



Publishable Executive Summary

Over-all objective and assessment of progress

This summary reviews activities within the ERICA project at the time of the Mid-Term Review, i.e. after 18 of the 36 months project duration, and briefly outlines the activities for the remaining 18 months. The project commenced 1 March 2004, and set out with the over-all objective to “provide and apply an integrated approach of addressing scientific, managerial and societal issues surrounding environmental effects of ionising contamination, at a community level, with emphasis on biota and ecosystems. The final outcome of the project will be the delivery of the ERICA integrated approach to assessment, risk characterisation and management of environmental risks of ionising radiation at a European level”. The objective remains unchanged, the project is on time, and has performed its tasks and produced its deliverables in accordance with the Technical Annex (publicly available at the project website, www.ERICA-project.org). Only minor changes in the work programme are foreseen; all available information at the time of the Mid-Term Review suggests that the ERICA Integrated Approach will be delivered on time (February 2007).

Conceptual structure of the Integrated Approach

The conceptual structure of the Integrated Approach has gradually evolved during the first half of the project, and a working model is outlined in Figure I. Whereas the earlier 5th FP project FASSET produced a linear assessment procedure, the ERICA Integrated Approach acknowledges that assessments are rarely linear, but involve numerous iterations within the assessment procedure as such but also with interested parties, ‘stakeholders’, and – also – necessitates a risk characterisation element to facilitate decision-making and management.



ERICA Integrated Approach

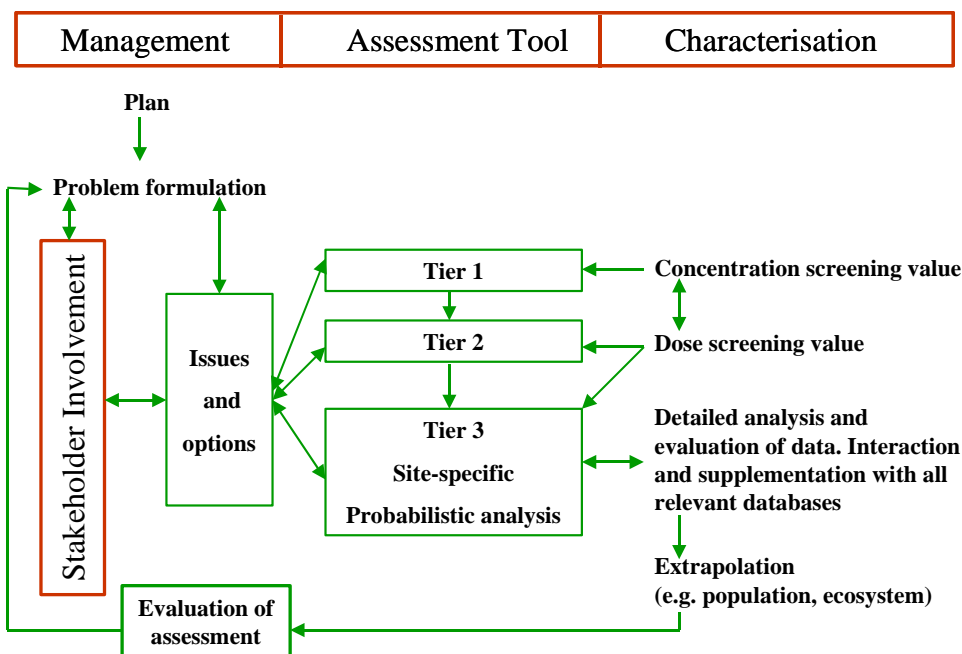


Figure I. Working model of the ERICA Integrated Approach, depicting its three main integrated features: An assessment tool, methodology for risk characterisation and guidance to stakeholder involvement and decision-making (management)



The ERICA Assessment Tool (WP1)

The development of the assessment tool rests largely with Work Package (WP) 1, with input from primarily WP2 (development of a tiered approach) and WP4 (experience from case studies). An early prototype of the software tool programmed in Java has been developed. The programme is based on a flexible and easily expandable structure, has a user-friendly interface and will include wizards for further user-friendliness. The prototype will be tested from Month 24 onwards in the second set of case studies (see further below on WP4) and will become publicly available at the end of the project.

The operation of the tool requires generation of a number of databases to support the computations. There was agreement to delay tasks on transfer data collation until feedback from WP4 was received following the completion of the original round of case studies. This allowed a number of limitations with the earlier FASSET approach to be identified, including the simple fact that not all radionuclides that may need to be considered in an environmental impact assessment were included, that there was missing information in the existing radionuclide - reference organism matrix, and that protected species were not always covered by the existing reference organism list (the finally agreed nuclide and reference organism list has been posted on the project website). Work has begun on the collation of additional transfer data for terrestrial, freshwater and marine ecosystems, with concomitant statistical information (e.g. min, max, defined percentiles, number of samples) to allow probabilistic analyses to be conducted.

Several improvements of the FASSET dosimetry database are under way, including: an extension of the FASSET database for internal dose conversion factors in order to enable dose estimations for organs that accumulate radionuclides; integration of the ICRP reference animals and plants; and, inclusion of new radionuclides. A software utility has been developed, which computes dose conversion coefficients (DCC) for given nuclide and irradiation conditions and for an arbitrary organism, including a capability to interpolate between FASSET geometry sizes.

Regarding the effects database, the first 18 months have been dedicated to restructuring the FRED database into the new FREDERICA; reformatting and entering Russian data emanating from the EPIC project – Environmental Protection from Ionising Contaminants in the Arctic; and, performing quality scoring of new and existing data and quality control for all information contained within the database. The new restructured database will be publicly accessible from the project website shortly. The reorganization and quality checks have been described in Deliverable 1 (see project website).

Risk characterization (WP2)

The work plan of WP2 is divided into three sub-tasks – each corresponding to a deliverable: (1) risk characterisation methodologies (D4); (2) extrapolation issues including supporting experimentation (D5); and, (3) development of good practice guidance (D6, now constituting a component of the final deliverable termed D-ERICA).

During this period, the work was mainly devoted to a critical literature review of currently available risk characterisation methodologies. The results, reported in Deliverable 4b (available at the project website), were analysed to provide information to expand the capability of the FASSET approach within ERICA. They were then used to develop an interim method for the ERICA Integrated Approach. As a result, Deliverable 4a (see project website) introduces an interim tiered assessment approach focusing on the technical aspects, but does presently not consider in any great detail how the ERICA integrated approach will handle the stakeholder and decision making aspects. Collaboration on this issue between WPs 2 and 3 is planned for the second half of the project.

The second sub-task is to apply a scientifically sound reasoning to solve a number of main extrapolation issues, combining desk-based studies and experiments to establish robust extrapolation rules. The results will be reported in the forthcoming D5 entitled “Derivation of Predicted-No-Effect-Dose-Rate values for Ecosystems and their sub-organisational levels exposed to radioactive substances”. Work on this deliverable is in progress and will be divided as follows: (1) a brief description of the state-of-the-art with principles and techniques used for extrapolation issues from ecotoxicology, (2) the application of adapted methods to the FREDERICA effects data, underlying the



limits of the proposed rules for extrapolations, (3) the way to refine effect analysis when it is needed, focusing on the selected experimental refinements.

The experiments planned within ERICA started in September 2004 and will end in October 2005. Contractors involved in experiments agreed on the principles, guidelines and statistical analysis to apply when designing and carrying out laboratory experiments on biological effects of radioactive stressors in non-human organisms and on the specific protocols applied for these experiments. Two organisms (earthworm and daphnid) were selected with a particular emphasis on chronic external and internal irradiation and a number of vital traits such as reproduction, growth, survival effects (which are basic parameters in modelling from individual to population effects). Basically, the studies entail testing dose(rate)-response relationships for external (Co-60 or Cs-137 sources) and internal (Am-241) irradiation (dose rates up to ~40 mGy/hr), looking at a variety of reproduction effects over different life-stages and generations. The main outcomes from these experiments will be published in a separate report accompanying D5.

Communication, decision making and management (WP3)

The activities of WP3 can be grouped into three broad categories: the set-up and consolidation of the End-Users Group, EUG; consultation activities; and, guidance and training.

Terms of reference were set for the participation of stakeholders interested in the ERICA project, i.e. the EUG: End-Users Group. As a result, 53 international and national organisations from Europe and outside the EU were recruited. Two more organisations, from Italy and China, have also expressed interest and more details of their areas of expertise are being gathered.

Two EUG thematic events, and one generic event, were hosted in Stockholm, May 2004, Aix-en-Provence, September 2004, and Freising, April 2005 respectively. Following each event, a deliverable was published summarising the discussions and conclusions for the ERICA project (see project website). In addition, the project records all EUG recommendations and follows up the project's actions to address those comments. The resulting progress report is updated regularly and posted on the EUG protected-area of the ERICA website.

The Sellafield case study, under WP4, was used as an opportunity to focusing stakeholders involvement at a local level. Two local stakeholder events took place, on the 30th September 2004 and 16th February 2005. The first meeting enabled the ERICA project and the Sellafield case study to be introduced. The second meeting provided the opportunity to discuss the results from WP4's application of the FASSET framework to the Sellafield case study. Stakeholders expressed an interest in a further meeting to re-visit the case study assessment once the integrated ERICA approach had been tested on the site. The compiled results of these three events will be delivered as D7h, due in Month 34.

The structure of the website, www.ERICA-project.org, which falls under WP3, was designed and subsequently improved to enable easier access to all the ERICA material being produced. The website scores 10 - 20 hits per day on the public domain. Four e-newsletters were produced up to M18. They were used to communicate progress of the project, seek views/inputs from stakeholders and publicise forthcoming events. All ERICA deliverables are available from the public domain; a protected domain is used for communication and interaction with the EUG, and a further protected domain is used for Consortium internal matters only.

WP3 designed a first version of the contents table for "D8: Decision-making Guidance", using the EUG events as a basis for compiling information. D8 will take into account the development of the tiered approach by WP2, recommendations from review of the draft D4a and recorded EUG comments.

Case studies (WP4)

The relevant milestones for WP4 for the first 18 months were: (i) to have compiled relevant site data by Month (M)5 (ii) to have implemented the FASSET framework on all case studies by M9 (iii) to provide critical evaluation of the FASSET framework application by M11; and (iv) to make recommendations to WPs 1-3 in Deliverable 9 by M13. The next milestone for this WP is to have



completed the gathering of additional site data required for testing and validating the ERICA integrated approach.

The assessment tools, which will be the outputs of the ERICA project, will be developed starting from the FASSET Framework for assessing the environmental impact of ionising radiation. Deliverable 9 (see project website) describes the application of the FASSET framework to five different case study sites. The case study sites were: Sellafield, Loire River, North Sea oil and gas platforms, the Chernobyl exclusion zone and areas of enhanced natural radionuclides in the Komi Republic

The process of applying the FASSET framework to different case studies has been valuable in highlighting areas of improvement for consideration during the ERICA project resulting in the following recommendations:

- ERICA should consider the scenarios it expects its tools to address. ERICA should be clear in its output when the methodology will and will not be applicable, considering: equilibrium, site-specific factors and historic discharges.
- The guidance produced by ERICA must be user friendly and concise, it needs to clearly guide the assessor through the conduct and interpretation of all stages of the assessment, providing: interpretation of results at the various stages, guidance on how to proceed if required data or parameters are missing, guidance on how to take background exposure into account and guidance on chemical toxicity.
- The ERICA tool and other outputs presenting guidance must be consistent, and their purpose and status clear. A consistent terminology must be used. Consideration should be given to providing guidance on how to present the assessment process and results to an interested but non-technical audience.
- The ecosystems and reference organisms considered by ERICA should be rationalised and consideration given to interface between different ecosystems. The reference organism list should encompass protected species, for instance, terrestrial birds and amphibians. The additional radionuclides identified in the case study assessments need to be prioritised for inclusion within ERICA.

Production of D-ERICA

Experience from 18 months of developmental work, practical application in the field, and input from the EUG, has clearly indicated that the final project product, the *ERICA Integrated Approach*, has to be delivered in a comprehensive yet concise and user-friendly format; the reader should not be forced to consult numerous supporting documents in order to apply the Integrated Approach to any particular situation. The Consortium has therefore agreed to deliver the final product in a report, *D-ERICA*, which can serve as a practical handbook to assessment, risk characterisation and management, and a software tool with help buttons and other features to promote user-friendliness; all downloadable from the project website. A number of deliverables due at the end of the project (notably D3, 6, 11 and part of 8; see original Deliverables List in the Technical Annex on the project website) will thus be combined into a single stand-alone document. Towards the end of a project a training event is planned for disseminating D-ERICA to a wider range of users.