

Competence Development of Research Reactors Personnel in Indonesia

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BATAN (National Nuclear Energy Agency of Indonesia)

Main duty:

to conduct government duties in the field of research, development and utilization of nuclear energy

Functions, among many:

- Doing Assessment and preparation of the national policies in the field of research, development and utilization of nuclear energy
- Facilitation and provision of guidance towards the activities of government institutions in the field of research, development and utilization of nuclear energy.

Nuclear Area in Pasar Jumat



Uranium Exploration area, Kalan of West Kalimantan



HQ
Jakarta



Sites of BATAN

Site
Observationn,
Central Java



Nuclear Area in Serpong



Nuclear Area in Bandung



Nuclear Area in Yogyakarta

Research Reactors of Indonesia



No	Research Reactor	Location	Power	Operation Commenced	Remarks
1	Triga 2000	Bandung	2 MW 1965: 240kW 1971: 1 MW 2000: 2 MW	February 20, 1965	Construction: 1 January 1964
2	Kartini (Karya Teknisi Indonesia)	Yogyakarta	100 kW 1979: 50kW 1981: 100kW	March 1, 1979	Construction: 13 November 1974
3	G.A. Siwabessy MPR	Serpong	30 MW	August 20, 1987	Construction: 1983



Triga 2000

Bandung



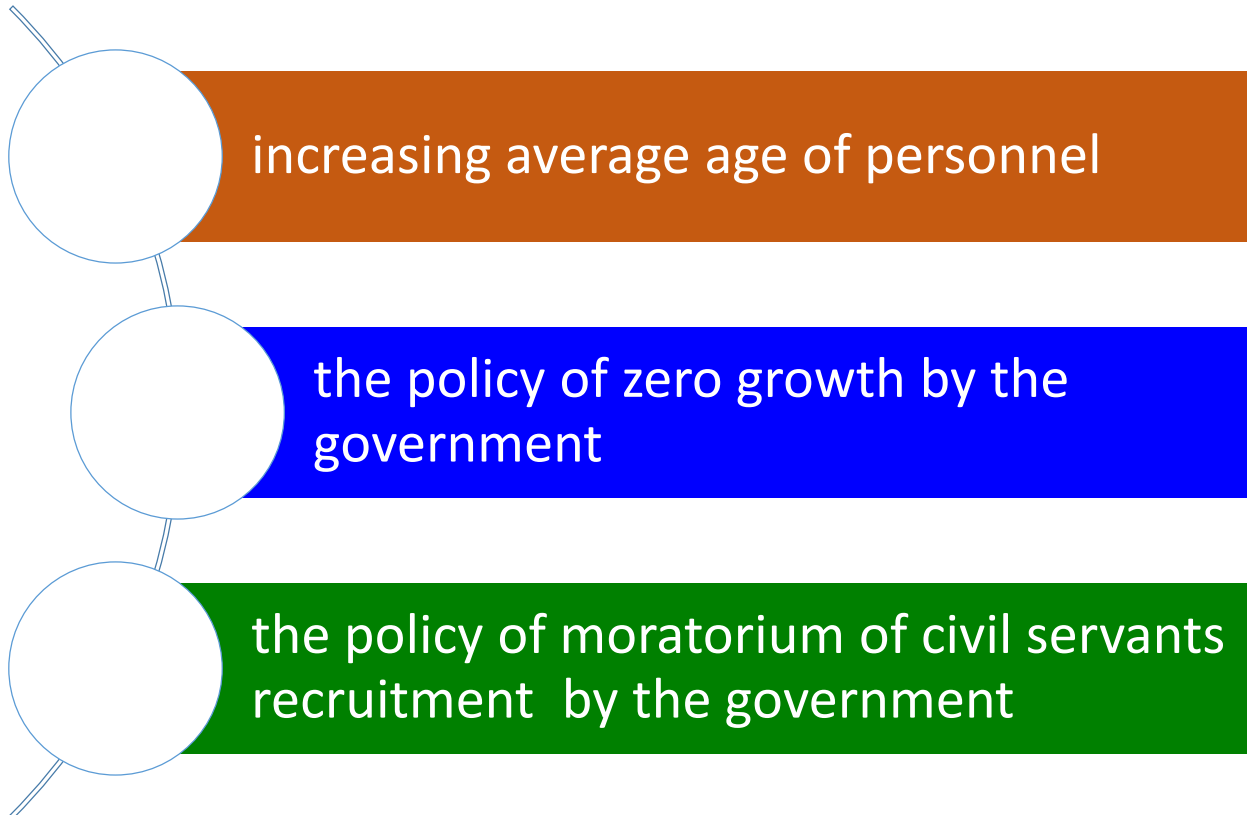
Kartini

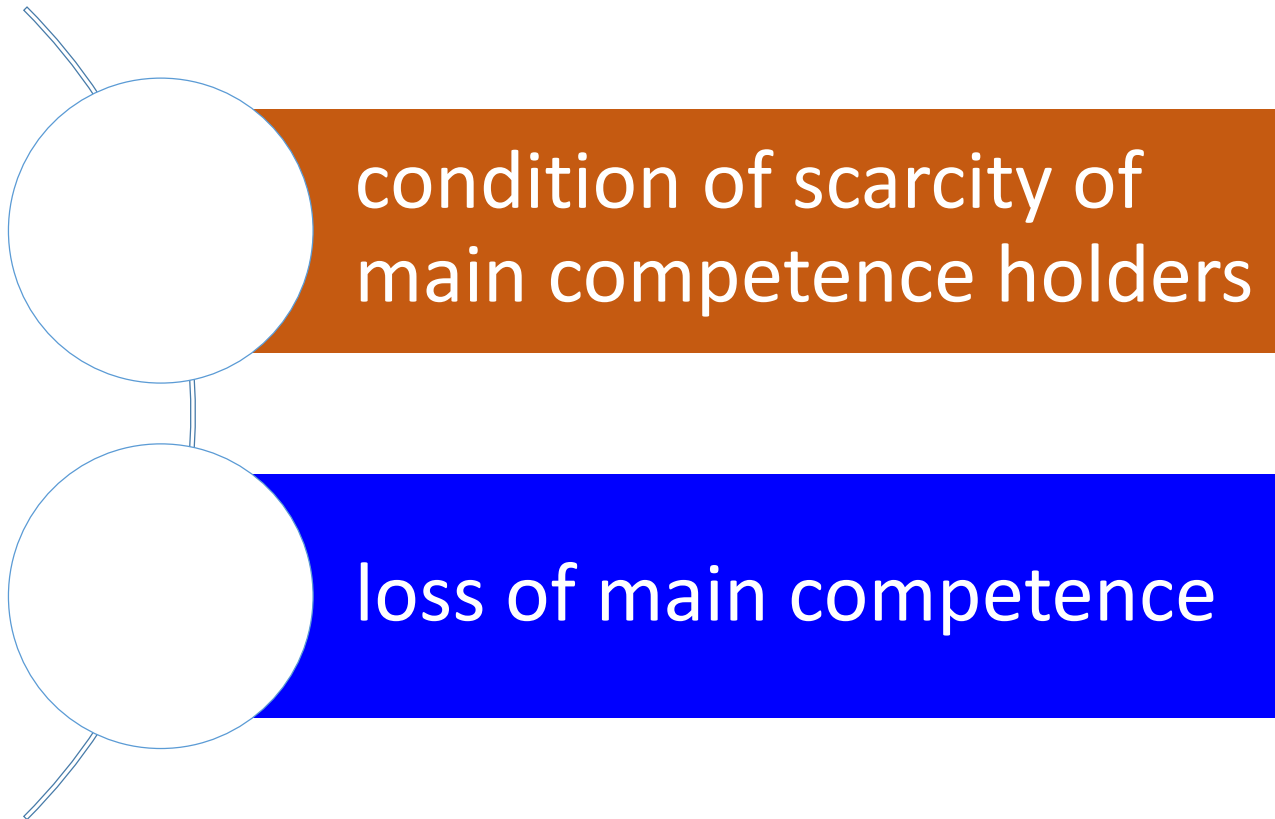
Yogyakarta



GA Siwabessy

Serpong





Outcomes of RR Personnel Competence Development



government
regulations are met

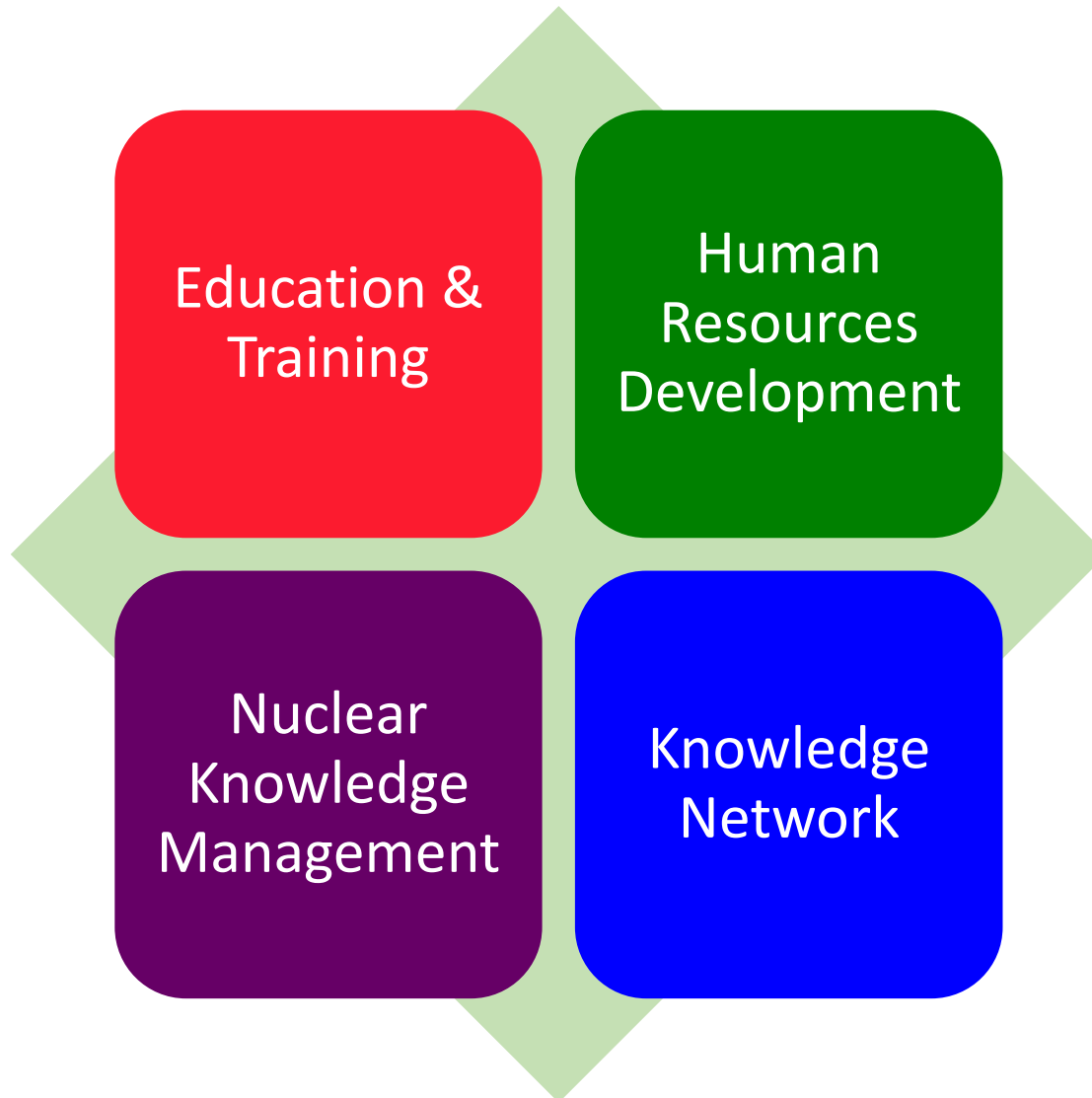
national programs
are still in place

critical knowledge
loss can be
prevented

knowledge
retention program
can be done

research reactors
can be operated in
a safe, secure and
sustainable

IAEA Concept for Nuclear Capacity Building



Objectives:

Education & Training

Building Competences

Preserving nat. comp. on NST

Public Outreach

Human Resources Development

Effective Human Capital Management

Nuclear Knowledge Management

Preserving NK

Preventing NK loss

Harvesting NK

Nuclear Network

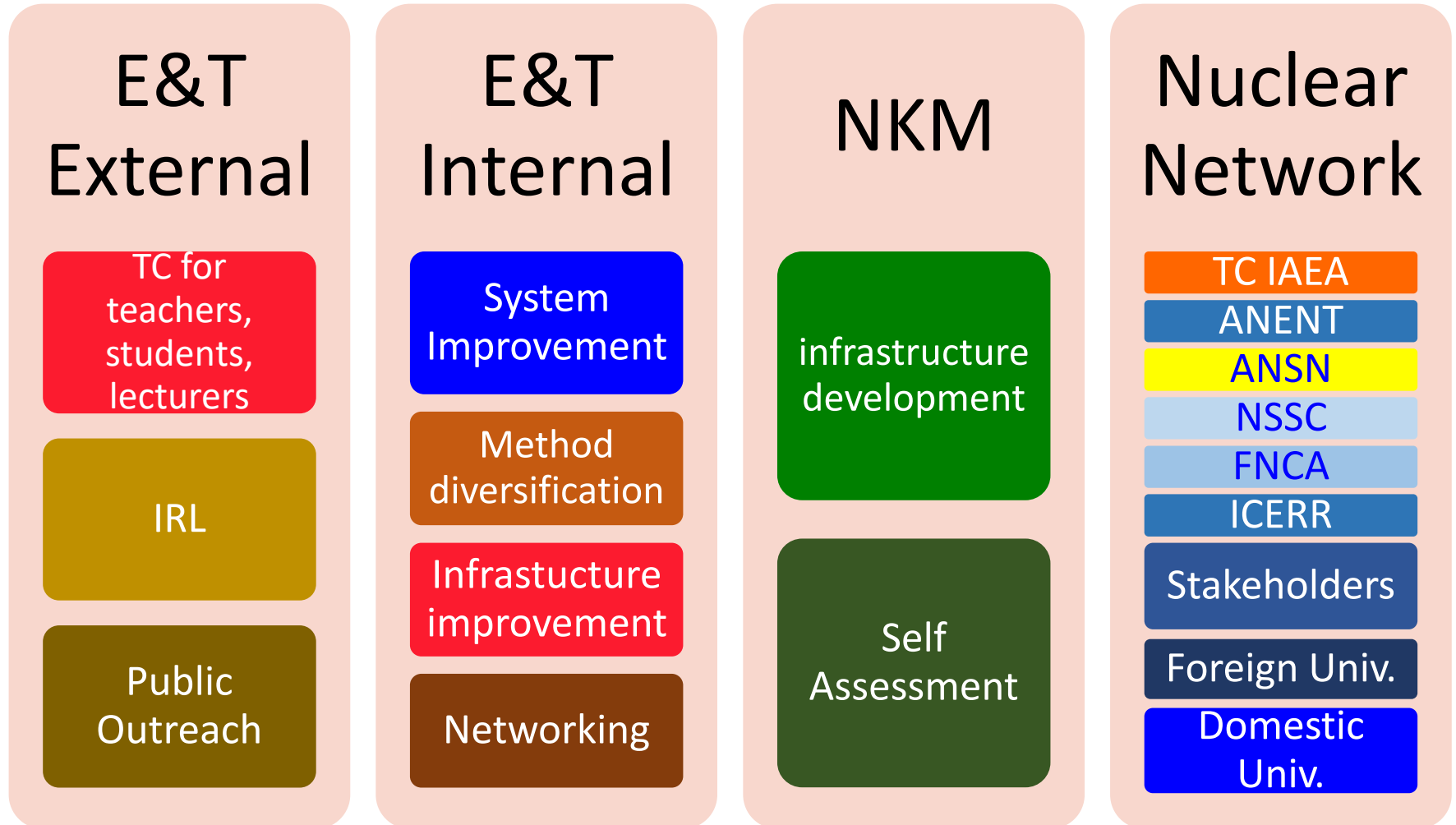
Building competencies

Stakeholders involvement

Public outreach

Increasing public support

Activities:



The self-assessment addressed four fundamental questions (NAMA):

- What is needed? (Need),
- What is available and adequate to meet the needs? (Availability),
- What is missing or needs improvement in order to meet the needs? (Missing/gaps), and
- What actions are needed? (Actions).

A

Manpower profile

B

Map of Knowledge

C

Transfer, Sharing and Dissemination of Knowledge

D

Critical Knowledge & Potential Knowledge Loss

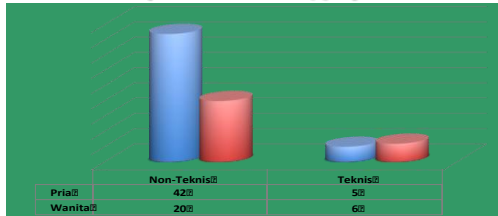
E

Program for Improvement

NKM Self-Assessment



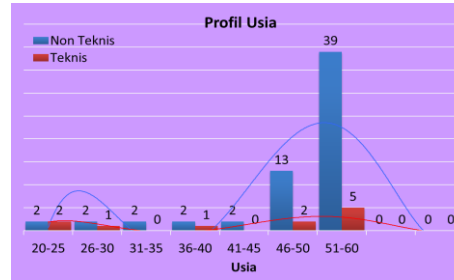
**Status Of Employees
(Based on Work Types)**



Total : 73 org Male : 49
 Management : 62 org Female : 26
 Technical : 11 org

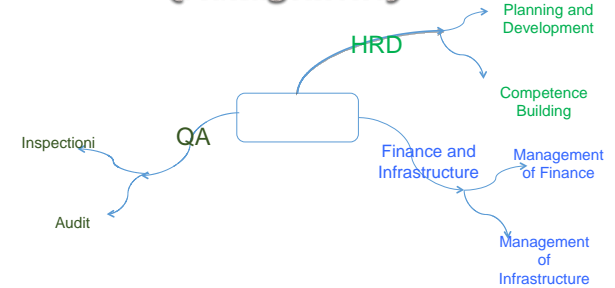
5

Age Profile



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**Knowledge Map: CET
(Management)**



Examples: CET- NKM Status

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Critical Knowledges



Needed, non-existent knowledge

- TOT : medical application of RIs
- TOT : Reactor Engineering

Existent, limited holders

- TOT: Radiografer Level 2 dan 3
- TOT: Radiation Protection
- TOT: Nuclear Instrumentation

Potential Knowledges Loss



TOT : Radiography Level 2 dan 3

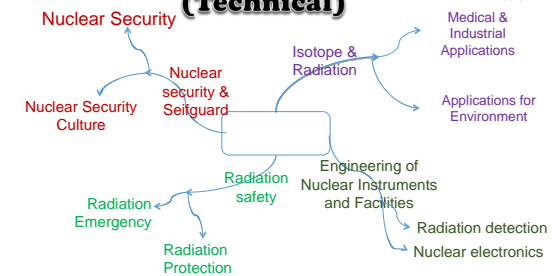
TOT : Radiation Protection

TOT : Nuclear Instrumentation

TOT : Teaching Methods, Learning materials development

Maintenance of nuclear radiation detectors

**Knowledge Map: CET
(Technical)**



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every personnel who works in nuclear research, development, and application should be provided with adequate training in certain level of competence.

- After completing the trainings, personnel have to get license from BAPETEN.
- training program is manage for all employees,
- a grading model is used to set priority,
- modalities of classical and non-classical are blended,
- utilizing network with partners.

Education

Formal education

Domestics/Foreign Universities

Training

Clasical: Face to Face

Non Clasical: *e-learning*, mentoring, distance learning, coaching, etc.

Elements	Value
National Program	5
Required for Certification of Personnel	5
International Cooperation	4
Potential Loss of Knowledge	4
Program of BATAN	4
Program of Technical Centers	3
Program for Dissemination/Outreach	2
Others	1

Training Scheme Research Reactor Personnel



Specialization	Topic of Trainings		
	Basic ~ 3 years	Junior 3 ~ 6 years	Senior 6 ~ years
Operation	Radiation Protection	Reactor Operator Reactor Kinetics and Dynamics Thermohydraulics Reactor Heat Transfer	Reactor Supervisor Radioactive waste management Safety of Installation Operation Reactor core modelling
Maintenance	Radiation Measurements Working Health and Safety	Operator of Maintenance Reactor Reactor Instrumentation System Reactor Controlling Technique	Supervisor Maintenance Reactor Safety of Installation Operation Design Reactor Control System
Safety	Basic of Nuclear Safety Safety Culture	Radiation Protection Officer Radioactive waste management Accounting of Nuclear Material Health and Safety Specific (Thermal, Electric, Mechanic etc)	Nuclear Safety Management Safety of Installation Operation Human Performance

Critical Knowledges and Knowledge with Potential Loss



RR	Critical Knowledge	Potential Knowledge Loss
A	Reactor core physics (Neutronic and Thermohydraulic Analysis), Radiation safety, Radiometric analysis, Process of radioisotopes (extraction of Tc-99m, Iodine-131, P-32, Br-82 etc.), Marked-substances production, Radiochemistry, Radiometric analysis, Treatment of TRIGA Instrumentation and Control Systems, Calculation of fuel burn-up	Calculation of reactor fuel burn-up, Neutron flux measurement, NDT for ageing management, Analysis and development of Neutronic and thermohydraulics, Nuclear Instrumentation
B	Reactor physics, Neutronic R & D, Reactor dosimetry, Core management, Reactor safety, Instrumentation and control, Reactor system technology, Operation and maintenance and utilization of reactor, Reactor technology, Reactor instrumentation and control.	Reactor Physics, Neutronic R & D, Reactor Dosimetry, Core Management, Reactor Safety, Instrumentation and Control, Reactor System Technology, Operation and Maintenance, and Utilization of Reactor Safety and security of radiation, nuclear and safeguard, Safety of transportation of radioactive substances and nuclear materials, Engineering of nuclear devices and facilities, Chemical process engineering
C	Accounting of nuclear materials and reactor irradiation services, Electrical, Mechanical, Instrumentation and reactor control, Waste control of reactor facilities, and Safety of reactor operations	Radioactive waste control of reactor facilities, Pre and post irradiation services

Penentuan Prioritas



Terkait Perizinan

Terkait Program Prioritas Nasional

Terkait Program Prioritas BATAN

Terkait Komitmen Kerja Sama

Terkait pengetahuan berpotensi hilang

Layanan Publik

Actions for Preventing or mitigating potential loss of knowledge



Training program is focused on the subjects of knowledge with potential loss.

Managing coaching and mentoring on the subjects of knowledge with potential loss.

Knowledge sharing program by personnels who will be retired in 2-3 years ahead.

Intensifying utilization of knowledge network with the IAEA, ICERR and others.

Request the IAEA to support the implementation of nuclear knowledge management (NKM).

- Competence development of research reactors (RR) personnels in Indonesia is very important in order to operate and maintain the research reactors in safe, secure and sustainable manner.
- A training scheme for RR personnels has been established and implemented in regular basis to be in compliance with the regulation.
- A self assessment on human reources has been done and the result showed indication of demotivation and decline in employee competence since there are no major programs in the last 25 years, ageing of employees because of moratorium program for new recruitment, limited competency budgets, as well as existence of potential of knowledge lost.
- In order to handle the possible occurrence of knowledge loss, BATAN takes a policy and plan incorporating policies on education and training, knowledge sharing, knowledge network, as well as NKM

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