Project Concept Template

Project Proposals for the RCA Programme 2024/2025

Part 1: Information Sheet

Project proposals for the RCA Programme 2024/2025 are to be prepared using the attached template and submitted BEFORE 31ST OF DECEMBER 2021. Completed templates will be reviewed by the RCA PAC in January 2022.

Resource documents required for developing Project Concepts can be found in the RCA web-site – (RCA Regional Office (rcaro.org)), under Projects/Resource Documents. (see below for the list of resource documents.

The Project Concept should be prepared in consultation with the stakeholders of the other participating GPs.Information on RCA stakeholders can be found in the RCA web-site (RCA Regional Office (rcaro.org)), under Projects/Project Information.

Please request access to the RCA Members Only web-site from RCARO (email: rcaro@rcaro.org) through your National RCA Representative if you do not already have access.

A proposal will be evaluated against the following criteria:

- Alignment of the objectives with priorities set out the RCA Regional Programme Framework (RPF) for 2024/25.
- Whether the project addresses a regional need.
- Whether nuclear technology is an essential component of the project.
- Whether outcomes and achievements of previous projects in this area of technology are considered.
- Does the proposal overlap or duplicate current or previous RCA projects?
- Is a convincing case made to justify further projects in this area?
- Is there a strong TCDC component?
- If the proposal is essentially an extension of previous projects in this area that have been implemented for more than 2 TC Cycles, does the proposal include arrangements for the transfer of project leadership to another GP?

List of Resource Documents on RCA web-site (www.rcaro.org)

1. Timeframefor preparation, review and approval of Project Concepts
2. Brochure on Logical Framework Matrix (Quick Reference Guide on Designing IAEA TC Projects)
3. RCA Regional Programme Framework for 2024-29
4. Details of RCA TC Projects implemented in 2007-2019
5. List of TC Projects being implemented in 2020/21 and projects approved for 2022/24
6. Recommendations on Technical Cooperation among Developing Countries (TCDC)

Please note that your National Representative will be reviewing the concept document to ensure that it has been prepared in compliance with the RCA and IAEA Criteria for TC Projects

Please contact the Chair of the RCA Programme Advisory Committee, Dr. Prinath Dias at prinathd@yahoo.com if you need assistance.

Part 2: Concept Template[1]

Title:

The title should be as concise as possible and should summarize the objective of the project.

Augmentation of regional NDT resources based on nuclear and related techniques for industrial growth and societal benefits (RCA-IND6)

Analysis of gaps / problems / needs as applied to the RCA region:

Outline the major gaps / problems/specific needs to be addressed by the project (~ max 300 words):

Analysis of gaps: Non-destructive testing and evaluation (NDT/E) using nuclear radiation is an important non-power application of nuclear technology that is widely used by industry for testing a variety of components for quality control, quality assurance, and monitoring of plant integrity during construction, operation, and maintenance. The nuclear radiation based methods do have an edge in NDT/E but other prominent techniques based on non-ionising and diffracting radiation also play an important role. Conventional industrial radio-diagnostic techniques based on sealed radioisotope sources continue to play an important role in quality assurance programme. Advanced computational industrial imaging technologies are fast acquiring industry acceptance due to newer codes and standards and their unique usefulness. However due to being an entirely new modality in sharp contrast to conventional film-based radiography and radiometry, the electronic data generated are huge and require special handling. As in the case of medical diagnostic technologies under Digital Imaging and Communications in Medicine (DICOM) modality, a standard for handling, sharing, storing and transmitting information among different NDT/E systems called Digital Imaging and Communication in Non-destructive Evaluation (DICONDE) is also in place. In addition, there are now competing advanced supplementary NDT technologies based on non-ionising radiation which are now commercially available. ***However, the lack of information, adaptability and to some extent lack of interest has prevented the core technology groups in the RCA MSs dealing in NDT/E domain from reaping their technological benefits.*** These are some of the gaps envisaged in carrying forward benefits of earlier projects implemented in advanced NDT technologies e.g. Digital radiography (DR) and Computed Tomography (CT) for NDT. The region now requires thinking and planning on these issues in aggregation for the forthcoming decade.

Problems and needs: (i) A standard for handling, sharing, storing and transmitting information among different NDT/E systems called Digital Imaging and Communication in Non-destructive Evaluation (DICONDE) is available, the same has not been widely integrated and utilised in regular practice. This is largely due to lack of information and adaptability among technology groups in the RCA MSs dealing in NDT/E domain. (ii) Scarcity of trained human resources in advanced NDT methods (nuclear and other complementary techniques) acting as deterrence in propagation and practice of newer technologies (DIR, CT) in the region. (iii) Adopting and sustaining conventional and advanced NDT methods in industrial processes by newly joined RCA MSs

[1] If you have not been involved in drafting a concept before and if you are not fully acquainted with the RCA and its Programme you are encouraged to support advice and assistance from your RCA National Representative.

Review the resource documentation and list any past RCA projects that have addressed similar problems/needs in this area of technology. Consider outcomes and achievements of previous projects, and avoid any overlap or duplication.

What are the major additional capabilities/skills in this area of technology that will be provided through this project (~ max 200 words).

Five RCA regional projects on Non-Destructive Testing have been implemented since 2007, including one project currently under implementation. Another project is being planned for implementation in 2022/23. These projects have been in areas of digital industrial radiography (DIR); establishment of quality management systems (QMS) in accordance with ISO standards; in situ applications in process and petrochemical industries; harmonization of non-destructive testing schemes; planar and volume imaging techniques; NDT of non-metallic materials; and NDT in Civil Engineering.Previous projects, i.e., RAS8100, RAS8105, RAS1013, and RAS1020, had placed emphasis on introducing RT-D and CT, and establishing the basic capacity to initiate the utilization of the technology.The current ongoing project, RAS1022, focuses on producing a pool of trainers in RT-D and CT, while at the same time expanding the focus to include NDT for civil structures and covers non-nuclear technique TOFD also. The recently approved RCA project for TC 2022-2023, RAS1029 will cover the application of advanced radiography-based NDT techniques, i.e., digital radiographic testing (RT-D) and computed tomography (CT), for composite inspection. The successful implementation of this project is expected to provide benefits for all participating GPs.

The scope of the proposed project for the next cycle will not only augment the benefits accrued through these but also usher into an entirely new era of self-sustainable technical competence in the RCA region. Major additional capabilities/skills expected to be introduced and acquired by the region from the implementation of the proposed project will be in the NDT/E data fusion, analysis and management domain and growth of specialised manpower dealing in advanced nuclear and supplementing NDE/E technologies indispensable during the next decade. The scope also includes adopting and sustaining conventional and advanced NDT methods in industrial processes by newly joined RCA MSs.

The present concept has wider dimensions on optimum and useful utilisation of technological capabilities and trained human resources for sustained socio-economic growth.

Overall Objective: (Required for the preparation of the IAEA Regional Programme Note)

Overall Objective: To introduce and incorporate advanced NDT/E data management and analysis methods for regional benefits and self-reliance and augmentation of human resources in line with global standards and practices.

State the overall long-term objective to which the project will contribute. This should reflect an impact related to the RCA Regional Programme Framework for 2024/29.
Problem and objective analysis using objective and problem trees is recommended. (See pages 9 and 10 of the Quick Reference Guide on Designing IAEA TC Projects in resource documents)

The overall long-term objective is in line with the future directions as envisaged in the RCA Regional Programme Framework for 2024/29. It takes into consideration several factors including rapid progress in other technology that enables better NDT implementation and bridges the gap in the capabilities of MSs in the development of integrated NDT inspection systems utilizing the Big Data approach for monitoring and assessing damage in critical engineering components. The objective also proactively responds to the rapid changing inspection requirements and demands.

Project Outcome: (Required for the preparation of the IAEA Regional Programme Note)

Implementation of global standard of NDT/E data archival and management systems in labs and infrastructure of beneficiary RCA member States and augmentation of trained manpower for their utilisation.

The outcome is the planned result of a project, achieved through the collective effort of stakeholders and partners. It represents the change or improvement that occurs as a result of the project. Should be worded in past tense. (eg. The capability for ……developed)

Successful and committed implementation of the proposed project if approved, is expected to bring about tangible changes in the way NDT techniques are practised by GPs in the RCA region. It would also be able to augment trained and certified personnel in conventional techniques as well as introduce trained resources in advanced software systems for better utilisation of data generated by nuclear as well as non-nuclear supplementing technologies.

RCA Projects are to be designed to have a Socioeconomic Benefit:
What is the potential socioeconomic benefit that might be realised from the project concept over a 5 to 7-year horizon?
The project envisages to realise tangible socio-economic benefits in the participating RCA Member States during the next 5-7 years as a result of:
(i) Planned capitalization on available national resources in advanced NDT/E for technical capability augmentation. Available national resources refer to physical assets and human resources developed in the MSs as a result of successful implementation of the ongoing project RAS/1/022 and the newly approved project RAS1029 for 2022-23 cycle.

(ii) knowledge-sharing and capability augmentation among key stake-holders as a result of training and workshops in comprehensive NDT modalities (using ionising and non-ionising radiation) both in technology applications and advanced data archival, management and its optimum utilisation.

(iii) Technical assistance and directions offered by consultants to the proposed project, capable participating MSs and received by newly joined RCA MSs in conducting national training programmes and workshops for enhancing local trained human resources for employment in NDT domain.

Proposed Participating Government Parties:

List the Government Parties expected to participate in the project. Indicate target and resource GPs:

1.Australia
2. Bangladesh
3. China
4. Fiji
5. India (suggested Lead Country)
6. Indonesia
7. Japan
8. Cambodia
9. Laos P D R
10. Malaysia
11. Mongolia
12. Myanmar
13. Nepal
14. New Zealand
15. Pakistan
16. Philippines
17. S. Korea
18. Singapore
19. Sri Lanka
20. Thailand
21. Vietnam

Technical Cooperation among Developing Countries (TCDC) Project Component:

The project design (to be developed) will feature partnering arrangements between those advanced and those less advanced in the technology to be transferred through this project by way of expert missions and training programmes.

The project area will contribute to SDG Goal 9 - Build resilient infrastructure, promote sustainable industrialization and foster innovation. SDG 9 has 8 target areas and the proposed future directions will address Targets 9.2 (promote inclusive and sustainable industrialization: 9.3 (access of small-scale industrial and other enterprises): and 9.5 (upgrade the technological capabilities of industrial sectors).

Expected partnership will be worked out and detailed during the project development phase.

Requirements for participation:

Indicate the minimum requirements that the counterpart institutions in Government Parties would need to meet in order to participate in this project.

The participating GPs should have at least established infrastructure in conventional NDT and national programme/priority in related area. They should also establish committed project team members for the implementation of the activities. Detailed requirements according to the level of participation are as follows: **[a] Resource GPs: (**i) Availability of related equipment i.e., Computed Radiography (CR) System, Digital Detector Array (DDA) system, Film Digitization system, X-ray, gamma projector, CT system and (ii) availability of computing platforms and software systems for DIR, industrial CT and allied

NDT/E technologies including training facilities i.e., exposure room, classroom, computer room. **[b] Intermediate Level GPs:** (i) Trained personnel in advanced NDT technologies and (ii) Certified personnel in conventional NDT methods in accordance with established national and international guidelines.
[c] Newer Recipient GPs: (i) Existence of national programme incorporating realisation of benefits by NDT/E techniques; (ii) A dedicated national team under GP able to liaison with other RCA MSs and (iii) An upcoming basic NDT infrastructure in the country.

Stakeholder analysis and partnerships:

Briefly describe who are expected to be the end-users and principal beneficiaries of this project. Indicate whether the end-users contributed to development of the Concept.

Stakeholders to the proposed project would be national nuclear research and development (R&D) organizations, industrial establishments & premier academic institutions. Some of the other end users who could not be direct and active stakeholders in the project will be benefited through collaborating with these stakeholders.

Topmost stakeholders / beneficiaries: Topmost stakeholders to the project are national nuclear research organizations and their commercial wings, Industrial establishments included in the project team and faculty and staff of selected academic institutions in the MSs. They will be responsible for sustaining long-term strategic goals in line with their national programmes in similar areas.

Middle-level Stakeholders / beneficiaries: These are the individual engineers, scientists and technology practitioners in topmost-level stakeholder agencies who will directly benefit from the participation but they will be entrusted to propagate the knowledge to the key beneficiaries.

Key- beneficiaries: Direct key beneficiaries of this project would be the small and medium industries and trained NDE and QA practitioners by value addition to their existing knowledge and improving upon the NDE and QA practices in industrial houses.

Other stakeholders of the proposed project would be:

i. **RCA Regional Office (RCARO) in Korea (ROK);**
ii. **Nodal Atomic Energy Establishments/Government Agencies in the participating RCA MSs;**
iii. **RCA National Representatives in respective MSs;**
iv. **RCA National Liaison Officer in respective MSs.**

A large chunk of untapped key beneficiaries will also benefit as a result of their participation in large national projects which would have some kind of collaboration with topmost stakeholders at higher levels.

Have any extrabudgetary funding possibilities been identified?

Not at this stage. At the project concept level, extra-budgetary funding possibilities, sponsors and partners have not been identified.

Role of nuclear technology:

Indicate the essential nuclear technique that would be used and outline why it is suitable for addressing the problems/needs in question.

The proposed project will heavily utilise data generated by NDT systems incorporating industrial digital imaging like digital radiography and computed tomography. These equipment make use of conventional and high energy X-ray and radioisotope sources like Ir-192, Cs-137 and Co-60 and thus need nuclear technology in many aspects. In specific non-destructive techniques like industrial digital radiography and tomography imaging which have no equivalence in other NDE modalities inherently require nuclear radiation in some form or the other. This is due to the fact that gamma and X-rays are the only non-diffracting and penetrating electromagnetic radiation with well-understood interaction properties with matter. DIR combined with industrial CT technologies based on nuclear radiation are the only viable technologies at present which can perform sophisticated external and internal metrology on industrial components and assemblies.

IAEA has a greater role to play by supporting the MSs in the overall development of nuclear technology based advanced NDE methods for industrial uses. This will not only bring the participating countries at a technological advantageous position but also encourage them to adhere to provisions for minimizing industrial pollution.

Is this the only available technique that could be applied to address the problem/ need?

There are many other supplementary NDT/NDE techniques based on other forms of non-ionising radiation. In aggregation, the broader objective of the new project concept does require amalgamation of their benefits with those based on ionising radiation.

Does it have a comparative advantage over non-nuclear techniques?
The unique characteristics of radioisotope and nuclear radiation based advanced industrial radiological modalities in qualifying and quantifying structural defects, process status and diagnostic capabilities set them apart from conventional techniques. In certain case studies, high energy gamma radiation based industrial radiometry is proven to be the only quality assurance technique which can be employed successfully. Very large assemblies and structural components often used in nuclear industry can only be tested with high energy gamma sources.

Duration of the project:

Indicate the number of years required to complete the project. **04 years**

Project duration of **four years** is proposed based on the assumption that the important component of the overall objective would require certain lead time in the beginning of the forthcoming TC cycles.

Part 3: National Representative Endorsement for Project Concept

As the RCA NR of INDIA *(RCA GP),* **I have reviewed the Project Concept thoroughly and confirm that it meets the following requirements:**

1. The objective of the Project Concept is aligned with priorities set out the RCA Regional Programme Framework (RPF) for 2024/25.
2. The project addresses a regional need.
3. Nuclear technology is an essential component of the project.
4. Outcomes and achievements of previous projects in this area of technology have been taken into consideration
5. There is no overlap or duplication with current or previous RCA projects
6. Further projects in this area can be justified (if relevant)
7. The Project Concept has a strong TCDC component

Signature: 

Name: SUNIL GANJU

NATIONAL RCA REPRESENTATIVE, INDIA

Date: 07 January 2022