

Information for course tutors: E-learning module EU-52: “Searching for, and identification of, existing alternative non-animal methods and approaches”

Welcome to this instruction guide for course tutors. This document aims to provide information on the content of this eModule, and give some recommendations for course tutors regarding its integration within courses.

This instruction guide is sub-divided as follows:

1) Module content

Target audience and prior knowledge level

Benefits of this eModule

Limitations of this eModule

2) How to use this eModule – some recommendations

Do I need to complete this module myself before integrating it in one of my classes/courses?

Where can I find reference material or additional materials in the eModule?

What may I expect from the additional materials?

Can I divide the module in several parts?

What part should be followed or prepared by interactive sessions with my students?

3) In-depth explanation lesson by lesson

1) *Module content*

This module focusses on the concept and the importance of the Three Rs, and in particular Replacement of animal use, in research, education and training. It provides necessary practical skills on how to conduct extensive searches for identifying alternatives, non-animal methods and approaches. A self-assessment quiz is available at the beginning and at the end of the module for users to test themselves and see their progression. The module consists of 4 parts (Figure 1): 1) the meaning of Replacement, 2) developing research questions, 3) development of effective searches to find alternatives, and 4) documentation and reporting of searches (for project applications and other contexts).

Target audience and prior knowledge required

(Bio)medical researchers, laboratory animal science students, university students, biology/medical teachers, ethical board members, or more generally anyone interested in learning more about retrieval techniques to search for non-animal methods/alternatives in research.

No specific prior knowledge is required. However, a basic understanding of searching bibliographic databases and a background in laboratory animal science and/or non-animal methods can be helpful.

		Learning objectives
Introduction	Lesson 1-2	<ul style="list-style-type: none"> • Get to know the learning objectives. • Assess your current knowledge.
	Lesson 3-6	<ul style="list-style-type: none"> • Describe and discuss the concept of, and need for, the Three Rs according to legislation. • Explain how Replacement differs from Reduction and Refinement. • Discuss ethical and scientific arguments for the importance of Replacement. • Describe different types of Replacement or non-animal approaches. • Explain why one-on-one Replacement is not the only way of achieving Replacement.
PART 1: The meaning of Replacement	Lesson 7-9	<ul style="list-style-type: none"> • Discuss the importance and various elements of formulating research questions. • Describe different or novel ways to approach research questions. • Critically evaluate research questions as to whether non-animal approaches can be applied to solving them. • Explain why identifying non-animal approaches is an interdisciplinary endeavour and requires a team approach.
PART 2: Developing research questions	Lesson 10	<ul style="list-style-type: none"> • Describe the main categories of information sources for the identification of non-animal alternatives and give examples.
PART 3: Searching for relevant information	Lesson 11-13	<ul style="list-style-type: none"> • Explain what factors should be considered when selecting and prioritising the appropriate search method for a specific research question and specific context. • Distinguish and discuss the strengths, weaknesses and appropriateness of simple and effective searches in relation to the type of project. • Discuss the different levels of comprehensiveness of search methods to identify non-animal approaches, and how this might affect the completeness and analysis of the search results.
	Lesson 14-15	<ul style="list-style-type: none"> • Explain the principles of judging the general reliability and relevance of a specific information source. • Describe the disadvantages of searching in non-specific information sources. • Explain what factors should be considered when selecting the appropriate information sources for a specific research question and specific context.
	Lesson 16-18	<ul style="list-style-type: none"> • Explain the key elements of building an effective search for large bibliographical databases and describe how to apply them. • Explain the key elements of translating an effective search into a strategy for searching the grey literature (including Three Rs-or Replacement-specific databases) and describe how to apply them in practice. • Explain the key elements of designing a strategy to identify and contact relevant experts and organisations, and describe how to apply them in practice.
PART 4: Documentation and advanced analysis	Lesson 19-21	<ul style="list-style-type: none"> • Judge the extent to which the search results are complete and fit for purpose. • Explain the importance of, and apply the principles for, documenting/reporting a search process in a transparent manner. • Explain the added value of analysing effective search results through a complete review.

Figure 1: Learning objectives per parts and lessons.

Benefits of this eModule

The eModule provides clear definitions and knowledge, practical skills, and interaction around the theme of identifying and searching for (non-animal) models, alternatives and methods. Content and references delivered in this module represent expert knowledge from different backgrounds (e.g. researchers, information specialists). The module presents the information in a dynamic format by combining text, built-in exercises, and videos. With a duration of approximately 2-2.5h, it can easily be added to courses as homework or be used within a lecture day.

Many learning objectives are well fitted to provide enough information and understanding to participants without requiring further interaction in class. In particular part 1, addressing the Three Rs, Replacement, motivations for Replacement and means of Replacement will provide robust knowledge in a short time. Similarly, part 2 can easily be followed independently and without further interaction.

Limitations of this eModule

Searching for alternatives, including assessing (the quality of) the search, reporting and documentation is not an easy task. It requires several tools, practice and often team efforts to be achieved appropriately. Therefore, not every tool or methods could be explained in detail within this eModule. However, references and further reading suggestions open wide possibilities for interested users wishing to learn more on this topic.

Some of the parts (i.e. 3 and 4) may require further explanation prior to or after they were followed, in order to help students apply their newly acquired knowledge.

2) *How to use this eModule? – Some recommendations*

Q&A: how to use the eModule

Do I need to complete this module myself before integrating it in one of my classes/courses?

We would highly recommend that you follow the course yourself and identify if it indeed fits the content and/or the scope of your course. Besides, it will help you to interact with students on the different topics covered across the eModule.

Where can I find reference material or additional material in the eModule?

All references and further readings are provided at the end of each lesson. They comprise scientific articles, sections of books, websites, and videos. Clicking on any link will open a new window, from which you can download or visualise the additional material.

To note: the collection of references and further reading was created during 2020-2021 and was checked in May 2021.

What may I expect from the additional materials?

In Figure 2 (A-C), we show the topics per lesson and the additional knowledge you may get from the additional material. For information on the content of each lesson, please refer yourself to the detailed explanation (part 1, page 3-5).

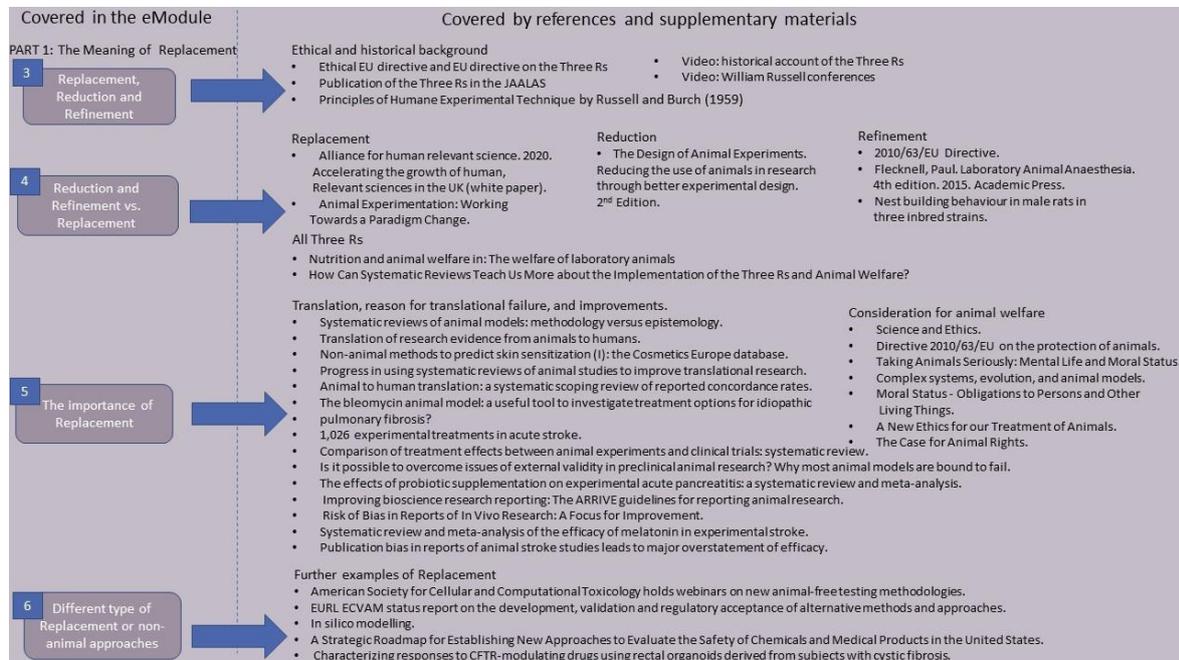


Figure 2A: References and further readings given per lesson for part 1

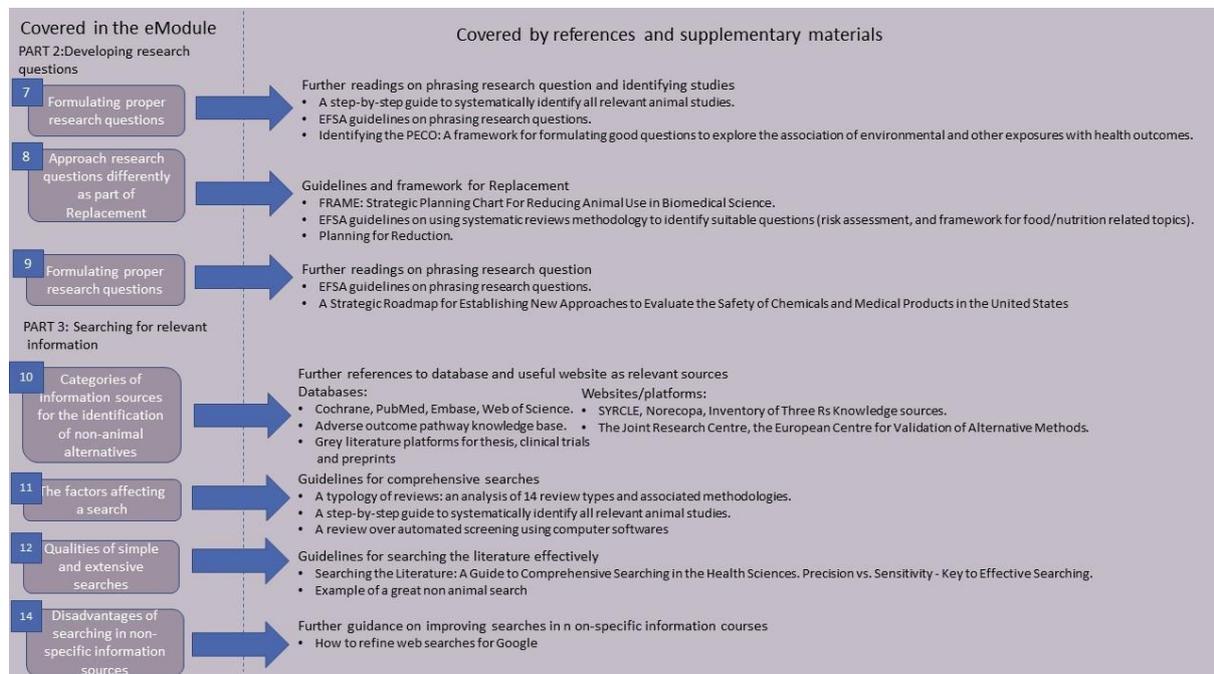


Figure 2B: References and further readings given per lesson for part 2 and the two first sections of part 3.

There is no further material provided for lesson 13.

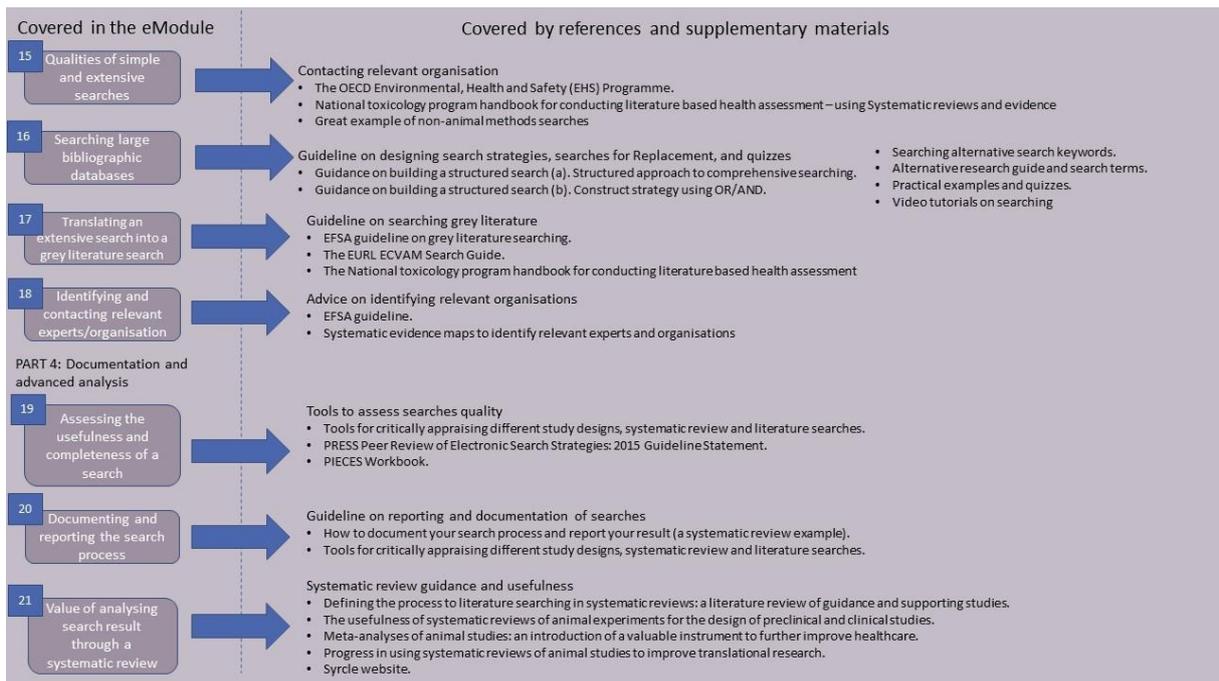


Figure 2C: References and further readings given per lesson for the last two sections of part 3 and part 4.

Can I divide the module in several parts?

Yes, you can; all parts can be done independently. However, some parts belong with each other and should be done in a specific order to sustain coherence. If you would like to divide the module into several sessions or focus only on some parts/lessons, we would advise cutting part 1 from the rest as it proposes a lot of further reading and sets the context. Part 2, 3 and 4 may be done independently from each other. However, part 2 would be more coherent if followed after part 1 and part 4 after part 3.

You can see in Figure 3 some examples of “sessions” by dividing several parts of this eModule.

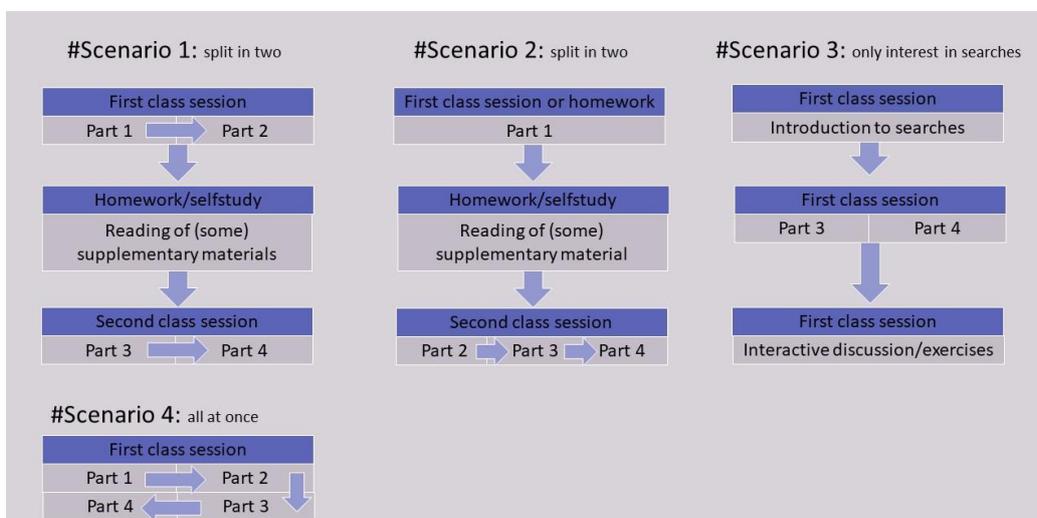


Figure 3: Multiple scenarios to divide the eModule in several parts

What part should be followed or prepared by interactive sessions with my students?

In part 3 and 4, several lessons may require discussion or further exercise with your students. We describe below the related lessons and propose interaction/discussion you may have in accordance with the content.

- In lesson 9, we explain why identifying non-animal approaches is an interdisciplinary endeavour and requires a team effort. You may want to provide websites, links to or e-mail of the information specialists of your own institute, laboratory animal welfare services, or non-animal method expert, if you have any, to help students/researchers with conducting their own comprehensive search.
- In lesson 16, students are taught how to search large electronic databases. The lesson finishes with an optional assignment regarding exploratory searches in the field of Replacement. It may be beneficial, depending on the audience, to introduce prior to this part what MeSH terms or indexed terms are and how to use Boolean operators. After the session, discussions could take place on the students' experience with their searches, e.g., easiness of use, understanding, results they got etc.
- In lesson 19: we provide information on how to assess usefulness and completeness of a search strategy to collect non-animal methods or alternatives. These concepts may be difficult to grasp without further application. We give a few quality tools that can be used to assess search quality. You may want to draw an exercise where students need to assess searches on their own using, for example, the ELS-CAT tool.

3) In-depth explanation lesson by lesson

PART 1: Meaning of Replacement

Lesson 1: Introduction to the course & learning objectives

Lesson 2: Review your understanding

-A small quiz to review students' first knowledge and understanding of the topics addressed in this course e.g., reasons and means for Replacement, searching for Replacement alternatives.

Lesson 3: Replacement, Reduction and Refinement

-Introduction and definitions, legal/ethical history and context for the Three Rs

-Video introducing "Can we do science without animal testing?"

Lesson 4: Reduction and Refinement vs. Replacement

-Focus on Replacement and how it differs from Reduction and Refinement.

-Interactive game where students need to place propositions in the correct place, stating which is Replacement, Reduction or Refinement.

Lesson 5: The importance of Replacement

- Provides ethical and scientific arguments for the importance of Replacement

Lesson 6: Different types of Replacement or non-animal approaches

-Provides information and examples on three main ways to replace: 1) one-on-one Replacement; 2) reformulating the research question; and 3) combination of data sets/evidence streams.

-Videos on an *in vitro* dynamic simulator of the human digestive system and on Helpathons (new ways to reformulate research questions).

- Interactive game where students need to place propositions in the correct place, stating which is one-on-one Replacement, reformulating the research question, or a combination of data sets/evidence streams.

PART 2: Developing research questions

Lesson 7: Formulating proper research questions

-Provides guidance on how to phrase clear and adequate research questions matching the aim and objective of one's research. Explanation and use of the PICO format.

Lesson 8: How to approach research questions differently as part of Replacement

-Gives some clues and examples of how to approach research questions differently in the context of non-animal approaches/alternatives.

Lesson 9: Identifying non-animal approaches – an interdisciplinary endeavour

-Explains the different roles of end-users, content experts, researchers, non-animal models experts, information specialists, and regulators in designing a search strategy for non-animal approaches/alternatives.

PART 3: Searching for relevant information

Lesson 10: Categories of information sources for the identification of non-animal alternatives

-Gives information on three main types of sources for the identification of non-animal alternatives; namely 1) bibliographic databases, 2) grey literature, and 3) contacting experts.

Lesson 11: The factors affecting a search

-Defines some factors required to be identified before designing a search strategy (with examples), e.g., what is the aim of the search, time and resources available. It covers in particular: the aim of the search, availability of time and resources, and the possibility to use advanced techniques (e.g., data or text mining).

Lesson 12: Characteristics of simple and extensive searches

-Provides definition, aim and scope of simple and extensive searches. Explains strengths and weaknesses regarding sensitivity and precision.

-Two explanatory videos covering an example of a simple search and an extensive search in PubMed.

Lesson 13: Explain the degree of comprehensiveness across different search methods

- Defines the difference in comprehensiveness between extensive searches and explorative searches.

Lesson 14: Disadvantages of searching in non-specific information sources

- Explains why searches in non-specific sources may provide unpredictable, less transparent and complete results. For instance, a lack of thesaurus or a hierarchy tree.

Lesson 15: Identify what sources are relevant depending on the aim of the research

- Example regarding the combination of sources (the three sources defined in lesson 10) depending on the aim of the search

- Interactive exercise regarding search sources

Lesson 16: Instructions on how to search large bibliographical databases

- Information on how to create search component and select terms for a search strategy (indexed terms e.g., MeSH, and synonyms).

- Interactive panels and links to teach students about indexed terms, synonyms, including a step by step PubMed guide

- Tutorial video about building a search strategy

- Optional assignment: students can run searches of their choice from a list of provided terms related to Replacement

Lesson 17: Translating an extensive search into a grey literature search

- Provides guidelines on how to translate extensive searches in bibliographic databases to grey literature searches (by using the EURL ECVAM guideline steps).

- Covers grey literature databases, citation checking, and hand searching of references

- Tutorial video on grey literature search

Lesson 18: Identifying and contacting relevant experts and organisations

- Provides tools and guidelines on how to identify and contact relevant experts or organisations, including performing evidence maps.

- Video addressing how to use evidence maps.

PART 4: Documentation and advanced analysis

Lesson 19: Assessing the usefulness and completeness of a search

- Provides guidelines on search combinations, methods and robustness needed for project applications.

- Explains the concept of usefulness and completeness depending on different aims and across the three main sources included in this eModule (electronic bibliographic searches, grey literature, and contacting experts and organisations).

Lesson 20: Documenting and reporting the search process

- Explanation and example of all items that should be documented and reported for the three main sources included in this eModule (electronic bibliographic searches, grey literature, and contacting experts and organisations).

- Interactive exercise on what is required for search documentation/reporting.

Lesson 21: Value of analysing search results through a complete review

- Introduction of the concept of systematic reviews to highlight all non-animal approaches or alternatives in a specific topic/area. Explains the different advantages it may provide and gives examples.

- Video on the preclinical systematic review process and its usefulness.

Lesson 22: Final quiz

- Assesses progress and knowledge acquired during the course

We hope that this document provided you with sufficient information to fully comprehend the content and scope of this eModule. We sincerely wish you best of luck in your teaching activities and thank you for considering our eModule.