Review and evaluation of exposure models in the 4FUN project

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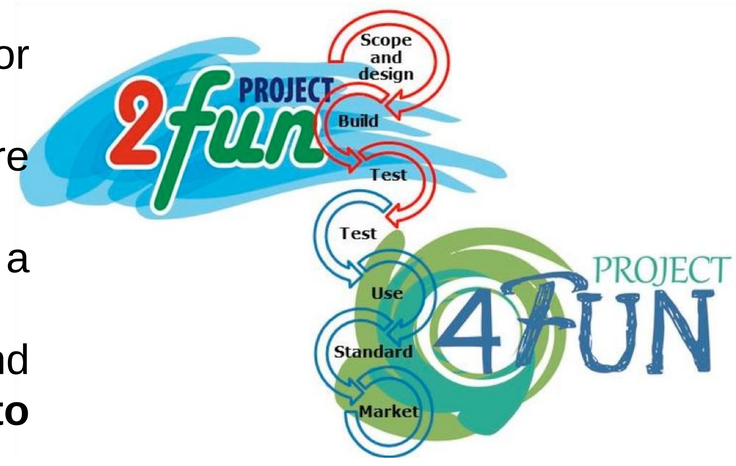
Introduction

The **4FUN project**, funded under the FP7, aims at delivering a **standardized tool** for **human exposure assessment to chemicals**

- FP6 **2-FUN** project produced **a prototype software** containing a library of exposure models, coupling **environmental multimedia and pharmacokinetic models**.
- 4FUN project will take the results from the 2-FUN project to the market, through a validation and standardization process and dissemination activities.
- **Aim of the present work**: to analyse the strengths, weaknesses, opportunities and threats (**SWOT**) of existing exposure assessment tools (including 2-FUN) in order **to identify possible improvement for the exposure assessment of the 4FUN** model.



Model evaluation approach

Compare and evaluate models
A transparent and structured approach is necessary. Multi-Criteria Decision Analysis (MCDA) provides an effective framework for comparing exposure models according to a set of criteria.
The selected evaluation criteria are organized in a **hierarchical structure**, based on 4 Lines of Evidence (see below).
Identified criteria can strongly be related to **regulatory frameworks**, such as REACH (EC 1907/2006), the Plant Protection Products Regulation (EC 1107/2009), etc…

Lines of Evidence	Category	Questions	Regulatory framework differences
Relevance	Exposure population	E.g. Does the model cover exposure to worker, general population, subpopulations?	PPP: worker, operator, bystander and resident. REACH/biocide: general population, industrial and professional use
	Compartments	E.g. Does the model calculate concentration in ground water, surface water, soil, air, etc…??	PPP: surface and ground water, REACH/biocide: surface + marine water
	Environmental processes	E.g. Does the model cover run-off, leaching, wet/dry deposition, degradation, etc…?	PPP specific processes: e.g. crop interception, REACH specific processes: e.g. sludge application from STP
	Substance	E.g. Is the model focused on pesticide, biocides, metals, etc..?	PPP: mostly organic substances, REACH: organic, inorganic substances and metals
	…		
Reliability	Validation, model, software, QSAR, availability, user-manual, initialization, input parameter	E.g. Is the model validated? Is the model developer well identified? Are QSARs used?	
User friendliness	Input parameters, helpdesk, manual, software, model output, etc..	E.g. Is it possible to change input parameters? Is a user manual available	
Uncertainty	Output, method, sensitivity analysis, distribution type, scenario analysis	E.g. Is a scientifically sound probabilistic approach used?	

Model selection
To be included in the SWOT analysis a model should be a multimedia model, fit in a regulatory framework, fit within the scope of the 2-FUN tool, be applicable to EU situations.

Models which will be included in the SWOT analysis: EUSES, CalTox, GREAT-ER, HESP, OURSON, etc

Model evaluation
The proposed questions will be presented through an on-line questionnaire to **experts** or to **model-developers** which will perform a model evaluation using the **pre-defined criteria**.
The output of the MCDA methodology will give a scoring of exposure models. This should place the 2FUN model into perspective and would identify gaps in the existing 2FUN model.
The identified gaps will guide actions aimed at the update and refinement of the 2FUN model.

People (experts and model developers) who want to participate in the model evaluation (± 2 hours) are highly appreciated!

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