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Project Report for the 18-36 month period

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STAR

STRATEGY FOR ALLIED RADIOECOLOGY

EURATOM

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PU	Public	PU
RE	Restricted to a group specified by the partners of the [STAR] project	
CO	Confidential, only for partners of the [STAR] project	

PROJECT PERIODIC REPORT

Grant Agreement number: 26972

Project acronym: STAR

Project title: Strategy for Allied Radioecology

Funding Scheme: Network of Excellence

Date of latest version of Annex I against which the assessment will be made: 2010-10-18

Periodic report: **1st** ☐ **2nd** ☑ **3rd** ☐ **4th** ☐

Period covered: **from August 1st, 2012 to January 31st, 2014**

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[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the Grant Agreement .

[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate) [3]:

  ☐ has fully achieved its objectives and technical goals for the period;

  ☑ has achieved most of its objectives and technical goals for the period with relatively minor deviations.

  ☐ has failed to achieve critical objectives and/or is not at all on schedule.

- The public website, if applicable
  ☑ is up to date
  ☐ is not up to date
- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 3.4) and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 3.2.3 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator: Laureline Février

Date: ...28 /.03./.2014

For most of the projects, the signature of this declaration could be done directly via the IT reporting tool through an adapted IT mechanism and in that case, no signed paper form needs to be sent.

[3] If either of these boxes below is ticked, the report should reflect these and any remedial actions taken.

List of Acronyms

Radioecology Alliance (European Radioecological Alliance association): A Research Platform, in accordance with relevant European Union policies which coordinate and promote European research on radioecology

COMET (Coordination and iMplementation of a pan-European instrument for radioecology): An EC-funded project designed to further the work of STAR and to bring radioecology within the OPERRA radiation protection programme established by the EC's next funding framework: Horizon2020

CP: STAR's Communication Plan

DoReMi (Low Dose Research towards Multidisciplinary Integration): An EC-funded Network of Excellence in radiation biology under the MELODI framework

DoW: Description of Work

EAB: STAR's External Advisory Board

EC: European Commission

FEP: Features Events Processes analysis

HERCA (Heads of the European Radiological protection Competent Authorities): A voluntary association in which the Heads of Radiation Protection Authorities work together in order to identify common issues and propose practical solutions for these issues

ICOBTE: International Conference on the Biogeochemistry of Trace Elements

ICRER: International Conference on Radioecology and Environmental Radioactivity

ICRP: International Commission on Radiological Protection

IAEA: International Atomic Energy Agency

IM: Interaction Matrix

MELODI (Multidisciplinary European Low Dose Initiative): A European Platform dedicated to low dose radiation risk research

MODARIA (Modelling and Data for Radiological Impact Assessments): IAEA Programme on radioecological assessment and modelling

MT: STAR's Management Team

NERIS: European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery

NoE: Network of Excellence

QA: STAR's Quality Assurance Plan

RTD: Research and Technology Development

SC: STAR's Steering Committee

SRA: Strategic Research Agenda

STAR (Strategy for Allied Radioecology): An EC-funded Network of Excellence in radioecology under the Radioecology Alliance framework

WP: Work Package

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1 Publishable summary

1.1 Summary description of project context and objectives,

Radioecology is the science concerned with how radioactive substances released to or present in the environment are dispersed by various transfer processes and retained by different environmental components. The quantification of these processes allows determination of radiation exposures. From exposure, radioecologists estimate the absorbed dose, potential biological/ecological effects, and ultimately assess the risks to humans and the environment.

With the scientific challenges related to the nuclear fuel cycle, the need for radioecological expertise is increasing world-wide. Concurrently, education related to radioecology has declined, leading experts are approaching retirement, and funding for radioecological research is at a minimum in many European countries.

To face these challenges and avoid further fragmentation, nine leading organisations, dedicated to strengthening the science of radioecology in Europe, were funded under the EC's 7th Framework to establish a Network of Excellence (NoE) in radioecology. *The goal of the NoE, called STAR (Strategy for Allied Radioecology), is to efficiently integrate important organisations, infrastructures, and research efforts into a sustainable network that contributes to a European Research Area in radioecology.*

1.2 A description of the work performed since the beginning of the project and the main results achieved so far

STAR has made significant progress in developing a durable integration among the consortium members. The progress towards an enhanced integration is evident from the following indicators:

- Improved communication inside the network
    - New methods for conducting video conferences (using each individual's personal computer) have make communication among members in the eight countries more effective, more fluid and much more common. Monthly conference calls are standard, as well as spontaneous ones as needs arise.
    - STAR's website, the *Radioecology Exchange* (www.star-radioecology.org), is now a common depository for developments, data, training material, and radioecological news that is routinely used by all consortium members, as well as outside stakeholders.
- Sharing of data, methods, equipment, personnel and infrastructure among the STAR members
    - STAR has harmonized key research methods and standardized them for its members and its research programmes. Deliverable 5.1 is an example. D5.1 is a report on the methods that STAR partners use to ensure consistency of research protocols when performing common experiments in different laboratories. The report ensures that the data collected among the various STAR work packages are comparable, even when shared experiments are conducted in different countries.
    - STAR initiated a mobility budget among its partners, with student exchanges occurring between SU, NMBU, IRSN, and SCK•CEN for joint experiments or

courses. Senior personnel that travel to other partner intuitions for teaching purposes also use the mobility budget for expenses.

- STAR has developed a *Virtual Laboratory* on its website that is available to all its members; providing information in four categories:
    a. *Methodological*: descriptions of analytical methods (including problems likely to be encountered); video clips of methods; protocols and manuals;
    b. *Informative*: fact and datasheets, databases, sample archives and examples of sources of environmental dose
    c. *Practical*: how to use models CROM and ERICA
    d. *Educational*: lectures, videos and links to other websites related to training activities

- More qualitative, but equally important, a change in attitude among individual STAR members is apparent. Their shared experiences over the last 36-months have resulted in the participants merging into a team and forming an identity associated with the Network of Excellence. There is now a sense of camaraderie among many STAR members that was not present in the beginning. This evolving solidarity among individuals is essential to the ultimate goal of integrating the member organisations.

STAR has also made significant progress in developing the long-term integration of the radioecology community. This is demonstrated by the following:

- STAR is integrating two new partners into the consortium, selected after an external call for proposals. The new partners (State University of New York and Tokai University in Japan) will conduct research on marine radioecology related to the 2011 accident at Fukushima.
- STAR's parent platform, the Radioecology Alliance, has established a legal association, and has grown during STAR's tenure by adding six new members, bringing the current membership to 14. Expanding the Radioecology Alliance is important because it reduces the fragmentation of the radioecology community and integrates the critical mass of resources and expertise.
- STAR partners were successful in obtaining funding for another consortium (COMET[4]) to advance the goals of STAR. All organisations within STAR are part of COMET, plus four new members from Ukraine, Poland and Japan
- STAR, and more prominently COMET, are developing radioecology as a key pillar under the OPERRA radiation protection scheme within the EC's Horizon2020 programme. This task is a key goal within the COMET consortium.
- STAR developed the concept of field Observatories for Radioecological Research, and has selected two sites, one in Poland and the other at Chernobyl. The Observatories will encourage international collaboration. Focused research at common observatory sites will efficiently maximize improvements in methods and models. Data collected from these sites will be made accessible on the STAR Web portal resulting in a valuable European compilation. Such a pooled, consolidated effort will facilitate the sharing of data and resources, as well as provide excellent opportunities for training and education. STAR's efforts in this area are state-of-the-art, innovative and multidisciplinary.

[4] COMET (Coordination and iMplementation of a pan-European instrument for radioecology) is an EC-funded project designed to further the work of STAR and to bring radioecology within the OPERRA radiation protection programme established by the EC's next funding framework: Horizon2020

- STAR has developed the Radioecology Education and Training Platform (E&T platform). It is a website focal point for students and professionals interested in the educational aspects of radioecology. The platform presents an overview of education and training course modules within radioecology/environmental radioactivity presently offered by the STAR consortium. Information on course curriculums and learning outcomes are provided, with recommended pathways to obtained academic merited education (MSc, PhD). The Radioecology E&T platform also provides links to other E&T platforms, such as those within Radiochemistry, Radiobiology and Radiation Protection.

STAR produced the first Strategic Research Agenda (SRA) in radioecology. The SRA is a powerful document that has the potential to influence the future direction of radioecology. A second version of the SRA integrates stakeholder input into the SRA and includes a strategy for radioecological education and training. The SRA is a key document that gives strategic direction for an entire discipline of science. As such, the SRA is important for the Radioecology Alliance, EC funding agencies and for the entire radiation protection field, including its numerous stakeholders. STAR's method of obtaining stakeholder input to the SRA has been examined and modelled by other research platforms under the OPERRA umbrella. Additionally, NCoRE, a radioecology network of excellence in the United States has developed its strategic agenda based on the one produced by STAR.

STAR has identified, through a series of stakeholder consultations, the demands for and supply of relevant radioecological training and educational needs within Europe. A sustainable nuclear energy programme requires a trained and competent workforce. To achieve a vibrant and sustainable skill base in radioecology a long-term training and education programme within the nuclear sciences is required. The programme must focus on the recruitment of future employees, as well as securing the competence of the present workforce. The stakeholder information is being used by STAR to enhance radioecological training programmes and thus:

1. develop a sustainable integrated European training and education platform in radioecology that will attract top-level graduates,
2. maintain a relevant workforce that is in a position to meet future economic and societal needs within the nuclear sciences, and
3. fill the identified European postgraduate education gap in radiological sciences, as well as provide a modular structure that is easily accessed by stakeholders for professional development training..

STAR's research programmes have made significant progress in three complex areas that were identified within the Strategic Research Agenda:

- address the need for integrating human and non-human radiation protection, and to approach the problem on levels ranging from conceptual to practical
- determine if radiation protection criteria for humans and wildlife need to be considered within a mixed contaminant context
- understand how toxicants affect animals at various levels of biological organization (from sub-cellular to individuals) and explore the implications of ionizing radiation on populations of organisms.

Progress relative to these three research lines are provided below as well as in the accompanying document (Deliverable 1.8, Performance Report). Because the research is on-going, their results will be the central focus of STAR's final report in July 2015, rather than in the current update.

1.3 The expected final results and their potential impact and use (including the socio-economic impact and the wider societal implications of the project so far)

Collectively, these accomplishments have established the STAR partners as the primary source in Europe for value added expertise in environmental radioactivity. The STAR partners have more than 170 experts covering a wide range of areas in terrestrial, freshwater and marine radioecology; atmospheric dispersion; dosimetry; ecology; ecotoxicology; environmental radiation protection; environmental surveillance; modelling; radiobiology and radionuclide analytics; emergency preparedness; education and training.

STAR, as well as COMET….and ultimately the Radioecology Alliance, promote the integration of radioecological expertise within the European community by networking outside the consortium and using the *Radioecology Exchange* to enhance communication among stakeholders. STAR's website maximizes the public accessibility of data concerned with environmental radioactivity and provides an archive for future meta-analyses.

The experience gained by STAR will assist the Radioecology Alliance (http://www.er-alliance.org/) achieve integration among its partners and develop long term sustainability of the science. Members of the Radioecology Alliance will bring together parts of their respective research and development programmes into an integrated platform that maintains and enhances radioecological competences and experimental infrastructures, and addresses scientific and educational challenges in assessing the impact of radioactive substances on humans and the environment.

The Radioecology Alliance will help support the radiation protection needs of national authorities, non-governmental organisations, industry, scientists and the public.

1.4 The address of the project public website

The STAR public site, referred as the Radioecology Exchange, is available at www.star-radioecology.org. Work has been ongoing in STAR to restructure the website. In spring 2014, STAR and COMET will both have 'project' websites containing: project descriptions, deliverable reports and a news blog. Additional information, such as the 'virtual laboratory' and the 'training and education platform' (both are being developed by STAR and enhanced by COMET) will be located on www.radioecology-exchange.org, which will become a 'hub' website for information related to radioecology.

2 Core of the report for the period: Project objectives, work progress and achievements, project management

2.1 Project objectives for the period

The project objectives for the period 1 August 2012 to 31 January 2014 are summarised below for each WP.

2.1.1 WP1 - Network coordination

The overall objective of this Work Package is to establish the administrative and financial plan for coordinating the Network of Excellence. During this second 18-month period, the objectives were to:

- ensure that the STAR participants meet the scheduled obligations established with the EC Grant Agreement and the Consortium Agreement made among the STAR participants (task 1.1 Legal, contractual and administrative management)
- manage the funds allocated by the EC in a transparent and efficient manner, in accordance with the Grand Agreement (task 1.2)
- update the Quality Assurance manual and the Proactive Communication Plan (task 1.3)
- evaluate the progress and success of STAR, with the help of the External Advisory Board, by using performance indicators (task 1.4),
- manage the flexible fund account and organise an external call as established within the Grant and Consortium Agreements (task 1.5),
- organize, coordinate and disseminate minutes from key meetings as scheduled within the Grant Agreement (task 1.6).

2.1.2 WP2 - Integration and Infrastructure

The primary goal of STAR's Work Package 2 "Integration and Infrastructure" is to facilitate the long term sustainable integration of European radioecological research, with an appropriate governance structure. The main objectives for the reporting period were to:

- Update the first version of the Strategic Research Agenda (task 2.1),
- Describe and develop a common virtual laboratory (task 2.3),
- Continue developing long-term integration, e.g. registration process to the Radioecology Alliance, cooperation with other platforms and collection of information on the partners' facilities available to others and the protocols to access them (task 2.4),
- Select and describe the field sites for observatories for radioecological research (task 2.5).

2.1.3 WP3 - Integrated human and non-human radiation protection

The primary goal of WP3 is to address the need for integration of human and non-human radiation protection and to approach the problem on a number of levels, ranging from the conceptual to the practical. The tasks of this WP are intended to complement the ongoing activities of the ICRP and the IAEA in the area of integrated assessment, by focusing on developing the scientific means for the practical implementation of integrated assessment. The main objectives for the reporting period were to:

- explore the concept of Interaction Matrices as part of model development (task 3.1),
- explore various extrapolation techniques and their feasibility (task 3.2),
- start the work to combine the CROM and ERICA Tool into an integrated screening tool for both humans and biota (task3.2),
- conduct an international workshop on wildlife dosimetry (task 3.3),
- compare risk assessment frameworks for humans and non-human biota and discuss possibilities for integration (task 3.4).

2.1.4 WP4 – Radiation protection in a mixed contaminant context

The primary goal of this WP is to determine if radiation protection criteria for humans and wildlife need to be considered within a mixed contaminant context. Three specific objectives are pursued:

- critically review existing approaches, methods and tools developed in ecotoxicology for assessing mixed contaminant exposures and evaluate their applicability in radioecological research and radiological assessments
- test and improve selected ecotoxicological approaches and tools for reliable radionuclide (bio)availability and exposure assessment under mixed contaminant conditions, and improve the understanding of underlying mechanisms and processes
- apply selected approaches developed in ecotoxicology to assess the impact of mixed contaminant conditions on radiation induced effects, and improve the understanding of underlying mechanisms and processes.

Within this work package the objectives for the reporting period were to execute the agreed experimental work described in Milestone 4.3:

1. Set up experiments to assess environmental (bio)availability under mixed contaminant conditions
    - Evaluate possible impacts of co-contaminants on speciation and hence availability of radionuclides of interest based on case studies for 4 different scenarios.
    - Perform the experiments to develop a Uranium Biotic Ligand Model for aquatic organisms under mixed contaminant conditions for salmon, daphnia and *Lemna minor*.
2. Set up experiments to assess the impact of mixed contaminants on radiation induced effects
    - Set up binary mixture exposure experiments applying classical ecotoxicological settings and CA/IA developed for
        i). External gamma irradiation + Cd;
        ii). External gamma irradiation + fluoranthene;

iii). U(VI) + Cd ;
iv). U(VI) + fluoranthene

The experiments were to be conducted on *C. elegans* (IRSN), *Lemna. min*or (SCK•CEN), *Salmon salar* (NMBU), daphnids, plankton (SU).

2.1.5 WP5 – Ecologically relevant low dose effects

The main objectives of WP5 during this second period were to:

- acquire dose-rate response relationships for major life history traits (namely survival, growth and reproduction) under controlled chronic exposure to gamma and alpha radiation in a selected range of plants, invertebrates and vertebrates species, according to the agreed set of experiments (task 5.1),
- explore "omics" (molecular and cellular biomarkers) responses at dose rates of alpha and gamma radiation giving significant effects on life history for a few species (for which analytical methods are available) (task 5.2),
- examine the validity of "omics" fingerprints as predictive early markers of effects on life history at higher levels of biological organisation and explore the applicability of the integrative approach known as "system toxicology" (task 5.2),
- initiate the application of the toxico-kinetic/toxico-dynamic model known as DEBtox to newly acquired radiation effect data in order to identify metabolic modes of action of radiation and test the hypothesis of the radiological dose addition (task 5.3),
- initiate the derivation of taxon-specific radiological protection criteria for populations, to be tested against data for wildlife from observatory sites (task 5.4).

2.1.6 WP6 - Mobility, training and education

The primary objective of WP6 is to meet the demand for both worker training and student education in radioecology in an integrated and sustainable way, as well as to enhance the mobility of teachers and STAR scientists as a means to secure a goal of competence building.

Specific objectives for the reporting period were to:

- Consolidate a multi-disciplinary, training and education platform in radioecology (Task 6.2),
- Implement and test a selection of educational modules (Task 6.3),
- Initiate work on securing mechanisms to assure sustainability of the training and education programme in radioecology (Task 6.4).

2.1.7 WP7 – Knowledge and data dissemination

The primary goal of this WP is to establish web-based mechanisms by which STAR can publicly disseminate the activities of the network and interact with the wider community of research

institutes, regulatory organisations, industry, non-governmental organisations and academics; the WP also helps facilitates internal communication. The objectives set for WP7 to be achieved (or to be initiated) in the second 18 months of the project were to:

- Begin to populate website with outputs of other WP's
- Begin to populate website with third party information via the Radioecology Alliance
- Explore the possibility of an Open -access journal (from month 14)
- Continue populating website with Targeted briefing documents and e-learning packages
- Continue to develop facility for long-term on-line data access and storage
- Begin to develop tools for data exploration
- Organise workshop on Kd's in collaboration with IAEA WG4
- Continue to represent STAR NoE at relevant events

No specific recommendations were given from the previous 18-month report.

2.2 Work progress and achievements during the period

2.2.1 WP2: Integration and Infrastructure

2.2.1.1 Summary of progress towards objectives and details for each task;

Task 2.1 Establishing and maintaining the Strategic Research Agenda

The first version of the Strategic Research Agenda (SRA) for radioecology was released during spring 2012. It concentrated on the research aspects of radioecology, by suggesting a prioritization of research topics with the goal of improving research efficiency and more rapidly advancing the science. The SRA defined three important Scientific Challenges that radioecology needs to address: (1) to predict human and wildlife exposure in a robust way by quantifying key processes that influence radionuclide transfers and exposure, (2) to determine ecological consequences under realistic exposure conditions and (3) to improve human and environmental protection by integrating radioecology. Fifteen major research lines were proposed to accomplish the three Scientific Challenges. Meeting these challenges will require a directed effort and collaboration with many organisations the world-over.

The SRA was distilled from several evaluations on the state of radioecology, including input from stakeholders (see below the on-line consultation and the stakeholder workshop), the interests of Radioecology Alliance member organisations, the International Union of Radioecology, lists of research needs, identification of data gaps and recommendations for the future of radioecology, and its sister science of ecotoxicology. Additionally, the SRA was also formulated by considering

several aspects related to (i) recent changes in policy; (ii) new scientific advancements; (iii) improving credibility with stakeholders; (iv) science deficiencies; (v) integration problems; and of course, (vi) early lessons from the Fukushima disaster.

An overview of the first version of the SRA and an invitation for stakeholder input was published in the international literature, as well as in Spanish literature:

- Hinton, T.G., Garnier-Laplace, J., Vandenhove, H., Dowdall, M., Adam-Guillermin, C., Alonzo, F., Barnett, C., Beaugelin-Seiller, K., Beresford, N.A., Bradshaw, C., Brown, J., Eyrolle, F., Février, L., Gariel, J.-C., Gilbin, R., Hertel-Aas, T., Horemans, N., Howard, B.J., Ikäheimonen, T., Mora, J.C., Oughton, D., Real, A., Salbu, B., Simon-Cornu, M., Steiner, M., Sweeck, L., Vives i Batlle, J. 2013. An invitation to contribute to a strategic research agenda in radioecology *Journal of Environmental Radioactivity* 115: 73-82.
- Hinton, T.G., Garnier-Laplace, J., Vandenhove, H., Dowdall, M., Adam-Guillermin, C., Alonzo, F., Barnett, C., Beaugelin-Seiller, K., Beresford, N.A., Bradshaw, C., Brown, J., Eyrolle, F., Fevrier, L., Gariel, J.C., Gilbin, R., Hertel-Aas, T., Horemans, N., Howard, B.J., Ikaheimonen, T., Mora, C., Oughton, D., Real, A., Salbu, B., Simon-Cornu, M., Steiner, M., Sweeck, L., Vives i Batlle, J. 2013. Una invitacion para contribuir a la agenda estrategica de investigacion en radioecologia *Radioproteccion* 74: 48-61

Supported by the Radioecology Alliance (www.er-alliance.org), a web-consultation was organised through 1 October 2012 to collect stakeholders' views on the SRA. The questionnaire allowed stakeholders to participate in further developing the SRA by making suggestions and recommendations. Advertisement for this public consultation was achieved through e-mail and STAR's website.

A meeting jointly organised by STAR and the Radioecology Alliance was held in Paris, 12-13 November 2012, to obtain stakeholder input on the SRA (see agenda). To help reach this objective, the workshop was an opportunity:

- to exchange with international organisations (e.g. IUR, UNSCEAR, ICRP, IAEA, OECD-NEA, IRPA) about their research priorities in radioecology and to discuss with their representatives how these could be incorporated into the SRA;
- to highlight and refine the SRA relative to the agenda of other existing research platforms (such as NERIS, MELODI, BIOPROTA and HERCA);
- to receive recommendations from a variety of stakeholders (from radioecology and other relevant disciplines), including regulators, funding agencies, nuclear industry representatives, the scientific community, scientific societies and NGOs.
- to inform organisations interested in radioecology how to join the Radioecology Alliance;
- to obtain stakeholder input, via breakout sessions on: 1) how to prioritise research lines within the SRA; 2) how to improve stakeholder involvement in the implementation of the SRA; 3) how to inform stakeholders of radioecology's importance; 4) listing other key scientific disciplines that radioecology should bridge with in order to achieve the

goals of the SRA; and 5) a list of approaches to help radioecology bridge with these other disciplines.

A summary of the Paris Stakeholder Workshop and the presentations from the meeting are available on the STAR website (SRA Stakeholder Workshop).

The stakeholders' comments, criticisms and suggestions have been itemized in a document available on the STAR website (SRA comments), and a revised version of the SRA has been produced. Stakeholder response to the SRA was overwhelmingly positive. The enthusiasm from stakeholders was as much for the general concept of a consolidated effort to address the difficult challenges in radioecology, as in the specifics of what STAR had suggested to be the key research priorities within the science.

The second version of the SRA contains hyperlinked codes throughout the document that link improvements to the SRA to specific comments offered by stakeholders. The stakeholders' comments are provided in an Annex to the SRA and the hyperlinks within the text of the SRA link to them. This innovative method allows stakeholders to see how their suggestions were incorporated into the new version of the SRA.

Implementation of the SRA and the future of radioecology also depends on developing new scientists and professionals with relevant skills in radioecology for industry and other stakeholders. Hence the new version of the SRA contains a strategic part focusing on Education and Training challenges in radioecology, the associated vision and key action lines. This new version of the SRA constitutes STAR's deliverable D2.5 *"Strategic research Agenda –updated version"* (delivered to EC in January 2014).

It was originally planned that STAR would prepare the roadmap associated to this SRA. However, the European Commission has recently provided funds for a second consortium, called COMET (COordination and iMplementation of a pan-European instrumenT for radioecology), to further the work of STAR and to help the Radioecology Alliance meet its objectives of sustainable integration. COMET is coordinated in Belgium by SCK•CEN (www.comet-radioecology.org), and it will take the lead in developing the roadmap for this SRA.

Task 2.2 Inventory of infrastructure

Nothing was due in this task during this second period. Deliverable 2.2 *"Description of the joint infrastructure"* was delivered to EC on time in the end of the first reporting period (July 2013).

Task 2.3 Virtual laboratory including common databases and sample archive

The Deliverable 2.4 *"Virtual Laboratory - Description"* was written and delivered to EC in May 2013. The virtual laboratory is being developed from information collated as part of Deliverable 2.2 (joint infrastructure description) and it has a dedicated area on the Radioecology Exchange website: (https://wiki.ceh.ac.uk/display/star/Virtual+Laboratory?atl_token=5cde63e676adf6a51f8bb5bfebecaac9620020d3)

It provides information related to each of the following four categories:

- Methodological: descriptions of analytical methods (including problems likely to be encountered); video clips of methods; protocols and manuals used in WP4/5;
- Informative: fact and datasheets, databases, sample archives and examples of sources of environmental dose
- How to use models: CROM and ERICA
- Training: lectures and videos and links to other websites related to training activities

The aim of the virtual laboratory is to provide openly available information which will encourage integration through joint research and joint use of infrastructure. It will also begin to establish the integrated use of data and sample materials within the network and also by the wider community. At the end of the STAR project it will form the basis for an expanded virtual laboratory for the Radioecology Alliance into the future.

The development of the virtual laboratory is ongoing. By the end of the second reporting period descriptions of analytical methods as well as examples of the fact and data sheets were been completed.

Task 2.4 Long-term integration

Long-term integration is one of the main goals of WP2 and considerable progress was made on this task during the second 18-month period of STAR.

Clear rules and management structures are important tools for long-term integration, and a legal status for the European Radioecology Alliance was completed in September 2012. It formed as an association, referred as the Radioecology Alliance, governed by the French law of 1st July 1901, with a bureau composed by:

- Franck Hardeman (SCK•CEN), president;
- Per Strand (NRPA), vice-president;
- Almudena Real (CIEMAT), secretary ;
- Jean-Christophe Gariel, treasurer.

The Radioecology Alliance is currently composed of 8 founding members (BfS, CIEMAT, IRSN, NERC, NRPA, SCK•CEN, SSM, STUK) and 7 new subscribing members (CEA, GIG, HMGU, HZDR, NNCRK, RPII, UoP). More details are available on the Radioecology Alliance website (http://www.er-alliance.org/).

Very recently, the Radioecology Alliance enhanced its cooperation by signing:

- a memorandum of understanding with the International Union of Radioecology (IUR), in the course of November 2013,
- a joint memorandum of understanding, on the premises of the European Commission, with MELODI, NERIS and EURADOS, on the 5th of December 2013.

It is anticipated that this cooperation might even be extended to other associations in the future.

Information exchanges with other platforms, NERIS, HERCA, MELODI, became more intensive during this 18-month period of STAR as the various sub-disciplines of radiation protection positioned under the OPERRA umbrella envisioned by the EC's next funding platform (Horizon2020). The issues under discussion include cooperation and overlapping fields of interest.

EURADOS was invited to our *Preparatory workshop for creating management structures and long-term funding* (MS 2.7), held in Paris in April 2013.

In 2013, efforts for ensuring a long-term integration among STAR partners, as well as for integrating new research partners in the field of radioecology, were enhanced by the acceptance of the COMET project, a new EC project funded by the FP 7. This project includes all STAR partners plus new partners from Poland, Ukraine and Japan.

Key milestones related to integration were achieved:

- Milestone 2.7 *"Preparatory workshop for creating management structures and long-term funding"* held in Paris in April 2013, and
- Milestone 2.8 *"Consortium meeting on integration and SRA"* held in Rovaniemi in January 2014.

Information on the partners' facilities available to others and the protocols to access them was collected and will be available at STAR web pages.

Task 2.5 European Observatories

One of the most prominent tasks concerning efficient integration of the STAR partners, as well as the larger radioecology community, is the creation of Observatories for radioecological research. The concept is that contaminated field sites will be identified and managed to provide a forum for international collaboration and shared field work. The Observatory sites will enable STAR to test hypotheses and approaches developed by the various work packages. All data collected will be archived on the web portal.

The main work of task 2.5 during this 18-month period was the choice of the Observatory sites. Based on the list of selection criteria for the choice of the European observatories sites created during the first 18-month period and the Observatory workshop held in Berlin, 13-14 June 2012, two sites were finally selected: a coal mining site in Poland that contains radium contaminated settling ponds and the Chernobyl exclusion zone.

All milestones and deliverables linked to this task were performed on time. Milestone 2.6 *"Selection of the European Observatory site(s)"* was finalised by the end of November 2012 and D2.3 *"Observatory for radiological research – description"* was finalised by the end of March 2013.

Legally binding agreements with the site owners are an essential condition for establishing the Observatories for Radioecological Research. However, they are difficult to obtain for the Polish Observatory sites. The Central Mining Institute (Główny Instytut Górnictwa, GIG) acts as a contact point and has drafted preliminary agreements between GIG and the site owners. Any field work for further characterizing the Observatory sites, however, requires definitive agreements. Otherwise, the risk of wasting money and time will be unacceptably high. Contrary to the STAR partners' expectations, the Radioecology Alliance is not in a position to sign legally binding documents. The most promising way forward is to draft definitive agreements between GIG and the site owners, although GIG is not a STAR member (but a COMET member). Well prepared documents should cover all expectations and rights of the STAR partners and clearly express that GIG acts on behalf

of and in close collaboration with STAR. According to GIG, bilateral agreements between STAR members and the site owners would be much more complicated.

2.2.1.2 Highlight clearly significant results

The five main outputs for integration and infrastructure (WP2) are the:

- Development of a new version of the Strategic Research Agenda (SRA) that integrates stakeholder input and includes a strategy for radioecological education and training. The SRA is a key document that gives strategic direction for an entire discipline of science: radioecology. As such, the SRA is important for the Radioecology Alliance, EC funding agencies and for the entire radiation protection field. STAR's method of obtaining stakeholder input to the SRA has been examined and modelled by other research platforms under the OPERRA umbrella. Additionally, NCoRE, a radioecology network of excellence in the United States has developed its strategic agenda based on the one produced by STAR.
- STAR's Virtual Laboratory has been established and is openly available on STAR's website. Virtual laboratory is useful to the Radioecology Alliance, but also to other stakeholders in radioecology as a place where, for example, information on methodologies are available and where educational fact sheets for various radionuclides can be obtained.
- Observatory sites for long-term research have been selected. Observatory sites are field research sites and serve as places where mutual research projects will be carried out within the Radioecology Alliance, and they may lure researchers from outside radioecology to collaborate. Observatory sites will also serve as training and education sites within radioecology.
- Integration of the European radioecology community is well underway because of STAR's efforts. This is demonstrated by the success of the STAR partners in obtaining funding for another consortium (COMET) to advance the goals of STAR; the number of new members (6) joining the Radioecology Alliance; and the development of radioecology as a key pillar under the OPERRA radiation protection scheme. Integration is the primary goal of the STAR project, and it is vital to the long-term success of the entire radioecology field. Expanding the Radioecology Alliance reduces the fragmentation of the radioecology community by integrating a critical mass of resources and expertise.

2.2.1.3 Deviations from Annex I and impact on other tasks, as well as on available resources and planning (if applicable)

All objectives in Work Package 2 were achieved in a timely manner.

There is a lot of information collected under STAR WP2 (e.g; infrastructure, project databases, observatories description,…) that is needed under the COMET project. Therefore, the STAR Steering Committee agreed to change the dissemination level of STAR WP2 deliverables, from RE to PU. The coordinator got an oral approval from our EC project officer, on the 6th of September 2013. This change will be formally addressed in the next amendment to STAR;s Grant Agreement (anticipated in May of 2014).

2.2.1.4 Reasons for failing to achieve critical objectives and/or not being on schedule; and explain the impact on other tasks as well as on available resources and planning (if applicable)

Not applicable

2.2.1.5 Statement on the use of resources: highlighting and explaining deviations between actual and planned person-months per beneficiary in DoW

No deviations

2.2.1.6 Corrective actions (if any)

Not applicable

2.2.2 WP3: Integrated human and non-human radiation protection

2.2.2.1 Summary of progress towards objectives and details for each task

Task 3.1 Integrated Protection: Towards a Conceptual Model

This task involves a Features Events Processes (FEP) analysis and Interaction Matrix (IM) approach to develop a conceptual model of integrated human and wildlife radiation protection. During this 18-month period, we focused on the second phase of this task, *i.e.* IM approach. A meeting was held in October 2012, where hypothetical scenarios for two IM were developed. Two sites among those chosen for the European Observatories in WP2 were selected to develop IM in two different environmental contexts: one representative of an aquatic ecosystem (lake Rontok Wielki in Poland) and one representative of a terrestrial ecosystem (Chernobyl forest). The IM for these two sites/scenarios was developed and the milestones MS 3.2 "*Complete interaction matrices for humans and wildlife for hypothetical site/scenarios*" was finalised in May 2013.

A complete report on both FEP and IM analyses, milestone MS 3.5 *"Report analyzing both FEP and IM analysis with respect to a conceptual model for integrated risk assessment"* is under way and will be delivered in April 2014.

An abstract entitled *"Interaction Matrices as a Tool for Prioritizing Radioecology Research"* was submitted to the International Conference in Radioecology and Environmental Radioactivity (ICRER) for presentation during their meetings in September 2014.

Task 3.2 Towards an Integrated Model for Humans and Wildlife

This task is comprised of two discrete subtasks.

Subtask 3.2.1 will develop a combined model to form the basis of a combined screening assessment tool. Because assessment models for humans and non-human species both require contamination levels of environmental media (air, water, soil, etc.), a sub-model which calculates the contamination levels of these media is a logical step in the development of a combined human wildlife model. The use of this sub-model, together with specific data for dose assessments for humans and for wildlife, will form the Tier-1 Model developed in this WP. Two worldwide recognized codes for dose assessments in humans and in wildlife are CROM (humans) and Erica-Tool (wildlife). STAR members were involved in developing both codes. Both codes calculate radionuclide concentrations in the environment using discharge rates and the mathematical models for dispersion developed by the International Atomic Energy Agency (IAEA) in its Safety Report Series No 19 (SRS-19). STAR plans to develop an integrated Tier-1 Model by combining the capabilities of both codes into a single code (possibly named CROMERICA).

To establish the mathematical equations for calculating radionuclide concentrations in the environment, a description of the coupled combined model for humans and wildlife was successfully developed as a milestone. Milestone MS3.3 *"Description of coupled combined model for humans and wildlife"* was finalized in March 2013, as a report called *"Integrated Screening Model for Humans and Wildlife"* and available on the STAR members restricted site.

The models in this milestone were based on the IAEA SRS-19 models which were issued in 2001. Every ten years the IAEA revises its documents, and revision of SRS-19 began in 2011. The IAEA plans to issue the revised version of SRS-19 in December 2013. It is important that CROMERICA is based on the most updated version of SRS-19. Thus our work is delayed until the revised IAEA SRS-19 is finalized. A member of STAR is involved in the revision of this document and thus STAR is well informed on the advances of the IAEA group. After the SRS-19 revision is issued by the IAEA, STAR's milestone MS3.3 will be updated and then the CROMERICA code can be programmed using the most recent advances in modelling.

STAR Deliverable D3.1 (combination of CROM and ERICA Tool into the combined screening model CROMERICA) will thus be delayed by one year. Notification of this delay was sent to STAR's EC project manager in October 2013.

Subtask 3.2.2 - extrapolation techniques to quantify radionuclide transfer – is proceeding in advance of schedule. This task involves exploring methods of providing parameter values when there are few or no data. We have developed novel approaches using techniques such as allometry and Bayesian statistics, critically evaluated current methods and lead international efforts in this area under IAEA programmes. STAR partners have significantly moved this area forward in innovative ways, reflected in the large number of papers produced. The outcomes of these activities are being used to repopulate the ERICA Tool CR parameter values where appropriate. Eight papers issued from this work were published during this period:

- Beresford, N.A., Vives i Batlle, J. 2013. Estimating the biological half-life for radionuclides in homoeothermic vertebrates: a simplified allometric approach Radiation and Environmental Biophysics 52: 505-511.
- Beresford, N.A., Yankovich, T.L., Wood, M.D., Fesenko, S., Andersson, P., Muikku, M., Willey, N.J. 2013.A new approach to predicting environmental transfer

of radionuclides to wildlife: A demonstration for freshwater fish and caesium Science of The Total Environment 463–464: 284-292.
- Brown, J.E., Beresford, N.A., Hosseini, A. 2013. Approaches to providing missing transfer parameter values in the ERICA Tool – How well do they work? Journal of Environmental Radioactivity 126: 399-411
- Hosseini, A., Stenberg, K., Avila, R., Beresford, N.A., Brown, J.E., 2013. Application of the Bayesian approach for derivation of PDFs for concentration ratio values Journal of Environmental Radioactivity 126: 376-387
- Howard, B.J., 2013. A new IAEA handbook quantifying the transfer of radionuclides to wildlife for assessment tools Journal of Environmental Radioactivity 126: 284-287
- Howard, B.J., Wells, C. Beresford, N.A., Copplestone, D. 2013. Exploring methods to prioritise concentration ratios when estimating weighted absorbed dose rates to terrestrial Reference Animals and Plants Journal of Environmental Radioactivity 126: 326-337
- Psaltaki, M., Brown, J.E., Howard, B.J., 2013. TRS Cs CRwo-water values for the marine environment: analysis, applications and comparisons Journal of Environmental Radioactivity 126: 367-375
- Wood, M.D., Beresford, N.A., Howard, B.J., Copplestone, D. 2013. Evaluating summarised radionuclide concentration ratio datasets for wildlife Journal of Environmental Radioactivity 126: 314-325

Some of these papers were in a special issue of Journal of Environmental Radioactivity (vol 126) edited by STAR member, B. Howard.

Finally, the milestone MS3.6 *"To have completed literature reviews and theoretical evaluations of extrapolation techniques"* due month 30 was presented early at the February 2013 Oslo workshop.

Task 3.3 Improving Wildlife Dosimetry

This task consists of two subtasks.

Subtask 3.3.1 - review.

This review is delayed compared to planned, but will be performed during spring 2014 and a summary will be included in MS3.9 in month 44.

Subtask 3.3.2 is an international workshop on wildlife dosimetry that is organised by STAR. Initially planned for month 36, this workshop will take place on 10-12 June 2014 in Madrid. An agenda has been prepared, see below. The workshop will include 10 invited speakers as well as 6 STAR speakers.

STAR Wildlife dosimetry workshop. CIEMAT. Madrid. Spain

TIME	TUESDAY 10 June 2014	WEDNESDAY 11 June 2014	THURSDAY 12 June 2014
9:00-10:00		Noble gas dosimetry for biota (including Rn exposure in burrowing animals) (Jordi Vives) --- Hot particle dosimetry (Paul Dale)	Uncertainties in field dosimetry for non-human biota (Jordi Vives) --- Dosimetry tools for field studies (Tom Hinton)
10:00-11:00		Discussion Session --- Voxel phantoms for biota: Challenges and controversies (Kathryn Higley)	Using a landscape perspective to refine exposure scenarios (Larry Kapustka) --- From satellites to faeces: multidisciplinary advances in field dosimetry (Mike Wood)
11:00-11:30		Coffee	Coffee
11:30-13:00		Voxel phantoms for wildlife dosimetry (frogs, mice, ...) (Sakae Kinase) --- Plant dosimetry (Vasyl Yoschenko) --- Discussion Session	Lessons learned in EURADOS useful for the dosimetry of wildlife (EURADOS, to be determined) --- Discussion session --- Conclusions of the workshop
13:00-14:30	Lunch	Lunch	Lunch
14:30-15:30	WELCOME --- Environmental dosimetry overview (Alexander Ulanovski)	Is microdosimetry important when evaluating dose to wildlife from chronic, low level exposures? (Leslie A. Braby) --- Characterization of radiation quality based on nanodosimetry (Hans Rabus)	
15:30-16:30	Heterogeneous distribution of radionuclides and external dosimetry (Karine Beaugelin) --- MCNP model for external dose to biota (Karolina Stark)	EPR dosimetry for fish (Elena Shishkina) --- RBE and wildlife (Deborah Oughton)	
16:30-17:30	Heterogeneous distribution of radionuclides and internal dosimetry (Jose Maria Gomez-Ros) --- Discussion Session	Discussion Session	

Green: STAR members

Task 3.4 Contextualising non-human with human radiation protection

This task will examine the relationship between assessments for non-human species with assessments for the protection of humans, and integrate information to support comprehensive, consistent and sustainable decision making. This work was initiated through the production of milestone MS3.4 *"Internal report on comparative analysis of human and non-human frameworks"* in July 2013. This report is available on the STAR members site. The group decided to work further on this issue and produce an article for a peer reviewed journal. This was discussed with the EAB during the EAB meeting in Rovaniemi in January 2014.

2.2.2.2 Highlight clearly significant results

For this second period, the main outcomes of WP3 include:

- An evaluation of FEPs and IMs as useful tools for either 1) mathematical model development or 2) getting an overview of the important processes and matrices that must be taken into account when performing risk assessments. It can also be used to document the thought process used for prioritizing processes before a model is developed. Since WP3 contains model development components, the analysis of FEPs and IMs is helpful in the further work of this WP.

- The development of Interaction Matrices for two Observatory sites chosen within STAR: the Rontok Wielki lake contaminated with Ra-226/228 and a forested area of the Chernobyl exclusion zone. The IMs will be useful to the radioecology community that conducts research at these two important locations.
- The comparison of the risk assessment frameworks for humans and non-human biota and the initiation of discussion about the possibilities and obstacles of creating a holistic framework. This topic is of international interest in the radiation protection sciences, including ICRP's committee 5.
- The development of methods of providing parameter values when there are few or no data, using various extrapolation methods. STAR has developed novel approaches using techniques such as allometry and Bayesian statistics, critically evaluated current methods and lead international efforts in this area under IAEA programmes. STAR partners have significantly moved this area forward in innovative ways, reflected in the large number of papers produced. The review of extrapolation techniques is important for filling knowledge gaps in existing and future model parameter databases in a more resource efficient way than to conduct field or laboratory studies for all data gaps. The outcomes of these activities are being used to repopulate the ERICA Tool CR parameter values where appropriate.
- The development of a screening tool, which combines human and non-human biota risk assessment, at the forefront of radioecological science. The work is in collaboration with the IAEA. STAR is merging the human model CROM with the biota model ERICA Tool into a new Tier-1 model named CROMERICA. A combined screening tool for both human and non-human biota could be very useful for regulators and operators and the development of CROMERICA has the potential to fulfill this need. At the same time, it is important to discuss the possibilities and obstacles of creating a holistic framework in a scientific and philosophical way
- The planning of the wildlife dosimetry workshop for 10-12 June 2014 in Madrid. The deficiencies in current methods for estimating dose to free-ranging wildlife are well known. The extent to which the methods need improving, without reaching a point of diminishing returns, is much debated. The workshop will bring together world experts in wildlife dosimetry to debate these important issues. Leading experts in this field will gather to discuss state-of-the-art and possible future improvements that can feed into a combined screening and/or mechanistic modeling tool.

2.2.2.3 Deviations from Annex I and impact on other tasks, as well as on available resources and planning (if applicable)

D3.1 is delayed from month 36 to month 48 (see explanation below in section 2.2.2.4). A letter requesting an extension was sent to the EC in October 2013.

MS3.5 is delayed until month 39.

2.2.2.4 Reasons for failing to achieve critical objectives and/or not being on schedule; and explain the impact on other tasks as well as on available resources and planning (if applicable)

STAR Deliverable D3.1 (combination of CROM and ERICA Tool into the combined screening model CROMERICA) will be delayed by one year. This is mainly due to a revision of the IAEA SRS-19 (which forms the basis of CROM) that has taken longer than anticipated. This revision will be published in the spring of 2014 and the changes implemented in CROM before the actual combination into CROMERICA. Also, plans for user-friendly graphical interface has been added which increases the time for completion. The work will, however, be finished by the end of STAR. A letter has been sent to the EC to ask for an extension of the deadline for this deliverable (D3.1). The delay will not jeopardize STAR completing the deliverable by February 2015. This will not have an impact on other deliveries in STAR.

MS3.5 was delayed due to a large workload for the lead author. This will not delay other deliveries in WP3 since it will give input to D3.4 which is due in month 54.

2.2.2.5 Statement on the use of resources: highlighting and explaining deviations between actual and planned person-months per beneficiary in DoW

CIEMAT has spent more person months than planned due to higher workload on integrating CROM and the ERICA Tool than anticipated.

STUK, SU and NMBU have underspent man months so far but still have important work to perform until the end of STAR.

Other partners are performing as planned.

The STAR consortium will look at the possibility of shifting some resources to work on the CROMERICA development to ensure the successful delivery of this tool by the end of STAR.

2.2.2.6 Corrective actions (if any)

In order to be on time for the further development of CROMERICA, a request was sent by STAR coordinator to IAEA to access and use the unpublished aspects of SRS-19 that are still being developed. This was positively accepted and contact with IAEA to ensure harmonization between the work being done as part of the CROMERICA and SRS-19 initiatives have been initiated. A road map for finalising CROMERICA with quality control, English user's manual and a graphical user interface is underway. The graphical user interface was not a part of the original proposal, but will be added by the end of the STAR project to increase the user-friendliness of the tool.

2.2.3 WP4 - Radiation protection in a mixed contaminant context

2.2.3.1 Summary of progress towards objectives and details for each task

The tasks 4.0 and 4.1 were finalized during the first 18-month period. Main work in WP4 during this second 18-month period was devoted to research experiments, required to reach the objectives described in MS4.3. The work was subdivided into three major parts: availability (linked to task 4.2), effects (task 4.3) and risk assessment (task 4.4).

Task 4.2 Test and improve existing approaches and tools in ecotoxicology for robust radionuclide (bio)availability and exposure assessment under mixed contaminant conditions

This task is subdivided into two subtasks.

Subtask 4.2.1 Environmental availability under mixed contaminant conditions

This subtask includes two actions.

Availability 1: Influence of co-contaminants on the speciation of natural radionuclides at U-mining sites.

This action was initiated during the first period and further developed during the second 18-month period. An evaluation of the possible impacts of co-contaminants on the speciation and hence environmental availability of radionuclides of interest was performed based on case studies for four different scenario's (French Ritord scenario, Beaverlodge lake in Canada and two Tajikistan sites (Pit Lake and Stream below Yellow mountain). Speciation modeling was performed with different geochemical speciation models by CEH (WHAM, Visual MINTEQ), IRSN (CHESS), SCK•CEN (Geochemical Workbench, PHREEQC). It was found that the co-contaminants did not directly influence the environmental availability of the radionuclides. Additionally, the different geochemical speciation models, although based on similar principles, gave very different results, depending on the model/database combination used.

A paper is in preparation, with a submission planned for the summer of 2014.

Availability 2: Preliminary characterisation and environmental availability assessment at the Observatory Site(s).

We tried to identify, from the preliminary site description available in MS2.3, for the Polish Observatory Sites some potential locations and prepare a sampling and analysis strategy for site characterisation/experiments for WP4. However:

1. the information available did not permit a justified site selection and sampling plan;

2. access to the sites was not clarified;

3. the EAB at their January 2014 meeting suggested that we should first consolidate what we already have conducted within WP4

As a consequence, we decided that these activities under Availability 2 would receive low priority and only be executed if time allows and all other conditions are optimal.

Subtask 4.2.2 Bio-availability (uptake) under mixed contaminant conditions (Availability 3)

This task focuses on the development of a Uranium Biotic Ligand Model for aquatic organisms under mixed contaminant conditions.

To predict the influence of co-contaminants on U bioavailability and toxicity it was decided to set up a biotic ligand model for U and Cd for different model species used within the STAR consortium [i.e., salmon (NMBU), Daphnia (IRSN) and the macrophyte *Lemna minor* (SCK•CEN, STUK and

BfS)]. A literature review was performed and an on-line course on BLM experimental set-up and modeling was given in October 2012 by CEH (organized in collaboration with the WP6).

A considerable amount of experimental work is being performed at NMBU for salmon, IRSN for Daphnia, and at SCK•CEN, with the help of BfS and STUK, for Lemna. The experimental data achieved so far have indicated some U specific issues such as the possibility of the formation of U precipitates in test solutions, this is partially due to the need to use high concentrations of U (for developing dose response curves); and practical difficulties in designing experiments for U that follow the principles of optimal BLM experimental design.

The scientists involved in BLM experimentation and development exchange experiences and outcomes of the work via a regular series of videoconferences, the first of which took place on 28th March 2013.

The milestone MS 4.5 *"Interim report on availability/exposure related lab/field R&D and model runs and updated R&D plan"* describes the progress made by the WP partners in each piece of work of this task 4.1. It was finalized during March 2013, and made available on the STAR restricted site. An annex is also included that reviews existing biotic ligand models for cadmium. Cadmium was chosen as one of the co–contaminants to be used in mixture exposure experiments in combination with U, and this review was done to establish the state of the art with respect to the modelling of its bioavailability.

The first results were presented at a meeting in Tromsø (June 2013), where a course on deriving parameters for the BLM was also given.

Experimental work is still in progress for developing the U-BLM. The next step is to study the effects of Cd on U-BLM.

Task 4.3 Apply selected approaches developed in ecotoxicology to assess the impact of mixed contaminant conditions on radiation induced effects, and improve the understanding of underlying mechanisms and processes

The two broad research activities planned during the first 18-month period have been initiated.

The central aim of this part of WP4 is to evaluate whether radiation protection criteria need to consider contaminant mixtures. This is done by first testing the possible interactions of some selected binary mixtures that include radiation or radionuclides by using approaches applied in ecotoxicology.

Subtask 4.3.1: Binary mixture exposure experiments applying classical ecotoxicological settings and CA/IA as reference models (Effects 1)

Experimental designs that used Concentration Addition (CA) and Independent Action (IA) models to test effects under mixture conditions were preferred for the majority of the experiments. The following binary mixtures were selected based on the likelihood of occurrence and/or expected mode of action of the different mixture components: (i) External gamma irradiation + Cd; (ii) External gamma irradiation + fluoranthene; (iii) U(VI) + Cd ; U(VI) + fluoranthene.

Different species groups and levels of biological organisation were chosen to assess the impact of co-contaminants: Invertebrate: nematode, *C. elegans* (IRSN); Plant: *L. minor* (SCK•CEN); Vertebrate: Fish -*S. salar* (NMBU); Community: Daphnids, plankton (SU). All the tests with these organisms (except the community test organisms) followed standard experimental designs. For each of the mixture components, the initial objective was to derive a dose-response curve for the selected test organisms, as described in STAR deliverable D5.1. Then, mixture experiments were designed based on the shape of the dose-response curves (under guidance from CEH and constrained by the number of experimental "units" that is possible to be run for any experiment) in order to plan a data analysis using the CA or IA concept from ecotoxicology.

Results obtained so far have recently been summarized in the milestone interim report MS4.7 *"Interim report on effects related lab R&D and model runs and updated R&D plan"* finalized by the end of October 2013.

Briefly, the U-Cd and Gamma-Cd experiments are making good progress:

i. For *C. elegans*, the first U-Cd results were shown at the Tromsø meeting and have in the meantime been repeated to obtain more data. First results suggest that a U/Cd dose ratio dependent antagonism occurred for the endpoints of nematode length and number of off-springs (but models were weaker in the high [U] region due to the lack of data). there was. Although experiments were performed to obtain dose response curves for gamma irradiation and gamma + Cd, the experiments need to be repeated (planned end of November 2013 at SCK•CEN).

ii. For *Lemna*, after deriving dose response curves, a U-Cd mixture experiment was performed. Results were comparable to those derived from the nematode experiments. Single gamma dose response curves have also been obtained and the combination gamma + Cd was run from 16-23 of October 2013; data analysis is on-going.

iii. For *Salmo salar*, the experiments concentrated so far on BLM modelling, but some of these data are also valuable for effects work. For smolt, most of the efforts focus will be on U-Cd mix-tox likely evaluating the potentiating effect of Cd instead of also developing full DRC for Cd. Part of these experiments have been performed in December 2013 and will be discussed at the next WP4 meeting (1-4 April 2014, Stockholm).

iv. For the Daphnia-plankton mix, existing data (assimilation of N and C and mobility, plankton density) of an acute gamma/ chronic Cd/fluoranthene experiment have been analyzed in order to design the final experiment (U, Cd and fluoranthene.). No U-combination experiments planned.

Setting up dose response curves with the organic stressor, fluoranthene, and testing the binary combinations with it, still needs to be started for most test-species. One of the major setbacks here is the limitations in solubility and stability of fluoranthene and the availability for good (and cheap) analyzing techniques. This issue was discussed with the EAB at the Rovaniemi meeting in January 2014.

After much discussion, the EAB recommends that the fluoranthene experiments be abandoned (or given a very low priority and only continued if all the other work is accomplished), but the possibility of developing a protocol for fluoranthene mixtox experiments for future use should be evaluated. The usefulness of conducting temperature fluctuation experiments should be evaluated.

The project should focus on the completion of the U-Cd and gamma-Cd experiments and explain the antagonism phenomenon and its mechanisms of interaction. The project should also show the impact, or lack of impact, of mixtox risk assessments on radiation protection criteria. The EAB recommends the project focus on establishing threshold effects (e.g., EC-50, mortality curve), then add contaminates to identify any changes to the dose response curve.

Subtask 4.3.2. Binary mixture exposure experiments applying the DEBtox approach (Effects 2)

In addition to analyzing binary mixtures with CA/IA approaches, a Dynamic Energy Budget (DEB) theory that links feeding, growth, development, and reproduction over the organism's life cycle was chosen to understand organisms' integrated responses to contaminant mixtures. . Since the DEBtox model is highly demanding from an experiment perspective, a limited number of species (*C. elegans*, *L. minor*) and exposure conditions (gamma+Cd and U+Cd) was planned to evaluate the impact of co-contaminants in a DEBtox approach.

For *C. elegans*, DEBtox modelling is on-going for single contaminants (Cd: available from literature, U: available from previous experiments at IRSN, gamma: developed in the framework of the WP5) and mixture experiments started in January 2014.

No DEB-model has been described for an autotrophic organism like *Lemna* and therefore parameterization of a DEB and DEBtox model is still needed. Experiments that will enable this parameterization are currently running. As such DEBtox mixture experiments will start in late spring 2014. This work is done in close collaboration and discussion with N. Cedergreen (on STAR's EAB) and T. Jager.

Milestone MS4.6 *"Parameterization of DEB model for all test organisms subjected to mixed exposure conditions"*, due initially at month 18, was delayed due to dismissal of a graduate student at SCK•CEN working on the research, and to a too optimistic scheduling. A post doc started in June 2013 to work on this project.

Task 4.4 Evaluating selected risk assessment approaches for mixed exposure situations were radionuclides are involved (Additional task)

The goal of this WP4 task, proposed in addition to the tasks within the DoW, was to identify appropriate tools for Ecological Risk Assessments (ERA) of mixtures containing radionuclides. We initially agreed to address chemical risk assessments (CRA) for a limited number of case studies (risk 1) and apply CRA to the Polish Observatory Site (risk 2) (which required the establishment of sampling and characterisation programme, including biota/population parameters: invertebrate community, bacterial DNA profiling and modelling).

Due to heavy experimental work for the BLM and effects modelling almost nothing has been done for the risk related tasks under WP4. This issue was discussed with the EAB at the Rovaniemi meeting in January 2014, they suggested that WP-4 not pursue risk assessment activities.

Task 4.5 (initially referred as 4.4 in the DoW): Integration of all RTD results for a critical evaluation on how mixed contaminant conditions may affect radiation protection standards

This final task is an integrative one where all RTD results will be consolidated in a critical evaluation of the possible impact of multiple contaminant exposure conditions on human and environmental impact assessments and on radiation protection standards. This consolidation effort will occur during the final months of STAR after all relevant data are compiled.

2.2.3.2 Highlight clearly significant results

Significant results during this second 18-month period include:

- the conclusion that co-contaminants do not have a significant effect on the speciation of natural radionuclides for the examples studied, and hence co-contaminants will unlikely alter the mobility of radionuclides . This is scientifically interesting and relevant to communicate to the scientific community.
- the initiation of the BLM work which aims at showing that the combination of geochemical speciation models with BLMs is a valuable tool for assessing the influence of varying environmental conditions and mixed contaminant conditions on U speciation, bioavailability and toxicity. This is scientifically interesting but can used for impact/risk assessment.
- the beginning of the multiple stressor effects and the BLM studies, which will help answer if and how we need to consider these other stressors when evaluating environmental impacts and developing protection values.

Additionally, regarding our goal of integration:

- we established within our experimental work, to the extent possible, common experimental approaches and protocols; approaches for setting up BLM, CA/IA experiments, biomarkers selected
- we increased integration through the realization of common experiments at radiation facility of SCK•CEN, collaboration (exchange of scientists) on *C. elegans* work between IRSN and NMBU

2.2.3.3 Deviations from Annex I and impact on other tasks, as well as on available resources and planning (if applicable)

Except for the delay in submitting milestone MS4.6 *"Parameterization of DEB model for all test organisms subjected to mixed exposure conditions"* (due initially at month 18) there are no deviations from Annex 1.

The BLM-related worked consumed more resources (man.months) than expected.

There are some deviations from our detailed research/activities intentions as described in M4.3 (but such detail was not provided in the DoW), i.e. we will not monitor and sample and do research at the Polish observatory site; we will virtually abandon the mixture toxicity experiments with fluoranthene and we will not perform any risk assessment related activities. Priority is given to consolidation of what was started.

2.2.3.4 Reasons for failing to achieve critical objectives and/or not being on schedule ; and explain the impact on other tasks as well as on available resources and planning (if applicable)

Not applicable.

2.2.3.5 Statement on the use of resources: highlighting and explaining deviations between actual and planned person-months per beneficiary in DoW

The research in WP4 is very demanding: both the CA/IA experiments and the BLM experiments are demanding in terms of man power allocation and analyses costs. Most partners gently offer in kind contribution for WP4.

2.2.3.6 Corrective actions (if any)

The corrective action we choose was to discuss with the EAB in Rovaniemi and try to re-center our activity. These are not to be viewed as corrected actions vis-à-vis the DoW but corrective actions vis-à-vis our intentions described in Milestone M4.3.

2.2.4 WP5 - Ecologically relevant low dose effects

2.2.4.1 Summary of progress towards objectives and details for each task

The main work in WP5 during this second 18-month reporting period was devoted to experimental work, identified as MS5.5 and MS5.7 associated with tasks 5.1 and 5.2. WP5 also initiated modeling work described under tasks 5.3 and 5.4.

Task 5.1 Integrate relevant population endpoints into ecological protection criteria by combining species physiological features, ecological traits and dose-effects relationships

This task is subdivided into three subtasks, the first of them (*Subtask 5.1.1 Modelling chronic effects of gamma radiation at the population level*) was finalized during the first reporting period.

Subtask 5.1.2 Dose rate response relationships for chronic exposure conditions (gamma, alpha)

Experiments were carried out in agreement with the common guidance established in STAR Deliverable report D5.1 in order to obtain radiation effect data on major life history traits in plants (*Lemna minor* and *Arabidopsis thaliana*), soil and aquatic invertebrates (*Caenorhabiditis elegans* and *Daphnia magna*) and fish (*Danio rerio*).

Studies with plants exposed to gamma and alpha radiation were performed by SCK•CEN. Gamma radiation effects on growth were obtained in *L. minor*, while results led to the conclusion that *A. thaliana* is radio-resistant even at the highest tested gamma dose rate. A simple comparison of effects between alpha and gamma proved difficult due to problems with Am-241 solubility (used as a waterborne alpha emitter) in the growth medium (*L. minor*) and heterogeneous distribution among organs (*A. thaliana*).

Parallel studies with zebrafish exposed to gamma and alpha radiation were performed by NMBU (autumn 2013) and IRSN (spring 2013), respectively. *In vivo* trophic contamination of large adult fish with Am-241 appeared technically difficult, with other options considered for future experiments (namely contamination via direct route in smaller younger life stages). Results will be presented at the next WP5 meeting in Stockholm (April 2014).

No alpha exposure experiments was run with nematode *C. elegans* during the second period to complement the dataset on gamma effects already acquired during the pilot study achieved by NMBU and IRSN in September 2011.

Achievement of milestone MS5.5 *"Acquire dose rate – response relationships in lab for gamma and alpha"* in *L. minor*, *C. elegans* and *D. rerio* still depends on success of alpha exposure experiments. This milestone was achieved by running a multi-generational exposure to gamma radiation in the waterflea *D. magna*, for which dataset on chronic alpha effects is available from experiments performed during the ERICA program. Both alpha and gamma experiments captured increasing effects on survival and fecundity across generations.

Acquisition of full dose-rate response relationships was not possible due to limitations in the amount of Am-241 permitted in all STAR partner facilities. This limit prevented testing responses at the highest dose rates. Therefore, we decided to connect the acquisition of radiation effect datasets to task 5.3 dedicated to DEBTox.

All available data on effects were presented in the deliverable D5.3 *"Radiation Quality report"* delivered to EC at the beginning of December 2013.

Subtask 5.1.3 Extrapolate radiosensitivity of life traits from one species to another within the same taxonomic group

The first part of this subtask was finalized during the first reporting period, as exemplified in Deliverable report D5.2, using species for which radiation effect data was lacking for some life history traits: effects on survival extrapolated among woodlouse species; effects on reproduction extrapolated among earthworm species; effects on survival and fecundity extrapolated among fish species of the salmonid family. Additional extrapolations of radiosensitivity to a range of representative species will be achieved within each taxonomic group as part of the derivation of protection criteria under task 5.4.

Task 5.2 Use new advanced techniques to test hypotheses about the mode of action of radiological exposures

This task is subdivided into two subtasks.

Subtask 5.2.1 Explore "omics" responses (gamma, alpha) for dose rates with significant effects on life history traits

This task was initiated during WP5 meeting in Berlin (June 2012) with the decision to build a table summarizing molecular and cellular biomarker techniques in different species available in different institutes. A video meeting (October 2012) and an additional face-to-face meeting in Oslo (March 2013) on "Radiosensitivity and Molecular markers" were conducted.

Discussions led to the agreement to conduct parallel *in vivo* exposure experiments in Zebrafish at NMBU (gamma irradiation in autumn 2013) and IRSN (alpha contamination in spring 2013) in similar conditions (same life stages, same exposure duration, attempt to cover same ranges of dose rates) and collect samples for analyses of a common set of molecular markers (gene expression associated with brain activity, inflammation and detoxication processes, DNA repair and apoptosis, oxidative stress, spermatogenesis…). Due to the delay in realisation, biomarkers analyses are still in progress and results will be presented at the next WP5 meeting in Stockholm (April 2014).

In vitro gamma and alpha exposure experiments on zebrafish fibroblast cultures were also conducted at IRSN and SU in order to quantify responses of biomarkers (associated with DNA damage and apoptosis) with an emphasis on detecting bystander effects (defined as responses of non-irradiated cells in contact with irradiated cells).

Alpha and gamma exposure experiments in *A. thaliana* at SCK•CEN aimed to quantify the response of various biomarkers (associated with stress on photosynthesis, oxidative stress, DNA damage and repair) in parallel of measurement of growth.

Gamma exposure experiments conducted in *C. elegans* (at IRSN and SCK•CEN) and *D. magna* (IRSN) aimed to measure biomarkers associated respectively with DNA damage, apoptosis, mitosis and sperm production in nematodes and DNA damage in daphnids.

Achievement of milestone MS 5.7 *"Explore omics response for one threshold dose rate giving significant effect"* was delayed and is now in good progress in all selected species (*A. thaliana*, *C. elegans*, *D. magna* and *D. rerio*). All available data on "omics" responses were presented in the Deliverable D5.3 *"Radiation Quality: studying sub-cellular modes of action using biomarkers and "omics" tools"* delivered to EC at the beginning of December 2013 with additional results to be presented at the WP5 meeting in Stockholm in April 2014.

During the Berlin meeting (June 2012), it was suggested to compare responses of biomarkers to alpha and gamma irradiation in order to obtain insights on mechanisms involved in the variation in radiosensitivity among tissues types and/or life stages for a given species and between species. Interpretations are complex due to the variety of experiments, endpoints and markers analysed. A robust comparison of biological effectiveness will require that the difference in distribution of alpha and gamma exposure is thoroughly addressed within organisms.

Subtask 5.2.2 Power of "omics" fingerprints for predicting consequences on life history traits

A section (paragraph 4.4 pages 74-85) of Deliverable D5.3 delivered to the EC in December 2013 describes how DNA damage (as measured by random amplified DNA technique combined with quantitative PCR) and effects on survival, growth and reproduction are linked together in the case of *Daphnia magna* exposed to depleted uranium over several generations. This work was done as part of the IRSN Envirhom program. Results suggest that DNA damage could be used as early indicators of future effects on life history traits. Underlying perturbations of energy budget are analysed mechanistically using a DEBtox model with two stress factors (one correlated to exposure concentration causing immediate effects of uranium on nutrition and another correlated to a heritable damage level to explain the increase in effects severity across generations). A similar approach is currently applied to compare chronic effects between alpha and gamma multigenerational exposures in *D. magna*.

Task 5.3 Use coupled Biokinetics/Dynamic Energy Budget approach to understand the metabolic mode of actions of radiological exposures at the individual level

This task was initiated with preliminary DEBtox fits for *C. elegans* exposed to gamma presented at the WP5 meeting in Berlin (June 2012). Additional calculations have been made in order to test whether improving the control nematode model (with extra parameters to take account of the gradual shutoff reproduction, which is not described in Jager et al., 2005) allows to reduce uncertainty in estimates of toxico-kinetic / toxico-dynamic parameters. Comparison of hypotheses involving different numbers of parameters in the model will be addressed using the Akaike Information Criterion. Various models are considered to address radiological stress in *L. minor*. A discussion between IRSN and SCK•CEN was initiated in Mol (January 2014) in order to formulate hypotheses which will be tested in Deliverable report D5.4 (due in July 2014) when applying the DEBtox approach to the case of radiological stress:

1/ stress metrics should be dose rate or a damage level (having the dimension of dose rate) with a one-compartment model with first-order kinetics and damage recovery rate constant k_r).

2/ metabolic modes of action could shift from "maintenance costs" (associated with repair of radiation-induced DNA damage) to "growth and maturation costs" (associated with the loss of damaged cells by apoptosis) with increasing dose rate. Additional direct effect on reproduction (either "cost of egg" or "hazard during oogenesis") can be considered.

Comparison of biological effectiveness will be addressed with the DEBtox approach using alpha and gamma radiation dataset acquired in *D. magna*, either comparing stress functions from two distinct fits between alpha and gamma or by fitting a common stress function for alpha and gamma with the ratio of biological effectiveness as an extra parameter.

Task 5.4 Integrate all RTD results into the proposition of new group-specific criteria, field validated at Observatory sites

This task was initiated through exchange with Valery Forbes (member of the EAB and expert on this theme), by e-mail and visioconference during the EAB meeting in Rovaniemi in January 2014. The suggestion was made to widen the range of population endpoints (equilibrium size in density dependent contexts – more relevant of natural situations where exposed populations are at maximum density, with $\lambda \approx 1$ – extinction probability, time to extinction) to address population protection, in addition to unlimited population growth rate λ (as calculated in Deliverable report N°5.2 – more relevant of recovery situations). Deriving protection criteria for each taxonomic group (aquatic invertebrates, soil invertebrates, fish and terrestrial mammals) will be achieved by extrapolating measured radiosensitivity from test species to representative natural species and exploring the variability in population responses associated with the range of life history strategies. During the discussion between IRSN and SCK•CEN in Mol (January 2014), the suggestion was made to use "*my_pet*" collection of DEB parameter sets to obtain life histories in additional species. Test of group specific protection criteria using data from observatory sites will be achieved based on dose rate estimations in wildlife compiled in report "Site Characterisation of the European Radioecological Observatories in the Upper Silesian Coal Basin (USCB)" by WP2.

2.2.4.2 *Highlight clearly significant results*

Significant results for this second period includes:

- The achievement/on-going and planned studies of alpha and gamma radiation effects at the organism level in various species including plants, soil and aquatic invertebrates and fish;
- The study of molecular and cellular mechanisms involved under alpha and gamma radiation exposure;
- A mechanistic model to explore the link between molecular damage, energy budget and life history in a multigenerational context;
- A mathematical model to project consequences of chronic radionuclide effects to the population level.

From an integration perspective, WP5 succeeded in conducting alpha and gamma radiation experiments which were shared among partners:

- γ-irradiation experiments on nematodes at SCK•CEN with IRSN collaborators (Jan and Nov 2013);
- α-irradiation experiments on zebrafish cells at SU with IRSN collaborators (September 2012);
- parallel γ- and α-exposure experiments in living zebrafish respectively at NMBU (autumn 2013) and IRSN (spring 2013) based on a shared set of laboratory conditions and molecular markers analyses.

2.2.4.3 *Deviations from Annex I and impact on other tasks, as well as on available resources and planning (if applicable)*

Achievement of milestones MS5.5 *"Acquire dose rate – response relationships in lab for gamma and alpha"* (initially planned for month 15) and MS5.7 *"Explore "omics" responses (gamma, alpha) for one threshold dose rate giving significant effects"* (initially planned for month 22) were delayed with experimental exposures performed between months 8 and 34 and molecular analyses still in progress.

2.2.4.4 *Reasons for failing to achieve critical objectives and/or not being on schedule ; and explain the impact on other tasks as well as on available resources and planning (if applicable)*

Delay in achievements of experimental work was due to: 1) too optimistic time scheduling; 2) shutting of NMBU irradiation facility for upgrade (mid-2012 to beginning of 2013); 3) problems to maintain different temperatures for *C. elegans* and *L. minor* encountered during joint experiment conducted at SCK•CEN irradiation facility; 4) technical difficulties in maintaining Am-241 bioavailable for *D. rerio* and *L. minor* during alpha contamination experiments.

Other options were considered:

- Performing future experiments of Am-241 contamination through direct ingestion route in younger (smaller) life stages in Zebrafish;
- Comparing alpha and gamma biological effectiveness in *Daphnia magna* for which a dataset on chronic alpha effects is available from experiments performed during the

ERICA program – the acquisition of a complementary dataset on chronic gamma effects is now achieved with chronic gamma effects to be used to compare biological effectiveness using the DEBtox approach (Deliverable report D5.4 due in July 2014).

2.2.4.5 Statement on the use of resources: highlighting and explaining deviations between actual and planned person-months per beneficiary in DoW

No deviation

2.2.4.6 Corrective actions (if any)

Not applicable

2.2.5 WP6 - Mobility, training and education

2.2.5.1 Summary of progress towards objectives and details for each task

For this second period, works in WP6 focused on task 6.2, 6.3 and 6.4

Task 6.2 Consolidation of a multi-disciplinary, training and education platform in radioecology

STAR has developed the Radioecology Education and Training Platform (E&T platform). It is a website focal point for students and professionals interested in radioecology. The platform presents an overview of education and training course modules within radioecology/environmental radioactivity presently offered by the STAR consortium. Information on course curriculums and learning outcomes are provided, with recommended pathways to obtained academic merited education (MSc, PhD). The Radioecology E&T platform also provides links to other E&T platforms, such as those within Radiochemistry, Radiobiology and Radiation Protection (Figure 1). This is an important outreach mechanism for the Radioecology E&T platform, as – for example – many of the basic course modules within radioecology are also relevant for other nuclear science students, and vice versa.

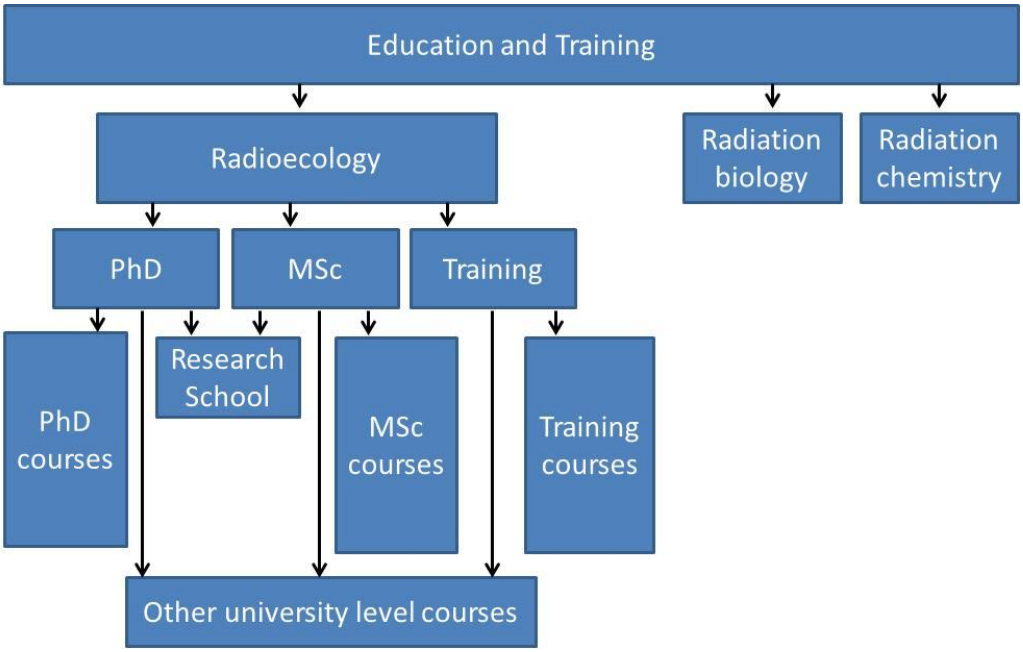

Figure 1. Education and Training platform

The E&T platform was introduced in Milestone MS 6.5 *"Draft training and education Programme"* finalized in June 2013 and fully described in deliverable D6.2 *"Training and education platform structure"* delivered to EC at the end of September 2013. The present version of the education and training platform is located on the STAR web site (the Radioecology Exchange). STAR's education and training platform (Figure 2) will be updated and finalised in connection with the overhaul of the website in connection with the COMET project.

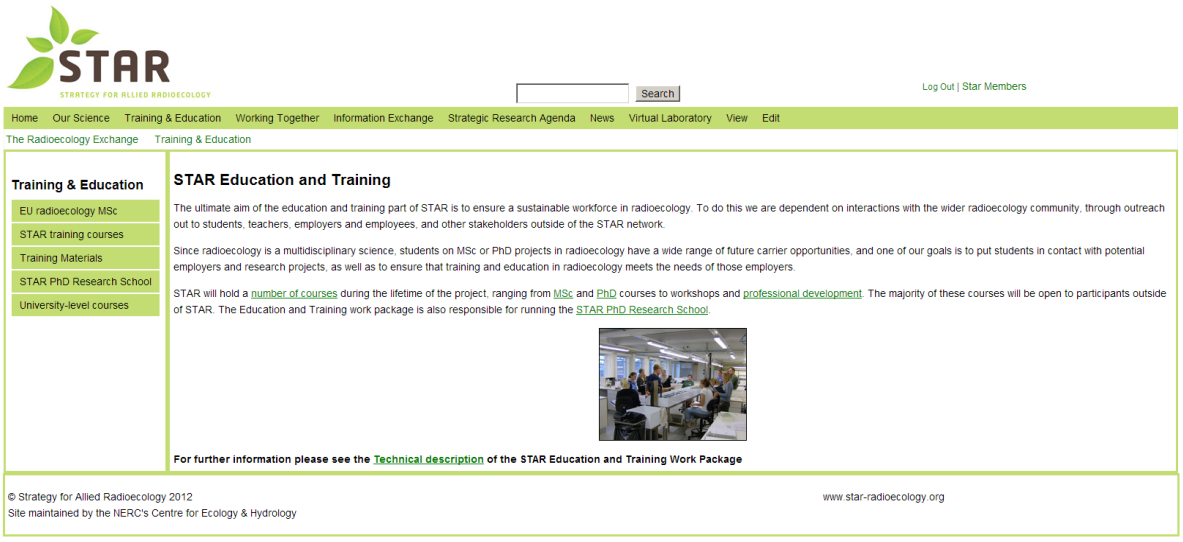

Figure 2. The current Education and Training webpages

The main elements of the E&T platform are as follows:

- The EU MSc in Radioecology – this is a tailored two year MSc programme, Bologna accredited, consisting of obligatory and voluntary stand-alone course modules. As for any EU MSc, students are free to make up credits by taking European Credit Transfer and Accumulation System (ECTS) accredited courses at other institutions and collaborating universities (e.g. Aix-Marseille).
- Radioecology MSc Course Modules – these are descriptions of the modules currently offered as part of the EU MSc, including the STAR flagship course Experimental Radioecology. These modules are open to MSc students from other programmes.
- Other MSc courses available from STAR partners – this covers relevant courses that are not currently part of the official Radioecology MSc Programme, but that might be relevant to any radioecology student.
- PhD courses – ECTS courses aimed primarily at PhD students. Most European PhD students are expected to take some accredited courses as part of their PhD training. These courses are often relevant and attractive for professional training.
- The Radioecology Research School – this is a web-based networking forum aimed primarily at PhD students in radioecology and other relevant nuclear sciences.
- Training courses – courses aimed primarily at professionals. These do not give ECTS, but can be relevant for both workers and students. Vocational credits can be implemented.
- Links to e-learning tools – useful teaching aids for students and professionals
- Links to the STAR Virtual Laboratory

Task 6.3 Implement and test a selection of modules

A total of four courses were planned within STAR WP6 (one MSc course, on PhD course and 2 training courses). The restructuring and development of certain courses has had a great benefit from the input of the both the STAR participants and the STAR E&T stakeholders (see Deliverable 6.1 from the previous period). In addition to the planned four courses, other courses held included web-based courses on BLM and mixture toxicity, and a potential new course module in modelling was prepared.

The four STAR courses, and the dates they were completed are:

- One week PhD course on Environmental Radiobiology, held in June 2013 (28 participants)
- Two week MSc course on Experimental Radioecology, held in October 2013 (16 participants)
- Three day training course in Mixture Toxicity, held in November 2013 (12 participants)
- Three day training course in Environmental Protection, held February 2014

The full report on the courses and student evaluation is being finalised for Deliverable 6.3. A brief summary of the MSc and PhD courses is given below.

The MSc course in Experimental Radioecology (KJM351/353) is the STAR "flagship" radioecology course intended to be accessible to students taking other environmental science and radiation related subjects, as well as to professionals wishing to enhance their competence. As a result of discussions within STAR, main changes made during the STAR project included addition of other international and STAR specialists from IRSN, McMaster University, NRPA, SCK•CEN, CIEMAT, NRPA and IRSN. An overview of the various proposals received from stakeholders and STAR participants is given in Table 1, together with the actual changes.

Table 1: Summary of proposed changes and revisions made (see STAR Deliverable 6.1 for more details of the proposals make at the STAR E&T Stakeholder Workshops).

Proposals based on 2011 course (see STAR D6.1, 2012)	**Revisions made to 2012 course**	**Revisions for 2013**
Need some more "catching" lecture titles: nuclear forensics, accidents, etc	Changed some titles	Continued …
The introduction needs to be more generally relevant	-	The curriculum has been changed to include – visually – and not just as sub-themes in lectures: 1) General Radioecology Introduction Lecture 2) General sources lecture 3) Stand alone Chernobyl and Fukushima lectures (these will make the lectures/course look really interesting)
Radiobiology is too heavy on non-human biota	Restructured to make the human/general radiobiology and non-biota parts clearer.	Lectures have been revised to coordinate better with the NMBU Environmental Radiobiology course (MINA410)
Too much on NORM	Cut one lecture	-
Not enough modelling	One lecture included	An overview modelling lecture has been included
Transfer should be a lecture in itself. At the moment seems to address speciation only or spread over aquatic, terrestrial, etc lectures.	Will be integrated in lectures concerning all ecosystems	A stand-alone lecture on transfer has been included
Too much with two tracer	One more lab experiment has	Revisions have continued

Proposals based on 2011 course (see STAR D6.1, 2012)	Revisions made to 2012 course	Revisions for 2013
experiments	been introduced, demonstrating speciation, transfer to biota, and the usefulness of tracer techniques	highlighting the different techniques.
Need for experience on RN analytical techniques (e.g. Sr/Pu)	-	Separation techniques are already included in the Radiochemistry course module. Thus is it difficult to include time consuming Sr/Pu separation techniques in the limited lab experiment time for the course. However a lecture on techniques has been added.
Need more on waste disposal/management (high EU relevance for nuclear power countries)	Covered in detail in the Aix-Marseille course; and mentioned in source lecture	The possibility for a stand-alone lecture has been discussed; the decision was to await feedback on the French course.
Radon measurement as a practical	Is discussed together with the Rn dose calculation during the NORM lecture	A practical has been included.
Include a visit from NRPA mobile whole body monitoring unit	-	This is now included in the 2013 course

The Environmental Radiobiology course (MINA 410) was the test PhD course run during the STAR project. The aim of the course was to give students an overview of the fundamental principles of radiobiology, but within the context of effects on non-human biota. The course covered both the history and the state-of-the-art of our knowledge on the biological effects of radiation on humans, including how recent studies are challenging established paradigms, but concentrated specifically on those issues and applications of most relevance for other organisms. This included effects and endpoints significant for non-human organisms, ways in which radiobiology methods and biomarkers are being applied in ecological research, factors influencing radiosensitivity in different organisms, and ecological risk assessment. Case studies included ecological research in Chernobyl and Fukushima, and laboratory work on biomarker analysis in model organisms. In a development from the original STAR workplan, we made a successful application for additional funding from DoReMi for this course, primarily to foster exchange of students between the two disciplines, and also to strengthen links with the radiobiology community. The rational was that the course would provide the opportunity to get a better understanding of the fundamentals of radiobiology for students of radioecology; and that for radiation biology students it would offer the chance to see how radiobiology concepts and tools are applied in other areas of

radiation research, thus gaining a more in depth understanding of the subject. Teachers were from Norway, Canada and Sweden and 28 students took the course with a split of 20 PhD and MSc students and 8 "professionals"; of whom 8 were from Norway, 15 EU and 5 non-EU (USA, Argentina, Russia).

Milestone MS 6.6 *"Revision of syllabus and test run training modules"* was delayed due to postponement of the Environmental Protection Training course (which was in turn delayed due to upgrade of the ERICA Tool). But the course was completed in time for the deliverable.

Milestone MS 6.7 *"Revision of syllabus and test run PhD module"* was achieved by January 2013 when the course and full syllabus was advertised on June 2013. The background and draft of syllabus revisions was posted on the internal website in July 2012.

Deliverable D6.3 *"Test run of course modules"* due for month 36 was finalized and delivered to EC by the end of March 2014.

Other important activities include fostering links with the education and training activities in other areas including talks at NERIS and MELODI workshops, as well as promoting radioecology through lectures on other Environmental Science Courses.

Task 6.4 Secure mechanisms for an efficient mobility programme of scientists and students within the Radioecology Network, and funding to assure long-term sustainability of the training and education programme in radioecology

The main part of the work on this task will be carried out in the final 18-month period of STAR's funding. The two main tasks for the current reporting period were:

Subtask 4.1 Development of a strategic plan for a sustainable integrated E&T platform

Implementation of the Strategic Research Agenda for radioecology and the future of radioecology will depend on scientists and professionals being trained with relevant skills for industry and the needs of other stakeholders. It is critical for a vibrant science to continually attract bright, young talent into the discipline. Thus, the new updated version of the SRA also includes a section on Education and Training challenges in radioecology, the associated vision and key action lines. The education section includes input from the two supply and demand stakeholder workshops organised by WP6 during the first 18-month period (in 2011 and 2012).

Subtask 4.2 Development of a mobility strategy

As part of the work on stimulating researcher mobility, a set of criteria were agreed upon by the STAR partners for the use of the mobility stimulus budget, during the 1st period. Briefly it should facilitate active collaboration and integration between STAR partners, by supporting exchange of scientists and students between partner institutions. It should entail a visit of at least 3 days, preferably longer. The budget does not cover attendance of STAR meetings and short workshops.

For this 2nd period, this budget has been used by STAR partners (IRSN, SCK•CEN) for students exchange in the framework of joint experiments and courses:

- WP5 IRSN experiments with the α-irradiation facility of SU (September 2012, 1 post-doc),
- WP4 and 5 SU and IRSN experiments with the γ-irradiation facility of SCK•CEN (January 2013 and November-December 2013, 2 PhD students),
- STUK and SCK•CEN students attending a STAR radioecology training course in Norway (October 2013).

2.2.5.2 Highlight clearly significant results

Significant results for this period include:

- Successfully held two of the academic STAR E&T Courses: Environmental Radiobiology (PhD course, 5 ECTS) and Experimental Radioecology (MSc Course 5/10 ECTS). Student participation (28 and 16 students, respectively) was more than a 100% increase over past attendance, with good student feedback.
- Successfully held two training courses: Mixture Toxicity and Environmental Protection.
- Revised STAR course content and the overall Radioecology MSc syllabus.
- Attracted funding from DoReMi to sponsor participation of additional students and foster links with the radiobiology community.
- Participated in MELODI/OPERRA E&T network meetings to initiate integration and STAR E&T in OPERRA and Horizon 2020
- Progressed on procedures for awarding joint degree between different universities
- Began work on co-accreditation of courses for academia and workers
- Commenced work on designing a new radioecology modelling module – one of the Launch of E&T platform and website

2.2.5.3 Deviations from Annex I and impact on other tasks, as well as on available resources and planning (if applicable)

The main delay for this period has been linked to the development of e-learning tools. While this has not had an impact on the delivery of milestones or deliverables for the current period, we are behind schedule with regard to the next period.

There were short delays due to the postponement of two of the training courses, but these were not serious enough to result in delays in submission of deliverables. On the positive side, the PhD course was held earlier than expected and an additional course on Risk Assessment will be held in June 2014 (also a collaborative project with STAR and DoReMi).

2.2.5.4 Reasons for failing to achieve critical objectives and/or not being on schedule ; and explain the impact on other tasks as well as on available resources and planning (if applicable)

Resource use appears to be in line with planned activities

2.2.5.5 Statement on the use of resources: highlighting and explaining deviations between actual and planned person-months per beneficiary in DoW

No deviation

2.2.5.6 Corrective actions (if any)

There will be a focus on e-learning tools at the start of the next period.

2.2.6 WP7: Knowledge and data dissemination

2.2.6.1 Summary of progress towards objectives and details for each task

Task 7.1 The STAR webportal

Subtask 7.1.2 Develop the structure of the STAR's webportal (the Radioecology Exchange)

Completed

Subtask 7.1.3 Maintenance and enhancement of the webportal

Agreements between STAR, COMET and the Radioecology Alliance means that much of the information collated on the Radioecology Exchange will be held in a sustainable format and manner providing a valuable resource to support radioecology in the future.

The Radioecology Exchange has attracted over 900 unique visitors between August 1st 2012 - January 31st 2014, many visiting on more than one occasion. Popular pages included those describing the STAR professional development courses, the consortium, and those describing jobs or training opportunities. Thirty three percent of visitors came from the UK, 12% from the USA (SRA), 11% from India (jobs) 4%, from France, 3% from Germany with the remainder spread worldwide. The site was used to obtain stakeholder input on STAR Strategic Research Agenda and to publicise the open call for new STAR members, via research associated with Fukushima marine research.

In spring 2014, www.star-radioecology.org will be re-structured. STAR and COMET will both have 'project' websites containing: project descriptions, deliverable reports and a news blog. The remaining information, such as the 'virtual laboratory' and the 'training and education platform' (which are currently being developed by STAR and will be enhanced during COMET) will be located on www.radioecology-exchange.org which will then become a 'hub' website for information related to radioecology.

We anticipate the numbers of visitors to increase from spring 2014 when the Virtual Laboratory and Training and Education information becomes available and later in 2014 when STAR is well publicized at the international radioecology conference (ICRER) in Barcelona in September 2014.

Subtask 7.1.4 Populate with outputs of other STAR WPs

This task began in month 20 and is ongoing throughout the project. Summaries and hyperlinks to publicly available deliverables, links to papers and conference proceedings are provided as WP7 is notified of their availability.

Publications produced by STAR are available here: https://wiki.ceh.ac.uk/x/a4FiC

Subtask 7.1.5 Populate with STAR partners inputs (with WP2)

This task is ongoing throughout the project. The web site is continually being enhanced and improved and is actively revised.

Task 7.2 Publications and knowledge management

Subtask 7.2.1 Develop long term publication strategy

This task is not due to begin until mid-2014

Subtask 7.2.2 Explore the possibility of an open-access journal

The advantages and disadvantages of this approach were discussed with the EAB. Since the task was devised the opportunities to publish on the web have greatly changed and other options such as the production of online data and other products have emerged. STAR is actively exploring these options which were presented at the January 14th meeting in Rovaniemi.

Subtask 7.2.3 Targeted briefing documents and e-learning packages

Milestone MS7.6 *"To have produced target briefing documents on basic radioecology"* was due by month 18, but some of the inputs have been delayed.

At the STAR meeting held in Berlin in June 2012 it was agreed amongst the consortium that joint activity with WP2 would involve the preparation of 'factsheets' focusing on the basic radioecology of some radioecologically important elements.

Target briefing documents on the status after the Fukushima accident for:

a. terrestrial areas;
b. marine areas; and
c. the population in the affected areas

will be produced by 1 November 2014. The new STAR member will be involved in marine radioecology at Fukushima which will enhance the integration of the new member into the STAR consortium.

Subtask 7.2.4 Disseminate EURATOM research on the Radioecology Exchange

The milestone MS7.5 *"Uploaded previous Euratom outputs"* was delivered in October 2012. The outputs are available on the *Radioecology Exchange* at: https://wiki.ceh.ac.uk/x/bYFiC.

EURATOM publications collated by STAR have also been made available for IAEAs International Nuclear Information System (INIS) (see http://www.iaea.org/inis/).

Task 7.3 Data archive and access

Subtask 7.3.1 Define database structures in collaboration with WP2

Some STAR Partners agreed to use the NERC-CEH Information Gateway which is compliant with the European INSPIRE Directive. A wiki site was used to collate the information and the task was completed in November 2011. Metadata and in some instances data can be accessed from: https://gateway.ceh.ac.uk/home using the search term STAR NoE.

Subtask 7.3.2 Develop facility for long term on-line data access

This task began in month-12; however, the lack of data provided by some partners has had an impact upon the planned activities related to this task. The data here refer to that which was collected by STAR partners prior to STAR.

NERC-CEH therefore developed an alternative method of making the data/metadata provided by STAR partner institutes publically available via the Radioecology Exchange. Data and/or metadata have been provided from France, Finland, Norway, Sweden and the UK related to a number of topics (e.g. Chernobyl, Fukushima, nuclear weapons fallout and natural radioactivity). The data have been collected from marine, freshwater and terrestrial ecosystems for a variety of sample types (e.g. foodstuffs and crops, milk, fungi and wildlife. All the data were indexed to aid 'searchability' and were made publically available via the Radioecology Exchange: https://wiki.ceh.ac.uk/x/7AXNCw in late December 2013.

Data produced during STAR should be made available on the web site. CEH gave a presentation on how WPs 2-5 can implement this commitment in January 2014 in Rovaniemi whilst ensuring that this does not compromise the need to publish papers using the data. WP leaders are now responsible for implementing this.

Subtask 7.3.3 Develop tools for data exploration

STAR partners have made metadata available with contacts from whom interested parties can request data. Consequently to date there has been no requirement to develop data exploration tools.

As noted above data generated by STAR WPs 2-5 should be made available. Discussions on how to do this are ongoing.

Task 7.4 Workshops and conference series

Subtask 7.4.1 On-line database (and publications) workshops

The first workshop, due month 18, and the associated milestone MS7.7 *'Database and publications workshop report'* has been delayed because of limited data availability from STAR partners.

The scope of the first workshop has changed; it will now focus on data for Kd and will be hosted in collaboration with the IAEA MODARIA WG4 in May 2014 in Oslo. The workshop offers some significant advantages in attracting relevant members of the research community. The advantage of STAR taking the lead on this is that we can use our allocated resources for the workshop to attract specified individuals that hold important data sets, as well as relevant expertise. An added benefit is the relevance to data/international perspective. We will explore if the Kd database summary statistics can be made available online on the Radioecology Exchange.

Subtask 7.4.2 NoE representation at relevant events (may vary from planned)

This task is ongoing throughout the project.

STAR was represented at the 'Environmental Radioactivity: Implications for Environmental and Human Health' conference hold in Plymouth, UK on 4-5th September 2012 where a special session was held for PhD students (introducing the STAR PhD Research School to a wider audience) (see also WP6 section, above).

STAR organised a special issue of the *Journal of Environmental Radioactivity* that was a compilation of twelve manuscripts from a special session, *Environmental Radioactivity: Legacy Sites, Chernobyl and Fukushima*, held during the 12th ICOBTE Congress in Athens, Georgia, USA (16-20 June 2013). The special session on environmental radioactivity occupied two full days and consisted of 30 oral presentations, seven posters and an invited plenary speaker (T. Hinton).

Presentations and posters associated with STAR will be given at the forthcoming ICRER conference in Barcelona in October 2014, where 15 abstracts have been submitted:

- **A mechanistic approach to link biological effects of radionuclides from molecules to populations in wildlife species.** F. Alonzo, F. Parisot, D. Plaire, C. Adam-Guillermin, J. Garnier-Laplace.
- **Mechanistic study of the toxicity of ionizing radiation in *Daphnia Magna.*** F. Parisot, F. Alonzo, J. Bourdineaud, J. Poggiale.
- **Radiological Observatories—Breeding grounds for innovative research**. M. Steiner, N. A. Beresford, B. Howard, C. Bradshaw, K. Stark, M. Dowdall, A. Liland, F. Eyrolle-Boyer, J. Guillevic, T. Hinton, S. Gashchak, K-L Hutri, T. Ikäheimonen, M. Muikku, B. Michalik, J-C. Mora, A. Real, B.Robles, D. Oughton, B. Salbu, L. Sweeck, L. Urso, K. Wichterey, C. Willrodt, V. Yoschenko.
- **Recent development of wildlife transfer databases.** N. Beresford, D. Copplestone; A. Hosseini, J.E. Brown, M. Johansen, G. Hirth, S. Sheppard, E. Dagher, T. Yankovich, S. Uchida, J. Napier, I. Outola, C. Wells, B.J. Howard, C.L. Barnett, M.D. Wood.
- **Making the most of what we have: Application of extrapolation approaches in wildlife transfer models.** N. Beresford, M.D. Wood, J. Vives i Batlle, J.E. Brown, A. Hosseini, C. Barnet,. T. Yankovich, N. Willey.

- **To what extent can human and non-human radiation protection frameworks be integrated?** C. Bradshaw, K. Beaugelin, N. Beresford, J. Brown, J. C. Mora, M. Dowdall, T. Hinton, A. Hosseini, A. Liland, D. Oughton, A. Real, B. Robles, K. Stark, M. Steiner, L. Sweeck, J. Vives I Batlle.
- **Combined effects of gamma irradiation and cadmium on celluar and population-level endpoints of the microalga *Pseudokirchneriella subcapitata*.** C. Bradshaw, D. Abdul Meseh, H. Alasawi, M. Qiang, F. Nascimento
- **Interactive effects of gamma irradiation and the PAH fluoranthene on the transfer of carbon between phytoplankton and zooplankton**. F. Nascimento, C. Bradshaw, C. Svendsen.
- **Is the use of wildlife group-specific concentration ratios justified?** M. Wood, N. Beresford, D. Copplestone, B. Howard, T. Yankovich
- **The Radioecology Exchange.** C. Barnett, N. A. Beresford, S. Patel, C. Wells, B. J. Howard, J- C. Mora, A. Real, B. Robles, K. Beaugelin-Seiller, R. Gilbin, T. Hinton, P. Vesterbacka, M. Muikku, I. Outola, L. Skuterud, M. Album, Ytre-Eide; C. Bradshaw, B. Jaeschke, D. Oughton, L. Skipperud, H. Vandenhove, M.Steiner.
- **STAR Infrastructure Database: An effort to know each other**. J.C. Mora P. Vesterbacka, I. Outola, C. Barnett, N. Beresford; A. Real, C. Bradshaw; L. Skipperud; C. Wilrodt, M. Steiner; N. Vanhoudt; M. Komperød, R. Gurriaran, R. Gilbin, T. Hinton.
- **Interaction matrices as a tool for prioritizing radioecology research**. J.C. Mora, C. Bradshaw, K. Stark, B. Robles, L. Sweeck, J. Vives i Batlle, N. Beresford, H. Thørring, M. Dowdal, I. Outola, T. Turtiainen, V. Vetikko, M. Steiner, K. Beaugelin-Seiller, L. Février, P. Hurtevent, P. Boyer.
- **Radioecology: Challenges and opportunities in common with low dose radiation biology.** T. Hinton, A. Real, D. Oughton, W. Morgan.
- **Advances in environmental radiation protection: Re-thinking animal-environment interaction modelling for wildlife dose assessment**. M. Wood, N. Beresford , C. Bradshaw, S. Gashchak, T. Hinton.
- **The European Radioecology ALLIANCE: Encouraging the coordination and integration of research activities in radioecology.** Real, A., L. Currivan, J-C Gariel, F. Hardeman, B. Howard, S. Lukashenko, I. Lund, L. Sabatier, S. Sachs, S. Salomaa, J. Smith, M. Steiner, P. Strand, J. Tschiersch, T. Hinton, H. Vandenhove.

2.2.6.2 Highlight clearly significant results

The main results of WP7 for this second 18-month period were:

a. Provide a regularly updated news blog for information related to environmental radioactivity e.g. upcoming conferences, jobs, publications etc.

b. Uploaded previous Euratom outputs onto the Radioecology Exchange site: https://wiki.ceh.ac.uk/x/N4DzC

c. Continued improvements to the Radioecology Exchange website

d. Uploaded metadata provided by STAR partner institutes was made publically available via the Radioecology Exchange (https://wiki.ceh.ac.uk/x/7AXNCw) in late December 2013. Data were made available from France, Finland, Norway, Sweden and the UK related to a number of topics (e.g. Chernobyl, Fukushima, nuclear weapons fallout and natural radioactivity). The data were collected from marine, freshwater and terrestrial ecosystems for a variety of sample types (e.g. foodstuffs and crops, milk, fungi and wildlife). Metadata describing the data were indexed to aid 'searchability' and was made publically available via the Radioecology Exchange

e. STAR organised a special issue of the *Journal of Environmental Radioactivity* (T. Hinton and G. de With. 2013. Journal of Environmental Radioactivity 131:1-3) that was a compilation of twelve manuscripts from a special session, *Environmental Radioactivity: Legacy Sites, Chernobyl and Fukushima*, held during the 12th ICOBTE Congress in Athens, Georgia, USA (16-20 June 2013). The special session on environmental radioactivity occupied two full days and consisted of 30 oral presentations, seven posters and an invited plenary speaker (T. Hinton).

2.2.6.3 Deviations from Annex I and impact on other tasks, as well as on available resources and planning (if applicable)

A lower level of proactive input from partners and WPs than anticipated has had an impact on WP7 largely connected with data related tasks.

2.2.6.4 Reasons for failing to achieve critical objectives and/or not being on schedule; and explain the impact on other tasks as well as on available resources and planning (if applicable)

The first workshop, due month-18, and the associated milestone MS7.7 *'Database and publications workshop report'* was delayed because of limited data availability from STAR partners. The scope of the workshop was also changed; it will now focus on Kd estimation and will be hosted in collaboration with IAEA WG4 in May 2014 in Oslo.

2.2.6.5 Statement on the use of resources: highlighting and explaining deviations between actual and planned person-months per beneficiary in DoW

A high quality, active website requires regular updating and input. For STAR, such input must come from the associated partners. Providing routine input to a website appears to be something that was not in the business cultural of STAR's partners when the network of excellence began. Therefore CEH WP7 time to update the website is greater than anticipated and originally funded. A paradigm shift in active communication is needed, but will take time and motivation to develop. Change will take time and will progress within COMET.

2.2.6.6 Corrective actions (if any)

Resources have been transferred from WP7 travel and sub contracts to provide more labour resources for CEH WP7 activities (see Table 3, section 2.3.1).

2.3 Project management during the period

2.3.1 Consortium management tasks and achievements;

The achievements of the consortium management are presented below task by task in compliance with the objectives described in section 2.

Task 1.1 Legal, contractual and administrative management

No changes in the legal and contractual documents (Grant Agreement and Consortium Agreements) occurred in STAR during this second 18-month period.

In close cooperation with the WP leaders, the Coordinator has monitored the progress of the project and has ensured that milestones and deliverables have been met in a timely manner, by the organization of face to face meeting (twice every reporting period, as stated in the Grant Agreement) and additionally monthly video-meetings (see task 1.6 for more details).

All deliverables due in this second period have been submitted on time to the EC, except Deliverable D 3.1 (combination of CROM and ERCIA Tool into the combined screening model CROMERICA) for which a delay has been asked and accepted by the EC (see section 2.2.2 for more details). This deliverable will be submitted with a 1-year delay, with no impact on other deliveries in STAR.

The first periodic report of STAR was submitted in a timely manner to the EC by the end of September 2012. This report was positively approved by the EC and the first interim payment of STAR was delivered to STAR on February 2013 (see task 1.2 below).

A change in STAR's restricted-access deliverables within WP2 was asked to the EC in order that they can be used under the COMET project. A letter was sent by the coordinator on the 6th of September 2013 to explain the situation. This change to the Grant Agreement will be one of the items on our up-coming amendment request.

A secure website (see section 2.2.6) has been established under the WP 7 which is used, among others, to archive all deliverables, milestones and contractual documents (see for example: WP1_deliverables_&_milestones). Paper copies of essential documents are stored by the Coordinator at the IRSN facilities.

Task 1.2 Financial management

The coordinator has received 1 239 340.43 € as the first interim payment of STAR on February 2013. These funds were immediately distributed (in April 2013) among the partners according to their cost declaration for the first period (see Table 2 below).

Table 2: First interim payment allocation between STAR's partners

Partners	1st interim payment
IRSN	480 666.69 €
STUK	161 434.27 €
SCK•CEN	211 290.99 €
NERC	159 524.73 €
CIEMAT	128 152.49 €
SU	70 517.71 €
BfS	27 753.55 €

WP7 required more work than anticipated by NERC to regularly update the website (see sections 2.2.6.5 and 2.2.6.6). Therefore, the Steering Committee of STAR approved the transfer of funds from NERC-travel and sub-contracting to NERC-labour. The amount of EC funds for NERC was not changed, nor was the total contribution of NERC to WP7 (Table 3).

Table 3: New breakdown budget for CEH in WP7

WP 7 budget	Initially planned budget	Revised budget
Man.month	14	19
Subcontracting	24 300	0
Webcost	13 000	0
Travel + meeting cost	26 700	26 700

In agreement with its Grant Agreement, STAR launched an open call during this second period. STUK provided a technical and administrative support to the coordinator of STAR for the organisation of the call. As a consequence, a transfer of funds from IRSN to STUK in WP1 will be performed. The total amount to be transferred is not yet completely calculated, but it should be at least 21 303.96 €. The latter amount corresponded to work done by STUK for the open call's organisation during the second period. It has been declared in the Form C of STUK submitted to the EU for this second period. Some work has been performed also in February 2014 by STUK which will be added to the 21 303.96 €. The transfer of funds will have no impact on the total EU contribution to the STAR project, but will have an impact on the requested EU contribution for IRSN and STUK. The transfer will be included in the next amendment done to STAR Grant Agreement. A new budget breakdown reflecting this transfer is not provided in this report since the total amount to be transferred is not yet known.

Task 1.3 Establishment of Quality Assurance Protocols and a Proactive Communication Plan

An update of the Quality Assurance (QA) manual and the Communication Plan (CP) were provided on time as a unique document (Deliverable 1.5). The QA manual provided guidance for dealing with contingency issues, such as use of a common template for all STAR report, delays in deliverables, funding arrangements, and access to infrastructures. A new authorship policy for scientific publications was established. It also provided guidance on research and technology development protocols within STAR relative to good scientific and laboratory practices, a portion of which also addressed ethical considerations.

The CP is a guide to improve the efficiency and effectiveness of communicating information to stakeholders of STAR and the Radioecology Alliance. The CP defined what is a stakeholder, categorized types of information that various stakeholders might want from STAR, identified STAR's key stakeholders, discussed the changes in setting communication priorities with stakeholders, particularly with the upcoming Horizon 2020 funding framework of the EC, described some the media options for communicating with stakeholders, gave guidance on how best to communicate with stakeholders and lists several communication events planned within STAR's funding period.

Task 1.4 Performance indicators

The External Advisory Board (EAB) of STAR underwent some modifications, with the leave of Maria Betti in September 2013 due to her new position at the EC and to potential conflict of interest.

Dick Roelofs also replaced Rick Jones (still EAB members) as the chair of the EAB.

A first set of performance indicators (PIs) was established within STAR's Grant Agreement with the EC to help evaluate STAR's progress and success. However, the EAB recommended changing these PIs, by including more value-added indicators. A list of new indicators was given in annex of the deliverable D1.4 *"Performance report"* in September 2012 and was used by the WP leaders to present the progress and achievement of their WP to the EAB members at month 36 (Rovaniemi meeting, held 12-16 January 2014). The deliverable D1.8 *"Performance Report for the 18-36 month period"* delivered in companion to this Project Report presents in more details the evaluation of STAR's progress.

In addition to the formal review of the Performance Indicators each 18 months, the EAB members requested to be more involved in the work done by STAR. Therefore, it was decided to invite them as often as possible to key WP meetings. Dick Roelofs has attended the Stakeholder Workshop on the SRA organised by WP2 in Paris (12-13 November 2012) as a representative of the EAB. Other EAB members will attend the Wildlife Dosimetry Workshop organised by WP3 in Madrid (10-12 June 2014) and Nina Cedergreen will attend the next WP4/5 meeting in Stockholm (1-4 April 2014). This new way of functioning is very positive, with closer relationships between the EAB and STAR members. However, more travels than initially planned in the DoW are performed.

Task 1.5 Management of flexible funding and external calls

Flexible funds of 100 k€ were earmarked for an open competitive call for new partners to the NoE or for subcontracts to third countries, and 59.5 k€ for emergency allocation. No flex funds have been used to date, but are anticipated to be allocated in April 2014 to a new STAR member that has been selected.

Indeed, as planned in the Grant Agreement, STAR launched an external call for 100 k€, in autumn 2013. The process of getting new partners in STAR was convoluted because of the 2011 Great East-Japan Earth Quake and Tsunami that occurred on 11 March 2011 (just 39 days after STAR's official start), causing extensive damage and radioactive releases from the Fukushima Daiichi Nuclear complex. The radioactive releases changed STAR's strategy of acquiring a new member. STAR's funding agency, the EC, suggested that it would be appropriate for STAR to obtain a Japanese partner. Several attempts to bring a Japanese partner into the consortium are detailed in the historical perspective section of the Deliverable D1.7 *"Flex Fund Report"*. The changing patterns of radioactive releases from the Fukushima Daiichi Complex resulted in prolonged contamination of the marine environment. The EC responded by stating that they wanted STAR to find a new partner to specifically conduct marine research related to the accident. The EC stated that the partner could be from any organization in the world. Thus, STAR initiated a call for proposals specific to marine research.

The call was open between 30 October and 18 December 2013. In total six proposals were received. According to STAR's Description of Work and Grant Agreement, STAR's EAB provided an independent evaluation of the proposals based on EC criteria. A consensus-decision-making meeting on the proposals was held by the EAB in Rovaniemi Finland, 15-16 January 2014, in parallel to STAR's 36-month progress meeting. The EAB ranked the proposals and made their recommendation. The EAB's selection procedure resulted in the State University of New York (SUNY) being selected as the top candidate to become a new member in STAR. The EAB presented their recommendation to STAR's Steering Committee (SC) on 16 January, 2014. The Steering Committee reviewed the proposals and concurred with the selection of the EAB. A Call Summary Report was prepared and sent to the EC for approval. The report detailed the process of seeking a new member and presented the EAB and SC recommendations. The EC approved the Summary Report on 29 January 2014, and stated that STAR could proceed with the process of bringing the selected candidate into the STAR consortium. STAR's coordinator contacted the successful proposers and a contract amendment procedure has started with the new beneficiaries in accordance with the Grant Agreement. The Coordinator also communicated to the other proposers whose proposals were not successful. The Coordinator and Assistant are currently developing an amendment to STAR's Grant Agreement to bring the new member into STAR. The amendment request is anticipated being submitted to the EC in April 2014.The intention is for the new partners to begin during May 2014 and for their research to be completed by the time that STAR's funding ends (July 2015).

Once the actual amount allocated to the new member is finalized, then STAR's Steering Committee will decide how best to spend the remaining flex funds. That meeting is anticipated in the summer of 2014.

The deliverable D1.7 "*Report on Flex Fund Spending*" delivered to the EC by the end of January 2014 gives more details about the organisation of the external call and the management of the flex funds.

Task 1.6 Coordination of periodic meetings

Meetings organised by the Coordinator during this second period include the management team, the steering committee and the external advisory board meetings. The latter have already been discussed above. The STAR wiki site contains a calendar section which is updated regularly by the coordinator with the timing of all meetings.

The Management Team (MT) is one the two administrative bodies of STAR. Formally, it is composed of the different WP leaders, plus the Coordinator. It is the supervisory body responsible for executing the project. All STAR's MT meetings have been opened to representatives of each STAR institute, even those that are not in charge of a WP. This way of conducting management decisions favours integration and transparency among the STARs partners, as well as enhances the flow of communication. Three MT meetings were initially scheduled (every six months) during the second reporting period (respectively Milestone MS 1.3, 1.4 and 1.5). But as for the first period, the MT routinely conducts a 1-hour video conference call the first Friday of each month.

The second administrative body of STAR is the Steering Committee (SC). It is composed of one representative from each of STAR's partners, plus the Coordinator. It is the ultimate decision-making body of the NoE. Only one SC meeting was initially scheduled for this reporting period (on month 36). It was held in Rovaniemi on January 2014, hosted by STUK. Additional requests to the SC meeting were discussed by e-mail when needed.

The agenda and minutes of all these meetings (MT or SC) have been distributed to all partners and uploaded on the STAR members' wiki site (see also Tables 4 and 5 for a summary of meetings).

2.3.2 Problems which have occurred and how they were solved or envisaged solutions;

No problems occurred during the reporting period.

2.3.3 Changes in the consortium

No changes in the consortium occurred during the second period. However, new partners will soon join STAR (anticipated in May 2014)

2.3.4 List of project meetings, dates and venues

Table 4 gives an overview of all STAR's meetings. It includes both web video and face-to-face meetings for MT, SC and EAB. Table 5 gives an overview of meetings for other WPs during this reporting period.

Table 4: Management and Coordination meetings conducted during the reporting period

Management and Coordination meetings			
type	**date**	**venue**	**host**
MT	3 July 2012	Web meeting	IRSN
MT	5 October 2012	Web meeting	IRSN
MT	7 December 2012	Web meeting	IRSN
MT	11 January 2013	Web meeting	IRSN
MT	8 February 2013	Brussels, Belgium	IRSN
MT	1 March 2013	Web meeting	IRSN
MT	5 April 2013	Web meeting	IRSN
MT	3 May 2013	Web meeting	IRSN
MT	7 June 2013	Web meeting	IRSN
MT	5 July 2013	Web meeting	IRSN
MT	6 September 2013	Web meeting	IRSN
MT	18 October 2013	Web meeting	IRSN
MT	8 November 2013	Web meeting	IRSN
EAB	12-16 January 2014	Rovaniemi, Finland	STUK
SC	12-16 January 2014	Rovaniemi, Finland	STUK
MT	12-16 January 2014	Rovaniemi, Finland	STUK

Table 5: Other WP meetings for the reporting period

Other WP meetings			
type	**date**	**venue**	**host**
WP3	4-5 October 2012	Oslo, Norway	NRPA
WP2 – SRA Stakeholder Workshop	12-13 November 2012	Paris, France	IRSN
WP3	19-20 February 2013	Oslo, Norway	NRPA
WP2	15 – 17 April 2013	Paris, France	IRSN
WP6	15 – 17 April 2013	Paris, France	IRSN
WP7	15 – 17 April 2013	Paris, France	IRSN
WP5	10 – 13 June 2013	Tromso, Norway	NRPA
WP4	10 – 13 June 2013	Tromso, Norway	NRPA
WP3	10 – 13 June 2013	Tromso, Norway	NRPA
WP6	10 – 13 June 2013	Tromso, Norway	NRPA
WP3	12-16 January 2014	Rovaniemi, Finland	STUK
WP2	12-16 January 2014	Rovaniemi, Finland	STUK
WP6	12-16 January 2014	Rovaniemi, Finland	STUK

2.3.5 Project planning and status

The project progresses with no major deviations from the initial planning (see also section 2.3.6 below). Figure 2 synthesizes the main outcome of the project during this first 18-month period.

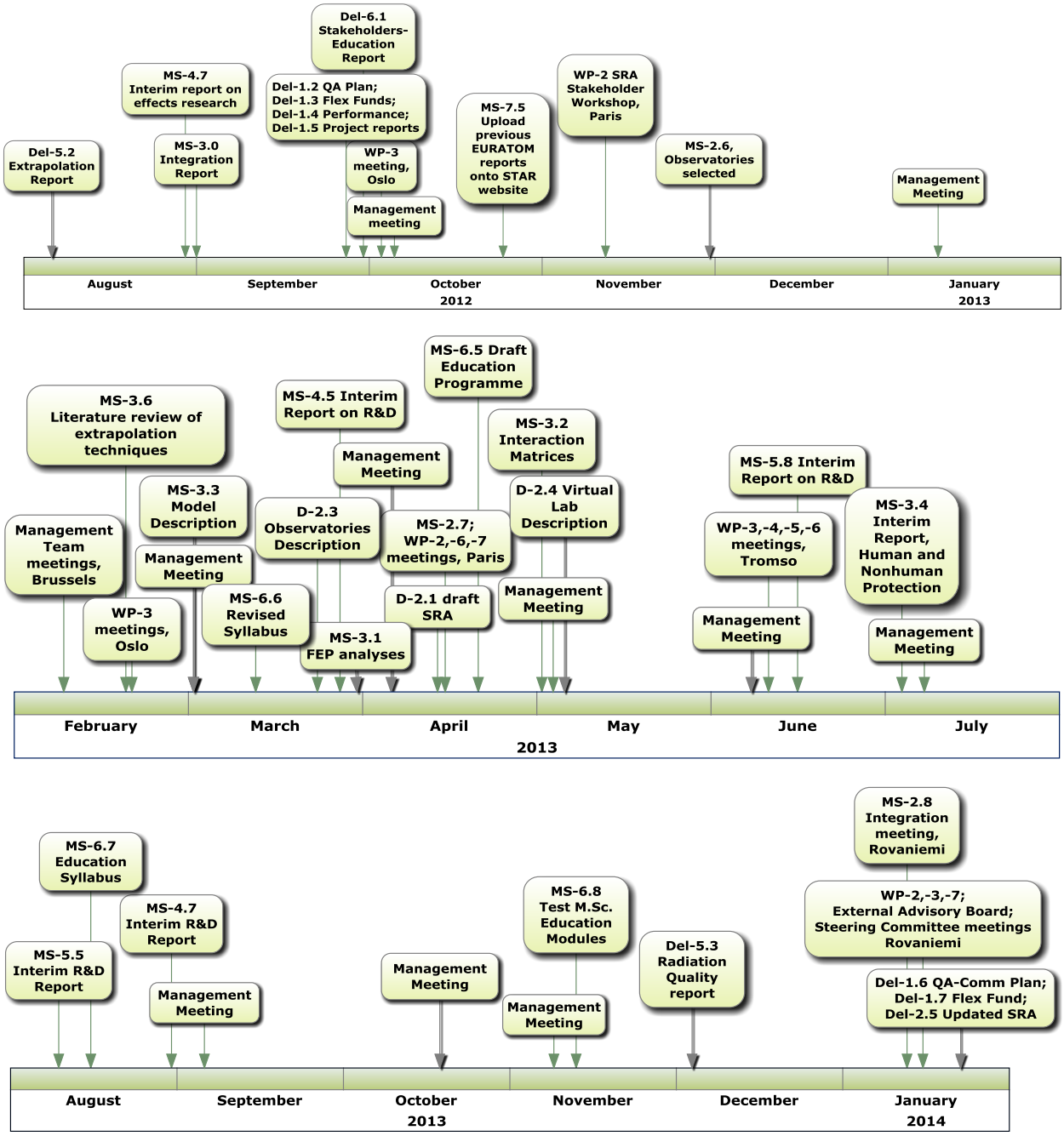

Figure 2: Timeline of Timeline of STAR progress from August 2012 through January 2014

2.3.6 Impact of possible deviations from the planned milestones and deliverables

No impact of possible deviations from planned milestones and deliverables is anticipated.

2.3.7 Any changes to the legal status of any of the beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs

No changes in the legal status of beneficiaries occurred during this first reporting period.

2.3.8 Development of the Project website

The STAR web site referred as the *Radioecology Exchange*, is available at www.star-radioecology.org. Its development and management constitute a task of WP7. See section 2.2.6 for more details about its current development.

2.3.9 Information on co-ordination activities during the period (communication between beneficiaries, possible co-operation with other projects/programmes, etc.)

Established as a Network of Excellence, the goal of STAR is to efficiently integrate important organisations, infrastructures, and research efforts into a sustainable network that contribute to a European Research Area in radioecology. Within this objective, two main outcomes of STAR during this second period are:

- The establishment of the European Radioecology Alliance as a legal entity (an Association under French law) in September 2012 and its expansion to new members (see section 2.2.1);
- And the beginning of a new EC funded project, called COMET for "COordination and iMplementation of a pan-European instrumenT for radioecology" in June 2013. COMET is a combination of collaborative project and coordination and support action (CP & CSA), funded by FP7-Fission-2013 and supported by the Radioecology Alliance platform. It will extend the work of the STAR Network of Excellence and focus on collaboration with NERIS and MELODI platforms. COMET consortium includes all STAR partners plus Ukrainian and Polish partners identified by STAR in the framework of the work on the creation of European Observatories sites and Japanese partners. STAR and COMET will work on close collaborations until the end of the STAR project.

3 Deliverables and milestones tables

3.1 Deliverables (except periodic and final reports)

Del n°	Deliverable name	Version	WP n°	Lead beneficiary	Nature	Dissemination level[i]	Delivery date from Annex I (proj. month)	Actual/Forecast delivery date dd/mm/yyyy	Status Not submitted / Submitted	Comments
1.1	Performance Report	1.0	1	1	Report	PU	4	23/07/2011	submitted	
1.2	QA-manual and Communication Plan	1.0	1	1	Report	PU	6	30/09/2011	submitted	
1.3	Flex fund report	1	1	1	Report	PU	18	27/09/2012	submitted	
1.4	Performance report	1	1	1	Report	PU	18	27/09/2012	submitted	
1.5	Project Report	1	1	1	Report	PU	18	28/09/2012	submitted	
1.6	Update QA-Manual and Communication Plan	1	1	1	Report	PU	36	28/02/2014	submitted	

Del n°	Deliverable name	Version	WP n°	Lead beneficiary	Nature	Dissemination level[i]	Delivery date from Annex I (proj. month)	Actual/Forecast delivery date dd/mm/yyyy	Status Not submitted / Submitted	Comments
1.7	Flex Fund Report	1	1	1	Report	PU	36	31/01/2014	submitted	
1.8	Performance Report	1	1	1	Report	PU	36	31/01/2014	submitted	
1.9	Project Report	1	1	1	Report	PU	36	31/01/2014	submitted	
2.1	Strategic Research Agenda – first version	1.0	2	1	Report	RE	12	13/04/2012	submitted	
2.2	Joint Infrastructure - Description	1.0	2	2	Report	RE	18	25/07/2012	submitted	
2.3	Observatory for Radiological Research - Description	1	2	7	Report	RE	24	29/03/2012	submitted	
2.4	Virtual Laboratory - Description	1	2	4	Report	RE	26	29/05/2013	submitted	

Del n°	Deliverable name	Version	WP n°	Lead beneficiary	Nature	Dissemination level[i]	Delivery date from Annex I (proj. month)	Actual/Forecast delivery date dd/mm/yyyy	Status Not submitted / Submitted	Comments
2.5	Strategic Research Agenda – updated version	1	2	1	Report	RE	36	21/02/2014	submitted	
3.1	Tier-1 model	1	3	7	Soft-ware	PU	36	February 2015	Not submitted	An extension request has been sent to the EC
4.1	Review of methods in ecotoxicology for mixed exposure	1.0	4	4	Report	PU	13	27/03/2012	submitted	Available from *Radioecology Exchange* see: https://wiki.ceh.ac.uk/download/attachments/159646177/STAR+deliverable+4.1+Final.pdf
5.1	Plan for laboratory radiation effects studies	1.0	5	1	Report	PU	9	02/11/2011	submitted	No deviation Available from *Radioecology Exchange* see: https://wiki.ceh.ac.uk/download/attachments/158597699/STAR+D5.1+Experiments+Common+Guidance+Final.pdf

Del n°	Deliverable name	Version	WP n°	Lead beneficiary	Nature	Dissemination level[i]	Delivery date from Annex I (proj. month)	Actual/Forecast delivery date dd/mm/yyyy	Status Not submitted / Submitted	Comments
5.2	Life history traits, radiosensitivity and population modelling: methods to extrapolate from individual endpoints to population dynamics	1.0	5	1	Report	PU	18	06/08/2012	submitted	Available from *Radioecology Exchange* see: https://wiki.ceh.ac.uk/download/attachments/187793683/STAR_Deliverable_D5.2_Population models.pdf
5.3	Radiation Quality	1	5	9	Report	PU	32	3/12/2013	submitted	Available from *Radioecology Exchange* see: https://wiki.ceh.ac.uk/download/attachments/187793683/STAR_Deliverable_D5.3_Radiation quality.pdf
6.1	Stakeholders demand and educational supply	1.0	6	9	Report	PU	12	22/02/2012	submitted	Available from *Radioecology Exchange* see: https://wiki.ceh.ac.uk/download/attachments/164888671/D6.1+Stakehold

Del n°	Deliverable name	Version	WP n°	Lead beneficiary	Nature	Dissemination level[i]	Delivery date from Annex I (proj. month)	Actual/Forecast delivery date dd/mm/yyyy	Status Not submitted / Submitted	Comments
										er+workshops.pdf
6.2	Training and Education Platform Structure	1	6	6	Report	PU	30	30/09/2012	submitted	
6.3	Test run of course modules	1	6	9	Report	PU	36	27/03/2013		
7.1	Webportal	1.0	7	4	Others	PU	12	27/02/2012	submitted	See: www.star-radioecology.org

[i] **Make sure that you are using the correct following label when your project has classified deliverables.**

PU = Public

PP = Restricted to other programme participants (including the Commission Services).

RE = Restricted to a group specified by the consortium (including the Commission Services).

CO = Confidential, only for members of the consortium (including the Commission Services).

EU restricted = Classified with the mention of the classification level restricted "EU Restricted"

EU confidential = Classified with the mention of the classification level confidential " EU Confidential "

EU secret = Classified with the mention of the classification level secret "EU Secret "

3.2 Milestones

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
MS 1.0	Kick-off meeting	1	5	1	Yes	7-8/03/2011	
MS 1.1	MT meeting	1	1	12	Yes	19/01/2012	
MS 1.2	Steering Committee, EAB and MT meetings	1	5	18	Yes	11-12/06/2012	Advanced by1 month because of holidays
MS 1.3	MT meeting	1	1	24	Yes		
MS 1.4	MT meeting	1	1	30	Yes		
MS 1.5	Steering Committee, EAB and MT meetings	1	5	36	Yes		
MS 2.1	Consortium Workshop for facilities and other infrastructure	2	2	2	Yes	9/03/2011	
MS 2.2	Consortium meeting on integration and SRA	2	2	4	Yes	17-18/05/2011	
MS 2.3	Selection criteria for the European	2	7	12	Yes	26/01/2012	

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
	Observatory sites						
MS 2.4	Consortium workshop for facilities and other infrastructures	2	2	16	Yes	24-26/05/2012	
MS 2.5	Consortium meeting on integration and SRA	2	2	18	Yes	11-12/06/2012	
MS 2.6	Selection of the European Observatory	2	7	22	Yes	30/11/2012	
MS 2.7	Preparatory workshop for creating management structures and long-term funding site(s)	2	2	27	Yes	15-17/04/2013	
MS 2.8	Consortium meeting on integration and SRA	2	2	36	Yes	12-16/01/2014	
MS 3.0	Summary of ongoing activities and projects in the area of integrated	3	8	12	Yes	1/09/2012	

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
	protection						
MS 3.1	Parallel FEP analysis for humans and wildlife for hypothetical sites/Scenarios	3	3	12	Yes	30/03/12	
MS 3.2	Complete interaction matrices for humans and wildlife for hypothetical sites	3	3	24	Yes	01/05/2013	
MS 3.3	Description of coupled combined model for humans and wildlife	3	7	24	Yes	01/03/2013	
MS 3.4	Internal report on comparative analysis of human and non-human frameworks	3	8	24	Yes	01/07/2013	
MS 3.5	Report analysing both FEP and IM analysis with respect to a conceptual model for integrated risk	3	3	30	No	30/04/2014	Delay due to large workload for lead author. Nearly finished

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
	assessment						
MS 3.6	Completed literature reviews and theoretical evaluations of extrapolation techniques	3	4	30	Yes	20/02/2013	
MS 3.7	International workshop on wildlife dosimetry1	3	8	36	No	10-12/06/2014	New dates were chosen to accommodate the availability of external speakers
MS 4.0	Summary for WP2 about actual and future R&D activites in multiple stressor studies by partners	4	5	12	Yes	09/02/2012	
MS 4.1	Report of expert workshop to get acquainted with the state of the art of multiple stressor research	4	3	4	Yes	18/06/2011	Workshop was held in month 4 (May 25-27 2011; final minutes available 1 month later)
MS 4.2	Review of approaches for exposure and effects assessment and draft proposal	4	3	11	Yes	26/11/2011	Workshop minutes of workshop held 7-8/11/2011

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
	for research programme						
MS 4.3	Expert and stakeholder consultation and final integrated research programme	4	3	12	Yes	27/03/2012	Integrated research plan developed based on Critical review (D4.1) and expert consultation at May and Nov 2011 and Jan 2012 meetings. Available at: https://wiki.ceh.ac.uk/download/attachments/125534772/Milestone+43+Experimental+plan+final.pdf
MS 4.4	Interim report on theoretical model runs to test effect of mixed contaminant conditions on exposure	4	4	18	Yes	29/02/2012	This MS4.4 is advanced since it is presented in annex 1 of D4.1. Additionally, it was decided to submit a research paper on the subject expected to be submitted Dec 2012
MS 4.5	Interim report on availability/exposure related lab/field R&D and model runs and updated R&D plan	4	4	24	Yes	31/03/2013	Report available at https://wiki.ceh.ac.uk/download/attachments/187793681/STAR_MS45%20report%20Mar%202013%20Final.pdf?api=v2
MS 4.6	Parameterization of DEB model for all test organisms subjected to mixed exposure conditions	4	3	18	No		Interim note on DEB parameters. Delayed due to dismissal of a graduate student at SCK•CEN working on the research and to a too optimistic scheduling. A Post doc has started in June 2013 to begin work.

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
MS 4.7	Interim report on effets related lab R&D and model runs and updated R&D plan	4	1	30	Yes	30/08/2013	Midterm results from lab research. Report available at https://wiki.ceh.ac.uk/download/attachments/187793681/Milestone%2047%20interim%20report%20effects_final.pdf?api=v2
MS 5.0	Produce a summary of WP2 about what has been done in low dose effects to nonhuman biota by partners	5	5	12	Yes	31/01/2012	
MS 5.1	Propose a method to collect info on life history traits and agree on population modelling	5	1	2	Yes	30/03/2011	Done during the Kick-off meeting and define within the minutes of the WP5 specific meeting
MS 5.2	Decide the sets of experiments, establish common guidance, discuss past/ongoing projects per partner	5	1	4	Yes	03/06/2011 and 10/07/2011	Done during the Mol meeting and refine during the WP5 extra meeting in Hamilton in June 2011 (see the minutes)
MS 5.3	Test the pop model sensitivity to life traits, justify the lab selected species and	5	1	7	Yes	30/09/2011	Pilot study performed at IRSN with the contribution of NMBU in September 2011

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
	endpoints						
MS 5.4	Organise a session on DEB theory applied to single stressor, connected to WP4	5	3	12	Yes	26/05/2011	Mol meeting, well in advance compared to the initial deadline due to merging with WP4 needs
MS 5.5	Acquire dose rate – response relationships in lab for gamma and alpha	5	1	15	Partially	09/08/2013 for *D. magna*	Started during the pilot study for gamma irradiation (September 2011); Decision to connect to task 5.3; still on going for some species
MS 5.6	WP5 meeting for intermediate evaluation if results and adjustments of R&D programme if needed	5	1	18	Yes	30/06/2012	See the minutes from WP5 specific meeting in Berlin
MS 5.7	Explore omics response for one threshold dose rate giving significant effect	5	1	30	Partially	Results to be presented at the WP5 meeting in Stockholm in April 2014	Available results reported in D5.3. Delays to obtain omics responses for chronic gamma and alpha in the same species
MS 5.8	WP5 meeting for intermediate evaluation of results and adjustements of R&D programme if	5	1	30	Yes	10/06/2013	See the minutes from WP5 specific meeting in Tromso

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
	needed						
MS 6.1	Stakeholder workshop on current demands for training and education in radioecology	6	5 changed for 2	4	Yes	19-20/05/2011	Meeting completed, Helsinki, May 2011. See D6.1 and meeting agenda and participant list
MS 6.2	Stakeholder workshop on current training and education supply in radioecology	6	9	12	Yes	14-16/11/2011	Meeting completed, Oslo November 2011. See D6.1 and meeting agenda and participant list
MS 6.3	Research school website	6	9	15	Yes	July 2012	Website running and PhD students registered See https://wiki.ceh.ac.uk/x/BwHICQ
MS 6.4	Mobility strategy draft	6	5	18	Yes	June 2012	Presented and accepted at Berlin EAB/WP6 meeting
MS 6.5	Draft training and education programme	6	6	20	Yes	April 2013	Available on the web portal following the Paris meeting in April 2013. Updated document highlighting the key components, based on input from 2 stakeholder workshops and NMBU's existing education programmes
MS 6.6	Revision of syllabus and test run training modules	6	4	24	Delayed	March 2013	Participation list. See: https://wiki.ceh.ac.uk/x/FYExCw. Initially due month-30, delayed because training conducted by CEH will had to wait until new

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
							version of ERICA is issued
MS 6.7	Revision of syllabus and test run PhD module	6	9	30	Yes	August 2013	Course syllabus and Examination list
MS 6.8	Revision of syllabus and test run MSc module	6	9	36	Yes	November 2013	Course Syllabus and Examination list
MS 7.1	NoE management Wiki	7	4	3	Yes	Feb. 2011	Management wiki sites established ahead of schedule , EAB and infrastructure/data holding collation sites also established for WP1 and WP2
MS 7.2	Promote STAR at 2011 International Radioecology Conference	7	4	6	Yes	June 2011	A special session (seven presentations) promoting STAR was held at ICRER in Hamilton, Canada.
MS 7.3	To have defined database structures	7	4	9	Yes	November 2011	Wiki site for collation established to collate information. Some partners agreed to use the NERC-CEH Information Gateway which is compliant with the European INSPIRE Directive.
MS 7.4	To have developed the structure of the *Radioecology exchange* ready for population	7	4	10	Yes, ahead of schedule	April 2011	Established ahead of schedule. See: www.star-radioecology.org
MS 7.5	Uploaded previous Euratom outputs	7	8	14	Yes	October 2012	Outputs are available on the Radoecology Exchange see: https://wiki.ceh.ac.uk/x/bYFiC

Milestone n°	Milestone name	WP n°	Lead beneficiary	Delivery date from Annex I dd/mm/yyyy	Achieved Yes/No	Actual/Forecast achievement date dd/mm/yyyy	Comments
MS 7.6	To have produced target briefing documents on basic radioecology	7	8	18	No	November 2014	The targeted briefing documents are being prepared. Co-operation with W2 on 20 factsheets by the end of the project. Some are already uploaded be by April 2014
MS 7.7	Database and publications workshop report	7	4	19	delayed; scope changed	May 2014 June 2014 (report)	Workshop on presenting STAR data to stakeholders has been delayed because of limited sharing of pre-STAR data by partners. Scope of this milestone has been changed and the first workshop will focus on data for Kd and be held in collaboration with IAEA WG4.
MS 7.8	Incorporation of social media outreach activities on web portal	7	4	20	Yes	Oct 2011	Twitter and Facebook accounts have been created and links to them added from www.star-radioecology.org. 'Blogs' available for all STAR members to post news items etc

4 Explanation of the use of the resources

According to new EC requests, the "explanation of use of resources" and Form C of all STAR partners that beneficiated form an EC allocation have been submitted electronically through the EC Participant Portal. NRPA and NMBU manage the funds allocated by the Norwegian Research Council for their participation to the Project. The separation of the Norwegian budget from the budget managed by the Coordinator has been approved by the European Commission in accordance with the Grant Agreement - Annex I.

In accordance with the Grant Agreement, the contribution of the EC for RTD activities is 50 % for IRSN, STUK, SCK•CEN, NERC, CIEMAT, and BfS. It is 75% for Stockholm University (SU).

IRSN and SCK•CEN have to provide a Certificate on Financial Statement (CFS) for this second reporting period. These CFS will be send directly to EC by mail.

The summary financial report for the reporting period as well as the copies of Form C submitted to EC by each STAR beneficiary are provided below.

FP7 - Grant Agreement - Annex VI - Network of Excellence

Summary Financial Report - Network of Excellence

Project acronym	STAR	Project nr.	269672	Reporting period from	01/09/2012	to	31/01/2014	Page	1/1

Funding scheme	NoE

Beneficiary nr.	If 3rd Party, linked to beneficiary	Adjustment (Yes/No)	Organization Short Name	Type of activity								Total (A)+(B)+(C)+(D)		Receipts	Interest
				RTD (A)		Demonstration (B)		Management (C)		Other (D)					
				Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution		
1		Yes	IRSN	22,639.62	16,979.72	0.00	0.00	14,138.96	14,138.96	139.47	139.47	36,916.05	31,256.15	0.00	0.00
1		No	IRSN	483,264.18	362,448.14	0.00	0.00	154,399.06	154,399.06	11,850.62	11,850.62	649,513.86	528,697.82	0.00	0.00
2		No	STUK	301,237.07	225,927.80	0.00	0.00	21,303.96	21,303.96	37,506.07	37,506.07	360,047.10	284,737.83	0.00	0.00
2		Yes	STUK	-12,612.01	-9,459.01	0.00	0.00	0.00	0.00	-4,504.76	-4,504.76	-17,116.77	-13,963.77	0.00	0.00
3		No	SCK-CEN	554,742.07	416,056.55	0.00	0.00	0.00	0.00	53,237.97	53,237.97	607,980.04	469,294.52	578.55	0.00
3		Yes	SCK-CEN	12,982.81	9,737.11	0.00	0.00	0.00	0.00	-88.42	-88.42	12,894.39	9,648.69	0.00	0.00
4		No	NERC	249,133.82	186,850.37	0.00	0.00	0.00	0.00	58,909.52	58,909.52	308,043.34	245,759.89	0.00	0.00
4		Yes	NERC	25,479.29	19,109.47	0.00	0.00	0.00	0.00	16,439.07	16,439.07	41,918.36	35,548.54	0.00	0.00
5		No	CIEMAT	104,620.95	78,465.71	0.00	0.00	7,084.25	7,084.25	34,224.19	34,224.19	145,929.39	119,774.15	0.00	0.00
6		No	SU	213,389.62	160,042.22	0.00	0.00	0.00	0.00	21,268.90	21,268.90	234,658.52	181,311.12	0.00	0.00
7		No	BfS	135,874.56	101,905.92	0.00	0.00	0.00	0.00	4,124.57	4,124.57	139,999.13	106,030.49	0.00	0.00
7		Yes	BfS	59,799.26	44,849.45	0.00	0.00	0.00	0.00	6,036.95	6,036.95	65,836.21	50,886.40	0.00	0.00
TOTAL				2,150,551.24	1,612,913.45	0.00	0.00	196,924.23	196,924.23	239,144.15	239,144.15	2,586,619.62	2,048,981.83	578.55	0.00

Requested EU contribution for the reporting period (in €)	1,561,549.42

IRSN Form C

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Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	269672	Funding scheme	Network of Excellence
Project Acronym	STAR		
Period from	01/08/2012	Is this an adjustment to a previous statement?	No
To	31/01/2014		
Legal Name	INSTITUT DE RADIOPROTECTION ET DE SURETE NUCLEAIRE	Participant Identity Code	999480726
Organisation short Name	IRSN	Beneficiary nr.	1
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A (Actual Indirect Costs)

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	208,788.02		73,660.22	2,996.33	285,444.57
Subcontracting	0.00		3,740.00	0.00	3,740.00
Other direct costs	78,215.42		7,758.23	6,037.74	92,011.39
Indirect costs	196,260.74		69,240.61	2,816.55	268,317.90
Lump sums/flat rate/scale of unit declared	0.00				0.00
Total	483,264.18	0.00	154,399.06	11,850.62	649,513.86
Maximum EU contribution	362,448.14	0.00	154,399.06	11,850.62	528,697.82
Requested EU contribution					407,881.78

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?			Yes
Name of the auditor	Ernst and Young	Cost of the certificate (in €)	2,000.00

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	D Demeillers
	Date & hand signature
	20/02/2014

STUK Form C

FP7 - Grant Agreement - Annex VI - Network of Excellence

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	269672	Funding scheme	Network of Excellence
Project Acronym	STAR		
Period from	01/08/2012	Is this an adjustment to a previous statement?	No
To	31/01/2014		
Legal Name	SATEILYTURVAKESKUS	Participant Identity Code	999460744
Organisation short Name	STUK	Beneficiary nr.	2
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A (Actual Indirect Costs)

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	112,711.01		3,963.79	12,403.76	129,078.56
Subcontracting	2,462.07		11,152.26	0.00	13,614.33
Other direct costs	19,889.18		315.68	2,119.80	22,324.66
Indirect costs	166,174.81		5,872.23	22,982.51	195,029.55
Lump sums/flat rate/scale of unit declared	0.00				0.00
Total	301,237.07	0.00	21,303.96	37,506.07	360,047.10
Maximum EU contribution	225,927.80	0.00	21,303.96	37,506.07	284,737.83
Requested EU contribution					209,428.56

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Ari Keinänen
	Date & hand signature
	24/03/2014

FP7 - Grant Agreement - Annex VI - Network of Excellence

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	269672	Funding scheme	Network of Excellence
Project Acronym	STAR		
Period from	01/08/2012	Is this an adjustment to a previous statement?	No
To	31/01/2014		
Legal Name	STUDIECENTRUM VOOR KERNENERGIE	Participant Identity Code	999986775
Organisation short Name	SCK-CEN	Beneficiary nr.	3
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A (Actual Indirect Costs)

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	286,461.28		0.00	30,318.40	316,779.68
Subcontracting	0.00		0.00	859.55	859.55
Other direct costs	76,151.22		0.00	1,725.47	77,876.69
Indirect costs	192,129.57		0.00	20,334.55	212,464.12
Lump sums/flat rate/scale of unit declared	0.00				0.00
Total	554,742.07	0.00	0.00	53,237.97	607,980.04
Maximum EU contribution	416,056.55	0.00	0.00	53,237.97	469,294.52
Requested EU contribution					330,609.00

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? Yes

If yes, please mention the amount (in €) 578.55

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19? No

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1? No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4? No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4? Yes

Name of the auditor	Callens, Pirenne & Co	Cost of the certificate (in €)	950.00

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Jos Sannen
	Date & hand signature: 28/03/2014

NERC Form C

FP7 - Grant Agreement - Annex VI - Network of Excellence

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	269672	Funding scheme	Network of Excellence
Project Acronym	STAR		
Period from	01/08/2012	Is this an adjustment to a previous statement?	No
To	31/01/2014		
Legal Name	NATURAL ENVIRONMENT RESEARCH COUNCIL	Participant Identity Code	999989200
Organisation short Name	NERC	Beneficiary nr.	4
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A (Actual Indirect Costs)

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	108,014.80		0.00	25,861.61	133,876.41
Subcontracting	0.00		0.00	0.00	0.00
Other direct costs	11,501.20		0.00	2,014.01	13,515.21
Indirect costs	129,617.82		0.00	31,033.90	160,651.72
Lump sums/flat rate/scale of unit declared	0.00				0.00
Total	249,133.82	0.00	0.00	58,909.52	308,043.34
Maximum EU contribution	186,850.37	0.00	0.00	58,909.52	245,759.89
Requested EU contribution					183,476.43

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? — No

If yes, please mention the amount (in €)

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19? — No

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1? — No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4? — No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4? — No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	SUSAN PEACHEY
	Date & hand signature: 24/03/2014

FP7 - Grant Agreement - Annex VI - Network of Excellence

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	269672	Funding scheme	Network of Excellence
Project Acronym	STAR		
Period from	01/08/2012	Is this an adjustment to a previous statement?	No
To	31/01/2014		
Legal Name	CENTRO DE INVESTIGACIONES ENERGETICAS, MEDIOAMBIENTALES Y TECNOLOGICAS-CIEMAT	Participant Identity Code	999614877
Organisation short Name	CIEMAT	Beneficiary nr.	5
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A (Actual Indirect Costs)

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	47,402.95		2,962.40	15,307.20	65,672.55
Subcontracting	0.00		0.00	0.00	0.00
Other direct costs	5,548.79		892.84	2,232.15	8,673.78
Indirect costs	51,669.21		3,229.01	16,684.84	71,583.06
Lump sums/flat rate/scale of unit declared	0.00				0.00
Total	104,620.95	0.00	7,084.25	34,224.19	145,929.39
Maximum EU contribution	78,465.71	0.00	7,084.25	34,224.19	119,774.15
Requested EU contribution					93,618.92

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? — No

If yes, please mention the amount (in €)

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19? — No

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1? — No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4? — No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4? — No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Ana Collados Martin-Posadillo
	Date & hand signature
	06/03/2014

SU Form C

FP7 - Grant Agreement - Annex VI - Network of Excellence

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	269672	Funding scheme	Network of Excellence
Project Acronym	STAR		
Period from	01/08/2012	Is this an adjustment to a previous statement?	No
To	31/01/2014		
Legal Name	STOCKHOLMS UNIVERSITET	Participant Identity Code	999885022
Organisation short Name	SU	Beneficiary nr.	6
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	115,658.00		0.00	11,595.00	127,253.00
Subcontracting	0.00		0.00	0.00	0.00
Other direct costs	17,710.51		0.00	1,698.06	19,408.57
Indirect costs	80,021.11		0.00	7,975.84	87,996.95
Lump sums/flat rate/scale of unit declared	0.00				0.00
Total	213,389.62	0.00	0.00	21,268.90	234,658.52
Maximum EU contribution	160,042.22	0.00	0.00	21,268.90	181,311.12
Requested EU contribution					181,311.12

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Pia Bjerén Fürstenbach
	Date & hand signature
	14/03/2014

BfS Form C

FP7 - Grant Agreement - Annex VI - Network of Excellence

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	269672	Funding scheme	Network of Excellence
Project Acronym	STAR		
Period from	01/08/2012	Is this an adjustment to a previous statement?	No
To	31/01/2014		
Legal Name	BUNDESAMT FUER STRAHLENSCHUTZ	Participant Identity Code	999517877
Organisation short Name	BFS	Beneficiary nr.	7
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A (Simplified Method)

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)
Personnel costs	63,721.18		0.00	1,966.35	65,687.53
Subcontracting	0.00		0.00	0.00	0.00
Other direct costs	6,534.42		0.00	184.51	6,718.93
Indirect costs	65,618.96		0.00	1,973.71	67,592.67
Lump sums/flat rate/scale of unit declared	0.00				0.00
Total	135,874.56	0.00	0.00	4,124.57	139,999.13
Maximum EU contribution	101,905.92	0.00	0.00	4,124.57	106,030.49
Requested EU contribution					72,061.65

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? — No

If yes, please mention the amount (in €)

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19? — No

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1? — No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4? — No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4? — No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Susan Fischer
	Date & hand signature
	26/02/2014