Project No. 018385
INTARESE
Integrated Assessment of Health Risks of Environmental Stressors in Europe

Integrated Project
Thematic Priority

D12 3rd Training Workshop

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Dissemination Level		
PU	Public	X
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Minutes INTARESE training workshop 22 – 23 May 2007, Hotel Schiphol

Aim of the training
This training was (primarily) meant for people working on SP3 case studies. During the two days, SP1 members provided in parallel sessions practical training related to the tools and methods that are being developed within INTARESE.

Introduction – David Briggs
David presented a short overview of the activities and plans within SP3 WPs, and was generally content with the progress in these case studies. For each case study, the area, scenario, exposures of interest and health outcomes of interested were presented.
He emphasized the importance of dose-response functions, cross-cutting issues, uncertainties etc. The case-studies of SP3 are an important element of the INTARESE process to identify usability of methods, gaps, uncertainties etc. More effort should be made on internal ánd external dissemination of results. These kinds of training workshops should also be used for networking, interaction with users, etc.

Intarese framework – Erik Lebret
Erik Lebret presented the key elements of the Intarese framework and an updated version of the full-chain approach. This version gives a clearer distinction between variables and causal relationships; environmental, social, economic and infrastructural contexts; physical and chemical processes; indicators; policy measures and assessment scenarios; appraisal of the results impacts; and adaptation and feedback. This full chain diagram can be used as a basis for describing the causal networks that are being used in SP3 WPs.

General discussion on usefulness of training sessions (day 2)
(overview of individual training sessions below)

In general, people found the trainings useful and practical. Working in smaller groups worked out very well. There is clear need for more communication between SP1-SP3, more active information sharing. These trainings were a good way of practical interaction between SP1-SP3, and this needs to be repeated in near future. Suggestions for other workshops/training are welcome.

Exposure modelling and health effect guidance: This training has been useful for interaction between SP1 and SP3, and had good discussions.
Combined exposures: This is a relatively unexplored field. It is important to check the literature.
Environmental equity: This field was also new to most people, and the underlying mechanism is complex. Most important question: how do we deal with environmental equity within Intarese?
Uncertainty: There is a need to get a broader view on uncertainty. Main question: how to assess this in impact assessment?
Monetisation: There is a need for guidance and a list of monetary values used in other projects
Dalys: There is a need for guidance and consistency in using severity weights
Risk perception: Relacvtively new concept. How to integrate? And what could be the added value for Intarese?
Indicator selection: SP3 was very interested in this topic. The diagram training (scoping) would have been appreciated earlier.

There is a shared need for more guidance on uncertainty (training will be held 17 and 18 October), exposure-response relations when there is less evidence, latency aspects, and setting up future scenarios. Finally, there was a lot of attention for air pollution in the trainings/ methods, but other pathways should also be addressed.

Parallel sessions – overview of trainings (minutes written by the respective trainers)

Session A: Source, exposure and effects

60 min	Exposure modeling guidance (source exposure training)	Mirando Loh, Arja Asikainen, Nicole Janssen, Herdis Laupsa, (Matti Jantunen, Eva Kunseler) – KTL, RIVM, NILU
60 min	Exposure response, meta analysis, use of epidemiological and toxicological evidence (exposure-health effect training)	Gerard Hoek – IRAS Utrecht university

Source - exposure training
Discussion points from each session

Training with WP3.1 and 3.2

- the guidance provided does not describe how to choose the appropriate exposure metric – for example, modelling personal exposures may be interesting but not applicable if exposure-response functions exist only for ambient concentrations
- related to the above point, how can intake fraction be used with exposure-response functions?
- what to do about data selection and quality – assessment of uncertainties
- how can source apportionment be incorporated into the toolbox
- guidance to SP3 – should be more specific

Training with WP3.4 and WP3.5

- binary and categorical exposure indicators, or proxies and how to deal with those; sometimes exposure cannot be modelled beyond these, so should we address them and how
- also, what if there is only information about the source, like number of units sold – how can we use this information to go forward? do we model? do we use literature data? this is especially relevant for a situation such as exposure to phthalates, where little modelling for exposure to these substances has been developed
- Gerard Hoek, who represented WP1.3 seemed happy with the different exposure metric options, as they cover most of the available exposure-responses. However, he brought up questions as to who should be dealing with target dose modelling and pbpk modelling

Training with WP3.3, 3,6, 3.7

- how to deal with ambient pesticide concentrations? exposure responses have been done for ingestion but not inhalation

Exposure-health effect training

- Keep in mind that in health impact assessment, the same exposure metric should be used for the population exposure distribution as that used to derive the exposure-response function (ERF) to calculate e.g. the burden of a certain disease.
- Decisions which exposure metric (external vs internal dose) to choose for your ERF needs to be based on 1) the amount of individual studies 2) the quality of the individual studies and 3) the representation of a mixture (see WP 1.3 protocol)
- Transferability of ERFs between locations (e.g Rome and Helsinki) can be explored by the methods of meta-analysis (investigating heterogeneity between study results).
- It is useful to put the issue of transferability between locations and populations in perspective. If we accept that it is possible to extrapolate from animal data to human data, the uncertainty of extrapolating human data to another location is likely much smaller.
- The tables to characterize and rate the most important sources of uncertainty in the core studies to be used in your exposure-response assessment work were helpful. To

rate the uncertainties on a +, ++, +++ scale (or the other way around) on a presumed increase of the effect estimate is difficult but worthwhile to give it a try. Maybe in the second pass assessments it is possible to quantify the most important sources of some core individual studies and come up with a more 'refined' estimate of the ERF.
- To make use of both epidemiological and toxicological evidence in the exposure-response assessment is challenging. Qualitative attempts has been done, quantitative attempts are rare. Within WP 1.3 we are exploring a few examples. If in your SP-3 you want to make use of both disciplines together, please contact IRAS.
- Any guidance and help needed for your exposure-response assessment work? Contact persons are indicated for each SP-3 WP (see protocol)

Session B: Uncertainty and cross cutting issues

30 min	Combined exposures	Gerard Hoek - IRAS Utrecht university
30 min	Equity issues	Hanneke Kruize - RIVM
60 min	Uncertainty	Martin Krayer Von Krauss, Marco Martuzzi - WHO Rome

Combined exposures training

- Epidemiology deals with mixtures inherently
- Five (epidemiological) approaches are indicated:
  1) Treate the mixture as a single agent;
  2) Select an indicator compound;
  3) Create a summary index;
  4) Study the effects of mixture components;
  5) Characterize the independent and joint actions of the components.
- Toxicological approaches mostly deal with chemicals including
  1) Simple similar action (dose addition), for example the toxicological equivalent factors of e.g. dioxins;
  2) Simple dissimilar action and
  3) Interaction
- WP 1.3 has a short review on the mixture problem.
- RIVM has now made a draft on how to deal with mixtures

Equity issues

For details, contact Hanneke Kruize, RIVM (Hanneke.Kruize@rivm.nl)

Uncertainty Training

The training began with a presentation of an adapted version of the Walker & Harremoës framework, a typology of uncertainty aimed at helping risk assessors understand and systematically diagnose a broad range of the uncertainties characterizing their assessments. Here, uncertainty is conceived as a two-dimensional concept, distinguishing between the i) *Location* and ii) *Level* of uncertainty.

All of the widely used approaches to risk assessment rely on methodologies that can be considered idealized models, that is, abstractions of the real world issues under consideration. The *location* dimension refers to *where* uncertainty manifests itself within the configuration of the system model. The *level* of uncertainty is essentially an expression of the degree of severity of the uncertainty, as seen from the decision-makers perspective. In accordance with a significant part of the body of literature on uncertainty, a scale containing different categories of *levels* of uncertainty is proposed. These categories are referred to as Statistical Uncertainty (known outcomes, known probabilities), Scenario Uncertainty (known

outcomes, unknown probabilities), and Identified Ignorance (unknown outcomes, unknown probabilities).

The presentation was followed by an exercise where participants were required to apply the above concepts to the example of chemical risk assessment. Participants were required to discuss their individual results in plenum with the group. The discussion focussed on agreement and disagreement in the answers provided within the group.

The take home messages for the training were the following:

- Uncertainty is a concept reaching beyond the notions of statistics and probability commonly associated with the term;
- Relatively quickly, a project team can gain an appreciation for the level of uncertainty that characterizes their assessment;
- The point of assessing the level of uncertainty is not to report the level of uncertainty;
- Rather, the point is to:
    - Determine if uncertainty should be reported quantitatively or qualitatively;
    - Identify areas of agreement and areas of disagreement;
    - Make explicit different, equally legitimate, value based perspectives on uncertainty;
    - Inform the qualitative reporting of uncertainty.

Session C: Aggregated Impact measures?

45 min	Principles of monetization and CBA, incl. a presentation of the Ecosense model	Rainer Friedrich, Alexandra Kuhn – University of Stuttgart
30 min	Calculation of DALYs	Anne Knol - RIVM
45 min	Theories of risk perception and MAU-analysis	Ric van Poll - RIVM

Monetarization training

- Monetary valuation helps to compare (health) impacts and is necessary for cost-benefit-analyses.
- The assessment of impacts is based on the preference of the affected well informed population.
- Thresholds are needed and only damages below those are taken into account.
- There are different methods to derive the willingness to pay (WTP). The mostly used one is the Contingent Valuation Method (surveys asking for the willingness to pay to avoid a damage).
- Also covered: Cost-Benefit-Analyses, Benefit transfer
- Further help needed on:
    - Discounting
    - Transfer to different countries / cities
    - List of health outcomes and the corresponding monetary values used in other projects.

DALY training

DALYs (Disability Adjusted Life Years) are a means to quantitatively describe an (environment-related) disease burden. DALYs combine information on quality and quantity of life. They give an indication of the (potential) number of healthy life years lost due to premature mortality or morbidity. In these calculations, morbidity is weighted for the severity of the disorder. They can be used for

- *Comparative* evaluation of environmental health impacts ("how bad is it?")
- Evaluation of the *effectiveness* of environmental policies (largest reduction of disease burden)
- Estimation of the *accumulation* of exposures to environmental factors (for example in urban areas)
- *Communication* of health risks

In the training, the basic concepts of DALY calculations were addressed and a draft version of a DALY calculation tool was presented. When DALYs (or similar Burden of Disease measures) are going to be calculated in SP3 case studies, help can be provided by WP1.4.

Further help was needed on:

- finding and harmonizing severity weight factors
- calculating number of cases for non-linear ERFs
- dealing with latency time
- harmonization with monetization methods (which have partly the same basis)
- life table analysis

Theories of risk perception and MAU-analysis

For details, contact Ric van Poll, RIVM (Ric.van.Poll@rivm.nl)

Session D: Methodology and application

90 min	Indicator selection and specification, incl properties of good risk assessments, causality, and variable structure	Jouni Tuomisto, Eva Kunseler - KTL
30 min	Policy deficit indicators	Leendert van Bree, MNP

Indicator selection and specification

- The full chain approach (causal network) consists of *variables*. Variables that are of special interest and will be reported are called *indicators*.
- There are several types of indicators used by different organisations. Intarese indicators differ from previous definitions and practices
- The assessment process has several phases, which can be described in the following way. Note that the process is iterative and you may need to go back to previous phases several times.
  - Define the purpose of the assessment (e.g. a key question)
  - Frame the issue: what are the boundaries and settings of the assessment?
  - Define the variables of special interest, i.e. indicators, and other important (i.e. key) variables.
  - Draft a causal chain that covers your framing.
  - Use clairvoyant test, causality test, and unit test to find development needs in your causal chain.
  - Quantify variables and links as much as needed and possible.

- The **clairvoyant test** determines the *clarity* of a variable. When a question is stated in such a precise way that a putative clairvoyant can give an exact and unambiguous answer, the question is said to pass the test.
- The **causality test** determines the *nature of the relation* between two variables. If you alter the value of a particular variable (all else being equal), the variables downstream (i.e., the variables that are expected to be causally affected by the tested variable) should change.
- The **unit test** determines the *coherence of the variable definitions* throughout the network. The functions describing the links between the variables must result in coherent units for the downstream variables.
- The goodness of a variable is described by the following properties: informativeness, calibration, relevance, usability, acceptability of premises, and acceptability of the specification.
- All variables should have the same basic attributes. These are 1) name, 2) scope, 3) description, 4) definition, 5) unit, 6) result, and 7) discussion.

In the training, we first introduced the concepts of indicator development in causal network settings. In succession, each SP3 WP issue framework was critically examined together with the respective SP3 WPs and ad-hoc suggestions for improvement were formulated.

The indicator guidance approach was appreciated though should have come earlier in the project. Causality and full chain approach have had a central role in the Intarese since the beginning. However, it was often not clear to the participants how the causality should be reflected in a particular assessment. And as trainers, we realised that the very basic concepts of causality, as well as the practical implementation of the concepts, must be emphasised and taught more actively. We are offering further individual guidance to the specific SP3 policy assessment cases on the transition process from issue framing to causal network description.

Policy deficit indicators training

The concept of environment and health policy deficit indicators was presented as part of the guidance for development and speciation in the assessment protocol and policy analysis. Policy deficit indices, on the the four types of aggregated weighing and appraisal indices (the others are burden of disease index, economic consequence index, and risk perception and acceptability index). Policy deficit indices in the output of a comprehensive impact assessment and policy evaluation need to be considered as the degree to which stated policy goals are or are not met and the degree to which standards and guidelines are reached or violated at present and under alternative environmental scenarios. Policy deficit indices deal therefore with trends and target achievements for emissions, environmental quality, exposure, impacts, and environment policy costs. Policy deficit indices therefore consist of weighing and appraisal of:

Distance to emission standards
Distance to environmental quality standards (usually concentrations)
Distance to exposure/intake/body burden standards
Distance to health risk / disease burden reduction targets
Distance to risk perception and degree of acceptation targets
Distance to monetary burden / cost-effectivity targets