



Evaluation of Tier 1 Exposure Assessment Models under REACH (eteam) Project

Substudy Report on User-Friendliness of Tier 1 Exposure Assessment Tools under REACH

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Exposure Assessment Tools under REACH**

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This publication is a Substudy report resulting from the work package D18 of the project “Evaluation of the Tier 1 Exposure Assessment Models used under REACH (ETEAM) Project” on behalf of the Federal Institute for Occupational Safety and Health.

The responsibility for the contents of this publication lies with the authors.

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Substudy Report on User-Friendliness of Tier 1 Exposure Assessment Tools under REACH

Abstract

Work Package I.6 of the eteam project was developed to evaluate operational aspects of the usability and fitness for purpose of each of the first tier exposure assessment tools included in the project.

A series of telephone interviews were carried out with experienced users for each of the tools. Data from the interviews were collated and a thematic analysis carried out to identify and examine common themes. This was followed up by the development of an online questionnaire survey of a much larger tool-user population, which was based on the initial questions used in the telephone interviews with appropriate modifications to facilitate web-based completion. Data were collected online, analysed using the MINITAB statistical software package and collated into a full report.

In total, 11 telephone interviews were carried out with experienced users of the tools. The interviewees were based in several EU countries and were involved in consultancy, REACH management, REACH regulations, occupational medicine, occupational hygiene and toxicology.

There were 295 respondents to the online survey, 44 percent were from industry, 33 percent from consultancy, 10 percent from government, 9 percent from research and 4 percent from other organisations. The respondents had a wide range of experience in exposure assessment, most self-reported having intermediate computer skills and they were from a range of EU countries and beyond.

The interview and questionnaire survey data identified that interviewees and respondents were generally satisfied with the usability of the tools and supporting documentation. However; the results suggest that use of the tools is affected to some degree by knowledge of the underlying tool concepts and by levels of user experience. To ensure effective exposure estimates are generated, it is therefore essential that training is available for the tools and that there is support and guidance provided for the user.

Key words:

exposure assessment, exposure modelling, REACH, user-friendliness

Bericht zur Benutzerfreundlichkeit von Tier 1-Expositionsabschätzungswerkzeugen unter REACH

Kurzreferat

Im Rahmen dieses Arbeitspaktes des eteam-Projektes wurde die Benutzerfreundlichkeit eines jeden Tier 1-Expositionsabschätzungstools untersucht.

Dazu wurden im Rahmen von Telefoninterviews erfahrene Anwender zu jedem der Tools befragt. Anschließend erfolgte eine thematische Analyse, um häufig genannte Punkte zu identifizieren und zu analysieren.

Daraufhin wurde eine Online-Umfrage bei einer deutlich größeren Anwendergruppe durchgeführt. Die Online-Umfrage basierte auf den ursprünglichen Fragen der Telefoninterviews, die für die webbasierte Durchführung modifiziert wurden. Die Ergebnisanalyse erfolgte mit der Statistik Software MINITAB. Deren Resultate wurden in einem Gesamtreport zusammengetragen.

Die in elf Telefoninterviews Befragten stammten aus verschiedenen Ländern der EU und waren in beratende Tätigkeiten, in das REACH Management, in die REACH-Regulierung involviert oder in der Arbeitsmedizin, der Arbeitsplatzhygiene sowie der Toxikologie tätig.

Die insgesamt 295 Probanden, die den Online-Fragebogen beantworteten, lebten zum Zeitpunkt nach eigenen Angaben sowohl in der Europäischen Union als auch in Staaten außerhalb der EU. Unter ihnen waren 44 Prozent in der Industrie, 33 Prozent in beratenden Tätigkeiten, 10 Prozent in staatlichen Stellen, 9 Prozent in der Forschung und 4 Prozent in anderen Organisationen tätig. Die Befragten gaben an, über eine große Bandbreite an Erfahrungen im Bereich Expositionsabschätzungen zu verfügen. Der überwiegende Teil ordnete seine Computerkenntnisse im mittleren Bereich ein.

Die Ergebnisse der Interviews und der Online-Umfrage ergaben, dass die Teilnehmer im Allgemeinen mit der Benutzerfreundlichkeit der Tools und der ergänzenden Dokumentation zufrieden waren. Allerdings offenbarte sich in diesem Zusammenhang, dass die Anwendung der Tools vom Wissen über die zu Grunde liegenden Toolkonzepte und dem Ausmaß der Erfahrung als Anwender beeinflusst werden. Um sicher zu stellen, dass Expositionsabschätzungen effektiv generiert werden, sollten Trainingsmöglichkeiten für die Tools und Benutzeranleitungen angeboten werden.

Schlagwörter:

Expositionsabschätzung, Expositionsmodellierung, REACH, Anwenderfreundlichkeit

1 Introduction

Work Package I.6 of the eteam project aimed to evaluate operational aspects of the usability and fitness for purpose of each of the first tier exposure tools included in the project. The package incorporated two main evaluation approaches:

- i) an appraisal of the usability and user-friendliness of the tools, through the use of telephone and on-line questionnaires; followed by
- ii) an assessment of the reliability of tool predictions of exposure, and how these can be influenced by users' input choices.

The reliability testing part of the work package will be undertaken via a "remote-completion" exercise where participants are forwarded (via email) a set number of exposure situation/ tool combinations, to be completed in late 2012. A one day focus group event will also be held to collect additional feedback from remote testing exercise participants on usability and tool functionality. The results of the remote-completion testing exercise will be reported in early 2013.

This report details the methods used to assess the user-friendliness of the tools, the results obtained and additional information on user-perceptions of tool value. The tools assessed during this work package were:

- ECETOC TRA (versions 2 and 3)
- MEASE v 1.02.01 (henceforth referred to as "MEASE")
- EMKG-EXPO-TOOL
- RISKOFDERM and
- STOFFENMANAGER v4.5[®] (henceforth referred to as "STOFFENMANAGER")

1.1 Usability and User-friendliness

Usability is defined as "the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in particular environments" (ISO 1998). Effectiveness is defined by the ISO (ISO, 1998) as the extent to which a goal or task is achieved. Efficiency relates to the amount of effort required to achieve the task. Finally, satisfaction (the most subjective state) relates to the level of comfort and acceptability the user feels when using the product.

All three of these factors are important in relation to usability but the latter may have a greater influence on individuals in relation to choosing to use a product. In the case of the Tier 1 tools evaluated in the eteam project, choice of a particular system will also be driven by the user's technical requirements, e.g. whether the tool predicts dermal exposure, inhalation exposure or both for the situation under consideration.

The primary aims of the evaluation process were to examine users' experience with the different tools and address the following questions:

- Is the software tool understandable by, and of practical value to, the users?

- What is the quality of the software (design of the input mask, system crash, bugs, interfacing with other software packages, and system requirements)?
- How does the user of the tool translate a given use/exposure situation into the available tool input parameters?
- Does the documentation meet the needs of the users with regard to clarity, user friendliness and expertise (background knowledge) of the user?
- How well do the tools meet the requirements of the user in relation to assessment of workplace exposure?

1.2 User- Appraisal of Tool Outputs

In addition to the above assessment of usability, users' opinions were collected on their general level of satisfaction with the tool-generated exposure estimates obtained, for example, whether comparisons of outputs with workplace measurement data had been carried out.

2 Methodology

To evaluate the usability of the Tier 1 tools, two methods were used; firstly a series of interviews with experienced tool users, followed by a more extensive online questionnaire survey to allow collection of feedback from a much wider user-group.

2.1 User Surveys

2.1.1 Telephone interviews with experienced users

The aim of the telephone interview was to use a series of open-ended questions to explore more proficient users' experiences of using each of the tools. In addition, the interviews informed the development of the questionnaire survey design. A copy of the interview format is provided in Appendix 3. The interview schedule was designed to identify:

- the participant's level of experience in exposure assessment and tool usage;
- the purpose for which they used the tool;
- any difficulties they experienced in installing and using the tool;
- the relevance of the tool input parameters to their situation;
- whether measured exposure data had been used as a comparison with the tool outputs; and
- whether the interviewees had used any other tools.

Potential participants for the interviews were identified from a list of interested parties, generated from a sign-up facility on the project website and from contacts of the Advisory Board and project team. In total, 77 individuals who had expressed an interest in the project were contacted to gauge their level of expertise in using the five tools (for subsequent selection purposes) and their availability for interview in April 2012. Each individual was then contacted by email and asked if they would be willing to be interviewed. If they responded "yes", they were asked to self-assess their level of knowledge about the concepts and usage of each of the tools within the three categories: Expert, Intermediate or Novice.

From this sample, 28 individuals provided information on their level of expertise with each of the tools and agreed to take part in an interview. From this group, eleven individuals were selected to be interviewed about one of the tools for which they were an expert or intermediate user, with the selection designed so that the interviews covered all five of the tools. The interviews were recorded and transcribed with the permission of all interviewees.

As the ECETOC TRA v3 was not available publicly at the time of the telephone interviews, it was not possible to assess this version using this approach.

2.1.2 Online questionnaire survey

For consistency, the online questionnaire was developed from the initial questions used in the telephone interviews, with appropriate modifications made to facilitate a web-based format. Additional contextual information was requested in the survey

questionnaire including country of residence, computer skills level, length of time working in exposure assessment and age.

Following receipt of comments on an initial version of the online questionnaire from the project Advisory Board, the final draft questionnaire was piloted within a group of exposure assessment scientists based at the IOM. Following minor adjustments, the final version of the survey was then distributed. Online access was chosen as the best means of distributing the survey quickly to as wide an audience as possible. The Survey Monkey software used also allowed for routing through the survey, thus allowing individuals to bypass questions relating to tools with which they had no experience.

Recruitment to the online survey was carried out by a number of routes as described below and as an incentive, respondents were invited to take part in a prize draw. A link to the survey was sent to the initial list of interested stakeholders generated via the project website and other contacts.

The link was also sent to the eteam Advisory Board for onwards distribution. The link was then forwarded to user-registration lists held by ECETOC for the TRA (~7000 users). Previous communications from the STOFFENMANAGER team to their user group had also publicised the survey (to ~7900 members of the user forum). Further information about participation in the eteam project had also been posted by the STOFFENMANAGER team on various LinkedIn and similar groups within the Netherlands.

For those tools which are available without registration (EMKG-EXPO-TOOL, MEASE and RISKOFDERM) and thus do not have formal distribution lists, the tool developers were asked to forward the link to suitable contacts within industry groups (e.g. EUROMETAUX) or other appropriate networks. It is therefore possible that the number of responses gathered relating to use of these tools will be lower than for those with a distinct user community, such as the TRA or STOFFENMANAGER.

Bulletins regarding the survey were posted on the LinkedIn message boards of the British Occupational Hygiene Society (BOHS) (950 members), Global Occupational Hygiene group (1344 members) and Control Banding group (77 members), and a page relating to the questionnaire was added to the eteam project website.

2.2 Data Analysis

Responses from the interviews were collated and a thematic analysis was carried out to identify and examine recurrent themes (see Appendix 4). Responses from the questionnaire survey were extracted directly from Survey Monkey as both an SPSS data file and a Microsoft Excel spreadsheet. A listing of the responses to each individual question is available as supplementary material in Appendix 2.

Within the questionnaire survey, inconsistent results were found for 13 respondents. In these, the respondent indicated that they did not use a specific tool, but had then provided responses to some of the follow-up questions on that tool. These comprised one respondent for the MEASE tool, four for EMKG-EXPO-TOOL, two for ECETOC

TRA v2, three for ECETOC TRA v3, two for STOFFENMANAGER and one for RISKOFDERM. Due to the Survey Monkey questionnaire routing restrictions used, the only way this could have been done was for the respondent to indicate that they used the tool, answered some supplementary questions and subsequently gone back and changed their original response on tool use to 'No'. In almost all of these cases, only a few supplementary questions had been completed. We think it most likely that the respondents realised that they had responded incorrectly to the screening question about model usage and have therefore assumed these 13 respondents were not users of the tools for which the inconsistent responses were recorded. Any responses they provided for these tools have thus been excluded from the statistical analyses.

Statistical analyses of the questionnaire output focussed on each tool, and used frequency tables and chi-square tests to examine any associations between users' experiences of the tools and their personal characteristics, including occupational hygiene experience, level of experience of using the tool, and the purpose for which they used the tool (i.e. whether it was used for REACH purposes or not). Where numbers of respondents in response categories were very small, adjacent categories were combined prior to the statistical analysis being carried out. Where differences between subgroups of questionnaire respondents are reported in the results section, these refer to differences which are statistically significant at the 5% level. Statistical analyses were carried out using the Minitab statistical software package.

3 Results

A summary of the salient information obtained from the telephone interviews and online questionnaires is given below separately for each tool, with additional information from the survey given in Appendix 2 and data gathered via the telephone interviews shown in Appendix 4. For clarity, in the following sections, participants in the telephone interviews are referred to as “interviewees”, whilst those who participated in the online questionnaire are referred to as “respondents”. Direct quotations from interviewees or questionnaire respondents are shown in italics.

3.1 Study Population

3.1.1 Telephone interviewees

In total, 11 participants were interviewed, covering all 5 of the tools available at that time. The interviewees were based in Belgium, Finland, Germany, Italy, the Netherlands, Sweden and the United Kingdom and worked in the following sectors:

- REACH consultancy
- REACH management
- REACH regulation
- Occupational medicine
- Occupational Hygiene consultancy
- Toxicology

The interviewees were asked to identify which of the five tools they had accessed or downloaded and confirm with which they had experience. The responses are presented in Table 3.1.

Table 3.1 Tools that interviewees had experience of using

Person	Interviewed For	ECETOC TRA v2	MEASE	EMKG-EXPO-TOOL	STOFFEN-MANAGER	RISKOF-DERM
1	RISKOFDERM	✓	✓		✓	✓
2	MEASE	✓	✓		✓	✓
3	ECETOC TRA v2	✓			✓	✓
4	STOFFENMANAGER	✓			✓	
5	EMKG-EXPO-TOOL	✓	✓	✓	✓	✓
6	STOFFENMANAGER	✓			✓	
7	ECETOC TRA v2	✓				
8	EMKG-EXPO-TOOL	✓		✓	✓	✓
9	MEASE		✓		✓	
10	ECETOC TRA v2	✓				
11	RISKOFDERM	✓		✓	✓	✓

Table 3.1 shows that all but one of the interviewees had experience with ECETOC TRA v2, while all but 2 interviewees had experience with STOFFENMANAGER. Fewer interviewees had experience with the other tools.

3.1.2 Questionnaire respondents

The questionnaire was live from 30th May 2012 until 21st June 2012. There were 295 respondents to the web questionnaire, of which 213 (72%) completed the full question set. Chi-square tests were carried out to compare those who completed the full question set and those who did not. There was no evidence of any significant difference in terms of age, type of organisation, years of work experience, computer expertise or country, suggesting that those who dropped out during the survey were no different to those who completed it to the end. Respondents were therefore included in the statistical analyses for all the questions to which they had provided answers, regardless of whether or not they subsequently dropped out of the survey before the end of the questionnaire.

Of the 295 respondents, the majority completed the survey for ECETOC TRA v 2 (59%), followed by STOFFENMANAGER (39%); the other tools were used by between 18 and 24% of the respondents. Table 2 suggests that there appeared to be no major differences in distribution of the organisation, occupational exposure assessment experience, computer skills and level of knowledge of the tools between the different Tier 1 tools. Overall, 44% respondents were from industry, 33% from consultancy, 10% from government, 9% from research and 4% from other organisations (Table 3.2).

The respondents covered a wide range of work experience on occupational exposure assessment from less than 1 year to over 10 years experience, most commonly 1-3 years (28%) and more than 10 years (28%). Most respondents had intermediate

(59%) or expert (36%) computer skills. Almost 20% of the respondents were based in Germany, with 16% based in the Netherlands, 8% in Italy, 7% in Belgium, 6% each in the UK and the USA, 5% in France and 4% in Spain.

Table 3.2 Distribution of Respondents' Background, Experience, Computer Skill Level and Level of Knowledge

	ECETOC TRA v2		ECETOC TRA v3		MEASE		EMKG- EXPO- TOOL		STOFFEN- MANAGER		RISKOF- DERM	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Respondents	151	59%	61	21%	58	20%	50	18%	87	39%	51	24%
Organisation												
Consultancy	57	38%	22	36%	19	33%	21	42%	29	33%	22	43%
Government	18	12%	5	8%	5	9%	4	8%	12	14%	5	10%
Industry	62	41%	29	48%	30	52%	19	38%	33	38%	18	35%
Research	9	6%	2	3%	3	5%	4	8%	8	9%	3	6%
Other	5	3%	3	5%	1	2%	2	4%	5	6%	3	6%
Occupational exposure assessment experience												
<1 year	20	13%	7	11%	4	7%	3	6%	9	10%	3	6%
1-3 years	46	30%	26	43%	14	24%	20	40%	21	24%	14	27%
4-6 years	34	23%	15	25%	17	29%	9	18%	17	20%	14	27%
7-10 years	10	7%	3	5%	7	12%	7	14%	8	9%	4	8%
>10 years	41	27%	10	16%	16	28%	11	22%	32	37%	16	31%
Computer skills												
Novice	8	5%	3	5%	2	3%	1	2%	3	3%	0	0%
Intermediate	89	59%	37	61%	33	57%	29	58%	55	63%	25	49%
Expert	54	36%	21	34%	23	40%	20	40%	29	33%	26	51%
Level of knowledge of tool												
Fully understand	39	27%	10	17%	14	25%	8	17%	18	21%	9	19%
Good working knowledge	62	43%	32	53%	28	51%	24	51%	39	46%	21	45%
Unfamiliar with concepts/limitations	43	30%	18	30%	13	24%	15	32%	27	32%	17	36%

3.2 ECETOC TRA V2

3.2.1 Background information on users of the ECETOC TRA v2

Of the respondents to the survey, 151 (59%) reported using the ECETOC TRA v2. The main sources of information which led the respondents to use the tool are summarised in Table 3.3. The most commonly reported sources were information on legislation and REACH awareness sessions. Among the 'other' responses were: '*recommended by colleagues*', '*involvement with the team who developed the tool*', '*educational programmes*' and '*because it is a well-known programme*'.

Table 3.3 Sources of information that led respondents to use the ECETOC TRA v2

Source of information	No. of responses	% of responses
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc.)	78	54%
REACH awareness sessions or similar training	60	42%
A meeting, conference, seminar, workshop etc.	42	29%
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc.)	36	25%
The tool's own website, its publicity materials or training course	34	24%
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc.)	11	8%
Peer-reviewed scientific publications or papers	9	6%
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc.)	5	3%
Other (please specify)	12	8%

Note: 7 users did not complete this question; table totals to more than 144 as multiple responses were permitted;

Frequency of use of the tool ranged from less than once a year (9% of respondents) to once a week or more (17%). The most common frequency was once every 2 to 3 months (28% of respondents). Around a quarter of respondents had used the tool in the last week, 29% in the last month, 30% in the last 2-5 months and 17% over 6 months ago.

The main purposes for which ECETOC TRA v2 was used are shown in Table 3.4. The responses identify that the main use was for REACH exposure assessments.

Table 3.4 Main purposes for which the ECETOC TRA v2 is used

Purpose of use	No. of responses	% of responses
For REACH exposure assessments	101	74%
To assist in the identification of risk management measures	40	29%
To determine compliance with an occupational exposure limit	33	24%
Other (please specify)	20	15%

Note: 14 users did not complete this question; table totals to more than 137 as multiple responses were permitted;

Additional comments were added by 20 respondents which included: ‘for Global Product Stewardship (GPS)’, ‘teaching’, ‘screening compounds’, ‘biocides’ exposure assessment’, ‘evaluation of the tool for comparison with other tools’, ‘exposure assessment’ and ‘compliance with local legislation’.

Many of these statements were also made by the interviewees, where the main use of the tool was for REACH exposure assessments and the tool had been chosen by the interviewees because of its ‘speed’, ‘ease of use’ and a ‘lack of alternatives’.

3.2.2 Usability of ECETOC TRA v2

Respondents were asked the ease of use of the tool in six ‘questions and responses are summarised in Table 3.5. For all six questions, the most common response was ‘easy’. Accessing and downloading the tool to computer was felt to be the easiest of the 6 categories, with 50 respondents finding it ‘very easy’ and only 6 finding it ‘difficult’ or ‘very difficult’. The most difficult aspect was learning the tool for the first time, which a quarter of respondents found ‘difficult’ or ‘very difficult’.

From the interviews, 1 interviewee found the only problem was related to ‘language problems with calculations at the start’.

Table 3.5 Usability of the ECETOC TRA v2

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading	49	72	10	6	0
Understanding the screen layout	15	63	36	20	3
Learning how to use the tool	7	56	39	33	2
Generating required tool output	9	58	41	25	4
Returning after a period of non-use	14	70	37	15	1
Fixing the problem	6	53	49	25	4

Note: 14 users did not complete this question.

Responses to the ease of use questions were compared among respondents with different levels of knowledge of the tool, different levels experience of occupational exposure assessment and by whether or not they used the tool for REACH purposes. In these analyses, the 'difficult' and 'very difficult' responses were combined because of the small number of 'very difficult' responses, and the '4-6 years' and '7-10 years' exposure assessment experience groups were combined because of the small number of responses in the 7-10 years group.

There was no evidence of any difference in the assessment of usability between respondents with different lengths of experience in exposure assessment or between those who used the tool for REACH purposes and those who used it for other purposes.

Respondents with a lower level of knowledge of the tool found it more difficult to use. An example is shown in Table 3.6 which looks at 'generating the tool output', and shows that a much higher percentage of those unfamiliar with the concepts of the tool found this difficult. Similar patterns were seen for the other usability categories with the exception of 'understanding the screen layout' where no significant difference was seen between knowledge levels.

Table 3.6 Comparison of level of knowledge of ECETOC TRA v2 and assessment of usability 'generating the required tool output'. (Each cell contains number of respondents and % of column total)

Usability	Level of knowledge						All
	Fully understand		Good working knowledge		Unfamiliar		
	No.	%	No.	%	No.	%	
Very easy	2	5%	6	10%	1	2%	9
Easy	23	61%	24	41%	11	28%	58
Neither easy or difficult	11	29%	17	29%	13	32%	41
Difficult/ Very difficult	2	5%	12	20%	15	38%	29
All	38		59		40		137

Note: 14 users did not complete this question.

Respondents' opinions on the help and guidance provided by the tool are summarised in Table 3.7, which shows that over half of respondents thought the help and guidance were 'helpful' or 'very helpful'. This was also stated by the interviewees, who thought the documentation and guidance were '*helpful*' and the '*short guidance sufficient if the technical reports were also read*'.

Table 3.7 Help and guidance in ECETOC TRA v2

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
Help functions	6	71	43	15	2
Supplementary guidance	13	77	38	7	2

Note: 14 users did not complete this question.

For comparison of responses between more and less experienced respondents, the 'helpful' and 'very helpful' categories and the 'unhelpful' and 'very unhelpful' categories were combined because of the small numbers of responses in the more extreme categories. No differences were seen by level of knowledge of the tool or by whether or not the tool was used for REACH assessments. Proportionally more respondents with less than one year experience of occupational exposure assessment found the guidance unhelpful compared to those with more years experience (Table 3.8). There was no such evidence for a difference in the respondents' assessment of the help functions.

Table 3.8 Assessment of supplementary guidance by years of experience in occupational exposure assessment. Each cell contains number of responses and % of column total.

Supplementary guidance	Years of exposure assessment experience								All
	< 1 year		1-3 years		4-10 years		>10 years		
	No.	%	No.	%	No.	%	No.	%	
Helpful	9	53%	27	60%	27	73%	27	71%	90
Neither helpful or unhelpful	3	18%	16	36%	10	27%	9	24%	38
Unhelpful	5	29%	2	4%	0	0%	2	5%	9
All	17		45		37		38		137

Note: 14 users did not complete this question.

Respondents were invited to make general comments on the user-friendliness of the tool and 42 responded. Responses are summarised below:

- 6 respondents found it *'easy to learn and use'*,
- 4 respondents who found it *slow* and a further one commented that it *'slowed the computer system down'*.
- 4 respondents *'found the layout difficult'* and one who commented further *'on a poor interface design'*.
- 3 respondents who thought *'only the standalone tools were user-friendly'*;
- 2 respondents who found it *'difficult to store and retrieve results'*;
- 2 respondents who thought the *'space for entering scenarios was too small'*; and
- 2 respondents who found it *'difficult to use and that training is required'*.

A full listing of comments is available in Question 53 in Appendix 2.

Some of these comments echoed those in the interviews where the single tool was found easy to use but the integrated tool was perceived to be more complex, with interviewees reporting that technical problems are occurring often when opening and closing the Microsoft Excel worksheets.

3.2.3 Using ECETOC TRA V2

Respondents to the survey were then asked to identify if they had used ECETOC TRA v2 for dermal exposure or inhalation exposures. In total, 101 (77%) reported using the tool to calculate dermal exposure estimates and 127 (96%) had used the tool to predict inhalation exposures.

For both types of exposure estimation (inhalation and dermal), most respondents found it 'easy' or 'neither easy or difficult' to translate real-life exposure situations into the required parameters, with 12% (inhalation) and 20% (dermal) finding it 'difficult' or 'very difficult'. For dermal exposure, proportionally more respondents with basic knowledge of the tool found it 'difficult' or 'very difficult' (40%) than intermediate (23%) or expert (6%) users of the tool. A similar pattern was seen for inhalation exposure but the differences between the groups were not statistically significant. No differences were seen by years worked in exposure assessment or by purpose of using the tool (REACH or otherwise).

The interviewees' comments with regard to translation of real-life work situations into the input parameters identified that it was *'becoming easier as the subject is being more widely discussed across industry'*. Furthermore, the interviewees felt that *'the assessments/predictions required refinement in relation to risk management measures'*.

Among those who used the tool for inhalation exposure, 74% thought it was 'important' or 'very important' that the tool appropriately overestimates exposure, 20% thought that it was 'neither important or unimportant' and 2% thought that it was 'unimportant'. The remaining 4% responded 'not applicable' to the question. Among the dermal exposure users of the tool, 79% thought that appropriate overestimation of exposures was 'important' or 'very important', 15% thought it was 'neither important or unimportant', 2% that it was 'unimportant' and 4% responded that the question was 'not applicable'.

Table 3.9 shows the distribution of respondents' views on the accuracy of the exposure estimates provided by the tool. Among the dermal exposure users of the tool, 43% think that the tool 'appropriately overestimates' exposures and 50% of users of the inhalation part of the tool think that it 'appropriately overestimates' exposures.

There was no evidence that the respondents' assessment of accuracy varied according to whether or not they used the tool for REACH purposes. The interviewees echoed this in that the two interviewees felt that they were estimating the worst-case exposure.

Table 3.9 Users' opinions of the accuracy of exposure estimates from the ECETOC TRA v2

Route of exposure	Accuracy of exposure estimates				Not applicable
	Greatly over-estimates	Appropriately overestimates	Over-estimates/ Under-estimates ¹	Under-estimates	
Dermal	21	43	29	2	6
Inhalation	18	64	37	1	7

¹Sometimes overestimates and sometimes underestimates'

When asked if the ECETOC TRA v2 fulfilled their requirements, 82 (64%) of respondents said 'Yes', 33 (26%) said 'No' and 13 (10%) reported that they did not know. The reasons for this were provided by 35 respondents for inhalation exposure, 30 of whom had responded 'No' to whether or not the tool fulfilled their requirements, and 5 of whom responded 'Yes' to this question. None of those responding 'Don't know' provided reasons.

For dermal exposures, reasons were provided by 27 respondents. Of these, 20 responded 'No' to whether or not the tool fulfilled their requirements, 6 responded 'Yes' and 1 responded 'Don't know' to this question. The results are presented in Table 3.10. These related to lack of information on the exposure scenario leading to difficulty in identifying the most appropriate model parameters, and to unrealistic or unclear/ambiguous exposure estimates.

Table 3.10 Reasons why respondents did not feel their requirements were fulfilled by the ECETOC TRA v2. Each cell contains number of respondents (N) and % of those who provided a reason.

Reasons	Inhalation		Dermal	
	N	%	N	%
I had insufficient workplace exposure information to enter all required input parameters	8	23%	9	33%
It was unclear how to translate my workplace information into the required input parameters	10	29%	10	37%
The estimates of exposure did not seem realistic for my workplace situation	19	54%	17	63%
The estimates of exposure were unclear or ambiguous	10	29%	9	33%
I could not identify a relevant PROC code for my work task	12	34%	7	26%

Note: Table totals to more than 35 for Inhalation and more than 27 for Dermal as multiple responses were permitted

Eleven respondents added additional reasons under the 'other' category within the survey. These included the following direct quotations:

- *'Takes just a whole lot of concentration and time to understand what fields to fill out where and how the application works. In other words: not user friendly enough';*

- *'Control means seem not enough taken in account';*
- *'We found that estimated exposure for high volatility substances (near end of middle range) not always overestimates';*
- *'Validation for dermal particularly poor. Predicts very erratically and fails to take account of most dermal challenge beyond hands and arms in many cases';*
- *'I compared the results obtained with (the) results in STOFFENMANAGER and there a big difference in the estimated exposure';*
- *'Overestimates of exposure grow as vapour pressure reduces';*
- *'Too great overestimation results in that safe use cannot be shown and another tool is needed';*
- *'..the technical services is not covered by a PROC, but it is generally known that exposures are high';* and
- *'Limited control measures possibilities'.*

Eighteen respondents had compared results from the tool for dermal exposure against measured data, of whom 6 thought the level of agreement was 'good', 7 thought it was 'poor' or 'very poor' and 5 thought it was 'neither good or poor'. Of those using the tool for inhalation exposure estimation, 54 had compared outputs against measured data, of whom 23 thought the level of agreement was 'good' or 'very good', 17 thought it was 'poor' or 'very poor' and 14 thought it was 'neither good or poor'.

Respondents to the survey were asked to identify the strengths of the ECETOC TRA v2 for inhalation exposure and 70 respondents offered comments. Thirty-four respondents found the tool *'easy and simple to use'* and a further 8 commented that it allowed a *'fast method of calculating estimates'*. Three respondents thought that *'the conservative approach taken by the tool'* was a strength, and a further two commented that the tool *'allowed prioritisation of exposure situations where more in-depth analysis was required'*. The complete listing of comments is available in Question 62 in the supplementary material in Appendix 2.

Sixty-seven respondents made comments on the limitations of ECETOC TRA v2 for inhalation exposure. Four respondents thought the outputs were *'very conservative'* and that *'exposure was overestimated'*. Three respondents thought the tool *'needed more personal protective equipment (PPE) and risk management measures (RMM) to be considered'* and two respondents highlighted that *'fumes and aerosols were not supported by the tool'*. Further relevant comments in relation to the limitations of ECETOC TRA v2 for inhalation exposure are available in the supplementary material in Appendix 2.

Examining the strengths of the ECETOC TRA v2 for dermal exposure, 56 respondents gave open comments. In summary, 14 respondents thought it was *'a simple and easy tool to use'*; 3 respondents thought it *'could be used quickly'*. Two respondents thought it was *'very conservative'* and one followed this up with a comment that this *'may lead to risk conclusion when there was no risk'*. It is unclear whether this is a strength of the tool or a limitation in relation to risk conclusions.

Sixty-one respondents made comments with regard to the limitations of the ECETOC TRA v2 for dermal exposure. In summary, 6 respondents made comments in relation

to ‘not allowing RMM’ within the tool. A further 2 commented that ‘glove protection was not allowed as a RMM’. Three respondents commented that it ‘underestimated exposure’. A broad range of comments were received and these are available in Table 65 in the supplementary material in Appendix 2.

Responses from the interviews reiterated some of these comments in that ‘its simplicity, processing power and clear illustrations of the assumptions made’ were strengths within the tool. The only limitation raised by an interviewee was that ‘point estimates rather than exposure distributions are generated by the tool’.

3.3 ECETOC TRA V3

3.3.1 Background information on users of the ECETOC TRA v3

Sixty-one respondents to the survey reported using the ECETOC TRA v3. The sources which had led them to use version 3 are presented in Table 3.11. The most common sources were a meeting or conference, the tool’s website and information on legislation such as REACH. There were no interview data on this tool as it had not been released at the time of the interviews.

Table 3.11 Sources of information that led respondents to use the ECETOC TRA v3

Source of information	No. of responses	% of responses
A meeting, conference, seminar, workshop etc.	24	40%
The tool’s own website, its publicity materials or training course	21	35%
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc.)	20	33%
REACH awareness sessions or similar training	17	28%
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc.)	16	27%
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc.)	5	8%
Peer-reviewed scientific publications or papers	2	3%
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc.)	2	3%
Other (please specify)	9	15%

Note: 1 user did not complete this question; table totals to more than 60 as multiple responses were permitted.

Nine respondents who stated ‘other’ in the responses had been informed about the ECETOC TRA v3 by GPS guidance, colleagues (2), a workshop on the tool (2), trade associations, membership of a trade federation, email correspondence with ECETOC and one individual who participated in its development.

The ECETOC TRA v3 was most commonly used 2-3 times per month (35% of respondents), and over half of respondents had last used the tool within the last

month. The main reasons for using the tool are summarised in Table 12 which shows that the most common use was for REACH exposure assessments.

Table 3.12 Main purposes for which the ECETOC TRA v3 is used

Purpose of use	No. of responses	% of responses
For REACH exposure assessments,	47	81%
To assist in the identification of risk management measures	14	24%
To determine compliance with an occupational exposure limit	9	15%
Other (please specify)	7	12%

Note: 3 users did not complete this question; table totals to more than 58 as multiple responses were permitted.

For those who responded 'other', 7 respondents gave additional information including using the tool for '*Global Product Stewardship (GPS)*' and '*Japan Initiative of Product Stewardship (JIPS) risk assessment*'; '*exposure assessment in chemical risk assessment*'; '*teaching how to evaluate substances*'; '*evaluating the tool and introducing to colleagues*'; '*company risk assessment*'; '*scaling calculations*' and '*checking results against the ECETOC TRA v2*'.

3.3.2 Usability of the ECETOC TRA V3

Usability of ECETOC TRA v3 was assessed in 6 different categories (Table 3.13). For most categories the most common classification was 'easy'. For fixing a problem, both 'easy' and 'neither easy or difficult' were used with similar frequency. Learning how to use the tool was classified as 'difficult' or 'very difficult' more often than the other categories, and accessing and downloading the tool was the easiest aspect assessed, with 40% of respondents classifying this as 'very easy' and 43% as 'easy'.

Table 3.13 Usability of the ECETOC TRA v3

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading	23	25	4	5	1
Understanding the screen layout	5	25	18	9	1
Learning how to use the tool	3	21	16	16	2
Generating required tool output	3	24	20	9	2
Returning after a period of non-use	6	26	16	8	2
Fixing the problem	1	21	23	8	5

Note: 3 users did not complete this question.

Responses to the ease of use questions were compared among respondents with different levels of knowledge of the tool, different lengths of experience of occupational exposure assessment and by whether or not they used the tool for

REACH purposes. Because of small numbers, the 'very easy' and 'easy' responses were combined in these analyses, as were the 'difficult' and 'very difficult' responses, while the years worked in exposure assessment were summarised as '<4 years', '4-10 years' and 'more than 10 years'.

No differences were seen in classification of usability amongst respondents with different lengths of exposure assessment experience. In terms of 'generating the required output' and 'correcting mistakes', those who used the tool for purposes other than REACH assessment tended to find this more difficult, while respondents with only a basic knowledge of the tool found all aspects of usability more difficult (Table 3.14).

Table 3.14 Proportion of respondents classifying usability as 'difficult' or 'very difficult' by level of knowledge of the ECETOC TRA v3 (Each cell contains number *and percentage* classifying as 'difficult/very difficult').

	Level of knowledge of the tool					
	Fully understand		Good working knowledge		Unfamiliar	
	No.	%	No.	%	No.	%
Accessing and downloading	0	0%	3	9%	3	19%
Understanding the screen layout	2	20%	1	3%	7	44%
Learning how to use the tool	2	20%	4	12%	12	75%
Generating required tool output	0	0%	4	12%	7	44%
Returning after a period of non-use	1	10%	4	12%	5	31%
Fixing the problem	1	10%	5	16%	7	44%

Respondents' opinions on the help and guidance provided by the tool are summarised in Table 3.15. In relation to these functions of the tool, 43% thought that the help functions were 'helpful' or 'very helpful', with 12% classifying them as 'unhelpful' or 'very unhelpful'. For the supplementary guidance, 57% thought it was 'helpful' or 'very helpful' and 10% thought it was 'unhelpful' or 'very unhelpful'. Assessment of the helpfulness of the help functions and guidance did not differ between levels of knowledge of the tool, length of experience of exposure assessment or whether or not the tool was used for REACH purposes.

Table 3.15 Help and guidance in the ECETOC TRA v3

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
Help functions	3	22	26	6	1
Supplementary guidance	5	28	19	5	1

Twenty-three respondents made comments on the user-friendliness of the ECETOC TRA v3. Five respondents did not think the tool was very user-friendly and one added a comment that they '*did not like the layout*'. Two individuals found '*the data entry time consuming*' and four individuals thought it was '*slow*'. Some further comments on the user-friendliness of version 3 are listed below as direct quotations from the respondents

- *'Advanced user manual would help'*;
- *'Limited space for exposure scenarios'*;
- *'Labour intensive when entering scenarios'*;
- *'Report and tool are still under development. Some "bugs" have been identified and will be remedied'*;
- *'Cumbersome and complicated tool'*; and
- *'Slow on my company's network'*.

3.3.3 Using the ECETOC TRA V3

Respondents were asked whether they used the tool for dermal or inhalation exposure. In total, 48 (86%) reported that they had used v3 for dermal exposure and 55 (98%) had used the tool for inhalation exposure, with 47 of these using the tool for both exposure routes.

Table 3.16 shows the ease of translating real-life workplace exposure situations into the parameters required for the tool for both dermal and inhalation exposures. Most respondents thought this was 'easy' or 'neither easy or difficult'.

Table 3.16 Ease of translating real-life workplace exposure situations

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Dermal exposure	3	21	14	5	1
Inhalation exposure	3	25	17	5	1

Note: 4 users for dermal exposure and 4 users for inhalation exposure did not complete this question

Among those who used the tool for inhalation exposure, 73% thought it was 'important' or 'very important' that the tool appropriately overestimates exposure, 16% thought that it was 'neither important or unimportant' and 4% thought that it was 'of little importance' or 'unimportant'. The remaining 7% responded 'not applicable' to the question. Among the dermal exposure users of the tool, 71% thought that appropriate overestimation of exposures was 'important' or 'very important', 17% thought it was 'neither important or unimportant', 2% that it was 'of little importance' and 10% responded that the question was 'not applicable'.

Table 3.17 shows the distribution of respondents' views on the accuracy of the exposure estimates provided by the tool. Among the dermal exposure users of the tool, 56% think that the tool 'appropriately overestimates' exposures and among inhalation exposure users of the tool, 56% think that it 'appropriately overestimates' exposures.

Table 3.17 Users' opinions of the accuracy of exposure estimates from the ECETOC TRA v3

Route of exposure	Accuracy of exposure estimates				
	Greatly over-estimates	Appropriately overestimates	Over-estimates/ Under-estimates ¹	Under-estimates	Not applicable
Dermal	7	27	7	0	7
Inhalation	6	31	10	0	8

¹"Sometimes overestimates and sometimes underestimates"

Respondents to the survey were asked whether the ECETOC TRA v3 had fulfilled their requirements. In total, 35 (63%) said 'Yes'; 12 (21%) said 'No' and 9 (16%) answered 'Did not know'. Five respondents did not complete the question.

Twelve individuals, of whom 8 had responded that the tool did not fulfil their requirements, 3 had responded that it did fulfil their requirements and 1 had responded 'Don't know', commented on the reasons for this (Table 3.18). A further 4 individuals added additional comments including:

- *'the system becoming too sluggish to work with';*
- *'have not been able to compare outputs yet';*
- *'ECETOC is unusable by me as an easy integration into workflow is needed while producing a CSR';* and
- *'new algorithms, vapour bands and outdoor exposure are needed'.*

Table 3.18 Reasons why respondents did not feel their requirements were fulfilled by the ECETOC TRA v3. Each cell contains number of respondents (N) and % of those who provided a reason.

Reasons	Inhalation		Dermal	
	N	%	N	%
I had insufficient workplace exposure information to enter all required input parameters	4	33%	4	33%
It was unclear how to translate my workplace information into the required input parameters	2	17%	3	25%
The estimates of exposure did not seem realistic for my workplace situation	6	50%	7	58%
The estimates of exposure were unclear or ambiguous	2	17%	1	8%
I could not identify a relevant PROC code for my work task	1	8%	0	0%

Note: Table totals to more than 12 as multiple responses were permitted

Only 3 respondents had compared results from the tool for dermal exposure against actual measured data, of whom 1 said that the level of agreement was 'good' and 2 said it was 'neither good or poor'. Seventeen respondents compared measured data with tool estimates for inhalation exposures and 6 reported the agreement to be 'good', 7 to be 'neither good or poor' and 4 to be 'poor'.

Respondents to the survey were invited to identify the strengths of the ECETOC TRA v3 for inhalation exposure and 30 individuals made comments. Two individuals found

it *'more realistic than v2'*; 2 individuals commented on the fact that *'you could run several scenarios together'* and 2 individuals commented that *'it was easy to use the broad category approach'*. Further comments are available in Question 83 in the supplementary material in Appendix 2. Thirty individuals also commented on the limitations of the ECETOC TRA v3 for inhalation exposure. Three individuals thought that *'it was not a user-friendly tool'*; and 2 individuals thought *'that a stand-alone worker assessment would be useful'*. Three individuals felt *'they did not have enough experience yet to comment'*.

Respondents were invited to comment on the strengths of the ECETOC TRA v3 for dermal exposure. Two respondents found it *'easy to use'*; 2 liked the *'broad category approach'*; and 2 respondents found *'the availability of RMM an improvement'*. Respondents were asked to make comment on any limitations that they had identified when using the ECETOC TRA v3 for dermal exposure. Five respondents reported that they *did not have enough experience with the tool yet* and 2 respondents *did not find the tool as user friendly as version 2*. Two respondents commented that they *'did not have enough experience yet to answer this question'*.

The full listing of comments on the strengths and limitations reported by respondents to the survey is available in Questions 83 to 86 in the supplementary material in Appendix 2.

3.4 MEASE

3.4.1 Background information on users of MEASE

Of the survey respondents, 58 (20%) reported using MEASE. The sources of information that had led them to use MEASE are summarised in Table 3.19. For respondents who reported 'other' sources, the answers included 2 who received *'information from a supplier'*; from a *'university course'*; from *'the REACH Copper Consortium'*; *'Safety Data Sheets'*; *contact from the developer'*; *'an exposure scenario'*; *'guidance on information requirements and chemical safety assessment'* and *'a need to rework assessments performed with MEASE for REACH dossiers'*.

Table 3.19 Sources of information that led respondents to use MEASE

Source of information	No. of responses	% of responses
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc.)	21	38%
A meeting, conference, seminar, workshop etc.	15	27%
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc.)	15	27%
REACH awareness sessions or similar training	10	18%
The tool's own website, its publicity materials or training course	10	18%
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc.)	5	9%
Peer-reviewed scientific publications or papers	3	5%
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc.)	3	5%
Other (please specify)	10	18%

Note: 3 users did not complete this question; table totals to more than 55 as multiple responses were permitted

In relation to how often MEASE was used, 1 (2%) respondent reported using the tool once per week or more; 6 (11%) reported using the tool 2-3 times per month; 11 (20%) once every 2-3 months; 23 (42%) 2-3 times per year and 14 (25%) respondents reported using MEASE less than once per year. Three (5%) of respondents had used MEASE in the last week; 13 (24%) in the last month; 20 (36%) within the last 2-5 months and 19 (34%) had used MEASE over 6 months ago.

Most respondents used MEASE for REACH exposure assessments (Table 3.20). Two respondents reported using the tool for 'other' purposes: trial and evaluation of the tool and prioritising substances for workplace measurements on their site. The interviewees reiterated this in that they were using MEASE for REACH, exposure scenarios and risk identification. Furthermore, their reasons for choosing MEASE were its specificity to metals and using more metal industry data than other tools.

Table 3.20 Main purposes for which MEASE is used

Purpose	No. of responses	% of responses
For REACH exposure assessments	39	77%
To determine compliance with an occupational exposure limit	17	33%
To assist in the identification of risk management measures	11	22%
Other (please specify)	2	4%

Note: 7 users did not complete this question; table totals to more than 51 as multiple responses were permitted

3.4.2 Usability of the MEASE tool

Usability of MEASE was assessed across 6 different categories (Table 3.21). For all of the categories, with the exception of accessing and downloading the tool, the most common classification was 'easy'. Accessing and downloading, was classified by more than half of the respondents as 'very easy'. The 'difficult' and 'very difficult' classifications were seldom used for any of the categories.

This was similar to responses from the interviewees, who reported that the computer interface was *'easy to use with everything available in one spread sheet'*. In addition, interviewees thought it useful that *'when tool parameters were changed, the impact was visible immediately'*.

Table 3.21 Usability of MEASE

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading	38	9	4	0	0
Understanding the screen layout	21	24	4	2	0
Learning how to use the tool	11	27	10	2	1
Generating required tool output	11	22	16	2	0
Returning after a period of non-use	13	25	10	3	0
Fixing the problem	9	23	18	1	0

Note: 7 users did not complete this question.

Responses to the ease of use questions were compared among respondents with different levels of knowledge of the tool, different levels experience of occupational exposure assessment and by whether or not they used the tool for REACH purposes. Because of small numbers, the 'difficult', 'very difficult' and 'neither easy or difficult' responses were combined in the analyses, while the years worked in exposure assessment were summarised as '<4 years', '4-10 years' and 'more than 10 years'.

There was no difference in the classification of the usability of MEASE between respondents with different years of exposure assessment experience. Differences between those who used the tool for REACH purposes or not were only apparent for fixing a problem after making a mistake, where 23% of those who used the tool for REACH reported this as 'very easy' compared to none of those who did not use the tool for REACH purposes.

Respondents with a more basic knowledge of the MEASE tool were generally less likely to classify the usability as 'very easy' or 'easy', compared to respondents with a better knowledge of the tool (Table 3.22).

Table 3.22 Proportion of respondents classifying usability as ‘very easy’ or ‘easy’ by level of knowledge of MEASE. (Each cell contains number *and* percentage classifying as ‘very easy/easy’).

	Fully understand		Good working knowledge		Unfamiliar	
	No.	%	No.	%	No.	%
Accessing and downloading	13	100%	23	92%	11	85%
Understanding the screen layout	13	100%	24	96%	8	62%
Learning how to use the tool	13	100%	20	80%	5	38%
Generating required tool output	11	85%	17	68%	5	38%
Returning after a period of non-use	12	92%	21	84%	5	38%
Fixing the problem	11	85%	16	64%	5	38%

Respondents’ opinions on the help and guidance functions of the tool are summarised in Table 3.23. Most respondents found the help and guidance ‘helpful’ followed by “neither helpful or unhelpful”. No differences were seen in the assessment of the help and guidance by years of experience in exposure assessment, level of knowledge of the tool or whether or not it was used for REACH purposes.

Table 3.23 Help and guidance in MEASE

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
Help functions	6	26	18	0	1
Supplementary guidance	5	26	15	4	1

Note: 7 users did not complete this question.

Interviewees also used the available help sources including the provided documentation and glossary. It was stated in the interviews that these were ‘easy to locate’ and the ‘links to associated publications were also useful’.

Respondents were invited to make any additional comments with regard to the user-friendliness of MEASE. Three respondents found the tool ‘straightforward and easy to use’ but one additionally commented that they were ‘unclear on the foundations of the tool’.

Two respondents commented on ‘only being able to evaluate one substance at a time’ with additional comments from 1 individual who added that because of this it can be ‘time consuming to do a complete risk assessment’. Furthermore, 2 individuals commented that the ‘guidance was helpful and easy to use but they would have liked more detailed documentation on how the calculations were carried out’.

Further open comments on the user-friendliness of MEASE included 1 individual *'liking the colour coding for relevance'*; 1 individual who found it *'difficult to understand the applicability domain and to identify differences to ECETOC and EASE'*.

The interview data confirmed some of these positive comments, including comments about the *'interface being easy to use'*, *'everything being available in one spreadsheet'* and *'any parameter changes being visible immediately'*.

3.4.3 Using MEASE

In total 33 (70% of those who had used the tool) had used the MEASE tool for dermal exposure and 43 (92%) had used the tool for inhalation exposure. Table 3.24 shows the ease of translating real-life workplace exposure situations into the parameters required for the tool for both dermal and inhalation exposures. Most respondents thought this was 'easy' or 'neither easy or difficult'.

Table 3.24 Ease of translating real-life workplace exposure situations

Route of exposure	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Not Applicable
Dermal exposure	1	17	13	1	1	
Inhalation exposure	4	20	14	3	1	1

Among those who used the tool for inhalation exposure, 63% thought it was 'important' or 'very important' that the tool appropriately overestimates exposure, 31% thought that it was 'neither important or unimportant' and 7% thought that it was 'of little importance' or 'unimportant'. Among the dermal exposure users of the tool, 61% thought that appropriate overestimation of exposures was 'important' or 'very important', 33% thought it was 'neither important or unimportant', 6% that it was 'unimportant'.

Table 3.25 shows the distribution of respondents' views on the accuracy of the exposure estimates provided by the tool. Among the dermal exposure users of the tool, 45% think that the tool 'appropriately overestimates' exposures and among inhalation exposure users of the tool 60% think that it 'appropriately overestimates' exposures.

Table 3.25 Users' opinions of the accuracy of exposure estimates from MEASE

Route of exposure	Accuracy of exposure estimates				
	Greatly over-estimates	Appropriately overestimates	Over-estimates/ Under-estimates ¹	Under-estimates	Not applicable
Dermal	3	15	12	2	1
Inhalation	5	26	11	1	0

¹Sometimes overestimates and sometimes underestimates'

Respondents were asked whether MEASE had fulfilled their requirements. Twenty-eight (62%) said that it had; 9 (20%) said that it had not and 8 (18%) said that they didn't know. Eleven respondents provided information on whether or not MEASE fulfilled their requirements, of whom 9 had responded that the tool did not fulfil their requirements and 2 responded that it did fulfil their requirements. The responses are presented in Table 3.26. Other reasons reported by respondents included the '*dermal challenge estimates being well below published values in peer-reviewed journals*'; '*insufficient information about definitions and influence of options*' and a '*lack of discussion about the commonalities and differences with the ECETOC TRA tool*'.

Table 3.26 Reasons why respondents did not feel their requirements were fulfilled by MEASE. Each cell contains number of respondents (N) and % of those who provided a reason.

Reasons	Inhalation		Dermal	
	N	%	N	%
I had insufficient workplace exposure information to enter all the required input parameters	2	18%	1	9%
It was unclear how to translate my workplace information into the required input parameters	2	18%	2	18%
The estimates of exposure did not seem realistic for my workplace situation	5	45%	4	36%
The estimates of exposure were unclear or ambiguous	4	36%	2	18%
I could not identify a relevant PROC code for my work task	3	27%	1	9%

Note: Table totals to more than 11 as multiple responses were permitted

Twenty-five respondents had compared results from the tool against measured data for inhalation exposure, of whom 8 thought the agreement was 'good', 6 that it was 'neither good or poor', 9 that it was 'poor' and 2 that it was 'very poor'. For dermal exposure, 7 respondents had compared tool results to measured exposure and of these, 3 thought the agreement was 'good', 2 that it was 'neither good or poor', and 2 that it was 'poor'.

Respondents to the survey were asked to comment on the strengths of MEASE for inhalation exposure, and comments were provided by 23 individuals. Eight individuals thought that it was *easy to use* with the *quickness of use* being commented upon by 3 individuals and 1 commented on '*having to input only a few parameters from occupational conditions*'. Three respondents commented that the '*results were reliable*' and a '*good estimation of exposure when compared with sampled data*'. Two further comments were that it was a '*reasonably conservative estimate of exposure*'. Further individual comments are listed in Table A2.23 in the supplementary material in Appendix 2.

The interview data identified that the main strength was the '*simplicity of the spread sheet layout making it straightforward to use*'. A particular strength highlighted during the interviews was the '*visual representation of changes to exposure made when modifying parameters*'.

When asked to comment further on the limitations of the MEASE tool for inhalation exposure, 19 respondents provided responses, of whom 4 thought that '*over-estimation*' was a problem. There were further varied comments with regard to this tool with 2 respondents finding it '*limited*' and 1 further commenting that there was '*limitation in being able to adjust input parameters and exposure modifiers for example, the outdoor setting*'. One further respondent mentioned that the '*refinement methods and detailed entry conditions were also limited but that this is the same for all Tier 1 tools and is fine for generic assessment*'. Further limitations identified included the fact that '*only one substance at a time could be assessed*' and '*it was not useful in predicting a mixture of exposures*'.

The comparison of predictions against measured data was raised by 3 respondents. The first identified that '*results under-predicted exposure when compared to measured values*'; the second commented that '*it was unclear to what extent measured values had been used to establish exposure values*'; and the third suggested that the tool could be improved by '*populating the database behind MEASE with additional data*'. One further respondent reported that there were '*under-estimations for compounds other than metal salts/oxides in a liquid state*'. It was also noted that predictions from the tool were '*within 30% of measured values when a comparison had been made with measured exposure data*'.

Two respondents mentioned the commonalities and differences between MEASE and the ECETOC TRA tool as they are closely related. One further comment was that it '*should be highlighted when it was recommended to use MEASE rather than ECETOC TRA*'. Further limitations reported by respondents are available in the supplementary material to this report in Appendix 2.

The responses from the interviews identified limitations relating to '*dermal exposure and overestimates of exposure when there were not enough determinants*'. Furthermore, it was perceived to be a '*simplistic view of inhalation exposure* by one interviewee'. A further concern raised was that the '*interviewees had the knowledge and experience to manually add or change specific parameters within the tool but less experienced users may not*'. A suggested improvement was the '*ability to add values of your own as well as having the default ranges*'.

3.5 EMKG-EXPO-TOOL

3.5.1 Background information on users of the EMKG-EXPO-TOOL

Fifty respondents to the survey (18%) reported using the EMKG-EXPO-TOOL. The main sources of information that first led them to use the tool are presented in Table 3.27, with respondents most commonly using information on legislation, REACH awareness sessions and meetings, conferences etc. The individual who selected the category 'other', reported that they had received information from BAuA with regard to the tool.

The interviewees reported that they had become aware of the tool through ECHA and REACH guidance documents, where it is listed as one of the screening tools.

Table 3.27 Sources of information that led respondents to use the EMKG-EXPO-TOOL

Source of information	No. of responses	% of responses
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc.)	25	53%
REACH awareness sessions or similar training	18	38%
A meeting, conference, seminar, workshop etc.	16	34%
The tool's own website, its publicity materials or training course	8	17%
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc.)	5	11%
Peer-reviewed scientific publications or papers	2	4%
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc.)	2	4%
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc.)	2	4%
Other (please specify)	1	2%

Note: 3 users did not complete this question; table totals to more than 47 as multiple responses were permitted

Two (4%) respondents reported using the tool once a week or more; 3 (6%) reported using the tool 2-3 times per month; 6 (13%) of respondents reported using the EMKG-EXPO-TOOL once every 2-3 months; 15 (32%) reported using the tool 2-3 times per year and 21 (45%) reported using the tool less than once per year.

Almost half of respondents, 23 (49%), reported last using the tool over 6 months ago, with 14 (30%) using the tool in the last 2-5 months, 8 (17%) using the tool in the last month and two (4%) of respondents using the tool in the last week.

The main purposes for which individuals used the EMKG-EXPO-TOOL are presented in Table 3.28. Most respondents used the tool for REACH exposure assessments followed by the identification of risk management measures. For individuals who responded with 'other', the reasons given were '*GPS risk assessment*'; '*to estimate occupational exposures*' (2 respondents); '*comparison with other tools, to fill gaps for not yet registered substances*'; '*pre-screening*'; '*educational purposes*'; '*research purposes*'; '*to test it for REACH exposure assessment*' and one individual who reported not using the tool any longer.

Table 3.28 Main purposes for which the EMKG-EXPO-TOOL is used

Purpose of use	No. of responses	% of responses
For REACH exposure assessments,	21	48%
To assist in the identification of risk management measures	15	34%
To determine compliance with an occupational exposure limit	12	27%
Other (please specify)	10	23%

Note: 6 users did not complete this question; table totals to more than 44 as multiple responses were permitted

The interview data identified that the main purposes that the interviewees used the tool for were risk assessments, risk management measure implementation, as a first screening tool and as a comparison for other tools. The interviewees identified that they chose EMKG-EXPO-TOOL as it was '*quick and easy to use*'.

3.5.2 Usability of the EMKG-EXPO-TOOL

Respondents were asked how easy they felt the tool was to use in 6 different categories. The responses are summarised in Table 3.29. For all of the 6 categories the most common response was 'easy'.

Table 3.29 Usability of the EMKG-EXPO-TOOL

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading	16	24	4	0	0
Understanding the screen layout	5	28	10	1	0
Learning how to use the tool	6	23	13	2	0
Generating required tool output	3	28	11	2	0
Returning after a period of non-use	4	30	9	1	0
Fixing the problem	4	27	11	2	0

Note: 6 users did not complete this question.

Responses to the ease of use questions were compared among respondents with different levels of knowledge of the tool, different levels experience of occupational exposure assessment and by whether or not they used the tool for REACH purposes. In these analyses, the 'difficult', 'very difficult' and 'neither easy or difficult' responses were combined because of the small numbers of responses and the 'easy' and 'very easy' categories were similarly combined. For years of experience in occupational exposure assessment, three subgroups were used 'less than 4 years', '4-10 years' and 'more than 10 years'.

There was no evidence of any difference in the assessment of usability between respondents with different lengths of experience in exposure assessment, or between those who used the tool for REACH purposes and those using it for other purposes. All respondents with an expert level of knowledge of the tool reported that all usability categories were 'easy' or 'very easy' compared to 43% to 86% across the six categories for those with a basic level of knowledge and 70% to 91% among those with an intermediate level of knowledge.

The interviewees also identified the tool as having a '*straightforward to use computer interface with simple input requirements e.g. only requiring temperature or boiling point for liquids*'. In addition, there were no problems or conflicts regarding installation of the tool or software problems.

The help function of the EMKG-EXPO-TOOL was found to be 'helpful' by 43% of respondents and 'neither helpful or unhelpful' by 34% of respondents; 14% found it

'very helpful' and 9% found the help function to be 'very unhelpful'. Assessment of the help function did not differ significantly by experience of occupational exposure assessment, use for REACH purposes or level of knowledge of the tool. Furthermore, the interviewees identified that the '*explanatory text was helpful in understanding how the tool worked*'.

Nine respondents to the survey added additional comments on the user-friendliness of the EMKG-EXPO-TOOL. Three individuals thought that the tool was '*too simple*' or '*of limited use for REACH assessments*'. One individual had stopped using the tool as it was *not 'precise enough'*. Further comments quoted directly from respondents are listed below:

- '*Practical tool for shop floor assessment*';
- '*Not possible to keep records in excel sheet, have to use another file*';
- '*In German not easy to use*';
- '*Cannot refine assumptions within the tool*';
- '*Would be better if it shows a link to CGS website*'; and
- '*Easy to use but not as robust as other models/ tools*'.

3.5.3 Using the EMKG-EXPO-TOOL

Of the 50 respondents who had used the EMKG-EXPO-TOOL, 44 ranked how easy it was to translate real-life exposure situations into the required EMKG parameters. Nineteen (43%) reported that this was easy, 16 that it was 'neither easy or difficult', and 9 that it was 'Difficult'. This assessment did not vary by length of experience, purpose of use or level of knowledge of the tool.

Among those who used the tool, 70% thought it was 'important' or 'very important' that the tool appropriately overestimates exposure, 20% thought that it was 'neither important or unimportant' and 9% thought that it was 'of little importance' or 'unimportant'.

Table 3.30 shows the distribution of respondents' views on the accuracy of the exposure estimates provided by the tool. Overall, 59% think that the tool 'greatly' or 'appropriately overestimates' exposures.

Table 3.30 Users' opinions of the accuracy of exposure estimates from the tool

Route of exposure	Accuracy of exposure estimates				
	Greatly over-estimates	Appropriately over-estimates	Over-estimates/ Under-estimates ¹	Under-estimates	Not applicable
Inhalation	10	16	16	2	0

¹Sometimes overestimates and sometimes underestimates'

Note: 6 users did not complete this question.

Interviewees were also asked about accuracy and precision within the interview and as a screening tool, EMKG-EXPO-TOOL was stated as '*being accurate and precise*'. Interestingly, and in apparent contradiction to this, interviewees also said that '*it was*

very conservative and it was felt to *generate much higher estimates than other tools*. Furthermore, interviewees commented that it was a *good tool but clients might find they have to implement many RMM but those familiar with the tool would appreciate its role as a screening tool*.

Respondents to the survey were asked if the EMKG-EXPO-TOOL fulfilled their requirements. Nineteen (43%) said 'Yes'; 22 (50%) said 'No' and 3 (7%) respondents said that they 'Did not know'. Twenty respondents who thought the tool did not fulfil their requirements provided the further information presented in Table 3.31. Three individuals who responded with 'other' provided additional comments, which were: *'substances in complex mixtures are not appropriately reflected'*; *'not task based and mainly because the tool is too basic for REACH purposes'*.

Table 3.31 Reasons why respondents did not feel that the EMKG-EXPO-TOOL fulfilled their requirements. Each cell contains number of respondents (N) and % of those who provided a reason.

Reasons	No. of responses	% of responses
The estimates of exposure did not seem realistic for my workplace situation	10	50%
It was unclear how to translate my workplace information into the required input parameters	9	45%
The estimates of exposure were unclear or ambiguous	6	30%
I had insufficient workplace exposure information to enter all required input parameters	4	20%

Note: Table totals to more than 20 as multiple responses were permitted

Thirteen respondents had compared results from the EMKG-EXPO-TOOL with measured exposures – 6 found the agreement to be 'good', 4 found it to be 'neither good or poor' and 3 found it to be 'poor'.

Respondents were asked for open comments in relation to the strengths of the EMKG-EXPO-TOOL and 27 individuals provided responses. In summary, 16 respondents thought the tool was *'easy to use'*; 3 thought it was *'quick to achieve results'*; and 2 individuals stated that it *'made a conservative or overestimate of exposure'*. A full listing of the comments made on the strengths of the tool is available in Question 43 in the supplementary material in Appendix 2.

The interview data also provided insight into the strengths of the EMKG-EXPO-TOOL where its simplicity of operation and ability to give a quick overview were seen as positive.

In relation to the opinions on the limitations of the EMKG-EXPO-TOOL, 22 people responded to the question, of whom 4 commented on the fact that it *'only covered inhalation exposure'* and *'the lack of dermal exposure was not useful'*. This was expanded by a respondent who commented that *'as dermal exposure is not covered; why not use another tool that covers both'*. Further comments related to the thoroughness of the tool in that it *'did not appear to precise enough'*; it was *'too basic*

for REACH exposure with no possibility for refinement'; and the 'range of exposure predictions being too wide causing over-estimation' (2 respondents). Further comments addressed the limitations of the inputs, and the fact that the situations were 'generic and unrealistic'. A full list of comments made by respondents is available in Question 44 in the supplementary material in Appendix 2.

The responses from the interview identified that as well as seeing its simplicity as a strength, some also saw it as a potential weakness. However, it was pointed out that 'if the tool was made more complex it would replicate other available tools'.

3.6 STOFFENMANAGER version 4.5

3.6.1 Background information on users of STOFFENMANAGER v 4.5

Eighty-seven respondents to the survey (39%) reported using STOFFENMANAGER. The main sources of information that had first led them to STOFFENMANAGER are summarised in Table 3.32, with most quoting 'a meeting, conference etc'. or 'information on legislation'. Eight individuals who completed the 'other' category identified that they had been informed about STOFFENMANAGER through the 'government' (2), 'customers and colleagues' (2), 'education on occupational health', 'search for exposure evaluation tools', 'involvement in the development of the tools' and 'that it is a well-known programme'.

Table 3.32 Sources of information that led respondents to use STOFFENMANAGER

Source of information	No. of responses	% of responses
A meeting, conference, seminar, workshop etc.	37	44%
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc.)	33	39%
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc.)	26	31%
The tool's own website, its publicity materials or training course	22	26%
REACH awareness sessions or similar training	21	25%
Peer-reviewed scientific publications or papers	11	13%
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc.)	10	12%
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc.)	5	6%
Other (please specify)	8	9%

Note: 3 users did not complete this question. Table totals to more than 84 as multiple responses were permitted

Nine (11%) respondents reported using STOFFENMANAGER once a week or more, 20 (24%) reported using the tool 2-3 times per month, 18 (21%) reported using it every 2-3 months, 26 (31%) reported using STOFFENMANAGER 2-3 times per year and 11 (13%) reported using the tool less than once per year. The survey then asked when respondents had most recently used STOFFENMANAGER. Seven (9%) stated

that they had used STOFFENMANAGER in the last week; 24 (30%) had used the tool in the last month; 30 (37%) had used the tool in the last 2-5 months and 20 (25%) had last used STOFFENMANAGER over 6 months ago.

Table 3.33 presents the main purposes for which respondents used STOFFENMANAGER. Around half of respondents used it for REACH exposure assessments. Responses from respondents who completed the 'other' category are listed below:

- *'Testing the programme to find out how it works';*
- *'To assess the usefulness of the tool';*
- *'Evaluation with corporate tool';*
- *'Use it to teach students';*
- *'Exposure estimates';*
- *'As part of a workshop to learn the tool';*
- *'Register the use of hazardous materials';*
- *'To gain experience';*
- *'In consulting and training';*
- *'As part of a workshop to learn the tool';*
- *'For research';*
- *'CMR registrations';* and
- *'To translate received information into ECETOC terms'.*

Table 3.33 Main purposes for which STOFFENMANAGER is used

Purpose of use	No. of responses	% of responses
For REACH exposure assessments,	41	51%
To determine compliance with an occupational exposure limit	31	38%
To assist in the identification of risk management measures	29	36%
Other (please specify)	15	19%

Note: 6 users did not complete this question; table totals to more than 81 as multiple responses were permitted

During the interviews, individuals were asked why they chose STOFFENMANAGER over other available tools. The reasons given were its *'ease of availability'* and the *'facility to refine parameters which is not available in other tools'*.

3.6.2 Usability of STOFFENMANAGER

The respondents' assessment of the usability of STOFFENMANAGER is summarised in Table 3.34 for the 6 usability categories. In most of the categories, the most frequent responses were 'easy' or 'neither easy or difficult', with the exception of 'accessing and downloading' the tool, where the most frequently used categories were 'easy' and 'very easy'.

Table 3.34 Usability of STOFFENMANAGER

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading	28	36	10	7	0
Understanding the screen layout	12	35	21	12	1
Learning how to use the tool	7	24	28	21	1
Generating required tool output	11	21	30	17	2
Returning after a period of non-use	7	34	26	13	1
Fixing the problem	8	27	29	14	3

Note: 6 users did not complete this question.

Responses to the ease of use questions were compared among respondents with different levels of knowledge of the tool, different levels of experience of occupational exposure assessment and by whether or not they used the tool for REACH purposes. Because of small numbers, the 'very difficult' and 'difficult' responses were combined in these analyses, while the years worked in exposure assessment were summarised as 'less than 4 years', '4-10 years' and 'more than 10 years'.

No differences were seen in classification of usability by respondents with different lengths of exposure assessment experience, or those using the tool for REACH purposes compared to other purposes, except for 'fixing the problem' after making a mistake which those with shorter exposure experience found more difficult. Respondents with only a basic knowledge of the tool found usability more difficult across all six categories, with the differences being statistically significant in four categories (access, generating output, returning after non-use and fixing the problem) (Table 3.35).

Table 3.35 Proportion of respondents classifying usability as 'difficult' or 'very difficult' by level of knowledge of the tool. (Each cell contains number *and* percentage classifying as 'difficult/very difficult').

	Fully understand		Good working knowledge		Unfamiliar	
	No.	%	No.	%	No.	%
Accessing and downloading	0	0%	3	8%	4	16%
Understanding the screen layout	1	6%	6	15%	6	24%
Learning how to use the tool	4	24%	9	23%	9	36%
Generating required tool output	1	6%	6	15%	12	48%
Returning after a period of non-use	2	12%	2	5%	10	40%
Fixing the problem	3	18%	5	13%	9	36%

Around half of respondents found the help functions ‘helpful’ and 11% found them ‘very helpful’ (see Table 3.36). Only 5% found them ‘unhelpful’ or ‘very unhelpful’. Similar responses were seen for the supplementary guidance – 46% ‘helpful’, 14% ‘very helpful’, 6% ‘unhelpful’ or ‘very unhelpful’. Respondents with a more basic knowledge of the tool were less likely to find the help functions and guidance ‘helpful’ or ‘very helpful’ than those with higher levels of knowledge. No differences in assessment of help and guidance were seen between respondents with different lengths of exposure assessment experience or those using it for REACH compared with other purposes.

Table 3.36 Help and guidance in STOFFENMANAGER

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
Help functions	9	41	27	2	2
Supplementary guidance	11	37	28	3	2

The interviewees reported using the user guides on the web and the guidance provided within the entry templates and they were noted as being helpful and making input requirements clear. Furthermore, the online documentation and guidance was noted as being helpful. Full details of the comments made by interviewees are available in Appendix 4.

Respondents were asked for further comments on the usability of STOFFENMANAGER. Twenty respondents provided comments of whom 1 reported ‘difficulties in understanding how it worked’ and 2 commented on the tool’s learnability in that that it ‘takes time to learn’ and ‘experience makes it easier’. Further comments made by respondents are available in Question 95 in the supplementary material in Appendix 2.

The interviewees reported that they had no problems with using the tool and had identified no software conflicts. They also noted that the computer interface was ‘easy to use’.

3.6.3 Using STOFFENMANAGER

Most respondents had found it ‘easy’ (47%) to translate real-life workplace exposure situations into the required input parameters, with 32% finding it ‘neither easy or difficult’, 17% finding it ‘difficult’, 2% ‘very difficult’ and 1% ‘very easy’. Respondents with a more basic knowledge of the tool were more likely to find the translation of real-life exposure situations ‘difficult’ or ‘very difficult’ (28%) compared to those with an intermediate knowledge of the tool (20%) or an expert knowledge of the tool (6%). This assessment did not vary by length of experience or purpose of use of the tool. From the interview data, interviewees suggested that ‘low and high pressure input parameters were not easy to find’ and ‘REACH systematics are a problem’.¹

¹ We are not entirely sure what is meant with this comment, although we think it refers to the REACH use descriptors system (e.g. PROC codes)

Among those who used the tool, 72% thought it was 'important' or 'very important' that the tool appropriately overestimates exposure, 25% thought that it was 'neither important or unimportant' and 4% thought that it was 'of little importance' or 'unimportant'.

Table 3.37 shows the distribution of respondents' views on the accuracy of the exposure estimates provided by the tool. Overall, 58% think that the tool 'appropriately overestimates' exposures.

Table 3.37 Users' opinions of the accuracy of exposure estimates from STOFFENMANAGER

Route of exposure	Accuracy of exposure estimates				Not applicable
	Greatly over-estimates	Appropriately over-estimates	Over-estimates/ Under-estimates ¹	Under-estimates	
Inhalation	7	47	26	1	0

¹Sometimes overestimates and sometimes underestimates'

Note: 6 users did not complete this question.

This mirrored the data from the interviewees, who noted that the tool generated '*more or less conservative estimates*'. Although both interviewees mentioned concerns with the precision and accuracy of the predictions, they did feel that the tool fulfilled their expectations.

Within the questionnaire, respondents were also asked whether the tool fulfilled their requirements. Fifty-two (64%) respondents said that it had; 17 (21%) said that it had not and 12 (15%) didn't know. Table 3.38 shows the reasons given for why STOFFENMANAGER did not fulfil users' requirements. These were provided by 18 respondents, of whom 17 had responded that the tool did not fulfil their requirements and 1 had responded that it did fulfil their requirements. A further 4 respondents who had ticked the category 'other' gave additional information, including 1 who said '*they could not use the tool*'; 1 who commented that the exposure is '*highly overestimated*'; 1 respondent who commented that the tool is '*designed for individual workplaces and it is difficult to use for a large group of users*'; and 1 who commented that '*translating the inputs into simple outputs for communication is not straightforward*'.

Table 3.38 Reasons why respondents did not feel that STOFFENMANAGER fulfilled their requirements. Each cell contains number of respondents (N) and % of those who provided a reason.

Reasons	No. of responses	% of responses
It was unclear how to translate my workplace information into the required input parameters	8	44%
I had insufficient workplace exposure information to enter all required input parameters	6	33%
The estimates of exposure did not seem realistic for my workplace situation	6	33%
I could not identify a relevant activity class for my work task	5	28%
The estimates of exposure were unclear or ambiguous	2	11%

Note: Table totals to more than 18 as multiple responses were permitted

Thirty-eight respondents had compared the results obtained from STOFFENMANAGER against actual measured data, of whom 22 thought the level of agreement was 'good', 9 that it was 'neither good or poor', 5 that it was 'poor', 1 that it was 'very good' and 1 that it was 'very poor'.

Respondents to the survey were asked what they thought the strengths of STOFFENMANAGER were. Forty-six respondents commented on this and the main comments have been summarised. Eleven individuals commented on the ease of use of the tool and further comments included the tool making it easy to make forms and manage storage, that it was web based and the colour coding of the ranking made it easier to prioritise, although it is not clear what is meant here regarding colours in the REACH version. Two further individuals commented that it was easy to access the tool. The input parameters were mentioned by 3 respondents in that there were more required compared to other tools, were relevant for exposure assessment, were detailed taking into account control measures and allowed a quick general assessment if the input parameters were satisfied. Two further comments on the tool were that it was '*clear on the input parameters*' and '*sensitive to a range of parameters*'.

The ability to assess a multi-component product was welcomed as was being able to fine-tune within one scenario. Two further respondents commented on the speed of the tool, one commenting that it was a '*quick general assessment*' and a second that it was '*quick to get a judgement as to whether more attention should be given to a particular exposure*'. Comments were also made by 2 people that it was '*clear on the input*'.

The fact that the outcomes of STOFFENMANAGER were accepted by the Dutch Labour Inspectorate was seen as a strength by one individual; a further 2 saw its strength as being written in Dutch; although it is also available in English and German.

Further relevant comments made by respondents to the survey are available in the supplementary material shown in Appendix 2.

The data from the interview on the strengths of STOFFENMANAGER highlighted its 'ease of use', the results show percentiles and the fact that it allows the user to explore a situation with different options. In addition, one interviewee found the ability to link the task options with real-life situations as a strength. Finally, the guidance was seen as helpful and the tool easy to learn.

Respondents were invited to make comments on the limitations of STOFFENMANAGER. Six respondents thought that PROC alignment was important and should be present in the tool. The over-estimation of exposure was raised by 3 respondents, who thought this was a limitation with one suggesting that this should be limited but this would result in a more complex tool. One respondent felt that under-estimation (specifically for closed systems) was an issue. Two further respondents commented on the usefulness of translating STOFFENMANAGER into other languages, although it is available currently in Dutch, English and German.

The effort required to enter data and other parameters was mentioned as a limitation by 5 respondents. Additional comments in relation to this were the '*difficulty of finding the physico-chemical properties of components*'; '*filling in the database taking a lot of time*'; and the perception that it should be '*possible to start before entering substances in the library as people give up before they start*'.

Two further respondents commented on the lack of a dermal module within the programme and saw this as a limitation.

In relation to usability issues, one individual commented that the layout was difficult to manage with additional comments that there was a need to '*simplify the screens*' and to '*make exporting of results less difficult*'. The experience of the user was also mentioned by 2 respondents, who highlighted the '*need for professional judgement at several points*' and that '*it was easy to make mistakes*'.

A complete list of additional comments made by respondents to the survey is available in the supplementary material in Appendix 2.

3.7 RISKOFDERM

3.7.1 Background information on users of RISKOFDERM

Of the survey respondents, 51 (24%) reported using RISKOFDERM. The main sources of information that led respondents to use RISKOFDERM are presented in Table 3.39, with more than half of respondents using information on legislation. For individuals who responded with 'other', their comments included '*GPS*', '*in the course of performing exposure assessments for biocides*' and two individuals who had '*taken part in a project*'.

Table 3.39 Sources of information that led respondents to use RISKOFDERM

Source of information	No. of responses	% of responses
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc.)	26	55%
REACH awareness sessions or similar training	15	32%
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc.)	13	28%
A meeting, conference, seminar, workshop etc.	12	26%
Peer-reviewed scientific publications or papers	5	11%
The tool's own website, its publicity materials or training course	5	11%
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc.)	3	6%
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc.)	1	2%
Other (please specify)	4	8%

Note: 4 users did not complete this question; table totals to more than 47 as multiple responses were permitted

Respondents were then asked how frequently they used the tool. No respondents reported using the tool once a week or more; 4 (8%) respondents reported using the tool 2-3 times per month; 11 (23%) of respondents reported using RISKOFDERM once every 2-3 months; 15 (32%) reported using the tool 2-3 times per year and 17 (36%) reported using RISKOFDERM less than once a year. Three respondents (6%) reported using RISKOFDERM in the last week; 7 (15%) reported using the tool in the last month; 14 (30%) reported using the tool in the last 2-5 months and 23 (49%) respondents reported last using the tool over 6 months ago.

Table 3.40 summarises the main purposes for using RISKOFDERM, with most respondents using it for REACH purposes. Of the 4 respondents who ticked the 'other' category, 3 used RISKOFDERM for biocide exposure assessment and 1 for consultations and training. The interviewees reported using RISKOFDERM for '*REACH assessment*'; '*to check estimates from other tools*'; and '*at the specific request of a client*'.

Table 3.40 Main purposes for which RISKOFDERM is used

Purpose of use	No. of responses	% of responses
For REACH exposure assessments	30	64%
For quantitative risk assessments	14	30%
To assist in the identification of risk management measures	12	26%
Other (please specify)	4	9%

3.7.2 Usability of RISKOFDERM

Respondents were asked how easy they felt the tool was to use in 6 different categories. The responses are summarised in Table 3.41. For all 6 categories, the most common response was 'easy'.

Table 3.41 Usability of RISKOFDERM

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading	6	26	12	2	1
Understanding the screen layout	5	22	18	2	0
Learning how to use the tool	4	22	13	7	1
Generating required tool output	2	21	17	7	0
Returning after a period of non-use	4	23	15	5	0
Fixing the problem	4	21	18	4	0

Note: 4 users did not complete this question.

Responses to the ease of use questions were compared among respondents with different levels of knowledge of the tool, different levels experience of occupational exposure assessment and by whether or not they used the tool for REACH purposes. In these analyses, the 'difficult' and 'very difficult' responses and the 'easy' and 'very easy' categories were combined because of small numbers of responses in some categories. For years of experience in occupational exposure assessment, three subgroups were used 'less than 4 years', '4-10 years' and 'more than 10 years'.

There was no evidence of any difference in the assessment of usability between respondents with different lengths of experience in exposure assessment, between those who used the tool for REACH purposes and those using it for other purposes or between respondents with different knowledge levels of the tool.

No installation problems were reported by the interviewees but they did mention an issue with initially locating the tool, as it is not easily available on the internet. One further issue mentioned during interview was the tool '*returning to default settings on each exit*' and '*going to a different security setting*'.

The help function of RISKOFDERM was found to be 'helpful' by 57% of respondents and 'neither helpful or unhelpful' by 38% of respondents (See Table 3.42). No one found it 'very helpful' and 2% each found the help function to be 'unhelpful' or 'very unhelpful'. For the supplementary guidance, 51% found it 'helpful', 40% 'neither helpful or unhelpful', and 4% each found the guidance 'unhelpful' or 'very unhelpful'. Assessment of the help functions and supplementary guidance did not differ significantly by experience of occupational exposure assessment, use for REACH purposes or level of knowledge of the tool. The interviewees reiterated this and found the guidance provided within the spreadsheet '*helpful but was not required after reading the initial guidance*'.

Table 3.42 Help and guidance in RISKOFDERM

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
Help functions	0	27	18	1	1
Supplementary guidance	0	24	19	2	2

Further open comments in relation to the user-friendliness of RISKOFDERM included 1 individual who reported it was '*hard to find*'; 1 person who commented that it was '*not self-explanatory*'; 1 who found it a '*reasonably simple tool*'; 1 person who thought '*it would be usable if you were familiar with Excel*'; 1 comment describing the layout as '*chaotic*' and 1 person who found that there was '*a lot of information required to carry out exposure assessments*'.

3.7.3 Using RISKOFDERM

Of the 51 respondents who had used RISKOFDERM, 47 ranked how easy it was to translate real-life exposure situations into the required tool parameters. Twelve (25%) reported that this was 'easy', 25 that it was 'neither easy or difficult', 8 that it was 'difficult' and 2 that it was 'very difficult'. Respondents with 0-3 years' exposure assessment experience were more likely to assess this as 'easy' (53%) compared to those with 4-10 years' experience (12%) or more than 10 years' experience (13%). This assessment did not vary by purpose of use of the tool or level of knowledge of the tool. The interviewees reported finding the translation of real-life work exposures into the input parameters '*easier than for other tools*'.

Among those who used the tool, 72% thought it was 'important' or 'very important' that the tool appropriately overestimates exposure, 25% thought that it was 'neither important or unimportant' and 2% thought that it was 'unimportant'.

Table 3.43 shows the distribution of respondents' views on the accuracy of the exposure estimates provided by the tool. Overall, 42%% think that the tool 'appropriately overestimates' exposures.

Table 3.43 Users' opinions of the accuracy of exposure estimates from the tool

Route of exposure	Accuracy of exposure estimates				Not applicable
	Greatly over-estimates	Appropriately over-estimates	Over-estimates/ Under-estimates ¹	Under-estimates	
Dermal	8	20	19	0	0

¹Sometimes overestimates and sometimes underestimates'

Note: 4 users did not complete this question.

Proportionally more of the respondents who use the tool for REACH purposes think the tool 'appropriately overestimates' exposures (57%), compared to those who use it for other purposes (18%). The interviewees reported that they had no concerns regarding the precision and accuracy of the predicted exposures, as they felt the

'estimates were reliable' and they were 'comfortable using the tool for their purposes'. However, it was commented by 1 interviewee that 'you couldn't evaluate the precision and accuracy as there is little chance of comparing it to measured data'.

The questionnaire survey asked respondents whether RISKOFDERM fulfilled their requirements. Twenty (44%) of respondents said 'yes'; 17 (37%) said 'no' and 9 (20%) said that they 'did not know'. Table 3.44 summarises the reasons why RISKOFDERM is not thought to fulfil user requirements. Responses were provided by 18 individuals, of whom 16 had responded that the tool did not fulfil their requirements, 1 had responded that it did fulfil their requirements and 1 had responded 'don't know'. A further 6 respondents added additional comments after completing the 'other reasons' category. These included the tool being 'user unfriendly'; 'only being able to use it for dermal exposure'; 'refinement options not being available'; 'long tasks being outside the boundaries of the tool'; 'dermal flux rates being so highly variable they are not reliable' and 'the basis of the algorithms not yielding confidence when compared to the data on which they are based'.

Table 3.44 Reasons why respondents did not feel that RISKOFDERM fulfilled their requirements. Each cell contains number of respondents (N) and % of those who provided a reason.

Reasons	No. of responses	% of responses
The estimates of exposure did not seem realistic for my workplace situation	10	56%
I had insufficient workplace exposure information to enter all required input parameters	8	44%
It was unclear how to translate my workplace information into the required input parameters	8	44%
The estimates of exposure were unclear or ambiguous	6	33%
I could not identify a relevant process description for my work task	3	17%

Note: Table totals to more than 18 as multiple responses were permitted

Only 5 respondents had compared results using RISKOFDERM against measured data, of whom 1 each assessed the agreement in each category: 'very good', 'good', 'neither good or poor', 'poor' and 'very poor'.

Respondents were asked to add any comments on the strength of RISKOFDERM, and 21 provided responses. Five respondents thought it was fairly 'easy and simple to use'. A further 3 respondents thought it was 'more detailed and accurate than other tools' and 3 commented on it 'being a specific dermal exposure tool'. Additional comments are available in Question 121 in the supplementary material in Appendix 2.

Further comments collected during the interviews on the strengths of RISKOFDERM were 'the inclusion of enough categories to cover a couple of handling situations without having too many questions'. Furthermore, the fact that 'it gives a rapid solution with a good balance of parameters' was seen as a positive feature.

A question on the limitations of the RISKOFDERM tool was asked of respondents, and was completed by 22 individuals. Two commented that it was *'too conservative'*; 2 respondents commented that the *'layout was difficult'*; 1 suggesting using *'fewer colours'*. The complete list of comments is available in Question 122 in the supplementary material in Appendix 2.

Perceived limitations of RISKOFDERM tool identified during the interviews were that it was *'prone to over-estimation'*. Furthermore, one interviewee highlighted that they could not identify limitations at present as they *'had not pushed the tool past its boundaries so did not know if it was unsuitable for certain situations'*.

3.8 Future Developments

Interviewees were invited to give opinions on future developments of all the tools and their responses are quoted below. Firstly, interviewees were asked whether the choice of tools available was appropriate for their requirements.

- *'Yes they cover 90% of the scenarios that you would have to assess. And the remainder is quite exotic and would need customized solutions'*;
- *'I have to live with the consequences of what tools I use. The other tools that are available have their strengths and weaknesses but from my perspective the range of tools available suit my purpose'*;
- *'Yes'*;
- *'I would say for inhalation yes but I would prefer to see a more robust version of RISKOFDERM'*;
- *'I think it is still appropriate, it is a basic tool. It will also in future be difficult to use a higher tier tool because the information needed is mostly not available'*;
- *'The variety of different tools make it tricky as some use this tool and others use that tool. I really favour the options to use the Chesar tool. If everyone was to use one tool, it would be easily compared. But then again all tools serve their own purpose and a tool that would cover all this would be very complex'*;
- *'Yes I do especially with availability of the ART tool'*; and
- *'In terms for tools for REACH – yes, although they are not perfect'*.

Interviewees were then asked if they were satisfied with the outputs of their chosen tool and the suitability for purpose. The responses are collated below:

- *'Yes I would say they are sufficient'*;
- *'Yes'*;
- *'I think so yes, for the time being and the situation, yes'*;
- *'Yes'*;
- *'Each tool has its limitations and the old ECETOC TRA (v1) tool had some assumptions that I believe were too optimistic but I believe that has changed in the new version (version 3) especially in the dermal deposition. I generally found the level of expertise required to run the tools properly was higher than you would say when looking at the tool. Because the tools are all extremely*

user friendly and anyone can use them but using them correctly requires a lot more skill that you would think.'

- *'Generally yes. As long as you understand how the tool works what quality of the underlying data is then you have some indication on how happy you are with your exposure assessment'*

Interviewees were also asked about their use of other exposure tools including higher tier tools. The responses are collated below

- *'I have used ART a lot as I think it's a nice tool to use. You can run scenarios through the ART tool and come up with a realistic outcome';*
- *'Advanced REACH tool is the tool we would use immediately after failing with ECETOC TRA. We are aware there are certain tools that are a fit for certain scenarios';*
- *'Yes- ART';*
- *'I have tested it and looked at it but that's the only one (ART)';*
- *'Yes, we have used ART for inhalation exposure; the situation was more tricky and could not be tooled with TRA worker tool. We even use the ART tool if we are needing a range'*
- *'Yes, I've used ART. I tried to apply it but in my experience it requires so much addition information which is not available that any assumptions made also add to the uncertainty of what you are calculating'*
- *'We use them in order to generate chemical safety assessments with a limited number of unnecessary risk management measures';*
- *'Yes, we have used ART and we have also used CONSEXPO. The main reason for going to the higher level tool was that ECETOC TRA was too simplistic for the scenarios that we were interested in and we felt that ART was a better tool and give us more reliable exposure predictions'.*

4 Discussion

4.1 Responses to the Survey and Interviews

Participants in the interviews were identified as users who had an interest in assisting the research project and who reported being experienced in one or more of the tools. The interviewees therefore represent experienced tool users, and this factor been considered in the assessment of the interviews and in comparison with the findings of the questionnaire survey.

Invitations to participate in the survey were widely distributed by various routes in order to reach as many users as possible. However, as the total number of tool users contacted is ultimately unknown, an overall response rate for the survey cannot be calculated. It is likely however that proportionally more responses were attained from users of tools where registration is necessary, as publicity for the exercise and a direct request, sent via the tool providers, was then possible. A prize draw incentive was offered to participants to try to maximise response and almost 300 completed questionnaires were received. Most respondents worked in consultancy and industry, and respondents had a broad range of experience levels, were based across more than 30 countries and covered a wide age range.

4.2 Results in relation to the aims of this work

4.2.1 Sources of information that led people to use different tools

For ECETOC TRA v2, EMKG-EXPO-TOOL and RISKOFDERM, the most frequently reported sources of information that led respondents to use the tool were information on legislation, official or statutory guidance (53% to 55% of users), followed by REACH awareness sessions (32% to 42% of users). Information on legislation was also the most commonly reported source for the MEASE tool, but this was reported by only 38% of users. For ECETOC TRA v3 and STOFFENMANAGER the most frequently reported source (by 40% to 44% of respondents) was a meeting, conference, seminar or workshop, followed by information on legislation (33% to 39% of users).

The tool's own website was a source of information for ECETOC TRA v3 (35%), STOFFENMANAGER (26%) and ECETOC TRA v2 (24%), while professional recommendations of colleagues were reported by more than a quarter of users of all of the tools except EMKG-EXPO-TOOL where it was an information source for only 11% of users. The use of the website as a source for information for ECETOC TRA v3 is unsurprising, as the launch of version 3 was concurrent with this research project and the developers were keen to use existing media to advertise the latest version.

4.2.2 Usability of the Tools

Usability was assessed in 6 categories for each of the tools, and responses are shown graphically in Figures 4.1 to 4.6 and are summarised in Table 4.1. Each figure

shows the proportion of respondents classifying the usability category as very easy, easy, neither easy or difficult, difficult or very difficult.

For all of the tools accessing and downloading the tool was the category most often reported to be easy or very easy (Figure 4.1), followed by understanding the screen layout (Figure 4.2) and returning after a period of non-use (Figure 4.3).

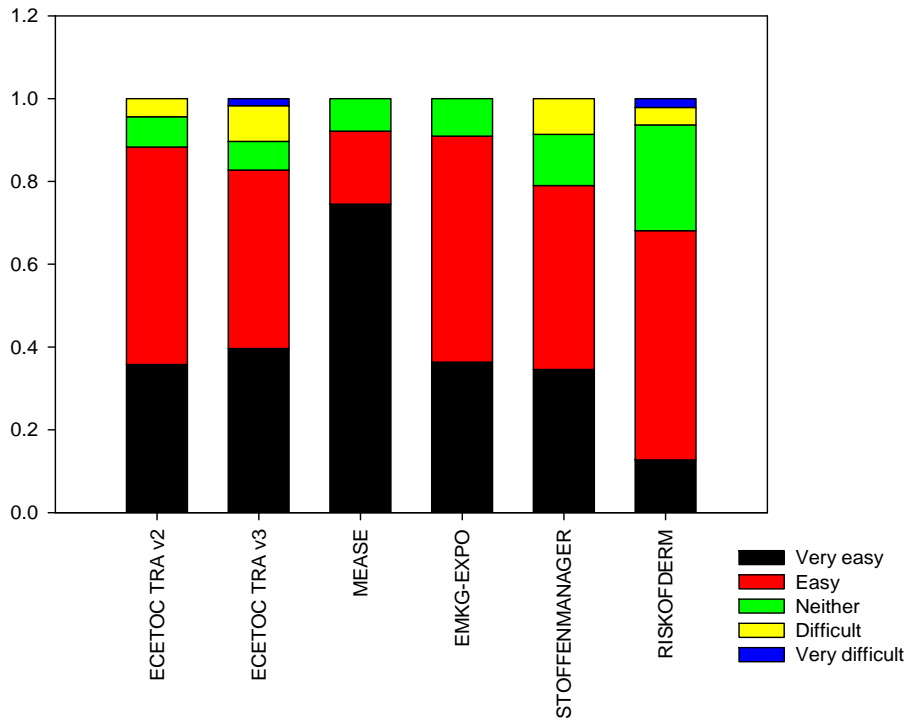


Figure 4.1 Usability – accessing and downloading the tool

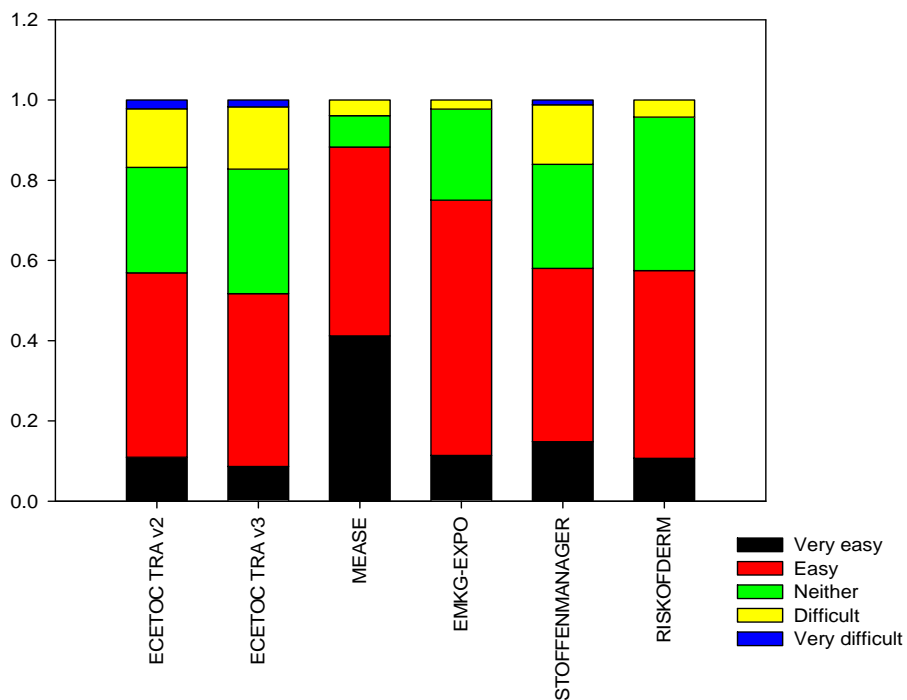


Figure 4.2 Usability – understanding the screen layout

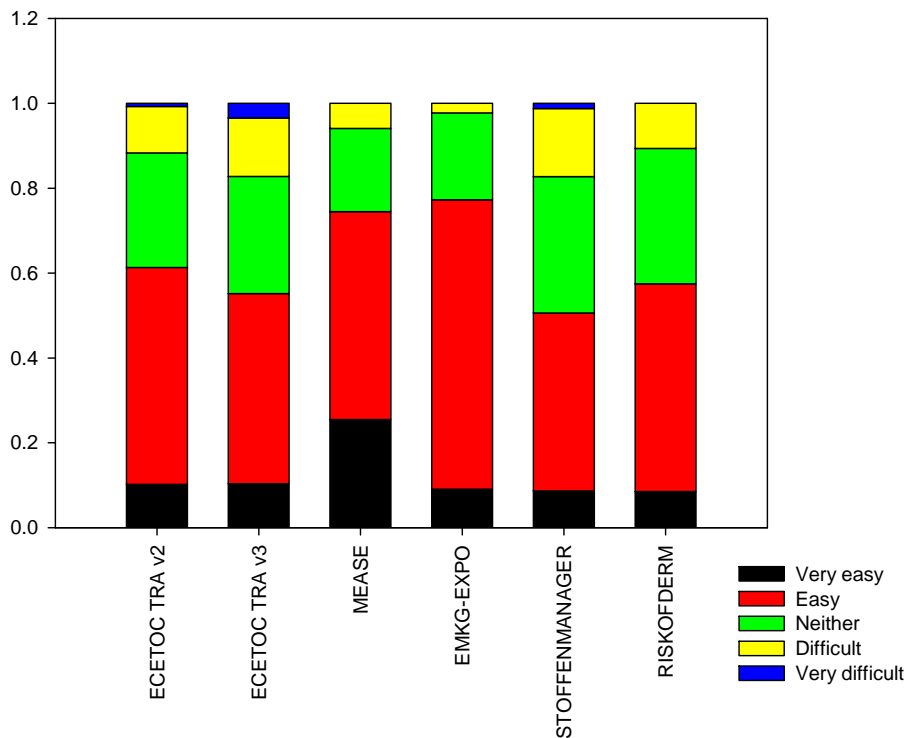


Figure 4.3 Usability – returning after a period of non-use

Respondents had most difficulty with fixing a problem (Figure 4.4.), learning how to use the tool (Figure 4.5), and generating the required tool output (Figure 4.6). For all 6 categories, a higher proportion of users of MEASE (63% to 92%) and of EMKG-EXPO-TOOL (66% to 91%) reported that the usability was easy or very easy than users of the other tools (38% to 88%).

Although accuracy of output is not assessed within the current report, the learnability of the tool, errors in identifying input and output parameters and difficulties in generating output have the potential to have an impact on this issue. Thus, ensuring that users have an understanding of the underlying concepts of the tools, as well as providing effective guidance on the layout of the interface and expected inputs, will be essential in aiding the accuracy of generated outputs.

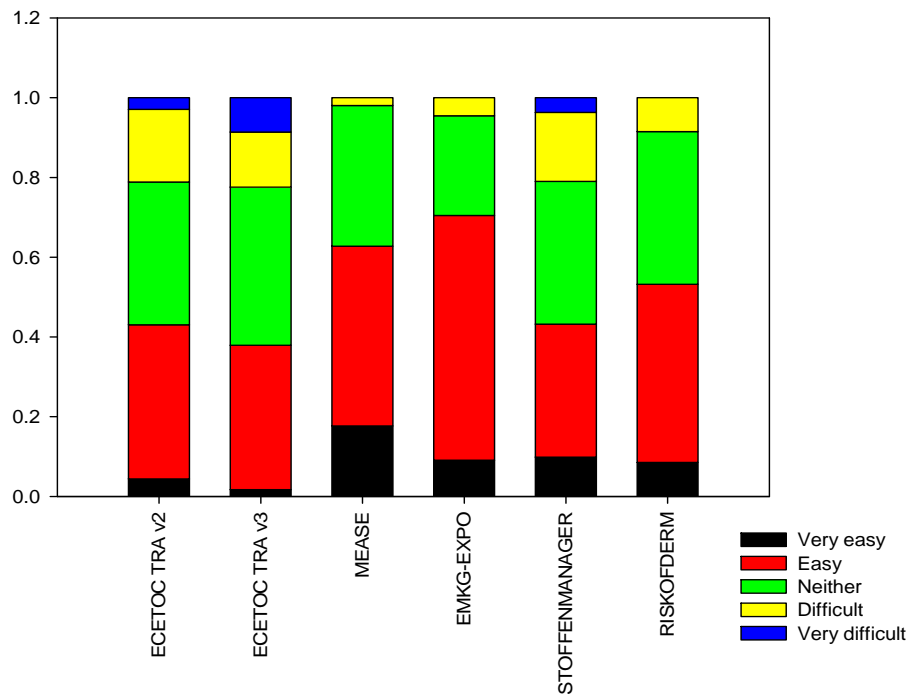


Figure 4.4 Usability – fixing a problem

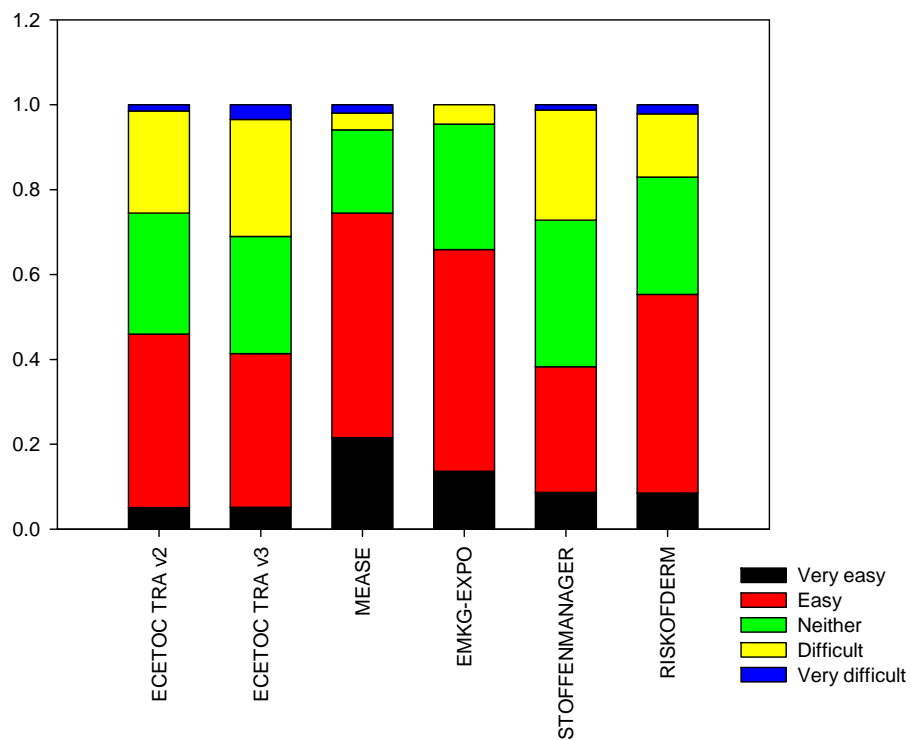


Figure 4.5 Usability – learning how to use the tool

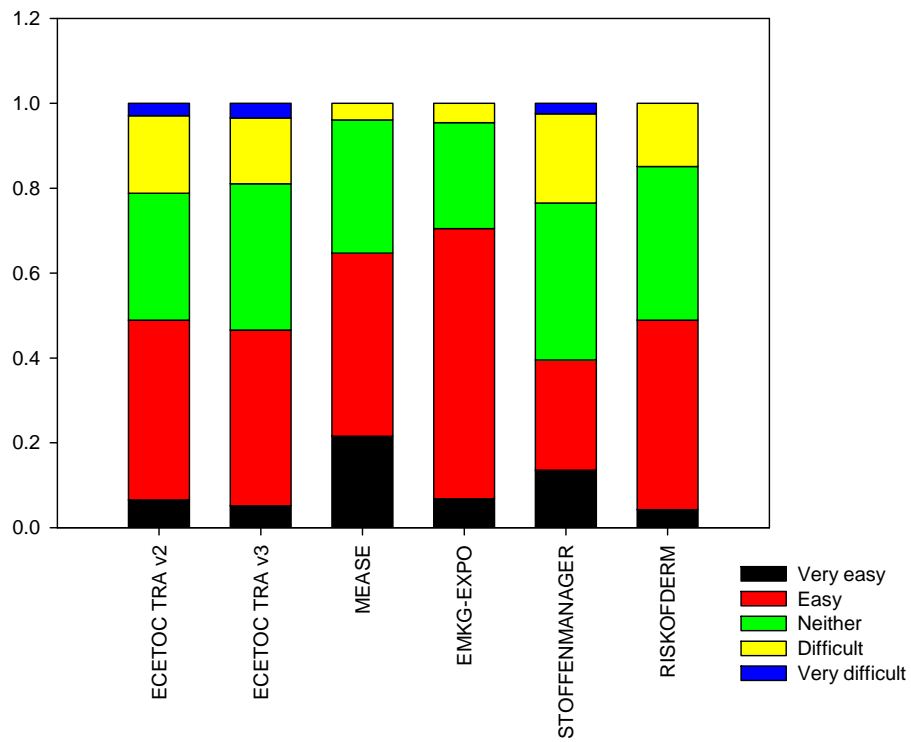


Figure 4.6 Usability – generating the required tool output

Table 4.1 Percentage of people who reported difficulties with usability and/or help and guidance

	ECETOC TRA v2	ECETOC TRA v3	MEASE	EMKG- EXPO- TOOL	STOFFEN- MANAGER	RISK- OFDERM
Usability						
Accessing and downloading	4	10	0	0	9	6
Understanding the screen layout	17	17	4	2	16	4
Learning how to use the tool	24	31	6	4	27	17
Generating required tool output	21	19	4	4	23	15
Returning after a period of non-use	12	17	6	2	17	10
Fixing the problem	21	22	2	4	21	8
Help and guidance						
Help Functions	12	12	2	9	5	4
Supplementary Guidance	7	10	10	NA	6	8

NA: Not applicable

In relation to user experience, some consistent patterns emerged regarding lack of experience and lack of knowledge of the underlying concepts being associated with the reports of the tools being less usable. This was echoed during the interviews in that interviewees, who were experienced users, were generally happy about the usability of the tools. In relation to the positive and negative aspects identified for each of the tools, comments have been summarised in Tables 4.2 and 4.3.

For 5 of the 6 tools, between 56% and 61% of respondents found the help functions helpful or very helpful; the exception was the ECETOC TRA v3 where only 43% of respondents found the help functions to be helpful/very helpful. For all 6 tools, over half of all respondents found the guidance provided with the tool to be helpful/very helpful, ranging from 51% for MEASE to 66% for the ECETOC TRA v2. The complexity level of the different tools varies, as do the required input parameters, so ensuring the users have access to adequate help and guidance is vital. On the whole, respondents to the survey did find the help and guidance provided useful and this only differed by knowledge of the underlying concepts for one tool, where those who had less knowledge did not find the help and guidance as useful. This would also suggest that learning to use the tool with adequate support is also essential to achieve reasonable outputs.

A majority of users (over 70% for all tools except MEASE, 63%) recognised that it is important that these tools overestimate exposure. For all 6 tools, a smaller proportion of respondents thought that the tools did in reality appropriately overestimate exposure, ranging from 36% for EMKG-EXPO-TOOL users to 60% for respondents who use MEASE for inhalation exposure. For RISKOFDERM, proportionally more of those using the tool for REACH purposes, thought the tool appropriately overestimated exposure (57%) compared to those who used it for other purposes (18%), which may be related to the tool's origins as a control banding system.

For most of the tools, around a half of respondents perceived it was easy or very easy to translate real-life exposure situations into the necessary inputs. The exception was RISKOFDERM where only 25% of respondents found this to be easy. For the ECETOC TRA v2 and STOFFENMANAGER, respondents with less knowledge of the underlying concepts of the tool found this more difficult to do.

Around three-quarters of respondents for the ECETOC TRA tools, MEASE and STOFFENMANAGER reported that the tools fulfilled their requirements. The responses were less positive for EMKG-EXPO-TOOL (46%) and RISKOFDERM (54%). The principal reasons given for both tools were that exposure estimates were not perceived as being realistic and that it was unclear how to translate workplace information into the required input parameters. RISKOFDERM users also felt that they had insufficient workplace exposure information to enter all required input parameters.

Table 4.2 Positive Aspects of Tools Highlighted by Respondents (direct quotations given)

ECETOC TRA v2	ECETOC TRA v3	MEASE	EMKG-EXPO- TOOL	STOFFEN- MANAGER	RISKOF- DERM
Easy to learn and use	Availability of RMM improved	Easy to use	Practical tool	Ease of use	Easy and simple to use
Fast method of calculating estimates		Colour coding good for relevance	Easy to use but not as robust as other tools	Colour coding good for prioritising	More detailed and accurate compared to other tools
Allows prioritisation of exposure situation		Changes in parameter being immediately visible Guidance helpful and easy to use Simplicity of the spread sheet layout	Quick to achieve results	Takes into account control measures Results showing percentiles Ability to explore a situation	Rapid solution

Table 4.3 Negative Aspects of Tools Reported by Respondents (direct quotations given)

ECETOC TRA v2	ECETOC TRA v3	MEASE	EMKG-EXPO- TOOL	STOFFEN- MANAGER	RISKOF- DERM
Data entry time consuming	Data entry time consuming	Only being able to assess one substance at a time	Perceived its simplicity as a weakness	Takes time to learn	Hard to find tool
Slow	Not user friendly	Over-estimation perceived as a problem		PROC alignment should be present in the tool	Too conservative in its outputs
Layout difficult	Dislike of the layout			A large amount of effort required to input data	Suggest fewer colours in its layout
Integrated tool perceived to be more complex Needs more PPE and RMM input	Advanced user manual would help			Layout difficult to manage	Prone to over- estimation

5 Conclusions

The interviews and questionnaire survey identified that in general, people were satisfied about the usability of the tools and the supporting documentation available to them. The main purposes for which tools were used were risk assessments, REACH exposure assessments and, when using different tools, comparing outputs. Overall, respondents and interviewees understood the limitations of the Tier 1 tools and appreciated when and where it was suitable to use the different tools.

It is clear that the use of the tools is affected by knowledge of the underlying concept of the tool and user experience. It is therefore essential that the support and guidance provided to users is fully understandable by all users to ensure that exposure situations can be effectively translated into the required input parameters and thus ensure that relevant exposure outputs can be easily obtained with the tools.

When asked about future developments, interviewees were satisfied that the choice of tools was appropriate for their requirements and that the outputs of their chosen tools fitted their needs. An understanding of the limitations of the tools was also shown by the interviewees. Other exposure tools used by the interviewees included ART and CONSEXPO, which had been utilised when users considered the Tier 1 tools as being too simplistic for the scenarios being examined.

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Appendix 1 Online Questionnaire Survey

eteam - Tier 1 Models User Assessment Survey

Introduction

Welcome to the eteam project Tier 1 model assessment questionnaire

Under REACH, a tiered approach is used to determine the risk of exposure to chemicals, with a great reliance placed on conservative screening models for exposure assessment. Several Tier 1 exposure models are recommended by the European Chemicals Agency (ECHA) for estimating occupational exposure; however, to date none of these models have been extensively evaluated and compared.

The **E**valuation of Tier 1 **E**xposure **A**ssessment **M**odels under REACH ("**eteam**") project, sponsored by the German Federal Institute for Occupational Safety and Health (BAuA), aims to compare and contrast the different REACH Tier 1 exposure assessment models in terms of their determinants, scope of application, functionality and user-friendliness. The project is being undertaken by the Institute of Occupational Medicine (IOM), Edinburgh, United Kingdom and the Fraunhofer Institute for Toxicology and Experimental Medicine (ITEM), Hannover, Germany. Further information about the project is available [here](#)

The models we are assessing in the project are: **MEASE, EMKG-Expo, ECETOC TRA (versions 2 and 3), Stoffenmanager and RISKOFDERM**.

The project includes an evaluation of the conceptual bases of the models and a comparison of model estimates with workplace exposure measurements. The user-friendliness of the models and within-user and between-user reliability are also being assessed.

As a user of one or more of the models, we would be grateful if you could complete the following questionnaire so that we can include your opinion on the user-friendliness and usability of the various tools, their respective strengths and limitations and their suitability for use in the EU REACH process.

This survey contains questions relating to each of the 6 models but you will only be asked to complete questions relevant to the models that you have used. It will take about 5 minutes to complete each set of questions relevant to a particular model.

No individual respondents will be identified in the publication of any results from this study.

Respondents who complete the questionnaire will be invited to participate in a free prize draw to win a €50 Amazon gift voucher. The prize draw will take place once the survey is closed.

eteam - Tier 1 Models User Assessment Survey**About you**

In this section we would like to obtain some background information about you.

***1. What type of organisation do you work for?**

- Industry
 Research
 Consultancy
 Government
 Other (please specify)

***2. How many years have you worked on occupational exposure assessment?**

- Less than 1 year
 1-3 years
 4-6 years
 7-10 years
 More than 10 years

***3. How would you describe your computer skills?**

- Novice
 Intermediate
 Expert

***4. What age group are you in?**

- 18-29 years
 30-39 years
 40-49 years
 50-59 years
 60 or more years

***5. What country are you based in?**

etteam - Tier 1 Models User Assessment Survey**Use of MEASE**

***1. Have you ever used the MEASE Model?**

- Yes
- No

eteam - Tier 1 Models User Assessment Survey

MEASE - Page 1

***1. What were the main sources of information that first led you to use MEASE?**

Was this via ... (please tick all that apply) ...

- Information on legislation, official or statutory guidance (eg from REACH/ECHA, HSE, etc)
- REACH awareness sessions or similar training
- Professional recommendation of colleagues or Exposure Associations (eg BOHS, DOHS, etc)
- A meeting, conference, seminar, workshop etc
- Peer-reviewed scientific publications or papers
- The tool's own website, its publicity materials or training course
- Other Website, links, discussions (eg e-newsletters, articles/blogs, LinkedIn, Twitter etc)
- Via other published materials - (eg SHE news, industry/trade papers, in-house magazines etc)
- Other (please specify)

***2. Please indicate your level of knowledge regarding MEASE**

- I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations
- I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations
- I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations

***3. How often do you use MEASE?**

- Once a week or more
- 2-3 times per month
- once every 2-3 months
- 2-3 times per year
- Less than once a year

***4. When did you last use MEASE?**

- Within the last week
- Within the last month
- Within the last 2-6 months
- Over 6 months ago

eteam - Tier 1 Models User Assessment Survey

MEASE - Page 2

*** 1. What are the main purposes for which you use MEASE (tick all that apply)**

- For REACH exposure assessments
- To determine compliance with an occupational exposure limit
- To assist in the identification of risk management measures
- Other (please specify)

*** 2. Thinking about your use of MEASE, please select the category that best matches your opinion**

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading the MEASE model to my computer was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding the screen layout is ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning how to use the model for first time was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generating my required model output was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When returning to the model after a period of non-use, I found that using it again was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I made a mistake when using the model, fixing the problem was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 3. Please select the category that best reflects your opinion about help and guidance in the MEASE model**

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
The help functions contained within the model itself, (eg comment boxes, glossary, links to additional info.) were ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The supplementary guidance provided, (eg on the model website or additional documentation) was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Please add any further comments on the user friendliness of MEASE in the box below

eteam - Tier 1 Models User Assessment Survey

MEASE - Page 3

In the next section, we would like to know more about the process of using the MEASE model - please select the answer which you think best reflects your experience

*** 1. Have you used MEASE to estimate dermal exposure and / or inhalation exposures? (tick all that apply)**

- Dermal exposure
 Inhalation exposure

*** 2. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required MEASE input parameters for inhalation or dermal estimates?**

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 3.**

In general, do you think that the exposure estimates provided by the model ...

	Greatly over-estimate exposure	Appropriately over-estimate exposure	Sometimes over-estimate and Sometimes under-estimate exposure	Under-estimate exposure	Greatly under-estimate exposure	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 4. How important to you is it that the model appropriately over-estimates exposure?**

	Very important	Important	Neither important or unimportant	Unimportant	Of little importance	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

etteam - Tier 1 Models User Assessment Survey

MEASE - Page 4

*** 1. In general, do you feel that MEASE fulfilled your requirements?**

- Yes
 No
 Don't know

2. If you answered "No", why did you feel that MEASE did not fulfill your requirements?

Please tick all that apply for both inhalation and dermal exposure estimates

	Inhalation	Dermal
I had insufficient workplace exposure information to enter all the required input parameters	<input type="checkbox"/>	<input type="checkbox"/>
It was unclear how to translate my workplace information into the required input parameters	<input type="checkbox"/>	<input type="checkbox"/>
The estimates of exposure did not seem realistic for my workplace situation	<input type="checkbox"/>	<input type="checkbox"/>
The estimates of exposure were unclear or ambiguous	<input type="checkbox"/>	<input type="checkbox"/>
I could not identify a relevant PROC code for my work task	<input type="checkbox"/>	<input type="checkbox"/>

Other reason(s) - please specify

*** 3. Did you compare the results obtained from MEASE against any actual measured data that you had available?**

	Yes	No	Not applicable
Measured inhalation exposure data?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measured dermal exposure data?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. If you did compare them, what level of agreement did the MEASE estimates have with the measured exposures for ...

	Very good	Good	Neither good or poor	Poor	Very poor	Not applicable
Inhalation exposure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

eteam - Tier 1 Models User Assessment Survey**MEASE - Page 5**

1. In general, please tell us what you think are the strengths of MEASE for Inhalation exposure estimation

2. In general, please tell us what you think are the limitations of MEASE for Inhalation exposure estimation and how do you think it can be improved?

3. In general, please tell us what you think are the strengths of MEASE for Dermal exposure estimation

4. In general, please tell us what you think are the limitations of MEASE for Dermal exposure estimation and how do you think it can be improved?

etteam - Tier 1 Models User Assessment Survey**Use of EMKG Expo-Tool**

***1. Have you ever used the EMKG Expo-Tool?**

- Yes
- No

eteam - Tier 1 Models User Assessment Survey

EMKG Expo-Tool - Page 1

*** 1. What were the main sources of information that first led you to use EMKG Expo-Tool?**

Was this via ... (please tick all that apply) ...

- Information on legislation, official or statutory guidance (eg from REACH/ECHA, HSE, etc)
- REACH awareness sessions or similar training
- Professional recommendation of colleagues or Exposure Associations (eg BOHS, DOHS, etc)
- A meeting, conference, seminar, workshop etc
- Peer-reviewed scientific publications or papers
- The tool's own website, its publicity materials or training course
- Other Website, links, discussions (eg e-newsletters, articles/blogs, LinkedIn, Twitter etc)
- Via other published materials = (eg SHE news, industry/trade papers, in-house magazines etc)
- Other (please specify)

*** 2. Please indicate your level of knowledge regarding the EMKG Expo-Tool**

- I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations
- I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations
- I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations

*** 3. How often do you use the EMKG Expo-Tool?**

- Once a week or more
- 2-3 times per month
- once every 2-3 months
- 2-3 times per year
- Less than once a year

*** 4. When did you last use the EMKG Expo-Tool?**

- Within the last week
- Within the last month
- Within the last 2-6 months
- Over 6 months ago

etteam - Tier 1 Models User Assessment Survey

EMKG Expo-Tool - Page 2

*** 1. What are the main purposes for which you use the EMKG Expo-Tool (tick all that apply)**

- For REACH exposure assessments,
- To determine compliance with an occupational exposure limit
- To assist in the identification of risk management measures
- Other (please specify)

*** 2. Thinking about your use of the EMKG Expo-Tool, please select the category that best matches your opinion**

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading the EMKG Expo-Tool to my computer was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding the screen layout is ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning how to use the model for first time was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generating my required model output was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When returning to the model after a period of non-use, I found that using it again was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I made a mistake when using the model, fixing the problem was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 3. Please select the category that best reflects your opinion about the help and guidance in the EMKG Expo-Tool**

- Very helpful
- Helpful
- Neither helpful or unhelpful
- Unhelpful
- Very unhelpful

4. Please add any further comments on the user friendliness of the EMKG Expo-Tool in the box below

etteam - Tier 1 Models User Assessment Survey**EMKG Expo-Tool - Page 3**

In the next section, we would like to know more about the process of using the EMKG Expo-Tool - please select the answer which you think best reflects your experience.

***1. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required EMKG Expo-Tool input parameters**

- Very easy Easy Neither easy or difficult Difficult Very difficult

***2. In general, do you think that the exposure estimates provided by the model ...**

- Greatly over-estimate exposure Appropriately over-estimate exposure Sometimes over-estimate and Sometimes underestimate exposure Under-estimate exposure Greatly under-estimate exposure

***3. How important to you is it that the model appropriately over-estimates exposure?**

- Very important Important Neither important or unimportant Unimportant Of little importance

etteam - Tier 1 Models User Assessment Survey**EMKG Expo-Tool - Page 4**

*** 1. In general, do you feel that the EMKG Expo-Tool fulfilled your requirements?**

- Yes
 No
 Don't know

2. If you answered "No", why did you feel that the EMKG Expo-Tool did not fulfill your requirements? Please tick all that apply

- I had insufficient workplace exposure information to enter all required input parameters
 It was unclear how to translate my workplace information into the required input parameters
 The estimates of exposure did not seem realistic for my workplace situation
 The estimates of exposure were unclear or ambiguous

Other reason(s) - please specify

*** 3. Did you compare the results obtained from the EMKG Expo-Tool against any actual measured data that you had available?**

- Yes
 No

4. If you did compare them, what level of agreement did the EMKG Expo-Tool estimates have with the measured exposures?

- Very good Good Neither good or
poor Poor Very poor

etteam - Tier 1 Models User Assessment Survey**EMKG Expo-Tool - Page 5**

1. In general, please tell us what you think are the strengths of the EMKG Expo-Tool

2. In general, please tell us what you think are the limitations of the EMKG Expo-Tool and how do you think it can be improved?

eteam - Tier 1 Models User Assessment Survey**Use of ECETOC TRA Version 2**

This section contains questions relevant to the ECETOC TRA model.

As the TRA has recently been revised, we would like to gather information on both the latest tool (Version 3), and the previous version (Version 2).

If you have used both Version 2 and Version 3 of the ECETOC TRA then please answer both of the two ECETOC TRA sections of the questionnaire.

*** 1. Have you ever used Version 2 of the ECETOC TRA?**

Yes

No

eteam - Tier 1 Models User Assessment Survey

ECETOC TRA Version 2 - Page 1

This section contains questions on the use of the ECETOC TRA Version 2

*1. What were the main sources of information that first led you to use the ECETOC TRA Version 2?

Was this via ... (please tick all that apply) ...

- Information on legislation, official or statutory guidance (eg from REACH/ECHA, HSE, etc)
- REACH awareness sessions or similar training
- Professional recommendation of colleagues or Exposure Associations (eg BOHS, DOHS, etc)
- A meeting, conference, seminar, workshop etc
- Peer-reviewed scientific publications or papers
- The tool's own website, its publicity materials or training course
- Other Website, links, discussions (eg e-newsletters, articles/blogs, LinkedIn, Twitter etc)
- Via other published materials - (eg SHE news, industry/trade papers, in-house magazines etc)
- Other (please specify)

*2. Please indicate your level of knowledge regarding the ECETOC TRA Version 2

- I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations
- I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations
- I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations

*3. How often do you use the ECETOC TRA Version 2?

- Once a week or more
- 2-3 times per month
- once every 2-3 months
- 2-3 times per year
- Less than once a year

*4. When did you last use the ECETOC TRA - Version 2?

- Within the last week
- Within the last month
- Within the last 2-6 months
- Over 6 months ago

eteam - Tier 1 Models User Assessment Survey

ECETOC TRA Version 2 - Page 2

*** 1. What are the main purposes for which you use the ECETOC TRA - Version 2 (tick all that apply)**

- For REACH exposure assessments,
- To determine compliance with an occupational exposure limit
- To assist in the identification of risk management measures
- Other (please specify)

*** 2. Thinking about your use of the ECETOC TRA Version 2 please select the category that best matches your opinion**

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading the ECETOC TRA Version 2 to my computer was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding the screen layout is ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning how to use the model for first time was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generating my required model output was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When returning to the model after a period of non-use, I found that using it again was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I made a mistake when using the model, fixing the problem was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 3. Please select the category that best reflects your opinion about help and guidance in the ECETOC TRA Version 2**

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
The help functions contained within the model itself, (eg comment boxes, links to additional info.) were ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The supplementary guidance provided, (eg on the model website or additional documentation) was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Please add any further comments on the user-friendliness of the ECETOC TRA Version 2 in the box below

eteam - Tier 1 Models User Assessment Survey

ECETOC TRA Version 2 - Page 3

In the next section, we would like to know more about the process of using the ECETOC TRA Version 2. Please select the answer which you think best reflects your experience

***1. Have you used the ECETOC TRA Version 2 to estimate dermal exposure and / or inhalation exposures? (tick all that apply)**

- Dermal exposure estimates
 Inhalation exposure estimates

***2. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required ECETOC TRA Version 2 input parameters for inhalation or dermal estimates?**

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

***3. In general, do you think that the exposure estimates provided by the model ...**

	Greatly over-estimate exposure	Appropriately over-estimate exposure	Sometimes over-estimate and Sometimes under-estimate exposure	Under-estimate exposure	Greatly under-estimate exposure	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

***4. How important to you is it that the model appropriately over-estimates exposure?**

	Very important	Important	Neither important or unimportant	Unimportant	Of little importance	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

etteam - Tier 1 Models User Assessment Survey

ECETOC TRA Version 2 - Page 4

*** 1. In general, do you feel that the ECETOC TRA Version 2 fulfilled your requirements?**

- Yes
 No
 Don't know

2. If you answered "No", why did you feel that the ECETOC TRA Version 2 did not fulfill your requirements?

Please tick all that apply for both inhalation and dermal exposure estimates

	For Inhalation	For Dermal
I had insufficient workplace exposure information to enter all required input parameters	<input type="checkbox"/>	<input type="checkbox"/>
It was unclear how to translate my workplace information into the required input parameters	<input type="checkbox"/>	<input type="checkbox"/>
The estimates of exposure did not seem realistic for my workplace situation	<input type="checkbox"/>	<input type="checkbox"/>
The estimates of exposure were unclear or ambiguous	<input type="checkbox"/>	<input type="checkbox"/>
I could not identify a relevant PROC code for my work task	<input type="checkbox"/>	<input type="checkbox"/>

Other reason(s) - please specify

*** 3. Did you compare the results obtained from ECETOC TRA Version 2 against any actual measured data that you had available?**

	Yes	No	Not applicable
Measured inhalation exposure data?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measured dermal exposure data?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. If you did compare them, what level of agreement did the ECETOC TRA Version 2 estimates have with the measured exposures for ...

	Very good	Good	Neither good or poor	Poor	Very poor	Not applicable
Inhalation exposure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

eteam - Tier 1 Models User Assessment Survey**ECETOC TRA Version 2 - Page 5**

1. In general, please tell us what you think are the strengths of ECETOC TRA Version 2 for Inhalation exposure estimation

2. In general, please tell us what you think are the limitations of ECETOC TRA Version 2 for Inhalation exposure estimation and how do you think it can be improved?

3. In general, please tell us what you think are the strengths of ECETOC TRA Version 2 for Dermal exposure estimation

4. In general, please tell us what you think are the limitations of ECETOC TRA Version 2 for Dermal exposure estimation and how do you think it can be improved?

eteam - Tier 1 Models User Assessment Survey**Use of ECETOC TRA Version 3**

This section contains questions relevant to the ECETOC TRA Version 3

***1. Have you ever used Version 3 of the ECETOC TRA?**

Yes

No

eteam - Tier 1 Models User Assessment Survey

ECETOC TRA Version 3 - Page 1

This section contains questions on the use of the ECETOC TRA Version 3.

*1. What were the main sources of information that first led you to use the ECETOC TRA Version 3?

Was this via ... (please tick all that apply) ...

- Information on legislation, official or statutory guidance (eg from REACH/ECHA, HSE, etc)
- REACH awareness sessions or similar training
- Professional recommendation of colleagues or Exposure Associations (eg BOHS, DOHS, etc)
- A meeting, conference, seminar, workshop etc
- Peer-reviewed scientific publications or papers
- The tool's own website, its publicity materials or training course
- Other Website, links, discussions (eg e-newsletters, articles/blogs, LinkedIn, Twitter etc)
- Via other published materials – (eg SHE news, industry/trade papers, in-house magazines etc)
- Other (please specify)

*2. Please indicate your level of knowledge regarding the ECETOC TRA Version 3

- I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations
- I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations
- I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations

*3. How often do you use the ECETOC TRA Version 3?

- Once a week or more
- 2-3 times per month
- once every 2-3 months
- 2-3 times per year
- Less than once a year

*4. When did you last use the ECETOC TRA Version 3?

- Within the last week
- Within the last month
- Within the last 2-6 months

eteam - Tier 1 Models User Assessment Survey

ECETOC TRA Version 3 - Page 2

*** 1. What are the main purposes for which you use the ECETOC TRA Version 3? (tick all that apply)**

- For REACH exposure assessments,
- To determine compliance with an occupational exposure limit
- To assist in the identification of risk management measures
- Other (please specify)

*** 2. Thinking about your use of the ECETOC TRA Version 3 - please select the category that best matches your opinion**

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading the ECETOC TRA Version 3 to my computer was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding the screen layout is ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning how to use the model for first time was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generating my required model output was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When returning to the model after a period of non-use, I found that using it again was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I made a mistake when using the model, fixing the problem was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 3. Please select the category that best reflects your opinion about help and guidance in the ECETOC TRA Version 3**

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
The help functions contained within the model itself, (eg comment boxes, links to additional info.) were ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The supplementary guidance provided, (eg on the model website or additional documentation) was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Please add any further comments on the user-friendliness of the ECETOC TRA Version 3 in the box below

eteam - Tier 1 Models User Assessment Survey

ECETOC TRA Version 3 - Page 3

In the next section, we would like to know more about the process of using the ECETOC TRA Version 3. Please select the answer which you think best reflects your experience

***1. Have you used the ECETOC TRA Version 3 to estimate dermal exposure and / or inhalation exposures? (tick all that apply)**

- Dermal exposure
 Inhalation exposure

***2. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required ECETOC TRA Version 3 input parameters for inhalation or dermal estimations?**

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

***3. In general, do you think that the exposure estimates provided by the model ...**

	Greatly over-estimate exposure	Appropriately over-estimate exposure	Sometimes over-estimate and Sometimes under-estimate exposure	Under-estimate exposure	Greatly under-estimate exposure	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

***4. How important to you is it that the model appropriately over-estimates exposure?**

	Very important	Important	Neither important or unimportant	Unimportant	Of little importance	Not applicable
Inhalation exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

etteam - Tier 1 Models User Assessment Survey

ECETOC TRA Version 3 - Page 4

*** 1. In general, do you feel that the ECETOC TRA Version 3 fulfilled your requirements?**

- Yes
 No
 Don't know

2. If you answered "No", why did you feel that the ECETOC TRA Version 3 did not fulfill your requirements?

Please tick all that apply for both inhalation and dermal exposure estimates

	For Inhalation	For Dermal
I had insufficient workplace exposure information to enter all required input parameters	<input type="checkbox"/>	<input type="checkbox"/>
It was unclear how to translate my workplace information into the required input parameters	<input type="checkbox"/>	<input type="checkbox"/>
The estimates of exposure did not seem realistic for my workplace situation	<input type="checkbox"/>	<input type="checkbox"/>
The estimates of exposure were unclear or ambiguous	<input type="checkbox"/>	<input type="checkbox"/>
I could not identify a relevant PROC code for my work task	<input type="checkbox"/>	<input type="checkbox"/>

Other reason(s) - please specify

*** 3. Did you compare the results obtained from ECETOC TRA Version 3 against any actual measured data that you had available?**

	Yes	No	Not applicable
Measured inhalation exposure data?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measured dermal exposure data?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. If you did compare them, what level of agreement did the ECETOC TRA Version 3 estimates have with the measured exposures for ...

	Very good	Good	Neither good or poor	Poor	Very poor	Not applicable
Inhalation exposure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dermal exposure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

eteam - Tier 1 Models User Assessment Survey**ECETOC TRA Version 3 - Page 5**

1. In general, please tell us what you think are the strengths of ECETOC TRA Version 3 for Inhalation exposure estimation

2. In general, please tell us what you think are the limitations of ECETOC TRA Version 3 for Inhalation exposure estimation and how do you think it can be improved?

3. In general, please tell us what you think are the strengths of ECETOC TRA Version 3 for Dermal exposure estimation

4. In general, please tell us what you think are the limitations of ECETOC TRA Version 3 for Dermal exposure estimation and how do you think it can be improved?

etteam - Tier 1 Models User Assessment Survey**Use of Stoffenmanager**

***1. Have you ever used Stoffenmanager?**

Yes

No

eteam - Tier 1 Models User Assessment Survey**Stoffenmanager - Page 1***** 1. What were the main sources of information that first led you to use Stoffenmanager?****Was this via ... (please tick all that apply) ...**

- Information on legislation, official or statutory guidance (eg from REACH/ECHA, HSE, etc)
- REACH awareness sessions or similar training
- Professional recommendation of colleagues or Exposure Associations (eg BOHS, DOHS, etc)
- A meeting, conference, seminar, workshop etc
- Peer-reviewed scientific publications or papers
- The tool's own website, its publicity materials or training course
- Other Website, links, discussions (eg e-newsletters, articles/blogs, LinkedIn, Twitter etc)
- Via other published materials = (eg SHE news, industry/trade papers, in-house magazines etc)
- Other (please specify)

*** 2. Please indicate your level of knowledge regarding Stoffenmanager**

- I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations
- I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations
- I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations

*** 3. How often do you use Stoffenmanager?**

- Once a week or more
- 2-3 times per month
- once every 2-3 months
- 2-3 times per year
- Less than once a year

eteam - Tier 1 Models User Assessment Survey

Stoffenmanager - Page 2

* 1. When did you last use Stoffenmanager?

- Within the last week
 Within the last month
 Within the last 2-6 months
 Over 6 months ago

* 2. What are the main purposes for which you use Stoffenmanager (tick all that apply)

- For REACH exposure assessments,
 To determine compliance with an occupational exposure limit
 To assist in the identification of risk management measures
 Other (please specify)

* 3. Thinking about your use of Stoffenmanager, please select the category that best matches your opinion

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing Stoffenmanager on the web was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding the screen layout is ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning how to use the model for first time was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generating my required model output was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When returning to the model after a period of non-use, I found that using it again was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I made a mistake when using the model, fixing the problem was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 4. Please select the category that best reflects your opinion about help and guidance in Stoffenmanager

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
The help functions contained within the model itself, (eg comment boxes, links to additional info.) were ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The supplementary guidance provided, (eg on the model website or additional documentation) was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Please add any further comments on the user friendliness of Stoffenmanager in the box below

etteam - Tier 1 Models User Assessment Survey**Stoffenmanager - Page 3**

In the next section, we would like to know more about the process of using Stoffenmanager - please select the answer which you think best reflects your experience.

***1. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required Stoffenmanager input parameters?**

- Very easy Easy Neither easy or difficult Difficult Very difficult

***2. In general, do you think that the exposure estimates provided by the model ...**

- Greatly over-estimate exposure Appropriately over-estimate exposure Sometimes over-estimate and Sometimes under-estimate exposure Under-estimate exposure Greatly under-estimate exposure

***3. How important to you is it that the model appropriately over-estimates exposure?**

- Very important Important Neither important or unimportant Unimportant Of little importance

etteam - Tier 1 Models User Assessment Survey**Stoffenmanager - Page 4***** 1. In general, do you feel that Stoffenmanager fulfilled your requirements?**

- Yes
 No
 Don't know

2. If you answered "No", why did you feel that Stoffenmanager did not fulfill your requirements?

Please tick all that apply

- I had insufficient workplace exposure information to enter all required input parameters
 It was unclear how to translate my workplace information into the required input parameters
 The estimates of exposure did not seem realistic for my workplace situation
 The estimates of exposure were unclear or ambiguous
 I could not identify a relevant activity class for my work task

Other reason(s) - please specify

*** 3. Did you compare the results obtained from Stoffenmanager against any actual measured data that you had available?**

- Yes
 No

4. If you did compare them, what level of agreement did the Stoffenmanager estimates have with the measured exposures?

- Very good Good Neither good or poor
 Poor Very poor

etteam - Tier 1 Models User Assessment Survey**Stoffenmanager - Page 5**

1. In general, please tell us what you think are the strengths of Stoffenmanager

2. In general, please tell us what you think are the limitations of Stoffenmanager and how do you think it can be improved?

etteam - Tier 1 Models User Assessment Survey**Use of RISKOFDERM**

***1. Have you ever used the RISKOFDERM Model?**

- Yes
- No

eteam - Tier 1 Models User Assessment Survey

RISKOFDERM - Page 1

***1. What were the main sources of information that first led you to use RISKOFDERM?**

Was this via ... (please tick all that apply) ...

- Information on legislation, official or statutory guidance (eg from REACH/ECHA, HSE, etc)
- REACH awareness sessions or similar training
- Professional recommendation of colleagues or Exposure Associations (eg BOHS, DOHS, etc)
- A meeting, conference, seminar, workshop etc
- Peer-reviewed scientific publications or papers
- The tool's own website, its publicity materials or training course
- Other Website, links, discussions (eg e-newsletters, articles/blogs, LinkedIn, Twitter etc)
- Via other published materials - (eg SHE news, industry/trade papers, in-house magazines etc)
- Other (please specify)

***2. Please indicate your level of knowledge regarding RISKOFDERM**

- I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations
- I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations
- I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations

***3. How often do you use RISKOFDERM?**

- Once a week or more
- 2-3 times per month
- once every 2-3 months
- 2-3 times per year
- Less than once a year

***4. When did you last use RISKOFDERM?**

- Within the last week
- Within the last month
- Within the last 2-5 months
- Over 6 months ago

eteam - Tier 1 Models User Assessment Survey

RISKOFDERM - Page 2

*** 1. What are the main purposes for which you use RISKOFDERM (tick all that apply)**

- For REACH exposure assessments
- For quantitative risk assessments
- To assist in the identification of risk management measures
- Other (please specify)

*** 2. Thinking about your use of RISKOFDERM, please select the category that best matches your opinion**

	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult
Accessing and downloading RISKOFDERM to my computer was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding the screen layout is ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning how to use the model for first time was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generating my required model output was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When returning to the model after a period of non-use, I found that using it again was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I made a mistake when using the model, fixing the problem was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 3. Please select the category that best reflects your opinion about help and guidance in RISKOFDERM**

	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful
The help functions contained within the model itself, (eg comment boxes, links to additional info.) were ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The supplementary guidance provided, (eg on the model website or additional documentation) was ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Please add any further comments on the user friendliness of the RISKOFDERM in the box below

eteam - Tier 1 Models User Assessment Survey**RISKOFDERM - Page 3**

In the next section, we would like to know more about the process of using RISKOFDERM - please select the answer which you think best reflects your experience

***1. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required RISKOFDERM input parameters?**

- Very easy Easy Neither easy or difficult Difficult Very difficult

***2. In general, do you think that the exposure estimates provided by the model ...**

- Greatly over-estimate exposure Appropriately over-estimate exposure Sometimes over-estimate and Sometimes under-estimate exposure Under-estimate exposure Greatly under-estimate exposure

***3. How important to you is it that the model appropriately over-estimates exposure?**

- Very important Important Neither important or unimportant Unimportant Of little importance

eteam - Tier 1 Models User Assessment Survey**RISKOFDERM - Page 4***** 1. In general, do you feel that RISKOFDERM fulfilled your requirements?**

- Yes
 No
 Don't know

2. If you answered "No", why did you feel that RISKOFDERM did not fulfill your requirements?

Please tick all that apply

- I had insufficient workplace exposure information to enter all required input parameters
 It was unclear how to translate my workplace information into the required input parameters
 The estimates of exposure did not seem realistic for my workplace situation
 The estimates of exposure were unclear or ambiguous
 I could not identify a relevant process description for my work task

Other reason(s) - please specify

*** 3. Did you compare the results obtained from RISKOFDERM against any actual measured data that you had available?**

- Yes
 No

4. If you did compare them, what level of agreement did the RISKOFDERM estimates have with the measured exposures?

- Very good Good Neither good or poor
 Poor Very poor

eteam - Tier 1 Models User Assessment Survey

RISKOFDERM - Page 5

1. In general, please tell us what you think are the strengths of RISKOFDERM

2. In general, please tell us what you think are the limitations of RISKOFDERM and how do you think it can be improved?

eteam - Tier 1 Models User Assessment Survey

Conclusions and workshop participation

You have now completed all of the questions about the Exposure Models

Thank you very much for taking part in the survey, your help is very much appreciated.

1. If you would like to participate in our prize draw to win a 50€ Amazon voucher, then please provide your name and contact details below.

Name:

Email Address:

Phone Number:

2. As part of the Tier 1 model evaluation process, we would like to invite a small group of model users to participate in a workshop which will assess model reliability.

Would you be willing to participate in such a workshop?

- Yes
- No

3. If so, would you be able to attend a face-to-face event, which would be held in Edinburgh, UK, or to participate via a webinar? (please tick all that apply)

- Face-to face event in Edinburgh, UK.
- Through a Webinar

4. If you are willing to participate in either way, please provide your contact details below so that we can provide further information when it becomes available.

Name:

Email Address:

Phone Number:

If you would like any further information about the project please contact: Judith Lamb, Institute of Occupational Medicine Tel 0044 131 449 8030 or email judith.lamb@iomworld.org You can find out more about the eteam project by visiting the [eteam website](#).

Appendix 2 Supplementary Material from the Survey

Please note that the responses below are shown exactly as collected and outputted by SurveyMonkey. For accuracy, spelling and grammatical errors within responses have not been corrected.

1. What type of organisation do you work for?		
Answer Options	Response Percent	Response Count
Industry	43.7%	129
Research	9.2%	27
Consultancy	32.9%	97
Government	9.8%	29
Other (please specify)	4.4%	13
<i>answered question</i>		295

1. 'Other (please specify)'	
1	Retailor
2	Academia
3	Agency
4	National Institute
5	National association for printing ink, paint, sealers and adhesives
6	national Standardization Body
7	Helth
8	occupational medicine
9	Distribution
10	Academic Member in Governmental University
11	occupational health service (non profit)
12	Both research and consultancy
13	research and consultancy

2. How many years have you worked on occupational exposure assessment?		
Answer Options	Response Percent	Response Count
Less than 1 year	15.3%	45
1-3 years	27.8%	82
4-6 years	20.3%	60
7-10 years	8.8%	26
More than 10 years	27.8%	82
<i>answered question</i>		295

3. How would you describe your computer skills?

Answer Options	Response Percent	Response Count
Novice	5.4%	16
Intermediate	59.0%	174
Expert	35.6%	105
answered question		295

4. What age group are you in?

Answer Options	Response Percent	Response Count
18-29 years	9.8%	29
30-39 years	24.4%	72
40-49 years	31.2%	92
50-59 years	25.8%	76
60 or more years	8.8%	26
answered question		295

5. What country are you based in?

Answer Options	Response Percent	Response Count
Austria	1.0%	3
Belgium	7.5%	22
Bulgaria	0.0%	0
Canada	0.3%	1
Cyprus	0.0%	0
Czech Republic	0.3%	1
Denmark	0.3%	1
Estonia	0.0%	0
Finland	2.0%	6
France	5.4%	16
Germany	19.7%	58
Greece	0.3%	1
Hungary	0.0%	0
Ireland	0.7%	2
Italy	8.1%	24
Latvia	0.0%	0
Lithuania	0.0%	0
Luxembourg	0.3%	1
Malta	0.0%	0
Netherlands	16.3%	48
Poland	0.7%	2
Portugal	0.3%	1
Romania	0.3%	1
Slovakia	0.0%	0
Slovenia	0.3%	1
Spain	4.1%	12

Sweden	2.7%	8
United Kingdom	6.1%	18
U.S.A.	6.1%	18
Another country (please specify)	16.9%	50
answered question		295

5. Another country (please specify)

- 1 Japan
- 2 Philippines
- 3 Norway
- 4 HK
- 5 Taiwan
- 6 kenya
- 7 Egypt
- 8 Australia
- 9 south korea
- 10 Japan
- 11 Algeria
- 12 Switzerland
- 13 South Africa
- 14 Switzerland
- 15 Switzerland
- 16 South Africa
- 17 China
- 18 Switzerland
- 19 japan
- 20 Norway
- 21 Norway
- 22 Japan
- 23 Malaysia
- 24 Australia
- 25 Philippines
- 26 Switzerland
- 27 JAPAN
- 28 Japan
- 29 Japan
- 30 New Zealand
- 31 Norway
- 32 Italy
- 33 China
- 34 china
- 35 Bosnia and Herzegovina
- 36 Switzerland
- 37 India
- 38 china
- 39 Cambodia
- 40 Algeria
- 41 Norway

42	India
43	Iran
44	Switzerland
45	India
46	BRAZIL
47	Australia
48	Australia
49	South Africa
50	Switzerland

6. Have you ever used the MEASE Model?

Answer Options	Response Percent	Response Count
Yes	19.9%	58
No	80.1%	233
answered question		291

7. What were the main sources of information that first led you to use MEASE? Was this via ... (please tick all that apply) ...

Answer Options	Response Percent	Response Count
Information on legislation, official or statutory guidance (eg from REACH/ECHA, HSE, etc)	38.2%	21
REACH awareness sessions or similar training	18.2%	10
Professional recommendation of colleagues or Exposure Associations (eg BOHS, DOHS, etc)	27.3%	15
A meeting, conference, seminar, workshop etc	27.3%	15
Peer-reviewed scientific publications or papers	5.5%	3
The tool's own website, its publicity materials or training course	18.2%	10
Other Website, links, discussions (eg e-newsletters, articles/blogs, Linked-in, Twitter etc)	9.1%	5
Via other published materials – (eg SHE news, industry/trade papers, in-house magazines etc)	5.5%	3
Other (please specify)	18.2%	10
answered question		55

7. Other (please specify)

- 1 Recommendation of REACH Copper Consortium secretariat
- 2 supplier
- 3 work in metal TREACH consortia and introduction by Eurometaux
- 4 Exposure scenario
- 5 SDS
- 6 University course
- 7 Guidance on information requirements and chemical safety assessment
- 8 Supplier of chemicals pointed it out to me.

- 9 Need to rework assessments performed with MEASE in CSRs for REACH dossiers
10 Contact form developer

8. Please indicate your level of knowledge regarding MEASE

Answer Options	Response Percent	Response Count
I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations	23.6%	13
I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations	50.9%	28
I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations	25.4%	14
answered question		55

9. How often do you use MEASE?

Answer Options	Response Percent	Response Count
Once a week or more	1.8%	1
2-3 times per month	10.9%	6
once every 2-3 months	20.0%	11
2-3 times per year	41.8%	23
Less than once a year	25.4%	14
answered question		55

10. When did you last use MEASE?

Answer Options	Response Percent	Response Count
Within the last week	5.4%	3
Within the last month	23.6%	13
Within the last 2-5 months	36.3%	20
Over 6 months ago	34.5%	19
answered question		55

11. What are the main purposes for which you use MEASE (tick all that apply)

Answer Options	Response Percent	Response Count
For REACH exposure assessments	76.5%	39
To determine compliance with an occupational exposure limit	33.3%	17
To assist in the identification of risk management measures	21.6%	11
Other (please specify)	3.9%	2
answered question		51

11. Other (please specify)

- 1 trial and evaluating the model
- 2 to prioritize substances for workplace measurements on our sites

12. Thinking about your use of MEASE, please select the category that best matches your opinion						
Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Response Count
Accessing and downloading the MEASE model to my computer was ...	38	9	4	0	0	51
Understanding the screen layout is ...	21	24	4	2	0	51
Learning how to use the model for first time was ...	11	27	10	2	1	51
Generating my required model output was ...	11	22	16	2	0	51
When returning to the model after a period of non-use, I found that using it again was ...	13	25	10	3	0	51
If I made a mistake when using the model, fixing the problem was ...	9	23	18	1	0	51
answered question						51

13. Please select the category that best reflects your opinion about help and guidance in the MEASE model						
Answer Options	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful	Response Count
The help functions contained within the model itself, (eg comment boxes, glossary, links to additional info.) were ...	6	26	18	0	1	51
The supplementary guidance provided, (eg on the model website or additional documentation) was ...	5	26	15	4	1	51
answered question						51

14. Please add any further comments on the user friendliness of MEASE in the box below

Answer Options	Response Count
	9
<i>answered question</i>	9

14. Response Text

- 1 straightforward and easy to use
- 2 only one substance at a time
- 3 Very user friendly model. The only disadvantage is that you have to model 1 agent at a time, it take a while for a complete risk assessment.
- 4 Easy to use but unclear of foundation of the model
- 5 It is not so easy to understand the applicability domain and to identify the differences to ECETOC TRA or EASE
- 6 The basic guidance on MEASE is quite helpful and easy to use, however, I would have appreciated a more detailed documentation on the way calculations are performed in MEASE and which data basis is included (maybe comparable to the ConsExpo manual). Furthermore I have the impression that probably not all combinations possible in MEASE are meaningful, e.g. a PROC that corresponds to a manual process in combination with "non direct handling" or "contact level: none". Therefore I think that some of the different options for selection could be explained a bit more, maybe with the use of scenario examples.
- 7 It's been awhile since I last used the tool so I can't recall very much about its friendliness.
- 8 I like the colour codes on relevance
- 9 Documentation helpfull but not sufficient!
Background information on indicative values, reducing factors, algorithm etc. are not published - limitations not sufficiently provided!

15. Have you used MEASE to estimate dermal exposure and / or inhalation exposures? (tick all that apply)

Answer Options	Response Percent	Response Count
Dermal exposure	70.2%	33
Inhalation exposure	91.5%	43
<i>answered question</i>		47

16. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required MEASE input parameters for inhalation or dermal estimates?

Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Not applicable	Response Count
Inhalation exposure	4	20	14	3	1	1	43
Dermal exposure	1	17	13	1	1	0	33
<i>answered question</i>							43

17. In general, do you think that the exposure estimates provided by the model ...

Answer Options	Greatly over-estimate exposure	Appropriately over-estimate exposure	Sometimes over-estimate and Sometimes under-estimate exposure	Under-estimate exposure	Greatly under-estimate exposure	Not applicable	Response Count
Inhalation exposure	5	27	12	1	0	2	47
Dermal exposure	4	18	14	2	0	9	47
<i>answered question</i>							47

18. How important to you is it that the model appropriately over-estimates exposure?

Answer Options	Very important	Important	Neither important or unimportant	Unimportant	Of little importance	Not applicable	Response Count
Inhalation exposure	3	25	14	2	1	2	47
Dermal exposure	2	22	14	2	0	7	47
<i>answered question</i>							47

19. In general, do you feel that MEASE fulfilled your requirements?		
Answer Options	Response Percent	Response Count
Yes	62.2%	28
No	20.0%	9
Don't know	17.8%	8
answered question		45

20. If you answered "No", why did you feel that MEASE did not fulfill your requirements? Please tick all that apply for both inhalation and dermal exposure estimates			
Answer Options	Inhalation	Dermal	Response Count
I had insufficient workplace exposure information to enter all the required input parameters	2	1	2
It was unclear how to translate my workplace information into the required input parameters	2	2	3
The estimates of exposure did not seem realistic for my workplace situation	5	4	6
The estimates of exposure were unclear or ambiguous	4	2	4
I could not identify a relevant PROC code for my work task	3	1	3
Other reason(s) - please specify			3
answered question			11

20. Other reason(s) - please specify

- 1 Dermal challenge estimates well below published values in peer reviewed journals
- 2 the commonalities and differences with the ECETOC TRA Model should be discussed more in detail. The goal should be to highlight, at which situation it is recommended to use MEASE instead of ECETOC TRA.
- 3 insufficient information about definitions and influence of choices/options

21. Did you compare the results obtained from MEASE against any actual measured data that you had available?				
Answer Options	Yes	No	Not applicable	Response Count
Measured inhalation exposure data?	25	13	7	45
Measured dermal exposure data?	7	24	14	45
answered question				45

22. If you did compare them, what level of agreement did the MEASE estimates have with the measured exposures for ...							
Answer Options	Very good	Good	Neither good or poor	Poor	Very poor	Not applicable	Response Count
Inhalation exposure?	0	8	6	9	2	7	32
Dermal exposure?	0	3	2	2	0	19	26
<i>answered question</i>							32

23. In general, please tell us what you think are the strengths of MEASE for Inhalation exposure estimation

Answer Options	Response Count
	23
<i>answered question</i>	23

23. Response Text

- 1 the only one for metals specifically
- 2 user friendly
- 3 Easy to use and only few parametrs from occupational conditions needed
- 4 easy to use
- 5 Very good estimation of the exposure, compared with sampling data (I only use the model in metal workers exposure - maybe that is the reason for above)
- 6 It takes the characterisitcs of dust exposure reasonably well into account. It has reasonably conservative assumptions for easy modifying factors on the Tier 1 level.
- 7 Reasonably conservative estimates of exposure
- 8 easy to use
- 9 simple, easy
- 10 Inhalation exposure is easy to calculate and the input screen is easy to handle.
- 11 easy to use, reliable results.
- 12 The ability of the tool to assess exposure for emtals and inorganic chemicals.
- 13 useful if no monitoring data are available, international validity (cfr US EPA etc)
- 14 Easy to use
- 15 Easy to use
- 16 MEASE integrates both physical form of the substance as well as a selection of RMM - including efficiencies (e.g. RPE).
- 17 Easy and quick estimation of exposure.
- 18 I can't really say because in the end, I did not use the tool. I think overall, the tool's strength is that it is supposedly based on data for a specific sector.
- 19 Easy to use.
- 20 conservative but not unrealistic worst case good fitting for metals PROCs allows to have a good overview of the operational conditions, RMMs and exposure determinants in one go
- 21 Quick, mostly no under estimation compared to measuring data
- 22 Model "speaks REACH", i.e., it uses use descriptor system. Therefore it is easy to use for registration purposes, or at least for some screening.
- 23 Metal-specificity

24. In general, please tell us what you think are the limitations of MEASE for Inhalation exposure estimation and how do you think it can be improved?

Answer Options	Response Count
	19
<i>answered question</i>	19

24. Response Text

- 1 for solids, there are only powders
- 2 over estimation to big. One substance at a time
- 3 Not very usefull to predicht mixture solvent exposure
- 4 As for all Tier 1 models the refinement methods and detailed entry conditions are limited, but for a generic assessment this is ok. Some additional OC/RMM could perhaps be featured in.
- 5 Too limited in being able to adjust parameters and exposure modifiers
- 6 I have stated it in the last page: the commonalities and differences with the ECETOC TRA Model should be discussed more in detail. The goal should be to highlight, at which situation it is recommended to use MEASE instead of ECETOC TRA. Obviously both models are closely related.
- 7 poor description of workplace
- 8 It appears that the inhalation exposure is underestimated for compounds other than metal salts/metal oxides and which are in the liquid state.
- 9 AS with all tools overestimation is a problem, could also add more information regarding different factors that may effect exposure (e.g. outdoor setting etc)
- 10 Limited Tier 2 possibilities, no automatic assessment for high temperature processes.
- 11 overestimation of exposure, no correction for particle size/inhalability
Improvement will be difficult (due to substance specificities)
- 12 Limited
- 13 Results of MEASE are questionable, as in some instances, it underpredicted exposure when compared to actual measured data.
- 14 For spray scenarios (PROC7) ans dust generation by e.g. grinding the assumptions appear to simple to me.
- 15 As is also the case with EASE and ECETOC TRA it is not clear to what extend measured values have been used to establish exposure values.
- 16 still too overpredictive for more hazardous metals. It may be improved by further populating the database behind MEASE with additional data. However, at the same this encourages either to go to monitoring as refinement, which is in most cases justified
- 17 It is "quick and dirty" effects of ppe and other work variabeles are

- limited
- 18 EASE on the background is quite coarse, but if it is ok for REACH requirements, why not. Idea of emphasizing exposure in risk assessment dries off when exposure is assessed with models with this level of sophistication.
- 19 PROC codes

25. In general, please tell us what you think are the strengths of MEASE for Dermal exposure estimation

Answer Options	Response Count
	13
<i>answered question</i>	13

25. Response Text

- 1 the only one for metals specifically
- 2 The link with the PROC's and the' estimated DNELS.
- 3 It seems to lead to relatively reasonable results, although actual measurements of dermal exposure are limited for comparison and also have methodological difficulties. It is good to have a tool that can predict dermal exposure to compare with dermal DNELS. ART for example does not cover dermal exposure.
- 4 None
- 5 NA
- 6 Dermal exposure is easy to calculate and the input screen is easy to handle.
- 7 The ability of the tool to assess exposure for emtals and inorganic chemicals.
- 8 cfr above
- 9 Easy to use
- 10 Easy and quick estimation of exposure.
- 11 Easy to use.
- 12 Estimates are still conservative (Tier 1 tool) but we can do something with it (not the case with ECETOC TRA generating unrealistic estimates for scenarios where dermal contact would result in very severe injuries)
- 13 Based on measured data

26. In general, please tell us what you think are the limitations of MEASE for Dermal exposure estimation and how do you think it can be improved?

Answer Options	Response Count
	10
<i>answered question</i>	10

26. Response Text

- 1 based one EASE, under-estimate the dermal exposure
- 2 no idea - very difficult to compare with actual data.
- 3 Again some more sophisticated RMM and OC could be featured in, but a validation against measured data may be difficult.
- 4 Not realistic - very low estimates of dermal challenge - further adjustment through modifying factors such as dermal absorption values will lead to ridiculously low results. There needs to be recognition that dermal challenge is much higher but that other modifiers have a part to play in predicting exposure.
- 5 the definition of exposed area not flexible
- 6 It appears that the dermal exposure is underestimated for compounds other than metal salts/metal oxides and which are in the liquid state.
- 7 Limited Tier 2 possibilities.
- 8 As is also the case with EASE and ECETOC TRA it is not clear to what extent measured values have been used to establish exposure values.
- 9 works by bands. Could be refined with more data in the database but currently measurements are not performed on a routine basis...
- 10 Hard to understand some of the required parameters.

27. Have you ever used the EMKG-EXPO-TOOL?

Answer Options	Response Percent	Response Count
Yes	18.4%	50
No	81.6%	222
<i>answered question</i>		272

28. What were the main sources of information that first led you to use EMKG-EXPO-TOOL? Was this via ... (please tick all that apply) ...

Answer Options	Response Percent	Response Count
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc)	53.2%	25
REACH awareness sessions or similar training	38.3%	18
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc)	10.6%	5
A meeting, conference, seminar, workshop etc	34.0%	16
Peer-reviewed scientific publications or papers	4.3%	2
The tool's own website, its publicity materials or training course	17.0%	8
Other Website, links, discussions (e.g. e-	4.3%	2

newsletters, articles/blogs, Linked-in, Twitter etc)		
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc)	4.3%	2
Other (please specify)	2.1%	1
answered question		47

28. Other (please specify)

1 Via BAuA itself

29. Please indicate your level of knowledge regarding the EMKG-EXPO-TOOL

Answer Options	Response Percent	Response Count
I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations	17.0%	8
I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations	51.1%	24
I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations	31.9%	15
answered question		47

30. How often do you use the EMKG-EXPO-TOOL?

Answer Options	Response Percent	Response Count
Once a week or more	4.3%	2
2-3 times per month	6.4%	3
once every 2-3 months	12.8%	6
2-3 times per year	31.9%	15
Less than once a year	44.7%	21
answered question		47

31. When did you last use the EMKG-EXPO-TOOL?

Answer Options	Response Percent	Response Count
Within the last week	4.3%	2
Within the last month	17.0%	8
Within the last 2-5 months	29.8%	14
Over 6 months ago	48.9%	23
answered question		47

32. What are the main purposes for which you use the EMKG-

EXPO-TOOL (tick all that apply)

Answer Options	Response Percent	Response Count
For REACH exposure assessments,	47.7%	21
To determine compliance with an occupational exposure limit	27.3%	12
To assist in the identification of risk management measures	34.1%	15
Other (please specify)	22.7%	10
<i>answered question</i>		44

32. Other (please specify)

- 1 GPS risk assessment
- 2 I am not using this model any longer
- 3 To estimate occupational exposures
- 4 comparison with other tools
- 5 To fill gaps for not yet registered substances, to compare versus ECETOC and Stoffenmanager
- 6 Pre-screening
- 7 educational purposes
- 8 for research purposes
- 9 To estimate occupational exposures
- 10 to test it for REACH exposure assessment

33. Thinking about your use of the EMKG-EXPO-TOOL, please select the category that best matches your opinion

Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Response Count
Accessing and downloading the EMKG-EXPO-TOOL to my computer was ...	16	24	4	0	0	44
Understanding the screen layout is ...	5	28	10	1	0	44
Learning how to use the model for first time was ...	6	23	13	2	0	44
Generating my required model output was ...	3	28	11	2	0	44
When returning to the model after a period of non-use, I found that using it again was ...	4	30	9	1	0	44
If I made a mistake when using the model, fixing the problem was ...	4	27	11	2	0	44
<i>answered question</i>						44

34. Please select the category that best reflects your opinion about the help and guidance in the EMKG-EXPO-TOOL

Answer Options	Response Percent	Response Count
Very helpful	13.6%	6
Helpful	43.2%	19
Neither helpful or unhelpful	34.1%	15
Unhelpful	9.1%	4
Very unhelpful	0.0%	0
<i>answered question</i>		44

35. Please add any further comments on the user friendliness of the EMKG-EXPO-TOOL in the box below

Answer Options	Response Count
	9
<i>answered question</i>	9

35. Response Text

- 1 practical tool for shop floor assessment
- 2 too simple for REACH exposure assessments
- 3 I am not using this model any longer, because it seemed to us not being precise enough
- 4 It is not possible to keep records in the excel sheet. Records have to be kept in another file.
- 5 in German - not easy to use --- gives indication on risk class
- 6 Of limited use for our REACH purposes.
- 7 The tool is too basic for REACH purposes. The level of guidance provided does not allow a user to refine the assumptions within the tool, so in the end, it was not used in my case. I assessed it >3 years ago so can only remember its functionality from memory.
- 8 it would be better if it shows a link to CGS website
- 9 I think is a easy to use model for exposure estimation but not as robust as other are

36. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required EMKG-EXPO-TOOL input parameters

Answer Options	Response Percent	Response Count
Very easy	0.0%	0
Easy	43.2%	19
Neither easy or difficult	36.4%	16
Difficult	20.4%	9
Very difficult	0.0%	0
<i>answered question</i>		44

37. In general, do you think that the exposure estimates provided by the model ...

Answer Options	Response Percent	Response Count
Greatly over-estimate exposure	22.7%	10
Appropriately over-estimate exposure	36.4%	16
Sometimes over-estimate and Sometimes underestimate exposure	36.4%	16
Under-estimate exposure	4.6%	2
Greatly under-estimate exposure	0.0%	0
<i>answered question</i>		44

38. How important to you is it that the model appropriately over-estimates exposure?

Answer Options	Response Percent	Response Count
Very important	6.8%	3
Important	63.6%	28
Neither important or unimportant	20.4%	9
Unimportant	6.8%	3
Of little importance	2.3%	1
answered question		44

39. In general, do you feel that the EMKG-EXPO-TOOL fulfilled your requirements?

Answer Options	Response Percent	Response Count
Yes	43.2%	19
No	50.0%	22
Don't know	6.8%	3
answered question		44

40. If you answered "No", why did you feel that the EMKG-EXPO-TOOL did not fulfill your requirements? Please tick all that apply

Answer Options	Response Percent	Response Count
I had insufficient workplace exposure information to enter all required input parameters	20.0%	4
It was unclear how to translate my workplace information into the required input parameters	45.0%	9
The estimates of exposure did not seem realistic for my workplace situation	50.0%	10
The estimates of exposure were unclear or ambiguous	30.0%	6
Other reason(s) - please specify		3
answered question		20

40. Other reason(s) - please specify

- 1 Substances in complex mixtures are not appropriately reflected
- 2 Not task based.
- 3 Mainly because the tool is too basic for REACH purposes

41. Did you compare the results obtained from the EMKG-EXPO-TOOL against any actual measured data that you had available?

Answer Options	Response Percent	Response Count
Yes	29.5%	13
No	70.5%	31
answered question		44

42. If you did compare them, what level of agreement did the EMKG-EXPO-TOOL estimates have with the measured exposures?

Answer Options	Response Percent	Response Count
Very good	0.0%	0
Good	46.2%	6
Neither good or poor	30.8%	4
Poor	23.1%	3
Very poor	0.0%	0
answered question		13

43. In general, please tell us what you think are the strengths of the EMKG-EXPO-TOOL

Answer Options	Response Count
	27
answered question	27

43. Response Text

- 1 simple excel sheet
- 2 easy to use, transparent, based on R-phrases, so also applicable to formulations
- 3 not very helpful, overestimate most of situations
- 4 simple to use
- 5 it satisfied the needs of our customer
- 6 If you are using a lot of different chemicals, EMKG assists with very useful strategies to implement a control banding system, which leads to a condensed number of technical, organisational and other RMM.
- 7 Good exposure and RMM screening tool
- 8 Very easy to use
- 9 Easy to use. Quick to have results.
- 10 conservative assessment of exposure, look up tables
- 11 easy to use
- 12 Simple and fast to use
- 13 Simple format, very easy to understand and use, limitations are clear up front but leave the user wondering if it is worth proceeding !
- 14 no interest
- 15 easy to use
- 16 May be useful to fill gaps if no complete information about critical substances/lead substances is available.

- 17 easy to use
- 18 Simple. Perhaps useful where no clear identifiable task based information available, and trying to estimate a "general background".
- 19 It's very easy to use. A few clicks and you get the results
- 20 very easy
- 21 Simple and easy to use
- 22 easy and simple to use
- 23 Straightforward, simple and understandable outputs, some useful solutions
- 24 It is very easy to use and the parameters to choose from are clearly visible.
- 25 Not interested any more
- 26 user-friendliness
- 27 Easy to use and interpret

44. In general, please tell us what you think are the limitations of the EMKG-EXPO-TOOL and how do you think it can be improved?

Answer Options	Response Count
	22
<i>answered question</i>	22

44. Response Text

- 1 systematic
- 2 only inhalation workers, based on R-phrases - only as correct as the classification
- 3 lack of US familiarity
- 4 As I know, the "Schutzleitfäden" are not validated at the moment
- 5 Fully sufficient for its screening purpose. However, integration of RiskofDerm would be great to get the total exposure
- 6 it seemed to be not precise enough
- 7 Very generic situations. In the case of liquids It is more common to have the boiling point than the vapour pressure. Could this parameter be more relevant?
- 8 refinement for ventilation, containment
- 9 EMKG gives bandwidths of inhalation exposure, but only the upper boundary is relevant for REACH. Since dermal exposure is not covered, a second model always has to be employed. Why would one not use TRA and cover both routes in one go?
- 10 Too generic; work practice should be separated form controls; allowance for use of respiratory protection should also be included; assumes controls are effective - would be useful to modify factors applied from visual observations of work area - spillages, releases, etc
- 11 Predicted exposures too broad to be useful for other purposes than orientation and general RMMs
- 12 DPC classification rules for mixtures containing hazardous substances may lead to a mismatch (e.g. 19 %/25 % of an

- irritant/harmful substance may not trigger an irritant/harmful mixture. However REACH expects to assess irritant/harmful substances in mixtures as of 1 % content (declaration threshold). Somehow ambiguous with regard to dermal impact. Unclear with regard to acceptance of personnel protection equipment.
- 13 limitation of inputs
- 14 No dermal exposure calculated. Not useful for task based exposure assessments.
- 15 Too basic for REACH, no possibility to refine assessment.
- 16 no dermal module
- 17 the range of exposure prediction is too wide which typically cause over-estimation
- 18 might be useful to allow some additional in/out for conditions of use
- 19 Application really OK for some substance types. Good for volatiles but treatment of solid substances variable
- 20 Not interested anymore
- 21 no possible use for CMRs as too conservative
- 22 More realistic situations, mainly energy of the process

45. Have you ever used Version 2 of the ECETOC TRA?

Answer Options	Response Percent	Response Count
Yes	59.2%	151
No	40.8%	104
answered question		255

46. What were the main sources of information that first led you to use the ECETOC TRA Version 2? Was this via ... (please tick all that apply) ...

Answer Options	Response Percent	Response Count
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc)	54.2%	78
REACH awareness sessions or similar training	41.7%	60
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc)	25.0%	36
A meeting, conference, seminar, workshop etc	29.2%	42
Peer-reviewed scientific publications or papers	6.2%	9
The tool's own website, its publicity materials or training course	23.6%	34
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc)	7.6%	11

Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc)	3.5%	5
Other (please specify)	8.3%	12
answered question		144

46. Other (please specify)

- 1 Different Consortia that I participated
- 2 it is a quiet well know program
- 3 Involvement in the ECETOC TRA TF who developed the model
- 4 Company membership of ECETOC
- 5 education program on occupational health
- 6 University course
- 7 eSDS
- 8 In-house information about development of ECETOC tools
- 9 not used it
- 10 On original Task Force
- 11 Recommendations from other REACH colleagues
- 12 As a downstream user I was forced to use it for scaling, being the model used by the registrant

47. Please indicate your level of knowledge regarding the ECETOC TRA Version 2

Answer Options	Response Percent	Response Count
I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations	27.1%	39
I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations	43.1%	62
I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations	29.9%	43
answered question		144

48. How often do you use the ECETOC TRA Version 2?

Answer Options	Response Percent	Response Count
Once a week or more	17.4%	25
2-3 times per month	22.2%	32
once every 2-3 months	27.8%	40
2-3 times per year	23.6%	34
Less than once a year	9.0%	13
answered question		144

49. When did you last use the ECETOC TRA - Version 2?

Answer Options	Response Percent	Response Count
Within the last week	23.6%	34
Within the last month	29.2%	42
Within the last 2-5 months	30.6%	44
Over 6 months ago	16.7%	24
answered question		144

50. What are the main purposes for which you use the ECETOC TRA - Version 2 (tick all that apply)

Answer Options	Response Percent	Response Count
For REACH exposure assessments,	73.7%	101
To determine compliance with an occupational exposure limit	24.1%	33
To assist in the identification of risk management measures	29.2%	40
Other (please specify)	14.6%	20
answered question		137

50. Other (please specify)

- 1 For GPS/JIPS risk assessment
- 2 GPS
- 3 Biocides
- 4 research project on Tiered approach to consumer exposure assessment
- 5 Biocides exposure assessment
- 6 I teach on how to evaluate substances in REACH dossiers (including use of ECETOC TRA)
- 7 to asses the risk for human exposure at a release of chemicals calamity
- 8 to evaluate this tool in comparison with the corporate one
- 9 To estimate exposures
- 10 Evaluation of the system and introduction to the Japanese Colleague
- 11 compare different scenarios to reduce exposure
- 12 to comply with local legislation
- 13 exposure estimation
- 14 To modify substance content and operational conditions at customer sites in order to ensure RCR < 1
- 15 not used
- 16 To estimates exposures
- 17 Scaling calculations
- 18 for comparison with other tools
- 19 Compliance with exposure scenarios annexed to the eSDS
- 20 To screen compounds as for identification of problematic substances

51. Thinking about your use of the ECETOC TRA Version 2 please select the category that best matches your opinion

Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Response Count
Accessing and downloading the ECETOC TRA Version 2 to my computer was ...	49	72	10	6	0	137
Understanding the screen layout is ...	15	63	36	20	3	137
Learning how to use the model for first time was ...	7	56	39	33	2	137
Generating my required model output was ...	9	58	41	25	4	137
When returning to the model after a period of non-use, I found that using it again was ...	14	70	37	15	1	137
If I made a mistake when using the model, fixing the problem was ...	6	53	49	25	4	137
<i>answered question</i>						137

52. Please select the category that best reflects your opinion about help and guidance in the ECETOC TRA Version 2

Answer Options	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful	Response Count
The help functions contained within the model itself, (e.g. comment boxes, links to additional info.) were...	6	71	43	15	2	137
The supplementary guidance provided, (eg on the model website or additional documentation) was ...	13	77	38	7	2	137
<i>answered question</i>						137

53. Please add any further comments on the user-friendliness of the ECETOC TRA Version 2 in the box below

Answer Options	Response Count
	42
<i>answered question</i>	42

53. Response Text

- 1 I prefer using the look-up tables and do my own calculations under the tool logic, rather than having the tool do this.
- 2 not very flexible.
- 3 slow EXCEL sheet
- 4 not always easy to store results
- 5 I didn't read the additional documentation. One of my colleagues who has participated to your courses showed me how to use the program.
- 6 Slow performance, labour intensive when entering all scenarios, small space for entering all scenarios for one substance
- 7 complicated to get use to handling the model in a conformable way. I do not use it very often and always need to read the help function to remember how it works
- 8 The integrated tool was not beneficial to my workflow. We mainly use the worker tools as the integrated tool would take too long to generate the required exposure estimations. Shame the standalone worker tool was not carried forward to version 3. For this reason, we will not be using the version 3 of the tool. Rather we have developed our own standalone worker tool.
- 9 the lay-out is mind-boggling and chaotic
- 10 Very easy to learn. One of our standard tools to get fast estimations
- 11 easy to use and fast results
- 12 Method of entering data is labour intensive, performance is slow, space is limited
- 13 need a Japanese version
- 14 The calculation takes too many seconds. It is conspicuous comparing with CHESAR. It is not transparency because the detail program source is closed by the password and I cannot trace the program code.
- 15 When downloading it was not working. At the Ecetoc conference the problem was solved but still very difficult to use. Training is needed to use this model.
- 16 ECETOC TRA was designed as a concept and not intended as a ready to use tool. Therefore, it suffers from its design and cannot be regarded as user friendly. However if one knows where to look it is at least fully transparent. A problem is that there are difficulties to get it work with different excel-versions.
- 17 Too much conservative respect to the monitoring results. Exposure modifiers are not enough. Ventilation: only yes or nor. In some cases, difficulties to identify the proper PROC

- 18 It has been easy to use with the exception of some data-entry limitations for certain fields that were not obvious. If data was entered in the wrong format, the model would not run.
- 19 long duration for running the program, unable to use other office software while it runs
- 20 Easy to use and aligned with REACH requirements - but easy to misuse too.
- 21 Only the stand-alone tools are user-friendly
- 22 The screen layout is just terrible and one needs a lot of time to find the actual model output. Dilutions, gloves etc. all have to be accounted for manually.
- 23 As a novice user it went rather well.
- 24 system is easy to use for Tier 1 --- for tier 2, it is more difficult
- 25 Retrieval of already calculated exposure scenarios is inconvenient. It would be an improvement to have the possibility to load calculated exposure estimations onto the input screen again.
- 26 I would identify it as a applicable and further a no nonsense tool.
- 27 Integrated version: still quite easy to handle for what you get (i.e. quite user-friendly); good that it's implemented in MS Excel
- 28 Problem is, guidance and any information are only in English available
- 29 The flashing screens when calculating exposures is annoying.
- 30 The main negative points against the user-friendliness of the ECETOC TRA version 2 are: (i) the need to make a fresh run/entry is one wish to change some input parameters e.g. DNEL for the same substance.(ii) Manual correction for use of gloves and concentration of substance in product for dermal exposure.
- 31 Above only applies for the worker part. Many excel tools were provided by industry and industry associations which made the use even easier.
- 32 Insufficient information on the impact of some of the advanced modelling variables on the output.
- 33 standalone for worker is friendly, but not the integrated version
- 34 Worker tool is user-friendly. Combined tool is a dogs breakfast.
- 35 I want to comment that I am referring to the integrated version of the tool and not the stand-alone version.
- 36 The inclusion of the basic base exposure estimates within the tool is a really welcome feature versus other tools that appear to be more of a 'black box'
- 37 A major problem is that the TWA-8 h exposure cannot be calculated for a specific function! A worker often executes more than one PROC a day! So the way ART is working is more like the real situation.
- 38 The excel format is not giving a good overview. I prefer to use the Easy TRA, which is based on the ECETOC TRA, but have a more user-friendly layout.
- 39 To change volatility you have to "clear all" ant then re-input all the section.

CAS number must be entered any time without any active role in

- the calculations
- 40 slow and a bit too much black box. Low degree of customization
- 41 It's a robust model but the interface in excel looks poor. It will be better to have a web based tool like ART
- 42 The TRAM excel sheet is very easy. I found the pages where additional parameters could be selected not very useful and no guidance was given.

54. Have you used the ECETOC TRA Version 2 to estimate dermal exposure and / or inhalation exposures? (tick all that apply)

Answer Options	Response Percent	Response Count
Dermal exposure estimates	76.5%	101
Inhalation exposure estimates	96.2%	127
<i>answered question</i>		132

55. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required ECETOC TRA Version 2 input parameters for inhalation or dermal estimates?

Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Not applicable	Response Count
Inhalation exposure	7	61	39	13	2	5	127
Dermal exposure	7	41	28	17	3	5	101
	<i>answered question</i>						132

56. In general, do you think that the exposure estimates provided by the model ...

Answer Options	Greatly over-estimate exposure	Appropriately over-estimate exposure	Sometimes over-estimate and Sometimes under-estimate exposure	Under-estimate exposure	Greatly under-estimate exposure	Not applicable	Response Count
Inhalation exposure	19	65	37	1	0	10	132
Dermal exposure	21	46	36	2	0	27	132
	<i>answered question</i>						132

57. How important to you is it that the model appropriately over-estimates exposure?

Answer Options	Very important	Important	Neither important or unimportant	Unimportant	Of little importance	Not applicable	Response Count
Inhalation exposure	13	83	25	3	0	8	132
Dermal exposure	8	75	22	4	0	23	132
	<i>answered question</i>						132

58. In general, do you feel that the ECETOC TRA Version 2 fulfilled your requirements?

Answer Options	Response Percent	Response Count
Yes	64.1%	82
No	25.8%	33
Don't know	10.2%	13
answered question		128

59. If you answered "No", why did you feel that the ECETOC TRA Version 2 did not fulfill your requirements? Please tick all that apply for both inhalation and dermal exposure estimates

Answer Options	For Inhalation	For Dermal	Response Count
I had insufficient workplace exposure information to enter all required input parameters	8	9	10
It was unclear how to translate my workplace information into the required input parameters	10	10	13
The estimates of exposure did not seem realistic for my workplace situation	19	17	25
The estimates of exposure were unclear or ambiguous	10	9	13
I could not identify a relevant PROC code for my work task	12	7	12
Other reason(s) - please specify			11
answered question			38

59. Other reason(s) - please specify

- 1 We tried to adapt ECETOC TRA for the assessment of consumer exposure via cosmetics and personal care products
- 2 Consumer part: unrealistic vapour bands, no outdoor exposure for consumer, instant release for vapour is too conservative
- 3 takes just a whole lot of concentration and time to understand what fields to fill out where and how the application works. in other words: not user friendly enough..
- 4 control means seem not enough taken in account
- 5 We found that estimated exposure for high volatility substances (near end of middle range) not always overestimates.
- 6 Validation for dermal particularly poor. Predicts very erratically and fails to take account of most dermal challenge beyond hands and arms in many cases
- 7 I compared the results obtained with de results in stoffenmanager and there a big difference in the estimated exposure
- 8 Overestimates of exposure grow as vapour pressure reduces.
- 9 FE the technical services is not covered by a PROC, but it is generally known that exposures are high

- 10** Limited control measures possibilities
11 To great overestimation results in that safe use cannot be shown and another tool is needed.

60. Did you compare the results obtained from ECETOC TRA Version 2 against any actual measured data that you had available?

Answer Options	Yes	No	Not applicable	Response Count
Measured inhalation exposure data?	54	54	20	128
Measured dermal exposure data?	18	72	38	128
<i>answered question</i>				128

61. If you did compare them, what level of agreement did the ECETOC TRA Version 2 estimates have with the measured exposures for ...							
Answer Options	Very good	Good	Neither good or poor	Poor	Very poor	Not applicable	Response Count
Inhalation exposure?	2	21	14	15	2	0	54
Dermal exposure?	0	6	5	6	1	0	18
<i>answered question</i>							54

62. In general, please tell us what you think are the strengths of ECETOC TRA Version 2 for Inhalation exposure estimation

Answer Options	Response Count
	70
<i>answered question</i>	70

62. Response Text

- 1 simple excel sheet, authorized by ECHA, small data requirements
- 2 The estimates work best when seen as task-related. From a task-profile one can then construct a shift exposure estimate if needed.
- 3 Algorithm is clear and transparent
- 4 Use descriptors have been integrated to the tool. It is easy to use
- 5 conservative approach, ensures compliance with few data
- 6 an easy interface to add data
- 7 Simple to use
- 8 large scale model
- 9 Systematic way to use for REACH (PROC's)
- 10 Fairly easy to work with; I actually only used it for workplace exposure estimations
- 11 Possibility to change the parameters for the mask, gloves and ventilation after the evaluation
- 12 Easy to use the broad category approach with a PROC code
- 13 simply and fast
- 14 Simple
- 15 it is free and it is generally accepted
- 16 Easy to handle. We are using it for REACH-registration. In case we get a save use with the result of ECTEOC we are sure that the model is conservative enough to cover most of possible variations of uses. In case we will get "no save use" we are changing to Stoffenmanager or Advanced Reach Tool (ART)
- 17 Good Tier 0-1 screening with sufficient selectable detail of workplace situation
- 18 Easy to use and only few parameters from occupational conditions needed
- 19 easy use, fast results
- 20 General broad category approach with use of PROC's. Easy to use, little information required from downstream users.
- 21 after reading manual it is very simple to use. It has the possibility to determine consumers exposure (non workers)
- 22 Useful for REACH and Hygienic evaluations
- 23 It is an tool to conservatively estimate exposures for a generic exposure scenario under REACH and errs on the safe side. It prioritises those exposure situations where a more in depth analysis is needed.
- 24 Easy to use and to generate several exposure scenarios i a short time
- 25 Simple, allows for consistent communication in the supply chain, aligns with REACH process categories.

- 26 ventilation, identifying worst case PROCs for worker activities, exposure
- 27 I do not trust the results since they rely on measurements done without full control of the parameters.
- 28 Easy to use
- 29 ECETROC TRA v2 provides a tool to prioritize, focus on dangerous substances with the greater health risks.
- 30 Quick and easy and probably realistic in many cases
- 31 simplicity
- 32 Provides base exposure estimate and requires only very limited knowledge about real exposure situation, information about both very often not available
- 33 easy to use
- 34 Links with PROCs, use of dustiness / volatility, comparison with reference values,
- 35 Simple and direct implementation of REACH use descriptors
- 36 I have not used it for this task yet although I will be in the future.
- 37 Simplicity of Use
- 38 very easy - results clear
- 39 very easy and quick to use
- 40 when learnt, it provides easy access to generate data
- 41 Entering PROCs for instance and working conditions (RPE, appearance) is easy. Calculations are easy to perform as well.
- 42 It's an fast and simple model, to reveal problems with operations. This model is resilient and evaluable.
- 43 No nonsense tool, a bit difficult to start with.
- 44 straightforward; good for tier 1
- 45 should be in every exposure assessment class-worldwide
- 46 (i) Alignment with REACH process categories (PROCs)
(ii) Modification for use of appropriate PPE
- 47 Capability to generate exposure estimates with few clicks
- 48 A good first Tier approach that allowed for easy screening of more hazardous chemicals
- 49 very simple model
- 50 Reasonably conservative, but still realistic
- 51 Simple and straightforward approach delivering conservative estimates quickly.
- 52 Easy to use for REACH purposes
- 53 link with REACH descriptors
- 54 Simple.
- 55 Easy to use for modelling several exposure scenario's under Reach.
- 56 Standardized scenarios, tier 1 to tier 1.5 capabilities, reasonable assumptions on RMM
- 57 Want to point out in the previous question, for the one substance, exposures were overestimated when compared against actual data. Strength of tool is it is aligned with REACH, making communication easier. Also offers refinement options.
- 58 Simplistic approach only sufficient for low-risk substances.
- 59 Relation with PROC, easy to use
- 60 Easy to use. Vapour estimates a suitably conservative reflection of

- reality. Aligns well with REACH without need to reinterpret e.g. vs PROCs and RMMs. The only integrated (dermal and inhalation) model
- 61 user-friendliness
 - 62 inclusion of metal PROCs
 - 63 Idiot proof, but that is just the problem!
 - 64 Simple
 - 65 Very generic tool that is useful to shift between scenario's
 - 66 Structured way of estimating exposure -easy to repeat the estimations for several scenarios
 - 67 Most registrants are using the tool, so there should be a lot of comparable estimates available in the future. Overestimates the exposure, in my understanding.
 - 68 Provide a first estimate to check compliance
 - 69 Takes into account the most important endpoints under REACH
 - 70 easy, accepted by ECHA
 - 71 Flexible, fast, easy to use

63. In general, please tell us what you think are the limitations of ECETOC TRA Version 2 for Inhalation exposure estimation and how do you think it can be improved?

Answer Options	Response Count
	67
<i>answered question</i>	67

63. Response Text

- 1 protected especially default values such as temperature, precipitation, body weight
- 2 Some of the PROCs are ambiguous and the TRA estimates for those tasks are therefore equally ambiguous. Agreement (or a convention) which PROCs describe commonly encountered tasks in industry/professions would benefit consistency (although not necessarily accuracy).
- 3 Very conservative. It uses information from the EASE model and little additional information is known on how these values were developed.
- 4 local exhaust ventilation may give vastly different protection factors
- 5 an easy interface to add data
- 6 Tracking Modifications
- 7 relevant for organics only
- 8 how to evaluate dustiness, how to estimate solid substances in liquid mixtures
- 9 Quite basic, producing a rough estimate, good for screening, not for fine tuning.
- 10 Not enough different parameters to describe the application by spray (near-far, high-low pressure...)
- 11 High exposure estimated for low volatile substances, especially for closed system PROC's
- 12 It needs more PPE and RMM.

- 13 Unspecific
- 14 user friendliness. less information per window/sheet. more structured presentation of the questions/ required fields to the user.
- 15 If possible: I would like to fit the result output in form I wish. In the moment I have to copy it into Excel and have to fit it for my purposes.
- 16 Fully sufficient for its purpose
- 17 if OK for a 1st approach, but too simple to be realistic (PROC, SU). I think that other parameters have to be taken in account for more accurate results (scenario, control means, EN 689 indications)
- 18 For low volatile substances the exposure estimations seems much too high
- 19 in closed system, evaluation is often overestimate
- 20 on substance at a time. PROC en RMM not always fit with working conditions
- 21 Similar to EMKG expo tool
- 22 As it is a Tier 1 model only limited modification possibilities are intended. Some of the "Tier 1.5" adaptations that can be done manually as described in the ECETOC report could be built in the model. Version 3 already includes some of those features.
- 23 too much difference from one scenario and another: Estimates differ of one order of magnitude from LEV yes to LEV no. Improve the ventilation modifier.
- 24 The process categories don't cover many uses/tasks, and don't take into account many important determinants of exposure. Unsure of how to interpret modifications based on exposure duration. For example, if duration is less than 4 hours, can the results be interpreted to be an 8 hour TWA with the remaining time considered unexposed time?
- 25 Tier 1 seems to greatly over estimate exposure versus other models, almost always requires Tier 2 so has limited use
- 26 -
- 27 don't always know how data are used
- 28 Still works with ranges for e.g. volatility, witch possibly causes problems with the estimated exposure in the transition areas between ranges.
- 29 May produce low estimates for substances if wrong fugacity class chosen or if substance in upper end of fugacity class. Vapour exposure from low volatility substances may be over-estimated. Unclear of position with regard to liquid aerosols. Appears to apply some unrealistic exposure modifiers from use of LEV especially when source data already have risk management measures associated with them. The range of results (at 90% value?) appear to be low for real workplace situations outside the well controlled process industries.
- 30 predictions about aerosol exposure are not possible; using a wider database and modifying the model
- 31 Exposure estimate - more real world data should be used in the baseline estimate (not only worst- worst-case data)
- 32 (1) there is obviously a lack of transparency within this model: e.g.: it is not easy to investigate how the "initial exposure" (i.e. before applying the modifying factors) is derived. It needs a lot of time to reconstruct the results, also because the relevant information to derive the initial

- exposure are spread in different technical reports.
- (2) ECETOC TRA is based on the EASE model. The measured data within the EASE model are collected only in UK and are quite old (mostly between 1987 and 1992), it is thus not clear how representative those data are.
- (3) The measured data of EASE are not publicly available. How the different categories of the different exposure paths of the EASE model are set stays unclear.
- (4) it is further not clear if those exposure data are really conservative: see the report of IOM (Cherrie: Validation of the EASE 2.0 Model)
- 33** No allowances for effectiveness of operational procedure / skills for handling ingredients [i.e. poor/good/bad] No allowances for effectiveness of controls due to type / positioning etc.
Some additional modifiers should be included to indicate effectiveness
- 34** No appropriate spray model is available. The reduction of exposure by dilution and short handling times is not appropriately reflected in the model.
- 35** I have not used it for this task yet although I will be in the future.
- 36** Simplicity of Use
- 37** temperature of use
- 38** I am not sure about the results obtained. I compared with Stoffenmanager and ART and found that the results obtained for the same substance were very different
- 39** limited possibilities to customise inputs
- 40** Weakness is that translation of local inhalation exposure into a systemic exposure via the inhalation route is only correctly done for a work duration greater 4 hours. If inhalation exposure is estimated for durations less than 4 hours, the systemic exposure calculations for the inhalation route take into account the defaults for an 8 hour working day (i.e. 10m³ per day based on an respiration rate of 1.25 m³/hour). This is not correct when using for instance a 4 hour working period (inhaled volume is then only 5 m³)
- 41** I only use it as Tier 1 analysis. For these purposes it is absolutely sufficient
- 42** -
- 43** limited RMM availability
- 44** (i) High exposure estimates for spray applications
(ii) Works in bands for vapour pressure and exposure
- 45** No possibility for calculation of short-term exposure values.
More options for respiratory protection should be possible.
- 46** No calculation for aerosols, fibres.
- 47** I some cases PROC codes were too generalised for the purposes of estimating exposure and refinements available within the model where not appropriate.
- 48** one substance at a time. The use of proc's don't fit to working conditions at all times.
- 49** Needs adaptation for technical room ventilation at one or two levels;
- 50** Far too conservative at low vapour pressures (low band and beyond).
Inevitable jumps in exposure for substances just above and below band ranges.

- 51 Role of RMM not considered enough
- 52 aerosol exposure not applicable
- 53 If any exposure scenario doesn't fit the working situation. There is no correct exposure estimation. I'll use another tool.
- 54 Fumes and aerosols not supported, temperature variation impact not easily supported (needs playing around with vapour pressure or dustiness bands)
- 55 As with all tools, difficult to verify exposure estimates. Difficulty is with explaining the RMM efficiencies and what it means (e.g., 90% LEV). This goes for all tools though. This can only be improved if we have more data available to compare against.
- 56 Simplistic approach only sufficient for low-risk substances
- 57 Better understanding of the effect of RMM
- 58 Probably could include more OCs and RMMs to provide better exposure estimates and/or evaluate a wider range of control options over conservative as soon as metal is hazardous
- 59 Exposures must be compared with DNELs or OELs with TWA - 8 h or TWA 15 min.
- ECETOC TRA should calculate exposures that can be compared with these OELs/DNELs, so should calculate the exposure per FUNCTION. A Function is composed of several PROCs!
- 61 Not very specific, detailed, limited option for control measures.
- 62 Over predicts the exposure, hard to have a realistic exposure estimation. If refinements is needed another tool must be used.
- 63 As Mease, oversimplifies exposure.
- 64 Overestimation
- 65 low possibility of customization
- 66 The are a number of variables not considers like training of people or energy
- 67 In some cases, the program does not react to LEV, concentrations. I did it therefore afterwards manually. We should have better guidance for use of dustiness.

64. In general, please tell us what you think are the strengths of ECETOC TRA Version 2 for Dermal exposure estimation

Answer Options	Response Count
	56
<i>answered question</i>	56

64. Response Text

- 1 simple excel sheet, authorized by ECHA, small data requirements
- 2 It provides numbers for circumstances where there are absolutely no measured data.
- 3 Idem for Inhalation
- 4 new version has more glove protection factors

- 5 an easy interface to add data
- 6 Simple to use
- 7 large scale model
- 8 easy tool for dermal EA
- 9 -
- 10 Easy to use the broad category approach with a PROC code
- 11 simply and fast
- 12 Simple
- 13 did not use that , no comment
- 14 I have not enough experience with this
- 15 Good Tier 0-1 screening tool
- 16 sorry, not really evaluated
- 17 General broad category approach with use of PROC's. Easy to use, little information required from downstream users
- 18 Too over estimated.
- 19 Good tool if there are DNEL available.
- 20 The dermal exposure estimates are very conservative and lead in many cases to a "risk" conclusion.
- 21 Dermal exposure is not always correct: decimal position is some times not right in the linear final report
- 22 identifying worst case PROCs for worker activities, exposure
- 23 -
- 24 did not do this yet
- 25 no experience so far
- 26 None
- 27 Provides base exposure estimate
- 28 None
- 29 Simple and direct implementation of REACH use descriptors
- 30 I have used it for this task yet and will be using it again in the future.
- 31 Need for further Procs
- 32 very easy - results clear
- 33 N/A
- 34 Entering PROCs for instance and working conditions (RPE, appearance) is easy. Calculations are easy to perform as well.
- 35 I do not use it to determine the dermal exposure
- 36 -
- 37 straightforward; good for tier 1
- 38 Alignment with REACH process categories (PROCs)
- 39 Estimates easy to obtain.
- 40 A good first Tier approach that allowed for easy screening of more hazardous chemicals
- 41 Easy to apply, however no idea about appropriateness
- 42 Simple and straightforward approach delivering conservative estimates quickly.
- 43 Easy to use for REACH purposes
- 44 easy to use
- 45 Simple.
- 46 idem
- 47 None except very conservative

- 48 Same as for 1, aligned with REACH so easier to communicate OCs/RMMs.
- 49 Relation with PROC, easy to use
- 50 Aligns well with REACH. Provides scenario information for both inhalation and dermal without need to go another tool
- 51 Idiot proof, but that is just the problem!
- 52 Structured way of estimating exposure -easy to repeat the estimations for several scenarios
- 53 Provide a first estimate to check compliance
- 54 it's simple buy good
- 55 easy, accepted by ECHA
- 56 Flexible, easy to use, fast

65. In general, please tell us what you think are the limitations of ECETOC TRA Version 2 for Dermal exposure estimation and how do you think it can be improved?

Answer Options	Response Count
	61
<i>answered question</i>	61

65. Response Text

- 1 A chronic lack of dermal exposure measurements expressed consistently in the most appropriate metric(s) makes any modelling tool for dermal exposure a shaky undertaking at the moment.
- 2 Idem for inhalation
- 3 difficult to estimate duration of exposure; 100% absorption rate is not realistic
- 4 the model doesn't consider the use of dermal protection
- 5 an easy interface to add data
- 6 not match input parameters. under-estimate exposure
- 7 Dermal assessment with LEV
- 8 -
- 9 RMM modifiers like gloves and dilution not available
- 10 more PPE, RMM and dermal penetration coefficients
- 11 Very conservative, because of the algorithm and no RMM (gloves) nor transfer factors
- 12 did not use that , no comment
- 13 I have not enough experience with this
- 14 Needed improvements now fully implemented in version 3
- 15 idem
- 16 Possibility to take into account RMM (gloves) and dilution
- 17 in closed system or wearing protective equipment case, evaluation is often overestimate
- 18 Permeability model should be introduced.
- 19 The units of the limit are based on DNEL.
Difficult to have other limits for dermal exposure-
- 20 Version 3 has already included some features, like the consideration

- of PPE effectiveness that make the estimations more realistic.
- 21** It seems overestimated
- 22** Doesn't allow for PPE exposure reduction, does not calculate exposure/RCR for local effects, gives too much credit for ventilation, process categories are better aligned with inhalation exposure than dermal exposure
- 23** whole body not considered for some relevant worker activities
- 24** -
- 25** did not do this yet
- 26** no experience so far
- 27** Can seriously under predict dermal challenge especially if the LEV modifier is used. Prediction of systemic dose is a step too far and the extrapolation from original concept to all embracing predictor of dermal exposure is unsupportable. However some predictions of challenge and dose are ridiculously high - the model is all over the place and has to use an artificial modifier (LEV) to produce numbers that appear to be within an acceptable range - but there is no underpinning scientific evidence for this.
- 28** Modifying the model
- 29** Limited options to modify within the tool
- 30** Little input as to operational procedure / risk of dermal contact; factors leading to dermal exposure needs to be better defined for selection; use of LEV has little impact on dermal exposure in practice yet tool applies serious reduction factors on exposure if LEV is present
- 31** The reduction of exposure by dilution and short handling times is not appropriately reflected in the model. Short exposure times do not reduce dermal exposure, which is not always realistic. No PPE available.
- 32** It does overestimate the level of exposure but I feel that is a good thing.
- 33** Need for further Procs
- 34** not clear : definition of RMM (gloves)
- 35** N/A
- 36** No adaptation of dermal exposure for concentration in the product. No consideration of gloves as a standard RMM. ECETOC TRA gives no information on whether or not dermal exposure reduction by LEV is a valid option. If this is not the case, LEV should by default not reduce dermal exposure
- 37** I do not use it to determine the dermal exposure
- 38** -
- 39** limited applicability of reduction due to LEV; PPE cannot be integrated (has to be done externally)
- 40** (i) Recalculation of dermal exposure with use of PPE done manually, outside the model
- (ii) Recalculation of dermal exposure with percentage concentration done manually, outside the model
- 41** No possibility for calculation of short-term exposure values. Gloves are not implemented as RMM.

- Dermal exposure values are reduced if LEV is chosen.
Exposure modifying factors do not apply for dermal exposure.
- 42 No possibility to modify exposed dermal surfaces, no calculation of exposure in term of amount per surface area...
- 43 I some cases PROC codes were too generalised for the purposes of estimating exposure and refinements available within the model where not appropriate.
- 44 Needs integration of protection efficiency for gloves
- 45 Maybe too conservative in some cases. Does not take into account volatility which will reduce exposures in cases of volatile substances.
- 46 Role of RMM not considered enough
- 47 not enough inputs (%; duration, ...);
LEV for dermal exposure not relevant
- 48 Manual reduction factors for concentration in solids, gloves etc.
Problems with LEV should have been fixed, or option removed.
- 49 idem
- 50 Too much conservative and few refinements possibilities
- 51 Not allowed to include glove protection as RMM reduction factor.
Does not consider some of the exposure reduction factors used for inhalation. Could be improved by including these options so users do not have to do this outside of the tool
- 52 categorisation of parameters too simplistic
- 53 Better understanding of the effect of RMM
- 54 Exposure estimates seem very high. Available OCs and RMMs very limited. No dermal penetration consideration
- 55 unrealistic estimates
- 56 How to calculate the mean exposure over a working day when several PROCs have to be added. Do workers wash their hands between the PROCs or will there be remaining exposure?
- 57 If refinements is needed another tool must be used.
- 58 low possibility of customization
- 59 Again not consider important aspects in the real case studies
- 60 It seems not clear to all users that dermal expo should be calculated without LEV. If LEV is present one had to perform 2 separate calculations for inhalation and dermal.
- 61 Use of gloves (now incorporated in version 3)

66. Have you ever used Version 3 of the ECETOC TRA?

Answer Options	Response Percent	Response Count
Yes	26.6%	61
No	73.4%	168
<i>answered question</i>		229

67. What were the main sources of information that first led you to use the ECETOC TRA Version 3? Was this via ... (please tick all that apply) ...

Answer Options	Response Percent	Response Count
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Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc)	33.3%	20
REACH awareness sessions or similar training	28.3%	17
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc)	26.7%	16
A meeting, conference, seminar, workshop etc	40.0%	24
Peer-reviewed scientific publications or papers	3.3%	2
The tool's own website, its publicity materials or training course	35.0%	21
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc)	8.3%	5
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc)	3.3%	2
Other (please specify)	15.0%	9
answered question		60

67. Other (please specify)

- 1 Participated in its development
- 2 GPS guidance
- 3 Membership in the TF
- 4 email correspondence with ECETOC
- 5 colleague
- 6 TRA workshops organised by CEFIC
- 7 Trade Associations
- 8 Colleague member of ECETOC development group
- 9 ECETOC Workshop on TRA model in May 2012

68. Please indicate your level of knowledge regarding the ECETOC TRA Version 3

Answer Options	Response Percent	Response Count
I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations	16.7%	10
I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations	53.3%	32
I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations	30.0%	18
answered question		60

69. How often do you use the ECETOC TRA Version 3?

Answer Options	Response Percent	Response Count
Once a week or more	16.7%	10
2-3 times per month	35.0%	21
once every 2-3 months	18.3%	11
2-3 times per year	13.3%	8
Less than once a year	16.7%	10
answered question		60

70. When did you last use the ECETOC TRA Version 3?

Answer Options	Response Percent	Response Count
Within the last week	31.7%	19
Within the last month	56.7%	34
Within the last 2-5 months	14.3%	7
answered question		60

71. What are the main purposes for which you use the ECETOC TRA Version 3? (tick all that apply)

Answer Options	Response Percent	Response Count
For REACH exposure assessments,	81.0%	47
To determine compliance with an occupational exposure limit	15.5%	9
To assist in the identification of risk management measures	24.1%	14
Other (please specify)	12.1%	7
answered question		58

71. Other (please specify)

- 1 For GPS/JIPS risk assessment
- 2 exposure assessment in chemical risk assessment
- 3 teaching how to evaluate substances in REACH dossiers
- 4 Evaluation of the tool and introduction to my colleagues
- 5 Company risk assessment
- 6 Scaling calculations
- 7 To check results against ECETOC TRA v2

72. Thinking about your use of the ECETOC TRA Version 3 - please select the category that best matches your opinion

Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Response Count
Accessing and downloading the ECETOC TRA Version 3 to my computer was ...	23	25	4	5	1	58
Understanding the screen layout is ...	5	25	18	9	1	58
Learning how to use the model for first time was ...	3	21	16	16	2	58
Generating my required model output was ...	3	24	20	9	2	58
When returning to the model after a period of non-use, I found that using it again was ...	6	26	16	8	2	58
If I made a mistake when using the model, fixing the problem was ...	1	21	23	8	5	58
<i>answered question</i>						58

73. Please select the category that best reflects your opinion about help and guidance in the ECETOC TRA Version 3

Answer Options	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful	Response Count
The help functions contained within the model itself, (e.g. comment boxes, links to additional info.) were...	3	22	26	6	1	58
The supplementary guidance provided, (e.g. on the model website or additional documentation) was ...	5	28	19	5	1	58
<i>answered question</i>						58

74. Please add any further comments on the user-friendliness of the ECETOC TRA Version 3 in the box below

Answer Options	Response Count
	23
<i>answered question</i>	23

74. Response Text

- 1 Please go on. Industry need your help. We need your help
- 2 unfriendly
- 3 idem ECETOC version 2
- 4 Slow performance, labour intensive when entering all scenarios, small space for entering all scenarios for one substance
- 5 ECETOC TRAM V3 in my opinion is not usable in the workplace. It tries to do too many things and does not allow compartmentalisation of workflow processes. There are too many errors which need addressing and not having the worker standalone tool was a mistake. Recreating EUSES seems redundant as EUSES works. The integrated approach to assessment as an excuse for the integrated tool not doing things independently made little sense. Having standalone modules that could be run on their own and also plugged into the integrated tool would be far more powerful and adaptable. Unfortunately I feel ECETOC TRA V3 has reached a dead-end, unless their is a complete rewrite of the way it is coded.
- 6 Still the same concept, time consuming data entry, slow performance, limited space for exposure scenarios for one substance
- 7 Integration of the three modes into a set of excel books seems to be of less value. The three models are practically and theoretically independent on each others. Integration have resulted into time-consuming.
- 8 Report and tool are still under development. Some "bugs" have been identified and will be remedied.
- 9 The drawback of v2 overcome.
- 10 When I downloaded version 3, the documentation was not available. The first time I ran the model, it did not generate any output.
- 11 An advanced user manual would be helpful (ie, information on which spreadsheets to go to which can exert more control over default model, chemical, or other parameters). The current user manual is very basic.
- 12 just trying the model out not sure what all the new modifications are and what information is required, reading the comments on cells trying to figure it out
- 13 Still some bugs (wrong references), screen layout has not been improved. Implementation of gloves, on/off for dermal LEV, dilution effect on dermal exposure are great improvements over v2.
- 14 Not very user-friendly, the layout is horrible.
- 15 cannot judge yet
- 16 Selections with regards to Question 2 are made on the basis of existing knowledge and use of version 2.
- 17 waiting for the guidance (not available)
- 18 Many cosmetic features added now for user guidance (flagging messages,

- comments, colours codifications, instantaneous pop-up)
- 19** Refinement steps in modelling are not transparent and difficult to undertake
- 20** The integrated TRAv3 for workers is less 'user friendly' than the standalone v2 but clearly now includes new features
- 21** I cannot run this with an acceptable time on my company citrix environment under ms office 2010, opens too many worksheets and react very sluggish. Tra2 is much faster and easier. Making a separate set that just evaluates worker exposure will be appreciated
- 22** Having provided an integrated tool (workplace, consumer and environment) has clearly facilitated the registrant but resulted in a cumbersome and quite complicated tool for downstream user that have the duty to verify compliance with workplace only.
- 23** same as version 2

75. Have you used the ECETOC TRA Version 3 to estimate dermal exposure and / or inhalation exposures? (tick all that apply)

Answer Options	Response Percent	Response Count
Dermal exposure	85.7%	48
Inhalation exposure	98.2%	55
<i>answered question</i>		56

76. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required ECETOC TRA Version 3 input parameters for inhalation or dermal estimations?

Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Not applicable	Response Count
Inhalation exposure	3	25	17	5	1	4	55
Dermal exposure	3	21	14	5	1	4	48
<i>answered question</i>							56

77. In general, do you think that the exposure estimates provided by the model ...

Answer Options	Greatly over-estimate exposure	Appropriately over-estimate exposure	Sometimes over-estimate and Sometimes under-estimate exposure	Under-estimate exposure	Greatly under-estimate exposure	Not applicable	Response Count
Inhalation exposure	6	31	11	0	0	8	56
Dermal exposure	7	28	7	0	0	14	56
<i>answered question</i>							56

78. How important to you is it that the model appropriately over-estimates exposure?

Answer Options	Very important	Important	Neither important or unimportant	Unimportant	Of little importance	Not applicable	Response Count
Inhalation exposure	3	37	10	1	1	4	56
Dermal exposure	3	33	8	1	1	10	56
<i>answered question</i>							56

79. In general, do you feel that the ECETOC TRA Version 3 fulfilled your requirements?

Answer Options	Response Percent	Response Count
Yes	62.5%	35
No	21.4%	12
Don't know	16.1%	9
answered question		56

80. If you answered "No", why did you feel that the ECETOC TRA Version 3 did not fulfill your requirements? Please tick all that apply for both inhalation and dermal exposure estimates

Answer Options	For Inhalation	For Dermal	Response Count
I had insufficient workplace exposure information to enter all required input parameters	4	4	4
It was unclear how to translate my workplace information into the required input parameters	2	3	3
The estimates of exposure did not seem realistic for my workplace situation	6	7	7
The estimates of exposure were unclear or ambiguous	2	1	2
I could not identify a relevant PROC code for my work task	1	0	1
Other reason(s) - please specify			4
answered question			12

80. Other reason(s) - please specify

- 1 new algorithm and vapour bands and outdoor exposure needed
- 2 My requirements mean an easy integration into my workflow whilst producing a CSR. In this respect ECETOC is unusable.
- 3 Haven't been able to compare just yet, and I model environmental concentrations, not those for human health
- 4 System becomes too sluggish to work with

81. Did you compare the results obtained from ECETOC TRA Version 3 against any actual measured data that you had available?

Answer Options	Yes	No	Not applicable	Response Count
Measured inhalation exposure data?	17	26	13	56
Measured dermal exposure data?	3	35	18	56
answered question				56

82. If you did compare them, what level of agreement did the ECETOC TRA Version 3 estimates have with the measured exposures for ...							
Answer Options	Very good	Good	Neither good or poor	Poor	Very poor	Not applicable	Response Count
Inhalation exposure?	0	6	7	4	0	0	17
Dermal exposure?	0	1	2	0	0	0	3
<i>answered question</i>							17

83. In general, please tell us what you think are the strengths of ECETOC TRA Version 3 for Inhalation exposure estimation

Answer Options	Response Count
	30
<i>answered question</i>	30

83. Response Text

- 1 More realistic than v2, also more options to account for actual circumstances of use.
- 2 Idem as my answer for ECETOC TRA version2
- 3 same as with Ver. 2
- 4 large scale model
- 5 Applies to REACH (PROCs)
- 6 Possibility to do several scenarios together
- 7 Easy to use the broad category approach with a PROC code
- 8 simple
- 9 Fully sufficient for Tier 0-1 purposes
- 10 Broad general approach using PROCs
- 11 It remains a Tier 1 tool, but the additional modifications make it more useful than TRA 2.
- 12 Good, you can generate several exposure scenario. It is better than v.2
- 13 Not enough experience yet to comment
- 14 acute and chronic exposure estimated, consumer uses
- 15 Fair. However, I (must) now use IUCLID Caesar
- 16 see version 2
- 17 equivalent to ECETOC 2
- 18 Good for first-tier assessment
- 19 same as for version 2
- 20 Version 3 allows more modifications in line with a Tier 1.5.
- 21 Similar to version 2.
- 22 More detailed than the previous version
- 23 general ventilation is now present.
- 24 The link between workers health, consumer health and environmental is a strength when it is needed. In my practice it is not needed. So the Excel-sheet contains to many data.
- 25 More refinements options (combinations of new RMMs) + short-term & long-term estimate
- 26 see comments to TRA, v2
- 27 Seems to address all the shortcomings of v2 e.g. increased # of RMMs; elimination of 'anomalies' in the base estimate look up tables. Provision of integrated CSA output
- 28 Estimations for some PROCs reduced by 50% when compared to version 2: more realistic.
- 29 similar to v2
- 30 Fast, easy to use, flexible

84. In general, please tell us what you think are the limitations of ECETOC TRA Version 3 for Inhalation exposure estimation and how do you think it can be improved?

Answer Options	Response Count
	30
<i>answered question</i>	30

84. Response Text

- 1 Remains a Tier-1 tool, cannot be further improved. Lacks an option to model combined mist and vapour exposures for semi-volatiles, but then also many existing field monitoring data are unreliable due to poor choice of monitoring methods.
- 2 Idem as my answer for ECETOC TRA version2
- 3 it can be improved for other substances than organics (like metals), and for the efficiency of respiratory protective equipment
- 4 dustiness, assessment of solids in mixtures
- 5 The program is unfriendly to use
- 6 High exposure estimated for low volatile substances, especially for closed system PROC's
- 7 unspecific
- 8 Worker stand-alone would be nice
- 9 Overestimat for non-volatile substane
- 10 There are still some "bugs" in the tool that need to be fixed and the excel basis is still problematic if it is to be used in a broader context.
- 11 Still to identify the proper PROC sometimes
- 12 Not enough experience yet to comment
- 13 still getting familiar with the model
- 14 Fair. However, I (must) now use IUCLID Caesar
- 15 the same critics as for ECETOC TRA v2
- 16 see version 2
- 17 Bad for higher-tier assessment
- 18 Not user-friendly model. Not intelligible interface.
- 19 cannot judge yet, but some improvements compared to version 2 limitations
- 20 Still not possible to make calculations for aerosols, fibres...
- 21 Whilst improved, it is still too conservative for low vapour pressure substances, below 50Pa. A function to estimate exposure continuously rather than banding would be a great improvement.
- 22 not so user friendly as the previous version
- 23 exposure of aerosol not possible
- 24 To much Mb, the file is to big to run quickly. Especially in specific network environments or in old software systems it takes to much time to run data.
- 25 Still no clear support for temperature variations. Could be fixed by adding an exposure modifying factor to account for the shift of vapour pressure or dustiness band and/or Vapour pressure calculator temperature dependant

- 26 see comments to TRA, v2
- 27 Availability only as an integrated tool means that the worker part is now a little less friendly than before (although many aspects are improvements)
- 28 Not workable in a citrix environment
- 29 Cumbersome tool for downstream users.
A separated only-worker tool would be appreciated
- 30 some limitations are corrected. Up to now I have not enough experience with V3.

85. In general, please tell us what you think are the strengths of ECETOC TRA Version 3 for Dermal exposure estimation

Answer Options	Response Count
	27
<i>answered question</i>	27

85. Response Text

- 1 More realistic than v2, also more options to account for actual circumstances of use.
- 2 Idem as my answer for ECETOC TRA version 2
- 3 better glove protection factors
- 4 the most relevant model for estimation of dermal exposure
- 5 better than v2, LEV effect no more the default
- 6 -
- 7 Easy to use the broad category approach with a PROC code. Availability of RMM like gloves is an improvement from previous version
- 8 more accurate than version 2 (PPE...)
- 9 Fully sufficient for Tier 0-1 purposes
- 10 Broad general approach using PROC's
- 11 see above
- 12 No experience
- 13 Not enough experience yet to comment
- 14 acute and chronic exposure estimated, added consumer use
- 15 Fair. However, I (must) now use IUCLID Caesar
- 16 Basic PPE now available, dilution now accounted for.
- 17 Good for first-tier assessment
- 18 same as for version 2
- 19 Version 3 allows more modifications in line with a Tier 1.5.
- 20 Similar to version 2.
- 21 More detailed than the previous version
- 22 new inputs (% , duration).
- 23 idem
- 24 New refinements possibilities included finally (support of RMMs already impacting inhalation exposure estimate)
- 25 A significant improvement over v2 but the base estimates still seem intuitively high

- 26 similar to v2
27 Fast, easy to use, flexible

86. In general, please tell us what you think are the limitations of ECETOC TRA Version 3 for Dermal exposure estimation and how do you think it can be improved?

Answer Options	Response Count
	23
<i>answered question</i>	23

86. Response Text

- 1 Cannot be improved unless a new, well-described database of exposure studies is built up which does not make the mistakes of the RiskOfDerm project.
- 2 Idem as my answer for ECETOC TRA version 2
- 3 still too inflexible with skin penetration effects - washing off versus evaporation
- 4 Scientific background uncertain
- 5 -
- 6 but still largely overestimating
- 7 Worker stand-alone would be nice
- 8 Improved over v2
- 9 see above
- 10 I don't know
- 11 Not enough experience yet to comment
- 12 still getting familiar with the model
- 13 Fair. However, I (must) now use IUCLID Caesar
- 14 Task duration still has no impact on dermal exposure estimate. The effect of dilution is not accounted for in a linear fashion. This doesn't make sense.
- 15 Bad for higher-tier assessment
- 16 Not user-friendly model. Not intelligible interface.
- 17 cannot judge yet, but some improvements compared to version 2 limitations
- 18 Need to be able to change exposed skin surfaces.
- 19 Too early to tell. Nothing identified as yet.
- 20 not so user friendly as the previous version
- 21 idem
- 22 Still too conservative
- 23 some limitations are corrected. Up to now I have not enough experience with V3.

87. Have you ever used Stoffenmanager?

Answer Options	Response Percent	Response Count
Yes	39.2%	87

No	60.8%	135
answered question		222
88. What were the main sources of information that first led you to use Stoffenmanager? Was this via ... (please tick all that apply) ...		
Answer Options	Response Percent	Response Count
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc)	39.3%	33
REACH awareness sessions or similar training	25.0%	21
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc)	31.0%	26
A meeting, conference, seminar, workshop etc	44.0%	37
Peer-reviewed scientific publications or papers	13.1%	11
The tool's own website, its publicity materials or training course	26.2%	22
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc)	11.9%	10
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc)	6.0%	5
Other (please specify)	9.5%	8
answered question		84

88. Other (please specify)

- | | |
|---|--|
| 1 | Direct from our ministry of Social Affairs, the institute ArboUnie, the IT-consultant BECO |
| 2 | customers/colleagues asking me how it works: so i checked it out |
| 3 | It is a well-known program |
| 4 | search for exposure evaluation tools |
| 5 | education on occupational health |
| 6 | Dutch labour inspectorate |
| 7 | colleagues |
| 8 | Involvement in the development of the tool |

89. Please indicate your level of knowledge regarding Stoffenmanager

Answer Options	Response Percent	Response Count
I fully understand how to use the tool and have an in-depth understanding of its	21.4%	18

underlying concepts and limitations I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations	46.4%	39
I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations	32.1%	27
answered question		84

90. How often do you use Stoffenmanager?

Answer Options	Response Percent	Response Count
Once a week or more	10.7%	9
2-3 times per month	23.8%	20
once every 2-3 months	21.4%	18
2-3 times per year	31.0%	26
Less than once a year	13.1%	11
answered question		84

91. When did you last use Stoffenmanager?

Answer Options	Response Percent	Response Count
Within the last week	8.6%	7
Within the last month	29.6%	24
Within the last 2-5 months	37.0%	30
Over 6 months ago	24.7%	20
answered question		81

92. What are the main purposes for which you use Stoffenmanager (tick all that apply)

Answer Options	Response Percent	Response Count
For REACH exposure assessments,	50.6%	41
To determine compliance with an occupational exposure limit	38.3%	31
To assist in the identification of risk management measures	35.8%	29
Other (please specify)	18.5%	15
answered question		81

92. Other (please specify)

- 1 register the use of hazardous materials
- 2 testing the programme to find out how it worked
- 3 For our industry we developed a special version to assess VOC exposures in the plants.
- 4 to asses if the application might be useful for us/clients

- 5 evaluation in comparison with corporate tool
- 6 Test of the software
- 7 stopped using it after ART became available
- 8 exposure estimates
- 9 I am Assistant Professor, and teach my student this subject
- 10 To translate received information based on Stoffenmanager into ECETOC terms
- 11 CMR registrations
- 12 for research purposes
- 13 As part of a workshop to learn the tool
- 14 in consulting and training
- 15 To get experience

93. Thinking about your use of Stoffenmanager, please select the category that best matches your opinion						
Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Response Count
Accessing Stoffenmanager on the web was ...	28	36	10	7	0	81
Understanding the screen layout is ...	12	35	21	12	1	81
Learning how to use the model for first time was ...	7	24	28	21	1	81
Generating my required model output was ...	11	21	30	17	2	81
When returning to the model after a period of non-use, I found that using it again was ...	7	34	26	13	1	81
If I made a mistake when using the model, fixing the problem was ...	8	27	29	14	3	81
<i>answered question</i>						81

94. Please select the category that best reflects your opinion about help and guidance in Stoffenmanager						
Answer Options	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful	Response Count
The help functions contained within the model itself, (e.g. comment boxes, links to additional info.) were...	9	41	27	2	2	81
The supplementary guidance provided, (e.g. on the model website or additional documentation) was ...	11	37	28	3	2	81
<i>answered question</i>						81

95. Please add any further comments on the user friendliness of Stoffenmanager in the box below

Answer Options	Response Count
	20
<i>answered question</i>	20

95. Response Text

- 1 Very basic and probably conservative. ART is a better tool.
- 2 I did not use Stoffenmanager for REACH purposes so I don't know how useful it is for REACH exposure evaluation
- 3 As mentioned, we developed a special version of the STM. We introduced the work spots, the most used OC and RMM's. We also introduced a list of approx. 100 max. exposure levels of solvents. With these data we are able to calculate the RCR-levels for a specific task in a specific work spot.
- 4 Bite-wise approach. nice. could use a bit more info on the various functions in a separate document
- 5 poor print output
- 6 sorry, I was unable to understand how it works !
- 7 You have to use the tool more than once to get used to it.
- 8 changing substance parameters re: concentration seems problematic to go back to original page. I limit my use of this model. Prefer ART.
- 9 A complicated model to use because of the various elements that need to be addressed to create the required output
- 10 I use the nano version of Stoffenmanager. The main problem i have encountered are:
 - 1) sometimes fields are not translated
 - 2) the boxes or drop down list do not provide any choice and no error message appears.
- 11 Webpage access only worked when Dutch postal address was provided.
- 12 not so user friendly
- 13 The on-line tips are particularly helpful. The background documents are also helpful in understanding the limitations, input parameters. One drawback is Stoffenmanager does not calculate risks, only exposures, and you cannot export your results. Also, Stoffenmanager does not use PROCs, which means users need "map" Stoffenmanager tasks to the PROCs and communicate both.
- 14 It's a very nice exposure tool. Some times the day exposure don't work very well and the processes will be stop. The choice for the handling, in the exposure assessment, is sometimes difficult to make the right choose. The handling doesn't every times match with the program, with experience it is more easier.
- 15 Stoffenmanager is improving with every new version
- 16 It costs a lot of time to fill in stoffenmanager
- 17 More modelling parameters, but you have to setup substances first,

- then the mix and the circumstances, thus more work than Ecetoc tra2
- 18** Since I only used it at a workshop, I chose the middle answers above.
- 19** Very user-friendly, but does not provide a lot of additional material (users' manual, etc.) even though the model is also aimed for DUs and other SMEs.
- 20** The effectiveness of any input parameter should be described on the screen where possible.

96. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required Stoffenmanager input parameters?

Answer Options	Response Percent	Response Count
Very easy	1.2%	1
Easy	46.9%	38
Neither easy or difficult	32.1%	26
Difficult	17.3%	14
Very difficult	2.5%	2
answered question		81

97. In general, do you think that the exposure estimates provided by the model ...

Answer Options	Response Percent	Response Count
Greatly over-estimate exposure	8.6%	7
Appropriately over-estimate exposure	58.0%	47
Sometimes over-estimate and Sometimes under-estimate exposure	32.1%	26
Under-estimate exposure	1.2%	1
Greatly under-estimate exposure	0.0%	0
answered question		81

98. How important to you is it that the model appropriately over-estimates exposure?

Answer Options	Response Percent	Response Count
Very important	8.6%	7
Important	63.0%	51
Neither important or unimportant	24.7%	20
Unimportant	1.2%	1
Of little importance	2.5%	2
answered question		81

99. In general, do you feel that Stoffenmanager fulfilled your requirements?

Answer Options	Response Percent	Response Count
Yes	64.2%	52

No	21.0%	17
Don't know	14.8%	12
answered question		81

100. If you answered "No", why did you feel that Stoffenmanager did not fulfill your requirements? Please tick all that apply

Answer Options	Response Percent	Response Count
I had insufficient workplace exposure information to enter all required input parameters	33.3%	6
It was unclear how to translate my workplace information into the required input parameters	44.4%	8
The estimates of exposure did not seem realistic for my workplace situation	33.3%	6
The estimates of exposure were unclear or ambiguous	11.1%	2
I could not identify a relevant activity class for my work task	27.8%	5
Other reason(s) - please specify		4
answered question		18

100. Other reason(s) - please specify

- 1 I could not use this tool
- 2 Exposure is highly over estimated and therefor the tool is not useful anymore.
- 3 Is designed for individual workplaces - is difficult to use for exposure scenarios for large group of users
- 4 Translating the inputs into simple understandable outputs for communication in an ES is not straightforward and is a major shortcoming.

101. Did you compare the results obtained from Stoffenmanager against any actual measured data that you had available?

Answer Options	Response Percent	Response Count
Yes	45.7%	37
No	54.3%	44
answered question		81

102. If you did compare them, what level of agreement did the Stoffenmanager estimates have with the measured exposures?

Answer Options	Response Percent	Response Count
Very good	2.6%	1
Good	57.9%	22
Neither good or poor	23.7%	9
Poor	13.2%	5

Very poor	2.6%	1
answered question		38
103. In general, please tell us what you think are the strengths of Stoffenmanager		
Answer Options	Response Count	
	46	
answered question		46

103. Response Text

- 1 Easy to use, good over-estimation of the exposure.
- 2 easy to make forms for the work floor and managing storage
- 3 More input parameters
- 4 approach sometimes more specific than PROCs
- 5 Rather easy to work with
- 6 Broad category approach, no need for very detailed information. Good to see the variance
- 7 standardized selection of information
evaluation limits in the system, calculating risk, and countermeasures recalculating
- 8 easy and complete
- 9 easy to use. apt for low knowledge users. adapted for companies to use (e.g. store substances, departments, suppliers etc. also a strength is that the Dutch working environment authority accepts the outcome and more and the application gains momentum internationally.
- 10 to estimate airborne substance concentration in case I need not an overestimation
- 11 More detailed description of workplace situation, estimates seem realistic, good to see variance
- 12 multiple substances at one run. Gives you the possibility to make you own mixtures.
- 13 easy access to the model. Many important output files that can be used in risk assessments.
- 14 I don't have sufficient experience with the model to judge.
- 15 quick general assessment if you can get the input parameters satisfied
- 16 It is accessible to everyone.
- 17 Easy to use, clear on the parameters, Exposure distribution available.
- 18 sensitive to a range of parameters that allow reasonable estimates to be generated
- 19 Web based.
- 20 Useful for scenarios where a bit more information on operating conditions is available
- 21 Easy to use
- 22 I think it is good for SMEs and also developing countries which suffer from shortage of budget and trained work force
- 23 estimations of exposure
- 24 Nicely defined exposure scenarios
- 25 The nano version tools for control banding is easy to use and the

- information required is available (compared to other control banding tools). Note this version does not provide an exposure estimated, only a risk score linked to risk management advice
- 26 Multiple substances at once
- 27 Customization of results of DU CSA
- 28 Easy to use and quick to get a judgement if more attention should be given to the exposure or that it is clearly no risk
- 29 the inputs for exposure calculation proposed are relevant. friendly tool.
- 30 Very good alignment with common industrial tasks, and provides a step up from ECETOC TRA v2 for problematic exposures.
- 31 It 's written in Dutch language. The ranking of products is clear (green, orange, red) and helpful to set a priority. The estimation of exposure is helpful because of compliance but also to see the effect of some measurements at the workplace.
- 32 Really useful. Seems to be quite easy to understand and to use.
- 33 Fine tuning possible within one scenario
- 34 Used it as a refinement tool in the event exposure estimates in TRA resulted in RCR >1. Stoffenmanager allows user to enter dilution fractions, but the TRA uses bands. If Stoffenmanager is used by the authorities to meet local requirements, then there must be some level of confidence in the results.
- 35 also available in Dutch, qualitative and quantitative assessment, output documents linked to the workstation, inventory of suppliers & products...
- 36 It considers lots of exposure determinants that can affect a worker's exposure
- 37 Conceptual basis possibly most flexible in being able to address the range of different workplace scenarios but then is this an advantage if the domain is 'set' e.g. as a PROC?
- 38 good, practical tool
- 39 Stoffenmanager is easy to handle and the exposure is over estimate the exposure limit. Because mostly stoffenmanager over estimate the exposure it is in workplace the exposure worst-case and that's a good thing.
- 40 Very helpful tool. Easy to find out what the limits are
- 41 It is possible to calculate the TWA 8 h per Function
- 42 More modelling parameters, but I prefer Ecetoc as a primary tool and stoffenmanager or reach advanced tool as a secondary model in case Ecetoc comes up with a result $RCR \geq 0.95$
- 43 Detailed input, taking into account control measures.
Possibility to assess a complete product (with multiple components)
Good model validation
- 44 Since I only used it at a workshop, I do not have a feeling for the usefulness of the tool.
- 45 Exposure estimation is based on measured data. No oversimplifications, but easy access to users.
- 46 very easy to use, has better skills than Ecetoc.

104. In general, please tell us what you think are the limitations of Stoffenmanager and how do you

think it can be improved?	
Answer Options	Response Count
	40
<i>answered question</i>	40

104. Response Text

- 1 No between Procs and Task Descriptions - correlation would be useful
- 2 A lot of work to enter all data and parameters
- 3 Overestimation of exposure
- 4 we need to have results which are close to measurement results to not show risk level which is (way) too high
- 5 to have determinants linked with the chemicals
- 6 should be translated in other languages! I'd help.
Not suitable for mass-maintenance of substance information.
mass-reporting (e.g. excel file output lists) would be useful
- 7 PROCs are missing to support REACH registrations
- 8 I think that the access to this tool can greatly be improved; a real guide could be helpful
- 9 A lot of data is needed before you can start
- 10 The empty box - you have to input every data yourself. Even difficult to find (or sometimes not comparable) physico-chemical properties of the components.
- 11 see above
- 12 layout is difficult to manage between products and the exposure assessment, not straightforward to use.
- 13 It should be possible to start without first entering products and substances in the library.
This can make people give up because they do not understand how to start.
- 14 Clearly mark the exposure determining parameters (e.g. volatility of the substances, hazardous properties, taken control measures) to enhance the transparency of the model.
- 15 Quite difficult to use and more so for the inexperienced and those who don't know what level of exposure to expect. Professional judgement needed at several points and easy to make mistakes or get lost in the software
- 16 a general problem: the measured exposure data are not publicly available and therefore the results are difficult to criticise though the concept of the model is smartly designed and seems to adequately represent the exposure scenarios a governmental agency usually needs to develop or assess.
- 17 Web-based tools are a disadvantage over stand-alone tools. The model calculations are not transparent.
- 18 More exposure time limits to chose and more preventive exposure options e.g. p3-p2-p1 LEV etc. exposure sources in the stoffenmanager should use the PROCS
- 19 Not aligned with REACH PROCs

- 20** Overestimation of exposure, especially for short time (5 -15 minutes) exposure
- 21** sometimes lot of data required
- 22** Underestimation of exposure (specifically for closed systems). It was thought that to present 0.00 mg/m³ though a closed system would require significant defence as a tier 1 exposure estimate
- 23** An error message indicating the problem occurred and how to solve it would help. For example if you enter a substance for which Stoffenmanager does not estimate a risk this should be indicated.
- 24** a lot of data input before you can start modelling
- 25** Low level of generalization; does not fit for substances in complex mixtures.
- 26** The over-estimation is an important limitation. It would be very useful if that overestimation would me more limited. I think that can only be achieved by a more complex system, so more questions to be answered. Or by more branch-specific systems (for example only for metal-working).
- 27** dermal not present
link with PROC should be present in the tool
- 28** Lack of a dermal module.
- 29** Some specific workplace conditions don't fit. The choice is limited. So sometimes I have to choose situations that doesn't represents the reality. To fill the database is to much work, it takes to much time.
- 30** No PROC alignment as in TRA + structuring in contributing scenarios not possible
- 31** Main limitation is difficulty of exporting results. This resulted in a lot of additional manual labour outside of the tool.
- 32** no database with all standard information (volatility, R or H phrases,...) coupled to a single CAS number: everybody has to type in the same standard information again & again
- 33** Not all exposure determinants are considered although my impression is that this tool is better than EMKG-Expo tool. Also, it would be better if more descriptions (or examples) of the workplace condition for selecting scores are explained.
- 34** Perhaps too sophisticated to be routinely used as a preferred Tier 1 tool e.g. not amenable to incorporation into IT systems. Translating the inputs into simple understandable outputs for communication in an ES is not straightforward and is a major shortcoming.
- 35** I am very happy with stoffenmanager. If I must tell some thing to make stoffenmanager more excellent, than i like to put more data in the system what are referent by the practical workplace. Think about other risk management measures and a bigger list of the chosen handling list. The day exposure must be directly add to the assessment and not as a separate assessment.
- 36** Simplify screens
- 37** It costs a lot of time to fill in all the parameters,
It is difficult for non-professional to choose the right tasks
- 38** Since I only used it at a workshop, I do not have a feeling for the usefulness of the tool.
- 39** Considering REACH, it would need use descriptor system, for CAD,

- 40 lack of process emissions.
There should be better guidance on how to use the percentiles.

105. Have you ever used the RISKOFDERM Model?

Answer Options	Response Percent	Response Count
Yes	23.9%	51
No	76.1%	162
<i>answered question</i>		213

106. What were the main sources of information that first led you to use RISKOFDERM? Was this via ... (please tick all that apply) ...

Answer Options	Response Percent	Response Count
Information on legislation, official or statutory guidance (e.g. from REACH/ECHA, HSE, etc)	55.3%	26
REACH awareness sessions or similar training	31.9%	15
Professional recommendation of colleagues or Exposure Associations (e.g. BOHS, DOHS, etc)	27.7%	13
A meeting, conference, seminar, workshop etc	25.5%	12
Peer-reviewed scientific publications or papers	10.6%	5
The tool's own website, its publicity materials or training course	10.6%	5
Other Website, links, discussions (e.g. e-newsletters, articles/blogs, Linked-in, Twitter etc)	6.4%	3
Via other published materials – (e.g. SHE news, industry/trade papers, in-house magazines etc)	2.1%	1
Other (please specify)	8.5%	4
<i>answered question</i>		47

106. Other (please specify)

- 1 GPS
In the course of performing exposure assessments for
- 2 biocides
- 3 took part in project
- 4 Took part in the project

107. Please indicate your level of knowledge regarding RISKOFDERM

Answer Options	Response Percent	Response Count
I fully understand how to use the tool and have an in-depth understanding of its underlying concepts and limitations	19.2%	9
I have a good working knowledge about how to use the tool for my purposes and am aware of its limitations	44.7%	21
I know how to use the tool to generate exposure estimates but am unfamiliar with its underlying concepts and limitations	36.2%	17
answered question		47

108. How often do you use RISKOFDERM?

Answer Options	Response Percent	Response Count
Once a week or more	0.0%	0
2-3 times per month	8.5%	4
once every 2-3 months	23.4%	11
2-3 times per year	31.9%	15
Less than once a year	36.2%	17
answered question		47

109. When did you last use RISKOFDERM?

Answer Options	Response Percent	Response Count
Within the last week	6.4%	3
Within the last month	14.9%	7
Within the last 2-5 months	29.8%	14
Over 6 months ago	48.9%	23
answered question		47

110. What are the main purposes for which you use RISKOFDERM (tick all that apply)

Answer Options	Response Percent	Response Count
For REACH exposure assessments	63.8%	30
For quantitative risk assessments	29.8%	14
To assist in the identification of risk management measures	25.5%	12
Other (please specify)	8.5%	4
answered question		47

110. Other (please specify)

- | | |
|---|----------------------------------|
| 1 | Biocides exposure assessment |
| 2 | Biocide |
| 3 | For biocides exposure assessment |
| 4 | consultations, training |

111. Thinking about your use of RISKOFDERM, please select the category that best matches your opinion						
Answer Options	Very easy	Easy	Neither easy or difficult	Difficult	Very difficult	Response Count
Accessing and downloading RISKOFDERM to my computer was ...	6	26	12	2	1	47
Understanding the screen layout is ...	5	22	18	2	0	47
Learning how to use the model for first time was ...	4	22	13	7	1	47
Generating my required model output was ...	2	21	17	7	0	47
When returning to the model after a period of non-use, I found that using it again was ...	4	23	15	5	0	47
If I made a mistake when using the model, fixing the problem was ...	4	21	18	4	0	47
<i>answered question</i>						47

112. Please select the category that best reflects your opinion about help and guidance in RISKOFDERM						
Answer Options	Very helpful	Helpful	Neither helpful or unhelpful	Unhelpful	Very unhelpful	Response Count
The help functions contained within the model itself, (e.g. comment boxes, links to additional info.) were...	0	27	18	1	1	47
The supplementary guidance provided, (e.g. on the model website or additional documentation) was ...	0	24	19	2	2	47
<i>answered question</i>						47

113. Please add any further comments on the user friendliness of the RISKOFDERM in the box below

Answer Options	Response Count
	8
<i>answered question</i>	8

113. Response Text

- 1 n/a
- 2 same as Ecetoc tra. to much info, chaotic lay out. mind boggling
- 3 straightforward - model output limited
- 4 A reasonably simple model to use with useful outputs and warnings
- 5 The tool is very hard to even find on the internet. There should be a download site that is officially endorsed by ECHA.
- 6 It is not a self-explaining model and there is big demand on information to be available for doing exposure assessments
- 7 OK to use if you're familiar with Excel
- 8 I am biased, as I took part in developing the model!

114. How easy or difficult did you find it to translate your real-life workplace exposure situations into the required RISKOFDERM input parameters?

Answer Options	Response Percent	Response Count
Very easy	0.0%	0
Easy	25.5%	12
Neither easy or difficult	53.2%	25
Difficult	17.0%	8
Very difficult	4.3%	2
<i>answered question</i>		47

115. In general, do you think that the exposure estimates provided by the model ...

Answer Options	Response Percent	Response Count
Greatly over-estimate exposure	17.0%	8
Appropriately over-estimate exposure	42.6%	20
Sometimes over-estimate and Sometimes under-estimate exposure	40.4%	19
Under-estimate exposure	0.0%	0
Greatly under-estimate exposure	0.0%	0
<i>answered question</i>		47

116. How important to you is it that the model appropriately over-estimates exposure?

Answer Options	Response Percent	Response Count
Very important	6.4%	3
Important	66.0%	31
Neither important or unimportant	25.5%	12
Unimportant	2.1%	1
Of little importance	0.0%	0
answered question		47

117. In general, do you feel that RISKOFDERM fulfilled your requirements?		
Answer Options	Response Percent	Response Count
Yes	43.5%	20
No	37.0%	17
Don't know	19.6%	9
answered question		46

118. If you answered "No", why did you feel that RISKOFDERM did not fulfill your requirements? Please tick all that apply		
Answer Options	Response Percent	Response Count
I had insufficient workplace exposure information to enter all required input parameters	44.4%	8
It was unclear how to translate my workplace information into the required input parameters	44.4%	8
The estimates of exposure did not seem realistic for my workplace situation	55.6%	10
The estimates of exposure were unclear or ambiguous	33.3%	6
I could not identify a relevant process description for my work task	16.7%	3
Other reason(s) - please specify		6
answered question		18

118. Other reason(s) - please specify	
1	only dermal exposure
2	to user unfriendly
3	Refinement options not available; output not modifiable; no options for RMMs in the model; no 75th percentile given
4	Long tasks typically ran outside the boundaries of the model and resulted in very large uncertainties. Didn't seem to provide much refinement on ECETOC TRA dermal.
5	dermal flux rates are so highly variable that they are not reliable. Otherwise dermal exposure assessment would be used for estimating occupational exposures instead of air monitoring.
6	The basis of the sustaining algorithms does not yield

enormous confidence when seen against the CLs of the data on which they are based

119. Did you compare the results obtained from RISKOFDERM against any actual measured data that you had available?

Answer Options	Response Percent	Response Count
Yes	10.9%	5
No	89.1%	41
<i>answered question</i>		46

120. If you did compare them, what level of agreement did the RISKOFDERM estimates have with the measured exposures?

Answer Options	Response Percent	Response Count
Very good	20.0%	1
Good	20.0%	1
Neither good or poor	20.0%	1
Poor	20.0%	1
Very poor	20.0%	1
<i>answered question</i>		5

121. In general, please tell us what you think are the strengths of RISKOFDERM

Answer Options	Response Count
	21
<i>answered question</i>	21

121. Response Text

- 1 specific dermal; exposure tool
- 2 tool for dermal assessment
- 3 very detailed
- 4 More accurate than ECETOC TRA
- 5 that it makes dermal estimations possible
- 6 Good Tier 0 screening tool
- 7 Still not worked in depth with the tool. It gives a good idea on the dermal exposition to chemicals.
- 8 can be used as an identification of a dermal exposure in a risk assessment study
- 9 includes whole body exposure, worker exposure for professionals, brush on applications etc, simple
- 10 Good predictor of potential dermal exposure - realistic estimates that align well with research findings
- 11 fairly easy to use; focus on dermal is good rather than trying to use Ecetoc model which has more of an ad on feel
- 12 Straightforward, fast results.
- 13 Simple to use
- 14 not convivial tool

- 15 doing able
- 16 RiskOfDerm gives a fast result provided the required information on the input parameters is available.
- 17 Provides a possibility to refine an exposure if more info is available than typical input for ECETOC TRA.
- 18 The ability to estimate dermal exposure is great, because doing measurements in the field is too difficult and takes too much time. And also the help of a worker is not needed (to put pads on him).
- 19 Alternative to TRA
- 20 Simple Excel based tool.
- 21 It is based on measured data. The quality and representativeness of the data is another question. Works well in some cases, which you have to know beforehand.

122. In general, please tell us what you think are the limitations of RISKOFDERM and how do you think it can be improved?

Answer Options	Response Count
	22
<i>answered question</i>	22

122. Response Text

- 1 Choice of process and PROC and/or task correlation
- 2 application for all types of exposures is not always easy (what scenario to choose)
- 3 More information on real life examples, for example in transfer situation what would the transfer rate be, what exposure time could be used
- 4 -----
- 5 Sometimes difficult to choose the determinants describing the use (and understand how it changes the results)
- 6 that the user unfriendly lay-out makes it try to avoid using it. more bite-size approach, maybe divide the input over various windows with appropriate helpful text.
- 7 clearer layout - less colours
- 8 Still not worked in depth with the tool. Starting now
- 9 Very easy outcome - if there's a R sentence with skin in there, it's always a red situation!
- 10 aggregate exposure for multiple steps re: fill, mix, load and application, else done outside the model
- 11 Doesn't help in predicting actual dermal exposure or systemic dose. Rather unclear how to access appropriate estimates from the generated distribution
- 12 scenarios could be expanded; optional link to proc's would be good, output could be better delivered - for instance what value / confidence does the model think is relevant? combination with Ecetoc tra could be an option - so that assessment is in same context

- 13 Weak output format. Body weight, dilutions etc. have to be manually accounted for. Use rates should have recommendations for certain standard operations.
- 14 Simplistic model
- 15 none
- 16 Refinement options not available; output not modifiable; no options for RMMs in the model; no 75th calculation provided.
- 17 The uncertainties in the estimated values are huge. The data sets on which the model is based do not lend themselves for extrapolation to full shift exposures.
- 18 Overestimation and the limitations to choose the right information.
- 19 Also too conservative
- 20 Appears very conservative. Conceptual basis is very difficult to translate into REACH. The basis of the sustaining algorithms does not yield enormous confidence when seen against the CLs of the data on which they are based
- 21 Limited measurement data that are used to validate the model.
- 22 Only limited number of tasks. Was developed on pre-REACH time, so the models do not match with use descriptor system

123. If you would like to participate in our prize draw to win a 50€ Amazon voucher, then please provide your name and contact details below.

Answer Options	Response Percent	Response Count
Name:	100.0%	113
Email Address:	100.0%	113
Phone Number:	91.2%	103
<i>answered question</i>		113

124. As part of the Tier 1 model evaluation process, we would like to invite a small group of model users to participate in a workshop which will assess model reliability. Would you be willing to participate in such a workshop?

Answer Options	Response Percent	Response Count
Yes	58.6%	92
No	41.4%	65
<i>answered question</i>		157

125. If so, would you be able to attend a face-to-face event, which would be held in Edinburgh, UK, or to participate via a webinar? (please tick all that apply)

Answer Options	Response Percent	Response Count
Face-to face event in Edinburgh, UK.	50.5%	51
Through a Webinar	87.1%	88
<i>answered question</i>		101

126. If you are willing to participate in either way, please provide your contact details below so that we can provide further information when it becomes available.

Answer Options	Response Percent	Response Count
Name:	98.9%	94
Email Address:	100.0%	95
Phone Number:	89.5%	85
<i>answered question</i>		95

Appendix 3 Format for BAuA Stakeholder Interviews

Introduction by Interviewer

Introduction to the project and its aims

As you may be aware, the IOM has been commissioned by BAuA, the German Federal Institute of Occupational Safety and Health to carry out an evaluation of Tier 1 exposure assessment models that can be used under REACH.

One part of the evaluation process will involve comparison of model predictions with collected workplace exposure data, and the second part will look at the user-friendliness of the different tools.

Why are we interviewing

In order to assess how easy the models are to use, how subjective they are and how well their scope and limitations are understood by users, we are conducting a targeted series of in-depth telephone interviews with experienced model users, followed up with a larger on-line questionnaire exercise, aimed at capturing the views of a wider range of interested parties.

What we want to find out generally

In summary then, we want to find out how easy the models are to use, how much their effective use is dependent on user experience, how well users understand the model outputs and most importantly gather ideas on how the models can be further refined to increase their ease of use and transparency, which will then be fed back to the developers for incorporation into model and guidance updates.

The interview will take approximately 1 hour.

1. Background information on stakeholder

Name:

Company name and address:

Job title:

2. Which of the following models have you accessed/downloaded?

- 2.1 MEASE
- 2.2 EMKG-EXPO-TOOL
- 2.3 RISKOFDERM
- 2.4 STOFFENMANAGER
- 2.5 ECETOC TRA

3. Which of the following models do you have experience of using?

- 3.1 MEASE
- 3.2 EMKG-EXPO-TOOL
- 3.3 RISKOFDERM
- 3.4 STOFFENMANAGER
- 3.5 ECETOC TRA

We would like to ask you a series of questions about the model you have most experience with.

If you have used more than one model, and time allows, it would be really helpful if we could ask some questions about other models you may have used, however we can decide on that later.

Interviewer – which model are you most familiar with?

4. MEASE

User Experience

- 4.0 How did you become aware of MEASE?
- 4.1 How long have you been using MEASE?
- 4.2. How often do you use MEASE?
Prompt –once a week, once a month or fewer times
- 4.3 When did you last use MEASE?
Prompt – in the last week, month or year
- 4.4 For what main purpose do you use MEASE- REACH exposure assessments, compliance estimates/risk assessments or to assist in the identification of risk management measures?
- 4.5 Why did you choose MEASE for this purpose in preference to other available models?
- 4.6 Did you experience any installation problems / software conflicts with MEASE?

If yes can you please describe any problems?

4.7 Was the computer interface easy to use?

If it was easy, why did you find it easy to use?

If it was difficult to use, what aspects did you find difficult?

4.8 What sources of information did you use to inform yourself about MEASE?

Prompts – documentation, glossary, underlying publication etc.

4.9 Were the documentation and glossary provided helpful to you when using the model?

If yes, what did you like about the information provided?

If no, what was lacking in this information?

How could it be provided/ designed to be more helpful?

Using MEASE

4.10 Have you used MEASE to predict dermal exposure or inhalation exposures (or both)?

Please describe how you have used MEASE for dermal exposure, inhalation exposure or both.

Ask for examples of specific exposure situations in which it was used.

4.11 Are you aware of any situations, i.e. substance types or process conditions for which MEASE should not be used?

4.12 Are you familiar with the underlying methods by which MEASE generates predictions for inhalation exposure and dermal exposure?
If so, can you describe them?

(PROMPT-ask for both inhalation and dermal as they are different. Also Prompt algorithms used, model development (basis or origin of initial values / modifiers)

Do you have any thoughts on their appropriateness and/ or potential limitations?

4.13 How easy/difficult did you find it to translate your real-life work situations into the required MEASE input parameters?

With which parts of the exposure situation, or which determinants of the tool, did you have difficulties?

4.14 Were there any exposure situations that you were not able to address using MEASE, for example, due to a lack of exposure determinants)?

- 4.15 There are a number of exposure determinants that influence the exposure level of real-life work situations. Are there any exposure determinants not taken into account in MEASE that you felt should be?
- 4.16 In general, did you have enough information about the workforce; tasks etc. to feed into MEASE or did you have to make any assumptions about the working practices?
- 4.17 How did you use the exposure predictions that were produced on each occasion MEASE was used?
- 4.18 Do you feel that the exposure estimates generated were accurate and precise for the situations you have explored?
If yes, how did you reach that opinion?

If no, why do you think that the predictions were inappropriate?
- 4.19 How concerned are you about the precision and accuracy of the predicted exposures for your purposes?
- 4.20 Did MEASE fulfill your requirements in this respect?

Validation of MEASE against measured exposures

- 4.21 Did you compare the results obtained from MEASE against any measured exposure data that you had available?
If yes, why was this undertaken?

What did the comparison process consist of?

How did the measured exposures compare with predictions?

What was the outcome and would you be happy for us to see the results of the comparison?

If no, why was no comparison undertaken? Were you confident in the results obtained from MEASE?
- 4.22 If using MEASE again, would you wish to validate it by some means?
- 4.23 Are you aware of any work done by others to evaluate or validate MEASE predictions?

Strengths, limitations and suggestions for improvement of MEASE

- 4.24 In general, what do you think are the strengths of MEASE?
- 4.25 In general, what do you think are the limitations of MEASE?
How do you think it can be improved?

Prompts:

Would additional information on the underlying methods be useful?

Would more guidance on selection of parameters be of assistance?

Did you find the point estimate helpful or would a distribution of exposures be more useful?

- 4.26 Did you notice any contradictions or inconsistencies in MEASE or the underlying literature?
- 4.27 Have you published any articles or reports on the MEASE model that you would be willing to share with the research team?

5. EMKG-EXPO-TOOL

- 5.1 How did you become aware of this model?
- 5.2 How long have you been using EMKG-EXPO-TOOL?
- 5.3 How often do you use EMKG-EXPO-TOOL?
- 5.4 When did you last use EMKG-EXPO-TOOL?
- 5.5 For what main purpose do you use EMKG-EXPO-TOOL - REACH exposure assessments, compliance estimates/risk assessments or to assist in the identification of risk management measures?
- 5.6 Why did you choose EMKG-EXPO-TOOL for this purpose in preference to other available models?
- 5.7 Did you experience any installation problems / software conflicts with EMKG-EXPO-TOOL?
- 5.8 Was the computer interface easy to use?
- 5.9 What sources of information did you use to inform yourself about the EMKG EXPO-TOOL?
- 5.10 Did the explanatory text on the model limitations and for each parameter within the spreadsheet helpful to you when using the model?

Using the EMKG-EXPO-TOOL

- 5.11 Have you used EMKG-EXPO-TOOL to predict inhalation exposure?
- 5.12 Are you aware of any situations, i.e. substance types or process conditions for which EMKG-EXPO-TOOL should not be used?

- 5.13 Are you familiar with the underlying methods by which EMKG-EXPO-TOOL generates predictions for inhalation exposure?
- 5.14 Do you have any thoughts on their appropriateness and/ or potential limitations?
- 5.15 How easy/difficult did you find it to translate your real-life work situations into the required EMKG-EXPO-TOOL input parameters?
- 5.16 Were there any exposure situations that you were not able to address using EMKG-EXPO-TOOL, for example, due to a lack of exposure determinants)?
- 5.17 There are a number of exposure determinants that influence the exposure level of real-life work situations. Are there any exposure determinants not taken into account in EMKG-EXPO-TOOL that you felt should be?
- 5.18 In general, did you have enough information about the workforce; tasks etc. to feed into EMKG-EXPO-TOOL or did you have to make any assumptions about the working practices?
- 5.19 How did you use the exposure range estimates that were produced on each occasion EMKG-EXPO-TOOL was used?
- 5.20 Do you feel that the exposure range estimates generated were accurate and precise for the situations you have explored?
- 5.21 Are you aware that the exposure estimate generated is only valid if the recommended risk management measures within the control guidance sheets are fully implemented?
- 5.22 How concerned are you about the precision and accuracy of the predicted exposures for your purposes?
- 5.23 Did EMKG-EXPO-TOOL fulfill your requirements in this respect?

Validation of EMKG-EXPO-TOOL against measured exposures

- 5.24 Did you compare the exposure ranges obtained from EMKG-EXPO-TOOL against any measured exposure data that you had available?
- 5.25 If using EMKG-EXPO-TOOL again, would you wish to validate it by some means?
- 5.26 Are you aware of any work done by others to evaluate or validate EMKG-EXPO-TOOL predictions?

Strengths, limitations and suggestions for improvement of EMKG-EXPO-TOOL

- 5.27 In general, what do you think are the strengths of EMKG-EXPO-TOOL?

- 5.28 In general, what do you think are the limitations of EMKG-EXPO-TOOL?
- 5.29 Did you notice any contradictions or inconsistencies in EMKG-EXPO-TOOL or the underlying literature?
- 5.30 Have you published any articles or reports on the EMKG-EXPO-TOOL that you would be willing to share with the research team?

6. ECETOC TRA

User Experience

- 6.0 How did you become aware of this model?
- 6.1 How long have you been using the ECETOC TRA? Which version(s) have you used?
- 6.2. How often do you use the ECETOC TRA?
Prompt –once a week, once a month or fewer times
- 6.3 When did you last use the ECETOC TRA?
Prompt – in the last week, month or year
- 6.4 For what main purpose do you use the ECETOC TRA- REACH exposure assessments, compliance estimates/risk assessments or to assist in the identification of risk management measures?
- 6.5 Why did you choose the ECETOC TRA for this purpose in preference to other available models?
- 6.6 Did you experience any installation problems / software conflicts with the ECETOC TRA?
If yes can you please describe any problems?
- 6.7 Was the computer interface easy to use?
If it was easy, why did you find it easy to use?

If it was difficult to use, what aspects did you find difficult?
- 6.8 What sources of information did you use to inform yourself about the ECETOC TRA?
Prompts – user guides, report files, implemented help/hints etc.
- 6.9 Were the available documentation and guidance provided with the tool helpful to you when using the model?
If yes, what did you like about the information provided?

If no, what was lacking in this information?

How could it be provided/ designed to be more helpful?

Using the ECETOC TRA

- 6.10 Have you used the ECETOC TRA to predict dermal exposure or inhalation exposures (or both)?

Please describe how you have used ECETOC TRA for dermal exposure, inhalation exposure or both.

Ask for examples of specific exposure situations in which it was used.

- 6.11 Are you aware of any situations, i.e. substance types or process conditions for which the ECETOC TRA should not be used?

- 6.12 Are you familiar with the underlying methods by which ECETOC TRA generates predictions for inhalation exposure and dermal exposure?

If so, can you describe them? (PROMPT-ask for both inhalation and dermal. Also prompt algorithms used, model development (basis or origin of initial values / modifiers)

Do you have any thoughts on their appropriateness and/ or potential limitations?

Did you find the value look-up facility on the spreadsheet helpful in terms of understanding the exposure modifiers used?

- 6.13 How easy/difficult did you find it to translate your real-life work situations into the required ECETOC TRA input parameters?

With which parts of the exposure situation, or which determinant of the tool, did you have difficulties?

- 6.14 Were there any exposure situations that you were not able to address using ECETOC TRA, for example, due to a lack of exposure determinants?

- 6.15 There are a number of exposure determinants that influence the exposure level of real-life work situations. Is there any exposure determinants not taken into account in ECETOC TRA that you felt should be?

- 6.16 In general, did you have enough information about the workforce; tasks etc. to feed into ECETOC TRA or did you have to make any assumptions about the working practices?

- 6.17 How did you use the exposure predictions that were produced on each occasion ECETOC TRA was used?

- 6.18 Do you feel that the exposure estimates generated were accurate and precise for the situations you have explored?

If yes, how did you reach that opinion?

If no, why do you think that the predictions were inappropriate?

- 6.19 How concerned are you about the precision and accuracy of the predicted exposures for your purposes?

6.20 Did ECETOC TRA fulfill your requirements in this respect?

Validation of the ECETOC TRA against measured exposures

6.21 Did you compare the results obtained from the ECETOC TRA against any measured exposure data that you had available?

If yes, why was this undertaken?

- What did the comparison process consist of?
- How did the measured exposures compare with predictions?
- What was the outcome and would you be happy for us to see the results of the comparison?

If no, why was no comparison undertaken? Were you confident in the results obtained from the ECETOC TRA?

6.22 If using the ECETOC TRA again, would you wish to validate it by some means?

6.23 Are you aware of any work done by others to evaluate or validate the ECETOC TRA predictions?

Strengths, limitations and suggestions for improvement of the ECETOC TRA

6.24 In general, what do you think are the strengths of the ECETOC TRA?

6.25 In general, what do you think are the limitations of the ECETOC TRA?
How do you think it can be improved?

Prompts:

Would additional information on the underlying methods be useful?

Would more guidance on selection of parameters be of assistance?

Did you find the point estimate helpful or would a distribution of exposures be more useful?

6.26 Did you notice any contradictions or inconsistencies in ECETOC TRA or the underlying literature?

6.27 Have you published any articles or reports on the ECETOC TRA model that you would be willing to share with the research team?

7. Stoffenmanager

User Experience

7.0 How did you become aware of this model?

- 7.1 How long have you been using Stoffenmanager? Which version(s) have you used?
- 7.2 How often do you use Stoffenmanager?
Prompt – once a week, once a month or fewer times
- 7.3 When did you last use Stoffenmanager?
Prompt – in the last week, month or year
- 7.4 For what main purpose do you use Stoffenmanager- REACH worker exposure assessments, quantitative exposure assessments or to assist in the identification of risk management measures via control banding?
- 7.5 Why did you choose Stoffenmanager for this main purpose in preference to other available models?
- 7.6 Did you experience any installation problems / software conflicts with Stoffenmanager?

If yes can you please describe any problems?
- 7.7 Was the computer interface easy to use?
If it was easy, why did you find it easy to use?

If it was difficult to use, what aspects did you find difficult?
- 7.8 What sources of information did you use to inform yourself about Stoffenmanager?
Prompts – user guides, report files, publications, implemented help/hints etc.
- 7.9 Was the online documentation and guidance provided within the entry templates helpful to you when using the model?
If yes, what did you like about the information provided?

If no, what was lacking in this information?

How could it be provided/ designed to be more helpful?

Using Stoffenmanager

- 7.10 Have you used Stoffenmanager to predict inhalation exposures?

Please describe how you have used Stoffenmanager for inhalation exposure

Ask for examples of specific exposure situations in which it was used.
- 7.11 Are you aware of any situations, i.e. substance types or process conditions for which Stoffenmanager should not be used?
- 7.12 Are you familiar with the underlying methods by which Stoffenmanager generates predictions for inhalation exposure?

If so, can you describe them? Prompt algorithms used, model development (basis or origin of initial values / modifiers)

Do you have any thoughts on their appropriateness and/ or potential limitations?

- 7.13 How easy/ difficult did you find it to translate your real-life work situations into the required Stoffenmanager input parameters?
With which parts of the exposure situation, or which determinant of the tool, did you have difficulties?
- 7.14 Were there any exposure situations that you were not able to address using Stoffenmanager, for example, due to a lack of exposure determinants?
- 7.15 There are a number of exposure determinants that influence the exposure level of real-life work situations. Are there any exposure determinants not taken into account in Stoffenmanager that you felt should be?
- 7.16 In general, did you have enough information about the workforce; tasks etc. to feed into Stoffenmanager or did you have to make any assumptions about the working practices?
- 7.17 How did you use the exposure range predictions that were produced on each occasion Stoffenmanager was used? For example, use of different percentiles?
- 7.18 Do you feel that the exposure estimates generated were accurate and precise for the situations you have explored?
If yes, how did you reach that opinion?
If no, why do you think that the predictions were inappropriate?
- 7.19 How concerned are you about the precision and accuracy of the predicted exposures for your purposes?
- 7.20 Did Stoffenmanager fulfill your requirements in this respect?
- 7.21 Have you used the other functions in Stoffenmanager?

Validation of Stoffenmanager against measured exposures

- 7.22 Did you compare the results obtained from Stoffenmanager against any measured exposure data that you had available?
If yes, why was this undertaken?
- What did the comparison process consist of?
- How did the measured exposures compare with predictions?
- What was the outcome and would you be happy for us to see the results of the comparison?

If no, why was no comparison undertaken? Were you confident in the results obtained from Stoffenmanager?

7.23 If using Stoffenmanager again, would you wish to validate it by some means?

7.24 Are you aware of any work done by others to evaluate or validate Stoffenmanager predictions?

Strengths, limitations and suggestions for improvement of Stoffenmanager

7.25 In general, what do you think are the strengths of Stoffenmanager?

7.26 In general, what do you think are the limitations of Stoffenmanager?
How do you think it can be improved?

Prompts:

Would additional information on the underlying methods be useful?

Would more guidance on selection of parameters be of assistance?

Did you find the generation of a distribution of estimated exposures useful?

7.27 Did you notice any contradictions or inconsistencies in Stoffenmanager or the underlying literature?

7.28 Have you published any articles or reports on Stoffenmanager model that you would be willing to share with the research team?

8. RISKOFDERM

User Experience

- 8.0 How did you become aware of this model?
- 8.1 How long have you been using RISKOFDERM?
- 8.2 How often do you use RISKOFDERM?
Prompt –once a week, once a month or fewer times
- 8.3 When did you last use RISKOFDERM?
Prompt – in the last week, month or year
- 8.4 For what main purpose do you use RISKOFDERM- REACH worker exposure assessments, compliance exposure assessments or to assist in the identification of risk management measures?
- 8.5 Why did you choose RISKOFDERM for this main purpose in preference to other available dermal models?
- 8.6 Did you experience any installation problems / software conflicts with RISKOFDERM?
If yes can you please describe any problems?
- 8.7 Was the computer interface easy to use?
If it was easy, why did you find it easy to use?

If it was difficult to use, what aspects did you find difficult?
- 8.8 What sources of information did you use to inform yourself about RISKOFDERM?
Prompts – user guides, report files, publications, implemented help/hints etc.
- 8.9 Was the guidance provided within the spreadsheet helpful to you when using the model?

If yes, what did you like about the information provided?

If no, what was lacking in this information?

How could it be provided/ designed to be more helpful?

Using RISKOFDERM

- 8.10 Have you used RISKOFDERM to predict dermal exposures?

Please describe how you have used RISKOFDERM for dermal exposure

Ask for examples of specific exposure situations in which it was used.
- 8.11 Are you aware of any situations, i.e. substance types or process conditions for which RISKOFDERM should not be used?

- 8.12 Are you familiar with the underlying methods by which RISKOFDERM generates predictions for dermal exposure?
If so, can you describe them? Prompt algorithms used, model development (basis or origin of initial values / modifiers)

Do you have any thoughts on their appropriateness and/ or potential limitations?
- 8.13 How easy/ difficult did you find it to translate your real-life work situations into the required RISKOFDERM input parameters?
With which parts of the exposure situation, or which determinant of the tool, did you have difficulties?
- 8.14 Were there any exposure situations that you were not able to address using RISKOFDERM, for example, due to a lack of exposure determinants?
- 8.15 There are a number of exposure determinants that influence the exposure level of real-life work situations. Are there any exposure determinants not taken into account in RISKOFDERM that you felt should be?
- 8.16 In general, did you have enough information about the workforce; tasks etc. to feed into RISKOFDERM or did you have to make any assumptions about the working practices?
- 8.17 How did you use the exposure range predictions that were produced on each occasion RISKOFDERM was used? For example, use of different percentiles?
- 8.18 Do you feel that the exposure estimates generated were accurate and precise for the situations you have explored?
If yes, how did you reach that opinion?
If no, why do you think that the predictions were inappropriate?
- 8.19 How concerned are you about the precision and accuracy of the predicted exposures for your purposes?
- 8.20 Did RISKOFDERM fulfill your requirements in this respect?

Validation of RISKOFDERM against measured exposures

- 8.21 Did you compare the results obtained from RISKOFDERM against any measured exposure data that you had available?
If yes, why was this undertaken?

What did the comparison process consist of?

How did the measured exposures compare with predictions?

What was the outcome and would you be happy for us to see the results of the comparison?

If no, why was no comparison undertaken? Were you confident in the results obtained from RISKOFDERM?

8.22 If using RISKOFDERM again, would you wish to validate it by some means?

8.23 Are you aware of any work done by others to evaluate or validate RISKOFDERM predictions?

Strengths, limitations and suggestions for improvement of RISKOFDERM

8.24 In general, what do you think are the strengths of RISKOFDERM?

8.25 In general, what do you think are the limitations of RISKOFDERM?
How do you think it can be improved?

Prompts:

Would additional information on the underlying methods be useful?

Would more guidance on selection of parameters be of assistance?

Did you find the generation of a distribution of estimated exposures useful?

8.26 Did you notice any contradictions or inconsistencies in RISKOFDERM or the underlying literature?

8.27 Have you published any articles or reports on RISKOFDERM model that you would be willing to share with the research team?

9. Future Developments

To close with, we have some general questions on the available models for use under REACH.

- 9.1 Do you think the choice of models available was appropriate for your requirements?
- 9.2 Overall, were you satisfied that the output(s) of your chosen model were suitable and sufficient for your intended purposes?
- 9.3 Have you used any other exposure models, for example higher tier tools, such as the Advanced REACH Tool (ART)?

End of interview:

Thank participant and ask if they have any questions.

Would you like to receive a copy of our report on this work? If yes, check name, address.

As part of the evaluation process, we would also like to invite a small group of tool users to participate in a workshop which will assess tool reliability. We would like to ask you if you would be interested in participating in such a workshop, and if so, if you would prefer a face-to-face event, which would be held in Edinburgh, or a webinar approach? (note: the flights and reasonable accommodation costs of workshop participants will be paid)

Appendix 4 Results of the interviews

The following sections detail the actual responses given by telephone interviewees and therefore reflect their opinions. Please note that in this section, the term “model” was used rather than “tool” to describe the various systems used and non-bold italic font are used to denote direct quotations.

A4.1 THE ECETOC TRA

Three individuals were interviewed about their experiences in using the ECETOC TRA version 2. The reason for the third interview was that one participant had not correctly identified their experience of the models at invitation stage, so was also interviewed regarding the ECETOC TRA, as this was the model with which they had most experience.

A4.1.1 User Experience

How did you become aware of this model?

The users had become aware of the TRA through the ECETOC website, its members and through the company where they worked.

How long have you been using the ECETOC TRA? Which version(s) have you used?

The interviewees differed in how long they have been using the model with one interviewee stating that they had used all the versions since the first and two interviewees stating that they had started using the tool at version 2.

How often do you use the ECETOC TRA?

The frequency of use also varied from 2 or 3 times a week to once every 3 or 4 weeks, with the most recent usage ranging from years ago to within the last month.

For what main purpose do you use the ECETOC TRA?

Interviewees indicated that their main uses of the TRA were for REACH exposure assessments and worker/consumer assessments. The model had been chosen because of its *speed, ease of use and the lack of alternatives*.

Did you experience any installation problems / software conflicts with the ECETOC TRA and how easy to use was the interface?

The only installation problem identified related to *language problems with calculations at the start*. The computer interface was described as being *easy to use and straightforward*. One of the responses stated that they found the *single tool easy to use and understand but found the integrated tool more complicated to use* and often had technical problems whilst opening and closing different Excel sheets.

What sources of information did you use to inform yourself about the ECETOC TRA and how helpful was the guidance?

To inform themselves of information about the ECETOC TRA the interviewees had used sources such as the main page instructions, 2 user guides and attendance at the launch of the tool in Brussels. The documentation and guidance were noted as being helpful, the short guidance was specified as being sufficient if the technical reports were read as well.

A4.1.2 Using the ECETOC TRA

Have you used the ECETOC TRA to predict dermal exposure or inhalation exposures (or both)?

The ECETOC TRA model was stated as being used for both dermal and inhalation exposures.

For dermal exposure, the basic tool had been used by one interviewee, with additional recalculations being made to refine the estimates. One interviewee commented that *the inhalation exposures cover a lot of substances with low vapour pressure.*

Also it was stated that there was a problem with the difference between the single and integrated model *as the opening and closing of numerous spreadsheets in the integrated version did not make it an easy tool to use.*

Are you aware of any situations, i.e. substance types or process conditions for which the ECETOC TRA should not be used?

Interviewees differed in their replies regarding the range of applicability of the tool, with one stating that there were no restrictions of use and the second that it should not be used to evaluate exposure to aerosols. The third interviewee had identified that the results obtained when using MDI (a monomer used in polyurethane production) were lower than the actual measured values.

Are you familiar with the underlying methods by which ECETOC TRA generates predictions for inhalation exposure and dermal exposure?

Responses in relation to the interviewee's familiarity of the underlying methods by which ECETOC TRA generates predictions ranged from not knowing to knowing that they come from the worst case exposure estimates from the HSE tool i.e. EASE.

Interviewees stated that they found the value look-up facility on the spreadsheet helpful in terms of understanding the exposure modifiers used.

How easy/difficult did you find it to translate your real-life work situations into the required ECETOC TRA input parameters?

It was felt that translating real life work situations into the ECETOC TRA input parameters was becoming easier as the subject is more widely discussed in industry. It was noted by interviewees that the assessments required refinement in relation to risk management measures.

Were there any exposure situations that you were not able to address using ECETOC TRA, for example, due to a lack of exposure determinants?

Exposure situations which were noted as not being able to be addressed with the ECETOC TRA were; *inhalation exposures from spraying and where there was a consumer tool which fitted into the situation and was easier to use and so providing a more acceptable level of exposure and therefore manageable risks.*

There are a number of exposure determinants that influence the exposure level of real-life work situations. Is there any exposure determinants not taken into account in ECETOC TRA that you felt should be?

Exposure determinants not taken into account in ECETOC TRA that interviewees thought should be incorporated included; *the concentration of substance in the preparation, fugacity in dermal exposure and exposure frequency in the consumer tool.* No one reported accessing version 3 at the time of the interview as the interviews were carried out before its release. The interviewees stated that they used the exposure predictions that were produced for chemical safety reports for REACH and exposure prediction. The exposure estimates generated were considered to be *very overestimated* and many of the cases were felt to be worst case estimates.

Do you feel that the exposure estimates generated were accurate and precise for the situations you have explored?

When asked about concerns for the precision and accuracy of the predicted exposures, interviewees re-stated that they were *convinced that they were estimating the worst case exposure.*

Did ECETOC TRA fulfil your requirements in this respect?

In relation to the ECETOC TRA fulfilling the requirements of the user it was stated that there were *drawbacks precluding its use in more refined assessments*, hence the use by one interviewee of the modified version to get better risk management measures. One further interviewee noted that it did fulfill their requirements.

A4.2 Validation of the ECETOC TRA against measured exposures

In relation to validation of the ECETOC TRA against measured exposures, interviewees mentioned they had done this with chemical exposure measurements and it shows that ECETOC TRA predicts the worst case scenario. For future use of the ECETOC TRA, responses varied from whether or not they would wish to validate it by some means and this being dependent on whether or not it is possible. Interviewees were not aware of any work done by others to evaluate or validate the ECETOC TRA.

A4.2.1 Strengths, limitations and suggestions for improvement of the ECETOC TRA

In general, the strengths of the ECETOC TRA mentioned by interviewees were; *its simplicity, the facility to process a lot of information simultaneously; its clear*

illustration of the assumptions made and how these affect the calculations and resultant estimate and the possibility to iterate the options.

The limitations quoted by interviewees included the fact that *point estimates are generated for scenarios rather than distributions.*

The interviewees had not identified any contradictions or inconsistencies in ECETOC TRA or the literature. The interviewees had not published any articles or reports on the ECETOC TRA.

A4.3 MEASE

Two participants were interviewed regarding their experiences with the MEASE model. One interviewee was a senior regulatory scientist and one was a senior occupational hygienist/industrial hygienist.

A4.3.1 User Experience

How did you become aware of MEASE?

One interviewee had become aware of MEASE in 2009 through completion of project work within the metals industry and the second interviewee through being a member of an ISO working group in 2009 also. This would have been the BETA version as the first public release was a BETA version for review in January 2010.

How long have you been using MEASE?

Interviewees reported that its use was *dependent on project work being undertaken*, thus it was used on *an on/off basis* which could be between 4 and 5 times per month.

When did you last use MEASE?

The interviewees had most recently used MEASE between 2 weeks and a few months ago.

For what main purpose do you use MEASE?

The main purposes for using the model stated in the responses were:

- exposure assessments for regulatory work related to the REACH registration process
- exposure scenarios
- risk identification

Why did you choose MEASE for this purpose in preference to other available models?

The reasons for choosing MEASE in preference to other available models included the model being *specific to metals* and being developed *using more metals industry measured data than other models*. Furthermore, one interviewee stated that the

predicted inhalation exposure estimates provided via the tool were within 30% of actual measured values when a comparison had been made through air sampling.

Did you experience any installation problems / software conflicts with MEASE?

No installation problems or software conflicts were identified when using MEASE,

Was the computer interface easy to use?

Both interviewees reported that the computer interface was easy to use with everything available on one spread sheet and when you *change a model parameter you can see the impact immediately. When this is compared to for example, the TRA, it can take more time to do the calculations.*

What sources of information did you use to inform yourself about MEASE and how helpful was the documentation?

To support themselves when using the MEASE model, the interviewees used help sources such as the glossary and documentation provided and further help about the software itself. These sources were stated as being easy to locate and the links to various publications were considered to be useful.

A4.3.2 Using MEASE

Have you used MEASE to predict dermal exposure or inhalation exposures (or both)?

The interviewees had used MEASE to predict both dermal exposure and inhalation exposures. For dermal exposure, it was perceived by one interviewee that dermal exposure estimates were noted as *not being very realistic because of the difficulties in assessing dermal exposure*. Inhalation exposure predictions with MEASE were stated as being *very good, even in complicated situations with a high number of compounds*.

Are you aware of any situations, i.e. substance types or process conditions for which MEASE should not be used?

Interviewees indicated an awareness of situations which were outside of the scope of MEASE, with the example given of *exposure to solvents in paint factories, where the presence of mixtures may affect the output*. Interviewees gave positive feedback about the guidance in MEASE, which details its range of applicability to different exposure situations.

Are you familiar with the underlying methods by which MEASE generates predictions for inhalation exposure and dermal exposure?

Both interviewees mentioned that they were familiar with the underlying methods by which MEASE generates predictions. These include it being a complementary extension of the ECETOC TRA inhalation model which was in turn developed from the EASE model. They were aware that EASE exposure predictions originated from

data in the UK Health and Safety Executive's National Exposure Database (NEDB). Interviewees also indicated knowledge of the logic tree approach taken in the EASE model to modify these initial estimates

There were limitations mentioned by the interviewees including; *incorrect predictions being made as you cannot make adjustments for risk management measures for dermal exposure*. In addition, it was perceived by one interviewee that in MEASE if *you put in ventilation patterns they can influence the outputs in ways that may not be completely valid in the workplace that is being assessed*. It was stated by both interviewees that these limitations also impact on other Tier 1 models. The data contained in the model is also recognised as being conservative as the starting values are derived from the NEDB. Interviewees mentioned the importance of user understanding regarding the scope of the model so they can determine the reliability of the exposure predictions generated.

How easy/ difficult did you find it to translate your real-life work situations into the required MEASE input parameters?

The participants were then asked about translating real-life work situations into the required MEASE input parameters. The large number of possible input parameters were considered to be a positive attribute of MEASE, as interviewees felt that this made it a "stronger" model than for example STOFFENMANAGER. It was also stated that for customer/client work, the assessments are undertaken and exposure predictions are produced without access to the workplace or actual exposure data. Thus direct translation into work situations or comparison with measured exposure data is not always possible.

Were there any exposure situations that you were not able to address using MEASE, (for example, due to a lack of exposure determinants)?

One interviewee commented that there were no situations that *could not be tackled under REACH*. However, the second interviewee perceived that there were exposure scenarios that MEASE does not address, those mentioned including exposure to electrolyzed bulbs and metals processing. They felt that MEASE produces a *huge over estimation which cannot be correct*.

There are a number of exposure determinants that influence the exposure level of real-life work situations. Are there any exposure determinants not taken into account in MEASE that you felt should be?

Interviewees commented that there are a number of factors which influence the exposure level in real life work situations, and suggested that there are other useful determinants which are not taken into account in MEASE. Industrial spraying was mentioned as being limited in its possible input options.

In general, did you have enough information about the workforce; tasks etc. to feed into MEASE or did you have to make any assumptions about the working practices?

Interviewees stated that they had generally had enough workforce and workplace information to obtain an exposure estimate from MEASE and in instances when this was not available, information was sought from their client.

How did you use the exposure predictions that were produced on each occasion MEASE was used?

The exposure predictions obtained were used for a variety of purposes, including risk assessments and exposure indices for priority agents.

The exposure estimates from MEASE were seen to be fit for purpose and acceptable as a screening tool. One interviewee added *although it is not seen as precise and there is scope for refinement.*

How concerned are you about the precision and accuracy of the predicted exposures for your purposes and did MEASE fulfil your requirements?

Both interviewees were generally happy with the precision and accuracy of the predicted exposures. One interviewee commented that if there was a concern, they *could make modifications within the model and assess whether these were realistic.* Furthermore, if there were still concerns indicated at a Tier 1 tool, they could move to the next stage and use a more sophisticated tool. The second interviewee thought the tool was good but still had some questions about the accuracy of the dermal model.

A4.3.3 Validation of MEASE against measured exposures

Did you compare the results obtained from MEASE against any measured exposure data that you had available?

Interviewees stated that a comparison against measured exposure data is always possible in specific situations, such as where priority agents have been identified. It was noted by one interviewee that there were *difficulties in obtaining many measurements and that the process was very time consuming.*

Are you aware of any work done by others to evaluate or validate MEASE predictions?

In relation to work done to evaluate or validate MEASE predictions, the responses varied from one interviewee who said that they were not aware of any independent validation but knew that the tool has been developed and additional data added by the metal industry. They did think that independent validation would be useful. The second interviewee reported that they had seen some work through publications but it was one of the reasons they had wanted to become involved in the eTEAM project as it is important to have this evaluation and validation work carried out.

A4.3.4 Strengths, limitations and suggestions for improvement of MEASE

In general, what do you think are the strengths of MEASE?

In general both interviewees found MEASE to be quite good with its main strength being the simplicity of its spreadsheet format making it straightforward to use. In comparison to ECETOC TRA, it was specifically mentioned that although this is also in a spreadsheet-based tool, it is more difficult to manipulate than MEASE. A

particular strength of MEASE was the visual representation of changes to exposure made when parameters are modified.

In general, what do you think are the limitations of MEASE?

The limitations of MEASE related to dermal exposure and the overestimates of exposure obtained when there are not enough determinants. This was attributed by interviewees by the derivation of MEASE from the TRA. It was felt that the limitations of the TRA would also apply to MEASE although it has been modified through the use of measured data. The stated limitations included the model *not covering exposure to aerosols and its simplistic view of inhalation exposure*.

One interviewee felt that the drop down menu options were *restrictive*, with the *manual additional of specific parameters being difficult as you did need to understand the underlying algorithms*. Those interviewed may have the knowledge and experience to do this, but less experienced tool users may not. One suggested improvement by one interviewee was as well as having the default ranges, the ability to add values of your own.

Useful potential improvements mentioned included being able to enter user-generated values and the replacement of some outputs by distributions of exposure.

Did you notice any contradictions or inconsistencies in MEASE or the underlying literature?

The users reported that they had not identified any contradictions or inconsistencies in MEASE or the underlying literature.

Neither interviewee reported publishing any articles or reports on the MEASE model.

A4.4 EMKG-EXPO-TOOL

Two participants were interviewed about their experiences when using EMKG-EXPO-TOOL. One was involved in risk assessment and the second was an occupational hygienist.

A4.4.1 User Experience

How did you become aware of this tool?

The users interviewed became aware of the EMKG-EXPO-TOOL through ECHA REACH guidance documents, where it is listed as one of the models for screening purposes. The guidance was obtained via internet searches.

How long have you been using EMKG-EXPO-TOOL?

The EMKG-EXPO-TOOL has been used by the interviewees from 2010 onwards.

How often do you use EMKG-EXPO-TOOL?

The frequency of use was reported as from time to time and usually in the early stages as a first look at a new substance. The most recent uses of the model were stated as being 4 to 6 months ago.

For what main purpose do you use EMKG-EXPO-TOOL?

Interviewees indicated that the main purposes for using the tool were:

- risk assessments
- risk management measure implementation
- as a comparison for other tools
- as a first screening tool.

Why did you choose EMKG-EXPO-TOOL for this purpose in preference to other available models?

The EMKG-EXPO-TOOL had been chosen because it was felt to be very quick and easy to use.

Did you experience any installation problems / software conflicts with EMKG-EXPO-TOOL?

No problems or conflicts regarding the tool's installation and software were mentioned by either participant.

Was the computer interface easy to use?

The tool was praised as being a straightforward-to-use computer interface. Further positive comments specifically related to liquids in that the *only information needed was temperature or boiling point making it very easy to use when working with a client.*

What sources of information did you use to inform yourself about the EMKG-EXPO-TOOL?

The main source of information the interviewees used to inform themselves about the EMKG-EXPO-TOOL was the BAuA website, which they used for the identification of risk management measurements and obtaining background documentation and EMKG documents.

Was the explanatory text on the model limitations and for each parameter within the spread sheet helpful to you when using the model?

The users found the explanatory text to be helpful in understanding how the model works. One interviewee mentioned that they had tested the applicability of the tool in relation to inhalation exposure and noted that they would rather use the ART tool for this as it *offers further refinement.*

A4.4.2 Using the EMKG-EXPO-TOOL

Have you used EMKG-EXPO-TOOL to predict inhalation exposure?

In using EMKG-EXPO-TOOL, one interviewee mentioned that it was not used for directly predicting inhalation exposure but instead for gauging an idea of the range of potential exposures in the initial phases of work. The second interviewee had used the tool for a number of solids and some low volatile substances.

Are you aware of any situations, i.e. substance types or process conditions for which EMKG-EXPO-TOOL should not be used?

Interviewees identified spraying and very hot processes as situations where the EMKG-EXPO-TOOL should not be used.

Are you familiar with the underlying methods by which EMKG-EXPO-TOOL generates predictions for inhalation exposure?

Interviewees were asked to comment on their knowledge of the underlying methods by which the EMKG-EXPO-TOOL generates its predictions for inhalation exposure. One interviewee reporting having an understanding of the underlying methods including Monte Carlo simulations. The second had looked at the underlying methodology but some time ago.

How easy/difficult did you find it to translate your real-life work situations into the required EMKG-EXPO-TOOL input parameters?

The interviewees indicated that they were unsure if they still felt confident in using the tool. They mentioned difficulties in translating real-life work situations into the limited number of required and fixed input parameters.

Were there any exposure situations that you were not able to address using EMKG-EXPO-TOOL, for example, due to a lack of exposure determinants)?

Although interviewees did mention situations where they would not use the tool, they also noted circumstances where they felt it did not work as well, *for example work with solids of high dustiness*. However, the second interviewee commented that as there were a lot of parameters entered, they did not feel that there were situations that they could not address.

There are a number of exposure determinants that influence the exposure level of real-life work situations. Are there any exposure determinants not taken into account in EMKG-EXPO-TOOL that you felt should be?

Interviewees mentioned that there are additional exposure determinants which they felt should be included in the EMKG-EXPO-TOOL. However, both felt that excessive refinement was inappropriate as it is a first tier screening tool, and that where there are high levels of significant exposure it should not be used.

In general, did you have enough information about the workforce; tasks etc. to feed into EMKG-EXPO-TOOL or did you have to make any assumptions about the working practices?

In relation to being able to gather sufficient workforce/workplace information, interviewees stated that the broad categories within the tool helped them in making assumptions. A specific example of this mentioned was; *if the application area is greater than one cubic meter or less results in a big difference in the output.* However, both interviewees were clear that making assumptions about the workplace or the workforce happens as they do not have access to this environment. One interviewee noted that access to workplace information can be obtained via those with knowledge of engineering controls or relevant knowledge of how the specific industry works. When asked about their intended use of exposure range estimates, interviewees mentioned a comparison of the upper band of the exposure estimate with limit values during initial screening and also for checking the effectiveness of implemented risk control measures.

Do you feel that the exposure range estimates generated were accurate and precise for the situations you have explored?

Interviewees were asked to comment on whether they found the models exposure range estimates accurate and precise enough for their situation. There were varied answers to this question. As a screening tool, the EMKG-EXPO-TOOL was stated as being accurate and precise however it was also noted as being very conservative. In general, it was felt that it generated much higher estimates than other tools and that when using more refined tools it was found that the estimate tends towards the lower end of the band. In some, one interviewee reported that, *specifically for substances with a very low vapour pressure, the estimates would go below the lower end of the exposure band.*

Are you aware that the exposure estimate generated is only valid if the recommended risk management measures within the control guidance sheets are fully implemented?

There was an agreement from both interviewees that they were aware that the exposure estimate generated is only valid if the recommended risk management measures within the control guidance sheets were fully implemented.

How concerned are you about the precision and accuracy of the predicted exposures for your purposes?

When asked about concerns towards the precision and accuracy of the predicted exposures interviewees stated it was a good tool. Its limitations related to low volatility substances, as the estimates were felt to be too high.

One interviewee highlighted that clients would find the use of the EMKG-EXPO-TOOL unsatisfactory, as they would then have to implement many risk management measures, whereas those familiar with the tool would appreciate its role as a screening tool.

Did EMKG-EXPO-TOOL fulfil your requirements in this respect?

The interviewees found that the EMKG-EXPO-TOOL fulfilled their requirements as a screening tool.

A4.4.3 Validation of the EMKG-EXPO-TOOL against measured exposures

In relation to the validation of the EMKG-EXPO-TOOL against measured exposures, there were mixed answers from the interviewees depending on whether or not they had measured data available.

For future validation, interviewees mentioned that they were either not ready to validate the tool, or did not see the need to validate a conservative tool. Interviewees were not aware of any published evaluation or validation studies for the tool.

A4.4.4 Strengths, limitations and suggestions for improvement of the EMKG-EXPO-TOOL

In general the strengths mentioned for the EMKG-EXPO-TOOL were its simplicity of operation and its ability to give a quick overview of exposure.

The interviewees felt that the limitations of the EXPO-TOOL were identical to those of other tools, e.g. non-applicability to some spraying processes and hot processes such as soldering or welding.

Interestingly, the simplicity of tool was also stated as being a possible limitation; however it was pointed out by the interviewees that if this was made more complex, this would replicate other available tools.

Interviewees had not noted any contradictions or inconsistencies in the tool.

Neither of the interviewees had published any articles or reports about the tool. .

A4.5 STOFFENMANAGER

Two participants were interviewed about their experiences in using STOFFENMANAGER. One interviewee was a Regulatory Chemist and one was a REACH Manager.

A4.5.1 User Experience

How did you become aware of this tool?

The interviewees became aware of Stoffenmanager through REACH guidance and in-house training with TNO.

How long have you been using Stoffenmanager and how often do you use the tool?

The participants reported that they had been using the model since 2009, initially version 4.0 and currently using 4.5. Stoffenmanager was stated as being used between once a month to 10 times in 3 years, the most recent use ranged from 2 weeks ago to 2 months ago.

For what main purpose do you use Stoffenmanager

The main reported purposes for using this model are; REACH exposure assessments and to improve estimates generated by the ECETOC TRA.

Why did you choose Stoffenmanager for this main purpose in preference to other available models?

Stoffenmanager was chosen in preference to other models available due to its ease of availability and the facility to refine parameters which is not available in the ECETOC TRA.

Did you experience any installation problems / software conflicts with Stoffenmanager and how usable was the computer interface?

No problems with using the tool or software conflicts were mentioned by the interviewees and the computer interface was noted as being easy to use.

What sources of information did you use to inform yourself about Stoffenmanager?

The sources of information used to inform the user about Stoffenmanager included; user guides on the website, published papers and REACH guidance documents.

Was the online documentation and guidance provided within the entry templates helpful to you when using the model?

Specifically, the online documentation and guidance provided within the entry templates was noted as being helpful, making the input requirements very clear.

A4.5.2 Using STOFFENMANAGER

Have you used Stoffenmanager to predict inhalation exposures?

STOFFENMANAGER has been used by the interviewees for the prediction of inhalation exposures.

Are you aware of any situations, i.e. substance types or process conditions for which Stoffenmanager should not be used?

In relation to situations for which the model should not be used, responses differed from not being aware of any, to stating a preference for more PROCs to be included, but with an appreciation that there were some situations where this was not possible.

Are you familiar with the underlying methods by which Stoffenmanager generates predictions for inhalation exposure?

The underlying methods of STOFFENMANAGER were *understood well enough to know what they were doing* was the comment made by one interviewee. Difficulty in comprehending the algorithms was mentioned by another interviewee and the other interviewee would prefer if more information was available on the use of full respirators or half-respirators and their impacts on the tool outputs.

How easy/ difficult did you find it to translate your real-life work situations into the required Stoffenmanager input parameters?

In translating real life work situations into the required STOFFENMANAGER input parameters, one interviewee stated that they find it *hard to justify when talking about spraying*. Low pressure and high pressure input parameters were stated as *not being easy to find* and the user cannot take into account any other factors which affect droplet size, vapour etc. The second interviewee identified that for REACH, systematics² are a problem.

Were there any exposure situations that you were not able to address using Stoffenmanager, for example, due to a lack of exposure determinants?

One of the interviewees stated that there were no exposure situations which they were not able to address using STOFFENMANAGER, however another interviewee stated they were not able to address mainly closed processes i.e. PROCs 1 and 2 as defined under REACH and in the TRA.

There are a number of exposure determinants that influence the exposure level of real-life work situations. Are there any exposure determinants not taken into account in Stoffenmanager that you felt should be?

The interviewees felt that no additional determinants were required for the model as it was satisfactory at present for its intended purpose. Interviewees indicated that whilst certain assumptions had to be made regarding workplace factors when using STOFFENMANAGER, similar assumptions were required when using other tools, such as the TRA.

How did you use the exposure range predictions that were produced on each occasion Stoffenmanager was used? For example, use of different percentiles?

The interviewees indicated that they tended to use the 75th, 90th and 95th percentiles from the exposure range predictions. However it was noted by one that they tended to use the 90th percentile as that was more conservative.

² It is possible that the interviewee meant "semantics"

Do you feel that the exposure estimates generated were accurate and precise for the situations you have explored

The exposure estimates generated were noted as having deficiencies as they are more or less conservative estimates.

How concerned are you about the precision and accuracy of the predicted exposures for your purposes?

Both interviewees mentioned concerns about the precision and accuracy of the predicted exposures but also felt that the model fulfilled their requirements. Other available functions within STOFFENMANAGER had not been used by the interviewees.

A4.5.3 Validation of STOFFENMANAGER against measured exposures

In relation to validation of STOFFENMANAGER against measured exposures, the interviewees mentioned that it is something they will be doing with a current project. In future if the interviewees were to use STOFFENMANAGER they stated they would wish to validate it by some means. One interviewee specifically mentioned they would do so *where they are close to having an RCR value of 1*. The interviewees were not aware of any work done by others to evaluate or validate STOFFENMANAGER.

A4.5.4 Strengths, limitations and suggestions for improvement of STOFFENMANAGER

In general the stated strengths of STOFFENMANAGER include, its *ease of use*, it *being easy to learn*, the *results clearly showing the percentiles*, it *allows exploration of different options*, it is *easy to link the task options with real-life situations* and the *associated guidance is helpful*.

Whereas the limitations mentioned include; *reluctance about the web based tool from clients as they are not keen on their information being stored somewhere online*; the *lack of a facility to print out or download the results file* and the fact that *the duration of the task has no impact on the output*; but this can be calculated using the daily average concentration.

No contradictions or inconsistencies in STOFFENMANAGER were mentioned by the interviewees. One interviewee mentioned STOFFENMANAGER evaluation work they had carried out, which they were happy to share with the eteam project team.

A4.6 RISKOFDERM

Two individuals were interviewed about their experiences when using RISKOFDERM. Both participants were senior scientists in their respective organisations.

A4.6.1 User Experience

How did you become aware of this model?

The users became aware of RISKOFDERM through seeing a presentation by the original model developers and via involvement in the research work that led to the development of the model.

How long have you been using RISKOFDERM?

The length of time that the interviewees had been using RISKOFDERM ranged from the last 3 to 4 years to the last 3 to 4 months.

How often do you use RISKOFDERM?

The frequency of use was reported as varying from once a month to intermittently. The most recent use of the RISKOFDERM model was within the last week.

For what main purpose do you use RISKOFDERM?

The main purposes of use for RISKOFDERM included; *at the specific request of a client, for REACH assessments and to check estimates from other models.*

Did you experience any installation problems / software conflicts with RISKOFDERM?

Problems which were mentioned as occurring with the model included locating the tool as it is not easily available on the internet. This would *potentially cause problems if the Excel sheet was lost*. A further problem mentioned is that every time the tool is exited, it defaults and goes to a different security setting. The computer interface itself was reported to be easy to use.

What sources of information did you use to inform yourself about RISKOFDERM?

The sources of information used by interviewees to inform themselves about RISKOFDERM include; user guidance and available peer review publications.

Was the guidance provided within the spread sheet helpful to you when using the model?

Interviewees noted that the guidance provided within the spreadsheet was helpful but felt that it was not *needed after reading the initial guidance*.

A4.6.2 Using RISKOFDERM

Have you used RISKOFDERM to predict dermal exposures?

Interviewees reported that RISKOFDERM has been used for comparing dermal exposure with other models and also to complement other tools that only give inhalation exposure estimates.

Are you aware of any situations, i.e. substance types or process conditions for which RISKOFDERM should not be used?

It was noted by the interviewees that situations where RISKOFDERM should not be used included exposures to volatile materials.

Are you familiar with the underlying methods by which RISKOFDERM generates predictions for dermal exposure?

Interviewees stated that they were aware of the underlying methods by which RISKOFDERM generates predictions. Potential limitations of the predictions had not been identified as interviewees stated *they may not have pushed it to every limit*.

How easy/ difficult did you find it to translate your real-life work situations into the required RISKOFDERM input parameters?

Interviewees found translation of real life work situations into the required RISKOFDERM input parameters easier than for other models.

Were there any exposure situations that you were not able to address using RISKOFDERM, for example, due to a lack of exposure determinants?

The interviewees did not mention any exposure situations that they were not able to address using RISKOFDERM, however qualified this by adding that this may be because they *could not recall such situations* or because *they had not covered relevant tasks*.

There are a number of exposure determinants that influence the exposure level of real-life work situations. Are there any exposure determinants not taken into account in RISKOFDERM that you felt should be?

The interviewees were asked if they thought there were any essential exposure determinants not taken into account in RISKOFDERM. The issue of personal protective equipment was raised but it was decided that it *could be done on top of the estimate* and the interviewee felt that the model was *quite complete* without this inclusion.

In general, did you have enough information about the workforce; tasks etc. to feed into RISKOFDERM or did you have to make any assumptions about the working practices?

In relation to information about the workforce and work tasks, interviewees mentioned that assumptions had to be made about the working practices. One interviewee commented that this was based on his own experience.

How did you use the exposure range predictions that were produced on each occasion RISKOFDERM was used? For example, use of different percentiles?

One of the interviewees mentioned that they would always use the 75th percentile in exposure range predictions.

Do you feel that the exposure estimates generated were accurate and precise for the situations you have explored?

There were differing responses in relation to the accuracy and precision for the exposure estimates including; *accuracy being more important than precision* and that *a response couldn't be given as there is little chance of comparing it to measured data.*

How concerned are you about the precision and accuracy of the predicted exposures for your purposes?

There were no concerns raised regarding the precision and accuracy of the predicted exposures as interviewees felt that the values were reliable, stating that they were comfortable with using RISKOFDERM estimates for their required purposes.

Did RISKOFDERM fulfil your requirements in this respect?

In relation to fulfilling the requirements of the model, one interviewee commented that they were *looking for the assessment to come out with a safe use. At the end if it appears there is a safe use then you are happy.*

A4.6.3 Validation of RISKOFDERM against measured exposures

Neither of the participants mentioned carrying out validation of RISKOFDERM predictions against measured exposure data.

For future work, there were mixed views on whether the interviewees would consider validating the model, with one stating that if *more exposure data were available, these should be incorporated into the model* and another saying that *this would not be a high priority for them as they tend to assume that if a product is officially endorsed, then it has undergone the correct validation.* The interviewees stated that they were not aware of any other work done to validate RISKOFDERM predictions.

A4.6.4 Strengths, limitations and suggestions for improvement of RISKOFDERM

In general, the strengths of RISKOFDERM mentioned were; *the inclusion of enough differentiation to cover a couple of handling scenarios without having a hundred or more questions to answer; it gives a good balance of parameters whilst giving a rapid solution and its estimates are considered to be realistic.*

Perceived limitations of RISKOFDERM included the model *being prone to overestimate exposure*; another interviewee stated that they *could not identify limitations at present, as they had not pushed the model to its boundaries, and thus could not determine if it was unsuitable for certain situations.*

One suggested improvement to the tool was the addition of more categories relating to the moving and handling of materials. Interviewees had not identified any contradictions or inconsistencies in RISKOFDERM or the underlying literature.

A4.7 Future Developments

All interviewees were asked about future developments of models and the responses are quoted below.

Firstly, interviewees were asked whether the choice of models available was appropriate for their requirements.

- *Yes they cover 90% of the scenarios that you would have to assess. And the remainder is quite exotic and would need customized solutions*
- *I have to live with the consequences of what models I use. The other models that are available have their strengths and weaknesses but from my perspective the range of models available suit my purpose.*
- *Yes*
- *I would say for inhalation yes but I would prefer to see a more robust version of RISKOFDERM*
- *I think it is still appropriate, it is a basic tool. It will also in future be difficult to use a higher tier tool because the information needed is mostly not available.*
- *The varieties of different models make it tricky as some use this tool and others use that tool. I really favour the options to use the Chesar tool. If everyone was to use one tool, it would be easily compared. But then again all tools serve their own purpose and a tool that would cover all this would be very complex*
- *Yes I do especially with availability of the ART model*
- *In terms for models for REACH – yes, although they are not perfect*

Interviewees were then asked if they were satisfied with the outputs of their chosen model and the suitability for purpose. The responses are collated below:

- *Yes I would say they are sufficient.*
- *Yes*
- *I think so yes, for the time being and the situation, yes.*
- *Yes*
- *Each model has its limitations and the old ECETOC TRA (version 1) model had some assumptions that I believe were too optimistic but I believe that has changed in the new version (version 3 especially in the dermal deposition. I generally found the level of expertise required to run the models properly was higher than you would say when looking at the model. Because the models are all extremely user friendly and anyone can use them but using them correctly requires a lot more skill that you would think.*
- *Generally yes. As long as you understand how the model works what quality of the underlying data is then you have some indication on how happy you are with your exposure assessment.*

Interviewees were also asked about their use of other exposure models including higher tier models. The responses are collated below

- *I have used ART a lot as I think it's a nice tool to use. You can run scenarios through the ART model and come up with a realistic outcome*

- *Advanced REACH tool is the tool we would use immediately after failing with ECETOC TRA. We are aware there are certain models that are a fit for certain scenarios.*
- *Yes- ART*
- *I have tested it and looked at it but that's the only one (ART)*
- *Yes, we have used ART for inhalation exposure; the situation was more tricky and could not be modeled with TRA worker tool. We even use the ART tool if we are needing a range.*
- *Yes, I've used ART. I tried to apply it but in my experience it requires so much addition information which is not available that any assumptions made also add to the uncertainty of what you are calculating.*
- *We use them in order to generate chemical safety assessments with a limited number of unnecessary risk management measures*
- *Yes, we have used ART and we have also used CONSEXPO. The main reason for going to the higher level model was that ECETOC TRA was too simplistic for the scenarios that we were interested in and we felt that ART was a better model and give us more reliable exposure predictions*

A4.8 Conclusions

The aim of the interviews was to identify if the different tools were understandable and of practicable value to the end users. This included the usability of the tools and supporting documentation; the understanding of the underlying methodologies used in the tools and the tools' limitations.

The interviews identified that in general, people were happy about the usability of the tools and the supporting documentation available to them. The main reasons for using the tools were for risk assessments, REACH exposure assessments and when using different tools, comparing outputs. On the whole, interviewees understood the limitations of the models as Tier 1 models and appreciated when and where it was suitable to use the different tools.

When asked about future developments, interviewees were satisfied that the choice of tools was appropriate for their requirements and the outputs of their chosen tools fitted their needs. Again an understanding of the limitations of the tools was shown by interviewees. Other exposure tools used by the interviewees included ART and CONSEXPO.