Vitenskapskomiteen for mat og miljø

Norwegian Scientific Committee for Food and Environment


# **C**ollaboration to **H**armonise the **A**ssessment of **N**ext **G**eneration **E**vidence (CHANGE) – 59th Focal Point Meeting 24-25 September 2025

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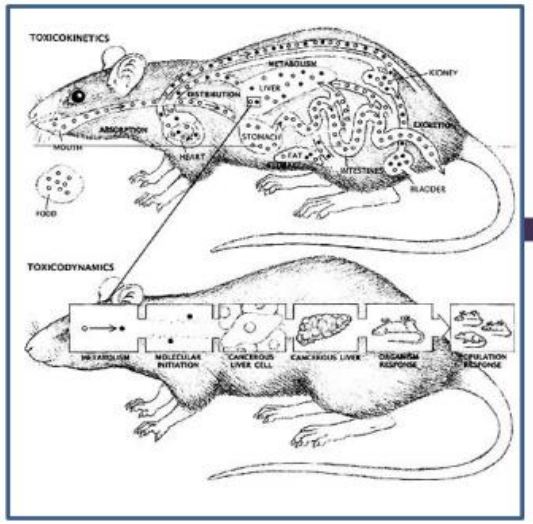
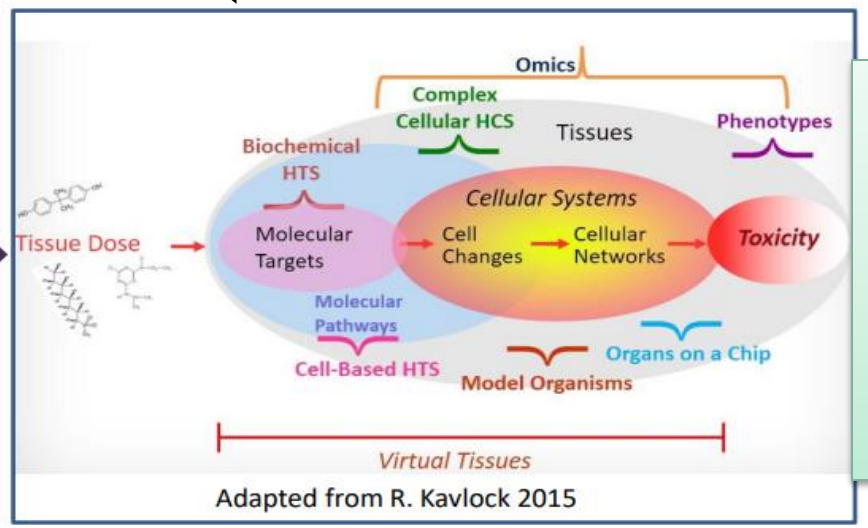
# Background: Changing/improving a system

Overall goal: protect human health and the environment

The ongoing shift of the regulatory toxicology system – from «traditional» to «next generation» evidence



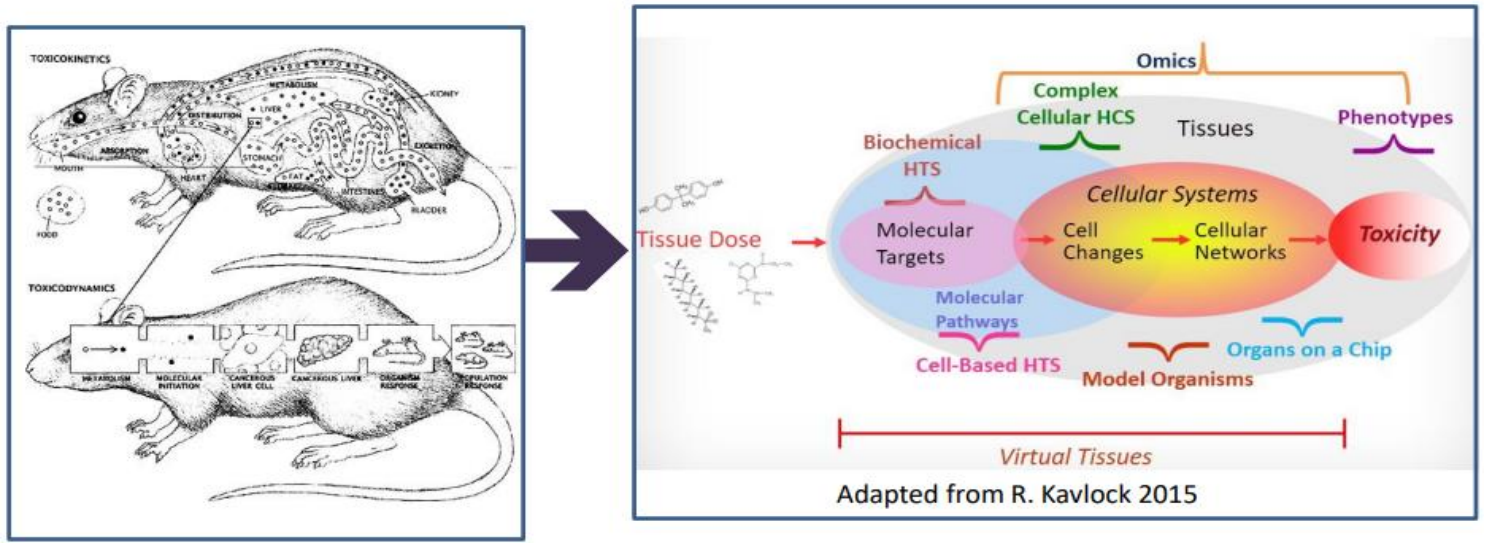




Adapted from R. Kavlock 2015

New Approach Methods: **NAMs**

- Computational modelling methods
- High throughput screening
- Tissue/organ engineering (human-on-a-chip)
- Cell cultures
- ...

# Background: Changing a system




- Implementing the effective use of NAMs in regulatory toxicology has proven to be challenging
- Efforts to facilitate the change frequently focus on singular specific aspects driving or inhibiting the uptake of NAMs
- CHANGE: takes a system-thinking approach to identify interventions for the effective use of NAMs

# CHANGE project

Aim: Design interventions for the effective use of NAMs in the regulatory toxicology system

System thinking approach
Interdisciplinary, cross-sectorial

3 Phases
(Explore, Reflect, Design)
Data collection in workshops

People in all parts of the regulatory toxicology system

Project period
2023-2026

VKM, EBTC, EFSA

**Effective use of NAMs**

- A system prioritising NAMs that offer actionable evidence (i.e., a scientific basis for health-protective actions), improvements to the status quo, or other benefits.
- Not prioritising NAMs that are not reproducible, are inefficient, or do not have a ready fit-for-purpose application.

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# Project team and Advisory Board

## Project team

- Heather Ames, NIPH
- Angela Bearth, HF Partners, Switzerland
- Sebastian Hoffmann, EBTC, Johns Hopkins University, USA
- Trine Husøy, NIPH
- Lowenna Jones, University of Sheffield, UK
- Birgit Kopainsky, University of Bergen
- Gro Mathisen, VKM, NIPH
- Gisle Solstad, VKM, NIPH
- Camilla Svendsen, NIPH
- Gunn Vist, NIPH
- Paul Whaley, Lancaster University, UK

## Advisory Board

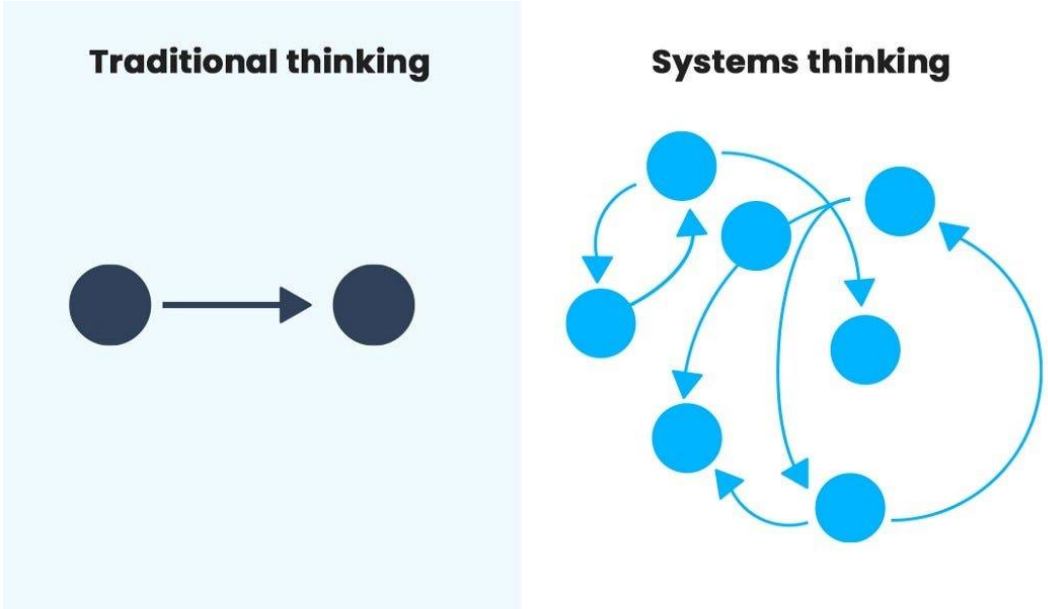
- Jean-Lou Dorne, European Food Safety Authority, **Italy**
- Andrew Rooney, National Institute of Environmental Health Sciences, **USA**
- Thomas Hartung, Johns Hopkins, **USA**; University of Konstanz, **Germany**
- Denise Bloch, German Federal Institute for Risk Assessment**, Germany**
- Kris Thayer, United States Environmental Protection Agency, **USA**
- Weihsueh Chiu, Texas A&M University, **USA**
- Ulla Simanainen, European Chemicals Agency, **Finland**
- Aleksandra Cavoski, University of Birmingham, **UK**
- Ovnair Sepai, UK Health Security Agency, **UK**
- Erwin Roggen, 3Rs Management and Consulting ApS, **Denmark**
- Miles Davenport, University of New South Wales, **Australia**
- Christophe Rousselle, French Agency for Food, Environmental and Occupational Health and Safety, **France**
- Fred Wright, North Carolina State University; NC State Bioinformatics Research Center, **USA**
- Kannan Krishnan, California Environmental Protection Agency, **USA**
- Arianna Giusti, Cosmetics Europe, **Belgium**
- Jennifer Sass, Natural Resources Defense Council; George Washington University, **USA**
- Suzanne C Fitzpatrick, US Food and Drug Administration, **USA**
- Holly Davies, Washington State Department of Health, **USA**
- Weida Tong, US Food and Drug Administration, **USA**
- Takao Ashikaga, National Institute of Health Sciences, **Japan**
- Yoko Hirabayashi, National Institute of Health Sciences, **Japan**
- Helena Hogberg-Durdock, National Institute of Environmental Health Sciences**, USA**
- Rashmi Joglekar, University of California, San Francisco, **USA**
- Hajime Kojima, National Institute of Health Sciences; Sanyo-Onoda City University**, Japan**
- Olivia Osborne, Food Standards Agency, **UK**
- Daniele Wikoff, ToxStrategies, **USA**
- Seok "Soga" Kwon, National University of Singapore, **Singapore**

# CHANGE: Co-creation and co-financing

- About 115 individuals from about 65 institutions in 24 countries worldwide (Asia, Oceania, North America, South America, Europa) have been **actively** involved = **Considerable and consistent own-contribution**
  - Through Convening Committee, Advisory Board, the 2024 and 2025 workshops, and the Project team.
- 16 EFSA article 36 institutions from 13 Member States
- EFSA, ECHA, JRC, EC, OECD

# System thinking

A holistic approach to describing the interactive relationships between components inside a system as well as influences from outside the system



# System thinking approach

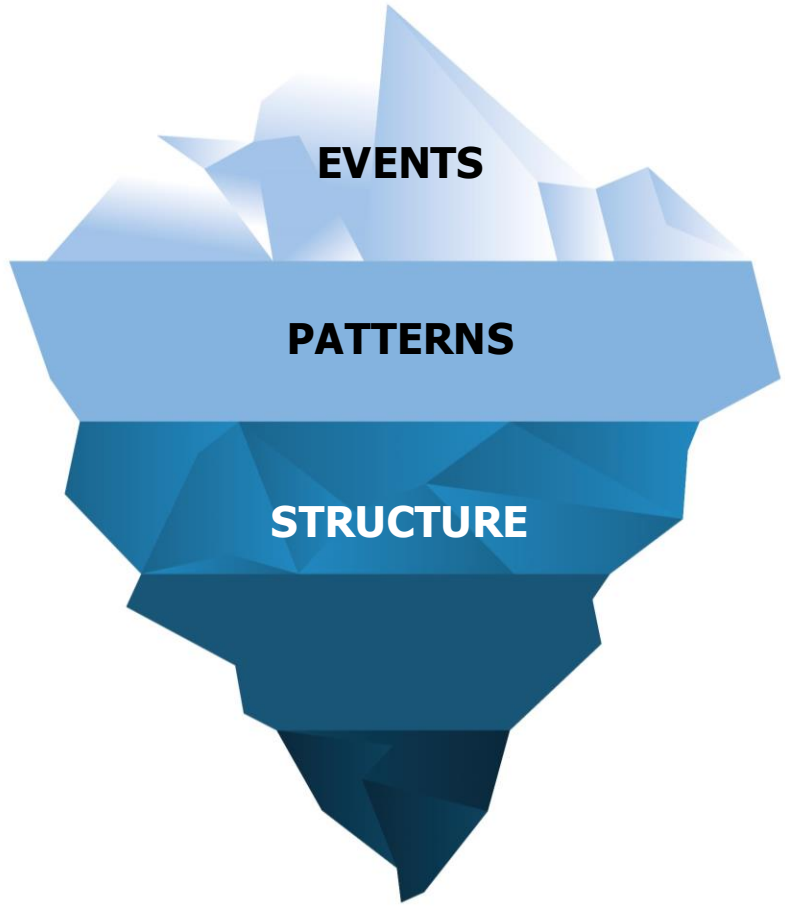
Designing interventions more likely to have a positive impact on the whole system, rather than just treating isolated symptoms.

Avoid potential unintended consequences

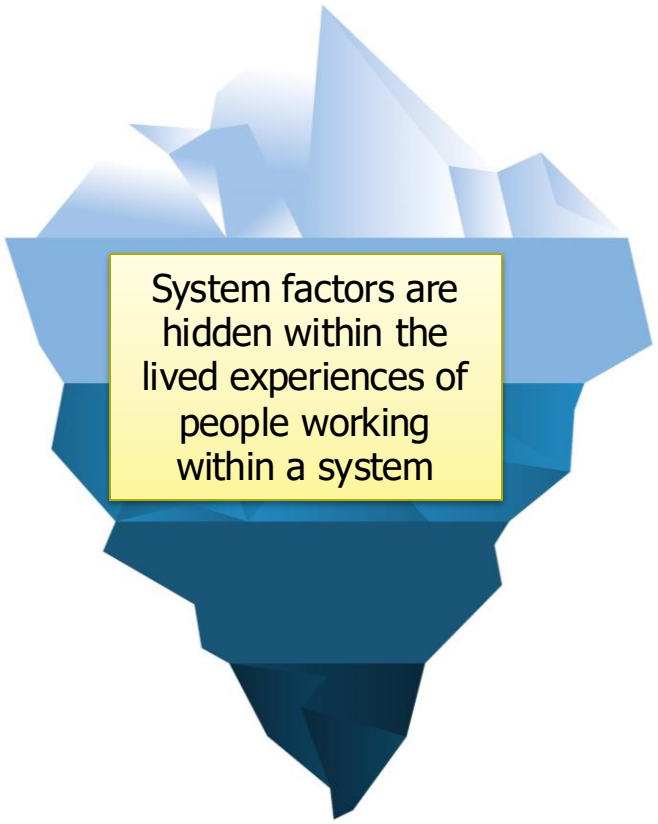
Understand how various parts of a system interact and influence each other (map the system factors)

System factors: Aspects of the regulatory toxicology system in which NAMs are developed and NAM-data is collected, interpreted and acted on

Identify the underlying structures and feedback loops that drive system behavior



# The CHANGE project




Use the experience of actors working in or around the system to identify system factors and relationships between the factors, and use this as the starting point for designing interventions

**CHANGE Phase 1 Explore (2024)**

- Map the system based on people's experience, assumptions, values and beliefs
- Identify system factors that facilitate or inhibit use of NAMs
- Identify how system factors interact and form the system

**CHANGE Phase 2 Reflect (2025)**
Challenge and refine the outcome of Phase 1

**CHANGE Phase 3 Design (2026)**
Design interventions for more effective use of NAMs in the regulatory toxicology system

# CHANGE Phase 1 Explore (2024)

System factors are hidden within the lived experiences of people working within a system

Workshops with experts representing major actors from the global regulatory toxicology system


More than 250 anecdotes

Develop initial theory of how the system works around NAMs
Develop an initial system map based on the theory

*Bearth et al. (Accepted): Exploring Experiences of the Regulatory Toxicology System – System-Level Promoters and Inhibitors of New Approach Methodologies*

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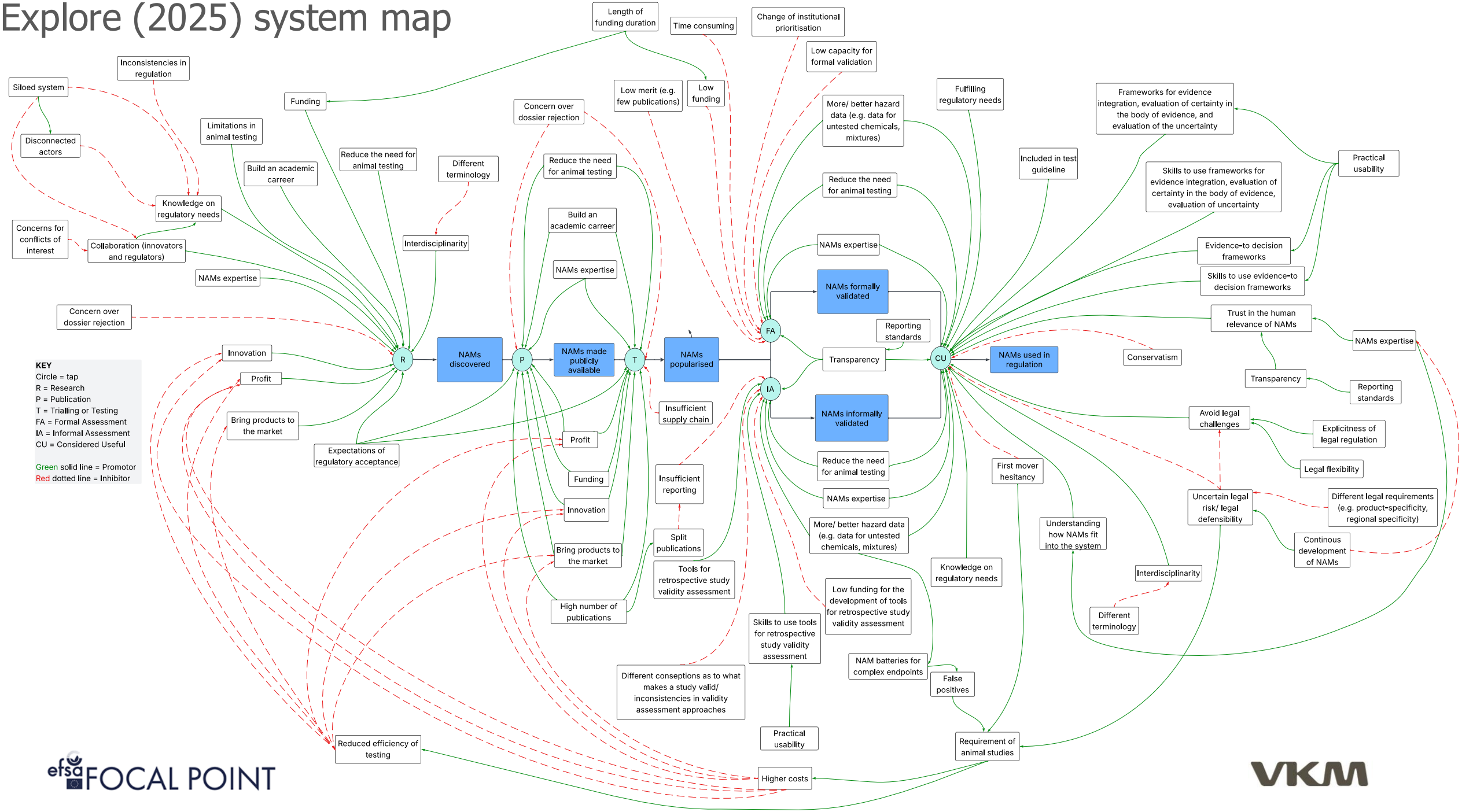
# Explore (2025) system map

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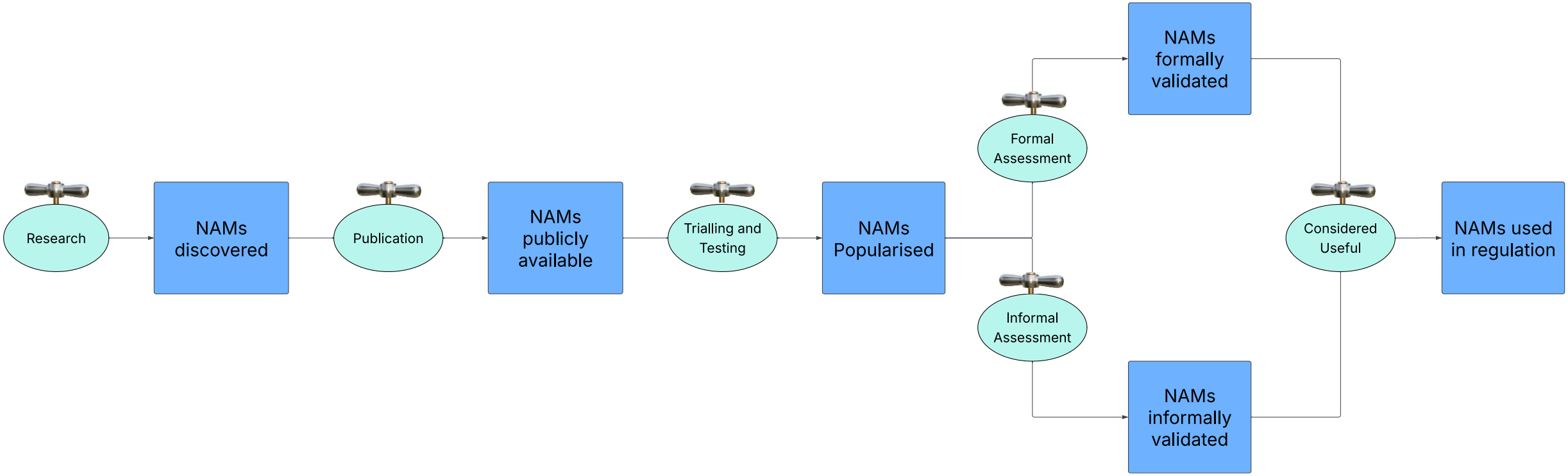
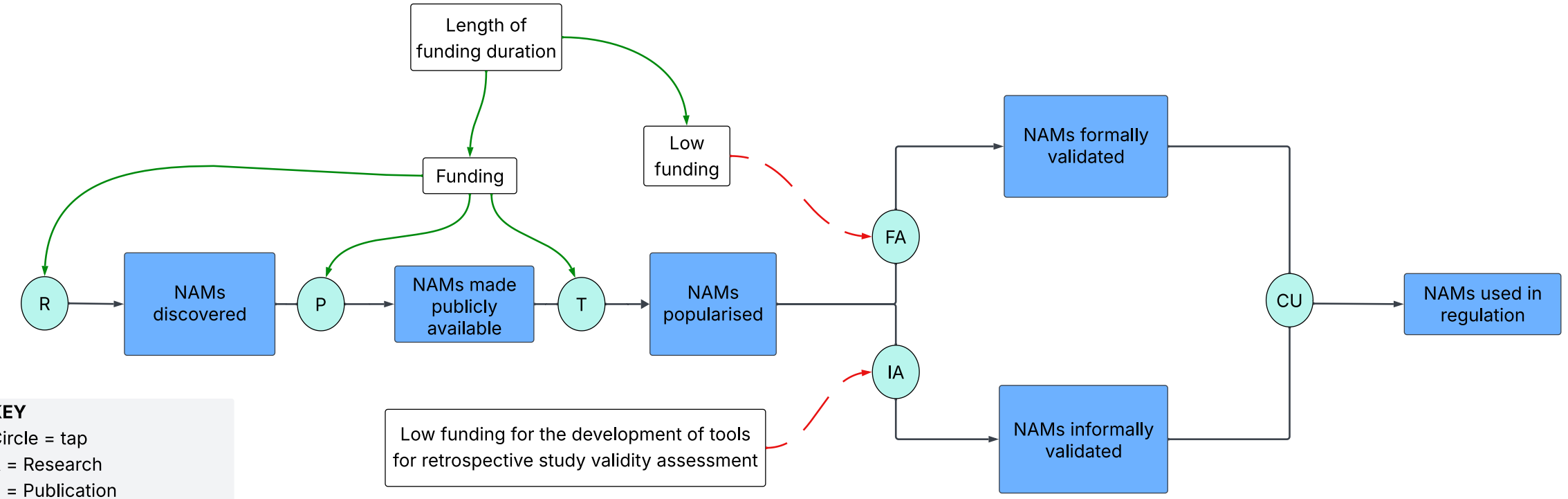
# Explore (2024) system map backbone




Taps are opened or closed by system factors

# Example: Multiple effects of a single system factor




**KEY**
Circle = tap
R = Research
P = Publication
T = Trialling or Testing
FA = Formal Assessment
IA = Informal Assessment
CU = Considered Useful

Green solid line = Promotor
Red dotted line = Inhibitor

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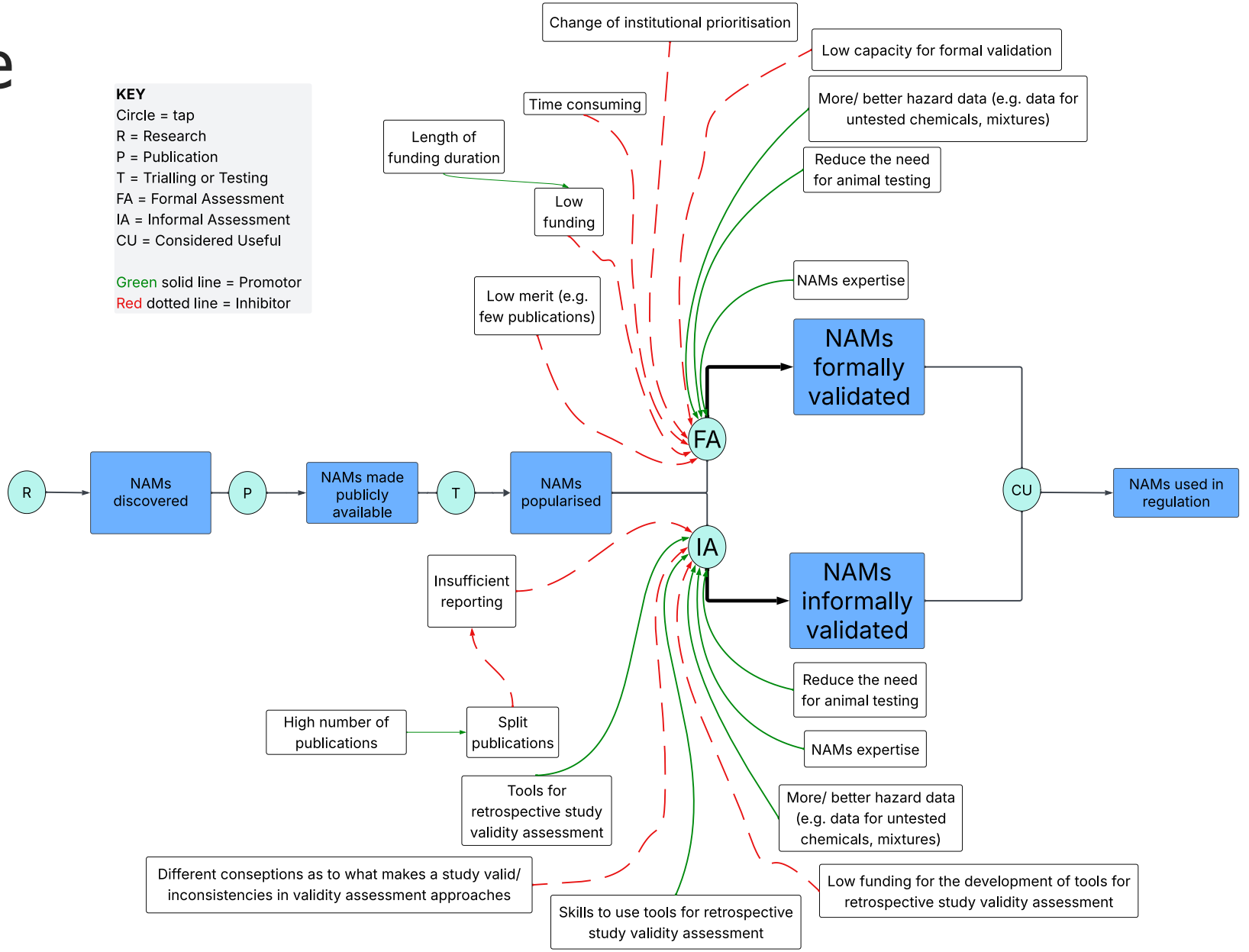
# Example: Multiple system factors affecting a single tap

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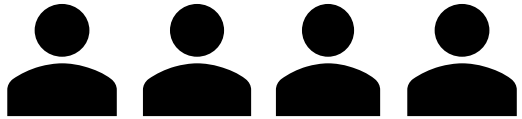
# CHANGE Phase 2 Reflect (2025)



Workshop with experts representing major actors from the global regulatory toxicology system

Group discussions and workbooks
- Creating more promising NAMs
- Making NAMs accepted and accessible
- Understanding and using evidence from NAMs in regulation

Hypotheses about how the system works (51) → Collect feedback → Analyse

Challenge the outcome phase 1 (initial theory, system map)

Improve the theory of how the system works around NAMs
Improve the backbone and the system map

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# Workshop 2 in Oslo 24-26 June 2025

- 47 participants + project team
- Using same format as workshop 1 – see these publications:
  - Improving how we use workshops when solving complex research problems: reflections from the CHANGE project
  - How to organise a successful toxicology workshop? A participant perspective on the Collaboration to Harmonise the Assessment of Next Generation Evidence (CHANGE) workshop in Oslo, 18–20 June 2024

# Participants in the workshops

- Risk managers
- Risk assessors
- Industry
- Researchers

# Success factors

- Appropriate balance of risk managers, risk assessors and researchers
- Broad international participation from all sectors
- High-level participation
- Involvement of social sciences

# Workshop 2 - Program

| Time (CEST) | June 24 |
|---|---|
| 12.00-13.00 | Registration and lunch |
| 13.00-13.10 | Welcome<br><br>*Plenum* |
| 13.10-13.25 | Practical information for the workshop<br><br>*Plenum* |
| 13.25-13.50 | Introduction to the CHANGE project:<br><br>CHANGE Phase 1 ("Explore"), CHANGE Phase 2 ("Reflect")<br><br>*Plenum* |
| 13.50-14.10 | Using diagrams to visualise the dynamics of a system<br><br>*Plenum* |
| 14.10-14.50 | Introduction to the conceptual tools used in the workshop:<br><br>• The concept of "Effective use of NAMs in the regulatory toxicology system"<br>• The system diagram presenting the outcome of the "Explore" workshop<br><br>*Small group discussions* |
| 14.50-15.20 | Break |
| 15.20-15.45 | Introduction to the workshop approaches and discussion theme 1: "Making NAMs accepted and accessible"<br>*Plenum* |
| 15.45-16.45 | Theme 1: "Making NAMs accepted and accessible"<br>*Small group discussions* |
| 16.45-17.00 | Break |
| 17.00-17.50 | Theme 1: "Making NAMs accepted and accessible"<br>*Large group discussion (fishbowl)* |
| 17.50-18.25 | Art gallery<br>• Fill in workbook for theme 1: "Making NAMs accepted and accessible"<br>• Add feedback to posters in the art gallery<br>*Personal reflections* |
| 18.25-18.30 | End the day<br>*Plenum* |
| 18.30 | Dinner at the venue |

| Time (CEST) | JUNE 25 |
|---|---|
| 08.45-09.00 | Arrival |
| 09.00-09.05 | Welcome, introduction to day 2<br><br>*Plenum* |
| 09.05-09.15 | Introduction to discussion theme 2: "Creating more promising NAMs"<br>*Plenum* |
| 09.15-10.15 | Theme 2: "Creating more promising NAMs"<br>*Small group discussions* |
| 10.15-11.15 | Keynote<br>'Making NAMs Usable: Thinking about Values in Science'<br><br>Kevin Elliott, Michigan State University<br><br>*Plenum* |
| 11.15-11.45 | Break |
| 11.45-12.35 | Theme 2: "Creating more promising NAMs"<br><br>*Large group discussion (fishbowl)* |
| 12.35-13.15 | Art gallery<br>• Fill in workbook for theme 2: "Creating more promising NAMs"<br>• Add feedback to posters in the art gallery<br>*Personal reflections* |
| 13.15-14.15 | Lunch at the venue |
| 14.15-14.25 | Introduction to discussion theme 3: "Understanding and using evidence from NAMs in regulation"<br>*Plenum* |
| 14.25-15.25 | Theme 3: "Understanding and using evidence from NAMs in regulation"<br>*Small group discussions* |
| 15.30-16.00 | Reflection and end the day<br>*Plenum* |
| 19:00 | Dinner at Havsmak |

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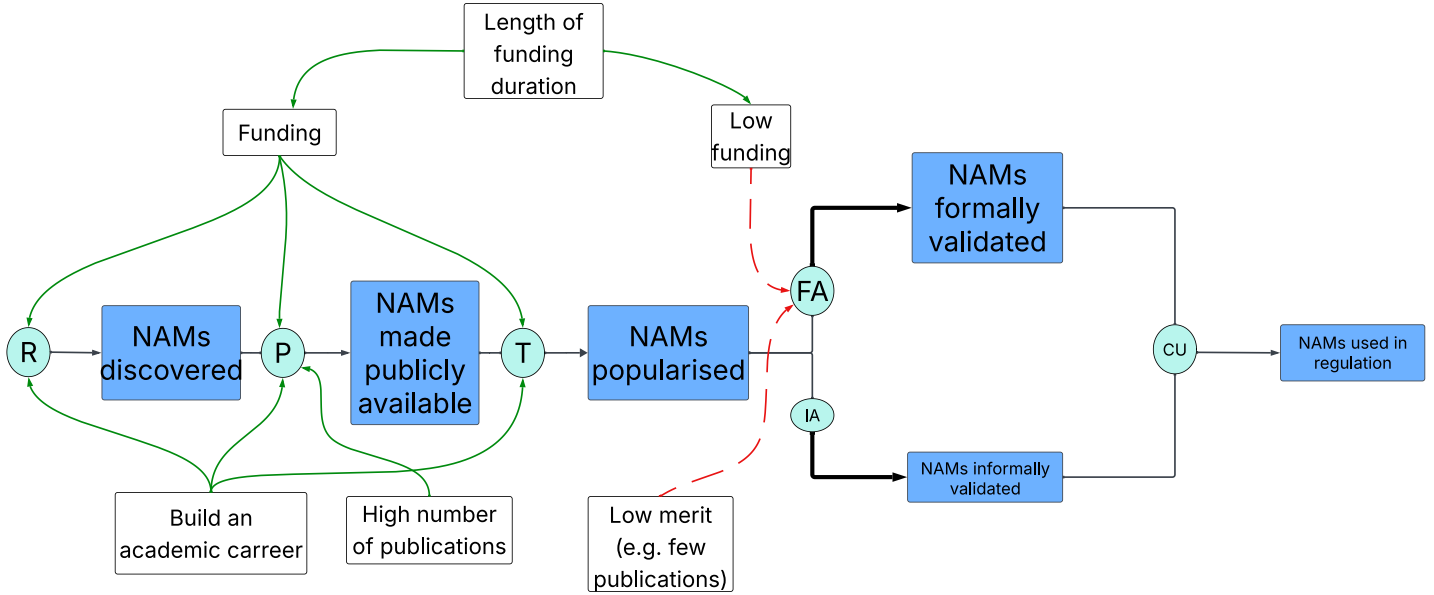
# Workshop 2 - Program

| Time (CEST) | June 26 |
|---|---|
| 08.45-09.00 | Arrival |
| 09.00-09.15 | Welcome, summary of day 1 and day 2 and introduction to day 3<br><br>*Plenum* |
| 09.15-09.30 | Participant meeting report<br><br>Anne Kienhuis, National Institute for Public Health and the Environment (RIVM) &Michael Guy Diemar, 3Rs Management and Consulting Aps<br><br>*Plenum* |
| 09.30-10.20 | Theme 3: "Understanding and using evidence from NAMs in regulation"<br>*Large group discussion (fishbowl)* |
| 10.20-10.45 | Break |
| 10.45-10.55 | Introduction to the art gallery / drop-box<br>*Plenum* |
| 10.55-11.45 | Art gallery<br>• Fill in workbook for theme 3: "Understanding and using evidence from NAMs in regulation"<br>• Add feedback to posters in the art gallery<br>• Drop-box of things for more discussion, missing, etc.<br>*Personal reflections* |
| 11.45-13.00 | • Review drop-box<br>• Summary of the "Explore" and the "Reflect" phases, next steps, and closing of workshop.<br>• Evaluation survey<br><br>*Plenum* |
| 13.00-14.00 | Lunch at the venue |

# CHANGE Phase 2 Reflect (2025)




Hypothesis based on the system map (example), ratings collected in workbooks

- Funding is structured in a way that does not support the popularisation and validation of promising NAMs.

| Strongly disagree (%) | Disagree (%) | Agree (%) | Strongly agree (%) | Do not know (%) |
|---|---|---|---|---|
| 0 | 5 | 48 | 40 | 7 |

- The actors who make the discovery are not necessarily the actors who should do the popularisation and validation.

| Strongly disagree (%) | Disagree (%) | Agree (%) | Strongly agree (%) | Do not know (%) |
|---|---|---|---|---|
| 0 | 11 | 70 | 18 | 0 |

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# Workshop 2 - Evaluation

## Overall evaluation (missing values in 1 response)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1: poorly / 5: well-organised | - | - | - | - | 36 (100)% |
| 1: boring / 5: interesting | - | - | - | 4 (11%) | 32 (89%) |
| 1: dull / 5: enjoyable | - | - | - | 5 (14%) | 31 (86%) |
| 1: not relevant to me / 5: relevant to me | - | - | 1 (3%) | 6 (18%) | 28 (79%) |
| 1: useless / 5: useful | - | - | 1 (3%) | 4 (11%) | 31 (86%) |
| 1: a waste of time / 5: time well spent | - | - | 1 (3%) | 4 (11%) | 31 (86%) |

# Workshop 2 - Evaluation

## Individual experiences in the workshop

| | 1 Strongly disagree | 2 Disagree | 3 Agree | 4 Strongly agree | 5 Do not know |
|---|---|---|---|---|---|
| I feel that I've gained a lot new and useful insights into other people's views. | - | 1 (3%) | 15 (42%) | 20 (55%) | - |
| The experiences that I gained in the workshop will impact my work in the future. | - | 3 (8%) | 22 (61%) | 9 (25%) | 2 (6%) |
| The workshop made me aware of my own assumptions and potential preconceptions. | - | 2 (5%) | 18 (50%) | 15 (42%) | 1 (3%) |
| I felt comfortable sharing my own perspectives in the workshop. | - | 2 (6%) | 9 (25%) | 25 (69%) | - |

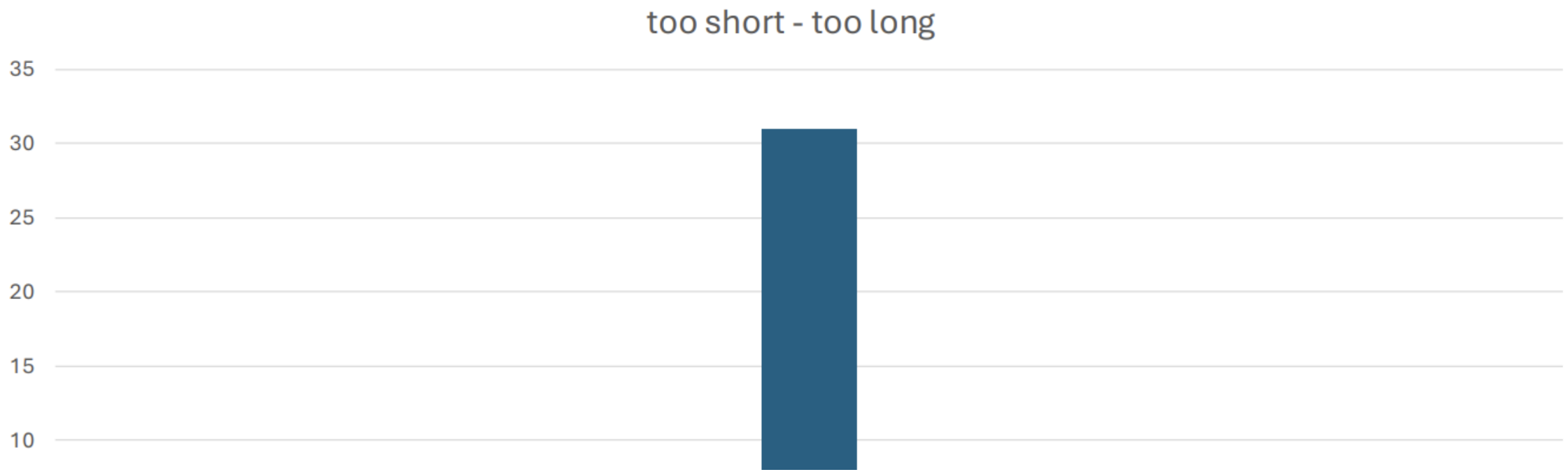
# Workshop 2 - Evaluation

## Evaluation of individual parts

| | 1<br>I did not like this at all | 2<br>I somewhat did not like this | 3<br>I liked this somewhat | 4<br>I liked this a lot | 5<br>Do not know |
|---|---|---|---|---|---|
| Input presentations | - | - | 6 (17%) | 29 (80%) | 1 (3%) |
| Small group discussions | - | - | 3 (8%) | 33 (92%) | - |
| Large group discussions (fishbowl) | - | 1 (3%) | 13 (36%) | 22 (61%) | - |
| Art gallery | - | 3 (8%) | 16 (44%) | 15 (42%) | 2 (6%) |
| Keynote on day 2 | - | 1 (3%) | 3 (8%) | 32 (89%) | - |
| Closing session on day 3 (summary of explore and reflect phases) | - | 1 (3%) | 8 (22%) | 26 (72%) | 1 (3%) |

# Workshop 2 - Evaluation

## Duration of the workshop

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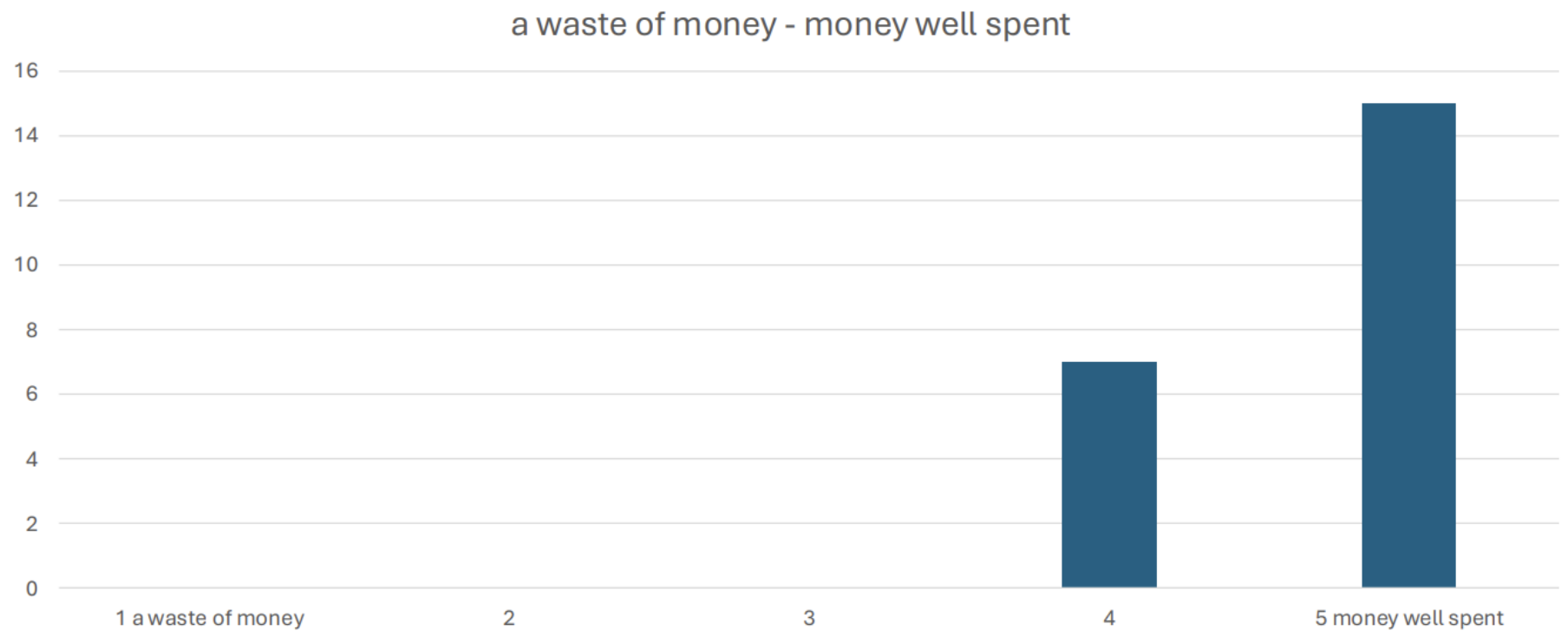
# Workshop 2 - Evaluation

## Evaluation of organisation (missing values in some responses)

| | ☆ | ☆☆ | ☆☆☆ | ☆☆☆☆ | ☆☆☆☆☆ |
|---|---|---|---|---|---|
| Comm. Before | - | - | 1 (3%) | 7 (20%) | 27 (77%) |
| Comm. During | - | - | - | 1 (3%) | 35 (97%) |
| Oslo as workshop location | - | - | 3 (8%) | 1 (3%) | 32 (89%) |
| Venue location | - | - | - | 4 (11%) | 32 (89%) |
| Venue facilities | - | - | 3 (8%) | 2 (6%) | 31 (86%) |
| Coffee breaks | - | - | 2 (6%) | 3 (8%) | 31 (86%) |
| Lunch/dinner at the venue | - | 1 (3%) | - | 2 (6%) | 33 (92%) |
| Dinner at Havsmak | 1 (3%) | - | 2 (6%) | 1 (3%) | 31 (88%) |
| Hotel | 1 (7%) | 1 (7%) | 4 (29%) | - | 8 (57%) |
| Trip organisation | - | - | - | - | 14 (100%) |

# Workshop 2 - Evaluation

## Waste of money?

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# Way ahead: Several milestones to follow

- Possible follow-up with online workshops
- Data preparation and analysis
- Preparing for the last workshop in Oslo in June 2027: Design

# CHANGE: Use of AI

- The project uses extensively AI, both in the data capture and data analysis

  - **Data capture**: Whisper (OpenAI) is used to generate high quality transcripts from the workshop's recordings.
  - **Data analysis**: ATLAS.ti is used to carry out a two-step coding (inductive freestyle coding & flexible deductive coding) and thematic analysis.
  - Cooperation with NIEHS, USA – Exploring the **use of LLMs** to validate and enhance coding and thematic analysis, including comparisons between human- and LLM-applied codes.

# Next workshop, CHANGE website and publications

- Next workshop: In Oslo,  23 – 25 June 2026
- VKM CHANGE-website
- Time for CHANGE: system-level interventions for bringing forward the date of effective use of NAMs in regulatory toxicology
- Improving how we use workshops when solving complex research problems: reflections from the CHANGE project
- How to organise a successful toxicology workshop? A participant perspective on the Collaboration to Harmonise the Assessment of Next Generation Evidence (CHANGE) workshop in Oslo, 18–20 June 2024
- Exploring experiences of the regulatory toxicology system: system-level promoters and inhibitors of new approach methodologies

# CHANGE website and publications

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# The CHANGE project

**C**ollaboration to **H**armonise the **A**ssessment of **N**ext **G**eneration **E**vidence

Project webpage

Editorial

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