Delivering a radiation protection dividend: systemic capacity-building for the Radiation Safety Profession in Africa: 2010-2014…

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Background

afrirpa2010
Nairobi Kenya

- Plan adopted AFRIRPA 3, Nairobi, September 2010 – ongoing
- Update at IRPA 13 - today
- Progress Milestone at AFRIRPA 4, Morocco 2014
- Benchmark: IAEA TC feedback (2012) “W. Asia took 25 years…this feels the same”
  - does it have to take a generation?
  - do we have that amount of time?
  - Can the “lions” (6 leading African economies) roar louder?

The Nairobi 2010 AFRIRPA Objectives:

- : “developing National/Regional Strategies and Infrastructures for Radiation Protection (RP) and fostering Co-operation and Networking among RP Professionals in Africa”.
- “ [efforts] to promote professional standards of training and practice among Radiation Protection Professionals in Africa and to found and foster Radiation Protection Societies or Associations at National and Regional levels” (Resolution 1) and
- “the promotion of formal [and informal] networks, drawing on existing infrastructures and training opportunities that are available in the region” (Resolution 2)

Systemic approach

- Derives from an AFRIRPA regional mandate (Nairobi September 2010)
- Bottom up and top down:
  - Professionals and Professional Associations
  - Industry
  - National and international bodies
  - Stakeholders
- Correcting imbalance
  - current weighting to 3 countries – Egypt, Morocco, South Africa)
  - “Lions” have to pull their weight

Coordinated effort

- **National Associations**, eg AIGAM, Morocco
- **IRPA** – regional and global meetings – regular feedback – Glasgow 2012 (G), Morocco 2014(R))
- **IFA** – new NORM Expert Working Group; strong interest from the P industry, with associated interests in U, REE etc from/ associated with P; first joint workshop, April 2012, Tashkent
- **IAEA** – embedded into the ToR of a) the UxP Expert Working Group b) TC programmes (eg INT 2015 – ie sessions in each workshop or training course) c) new projects such as PUI on U mining (20 MS) d) support activities and publications
  - Marrakech November 2011, Tashkent April 2012, Cairo June 2012, Finland June 2012, Jordan October 2012, Philippines late 2012; programme extends though
- **Exit strategy – strengthen professional associations and hand off to them**

Core Values

- “Horizontal” standards such as BSS and the IAEA Fundamental Safety Principles
- “Vertical” standards such as Safety Reports/ Good practices in key industries for emerging economies, eg NORM
- Contributes to clear outcomes
  - Building critical mass in the regional RP professional community (formal and informal networks; many cultures)
  - Stakeholder engagement and acceptance
  - Sustainable development
    - Economic
    - Social
    - Environmental (Triple Bottom Line)
- Contextualised
  - safer, more effective working practices and service delivery
  - contributes to economic development
  - meeting the needs of specific public and private sector organisations

Why “dividend”?

- **Living with Radiation - Engaging with Society**
  - **In line with the Brundtland (1987) agenda**
- RP as an investment in sustainable development, yielding
  - Transferable skills and competencies
  - Triple Bottom Line Returns
- Urgently needed in economic growth areas, eg in medicine, NORM industries, eg U, REE mining and exploitation, P fertilisers
- Critically dependent on political stability

Sustainable Development

Introduced by Gro Harlem Brundtland[1], (UNWCED), Our Common Future, Oxford: Oxford University Press, (1987)

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- *the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs."*

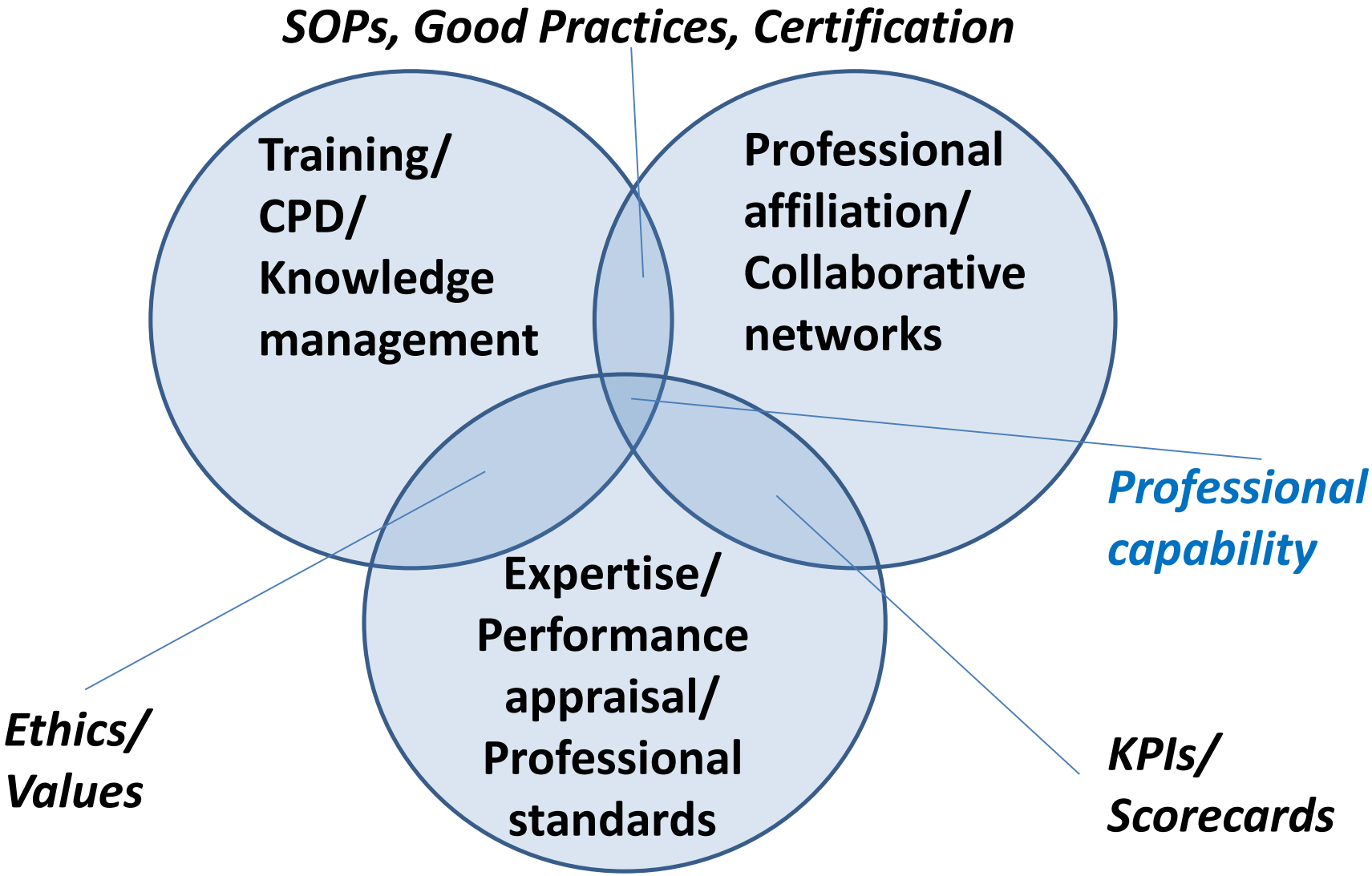
The 3 Cs

- **Competency**
- **Capacity**
- **Capability**

Competency + Capacity = Capability

Professional competence is the cornerstone, connecting personal capacity with organisational or institutional capability

Professionalism: the Capability Fit



Capacity building: Linkages

- **Health, Safety and Environment (HSE)**
- **Regulations and Good Practices**
- **Stakeholder relations and risk communications**

Support required:

a) to win over public sentiment and societal acceptance

b) confidence building of P acid fertilizer industry

Delivery Basics

- Seminar/ round table format – not lecture room
- In situ/ on the job practical training
- Formal and informal interactions between experts and participants/ trainees (flat structure)
- Competency based with clear body of knowledge and expertise to be acquired; systematic delivery within a clear time frame (eg 3 5 day meetings/ workshops over a one year period, with web-based support and “homework” between workshops; support from employer and local professional association
- Emphasis on formal and informal modes of knowledge transfer – presentations, publications (eg Manuals and Papers), mentoring; coffee table/ tool box type talks (role models/ advocates)
- Emphasis on proactive training within a) a culture of safety, b) stakeholder engagement and c) “lead” as well as “lag” performance indicators

The feedback and delivery process

- Focus on IAEA TC RAF 3007 – some 30 MS have given feedback, and continue to do so
- RP contextualised
  - Technology and technology transfer
  - Capacity building
  - Health, Safety and Environment (HSE)
  - Social return
- Needs capture and analysis in complete confidence
- Direct and indirect delivery – use of “train the trainer”/ cascade effect

Aligning the structures and incentives

- Professional
- Institutional/ Organisational
- National
- Regional

Professional

- Continuity
- Competency
- “Graduation point” – clear body of knowledge/ expertise
- = a coherent training programme with a defined outcome

Organisational

- Whole team/ unit or enterprise approach
  - Junior
  - Senior
  - Manager
- Joint events for core (essential) knowledge
- Combines formal and informal training
- = “critical mass” (Tenorio) and hence sustainability

UxP Website

Firefox | Uranium eXtraction from Phosphates an... | www.uxponline.com/UxP.aspx?wadi=06RyQbD7ZL8zpgSJ6Kmd6A%3d%3d

UxP

Site Map | Terms | Assistance | Resources | Search | E-Learning | Capacity Building

Exploration | Techno-feasibility | Mining | Extraction and Processing | Post Mining | Good Practices | Management

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Julian Hilton, welcome back.

Uranium Extraction

Contact

Workshop

<< < MAY 2012 > >>

Mo	Tu	We	Th	Fr	Sa	Su
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7	8	9	10	11	12	13
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21	22	23	24	25	26	27
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14 May 2012

CALENDAR EVENTS
- PAST
- TODAY
- FUTURE

UxP

Uranium eXtraction from Phosphoric Acid (UXP)

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National/ Regional

- Expert missions
- Inclusive national/ regional meetings (taps whole network)
- Train the trainer model used for capacity-building focused on whole, multidisciplinary team(s)
- Regular meetings (annual)
- Web-based support and follow-on
  - Networking (peer to peer)
  - Mentoring/ expert assistance
  - Elearning
  - Resource bank

IAEA **Strategic Approach**

Education and Training in Radiation and Waste Safety: Strategic Plan 2001 – 2010 (2001).

The Vision was:

"A sustainable education and training system is in place in Member States compatible with the requirements of the BSS and other relevant radiation safety standards to contribute to an adequate radiation and waste safety infrastructure."

INTERNATIONAL ATOMIC ENERGY AGENCY, Strategic Approach to Education and Training in Radiation and Waste Safety: Strategic Plan 2001 – 2010, Vienna, (2001).
http://www-ns.iaea.org/downloads/rw/training/rad-waste-strategic-plan.pdf

Objectives

The 2001 objectives were presented as follows:

- To put in place an appropriate education and training programme as a mechanism for the implementation of the BSS and other relevant safety standards.
- To encourage appropriate knowledge and understanding to promote and sustain safe working practices.
- To promote the continuous exchange of information between member states as an essential mechanism for establishing and maintaining safety.

Competencies (undifferentiated)

The key deliverable from this effort would be a body of competent professionals able:

—To recognize radiation risks in the workplace

—To identify warning signals and signs

—To operate and/or use correctly radiation monitoring equipment and/or individual radiation protection devices

—To measure correctly levels of dose rate or contamination

—To distinguish between practices and interventions, and between workers' and licensee's responsibilities

—To interpret the results of measurements

—To put on and remove safely protective clothing and respiratory devices

—To inspect the safety of a given facility

—To decontaminate different surfaces

—To respond correctly and promptly to alarm signals and emergencies

—To determine and/or calculate radiation doses and shielding.

2012…opportunity for revision - differentiated competencies

1. Use a more explicit, formal competency model
   - We propose a 5 tier system
   1. Novice
   2. Advanced Beginner
   3. Competent
   4. Proficient
   5. Expert
2. Review competencies and align to the appropriate level
3. Clarify roles and responsibilities by level
4. Train to the appropriate level
5. Monitor performance and outcomes by agreed indicators

Competency (2001 model revised)	Level
Recognize radiation risks in the workplace	(1)
Put on and remove safely protective clothing and respiratory devices	(1)
Identify warning signals and signs	(1)
Respond correctly and promptly to alarm signals and emergencies	(1)
Operate and/or use correctly radiation monitoring equipment and/or individual radiation protection devices	(2)
Measure correctly levels of dose rate or contamination	(2)
Decontaminate different surfaces	(2)
Interpret the results of measurements	(3)
Inspect the safety of a given facility	(3)
Determine and/or calculate radiation doses and shielding	(4)
Distinguish between practices and interventions, and between workers' and licensee's responsibilities	(4)
Respond appropriately to incidents, accidents and unforeseen events	*(4)*
Deliver training and mentoring to new or inexperienced personnel	*(4)*
Know when to seek assistance, and from where	*(4)*

Match the Competency to the Job and Train Accordingly

MiLo*rad*


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jhilton, welcome back.
Radioactivity and Radiation
Biological Effects
Dose and Limits
Relative Risk
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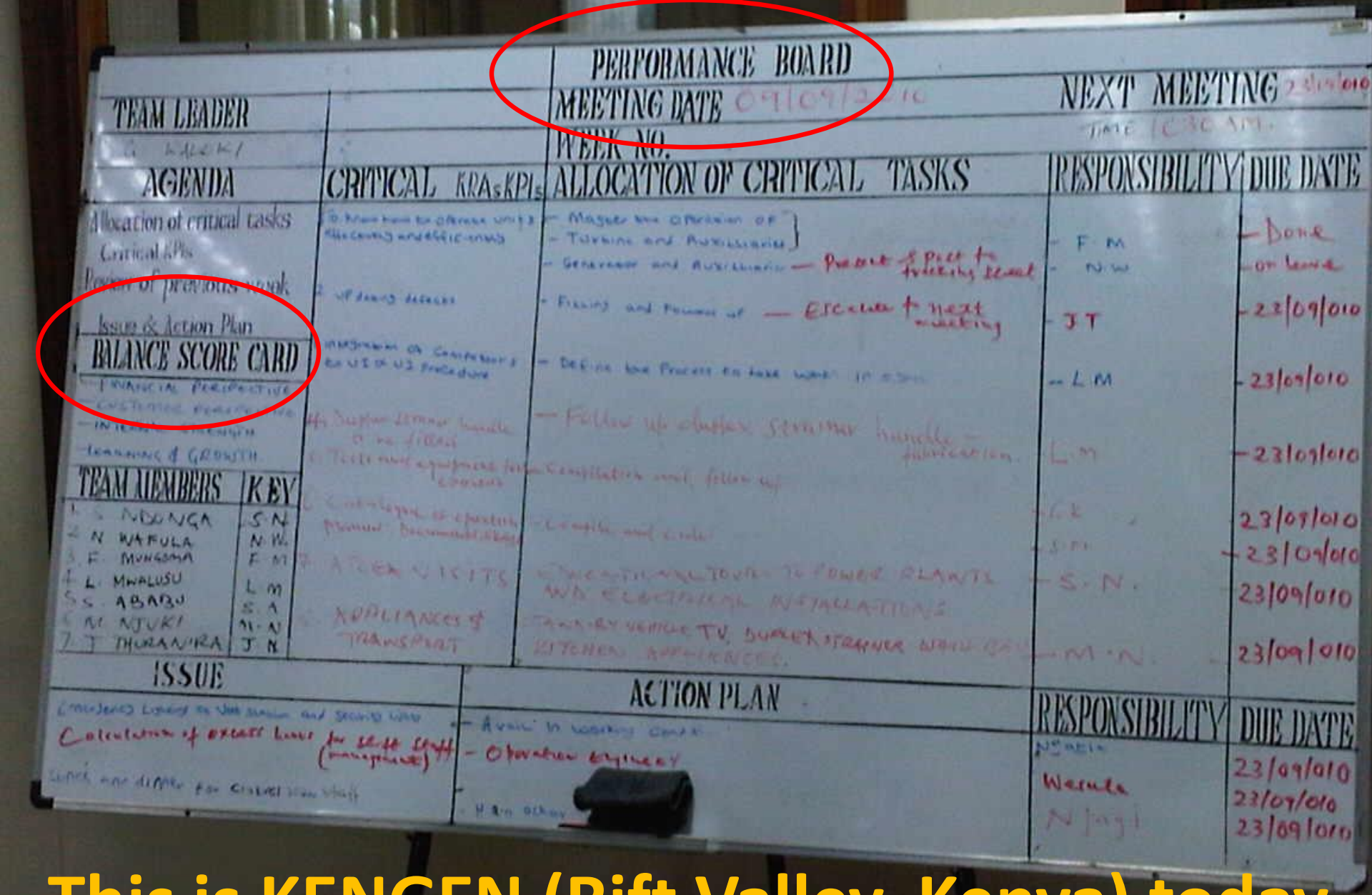


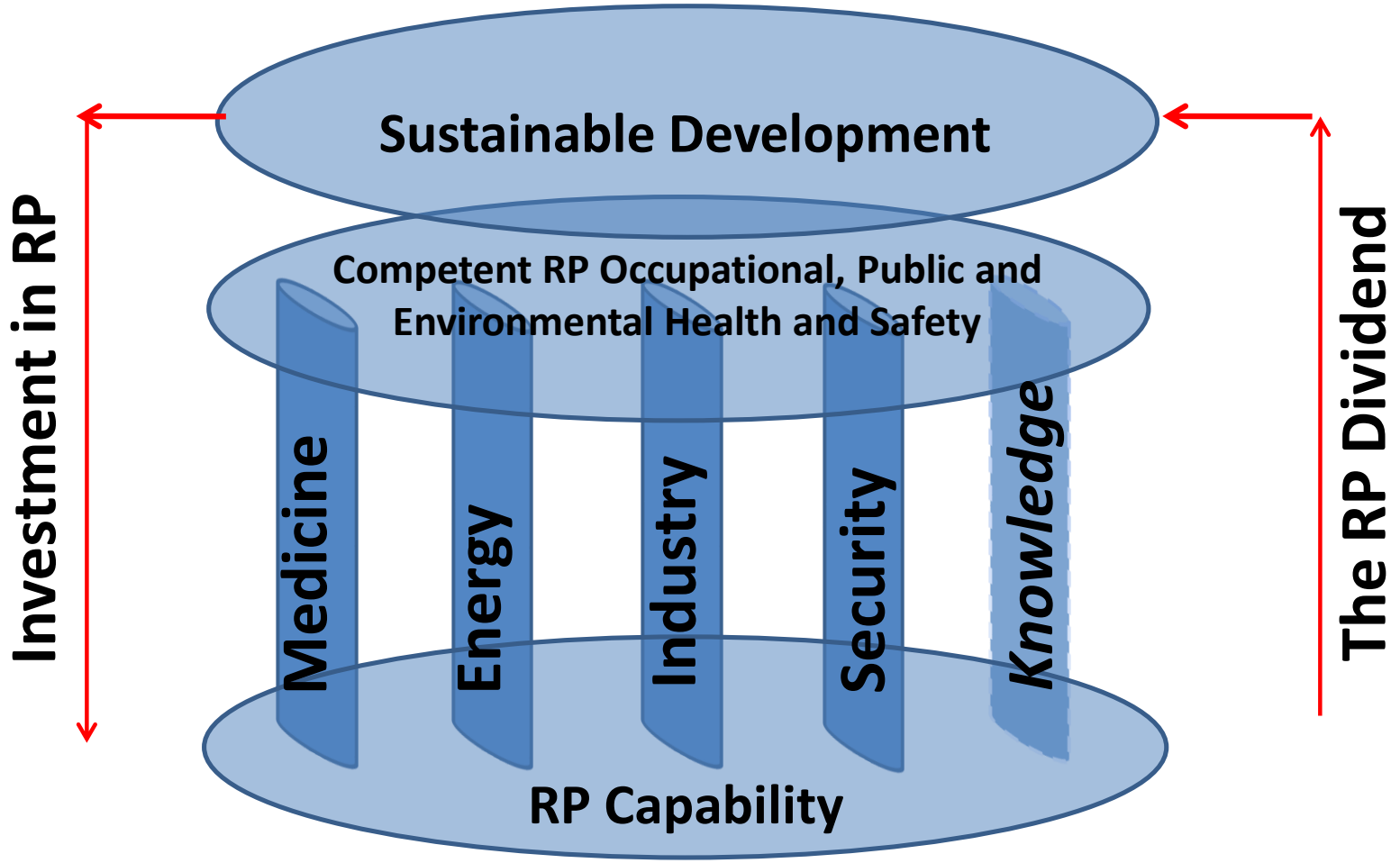
This is KENGEN (Rift Valley, Kenya) today

Where next?

- The Lions have to take the lead
- Create a single framework within which RP as a single professional community can operate, allowing for each of the different sectors to develop specialist competencies, but from a common base of both knowledge and practice
- Counter the risk of “tribalism”, within the RP community crucially by building an entry level training culture that is generic and transferable
- Engage with stakeholders to demonstrate RP is an investment not an externality – yielding a dividend, not working like a tax
- For Africa at least, our case is that in the absence of such an approach no sustainable systemic progress will be made, however much individual training courses and interventions succeed.

Clear, integrated, professional purpose – the path to the RP dividend?

From a customer or stakeholder point of view, professional fragmentation may be undermining the perceived value of RP



The Challenge to ourselves: Towards a Generic (non-Tribal) Competency Model for RP – Example, NORM and Medical Applications Compared

Level	Generic	NORM / Medical Operational	Safety Hurdle + Medical	Management
1. Novice	• Works to taught rules or plans • Little situational discrimination (e.g. between safe/ unsafe behaviours) • No comparative judgment	• Works directly with NORM-bearing or contaminated objects • Students undergoing supervised training in a clinical setting	• Must be taught basic radiation safety principles, e.g. justification, optimisation, dose limitation; ALARA • Must be taught to use PPE • Must be taught basics of dose limitation to patient doses and workers	Requires constant supervision • Task-specific
2. Advanced Beginner	• Follows guidelines for work aligned to key task attributes or aspects • Some situational discrimination (e.g. safe/ unsafe) • All attributes and aspects are treated separately and given equal importance	• May perform routine radiation surveys or sampling, unsupervised • May be specifically assigned to work in higher NORM exposure situations • May provide care of nuclear medicine patients • Advanced student/intern • Medical referrers (including some medical students) • Referring chiropractors • Regulators	• Must be taught radiation safety principles in more detail, e.g. radioactivity and radiation, biological effects, dose and risk, limits, use of survey equipment and personal dosimeters (for those in exposure situations) • Must follow established SOPs specific for equipment to minimise patient and worker doses • Must know typical doses of prescribed procedures • Must understand the application of risk in the justification process • Must understand the importance of the optimisation principle and the use of diagnostic reference levels in managing the exposure of patients • Must understand risks to pregnant women (staff and patients) and foetuses	Works largely unsupervised • Task-specific • Procedural –tasks are concatenated into a coherent process or flow sheet
3. Competent	• Multi-tasking – can also prioritise • Contextualises routine actions in terms of longer-term goals • Methodical planning with limited adaptability • Differentiates standardised and routine procedures from exceptions • Can diagnose and remedy routine faults • Follows all safety procedures; anticipates and prevents risks	• May supervise teams working in NORM exposure situations • May participate in drafting Radiation Work Permits • May participate in planning for decontamination, decommissioning, or waste disposal activities, including QA/QC • May supervise teams working in diagnostic and interventional radiology departments • May operate, maintain or test x-ray equipment • May use pharmaceuticals in nuclear medicine including PET or PET/CT • May use radionuclides for diagnostic purposes such as radioimmunoassay • Radiographers, nuclear medicine technologists, x-ray technologists, maintenance engineers and clinical applications specialists, podiatrists, physiotherapists, speech therapists, nurses, dental care professionals, radio-pharmacists and radionuclide laboratory staff	• Must be taught to supervise a team working in a radiation environment • Must be taught to recognize and characterize an exposure situation • Must be taught how to assess dose and manage time, distance and shielding to keep doses ALARA • Must be taught radiological waste management	Supervises, within defined framework • Interpersonal – such as communications (oral and written) and teamwork • Contextual –demonstrates capacity to work within the wider operating or process environment • Reporting - outputs

4. Proficient	• Understands situations holistically
	• Knows quickly what is most important in a situation; reacts instinctively safely
	• Perceives deviations from the normal pattern and is adaptive
	• Practised at decision-making
	• Uses maxims for guidance, whose meaning varies according to situational need, and can direct others
		• Will be placed in charge of health physics duties for a site or company to include:
		  ○ site characterization and monitoring,
		  ○ personnel monitoring,
		  ○ shipping,
		  ○ reporting
		  ○ regulatory compliance
		• May construct and direct corporate initiatives May author corporate policies, procedures and best practices
		• Radiation safety officer, radiologists, nuclear medicine specialists, cardiologists and interventionalists from other specialties (vascular surgeons, neurosurgeons), other specialists using x rays (urologists, gastroenterologists, orthopaedic surgeons), other specialists using nuclear medicine, assisting physicians (anaesthetists, occupational health physicians who review records of radiation workers), dentists, medical physicists
			• Must acquire skills to function as site or corporate Radiation Safety Officer
			• Must be able to design radiation safety and environmental monitoring programmes
			• Must be able to analyze dosimetry and environmental data
			• Must be able to report analysis results to corporate officers and regulatory agencies
				Manages/ Decides
				• Performance – optimisation
				• Contingent – such as dealing successfully with the unexpected or unforeseen
				• Accountability – legally liable for radiation protection decisions made on behalf of the company

5. Expert	• No longer relies on rules, guidelines or maxims • Intuitive grasp of situations based on deep tacit understanding • Defines performance and safety outcome measures; can spot emerging trends • Analytic approaches used only in novel situations or when problems occur • Vision of what is possible	• Is capable of adapting existing or developing new policies and procedures for contingent or unforeseen events • Is capable of strategic planning and foresight including what-if modelling and scenario development • Is capable of developing innovative strategies for radiation protection • Will participate in technical dialogue with standard-setting or regulatory agencies • Will develop the corporate (or hospital) vision on how NORM is used, avoided, or otherwise managed/ how radioactive materials or radiation-generating equipment are used, avoided, or otherwise managed	• Must have access to information in order to evaluate NORM impacts for a company or entire industry • Must have expert knowledge of radiation principles and NORM to author policies, procedures and best practices • Must have access to information in order to contribute to organizations that set standards or draft regulations	Leads • Defines, evaluates, redefines processes and competencies • Influences scientific debate and regulatory policy • Influences or establishes corporate vision and mission statement

Thank you:
participation welcome…

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