International Conference on Human Resource Development for
Nuclear Power Programs: Building and Sustaining Capacity
IAEA Headquarters, Vienna, Austria, 12-16 May 2014

Nuclear E&T for Building and Sustaining Capacity from Korean Experience

14 May 2014

Youngmi Nam

KAERI
Korea Atomic Energy Research Institute

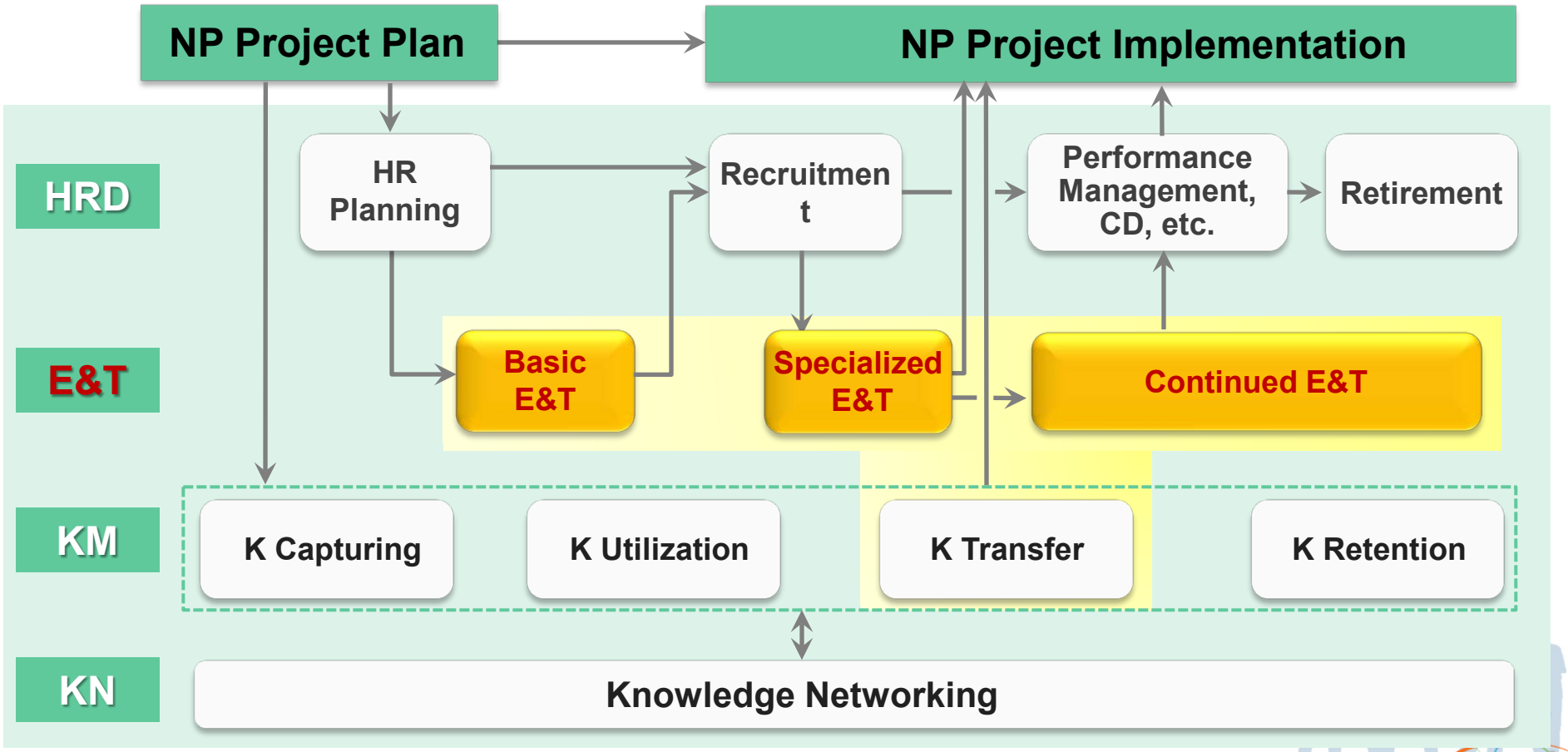
Contents

- Nuclear E&T for Building and Sustaining Capacity
- Korean Experience of Nuclear E&T
- Way Forward

Nuclear E&T for Building and Sustaining Capacity

E&T and Capacity Building

Capacity Building is a systematic & integrated approach to develop and continuously improve governmental, organizational and individual competences & capabilities necessary for achieving safe, secure and sustainable NP program



Trends and Issues (1)

- **E&T has become more systematic and specialized in addressing emerging issues**

Planning	• Implemented based on self assessment
Programs	• Expanded and more specialized • Addressed emerging issues, e.g. - safety/security & culture, - stakeholder involvement, - project management. • Enhanced by use of SAT
Methodology	• Innovative (e.g. ICT), diversified and customized
Infrastructure	• Built & strengthened
Cooperation	• Promoted nationally & internationally

Trends and Issues (2)

International cooperation is an important mechanism for sharing E&T experience

Korean Experience of Nuclear E&T

Nuclear Project with Manpower Training

- **Capable workforce was a key for the development of nuclear energy**
  - Manpower training : priority No.1
  - Pre-investment for manpower training
- **237 people were sent abroad for nuclear E&T**
- **Trained personnel played a ‘core role’ in the Korean nuclear energy programme**

First Korean President, Dr. Syngman Rhee, groundbreaking the site for the first nuclear research reactor in Korea

Nuclear Policy and Plan in Korea

- **Comprehensive Nuclear Energy Promotion Plan (CNEPP)**
  - Establish every 5 years for the promotion of nuclear R&D and industry
- **The 4th CNEPP include HRD issues:**
  - Establish a proactive nuclear HRD system
  - Cultivate highly skilled on-site manpower and recruitment support
  - Develop professionals from university to research field

Ref. Ministry of Science, ICT and Future Planning (MSIP) (2013), Korea's Nuclear Energy Map

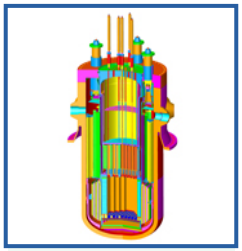
Contribution to National Economy

- **Korea has achieved phenomenal economic growth**
  - From 60$ GDP/capita in the 1950s to 23k$ in the 2000s

- **Key factors for Korean economic improvement**
  - Diligent people with a top priority on education
  - Political leadership with an economic development policy and a high priority of public education
  - Challenging business leader

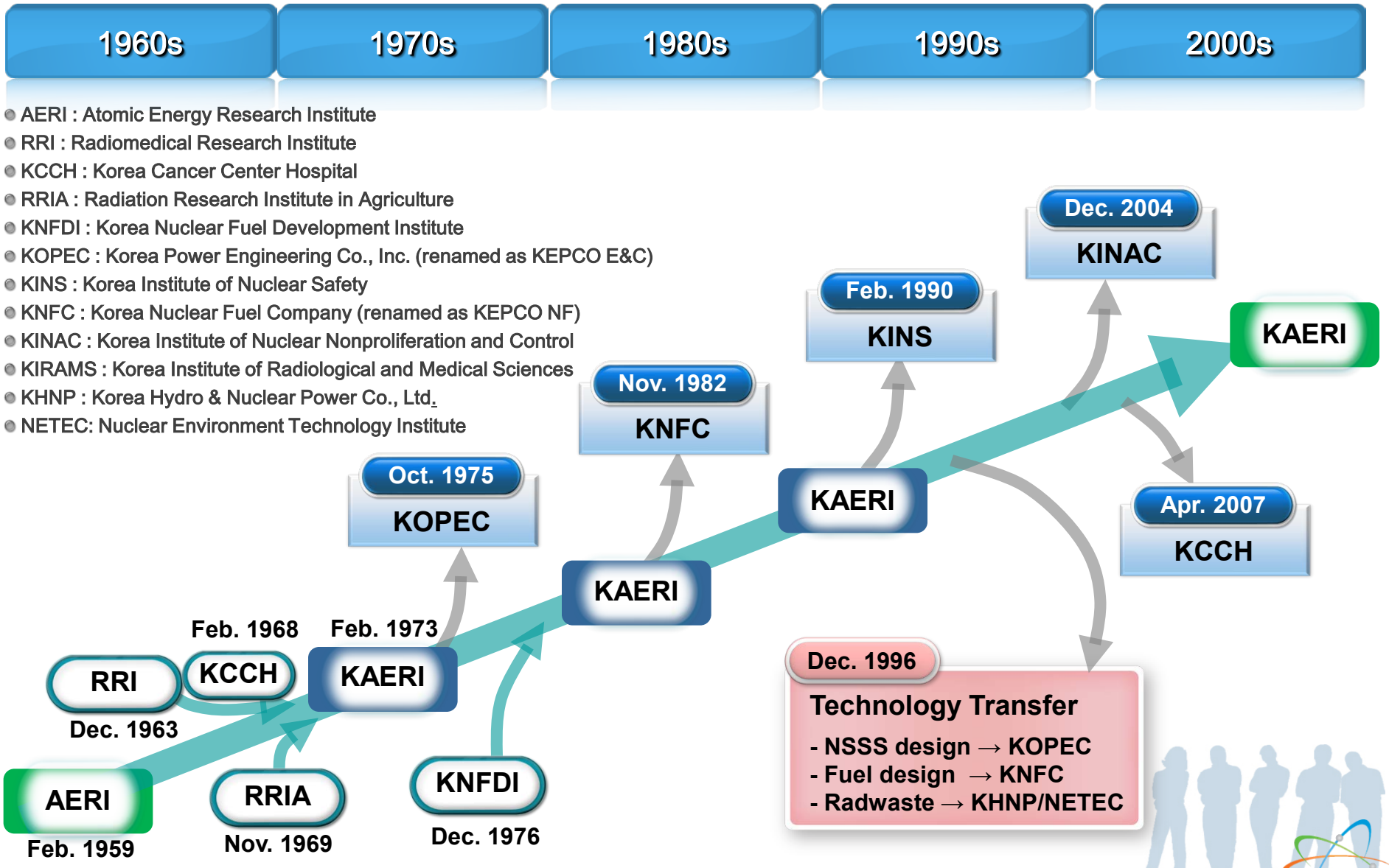
- **Nuclear tech. self-reliance to national economy**
  - Technology self-reliance resulted from qualified man power
  - Contributed to the Korean industry with its good quality, cheap electricity generation, and wide spectrum of supply chain
  - IAEA case study: nuclear contributed to 2.2% added value of GDP

Capacity Building and Nuclear Programme

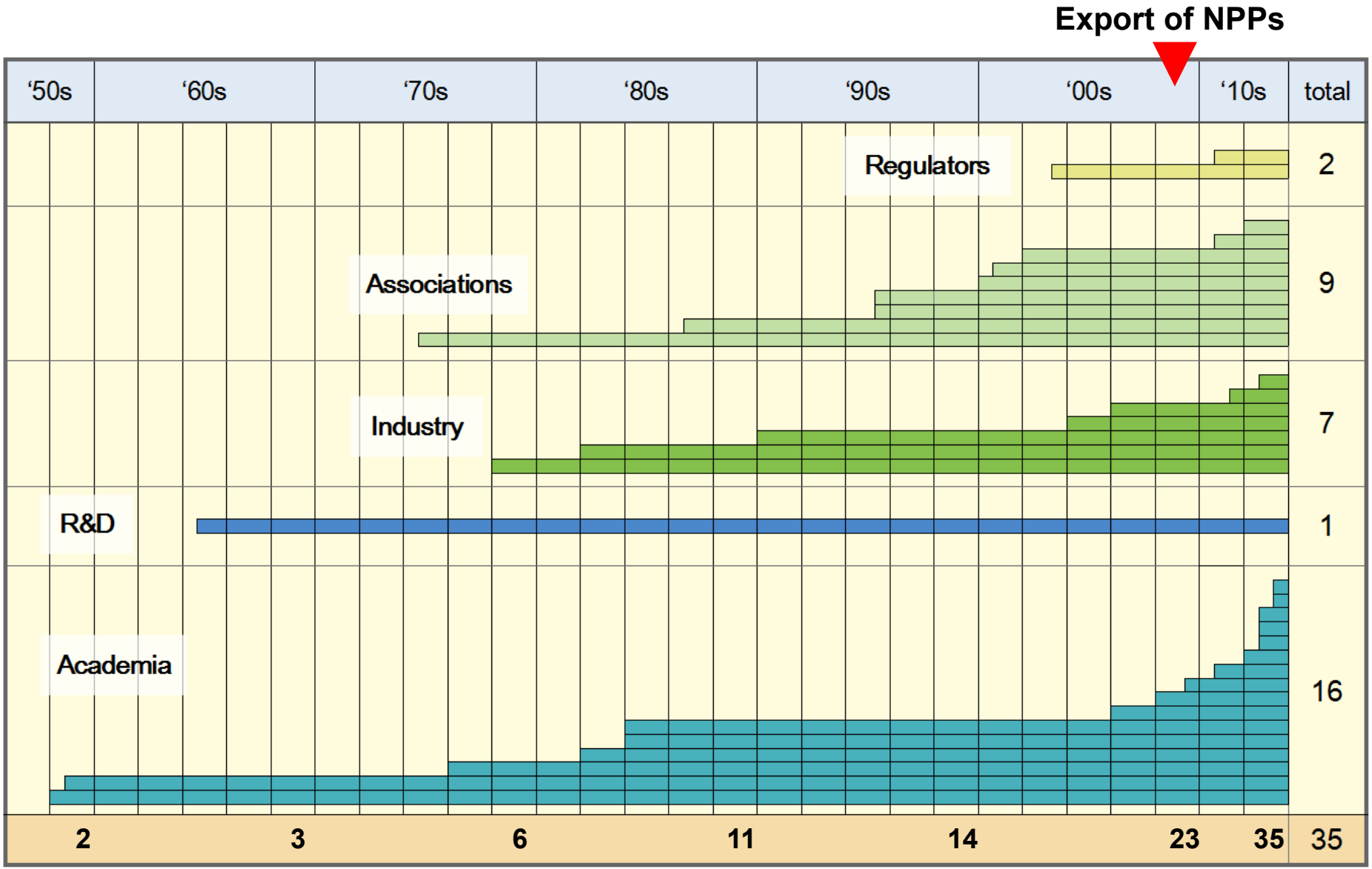
1960s	1970s	1980s	1990s	2000s	2010s	Beyond
Preparation for Nuclear Energy	Introduction of Nuclear Power	Promoting Localization	Technology Self-reliance	Advanced Tech. Development	Technology Innovation	Gen. IV Technology
						
Install TRIGA II, III	Construction of Kori #1	Establish Localization Plans	OPR1000, HANARO Development	APR1400 Development	SMART	SFR VHTR
Overseas Training	Basic Training	Advanced Training	On-the-job Participation	Experience Sharing	Global HRD	Global Network

Absorbing → **Catching-up** → **Forging-Ahead**

Spin-offs of Korean Nuclear Entities



Growth of Nuclear E&T Organizations



Major Actors in Nuclear HRD Field

Academia	R&D/ Regulatory/Safeguard	Industry
	KONICOF KOREA NUCLEAR INTERNATIONAL COOPERATION FOUNDATION	KNA 한국원전수출산업협회

Universities — Higher Education and Basic Research

- Hanyang University
- Seoul National University
- Kyunghee University
- KAIST
- Chosun University
- Jeju National University
- UST-KAERI
- Donguk University
- UNIST
- Busan University
- KINGS

KAERI — Nuclear R&D. R&D on advanced reactors, fuel cycle and nuclear safety

KINS — Nuclear safety and regulations licensing, safety standards and procedures

KINAC — Nuclear safeguards, physical protection and export control

KEPCO — Electrical grid operation & Abroad NPPs' construction

KHNP — Construction, operation and maintenance of NPPs

KPS / KEPCO KDS — NPP O&M service

Academic Education → Specialized E&T → On-site Training

E&T Activities at KAERI(1)

For Industry Personnel

- Nuclear power technology
- Fuel cycle technology
- Radiation protection and RI application
- Non-destructive testing technology
- Re-training courses for license holders

~ 1,000 industries' personnel a year

For Students & Teachers

- Next generation school on nuclear
- Experiencing & learning nuclear basic
- Research reactor experiment course
- Laboratory OJT during vacations
- Internship program
- Public acceptance and others

~ 1,500 students & teachers a year

KAERI program

For KAERI Staff

- Basic courses on nuclear energy
- Legal requirements of education programs
- Managerial education programs
- Self-development education programs
- Foreign language courses
- Computer skill courses

1,300 regular staff + 750 non-regular staff

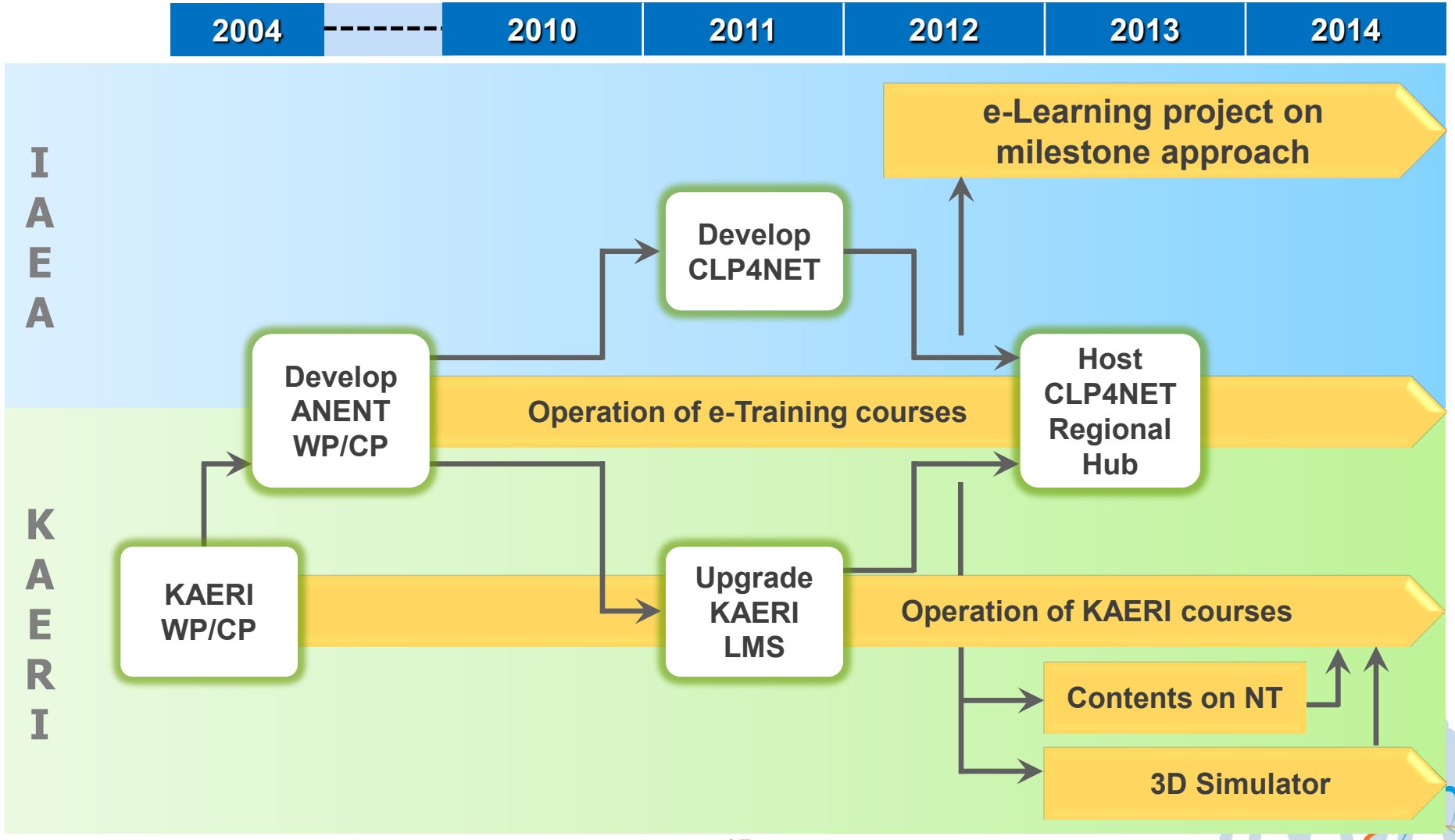
For Foreign Personnel

- Multilateral cooperation programs
  - IAEA, WNU courses
- Co-hosted/supported programs
  - KOICA, RCARO, KNA courses
- Bilateral cooperation programs
- KAERI-UST MS/PhD programs
- Workshops/meetings on nuclear HRD

~ 300 foreign personnel a year

E&T Activities at KAERI (2)

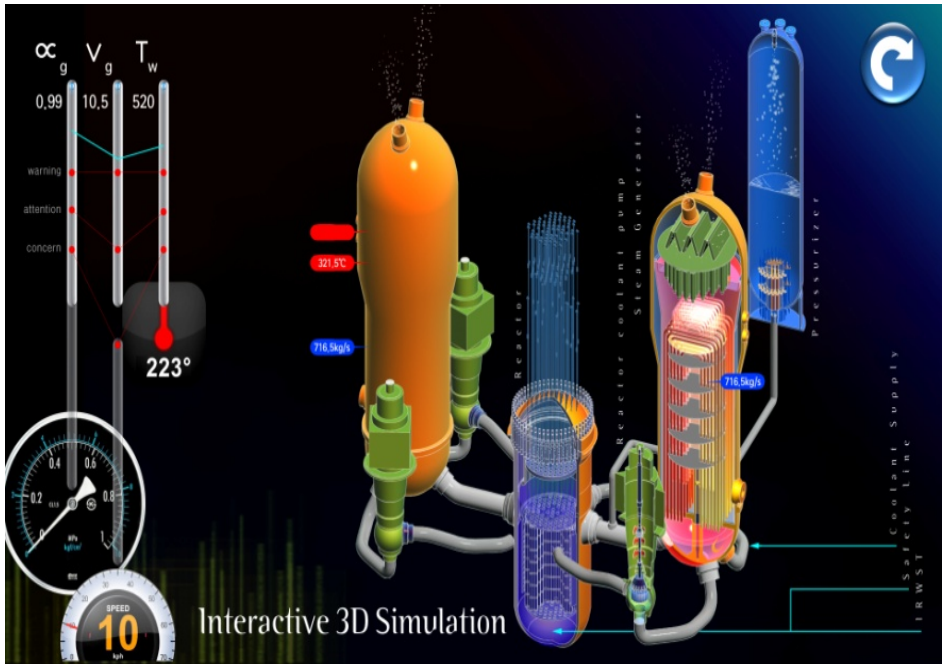
Promotion of e-Learning based on ICT



E&T Activities at KAERI (3)

ICT based E&T materials

e-Learning contents on NP technology (KAERI-NWU Cooperation)



PC based 3D NPP simulator on NPP system for basic E&T

Lessons Learned

- **A strong national initiative** needs to be maintained, involving stakeholders with a staged national nuclear E&T plan and its execution together with an HRD plan.
- **An integrated competence based E&T** for NEPIOs, operators, regulators, TSOs and etc. is an important element to become a knowledgeable customer or responsible vendor.
- **International cooperation** is a useful mechanism by which long-term and widely ranged experience from others, including international organizations can be absorbed or transferred effectively in a relatively shorter term, minimizing trial and error.

Way Forward

Way Forward

- **Integration and harmonization of E&T programs**
  - with other CB areas, e.g. workforce planning, KM
  - within E&T area based on the required competency and organizational responsibilities
- **Addressing emerging issues**
  - safety/security and culture
  - stakeholder involvement including outreach to future generation
  - project management
  - improvement of E&T effectiveness
- **Strengthening cooperation**
  - at the organizational, national, international levels
  - with a strategic approach

Nuclear Project can start with Man Power

Thank You !

ymnam@kaeri.re.kr