Capacity building in Nuclear Area with Particular Emphasis on Nuclear Power Plant Introduction

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IAEA INS0020 Technical Cooperation Project

National Workshop on Industrial Involvement and Discuss and Update the Infrastructure Status

24th to 27th February 2020

Jakarta, Indonesia

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1
Introduction

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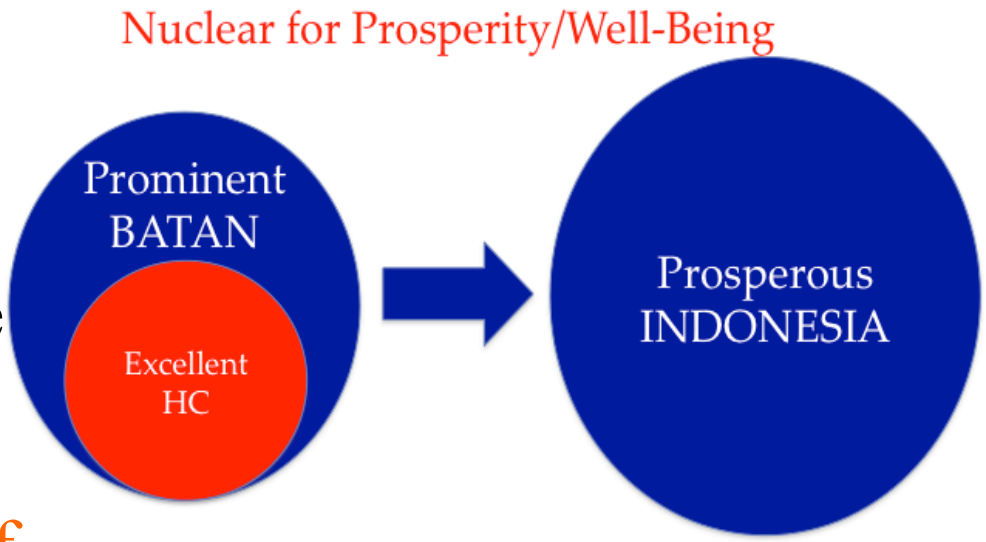
Introduction

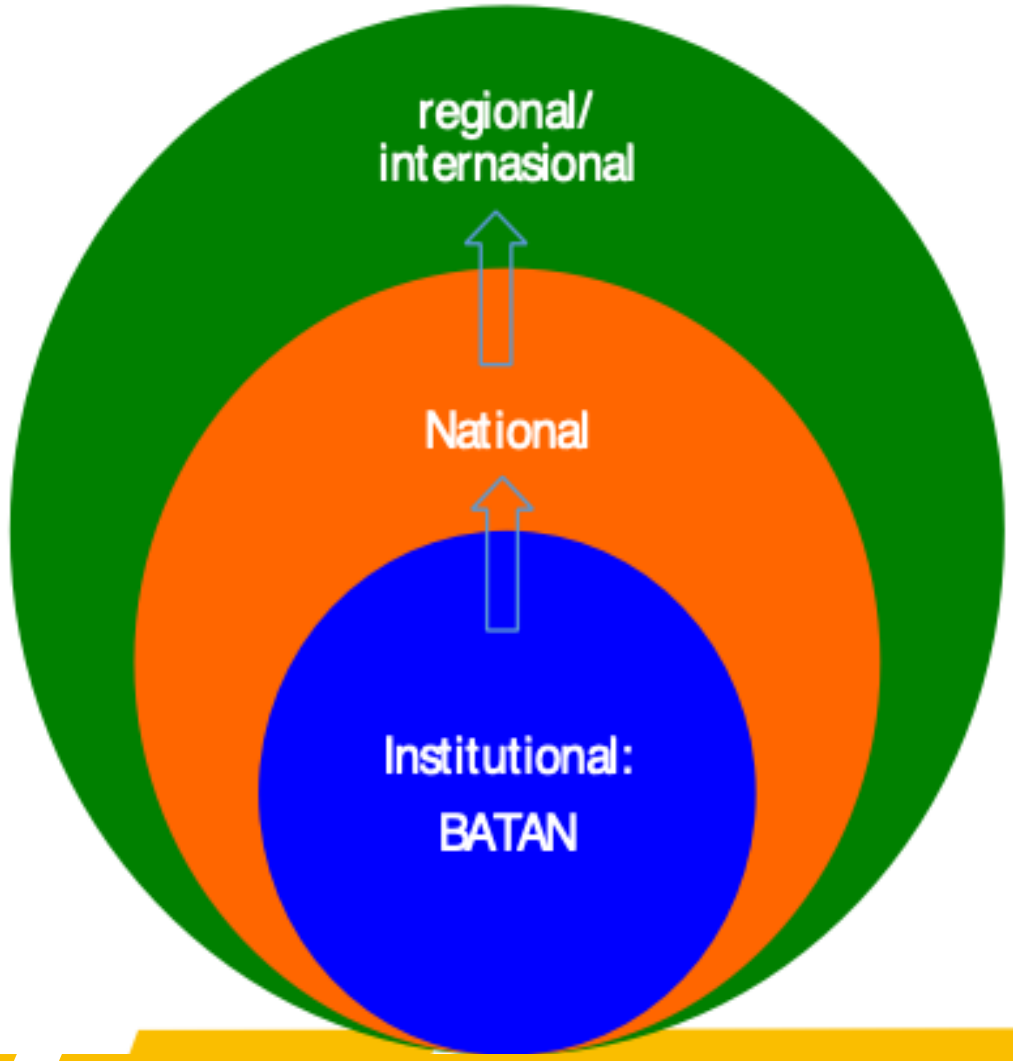
Human is the important element for BATAN to implement governmental functions/tasks on research, development, engineering & utilization of nuclear science and technology for the well-being of the people of the nation through the process of Plan, Do, Check, Act (PDCA)

- Safe, Secure, Sustainable
- Continuous improvement



Introduction

- BATAN holds roles of capacity building on institutional and national level, and may contribute to regional and international communities



2
National Policy on Nuclear Sector

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Basic Policy

National Policy on Nuclear Utilization

- Peaceful usage
- Regulated and controlled by the Government
- To ensure health and safety of the worker and public, and to protect the environment

Separation of Roles

(The ACT NO. 10 YEAR 1997)

PROMOTING BODY

BATAN

- research and development,
- general investigation, exploration and exploitation of nuclear minerals
- production of raw materials for manufacturing and production of nuclear fuel,
- radioisotope production for research and development, and
- radioactive waste management

REGULATORY BODY

BAPETEN

- Regulation
- License
- Inspection

3
Capacity Building

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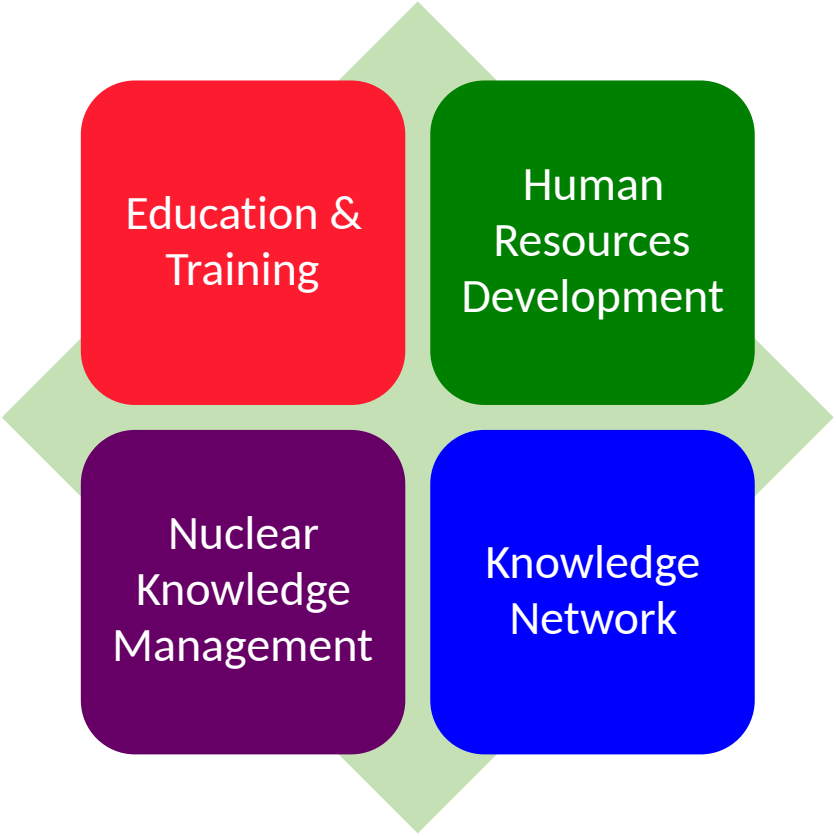
IAEA Capacity Building

- BATAN has been developing and implementing an integrated capacity building program to support national nuclear program in Indonesia based on the IAEA capacity building concept consists of education and training (ET), HRD, NKM, and nuclear network.



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 competences
- Stakeholders involvement
- Public outreach
- Increasing public support
- Teaching Material sharing
- Experst exchange

Capacity Building Activities of BATAN

E&T External

- PINT
- TC for stakeholders
- Information Sharing
- Public Outreach

E&T Internal

- System Improvement
- Method/ Modality diversification
- Infrastructure improvement
- Networking

HRD

- Information system Development
- Talent Management

NKM

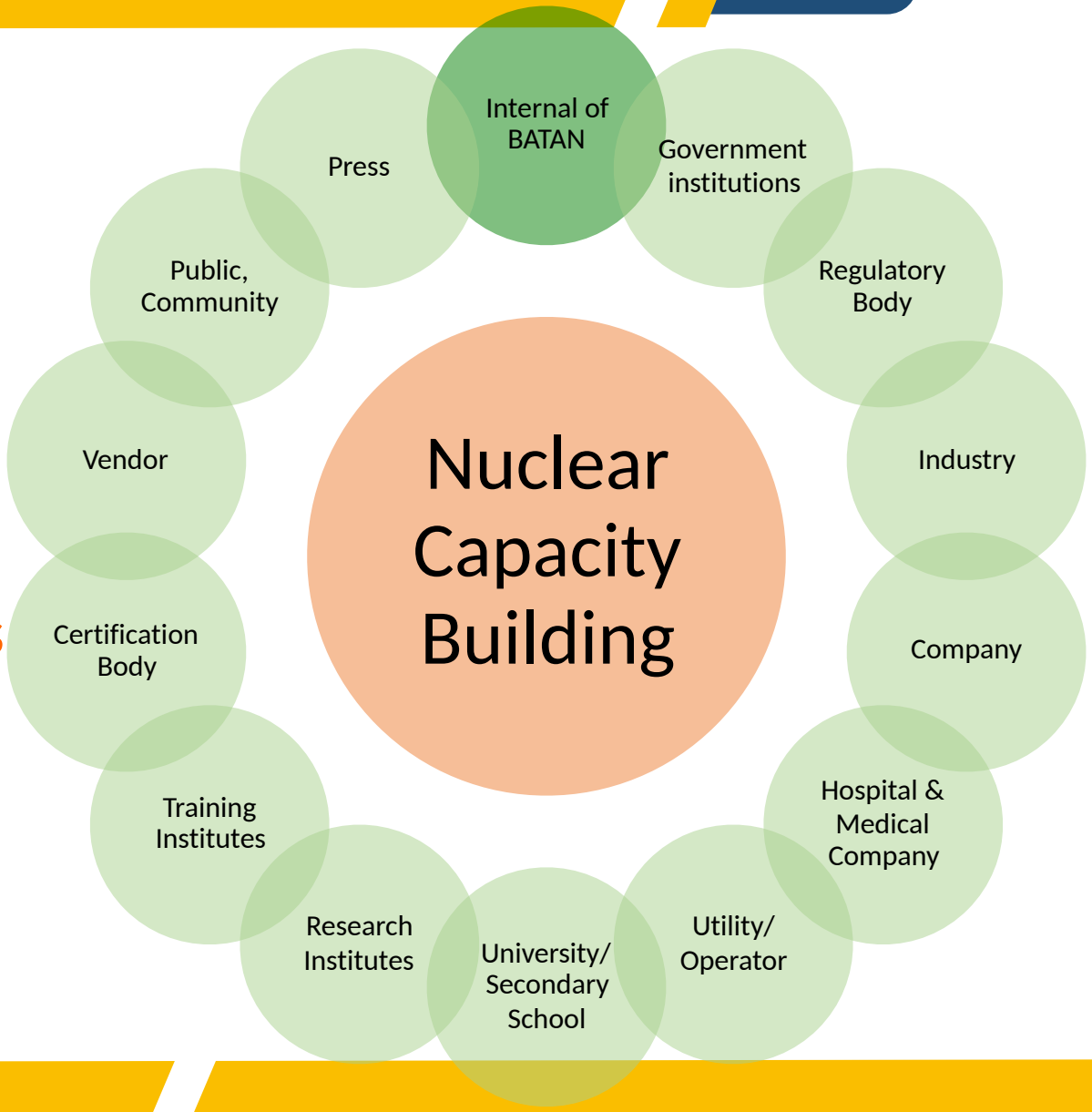
- Program Development & Implementation
- Infrastructure development
- Program Monitoring & Evaluation

Nuclear Network

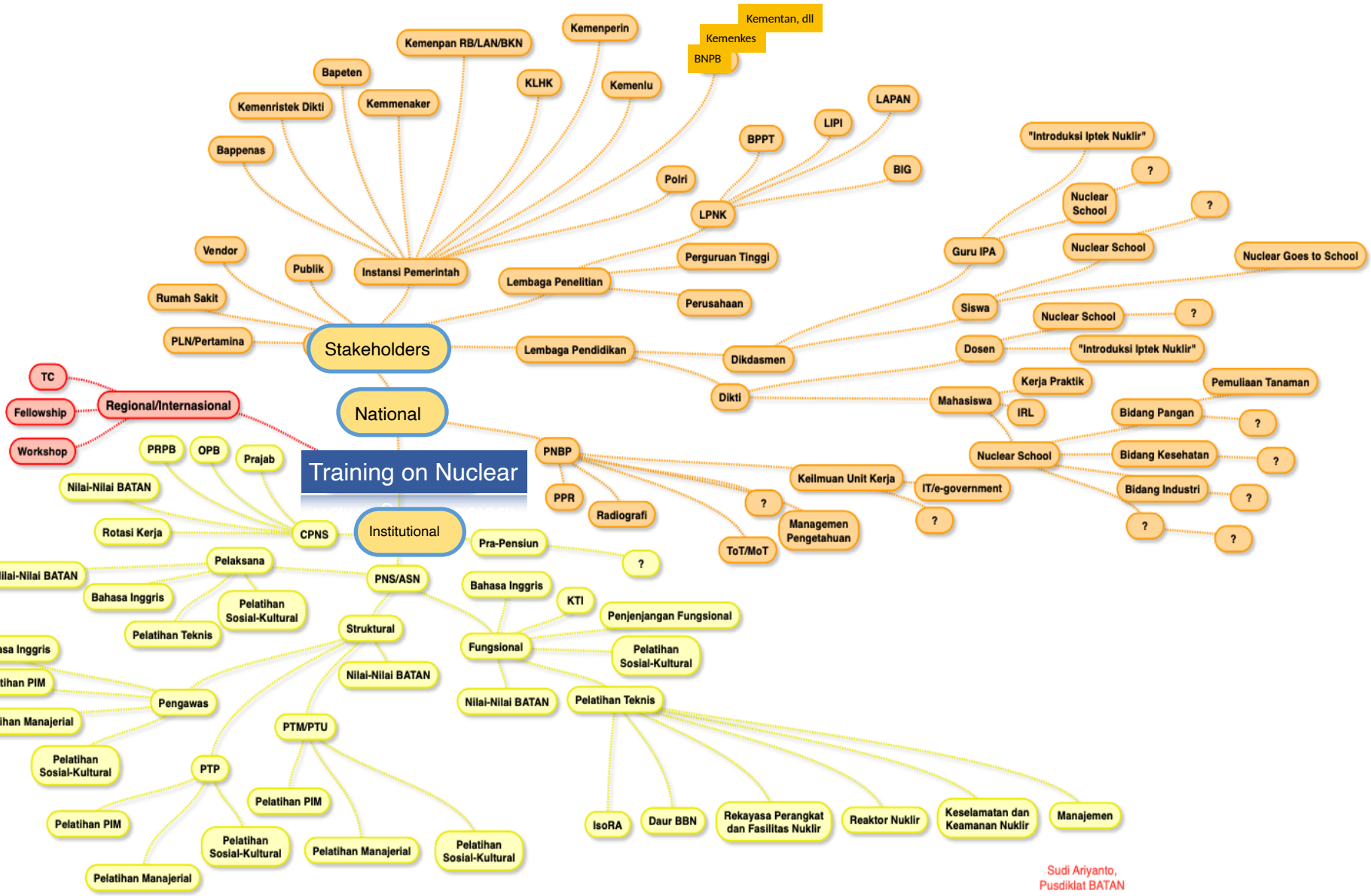
- TC IAEA
- ANENT
- ANSN
- NSSC
- FNCA
- ICERR
- Stakeholders
- Foreign Univ.
- Domestic Univ.

Capacity Building: ET

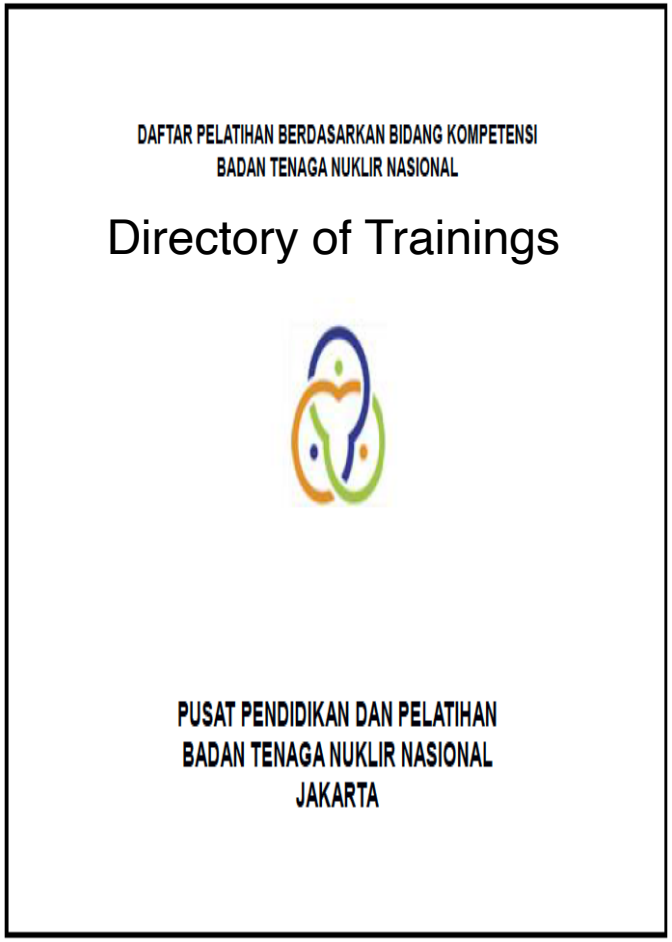
- ET is also aimed for improving knowledge and capacity of stakeholders that may consist of universities, government agencies or institutions, industries, hospitals, and public.



General Architecture for Training



BATAN Knowledge Taxonomy


DAFTAR PELATIHAN BERDASARKAN BIDANG KOMPETENSI
BADAN TENAGA NUKLIR NASIONAL

Directory of Trainings

PUSAT PENDIDIKAN DAN PELATIHAN
BADAN TENAGA NUKLIR NASIONAL
JAKARTA

1. Isotope and Radiation
2. Nuclear Fuel Cycle
3. Engineering of Nuclear Devices and Facilities
4. Nuclear Reactor
5. Nuclear Safety and Security
6. Management

Training Scheme has being developed for each competence

Capacity Building: ET

- ET incorporates various modalities and deliveries, teaching materials, repository, digital library, network of cooperation as well as learner community.

Modalities for Capacity Building

Education

- University
- Scholarship

Training

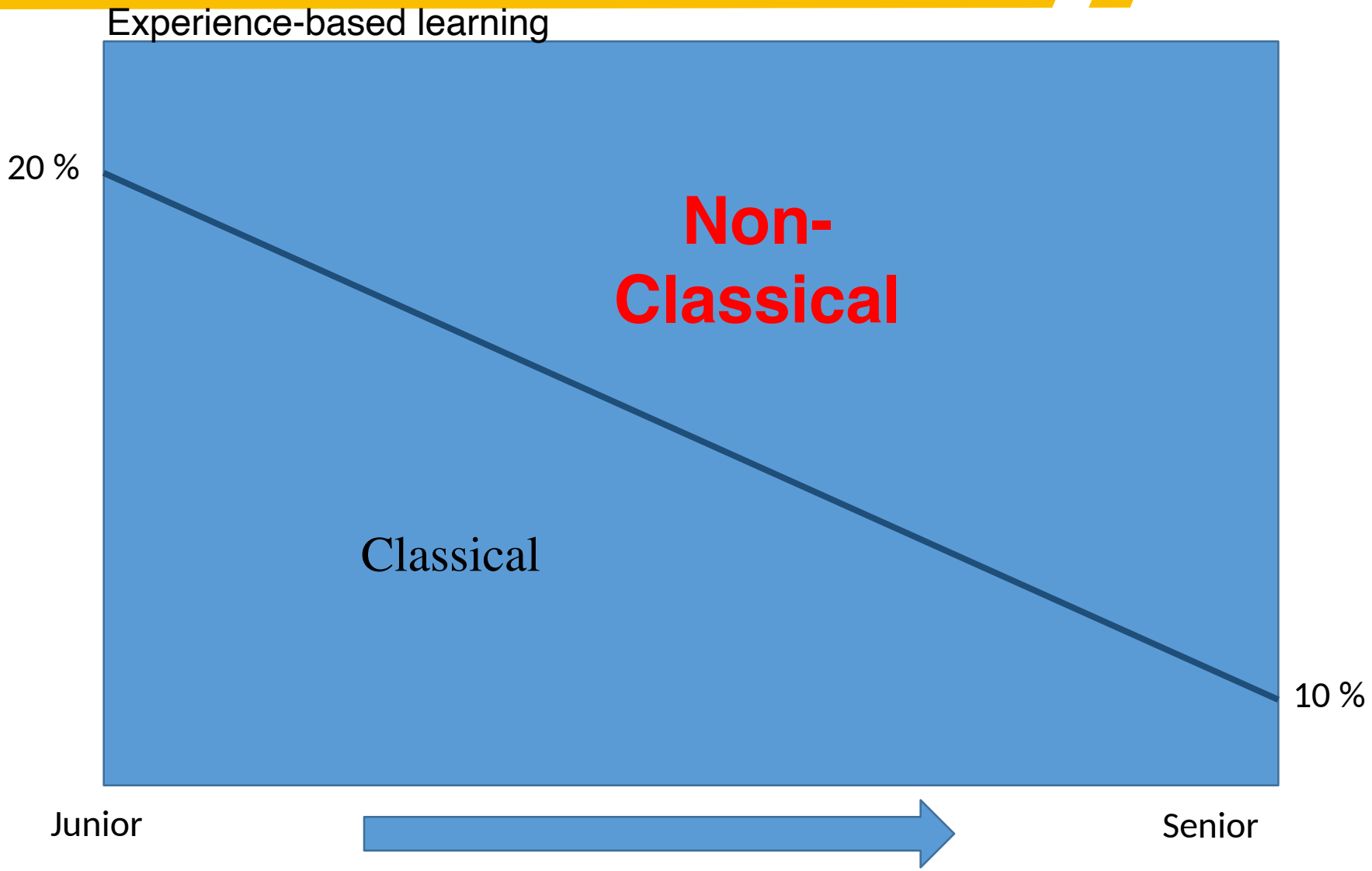
- Classical: Face-to-Face
  - training, seminar, others
- non klasikal
  - *e-learning*, distance learning, OJT, blended learning, self-development, developmental assignment, etc.

Modalities for Training

Explicit Knowledge	Tacit Knowledge
Training: Internal & External providers	Coaching & Mentoring
Workshop: : Internal & External	Shadowing
Seminar	Knowledge Sharing
Developmental Assignment	External Internship/ OJT
	Internal OJT, etc.

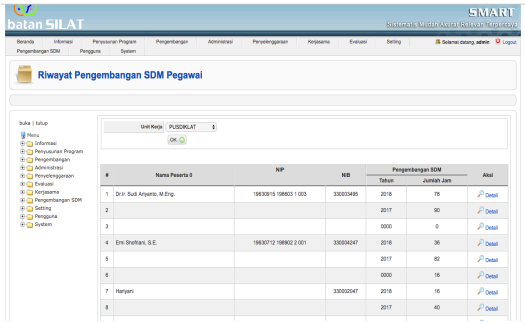
No.	Program
1	Pendidikan
2	Pelatihan Luar BATAN
3	Pelatihan Reguler di BATAN
4	Seminar
5	Kursus
6	Penataran
7	Lokakarya/Workshop Eksternal
8	Lokakarya/Workshop Internal
9	Praktik Kerja/Pemagangan Eksternal
10	Praktik Kerja/Pemagangan Internal
11	Pelatihan Selingkung
12	Penugasan (*Developmental Assignment), Coacing&Mentoring, Shadowing*
13	*Knowledge Sharing*

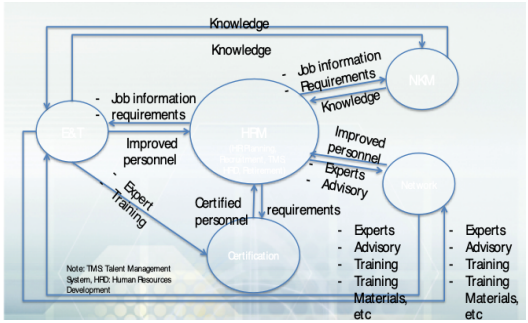
Portion of Non-Classical and Classical trainings



Utilization of Technology

1. Learning Management System: Moodle-Based
2. Smartclass
3. e-learning materials collection
4. Integrated Information system: E&T, HRD, NKM, Network
5. Dashboard to Monitor Capacity Building Implementation





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Capacity Building in Relation with NPP Introduction

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Framework for Nuclear HRD

Government

1. Infrastructure Dev.
2. Nuclear Policy
3. Nuclear Energy Planning, etc

Vendor

1. Design, Construction
2. Training, OJT

Regulatory Body

1. Regulation, License, Inspection

Training Institution

1. Training

Industry

1. Construction, Design, A/E, Fabrication

Research Institutions

1. Research & Disemination

Utiliti/Operator

1. Operation & Maintenance
2. In-house training

University

1. Higher Education
2. Research

Strategy for HR Preparation for 1st NPP

- Develop Infrastructure for HR
- Build Capacity
- Develop and Sustain Competences

Strategy for HR Preparation for 1st NPP

University Involvement

Nuclearization of others disciplines (Engineering, Sciences)

BATAN

- Site Preparation
- Training on nuclear and NPP, etc

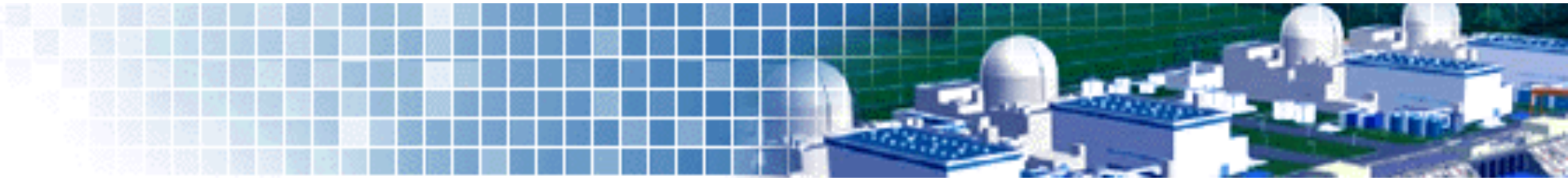
Vendor Involvement

Specific trainings

Utility/PLN Involvement

OJT on non-nuclear subjects

Readiness

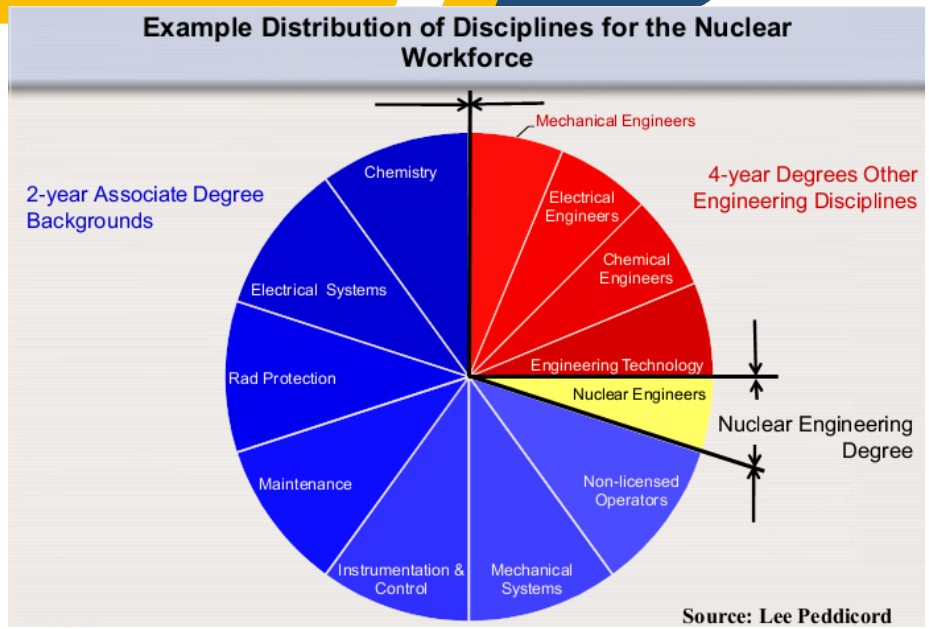


HRD for NPP

- Majority of permanent workforce is needed for the Operating Organization, once NPP is commissioned; typical workforce for a 2-Unit NPP is 600-1200 personnel
- Around 65 - 80% of workforce are required at non-graduate level i.e. 'Technicians'
- Of the graduate workforce (20 – 35%) only around 20% (or ~ 5% of total workforce) need a Nuclear engineering background
- Training/experience requirements for very specialist roles can be 5-10 years
- In Regulatory Body, % of Graduates is much higher (> 50%) but specialist Technicians still needed

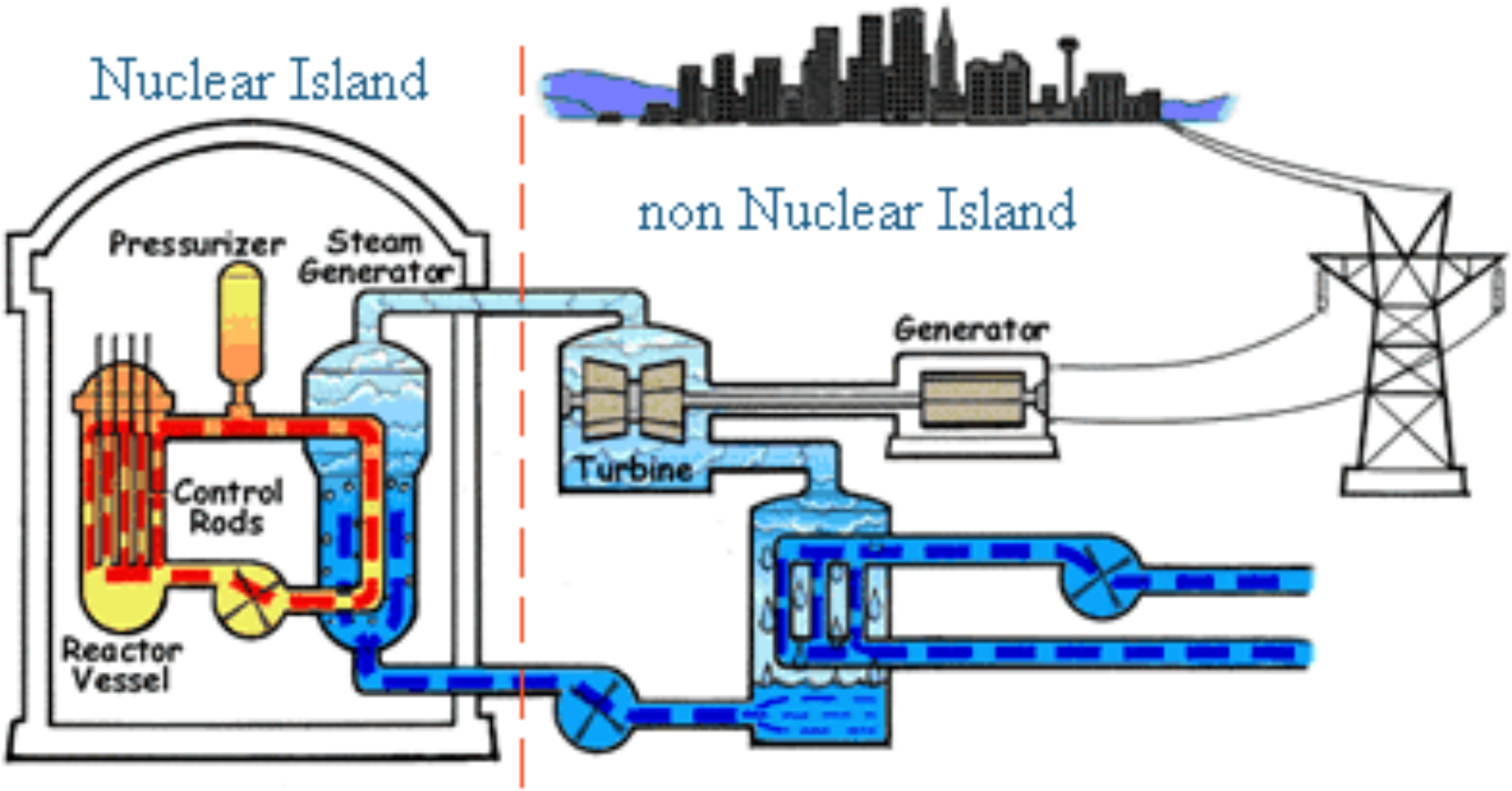
IAEA

Brenda Paganone, IAEA



Operation and Maintenance of NPP needs 170-270 personnels:
9-14 personnels of Nuclear Engineering (5%)

Working Areas



HRD based on Areas

Experiences

Non-Nuclear area

1. Construction and Operation of Non-Nuclear Power Plant

(Fossil-fueled Power Plant

35 MW - 600 MW)

2. Training on non-nuclear area:

- MEMR
- PLN
- Universities
- Secondary/Vocational Schools

Nuclear area

1. Construction and Operation of Nuclear Research Reactors:

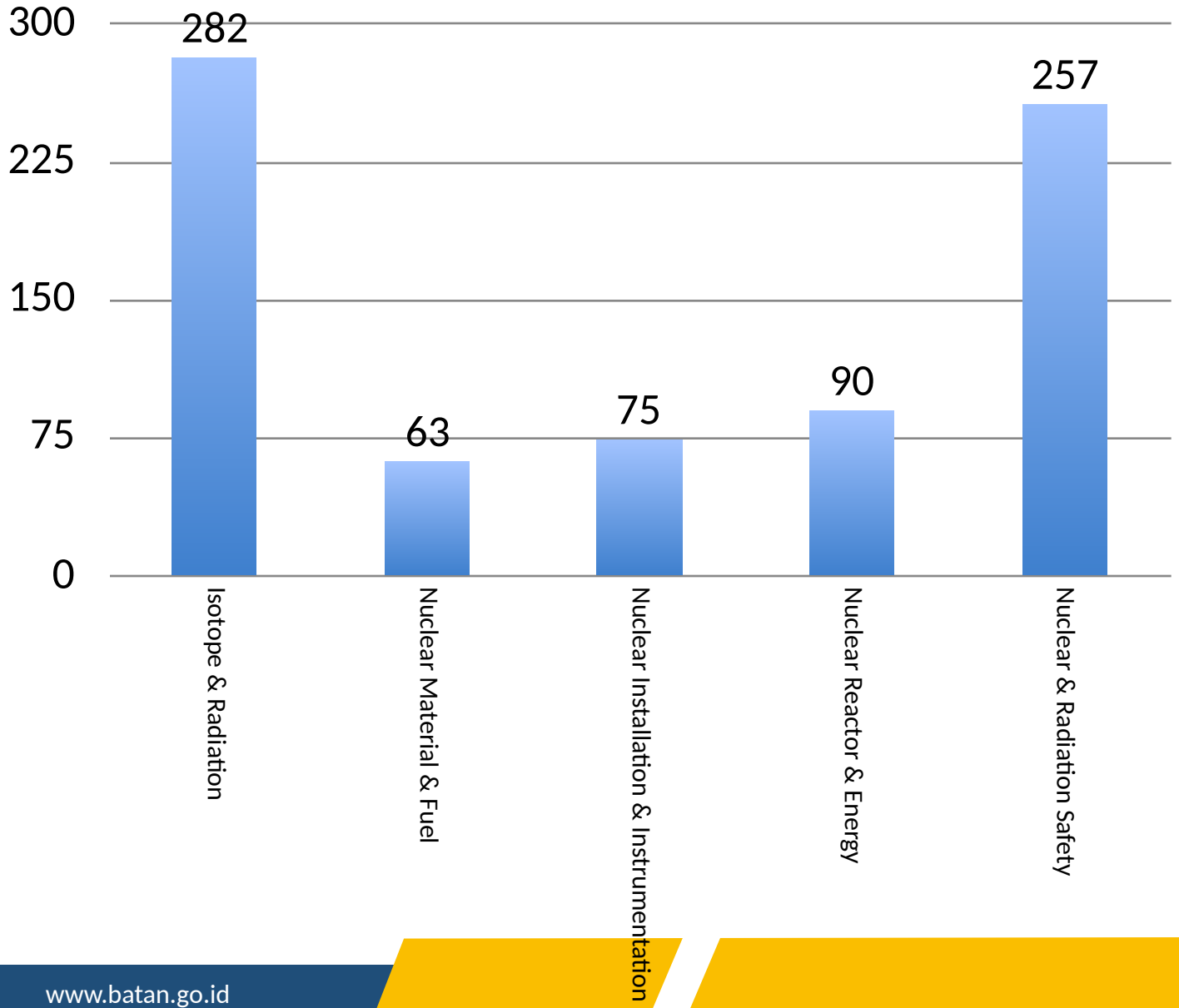
- Kartini, Yogyakarta (100 kW)
- Triga-2000, Bandung (2 MW)
- MPR, Serpong (30 MW)

2. Training on nuclear area:

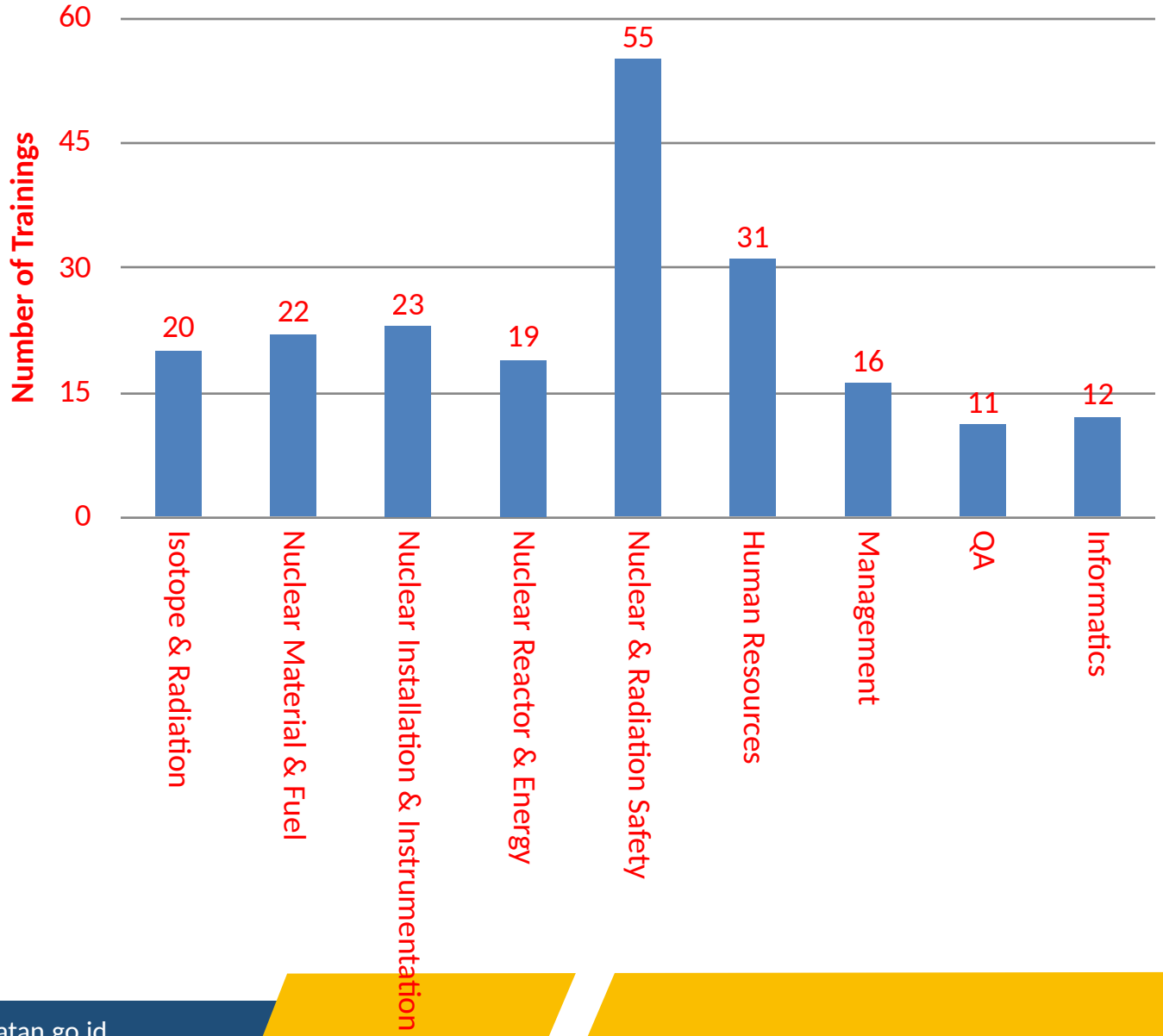
- BATAN: CET, Polytechnic Institute on Nuclear Tehnology
- BAPETEN
- Universities

Experiences

Training by CET, BATAN 1980-2009

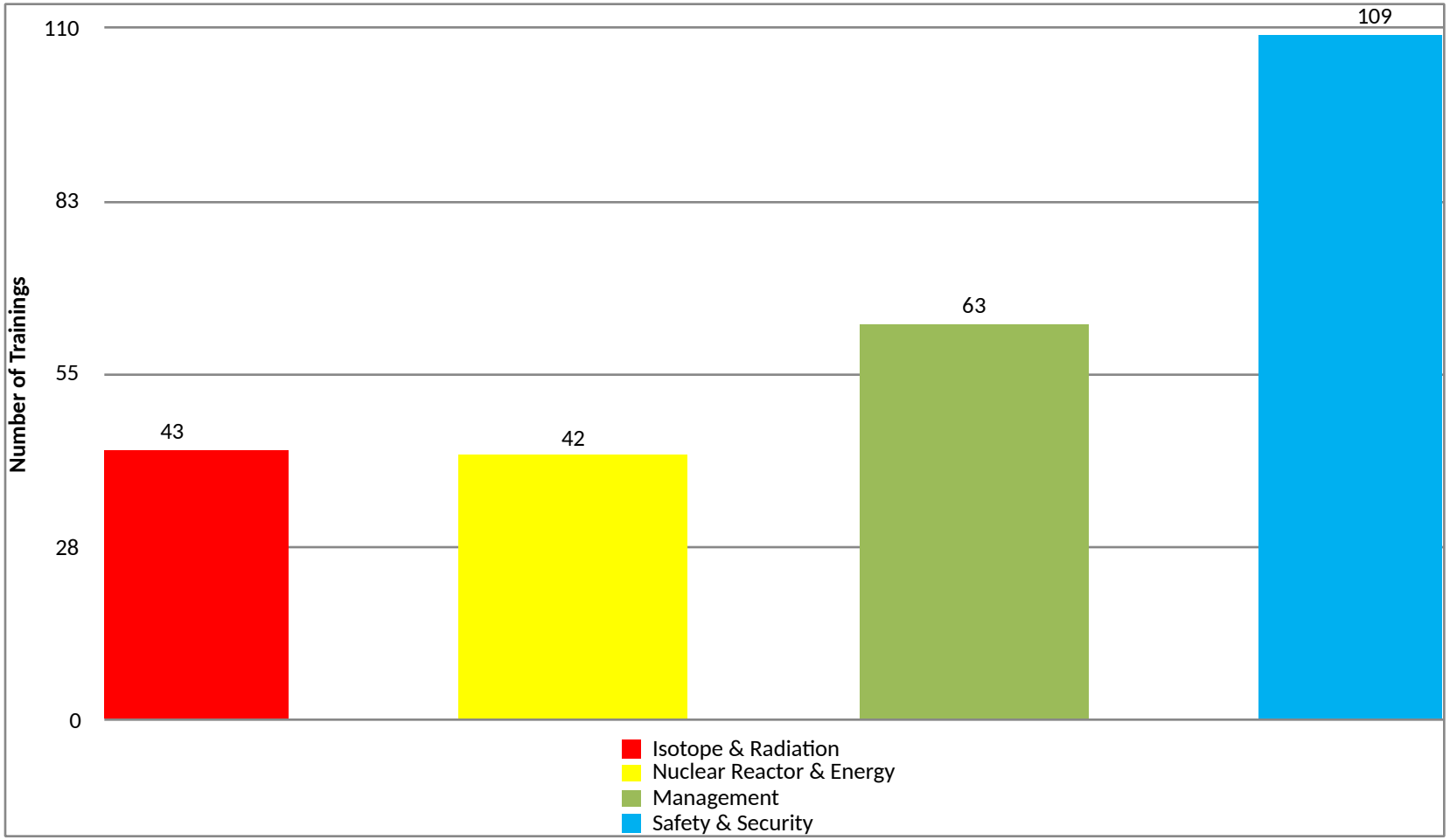


Experiences
Training by CET, BATAN 2010-2015



Experiences

Training by CET, BATAN 2016-2019



Experiences

Reactor Engineering and Safety I

Nuclear Physics	Core Inherent Characteristic	SRAC Code: Neutronic
Reactor Physics	Reactivity Control	Reactor Operation Startup, Power Manuver, Shutdown
	Characteristic of BWR	
	Characteristic of PWR	NPP Simulator Startup, Power Manuver, Shutdown
NPP Technology	Reactor Structural Mechanics	
	Reactor Material Engineering	
	Waste Management	
Fuel Engineering	Decommissioning	

Experiences

Reactor Engineering and Safety II

Thermal Engineering	Reactor Thermo Hydroulic	Boiling Heat Transfer
Reactor Heat Transfer and Thermodynamic	Thermal Hydraulic Design	
	Core Thermo Hydraulic	Cobra
	Fuel Element Thermal Performance	
Intro. Reactor Safety	Deterministic Safety Analysis	RELAP 5
Basic Concept of Reactor Plant Safety	Probabilistic Safety Analysis	
	Severe Accident	
	Exposure Evaluation at Accident	Origen

Universities with Nuclear Specialization

Faculty	Subject	UGM (S1)	UI (S1)	ITB (S1)	STTN (D4)
Engineering	Nuclear Eng.	40	0	0	0
	Physic Eng.	93	0	100	0
	Electrical Eng.	103	80	150	0
	Chemical Eng.	115	80	271	0
	Mechanical Eng.	119	80	155	0
	Electronic & Mechanics	0	0	0	34
	Elektronic and Instrumentation	0	0	0	31
	Nuclear and Tecnochemical	0	0	0	37
Natural Science	Physic	75	90	227	0
	Chemistry	179	70		0
Specialization		Nuclear Eng: Technology, Safety, Medical Physics	Nuclear Physic and Particle	Nuclear Physic	Reactor Technology

Deendarlianto, French-Indonesia Joint Seminar, Serpong, 12-13 October 2015

National Team of HRD for NPP 2008

Members from various institutes:

- Ministry of Energy and Mineral Resources (ESDM)
- Ministry of Research and Technology
- National Nuclear Energy Agency (BATAN)
- National Nuclear Regulatory Body (BAPETEN)
- State Owned Electricity Company (PLN)
- others

National Team of HRD for NPP

Tasks and Program (start from 2008)

- Development of Academic Paper on "Preparation of Human Resource Development for the First Nuclear Power Plant in Indonesia".
- Development of Blue Print on "Human Resource Development for Nuclear Power Plant".
- Establishment of Nuclear Training Center for NPP: standard of personnel competences; standard for competences training.

National Team of HRD for NPP

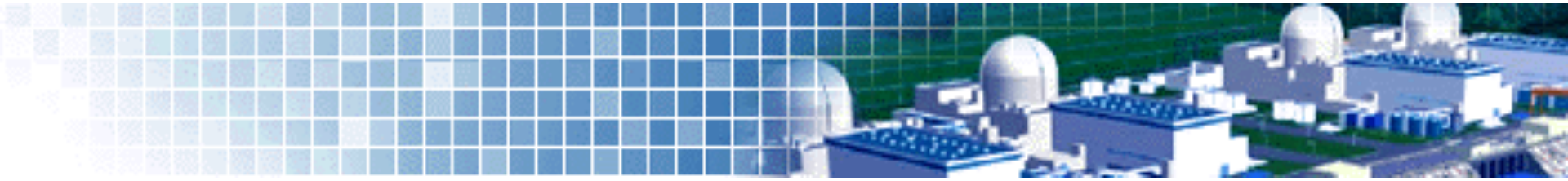
- Development of Academic Paper (2008 ~ 2009)
- **Personnel requirements**: quantitative and qualification (education, training, and experience)
- **Existing infrastructure of HRD:** education, training, and licensing system.
- **Action Plans**

Standards for Personnels Available

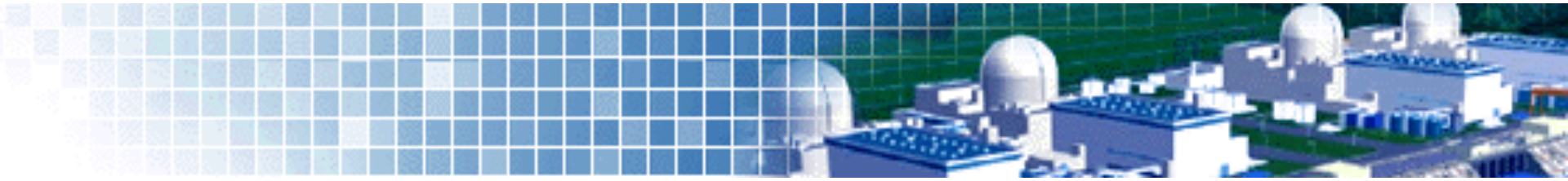
Standard of Personel Competences

Standar of Competences Training (SLK)

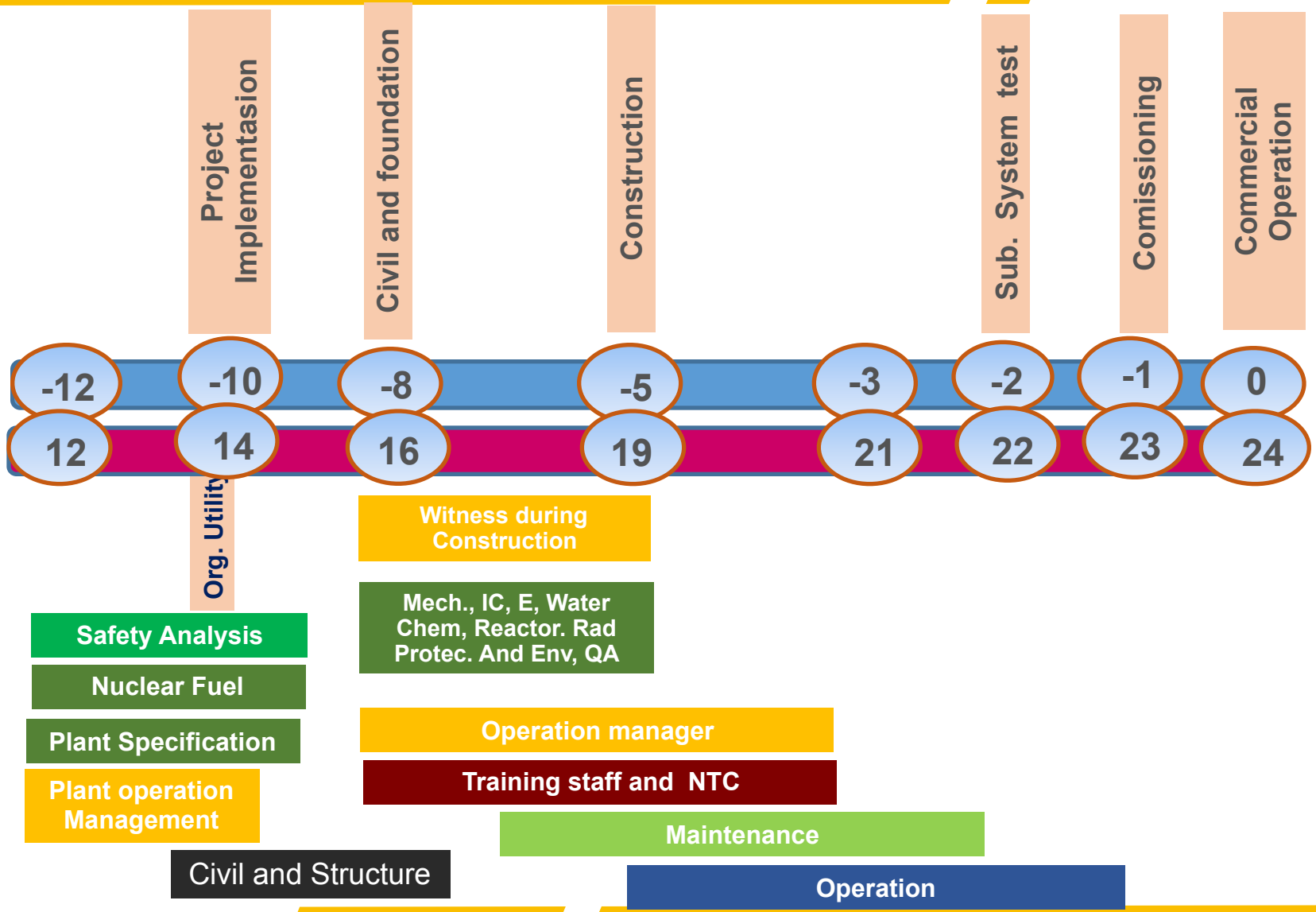
NPP Operator and Maintenance



Training Scheme and Certification

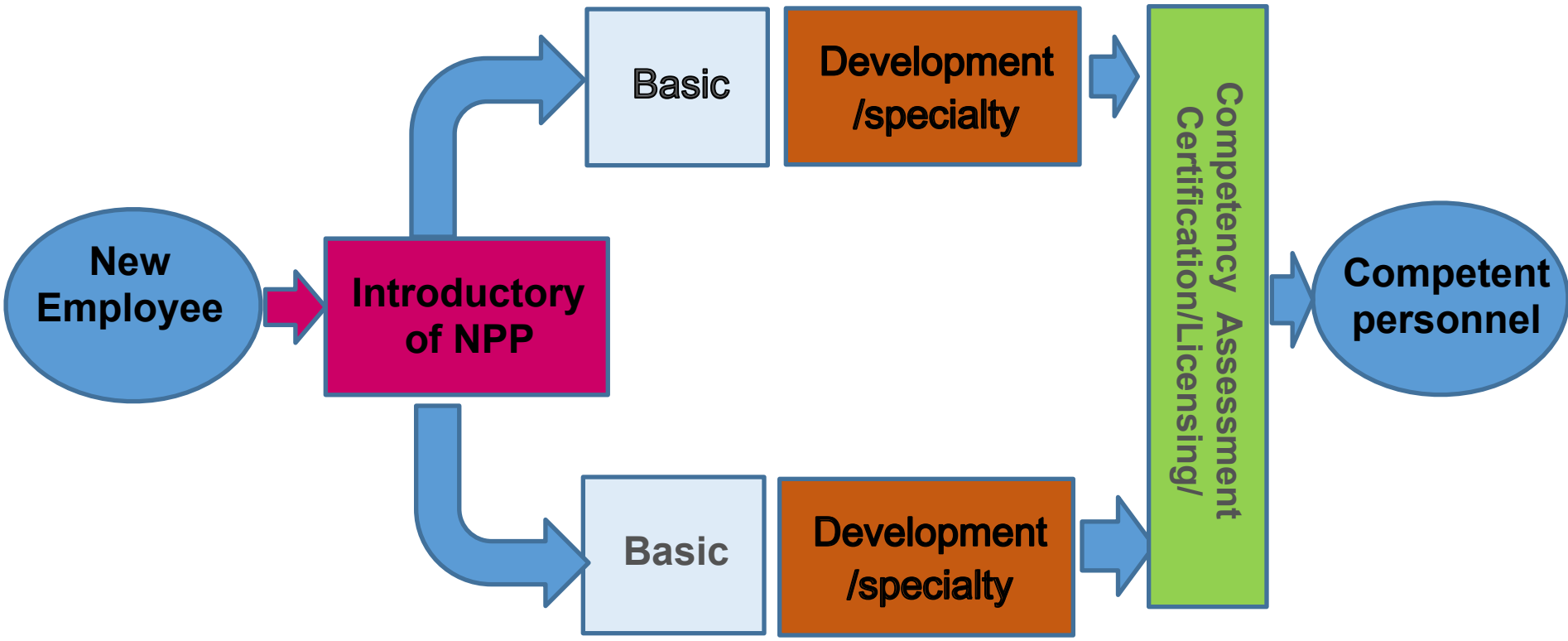


Training timeline for NPP key personnel



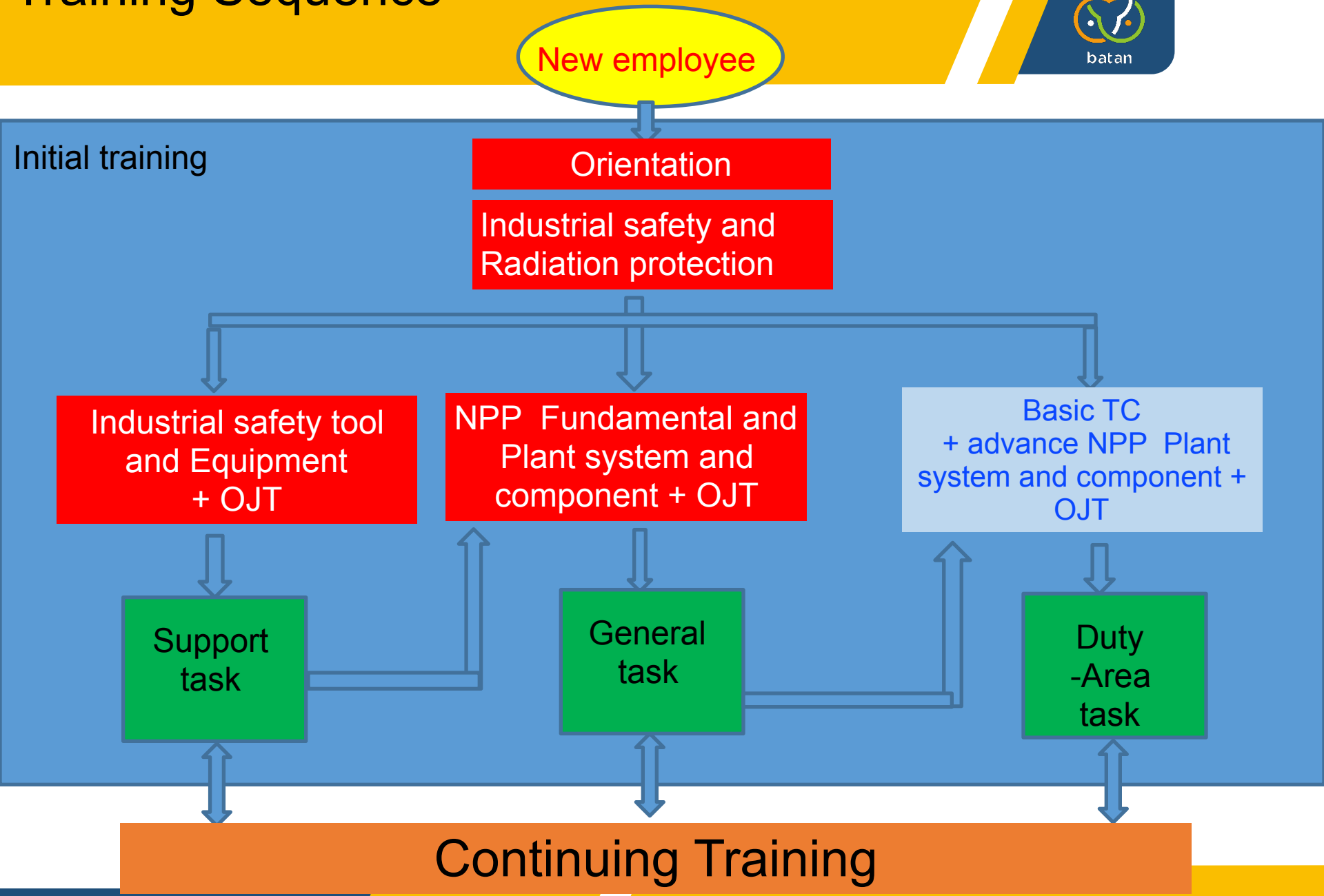
Training and Certification

Technician (nuclear Island /BOP)



Engineer (Nuclear Island/BOP)

Training Sequence



Training Scheme Developed

1. Introductory Training for New Employee
2. Training for Operator
3. Training for Maintenance Personnel
4. Training for Radiation Protection, Chemistry, Waste and Environment personnel
5. Training for Engineer
6. Training for new plant construction quality assurance auditor, quality control inspector, and nondestructive examination

Month

5
Incentive for NRE

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Incentive for Geothermal

TAX ALLOWANCE

1. reduction of 30% Net income tax from investment value for 6 years,
2. Accelerated depreciation and amortization,
3. Imposition of 10% dividend income tax,
4. Compensation of losses of 5-10 years

Min. Investation 100 billion IDR

Exemption from import duty

operation of goods and machinery in Geothermal exploitation.
Requirements:
1. Goods cannot be produced domestically,
2. Goods have been produced domestically but have not met the required specifications,
3. Goods have been produced domestically but the amount has not been sufficient for industry needs

Exemption from land & building tax

Reduction of land and building tax on the body of the earth to 100% for the exploration phase. Facilities can be obtained for holders of permits for 5 years and can be extended for 2 years. Started in 2017

Incentive for NRE

Government issued regulations on income tax facilities, tax allowance and tax holidays:

- income tax facilities for investment:

(1) Reduction in net income tax by 30% of the total investment;

(2) Accelerated depreciation of tangible assets and accelerated amortization of intangible assets obtained in the context of new investment and/or business expansion;

(3) Imposition of income tax on dividends paid to foreign taxpayers of 10%; and

(4) Compensation for losses of more than 5 years but not more than 10 years.

new energy: hydrogen, CBM, liquefied coal or gasified coal
renewable energy: hydropower and water flow, solar power, wind or ocean currents

Note: Criteria and Conditions apply

http://ebtke.esdm.go.id/post/2019/06/27/2273/ditjen.ebtke.sosialisasikan.insentif.fiskal.bidang.ebt?lang=en

Incentive for NRE

Tax holiday: a reduction in corporate income tax by 100% of the tax payable.

Criteria of the companies that are entitled to this facility:

- new companies in the pioneering industry,
- registered in Indonesia,
- not yet in commercial production,
- fulfilling the DER (Debt Equity to Ratio) provisions, etc.

Conclusion

- Human resource development is an important component of nuclear infrastructure and needs a long term commitment from the stakeholders.
  - Infrastructure readiness
  - Program readiness
- The HRD program for NPP is essential to be developed and implemented:
  - to develop adequate number of qualified human resource timely
  - to convince the public that Indonesian personnels are capable

Conclusion

- Considerable effort has being done to design and develop training materials, and to prepare instructors as well as training facilities.
- Cooperation with stakeholders are very beneficial in order to develop and implement the HRD program.

Terima Kasih

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