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EJP-CONCERT

European Joint Programme for the Integration of Radiation Protection Research

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CONTENT

1	SUMMARY	4
2	THE EJP CONCERT MISSION	5
3	PROJECT RESULTS	6
4	CONCLUSIONS, LESSONS LEARNED AND RECOMMENDATIONS	12

1 Summary

In Horizon 2020, the European Joint Programme (EJP) has been a new funding tool in the EURATOM Work Programme for 2014-2015 being the first time the EJP instrument has been applied outside of fusion. European Joint Programmes are co-funded actions designed to support and coordinate EC and national research and innovation programmes of Member States and associated countries. EJPs aim to attract and pool critical masses of national and EC resources on objectives and challenges of Horizon 2020 and achieve significant economies of scale. A special feature of EJPs is that the principal partners of an EJP consortium are national Programme Owners and Programme Managers (POMs), meaning institutions responsible for governing and managing national research programmes within the discipline of the programme call by EURATOM.

The focus of the CONCERT proposal was closely related to the EURATOM call NFRP-07-2015 requirements: Integrating radiation research in the European Union. In particular, CONCERT responded to the call description:

“This activity will build on the Strategic Research Agendas of MELODI, NERIS and ALLIANCE, while also making use of other existing expertise in Europe, notably regarding dosimetry (EURADOS) and the medical use of ionising radiation. EU funding will specifically be devoted to supporting the further integration, at EU level, of radiation protection research, with due attention to the interaction and synergies to be established between the various areas of expertise, in particular biology, biophysics, epidemiology, dosimetry and modelling.”

In 2014, several POMs from Member States and associated countries formed the CONCERT consortium to prepare a proposal, which later became the EURATOM funded EJP CONCERT that was designed to respond to the call requirements. The ‘CONCERT-European Joint Programme for the Integration of Radiation Protection Research’ project was launched in 2015 being the first and only EJP in the area of radiation protection of the EURATOM Fission Programme 2014-2017 being allocated a EURATOM contribution of €19.8m.

To respond fully to the requirements of the call, the CONCERT consortium was extended beyond the POM members by integrating the European Radiation Protection Research Platforms [MELODI](#), [ALLIANCE](#), [NERIS](#), and [EURADOS](#) as full consortium members., as well as the more recently founded research platforms [EURAMED](#) and [SHARE](#). The European radiation protection research community is now successfully integrated, serving as global model for operation.

The structure of the project, to perform the work in terms of Work Packages, is shown in Figure 1.

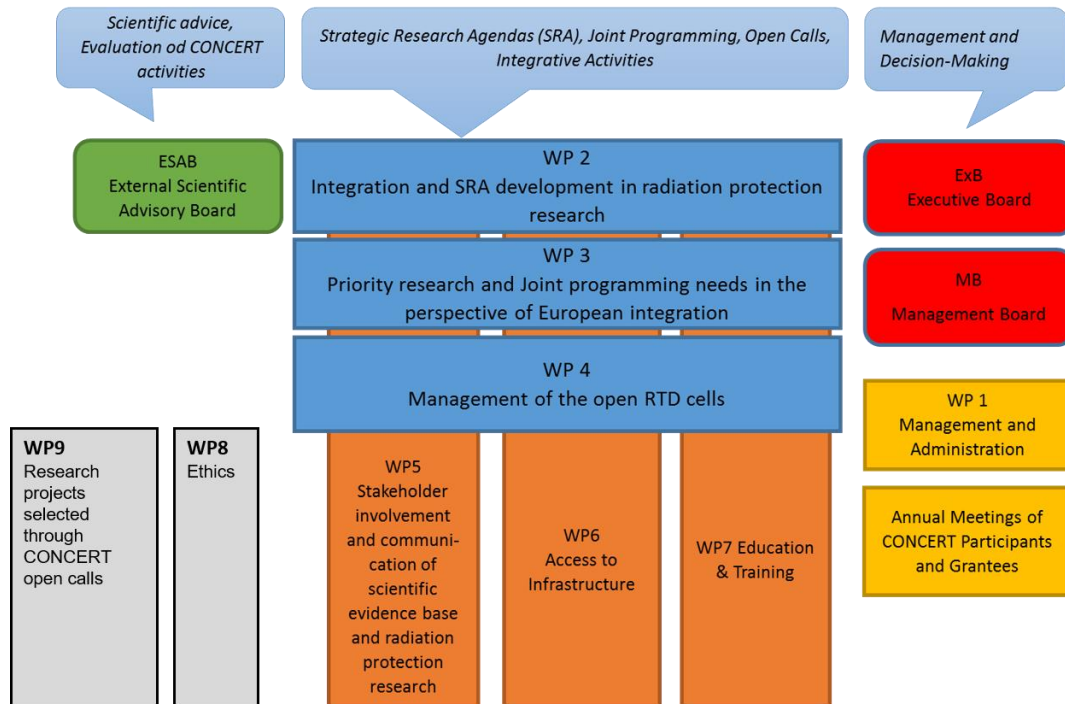


Figure 1. Structure of the CONCERT EJP in terms of Work Packages

2 The EJP CONCERT Mission

The CONCERT-EJP aimed to contribute to the sustainable integration of European and national research programmes in radiation protection. CONCERT as a co-fund action strived to achieve the attraction and pooling of national research efforts in Radiation Protection with EURATOM research programmes in order to make better use of public R&D resources in Europe and to tackle common European challenges in radiation protection more effectively by joint research efforts. In order to address this challenge the CONCERT-EJP operated as an umbrella structure for the research initiatives launched collaboratively by the European Radiation Protection Research Platforms MELODI, ALLIANCE, NERIS, and EURADOS.

Given the limited, and indeed even diminishing, resources available for research on effects and risks of ionizing radiation in humans and the environment and for research on radiation protection, and the loss of scientific as well as professional competence in recent years, every opportunity was taken to tailor research activities to the needs of society, authorities and stakeholders, to develop synergies and economies of scale between national competent institutions in the field of radiation protection research, particularly to link access to research infrastructures to international research efforts, and to optimise impact of the EURATOM RTD programme by further integrating the radiation protection related education and training activities across Europe.

Furthermore, CONCERT stimulated the contribution of Member States (all Member States are represented in CONCERT apart from Cyprus, Luxembourg and Malta) to the development of a European Joint Research Roadmap (JRM) in the field of radiation protection. Care was taken to ensure that the joint roadmap included multidisciplinary science, tailored to societal needs. It makes full use of newly gained knowledge in all disciplines of life sciences and humanities and fully integrates education and training, especially for the young generation in science to build up and maintain scientific as well as vocational competences needed for a robust and sustainable radiation protection regime in Europe today and in future.

The work of CONCERT was also of importance for the society. CONCERT had the mission to address and further reduce uncertainties in the assessment and management of radiation risks to humans and to the environment by targeted science. The promotion of joint national and European research and other co-funded integration activities will ensure that human health risks and possible impacts on the environment are better understood and quantified and that radiation protection strategies are optimised. This was achieved by an open exchange of knowledge and information between scientists, regulators, stakeholders involved and society as a whole.

Excellence in research is indispensably linked with fair and open competition for research resources. From the beginning, CONCERT was designed around the central idea to organise open research and development calls as well as calls for activities in education and training. These calls were open to research partners from within and outside the CONCERT consortium. To promote open and fair competition between the research proposals to CONCERT calls, a peer review process with scientists not involved in CONCERT and largely from outside Europe was organised to avoid conflicts of interest influencing the scientific rating of the research proposals.

3 Project Results

CONCERT as a co-fund action (70% EC and 30% national funding) was designed to support co-ordinated European funding of successfully evaluated projects from EURATOM administered by the European Commission and from national research funding from national governments of EU Member States and associated countries. It aimed to attract and pool a critical mass of national resources on objectives and challenges of Horizon 2020 and to achieve significant economies of scale by adding Horizon 2020 resources to joint efforts. The ambition was to use the most efficiently financial resources available for radiation protection research, adjusting national research programmes, and fostering synergistic efforts, leading to benefits to radiation protection research in Europe.

Added value was given for example by the joint effort undertaken with a strategic perspective on supporting excellent science, on building and maintaining high competence in radiation science and radiation protection as well as further promoting integrative and multidisciplinary research at the European level, i.e. by initiating and funding concerted joint research actions, promoting access to research infrastructures and optimising radiation protection related education and training activities across Europe.

All CONCERT activities build on the Strategic Research Agendas developed by the four European Radiation Protection Research Platforms MELODI, ALLIANCE, NERIS and EURADOS. This grouping of four platforms was later extended, with the specific support of CONCERT to six platforms, i.e. the extension to research in radiation protection related to medical applications as represented by the EURAMED platform and later to research of aspects of radiation protection in relation to social sciences and humanities as represented by the platform SHARE.

CONCERT organised two major open research and technological development (RTD) calls to strengthen the scientific research in strategic priority areas of radiation protection as described by the European Radiation Protection Research Platforms in their SRAs. CONCERT committed in total EUR 17.1 million (EUR 10.5 million in call 1 and EUR 6.6 million in call 2) in the funding for the open research calls. Nine projects were selected for funding.

The total budget for the first call issued by CONCERT added up to approximatively 13 M€ in total. From these costs, CONCERT was committed for 10.5 M€. The remaining 2.5 M€ were provided by Norway and Ireland that brought their own resources to the projects. This budget allowed the funding of the first three projects from the ranking list. This ranking list was established by an independent peer review panel. Three projects were selected, one from Topic 1 and two from Topic 2.

The three projects funded in the first open CONCERT call 2016 were:

Topic 1 “Improvement of health risk assessment associated with low dose/dose rate radiation”

- **LDLensRad (Budget 2.5 M€)**

Content

Human studies indicate the lens is sensitive to low dose IR. LDLensRad seeks to understand the biological aspects of radiation cataract

Goals

To identify mechanistic pathways and elucidate the impact of dose, dose rate, age, gender and genetics on radiation cataract

Topic 2 - “Reducing uncertainties in human and ecosystem radiological risk assessment and management in nuclear emergencies and existing exposure situations, including NORM.”

- **CONFIDENCE (Budget 6.2 M€)**

Content

Improvement of atmospheric dispersion, foodchain and dose modelling
Analyzing of the radiological situation with advanced tools and development of recovery strategies with stakeholder engagement
Decision making for the protection of the affected population and minimal disruption of living conditions

Goals

Understand, reduce and cope with the uncertainty, including social and ethical aspects, in both the threat and early release and transition phase of an accident
Engagement of all relevant stakeholders from lay people to decision makers in planning and recovery strategy development and final decision making

- **TERRITORIES(Budget 4.2 M€)**

Content

State-of-the-art reviews leading to topical guidances and recommendations:

- Monitoring and modelling environmental radioactivity,
- Assessing doses to populations and ecosystems,
- Engaging stakeholders in preparedness and remediation,
- Analysing remediation with a socio-economic approach
- Final recommendations about management.

Goals

Enhance uncertainties reduction and stakeholders involvement toward integrated and graded risk management of humans and wildlife in long-lasting radiological exposure situations

The total budget for the second call issued by CONCERT added up to approximatively 6.7 M€ in total. From these costs, CONCERT is committed for approximatively 6.6 M€. The remaining 2% are provided by partners/countries bringing to the project their own resources (including Norway, Serbia and Japan as well as partners from Switzerland and France). This budget allowed the funding of the first six projects from the ranking list. This ranking list was established by an independent peer review panel. Six projects were selected, four from Topic 1 and two from Topic 2.

The six projects funded in the second open CONCERT call 2017 were:

Topic 1 “Understanding human health effects from ionising radiation and improving dosimetry”

- **LEU-TRACK (Budget 1,34 M€)**

Content

Study of basic mechanisms in low dose radiation-induced leukaemia by focusing on the role of EVs in the crosstalk between the bone marrow microenvironment and the stem cell compartment in initiating the leukemic process

Goals

- to investigate mechanisms and pathways how bone marrow-derived EVs can modulate low dose radiation-induced leukaemia
- to identify EV-related biomarkers of radiation exposure and/or leukaemia risk

- **PODIUM (Budget 1,34 M€)**

Content

To improve occupational dosimetry by an innovative approach: using computer simulations coupled with flexible phantoms and personal tracking devices

Goals

to develop an online application in which we will calculate individually the occupational doses, instead of measuring them with dosimeters

- **SEPARATE (Budget 1,74 M€)**

Content

To examine the effects of inhomogeneous exposures under conditions that closely replicate realistic human exposure scenarios

Goals

- To identify molecule(s) and pathways involved
- To discover candidate biomarker molecules of whole body (TBI) and partial body (PBI) irradiations

- **VERIDIC (Budget 0,71 M€)**

Content

- Testing of software products used for skin dose calculation (SDC) in interventional cardiology (IC)
- Analysis of skin dose determinants in IC

Goals

- Harmonisation of digital dose reporting in IC
- Protocols for quality control (QC) of SDC software
- Reference Levels and dose reduction strategies in IC

Topic 2 - "Radioecology, emergency and social sciences and humanities"

• **SHAMISEN-SINGs (Budget 0,76 M€)**

Content

- Stakeholder consultation to assess needs & interest in contributing to dose and health assessment
- Guidelines for APP(s) to monitor radiation, log behavioural and health for citizen science studies & provide a channel for practical information, professional support and dialogue.
- Assess ethical challenges and implications of APPs and citizen science activities through consensus workshop

Goals

Build upon the recommendations of SHAMISEN to:

- Enhance Citizen Participation in preparedness for, and recovery from a radiation accident
- Use novel tools and APPs to support data collection on radiation measurements & health and well-being and create a channel for dialogue.

• **ENGAGE (Budget 0,78 M€)**

Content

Key challenges & opportunities for stakeholder engagement (SE) in radiological protection (RP) for medical, post-accident and indoor radon exposures.

Examine rationales and frameworks for engagement; analyse participation practice, and clarify the role of radiation protection culture through case studies; provide guidance for enhancing stakeholder engagement in radiological protection.

Goals

Clarify why, when and how stakeholders engage in radiation protection; study how radiation protection culture is defined and developed, and whether it can facilitate stakeholder engagement; design a knowledge base for recording cases of stakeholder engagement; provide guidance and co-develop recommendations for more robust stakeholder engagement in radiation protection.

The overall mission of the CONCERT umbrella structure was to manage and administer radiation protection research funding in Europe by

- Co-ordinating the SRAs, research priorities and long-term roadmaps of all research platforms
- Developing joint research priorities and a joint research roadmap
- Promoting the integration of research groups from radiation protection institutions, research centres and universities
- Promoting the integration of research organisations and funding agencies
- Building a research network open to new partners
- Integrating Education and Training (E&T) and access to infrastructure in the research programme

CONCERT managed the development of strategic research agendas (SRA), the recommendation of research priorities and the development of research roadmaps in all major sectors of radiation protection research via the platform activities of MELODI, ALLIANCE, NERIS, EURADOS, EURAMED and SHARE. These developments were also discussed with and disseminated to European and international organisations involved in radiological protection.

CONCERT considered the integration of research activities in the field of medical applications of ionising radiation and of research in social sciences and humanities (SSH) related to radiation protection to meet the need for a reinforced multidisciplinary approach to research and innovation. Therefore, CONCERT actively supported the establishment of a new research platform in the field of Radiation Protection in Medicine – EURAMED (European Alliance for Medical Radiation Protection Research) and of a new platform of Social Sciences and Humanities in Radiation Protection - SHARE.

To meet the research needs of the European Union, the call priorities of the open CONCERT calls were developed by joint programming taking into account the SRA of the European Radiation Protection Research Platforms and favouring multidisciplinary approaches. The two open transnational calls for proposals on “Radiation Protection Research in Europe” were a unique added value of the CONCERT-EJP, taking on board the broad spectrum of scientific disciplines relevant to radiation protection research. They allowed CONCERT to support nine scientifically excellent evaluated projects. The projects have been successfully completed and have contributed to a significant increase in knowledge in radiation effects and risks as well as in knowledge in radiation protection measures. The CONCERT deliverables [D4.3](#) and [D4.6](#) summarising the EJP CONCERT open calls and providing a final analysis of the respective funded projects.

Parallel to the research funding activities, CONCERT was also fully engaged in outreaching activities towards stakeholders. CONCERT initiated workshops and meetings of scientists and stakeholders in the field of risk communication, and social and ethical issues together with scientists and stakeholders in the wider field of radiation protection. Topics of the SSH (Social Sciences and Humanities) SRA were included as an integral part in the second call for research projects funded by CONCERT. The most recently established platform SHARE benefitted from the CONCERT project. CONCERT supported the development of a strategic research agenda in social sciences and humanities in relation to radiation protection by initiating workshops and meetings of scientists and stakeholders in these fields together with scientists and stakeholders in the wider field of radiation protection that led to the establishment of the SHARE platform. SHARE contributes in the field of radiation protection, taking into account societal needs and aspirations.

CONCERT has prepared and made available a database of relevant research infrastructures operated in EU member countries, a list of existing databases, including sample banks of biological material – aiming at facilitating access to Radiation Protection research infrastructures and to strengthen and expand cooperation between Radiation Protection stakeholders in Europe. All related information can be found in the final version of the [web-handbook](#)¹ that compiles the articles on the 120 infrastructures published in the CONCERT Bulletin AIR², with 45 radiation exposure facilities and contaminated sites, 35 databases, sample banks and cohorts and 40 analytical platforms, models and tools. AIR² was received by more than 1000 readers and was relayed for diffusion by the European Radiation Protection Research Platforms MELODI, ALLIANCE, NERIS, EURADOS and EURAMED. The present status is not already a network with legal links between them, but the links could be considered as stronger, because they are based on confidence, respect of independency, without technical control or evaluation, without a superstructure as lead which could not be considered as legitimate. This approach is an important part of the built strategy where activities dedicated to harmonization has promoted firstly the sharing of data produced on/by them. This work done through the database STORE and the “FAIR standards” could be considered today for the radiation protection research field as better understood and also a true step of integration. Finally, the added final part dedicated more to E&T on infrastructures through sharing

¹ CONCERT deliverable [D6.6: Access to infrastructure -Publishing the web-Handbook including protocols issued from harmonization procedures](#)

protocols and know-how has been considered as a good and crucial step to implement the promotion for using these infrastructures by demonstrations and exercises and finally to increase the confidence by potential users.

Within its E&T efforts, CONCERT ensured the inclusion of the interests and requirements of E&T Working Groups of all six radiation protection research platforms involved in the EJP and established a system of student travel grants to promote participation in relevant training courses at other institutions, to present their work, and to attend conferences. In addition, the EJP-CONCERT project organised annual open calls for training courses in topics of interest to the participating radiation protection research platforms for the purpose of further developing and sustaining expertise and competence of the research community and attracting new students into the field of radiation protection research. These courses were not primarily concerned with practical operational radiation protection, but they were potentially of interest and benefit to radiation protection professionals in providing the background science that underpins the principles of radiation protection.

The CONCERT project ran over 60 months from 01 Jun 2015 to 31 May 2020. During this five year duration 211 deliverables were due for completion and submission. These deliverables span across all work packages and nine projects as part of work package 9 and are openly accessible via the project's [public website](#). The public website acted as an information hub about the objectives, activities and results of CONCERT and served as a prime public dissemination tool making available the project published materials (e.g. for calls) to keep the audience informed and ensure continued interest in the project, and to attract new visitors. This public website is used effectively as an important outreach tool and a vehicle to communicate project activities and results as the CONCERT website public stakeholder pages which can be found under the 'Stakeholders' tab serving as a resource that provides a source of trusted and evidence based information on radiation and associated risks.

4 Conclusions, lessons learned and recommendations

The CONCERT-EJP Co-fund project consortium is confident that the project fully achieved all the objectives described in the original proposal. The CONCERT-EJP accomplished the implementation of a joint programme of research in radiation protection, the coordination and networking of activities in all fields of radiation protection research, as well as specific training, stakeholder engagement and dissemination activities. The CONCERT-EJP supported direct integrative activities of the consortium at a European level and managed successfully two open RTD calls for proposals with financial support to third parties. With all these activities, the CONCERT-EJP reached fully the proposed and expected impact.

CONCERT initiated its activities in a partnership approach towards common visions and co-ordinated Strategic Research Agendas (SRAs) to address major research challenges that resulted in the formulation and development of topical research needs and roadmaps, and established long-term Research and Technology Development (RTD) roadmaps based on these SRAs. These activities and the research platforms provide important input and a strong basis to guide future research and to laying out a joint roadmap for radiation protection in Europe, emphasizing the main challenges for society with regard to radiological protection in the future and the need for further multidisciplinary and topical research in this field.

In concluding CONCERT, the Federal Office for Radiation Protection (BfS) as the CONCERT coordinator together with all POMs, CONCERT partners and with the European Radiation Protection Research Platform partners draw valuable lessons from managing the first EJP in radiation protection research:

- Research in radiation protection is carried out in national radiation protection institutions as well as in research centres and universities. The latter also have a key role in educating and training of radiation protection scientists as well as experts. CONCERT as co-funded action identified problems in using the EJP funding tool, especially for smaller research groups and those universities that do not have a dedicated national mandate in radiation protection research to be approved as POMs but are still important as they provide complementary expertise in disciplines typically not mastered by the RP authorities (e.g. basic sciences or omics platforms). In addition, smaller research groups, especially if they are relatively new in the field have not have established legal links with their national POM. Within EJPs they are defined as Third Parties. Third Parties, however, have a funding disadvantage in competing with beneficiaries and linked third parties (LTP) in an EJP. In a co-fund European action the national co-fund for Third Parties have to be provided as cash funding by national funding institutions in contrast to the in-kind co-funding options for linked third parties and beneficiaries. This led to a clear disadvantage for third parties given the time needed to establish cash co-funding systems for research in all Member States.
 - The broad spectrum of research partners in the European radiation protection research area should consequently be valued and welcomed by the next EURATOM research programme, and the respective funding tool whether it will be co-funded or co-programmed. The instrument should respect and support this variety from large national RP institutions to smaller and less established research partners in universities. The EJP (programme co-fund action) type of instrument used for CONCERT is clearly more challenging if not prohibitive for third party contribution and their corresponding national POM.

- Another important lesson-learnt from CONCERT arises due to the fixed funding period required to be efficient with open calls. The topics, the conditions and requirements for proposals submitted to open call(s) should be established right from the beginning of the EJP so that the call(s) can be implemented without undue delay right after the EJP start. Otherwise, the common 3-5-year project term is difficult to achieve.

- Taking into account the concept that European Joint programming should benefit from alignment of European and National resources, the respective national POMs should be encouraged to strengthen their collaborations within their national research communities towards specified nationally coordinated radiation protection research programmes and agreement-based consortia. An alternative would be to accept only POMs from those Member States in a future EJP, in which active cash co-funding systems for research funding to Third Parties is established for participation in European co-funded and co-programmed activities. It is important to recognise, however, that in some Member States such cash-funded and co-programmed activities exist for the main framework program only but not the complementing EURATOM programme.
 - in the upcoming Horizon Europe there is a need for more meaningful consultation with everyone intending to participate, in particular with regard to the mandate and commitment to radiation protection and above all by the ability to commit resources. Co-funding requirements may preclude the involvement of otherwise well qualified partners

- Regarding the infrastructures, one the lessons learnt is that researchers and owners of infrastructures prefer a lot AIR² rather than the database AIR²D². AIR² is really a tool to promote infrastructures and could prepare a future integration, AIR²D² is more an inventory. Openness and access are subordinated to confidence.
 - Looking efforts done to compile relevant infrastructures and information about their access, it is obvious the work to be done and the way to have a European network with a common door and nodes will be still long. The actual list is not closed. To build a more formal system linked irradiation facilities, is not identical to link databases or sample banks among them.
 - The coordination and integration for a network dedicated to infrastructures is an objective completely different from SRA, roadmap, and research priorities. These one are immaterial and constitute an intangible gain. Regarding facilities, we have observed that institutions are much more sensitive to their property, their rights, their choices considered as strategic around their staying power to execute their own (national) research programme. All these have been build regarding local interests and independency. These points affect directly the real openness.