IAEA activities in support of study and preservation of Cultural Heritage

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International Atomic Energy Agency

Outline:

- IAEA objective, functions and main pillars of work
- Introduction to NAPC
  - PS-NSIL
  - RIRT
- Why to support CH studies?
  - Rationale
  - NT suitable to support CH
- IAEA activities in support of CH studies
  - Regular Budget
    - Technical and Consultancy meetings
    - Coordinated Research Projects
    - Publications
  - TC projects
    - National
    - Regional
- Concluding remarks and recommendations

IAEA objective:

The Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world. It shall ensure, so far as it is able, that assistance provided by it or at its request or under its supervision or control is not used in such a way as to further any military purpose

IAEA functions:

1. **To encourage and assist research on, and development and practical application of, atomic energy for peaceful uses** throughout the world; and, if requested to do so, to act as an intermediary for the purposes of securing the performance of services or the supplying of materials, equipment, or facilities by one member of the Agency for another; and to perform any operation or service useful in research on, or development or practical application of, atomic energy for peaceful purposes;

2. **To make provision**, in accordance with this Statute, **for materials, services, equipment, and facilities** to meet the needs of research on, and development and practical application of, atomic energy for peaceful purposes, including the production of electric power, with due consideration for the needs of the under-developed areas of the world;

IAEA functions:

3. **To foster the exchange of scientific and technical information** on peaceful uses of atomic energy;

4. **To encourage the exchange of training of scientists and experts** in the field of peaceful uses of atomic energy;

5. **To establish and administer safeguards** designed to ensure that special fissionable and other materials, services, equipment, facilities, and information made available by the Agency or at its request or under its supervision or control are not used in such a way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or at the request of a State, to any of that State's activities in the field of atomic energy;

IAEA functions:

6. **To establish or adopt**, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, **standards of safety for protection of health and minimization of danger to life and property** (including such standards for labour conditions), and to provide for the application of these standards to its own operation as well as to the operations making use of materials, services, equipment, facilities, and information made available by the Agency or at its request or under its control or supervision; and to provide for the application of these standards, at the request of the parties, to operations under any bilateral or multilateral arrangements, or, at the request of a State, to any of that State's activities in the field of atomic energy;
7. **To acquire or establish any facilities, plant and equipment useful** in carrying out its authorized functions, whenever the facilities, plant, and equipment otherwise available to it in the area concerned are inadequate or available only on terms it deems unsatisfactory.

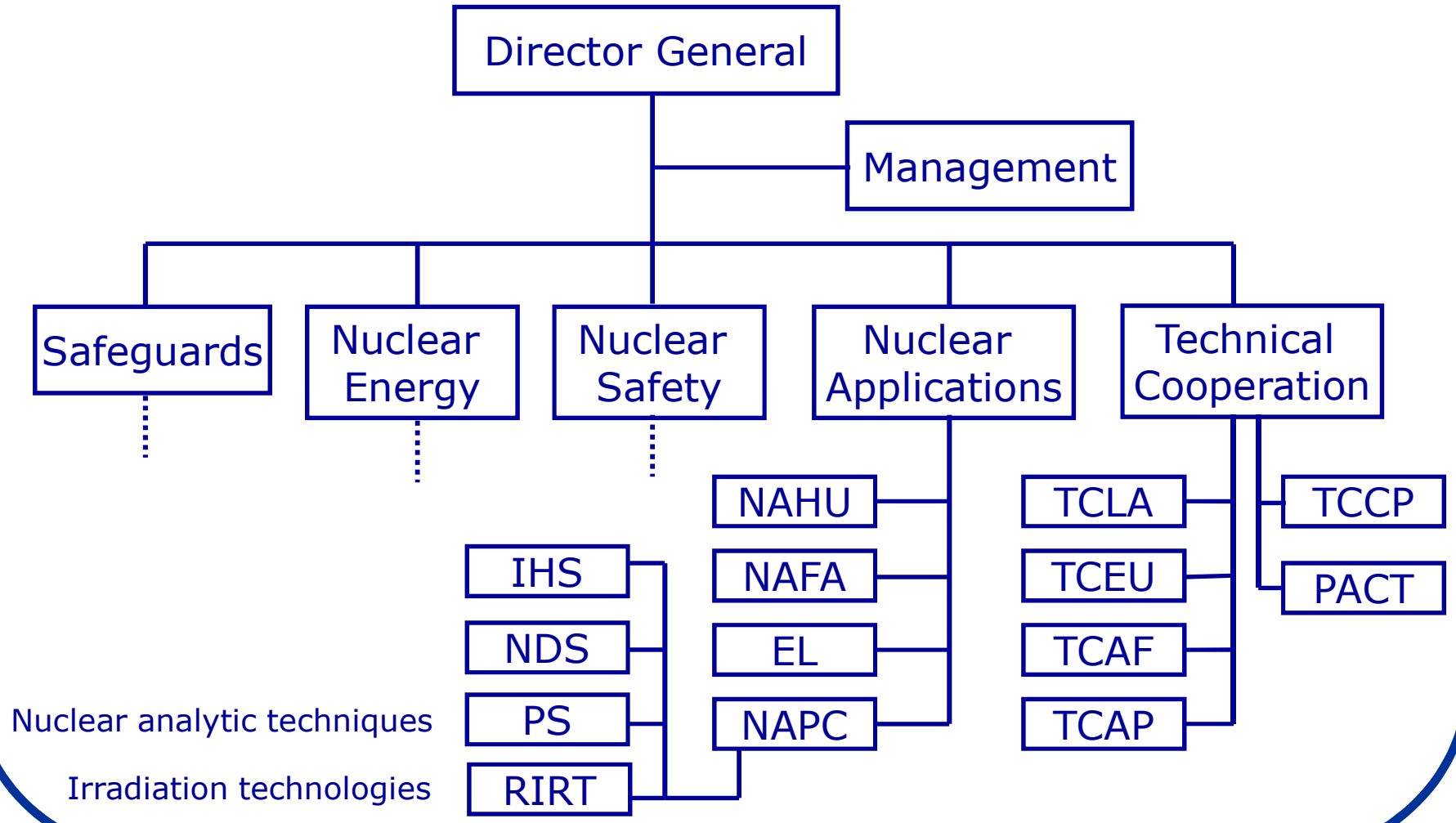
IAEA areas of work (main pillars):

- Nuclear Technology and Applications
- Nuclear Safety and Security
- Safeguards and verification

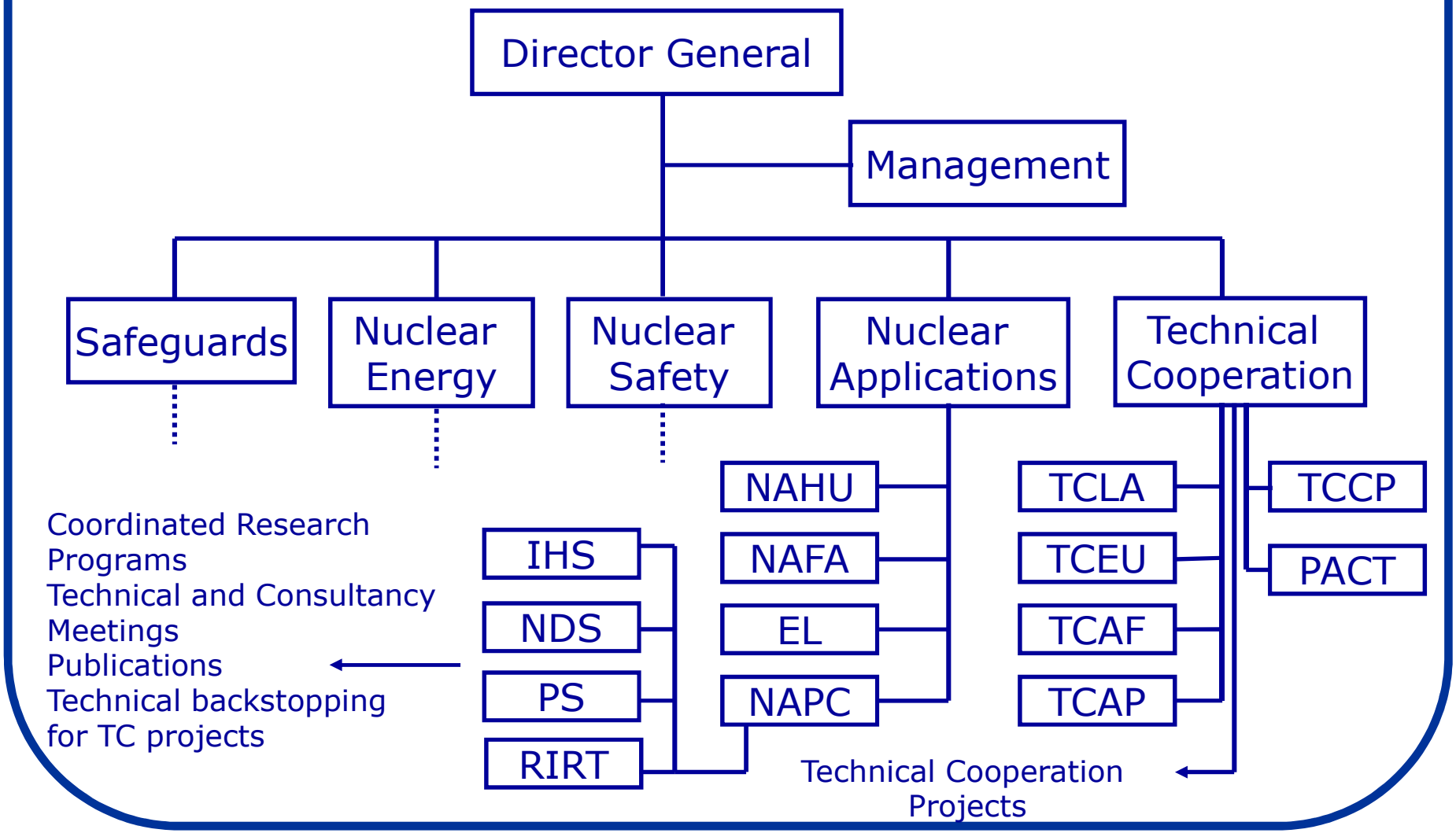
Main fields of nuclear technology and applications:

- Nuclear Technology and Applications
  - Energy
  - Health
  - Addressing environmental issues
  - Water
  - Food and agriculture
  - Industry
  - Nuclear Science

IAEA organizational structure



IAEA organizational structure



NAPC: Division of Nuclear Applications in Physics and Chemistry

Mission:

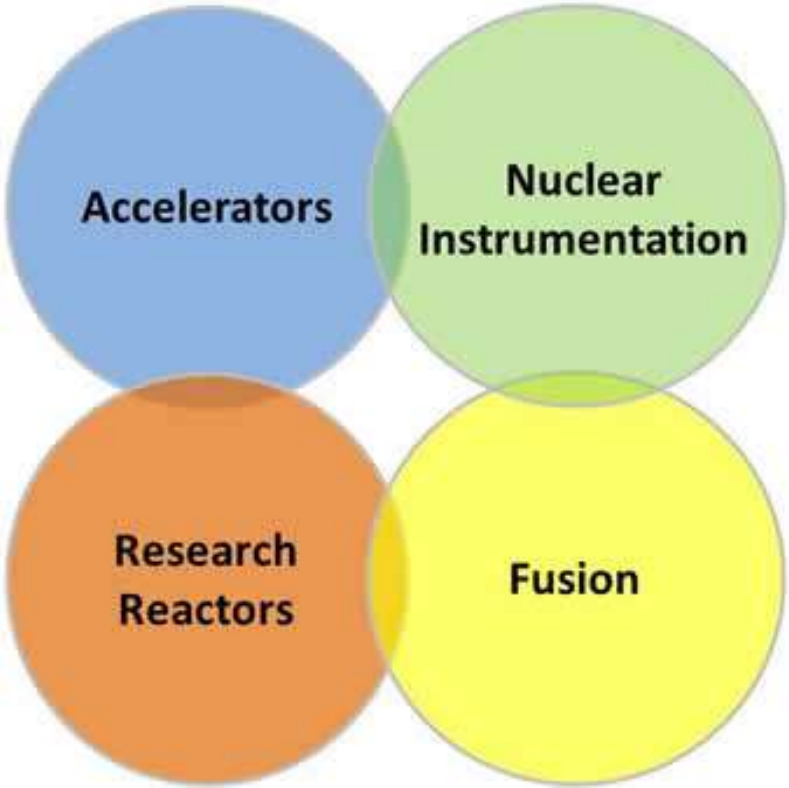
carrying out Agency activities to assist and advise Member States (MS) in assessing their needs for capacity building and research and development in the nuclear sciences, as well as in supporting the MS activities for deriving benefits in specific fields, including:

- Atomic, molecular and nuclear data
- Nuclear and radiation techniques, their applications and allied instrumentation
- Utilization of research reactors and particle accelerators
- Radioisotopes and radiopharmaceuticals
- Radiation processing applications
- Radiation technology and isotopic tracers for industrial processes
- Isotope hydrology and water resources management
- Nuclear fusion

PS: Physics Section

Mission:

Supports Member States with regard to the utilization of **particle accelerators**, **research reactors**, **applications of instrumentation** and **controlled nuclear fusion**



Regular Programme Projects (PS)

Major programme 1. Nuclear Power, Fuel Cycle and Nuclear Science

Programme 1.4 Nuclear Science

Sub-programme 1.4.2 Research Reactors

Project 1.4.2.1 Enhancement of utilization and applications of research reactors

Sub-programme 1.4.3 Accelerator Applications and Nuclear Instrumentation

Project 1.4.3.1 Fostering accelerator applications in multiple disciplines

Project 1.4.3.2 Facilitating experiments with accelerators

Project 1.4.3.3 Nuclear Instrumentation

NSIL: Nuclear Sciences and Instrumentation Laboratory

Spectrometry

Instrumentation

Mission: Assisting Member States in introducing and extending the use of nuclear instrumentation and radiation spectrometry techniques

- Training
- Research aimed to improve analytical performance and to extend applicability (Adaptive Research)
- Provision of analytical services (MS and other IAEA units)

NSIL: Analytical facilities

- Energy Dispersive XRF
  - 2 x Secondary Target Excitation (SPECTRO2000, EPSILON 5)
  - Direct/filtered x-ray tube excitation (MiniPAL3)
  - Micro-XRF and confocal-XRF setup (own development)
  - Transportable XRF (Collimated / micro-XRF, own development)
  - Handheld XRF (NITON Xlt)
  - 2 x TXRF (Atominstitut, ATOMIKA)
  - FFXRF (under development)
- SEM-EDS (FEI)
- Transportable XRD (InXitu)
- Multipurpose HVC (GIXRF, XRR, XAS)
  - At ELETTRA Synchrotrone, Trieste
  - At Seibersdorf (for training)
- IBA end station (PIXE, RBS, at IRB, Zagreb, Croatia)

NSIL: Analytical facilities (future)

- ReNUAL (planned accelerator facility)
  - E-beam
  - Linear particle accelerator

http://www-naweb.iaea.org/na/renual/

RIRT: Radioisotopes and Radiation Technologies Section

Mission:

To improve Member State capabilities in the production and use of radioisotope products for supporting the management of cancer and other chronic diseases.

To promote worldwide availability of products and facilities needed to extend the benefits of radioisotope products and radiation technology to large segments of the population of developing Member States.

RIRT: Radioisotopes and Radiation Technologies Section

Provides capacity building in:

- Development, production and quality assurance of reactor and accelerator based medical isotopes and radiopharmaceuticals for both diagnosis and treatment of diseases, especially cancer.
- Setting up Cyclotron and radioisotope/radiopharmaceutical production facilities.
- Setting up irradiation facilities and using gamma radiation, electron beam and X-rays for varied applications such as tackling pollutants, wastewater treatment, sterilization of medical products, disinfestation of food grains, synthesis and characterization of advanced materials.
- Applications of radiation and isotopes in industrial process management as well as for preservation of cultural heritage artefacts.

Regular Programme Projects (RIRT)

Major programme 2. Nuclear Techniques for Development and Environmental Protection

Programme 2.5 Radioisotopes Production and Radiation Technology

Sub-programme 2.5.2 Radiation Technology Applications for Health Care and Cleaner Industrial Processes and Practices

PROJECTS:

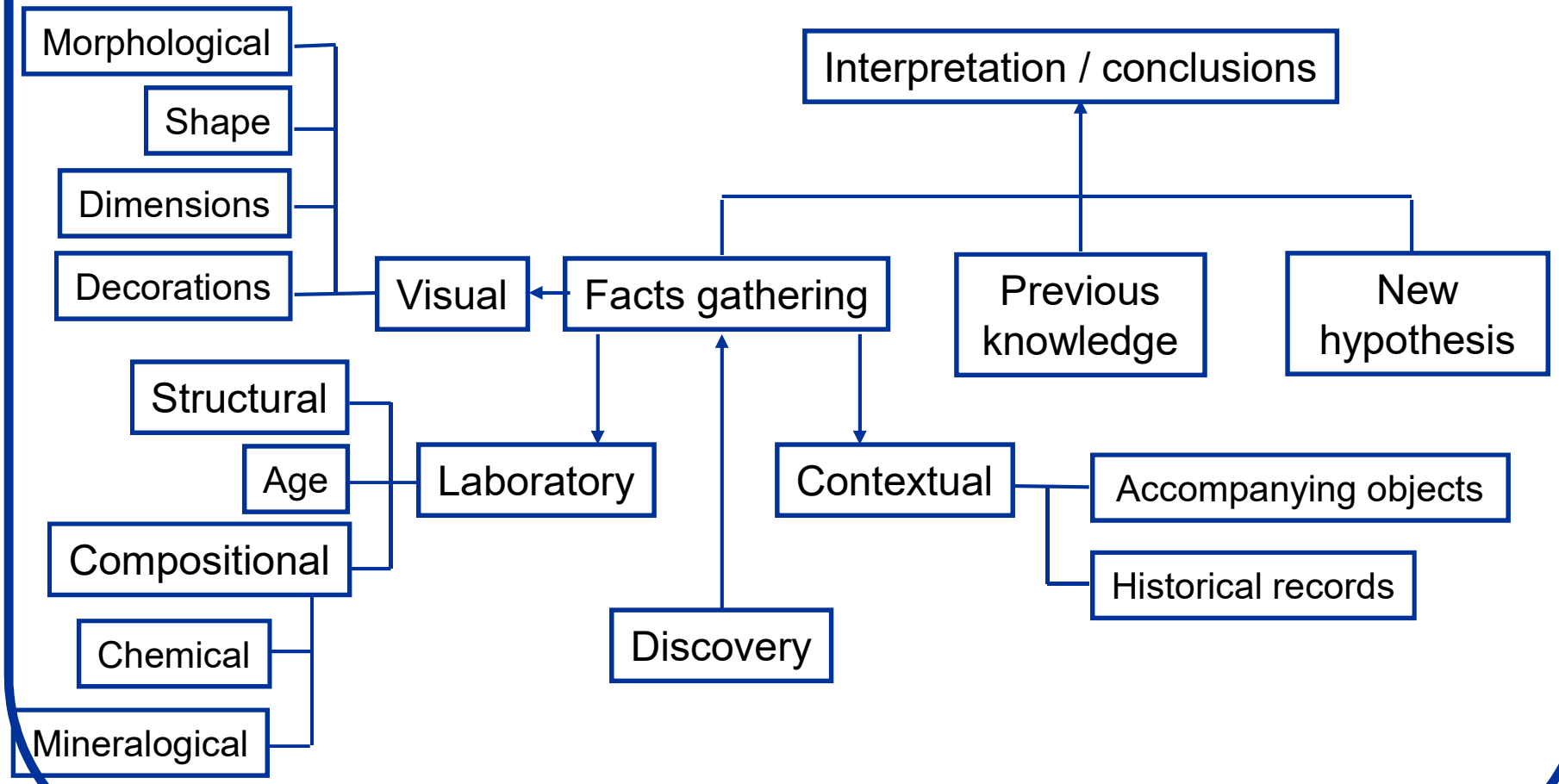
2.5.2.1 Industrial applications of radioisotopes and radiation techniques

Why to support CH studies?

- legacy of the past
- powerful beacon of cultural identity
- primarily composed of collectively owned goods

→ A proper characterization, conservation and transmission of this legacy to future generations is a responsibility of the whole society

Object characterization implies, among other actions…



Which techniques are considered as “nuclear”?

- All the methods aimed to measure radioactivity, either natural or induced
  - α, γ - spectroscopy, β counting, counters, dose-meters
  - NAA, PGAA, PIGE
- Techniques based in using some type of ionizing radiation to induce some interactions in the inspected samples and the further measurement of a response signal related to a particular property of the sample
  - x- ray spectroscopy (SEM-EDS, PIXE, XRF)
  - IBA techniques (PIXE, PIGE, RBS, ERDA, IIC, etc)
  - Synchrotron based techniques
  - X and n radiography
  - Dating techniques (^{14}C, TLD, PLD)

Which nuclear techniques can be applied to CH?

- **Comprehensive characterization**
  - **Age** — ^{14}C, Thermo and Photo-Luminescence, K-Ar
  - **Composition**
    - **Chemical** — NAA, XRF, IBA, RBS, SEM-EDS, PIGE
    - **Mineralogical** — XRD, SEM-EDS
  - **Structural**
    - Micro scale: SEM-EDS, μ–XRF, μ–PIXE, FFXRF, GIXRF, XRR
    - Macro scale: X-ray radiography, x, n -tomography
- **Conservation** — Radio-sterilization

Main advantages of nuclear techniques

- Applicable to a wide diapason of materials
- Non-destructive or minimal invasion/alteration of the sample
- Simple sample preparation (less contamination risks)
- In a number of cases, transportability to the object
- High selectivity and multi-elemental(compounds) capability
- Spatial resolution

IAEA activities

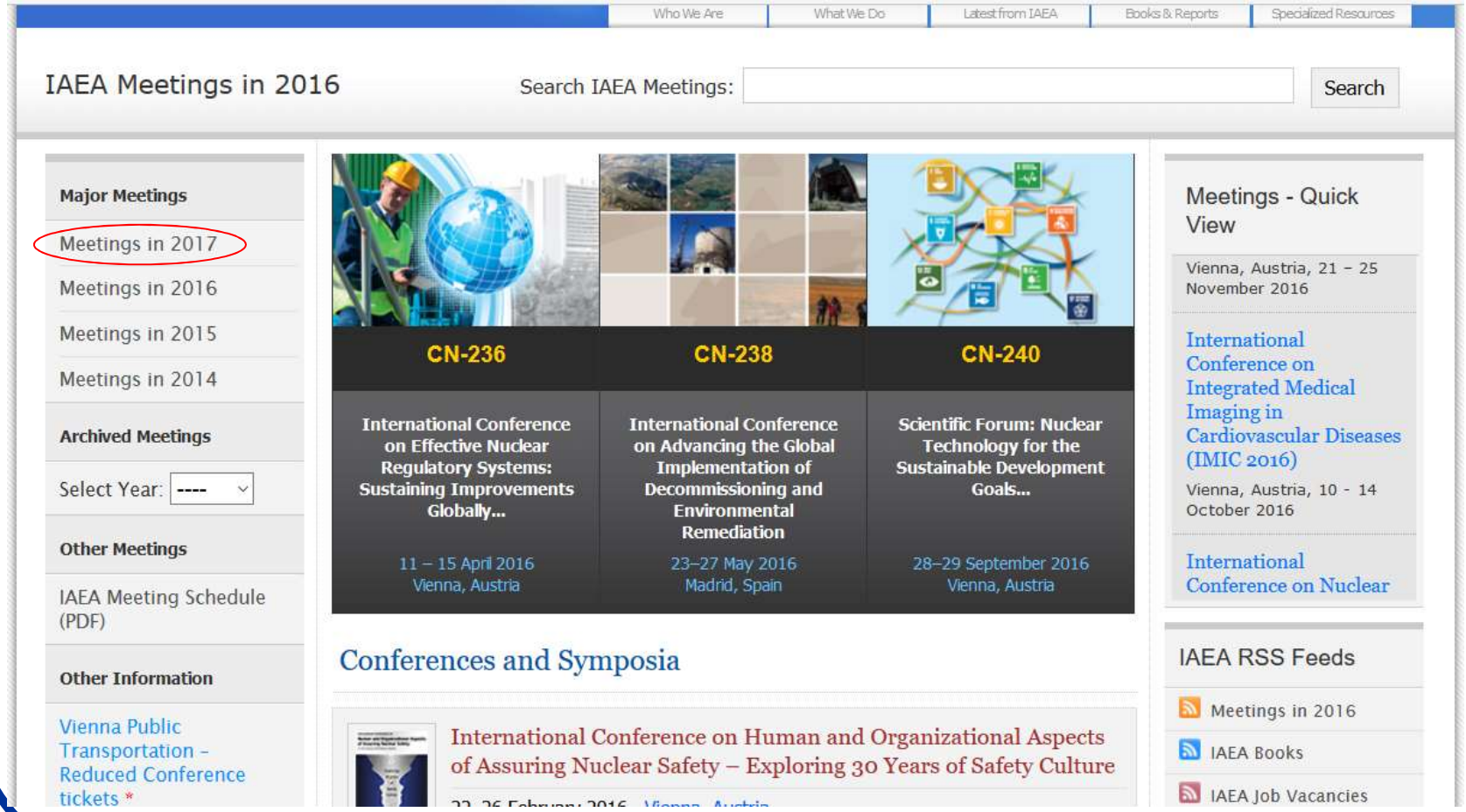
- Implemented under Regular Budget projects
  - Conceived from assessment of MSs needs/demands
  - Include:
    - Technical / Consultancy Meetings
    - Coordinated Research Programs
    - Publications
- Implemented under Technical Cooperation
  - Projects originate from MSs proposed concepts
  - Include:
    - National Projects
    - Regional Projects
    - Interregional

Meetings

- Consultancy Meetings
  - Bring together investigators to seek advice on technical insights of emerging, edge-cutting investigations in a particular field
  - Not announced publicly
  - Consultants are invited by technical sections, based on expertise
- Technical Meetings
  - To foster exchange of information on fields of applications that are of relevant interest for member states
  - Announced in IAEA website
  - Nomination by government is required
    - Limited funds available for support of participants from developing MSs

Technical Meetings are announced at...

http://www-pub.iaea.org/iaeameetings/



Coordinated Research

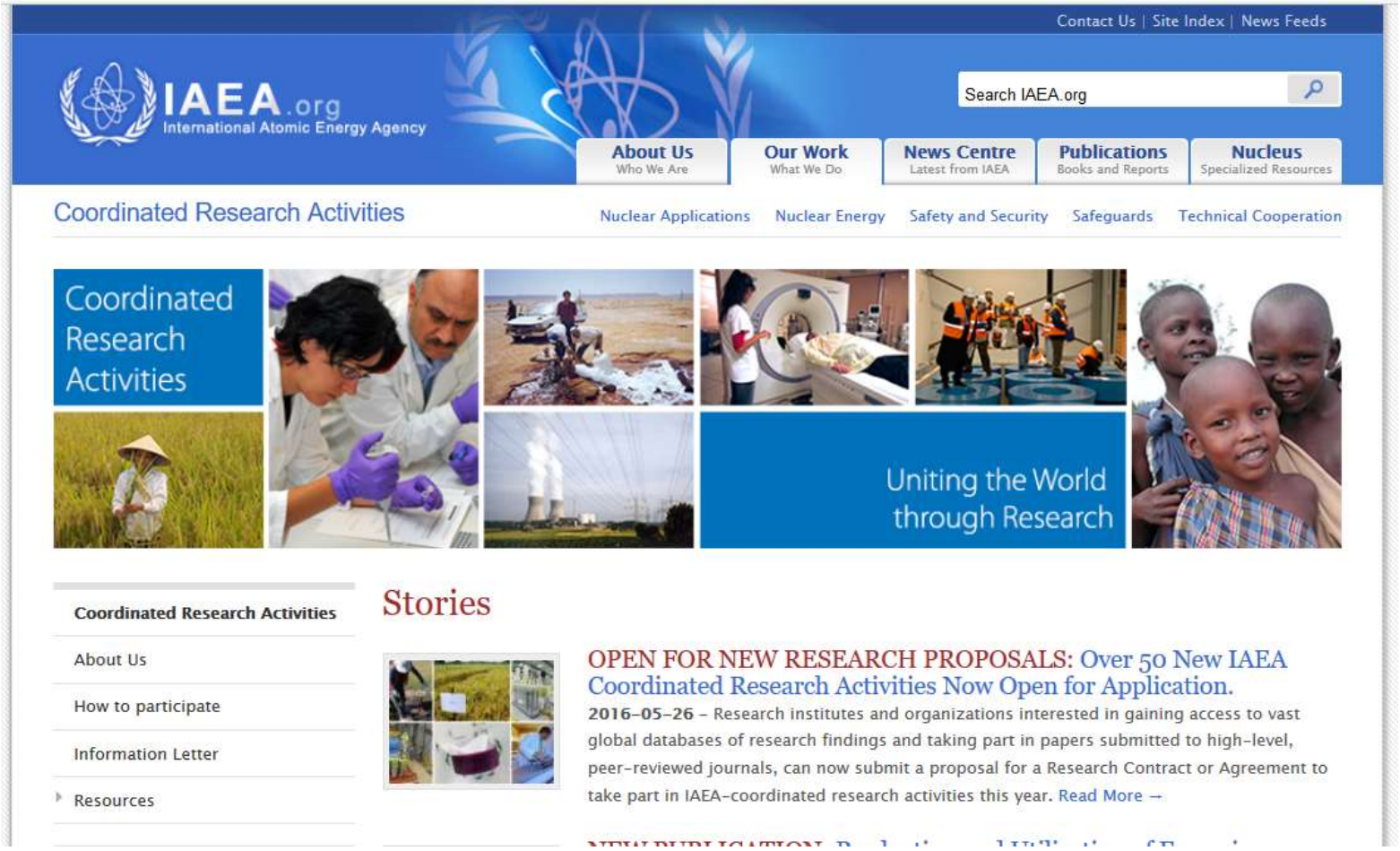
- Coordinated Research Projects

  bring together research institutions from its developing and developed Member States to collaborate on research projects of common interest

- Initiated at Technical Divisions based on recommendations from previous Consultancy and Technical Meetings

Information on CRPs is available at

http://cra.iaea.org/cra/index.html



Information on CRPs is available at

Coordinated Research Activities

- About Us
- How to participate
- Information Letter
- Resources

Explore CRPs

- All CRPs open for proposals
- All active CRPs
- All completed CRPs (last 5 years)
- Advanced Search

Forms

CRA Information Letter

Stories

OPEN FOR NEW RESEARCH PROPOSALS: Over 50 New IAEA Coordinated Research Activities Now Open for Application.

2016-05-26 – Research institutes and organizations interested in gaining access to vast global databases of research findings and taking part in papers submitted to high-level, peer-reviewed journals, can now submit a proposal for a Research Contract or Agreement to take part in IAEA-coordinated research activities this year. Read More →

NEW PUBLICATION: Production and Utilisation of Emerging Positron Emitters for Medical Applications with an Emphasis on Cu-64 and I-124 (F22049)

2016-03-16 – This publication presents the achievements of the CRP. It provides a comprehensive overview of the technologies involved in the production of copper-64 and iodine-124, techniques on preparation of targets, irradiation of targets under high beam currents, target processing, target recovery and labelling. Read More →

NEW CRP: Mutation Breeding for Resistance to Striga Parasitic Weeds in Cereals for Food Security (D25005)

2016-01-18 – This Coordinated Research Project will support generation of novel sources of variation, using mutation breeding, by developing efficient screening protocols for Striga resistance in cereals for building research capacity and improving food security in Member States. Read More →

NEW CRP: Application of Nuclear and Genomic Tools to Enable for

take part in IAEA-coordinated research activities this year. Read More →

Resources

Coordinated Research Projects

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
NAA in archaeological investigations ARG, BRA, CHI, CUB, MEX, PER, USA							Investigate the Authenticity of Art Objects: ARG, BRA, CUB, MEX, PER, CRO, GRE, LEB, SYR								2D and 3D Neutron Imaging ARG, AUL, BRA, BUL, CUB, EGY, GER, ITA, JAP, MAL, POL, POR, ROM, RUS, SAF, SWZ, THA, USA										
									Unification of nuclear spectrometry ARG, AUT, AUL, BEL, CRO, CUB, GER, GRE, ITA, SLO, UAE, USA				Microanalytical techniques: ARG, AUL, AUT, BEL, CRO, GRE, ITA, POL, POR, SLO, SAF, SRL, UKR, UAE, USA			Experiments with Synchrotron radiation GIXRF, TXRF, XRR, XAS						
											Large Sample Neutron Activation Analysis BRA, CHN, EGY, GHA, GRE, IND, JAP, MAL, NET, PER, ROM, RUS, SYR, THAI, USA												
														Improvement of portable instruments ARG, BEL, CUB, ITA, JAM, LEB, SYR, THA										

Completed Coordinated Research Projects

CRP Title:	Nuclear analytical techniques in archaeological investigations
Duration	1997-2000
Participating Countries:	Argentina(C), Brazil(C) (2), Chile(C), Cuba(C), Mexico(C), Peru(C), United States Of America(A)
Duration:	Start date: 1996-12-01 Closed date: 2000-12-14
Overall Objectives:	a) To promote interdisciplinary research between analytical chemists using nuclear analytical techniques and archaeologists in the Latin American region

Completed Coordinated Research Projects

CRP Title:	Nuclear analytical techniques in archaeological investigations
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Duration:	Start date: 1996-12-01 Closed date: 2000-12-14
Overall Objectives:	a) To promote interdisciplinary research between analytical chemists using nuclear analytical techniques and archaeologists in the Latin American region

On-going Coordinated Research Projects

CRP Title:	Experiments with Synchrotron Radiation for Modern Environmental and Industrial Applications
Participants	Australia, Austria, Germany, India, Indonesia, Italy, Poland, Spain, Thailand, United Arab Emirates, United States of America
Duration:	2014 - 2018
Overall Objectives:	expanding and strengthening the research capacity of MS in multidisciplinary applications of synchrotron radiation based X-Ray Spectrometry (XRS) techniques (40% of the beam time has been granted to the IAEA, accessible to end-users by the second semester of 2014) GIXRF, TXRF, XRR, XAS

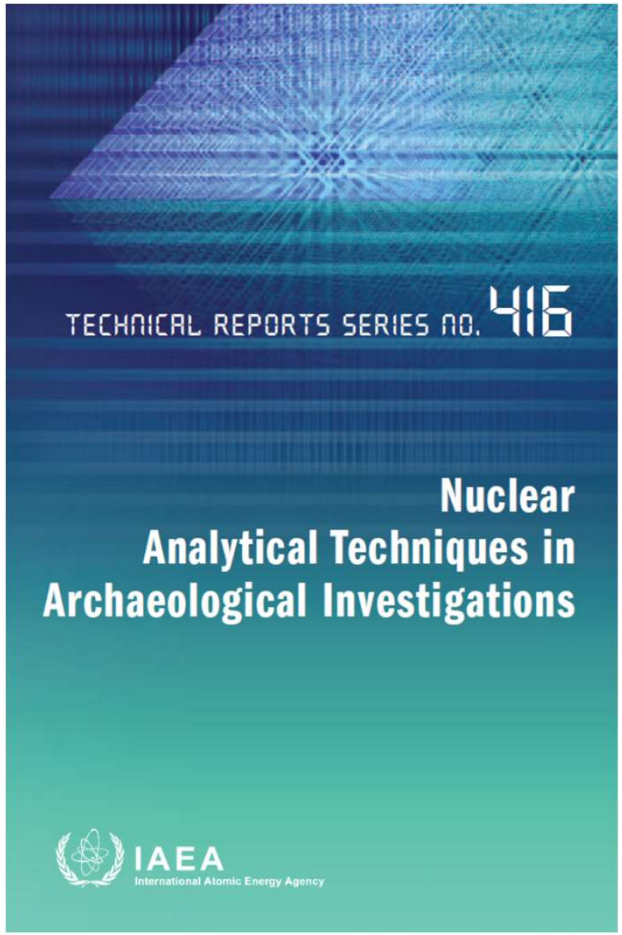
On-going Coordinated Research Projects

CRP Title:	Developing Radiation Treatment Methodologies and New Resin Formulations for Consolidation And Preservation of Archived Materials and Cultural Heritage Artefacts
Participants	Bangladesh, Brazil, Bulgaria, Croatia, Egypt, France, Iran - Islamic Republic of, Italy, Poland, Portugal, Romania, Tunisia, Turkey, Ukraine
Duration:	2015 - 2019
Overall Objectives:	Evaluating the effect of irradiation on the functional properties of such artefacts' base materials and minor constituents, as well as on post-irradiation effects and appropriate irradiation procedures for wider use of the technique

IAEA publications

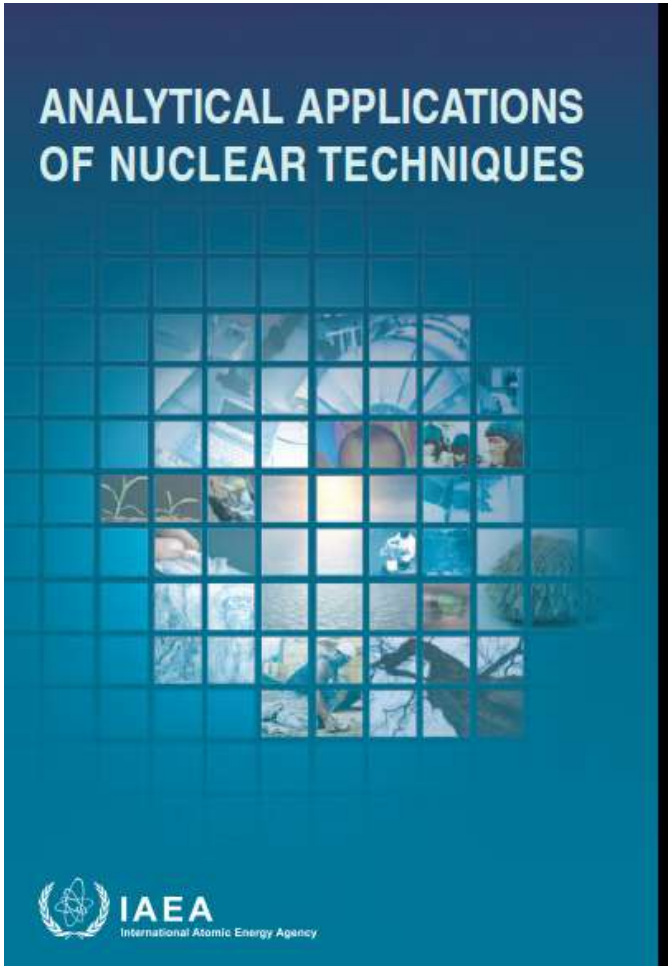
- Safety Standards
- Book series (technical)
- Nuclear energy series
- Nuclear Fusion Journal
- Conference proceedings
- Data publications
- Newsletters

IAEA publications related to CH studies



2003:
INAA method for ceramic paste analysis
Multivariate analysis of results
COUNTRY REPORTS

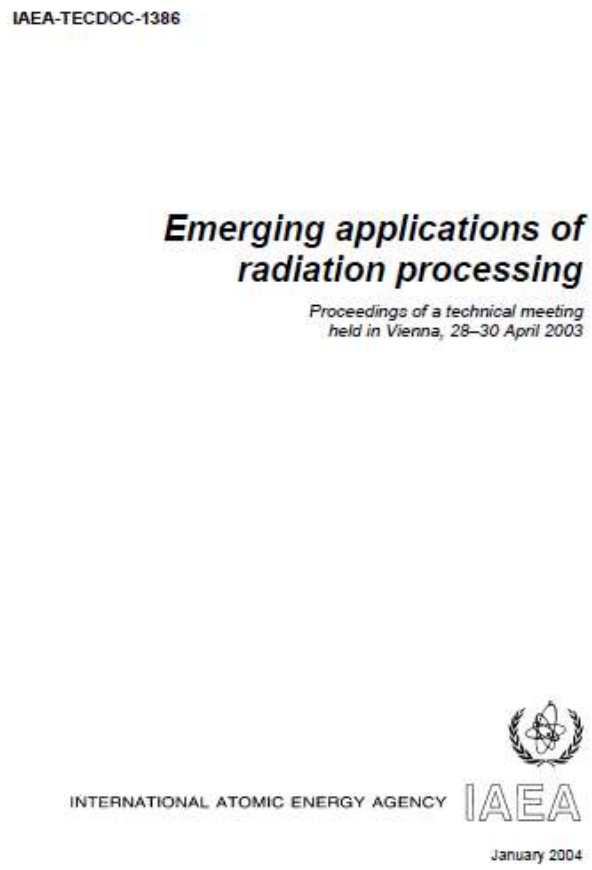
IAEA publications relevant to CH studies



2004:

Part VI
Non-destructive testing of art objects
Part VIII
Archaeological investigations

IAEA publications relevant to CH studies



2004:

- Role in sustainable development
- Prospect and developments
- Accelerator technology developments

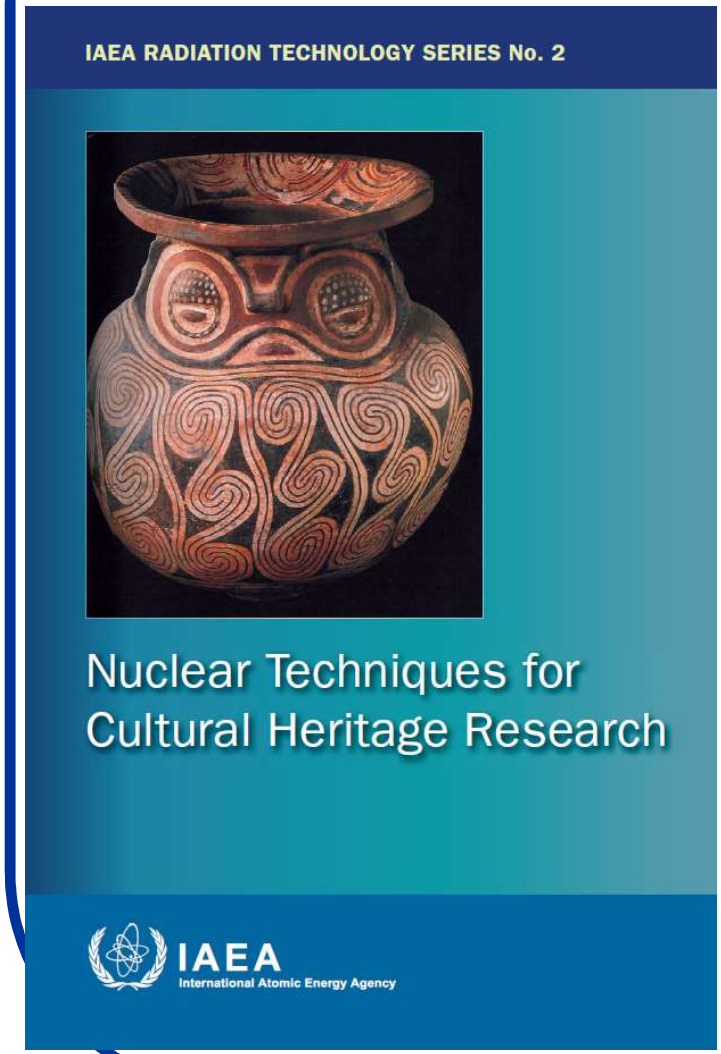
IAEA publications relevant to CH studies

2005:

COUNTRY REPORTS

- Novel quantitative procedures for in-situ XRF (μ-XRF for cultural heritage)
- In-situ characterization of paint layers of large art and archaeological objects
- Optimization of portable systems for EDXRF analysis of paintings
- In-situ XRF elemental analysis of art and archaeological objects

IAEA publications related to CH studies



2011:

PART I: OVERVIEW

CHAPTER 1. INTRODUCTION

1.1. Historical development

1.2. Conservation/restoration

1.3. Provenancing

1.4. Dating

1.5. Authenticity verification

1.6. Scope of the book

PART II: THE SCIENTIFIC METHODS USED IN CULTURAL HERITAGE RESEARCH

CHAPTER 2. CONSERVATION OF PAINTINGS

CHAPTER 3. PROVENANCING OF POTTERY

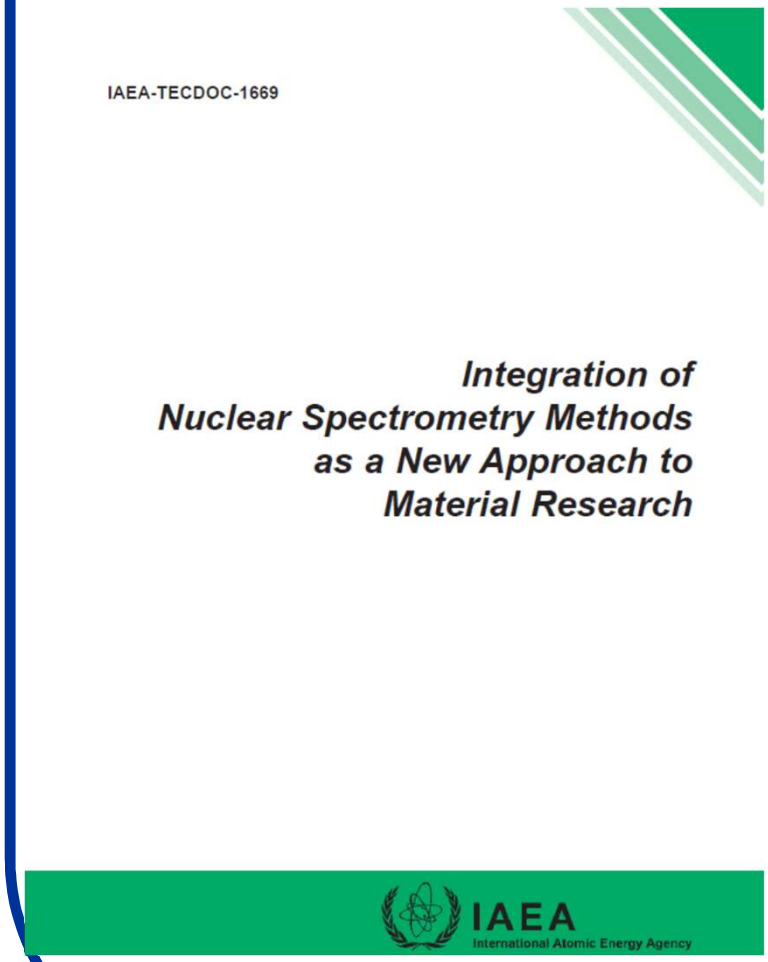
CHAPTER 4. DATING OF ARTEFACTS

CHAPTER 5. AUTHENTICITY VERIFICATION OF JEWELLERY AND COINAGES

CHAPTER 6. NEW DEVELOPMENTS IN NEUTRON RADIOGRAPHY

PART III: CASE STUDIES

IAEA publications relevant to CH studies

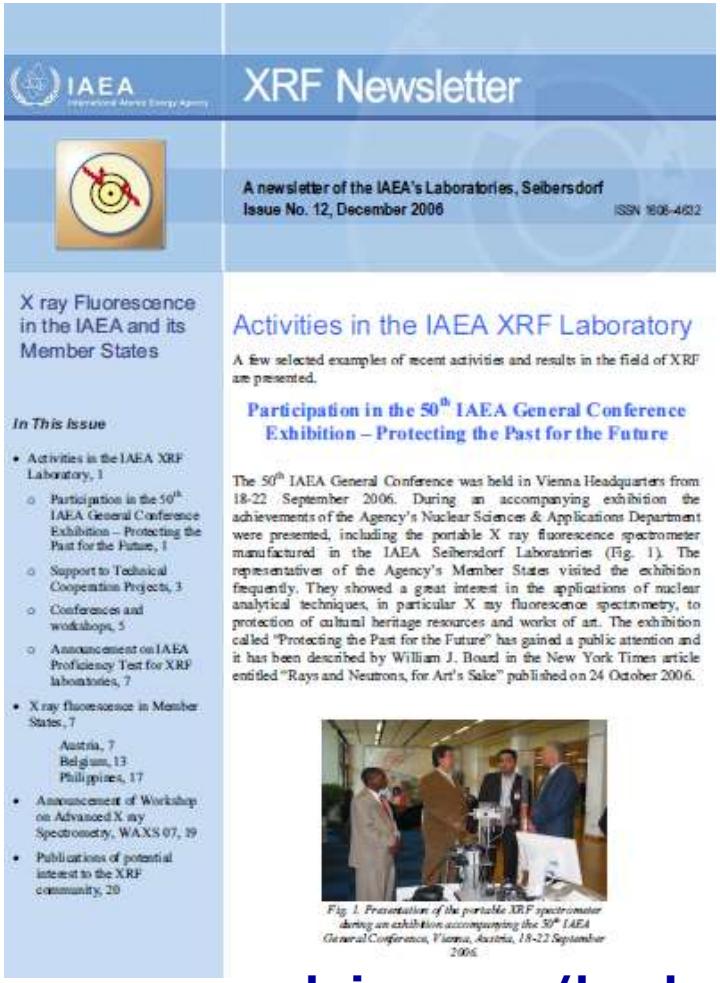


2011:

COUNTRY REPORTS

- Compositional correlation between pigments found in excavations and on human bones investigated with micro-raman spectrometry and scanning electron microscopy
- Black pigments of rock art: identification of inorganic and organic components by combining analytical techniques
- Combined use of μ-XRF, μ-XAS and μ-XRD for microanalysis of environmental and cultural heritage materials in two and three dimensions
- Integration of analysis techniques of different scales using x ray induced and electron induced x ray spectrometry for applications in preventive conservation and environmental monitoring
- Analysis of pre-columbian and contemporary gold alloys availing of EDXRF equipment

IAEA series relevant to CH studies



IAEA

XRF Newsletter

A newsletter of the IAEA's Laboratories, Seibersdorf
Issue No. 12, December 2006 ISSN 1606-4682

X ray Fluorescence in the IAEA and its Member States

In This Issue

Activities in the IAEA XRF Laboratory

A few selected examples of recent activities and results in the field of XRF are presented.

Participation in the 50th IAEA General Conference Exhibition – Protecting the Past for the Future

The 50th IAEA General Conference was held in Vienna Headquarters from 18-22 September 2006. During an accompanying exhibition the achievements of the Agency's Nuclear Sciences & Applications Department were presented, including the portable X ray fluorescence spectrometer manufactured in the IAEA Seibersdorf Laboratories (Fig. 1). The representatives of the Agency's Member States visited the exhibition frequently. They showed a great interest in the applications of nuclear analytical techniques, in particular X ray fluorescence spectrometry, to protection of cultural heritage resources and works of art. The exhibition called "Protecting the Past for the Future" has gained a public attention and it has been described by William J. Board in the New York Times article entitled "Rays and Neutrons, for Art's Sake" published on 24 October 2006.

Fig. 1. Presentation of the portable XRF spectrometer during an exhibition accompanying the 50th IAEA General Conference, Vienna, Austria, 18-22 September 2006.

XRF Newsletter:

Contents:

- *Activities at SEIB XRF laboratory*
- *Technical Meetings and CRPs*
- *Conferences and Workshops*
- *Support to Regional TC Projects*
- *Announcements*
- *Publications of potential interest*
- *XRF at Member States*

www-pub.iaea.org/books/IAEABooks/View_Newsletters/109/XRF-Newsletter

IAEA series relevant to CH studies

IAEA

XRF Newsletter

Newsletter of the IAEA Laboratories, Seibersdorf
Issue No. 26, April 2014 ISSN 1608-4632

X ray Fluorescence in the IAEA and its Member States

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Activities in the IAEA XRF Laboratory

A few selected examples of the recent activities and results in the field of XRF are presented.

Handheld XRF analysis of a 16th century Mexican Feather Headdress

Introduction

The 16th century feather headdress in the Weltmuseum Wien (WMW), an affiliated institution of the Kunsthistorisches Museum (KHM) in Vienna, is the most renowned of the few remaining pre-Columbian "Arte Plumaria" artefacts, which were made by feather artisans (Amanteca) using traditional techniques in the territory of present day Mexico [1]. The recorded history of the headdress begins in 1596, when it is first mentioned in the estate inventory of the art collection of Archduke Ferdinand II of Tyrol at Ambras Castle [2]. Due to its age, the variety of materials used, its history and former restoration treatments, the artefact is today one of the most sensitive and demanding care objects of the museum.

Fig. 1. Feather headdress from ancient Mexico (Photo: Christian Mender, February 2010, Kunsthistorisches Museum, Wien)

XRF Newsletter:
Issues describing MSs facilities & applications:

(2) BEL, HUN, POL; (3) SLO, SPA;
(4) PER, SPA; (5, 6, 7, 8) SPA; (7) GRE;
(9) ALB; (10) CUB. PER, SPA;
(11) CRO, GRE, POL; (12) BEL;
(13) SEIB, ITA, SPA; (14) ALB, CUB;
(15) POR; (16) ARG, GRE, SPA;
(17) SEIB, ITA; (18) BEL, POL, SPA;
(19) ALB, ARG, PER, SPA;
(20) PER, SPA; (21) SEIB, ITA; (22) SRB;
(23) UAE; (24) THA; (25) ITA; (26) ITA

IAEA series relevant to CH studies

XRF Newsletter: Detailed info on CH applications

(6) Collaborative "Bronze Art Project" (SEIB)
(8) In-situ analysis of bronzes by PXRF (SEIB)
(10) Transportable XRF spectrometer with poly-capillary optics and vacuum chamber (SEIB)
(15) Non-destructive elemental characterization in art and cultural heritage research (POR)
(18) Integration of analysis techniques of different scales using x ray induced and electron induced x-ray spectrometry for applications in preventive conservation and environmental monitoring
(18) Compositional characterization of ancient coins by means of XRF instrumentation
(21) NSAL 3D u-XRF for elemental imaging of paint layer composition in Roman period pplaster fragments
(22) Micro-XRF analysis of metal alloys: Addressing the problem of micro-scale heterogeneity
(25) Full Field XRF Imaging with High renerg abd spatial resolution (ITA)
(26) Handheld XRF analysis of a 16th century Mexican Feather Headdress

Technical Cooperation

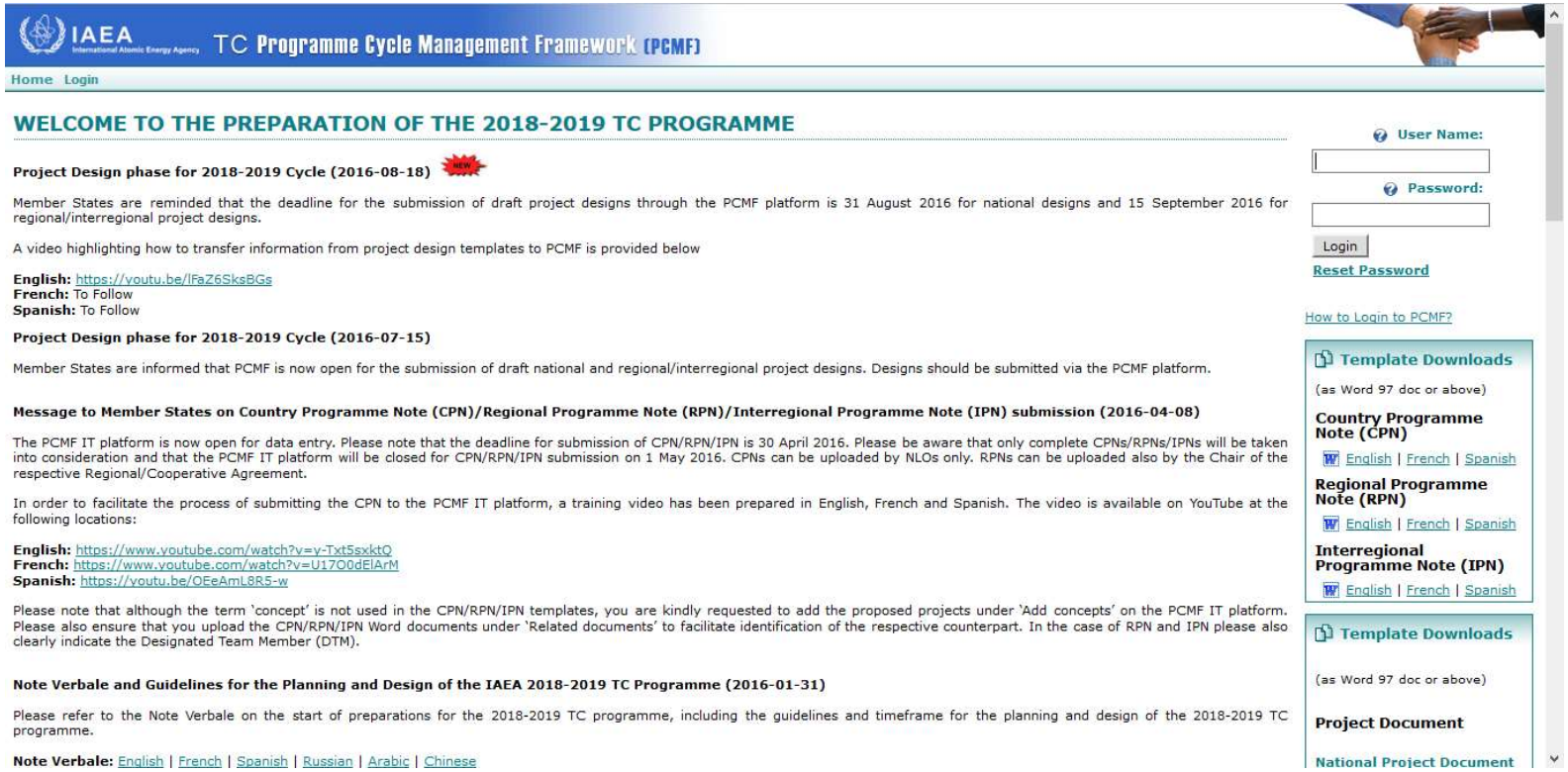
- Projects originate from MSs proposed concepts
  - National Projects
    - Any person can initiate a concept proposal
    - Prioritization set by national authorities
    - Number of national projects constrained by available funds
    - Aimed at introducing new techniques in support of solving a national need
      - Equipment
      - Human capacity building

Technical Cooperation

- Projects originate from MSs proposed concepts
  - Regional Projects
    - Concept proposals initiated by a DTM with support of other countries
    - Each participating team likely to represent the interest of a number of national institutions
    - Approved at Regional forum (ca. 200 – 400 kEur)
    - Aimed at fostering exchange of information
      - RTC
      - Provision of special materials and supplies
      - Harmonization of practices
        - Quality control

Proposal and design is made through web platform PCMF

http://pcmf.iaea.org/



Registration: TC-Project-Team.Contact-Point@iaea.org.

Technical Cooperation Projects

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
SYR1004: Dating Analysis and Preservation						MAK2005: Analysis and Preservation									LEB1009 Dating			
PER8013 : Analysis Conserv ation		CRO1005: Analysis and Preservation				UAE0006: XRF for Archaeol. Appl.									MAT1001 Capab. For CH			
						LEB1006: PIXE for Archaeol.												
				RLA8043 Databases		ALB2013: Conservation and Protection												
		RER1006: Protection CH Mediterranean				RER8015: Charact. & Preservation			RER0034 Charact. Preserv.		RER0039 Diversify ing		RLA0058 Cons & Preserv		RER1018 NDT		RLA	
				RAS1010 Acceler.		RAS1011: IBA									RAS1021 Preserv. Conserv.		RAS1023 IBA	

TC National Projects implemented

Code Year	Title	Objective
TUR2007 1982	Conservation of Archaeological Works	To support experiments on conversation of archeological works using radiation polymerization on the impregnating monomers)
SYR1004 2008	Nuclear Techniques for Dating Analysis and Preservation of Archaeological Materials	To promote and strengthen the use of the accelerator and miniature neutron source reactor (MNSR) facilities for dating and elemental composition analysis of archaeological artefacts.
MAK2005 2009	Establishing Nuclear Techniques for the Analysis and Preservation of National Cultural Heritage Objects	To improve national heritage conservation capabilities through establishing and making available to the restorers new techniques for characterization of the artefacts.

TC Regional Projects implemented

Code Year	Title Participants	Objective
RER0034 2012-2013	Enhancing the Characterization, Preservation and Protection of Cultural Heritage Artefacts ALB, AZB, BIH, BUL, CRO, CYP, GRE, HUN, LIT, MAT, MNE, MOL, POL, POR, ROM, SRB, SLO, TAD, TFYRM, TUR, UKR	To improve the characterisation, preservation, protection and authentication of cultural heritage artefacts by effective utilisation of nuclear analytical techniques and radiation technology
RER0039 2014-2015	Extending and Diversifying the Application of Nuclear Technology in Cultural Heritage ALB, ARM, AZB, BIH, BUL, CRO, CYP, GRE, HUN, KAZ, LAT, LIT, MAT, MNE, POL, POR, ROM, SRB, SLO, SLK, TAD, TFYRM, TUR, UKR	To enhance cultural heritage knowledge and its contribution to socioeconomic welfare

TC Regional Projects implemented

Code Year	Title Participants	Objective
RAS1010 2007-2010	Use of small accelerators as nuclear analytical tool in art and archaeology (ARASIA) IRQ, JOR, LEB, SAU, SYR, UAE	To support establishing the authenticity and provenance of objects of art and archaeology making use of Ion Beam Accelerators as nuclear analytical tool.
RAS1011 2009-2012	Using Ion Beam Analysis and Complementary Nuclear Techniques for Material Characterization in ARASIA State Parties IRQ, JOR, LEB, OMN, QAT, SAU, SYR, UAE, YEM	To enhance and promote the use of ion beam analysis and complementary nuclear techniques, such as X ray fluorescence, to study the characteristics of materials related to archaeology, and new elaborated materials. In some cases, samples related to environment will also be considered.
RAS1023 2018-2021	Harnessing Nuclear Science and Technology for the Preservation and Conservation of Cultural Heritage	To enhance the characterization, preservation and protection of cultural heritage artefacts

TC Regional Projects implemented

Code Year	Title Participants	Objective
RLA8043 2007-2010	Use of Nuclear Analysis Techniques and Development of Databases for Characterization and Preservation of National Cultural Heritage Objects (ARCAL XCIV) ARG, BRA, CHI, COS, CUB, ECU, MEX, PER	To contribute to the study and preservation of the national cultural heritage by providing analytical information for the characterization and contextualization of cultural heritage artefacts, through the collaborative use of facilities that are available for these purposes in Latin America
RLA0058 2016-2017	Utilización de técnicas nucleares en apoyo de la conservación y la preservación de los objetos de patrimonio cultural ARG, BOL, BRA, CHI, COS, CUB, DOM, ECU, MEX, PAN, PER, URU	Use of nuclear techniques in the field of CH promoted and harmonized in Latinamerica and the Caribbean region

TC Regional Projects planned

Code Year	Title Participants	Objective
RLA2018012 2020-2021	Using Nuclear and Radiation Technology to Characterize, Conserve and Preserve the Cultural Heritage of Latin America and the Caribbean	To use nuclear techniques / technologies efficiently to support cultural heritage preservation

TC Success stories

https://www.iaea.org/technicalcooperation/Pub/Suc-stories/

Presented at IAEA General Conference

2008: Europe **2009: LA** **2010: Croatia** **2012: Europe**

Concluding remarks

- IAEA has dedicated considerable resources to foster the use of nuclear techniques in the effective preservation of cultural heritage objects.
- Regional cooperation allows effective exchange of knowledge and harmonization in performance, as well as provides a framework to foster access to different facilities could enhance the regional capabilities
- National TC projects is a convenient strategy to strengthen analytical infrastructure
- Participants are encouraged to approach IAEA requesting the organization of dedicated Workshops, Technical meetings and CRPs

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Thanks for your time and attention…