Competence Development of Research Reactors Personnel in Indonesia

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INTRODUCTION

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.

Sites of BATAN

HQ
Jakarta

Nuclear Area in Pasar Jumat

Uranium Exploration area,
Kalan of West Kalimantan

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

Bandung

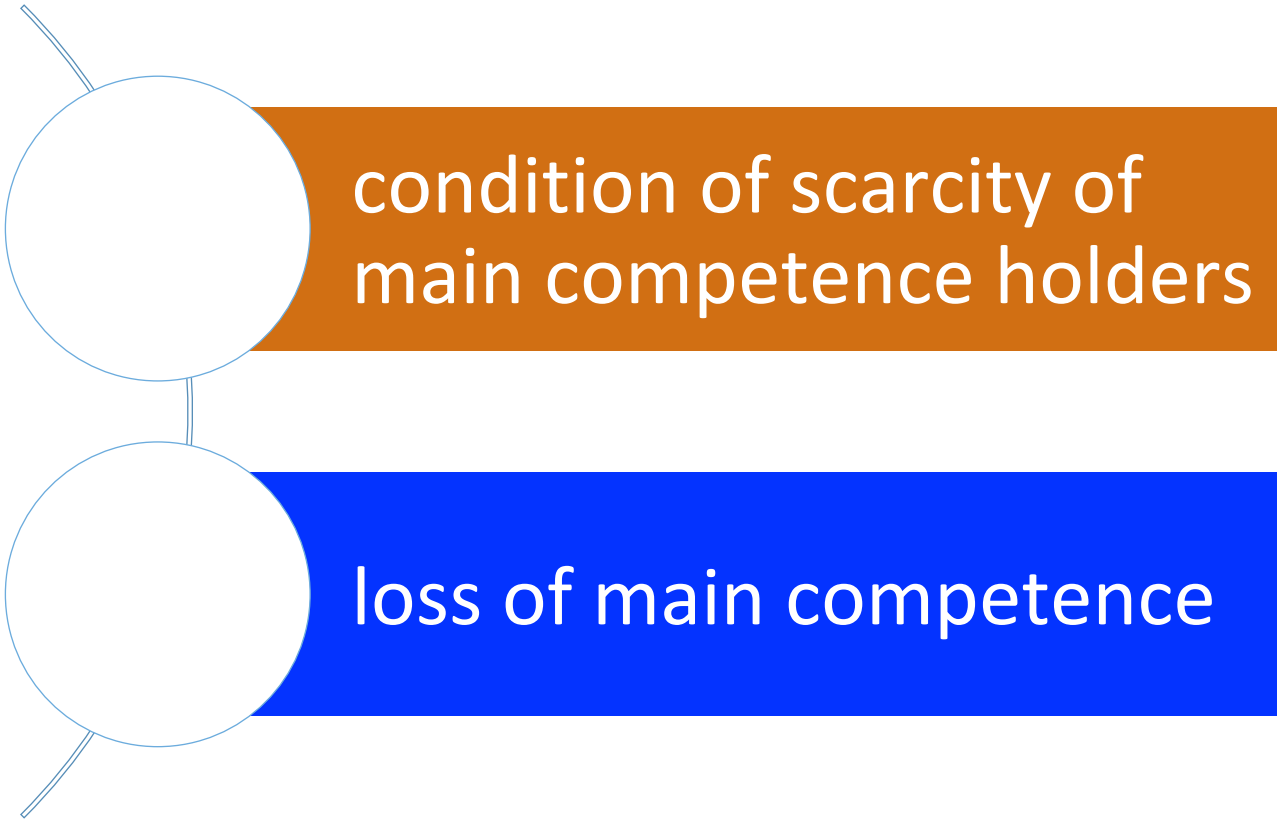
Yogyakarta

Serpong

Issues on human resources

- increasing average age of personnel
- the policy of zero growth by the government
- the policy of moratorium of civil servants recruitment by the government

Impact of human resources policy



Outcomes of RR Personnel Competence Development

government regulations are met

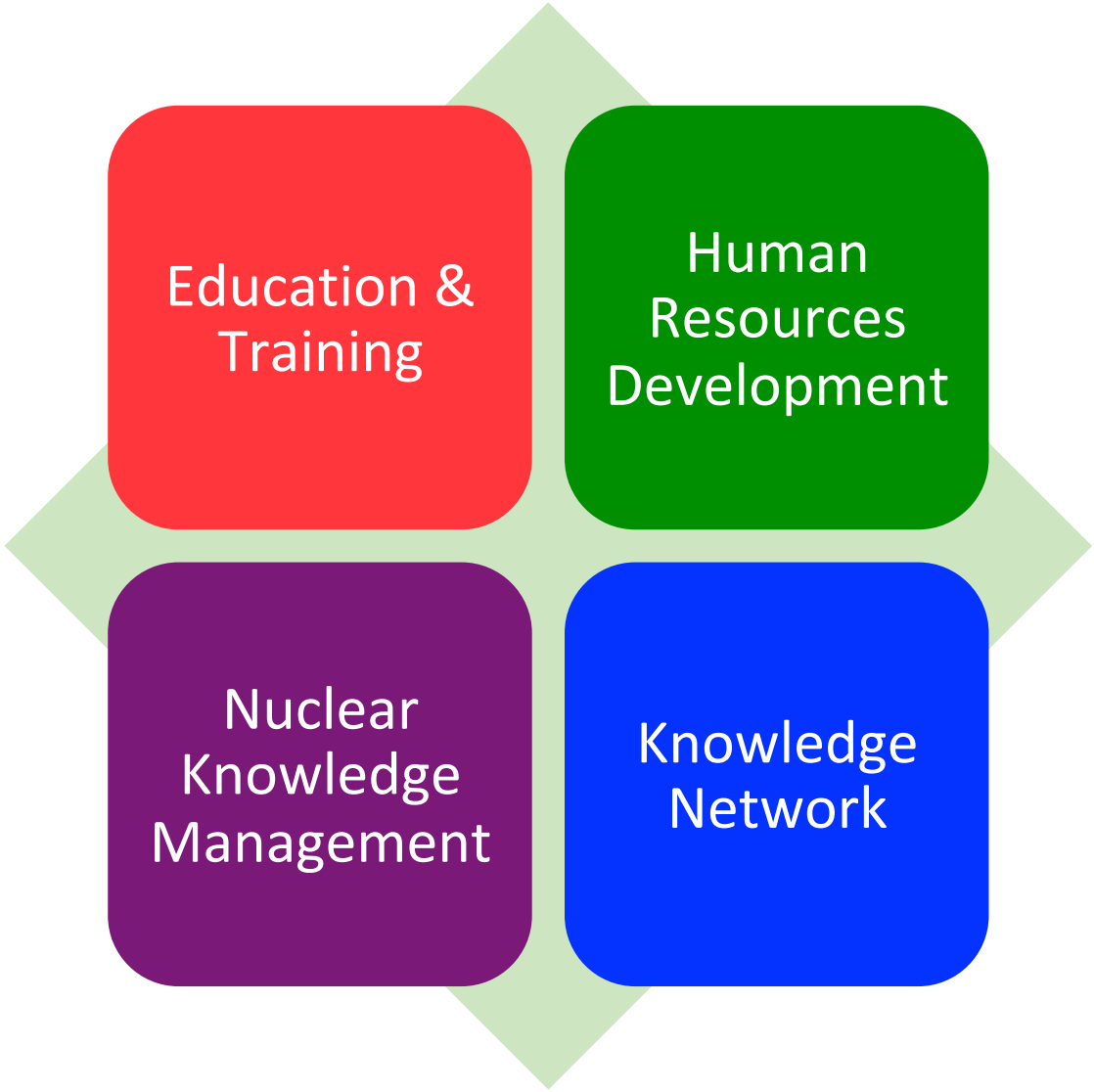
national programs are still in place

critical knowledge loss can be prevented

knowledge retension program can be done

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

IAEA Concept for Nuclear Capacity Building



Capacity Building of BATAN

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 for Capacity Building of BATAN

Activities:

E&T External

- TC for teachers, students, lecturers
- IRL
- Public Outreach

E&T Internal

- System Improvement
- Method diversification
- Infrastucture improvement
- Networking

NKM

- infrastructure development
- Self Assessment

Nuclear Network

- TC IAEA
- ANENT
- ANSN
- NSSC
- FNCA
- ICERR
- Stakeholders
- Foreign Univ.
- Domestic Univ.

NAMA self-assessment

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

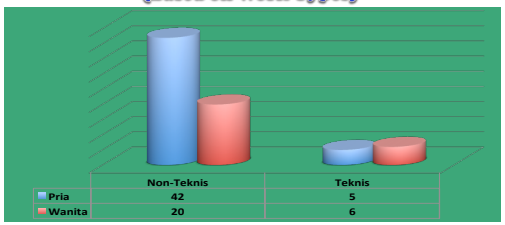
- What is needed? (Need),
- What is available and adequate to meet the needs? (Availability),
- What is missing or needs improvement in order to meet the needs? (Missing/gaps), and
- What actions are needed? (Actions).

NKM Self-Assessment

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		

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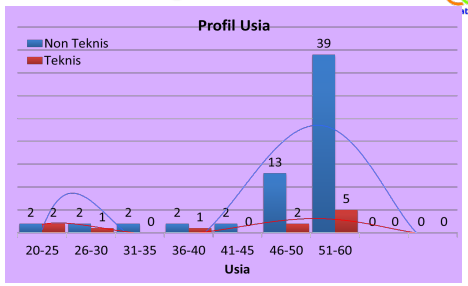
Age Profile



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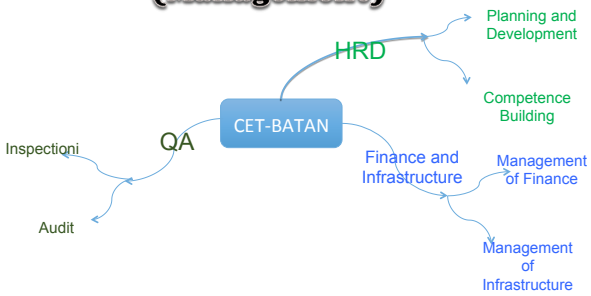
Knowledge Map: CET (Management)



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Examples: CET- NKM Status

Critical Knowledges

Needed, non-existent knowledge

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

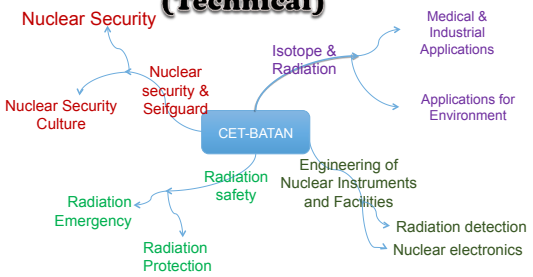
Existent, limited holders

- 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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Training Policy

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.

Modalities for Competencies Development

Education

- Formal education
- Domestics/Foreign Universities

Training

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

Grading Model

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 Radiation Measurements Working Health and Safety Basic of Nuclear Safety Safety Culture	Reactor Operator Reactor Kinetics and Dynamics Thermohydraulics Reactor Heat Transfer	Reactor Supervisor Radioactive waste management Safety of Installation Operation Reactor core modelling
Maintenance		Operator of Maintenance Reactor Reactor Instrumentation System Reactor Controlling Technique	Supervisor Maintenance Reactor Safety of Installation Operation Design Reactor Controll System
Safety		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 (Neutronik and Thermohydraulic Analysis), Radiation safety, Radiometric analysis, Process of radioisotopes (extraction of Tc-99m, Iodium-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

Grading for Priority

- Related to License
- National Pogram
- BATAN Program
- Cooperation
- Potential of Knowledge Loss
- Training for Public

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.
- Intesifying utilization of knowledge network with the IAEA, ICERR and others.
- Request the IAEA to support the implementation of nuclear knowledge management (NKM).

Conclussions

- 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

Terima Kasih

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