

2nd Draft Project Concept Template
Project Proposals for the RCA Programme 2022/2023
2nd Round Project Concept Template

Part 1: Information Sheet

2nd Round Concept Project proposals for the RCA Programme 2022/2023 are to be prepared USING THE 1ST ROUND CONCEPT PROJECT PROPOSAL.

The 2nd Round Concept should show the text changes that have occurred through the updating of the 1st Round Concept through THE USE OF TRACK CHANGE MODE.

The 2nd Round Concept Proposals will be evaluated against the response to the feedback you have received from RCA PAC on your 1st Round Concept Proposals as well as the criteria listed below:

- **Is its aims and objectives in line with priorities set out the RCA Medium Term Strategy for 2018/2023?**
- **Identify which elements of the MTS are being complied with.**
- **Why it should be a regional project.**
- **The essential role of the nuclear technology in the project.**
- **Does the proposal identify links to previous projects in this area of technology?**
- **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 to exploit the benefits from the earlier projects?**
- **Is there a readily available baseline against which to measure the effectiveness of the project?**
- **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 others?**

Completed templates will be reviewed by the RCA PAC at the Meeting in Vienna planned to be held January / February 2020.

Part 2: Concept Template¹

Title:

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

Enhancing regional capabilities in advanced non-destructive testing (NDT) techniques and applications for improved safety and inspection performance in industries

Compliance with the RCA Medium Term Strategy for 2018/2023:

All RCA projects have to comply with the RCA MTS for 2018/2023 - please refer to the MTS document. Briefly indicate to which specific MTS priorities this project proposal contributes and how will these be achieved?

This proposed project will contribute to the aligned RCA MTS priority in industry (C.2.3*) and SDG target in industry, innovation and infrastructure (SDG 9**) of the Regional Programme Framework (RPF). It is in line with the RCA strategic direction in building human capacity and strategic priorities in industry through Non-Destructive Testing (NDT). Its implementation will catalyse the efforts of RCA GPs' to improve their industrial safety and efficiency programs, pollution reduction program, and better energy consumption by prioritising the usage of advanced NDT technologies and applications. ~~With the rapid progress of industries in the region and the introduction of more stringent requirements in terms of safety, economic and environment factors, demand for advanced technology, sophisticated and standardised NDT inspection through qualified and certified personnel become more apparent. Throughout the world, conventional ways of applying NDT methods have been shifting rapidly towards digitalisation and at the same time there is a need to expand its application to new materials and components as used by the industries. Changes in international industrial standards and compulsory personnel requirements for NDT have created an urging need for GPs to enhance its capability not just for advanced NDT but also in the broader perspective of NDT as a whole.~~

*C.2.3. Priorities in Industry: Improve safety and efficiency, reduce pollution and energy consumption of industrial processes through radiotracer techniques, NDT/NDE, and advanced CT.

**SDG 9. Industry, Innovation and Infrastructure

Overall Objective:

State the objective to which the project will contribute. Note this has to be in line with the RCA MTS for 2018/2023. It should be a short description expressed as: To do

To establish regional advancement in NDT to fulfil the requirements set by global standards and industries for self-reliance and sustainable NDT system of GPs.

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.

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 RCA project has contributed substantially towards the initiation and development of national NDT infrastructures in the region. It continues to support the development priorities and play an important role in establishing and developing GPs NDT technology capacities. The potential socioeconomic benefit that might be realised from this project is in the employment opportunity to both graduate and non-graduate, given the self-reliance of GPs in NDT. In addition, having being qualified and certified in advanced NDT techniques would also increase the income of NDT personnel. This will be materialised through the creation of pool of trained NDT personnel produced directly by this project which will act as the focal resources for the GPs. They in turn, will generate new pool of NDT personnel through their national programme and activities. As a result, the number of practitioners will be increased, technology will be readily available in the country, new private company will be expanded, employment opportunity will be increased and the foreign dependency will be eliminated and finally the technology and benefits will be sustained in the country.

Proposed Participating Government Parties:

List the Government Parties expected to participate in the project:

1. Australia
2. Bangladesh
3. Cambodia
4. China
5. Fiji
6. India
7. Indonesia
8. Japan
9. Lao PDR
10. Malaysia
11. Mongolia
12. Myanmar
13. New Zealand
14. Nepal
15. Pakistan
16. Philippines
17. Republic of Korea
18. Singapore
19. Sri Lanka

- 20. Thailand
- 21. Viet Nam

Technical Cooperation among Developing Countries (TCDC) Project Component:

Review the resource documentation provided on-line – www.rcaro.org/ ???. Outline the TCDC strategies to be used in the project to enhance regional cooperation:

Will the project design feature partnering arrangements between those advanced and those less advanced in the technology?

If so, list those expected partnerships.

Through the regional cooperation platform, apart from acquiring optimum benefits from the advancement of NDT technologies, it will also provide support for the sustainability of GPs in NDT in fulfilling current and future industrial requirements. All expected participating RCA GPs have developed sufficient physical infrastructure (NDT equipment and test facilities/laboratories) and human resources (NDT personnel and staffs) as a result of their involvement in earlier regional and national projects. National institutes with their infrastructures and facilities will provide the necessary drive in the project implementation through a mixture of Technical Cooperation among Developing Countries (TCDC) and partnership between the advanced RCA GPs and those at a lower stage of development in the form of expert missions, hosting of training events, and if applicable volunteers as Regional Resource Unit (RRU). These facilities would provide additional boost in terms of physical infrastructures for the implementation of the project. National laboratories, academic institutions and technology practitioners in each GP will also provide support and extend their resources through involvement as the national project team members. Malaysia, having designated as the IAEA Collaborating Centre for Advanced Non-Destructive Testing for the period of 2019-2023, will play a major role in the provision of advanced NDT training facilities and human resources support. RCA GPs recognised with adequate expertise and facilities will contribute their expertise, experience and utilization of their national NDT training program for the regional activities. Other participating countries will actively provide assistance in the related supporting logistics. It is expected that the successful implementation of the project will provide benefits to all participating GPs of Asia and the Pacific region.

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

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

Safety and economic reasons have always been the main motivation for the advancement of NDT. The problems, requirements and gaps proposed to be addressed through this project reflect the common interest and priority needs of GPs in Asia and the Pacific region. The RCA regional approach will maximize opportunities through concerted efforts by participating GPs for developing capabilities and capacities in NDT. Through the regional cooperation platform, optimum benefits from the advancement of NDT technologies can be acquired, in relation to the industrial requirements. This project aims to bridge the gaps in relation to the outcomes and achievements of previous RCA project on NDT. Previous projects i.e.

RAS8100, RAS8105, RAS1013 and RAS1020 had given emphasis on introducing DIR and CT technology, and establishing the basic capacity to initiate the utilization of the technology at GP level. The current project, RAS1022, put focus on producing pool of trainers to train others in DIR and CT at the national level, and at the same time expand the focus to include NDT for civil structures. However, NDT requires qualified and certified personnel in order to be able to provide services to the industries. In addition, in order to expand their national NDT certification scheme to include advanced NDT, GPs need to establish pools of Level 2 and Level 3 personnel to act as trainers as well as examiners at the national level. Therefore, in an effort for sustainability and self-reliance of the technology at GP national level, fFocus will be given to personnel capacity building in producing qualified and certified personnel in the area of advanced NDT and inspection of civil structures, in accordance with ISO 9712 (Non-destructive testing – Qualification and certification of NDT personnel). The project will also cover capacity building on the application of advanced radiography-based NDT techniques i.e. Digital Industrial Radiography (DIR) and Computed Tomography (CT) on composite. With the additional certification requirements for Radiographic Testing (RT) personnel in the latest revision of ISO 9712, which outline the inclusion of DIR in RT, the need of qualified and certified Level 3 personnel in DIR is inevitable for GPs ~~in order to expand their national NDT certification scheme to include advanced NDT~~. The push for the inclusion of civil structures as a new certification sector in ISO 9712 also mean GPs have to establish capacities for inspection in this area using standardized syllabus which satisfies the training hours and techniques requirements. The region is also experiencing the increase in the introduction of composite material as industrial components due to its advantages in material characteristics. Therefore, there is a need for the region to proactively responds to the rapid changing technology developments to fulfil the needs of the industries. With the objective of establishing the regional advancement in NDT, it is expected that the successful implementation of the project will provide benefits to all participating GPs of Asia and the Pacific region.

Review the resource documentation and list any past RCA projects that have addressed similar problems/needs in this area of technology.

Previous RCA projects on advanced NDT i.e. RAS8100, RAS8105, RAS1013, and RAS1020, had given emphasize on DIR and CT to promote the utilization of DIR by the industries. This has result in better understanding and comprehensive coverage of the technology. The present RCA project on NDT, RAS1022, focus on capacity building to produce DIR trainers that would train their personnel at the national level. For the project component on civil structures, syllabus and training documents have been drafted to pave ways for certification in this sector.

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

It is expected that after the successful implementation of the project, the level of regional capabilities in NDT will be enhanced. This can be measured through:

- Pool of qualified and certified Level 3 personnel in advanced NDT techniques in DIR modality.
 - Baseline: 60 trained personnel on DIR during 2015-2016 under RAS1020; 16 qualified personnel and eligible to DIR Level 2 certification under RAS1022; 0 qualified and certified Level 3 DIR personnel.
 - Target: 20 qualified personnel and eligible to DIR Level 2 certification; 40 qualified personnel and eligible to DIR Level 3 certification.
 - Target countries: Bangladesh, China, India, Indonesia, Malaysia, Mongolia, Myanmar, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Republic of Korea, Thailand, Viet Nam.

- Pool of qualified and certified personnel in civil structure inspection using radiation-based NDT techniques.
 - Baseline: 40 personnel is expected to be trained during 2020-2021 under RAS1022; 0 qualified and certified personnel at any level.
 - Target: 40 qualified personnel and eligible to Level 2 for civil structure inspection.
 - Target countries: Australia, Bangladesh, Cambodia, China, Fiji, India, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, New Zealand, Nepal, Pakistan, Philippines, Singapore, Republic of Korea, Sri Lanka, Thailand, Viet Nam.

- Pool of trained personnel in DIR and CT for composite inspection.
 - Baseline: 0 trained personnel (based on past effort analysis).
 - Target: 40 trained personnel in DIR and CT for composite inspection
 - Target countries: Australia, Bangladesh, Cambodia, China, Fiji, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, New Zealand, Nepal, Pakistan, Philippines, Singapore, Republic of Korea, Sri Lanka, Thailand, Viet Nam.

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.
- ii. Availability of training facilities i.e. exposure room, classroom, computer room.
- iii. Competent personnel in accordance to ISO 9712 or equivalent.
- iv. Involvement in the development of codes and standards.
- v. Internationally recognized publications.

b) Intermediate Level Recipient GPs:

- i. Trained personnel in advanced NDT technologies.
- ii. Certified personnel in conventional NDT methods in accordance with ISO 9712 or equivalent.
- iii. National Certification Scheme for NDT is in place.

These aforementioned requirements and facts can be verified through the national reports and established procedures/documents. The level of competencies among the participating GPs are about same, therefore the same outcome is expected for all GPs involve in this project.

Stakeholder analysis and partnerships:

Briefly describe who are expected to be the principal beneficiaries of this project and any role that will be defined for them in the project.

In order to achieve the planned outcome and produce the best possible output, stakeholders to the proposed project are from R&D organizations, academic institutions, national institutions responsible for NDT, and main industrial organizations, which have the technological background and experience to drive the project in achieving its objectives. They may represent the participating GPs as the National Project Counterpart (NPC). The main responsibility of these stakeholders is to ensure the project is successfully implemented. Their general roles at their respective country are as follows:

R&D organizations:

Establish and conduct research activities in NDT for the advancement and development of the technology

Academic institutions:

Educational materials and syllabus related to NDT in academic training programs at National level i.e. diploma, BSc, MSc and PhD

National institutions responsible for NDT:

Propagate awareness on NDT requirements and advancement to NDT community

Main industrial organizations:

Adaptation and utilization of improved NDT technology and practices

These stakeholders would in turn establish partnerships with related/interested stakeholders in their respective country. This would pave ways for optimum benefits to all stakeholders through the project involvement and implementation. GPs representatives should also establish strong partnership with national certification bodies, national NDT society, NDT training centres, equipment suppliers/vendors, in order to sustain long-term strategic goals in line with national programs and requirements in similar areas. Direct key beneficiaries of this project would be plant owners, construction sector, NDT training institutions, and NDT service providers and practitioners. Generation and involvement in various projects are achievable from knowledge acquired, which allow expansion of new applications and innovations. Such allowance will help GPs to assist in the safe operation of their industries and appreciation of advanced NDT technologies and application in related industries.

Have any extrabudgetary funding possibilities, sponsors and partners been identified?

As in current RAS1022 project, Malaysia endeavour to make contribution to the extrabudgetary funding support for this proposed project.

The RCA GPs involved in this project have strong and strategic link with their respective National Certification Body for NDT, NDT society, and NDT training centres. These are the strategic partners who could materialize the implementation of activities and adaptation of new technology or application at the national level. Contribution of the respective partners are as follows:

- i) National Certification Body
To implement the certification of NDT personnel in the related sectors in accordance with internationally accepted standards i.e. ISO 9712.
- ii) NDT society
To enhance technical and administrative awareness among decision makers and stakeholders on the progress and way forward of NDT at the global level.
- iii) NDT training centres
To provide standardised and quality training for the qualification and certification of NDT personnel.

Have they been involved at this concept stage?

All of these stakeholders are aware of these new requirements by ISO 9712. Most of the NPCs have direct involvement and strong link with these stakeholders and the NPCs are expected to engage the involvement of relevant stakeholders to participate in the project activities i.e. RTC, RW, EX. Strong and strategic linkage with their respective National Certification Body for NDT, NDT society, and NDT training centres can ensure the sustainability of the project and successful implementation of the activities for achieving the project objective.

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 project involves the application of radiation related NDT technology. DIR and CT technology will be incorporated with penetrating ionizing radiation, either X or gamma rays, to acquire 2D and 3D digital radiographic images. Unlike conventional radiography method, the exposure time and dose required to produce acceptable image quality will be lower thus reducing unnecessary exposure towards radiation workers. Chemical waste will not be an issue with DIR and CT.

Is this the only available technique?

Other non-nuclear techniques such as Ultrasonic Testing (UT), Infrared Thermography, Phased Array Ultrasonic Testing (PAUT), Time-of-Flight-Diffraction (TOFD) etc. are also available and will be used to complement the nuclear based techniques.

Does it have a comparative advantage over non-nuclear techniques?

Despite of having other non-nuclear technique in performing such tasks, radiation-based method is still the best technique and proven to be consistent throughout the inspection processes. DIR and CT are thus fast becoming the integral part of Quality Assurance (QA) programmes in manufacturing and assembly lines worldwide due to the provision of remote evaluation, digital image processing and analysis, economy of storage and accuracy of dimensional measurement.

Duration of the project:

Indicate the number of years required to complete the project.

4 years

Part 2: National Representative Endorsement for Project Concept

This 2nd Round Concept meets the RCA project requirements and I endorse it as a priority for the RCA Programme 2022/2023.

Signed:



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