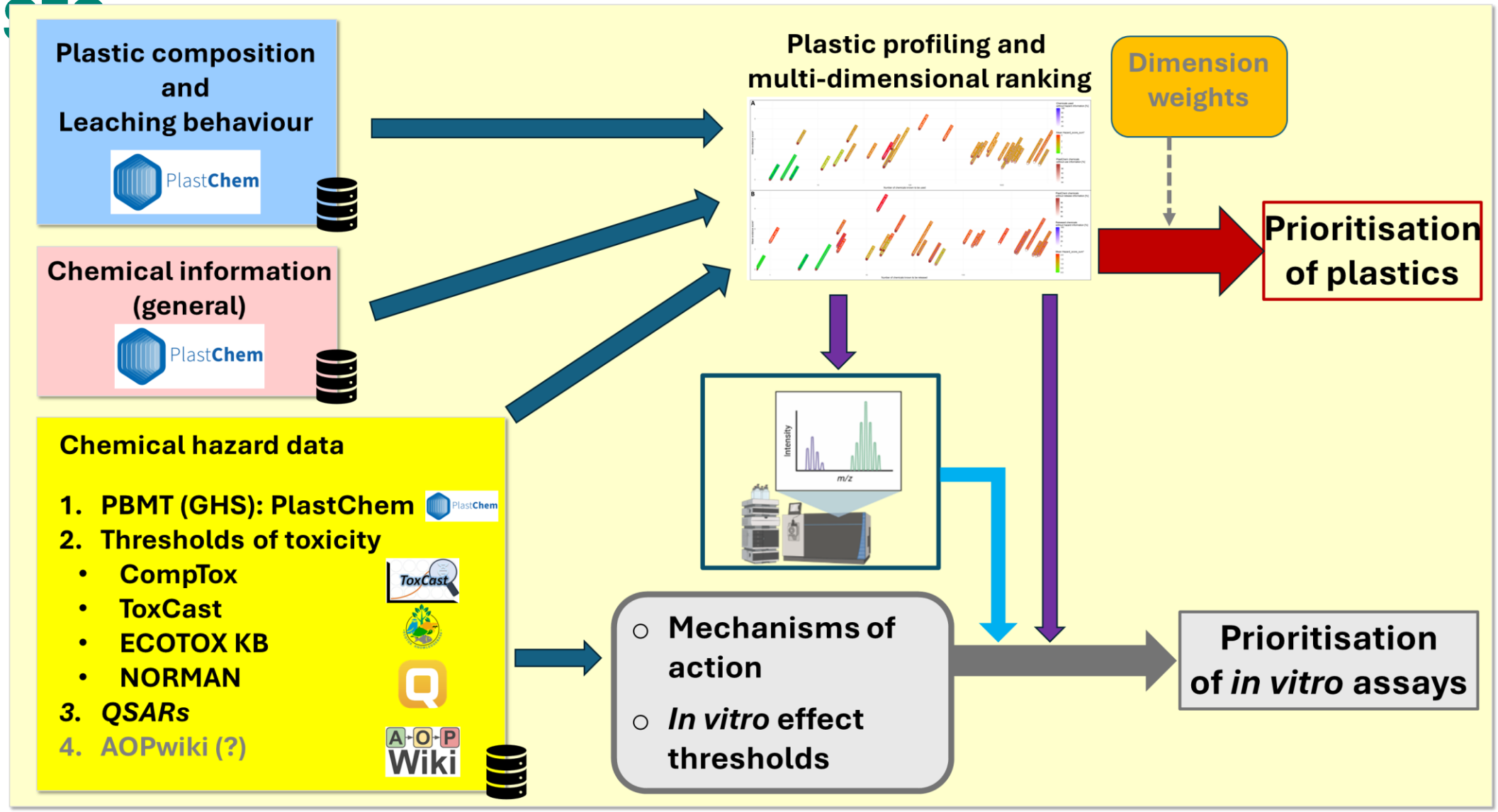


# Workflow for prioritisation of plastics and *in vitro* tests



# Workflow for prioritisation of plastics and *in vitro* tests

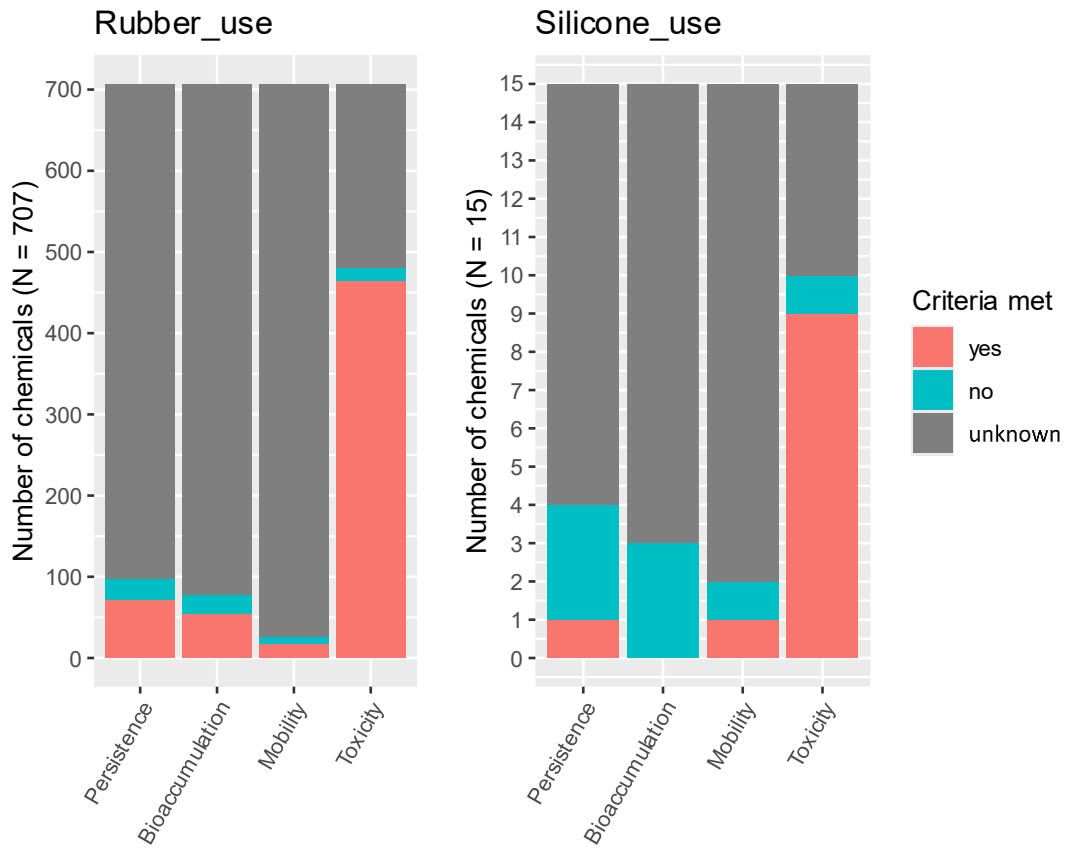


# Prioritisation of plastics

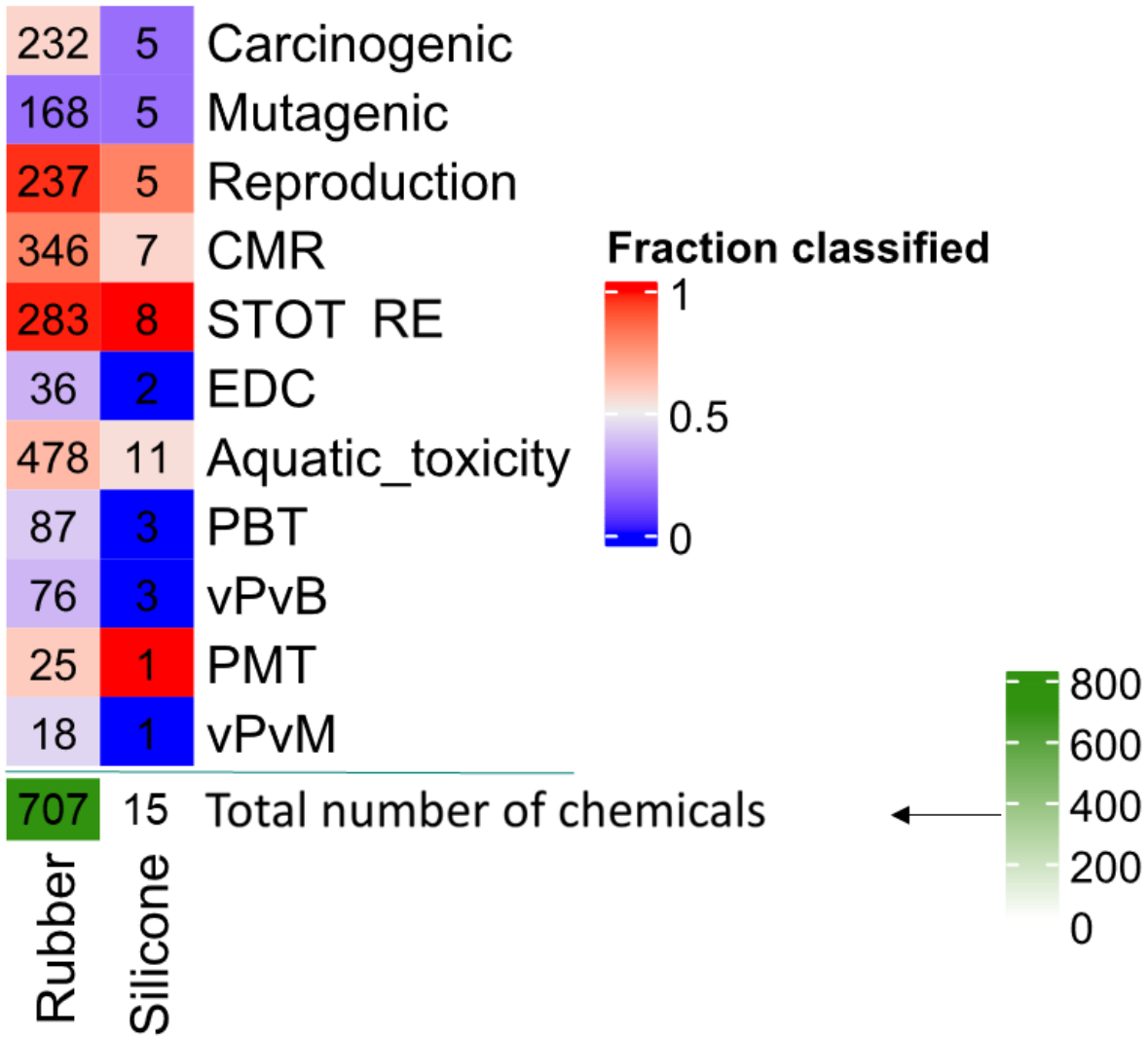
## Conceivable criteria:

- Number of PBMT chemicals
- Production/import volume
- Product and use type
- Degree of lack of data

## PBMT assessment

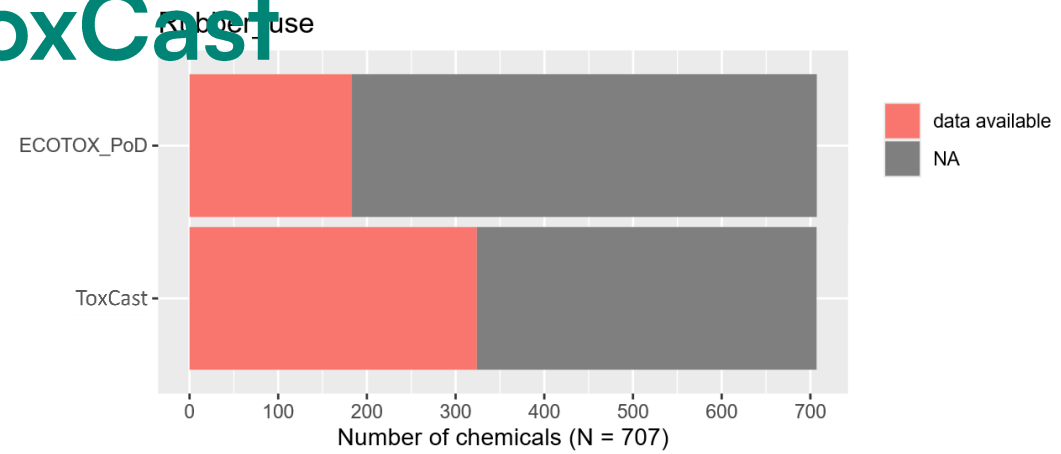


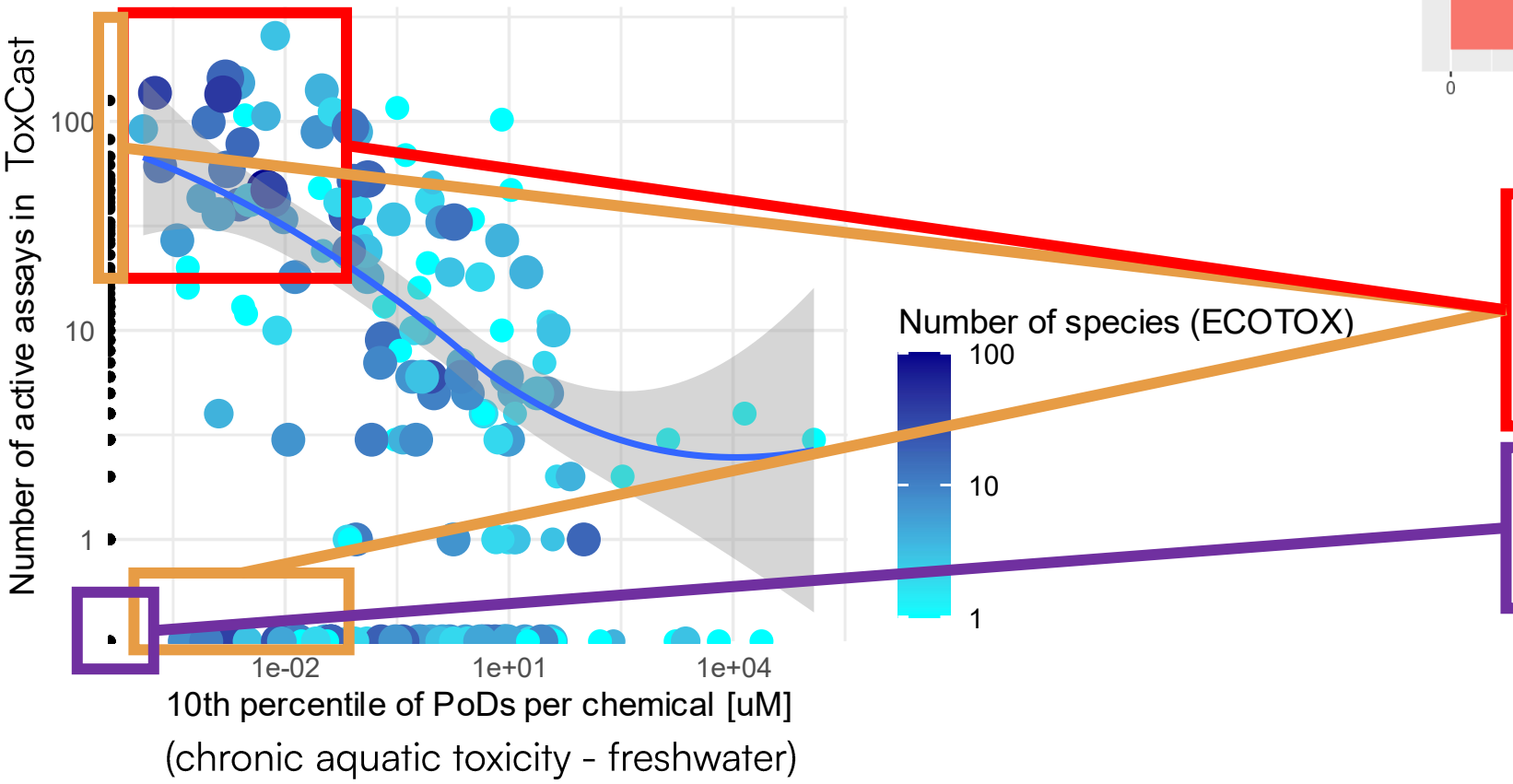
# PBMT: details for assessed chemicals




- High fraction with repeated dose toxicity or reproductive toxicity
- Vast difference in number of chemicals known to be used in production

# Additional rich sources of experimental toxicity data: ECOTOX knowledgebase and ToxCast




Focus for chemical identification and quantification

Focus for *in vitro* hazard screening

# Wrap up

- Major data gaps for plastic chemicals
  - P, B, M particularly under-assessed
- Work towards a strategy to
  - Integrate available hazard-related information
  - Prioritise for closing the most severe data gaps

➔Reduce (unnecessary) presence of hazardous chemicals in plastics

# Outlook

- Utilize QSAR predictions for data-poor chemicals
  - ❑ PM screening*
- Enable grouping for chemical types (CHEBI, ...)
- Utilize AOP information to facilitate extrapolation from mechanistic data to apical endpoints
- Integrate the workflow into the Source To Outcome Predictor (STOP)


*Hartmann et al. (2023)

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- *Li Xie*

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NCTP

EXPECT Project

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# Time for discussion...

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Pictures

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