WS on competence frameworks for research reactor regulation

IAEA KINS ANNuR AAEA

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Rabat (Morocco)

Systematic Assessment of Regulatory Competences (SARCON): Introduction and Methodology

José Gil Martin (Spain)

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International Atomic Energy Agency

CONTENT

- The Guidelines
- Quadrant Model of Competences
- The Step by Step Approach
- Experience using SARCoN

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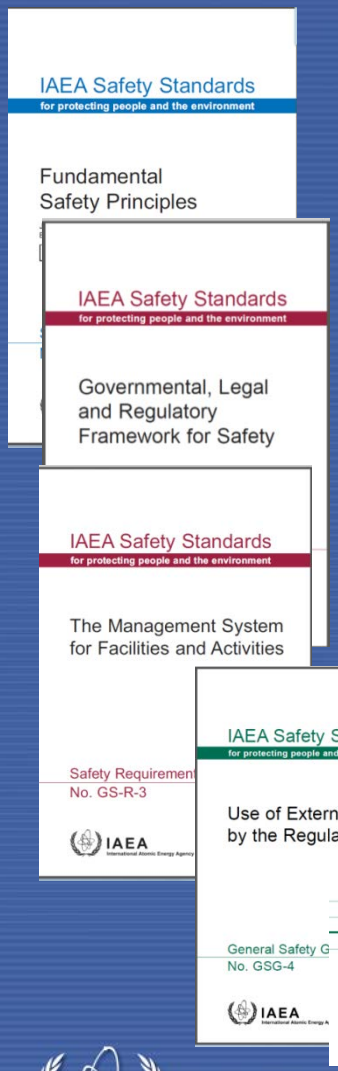
Why Competence Management?

- Arrangements for competence management is a key factor to:
  - Support the implementation of article 8 of CNS *(Convention on Nuclear Safety – "regulatory body with adequate competence and human resources")*
  - Support the implementation of Modules 3 and 4 of the IRRS and other IAEA Safety Standards *(Module 3: "Responsibilities and functions of the regulatory body", Module 4: "Management system of the regulatory body")*
  - Identify gaps between regulatory required competences and the existing resources
  - Develop and implement tools and programmes to fill the gaps
  - Review periodically the competence needs and training programmes

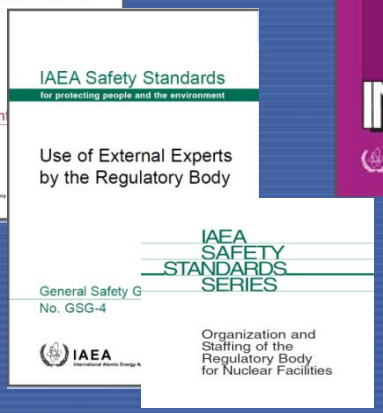
Regulatory Competence underlined in the IAEA Safety Standards, Safety Documents and INSAG

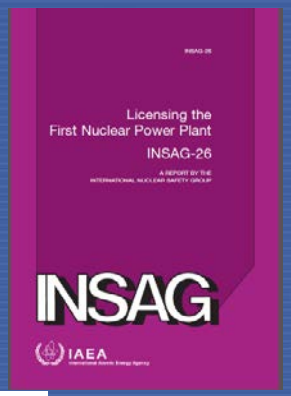


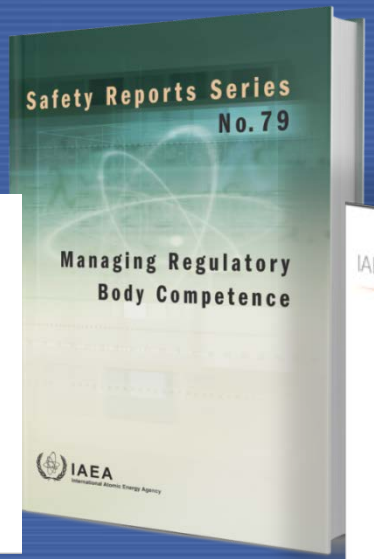
Competence of the regulatory bodies is mentioned more than 100 times in the relevant IAEA safety standards

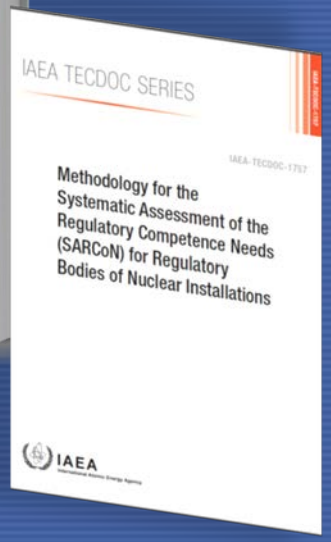
A specific regulatory competence model, guidance for managing regulatory competence and a systematic methodology for regulatory competence needs assessment has been developed by the IAEA in cooperation with Member States

INSAG 26 recognises and recommends the 4 Q model









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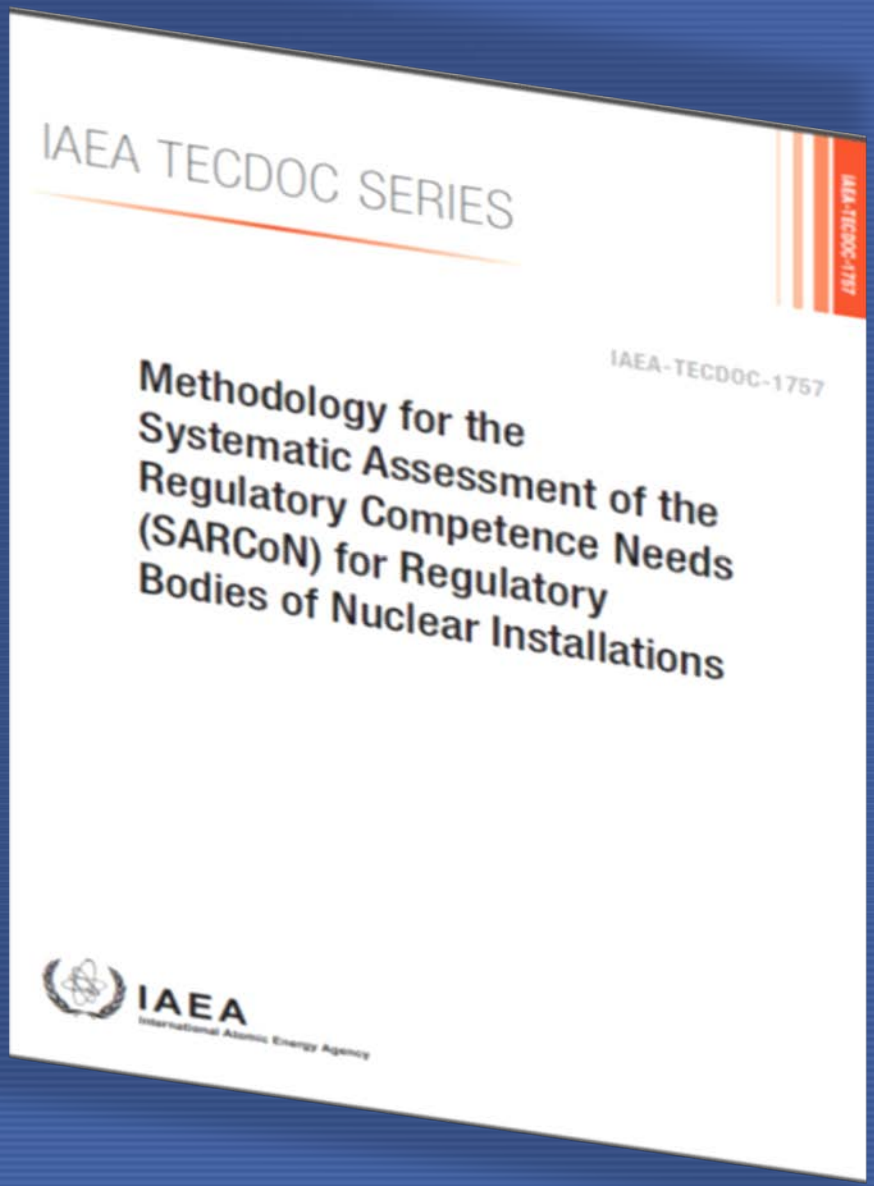
SARCoN Guidelines



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SARCoN Guidelines

No.	Level	Basis
1	Organizational	Quadrant areas
2	Organizational	KSAs
3	Individual	Quadrant areas
4	Individual	KSAs

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The quadrant model of competences

1. Legal, regulatory and organizational basis

1.1 Legal basis
1.2 Regulatory policies and approaches
1.3 Regulatory and regulatory guides
1.4 Management system

2. Technical disciplines

2.1 Basic science and technology
2.2 Applied schience and technology
2.3 Specialized science and technology

3. Regulatory body's practices

3.1 Review and assessment
3.2 Authorization
3.3 Inspection
3.4 Enforcement
3.5 Development of regulations and guides

4. Personal and interpersonal effectiveness

4.1 Analytical thinking and problem solving
4.2 Personal effectiveness and self-management
4.3 Communication
4.4 Team work
4.5 Managerial competences and leadership
4.6 Safety Culture

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The 4Q Regulatory Competence Model

Knowledge, Skill and Attitudes (KSA)

4. Personal and interpersonal effectiveness

4.1 Analytical thinking and problem solving
4.2 Personal effectiveness and self-management
4.3 Communication
4.4 Team work
4.5 Managerial competences and leadership
4.6 Safety Culture

1. Legal, regulatory and organizational basis

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3.1 Review and assessment
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3.4 Enforcement
3.5 Development of regulations and guides

2. Technical disciplines

2.1 Basic science and technology
2.2 Applied schience and technology
2.3 Specialized science and technology

Quadrant 3: Competences related to a regulatory body's practices

3.1. Review and assessment

This competence area is the ability to examine safety cases and other documentation submitted by licensees in support of their justifications regarding installations and the forming of judgements on the adequacy of the documents and the processes used by the licensees in producing them. Examples of KSAs could be:

——Comprehension of the regulatory body's requirements for review and assessment;
——Ability to identify and to synthesize information relevant to the safety of a facility or activity (such as facility's submission, past performance, and enforcement and inspection history);
——Ability to identify the need for further information in relation to review and assessment;
——Ability to initiate other regulatory processes when needed (such as inspection);
——Ability to take the outcomes of other regulatory processes into consideration in the review and assessment process;
——Ability to examine documentation and relevant information, recognize issues regarding the safety of a facility or activity and possible non-compliance, and make judgements regarding the overall safety and compliance with regulatory requirements;

4.6. Safety culture competence

This competence area is the necessary KSAs to promote and to support a strong safety culture effectively (see Ref. [2]). Examples of KSAs could be:

- Comprehension of the key aspects of safety culture within the organization;
- Comprehension of the ITO concepts (individuals, technology and
- organization) in the regulatory body;
- Learning and questioning attitude;
- Comprehension of the importance to provide means by which the
- organization continually seeks to develop and to improve its safety culture.

Quadrant 1: Competences related to Legal, Regulatory and Organisational basis

1.1.2. Regulatory policies and approaches

This competence area is the knowledge of, and skills needed to comprehend and to apply, the regulatory policies and approaches in order to achieve the relevant regulatory objectives. Examples of KSAs could be:

——Comprehension and appreciation of the mandate, mission and objectives of the regulatory body;
——Comprehension of the values of the regulatory body and the principles of good regulation (e.g. independence, openness, efficiency, clarity, objectivity, stability, proportionality, accountability and consistency);
——Comprehension of regulatory body governance regarding its short and long term strategic objectives and goals;
——Comprehension of regulatory body policies and principles on which the regulatory processes are based;
——Appreciation of measures for implementing actions to achieve the short and long term strategic objectives and goals of the regulatory body.

1.3. Regulations and regulatory guides

This competence area is the knowledge of, and skills needed to comprehend and to use, the regulations and regulatory guides. Regulations and regulatory guides typically cover:

(a) Nuclear safety areas:
(i) Technical safety requirements for siting, design, construction, commissioning, operation, decommissioning and waste management of nuclear facilities or devices;
(ii) Requirements on the safety analysis report (SAR);
(iii) Operational limits and conditions, surveillance and maintenance;
(iv) Emergency preparedness and response;
(v) Requirements related to the periodic safety review.

Quadrant 2: Technical disciplines competences

2.1. Basic science and technology

This competence area is the knowledge of, and skills needed to comprehend and to apply, science and engineering fundamentals in a particular field. Some typical science and engineering fields that are common to many regulatory bodies include:

——Mathematics;
——Physics;
——Chemical, electrical, civil and mechanical engineering;
——Chemistry, including radiation chemistry;
——Earth sciences, including geology, seismology, meteorology and hydrology;
——Computer science;
——Nuclear engineering, including nuclear reactor concepts, nuclear physics and reactor physics;
——Environmental engineering;
——Materials and metallurgical engineering;
——Radiography, including medical applications;
——Thermodynamics and thermohydraulics;
——Behavioural sciences.

2.2. Applied science and technology

This competence area is the additional knowledge of, and skills needed to comprehend and to apply, engineering and science concepts in specific areas. The main areas may include:

——Nuclear reactor and power plant technology;
——Nuclear fuel cycle technology;
——Nuclear safety technology;
——Technologies regarding the application of radiation in industry, research and agriculture;
——Medical physics;
——Radiation physics, including shielding;

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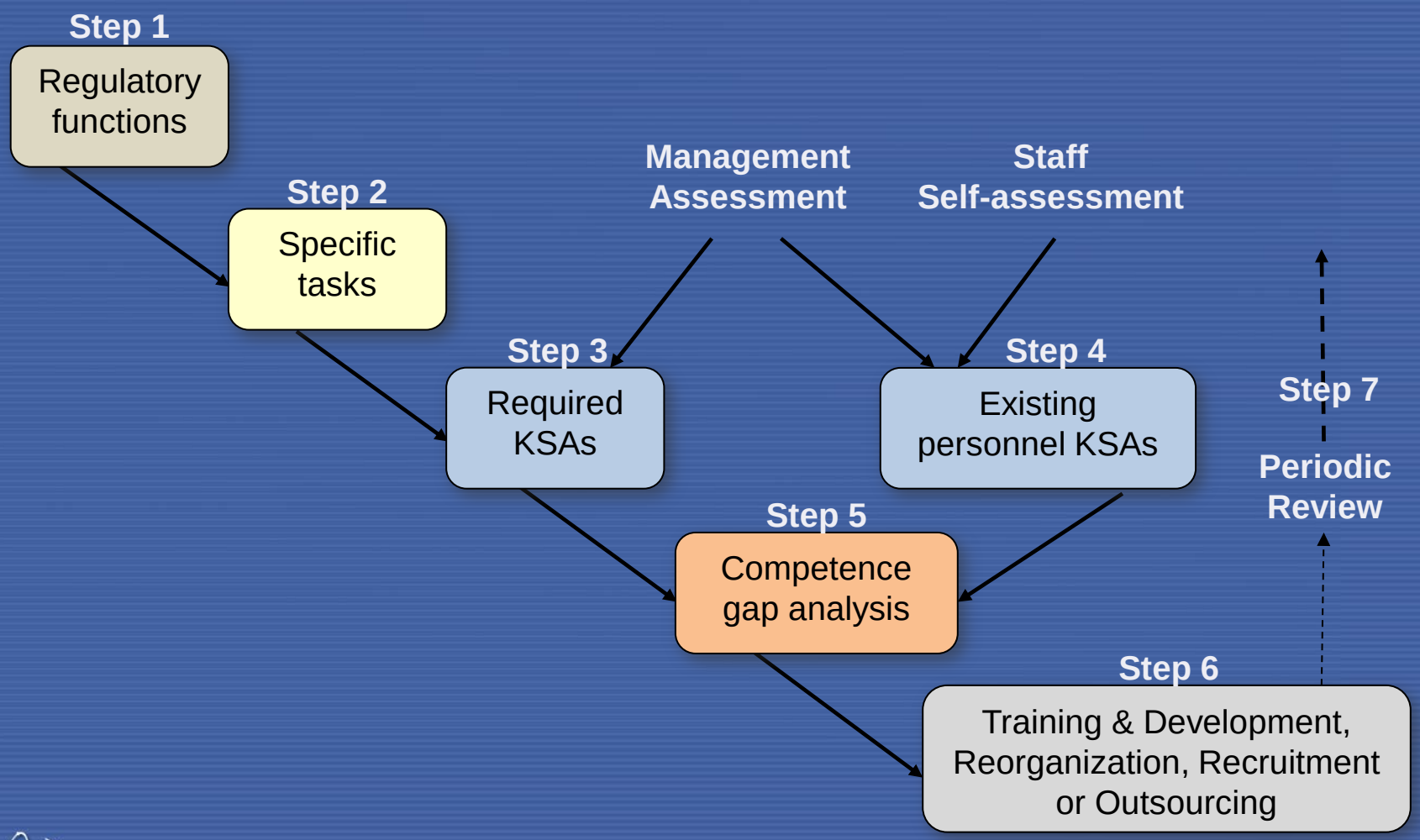
The step based approach



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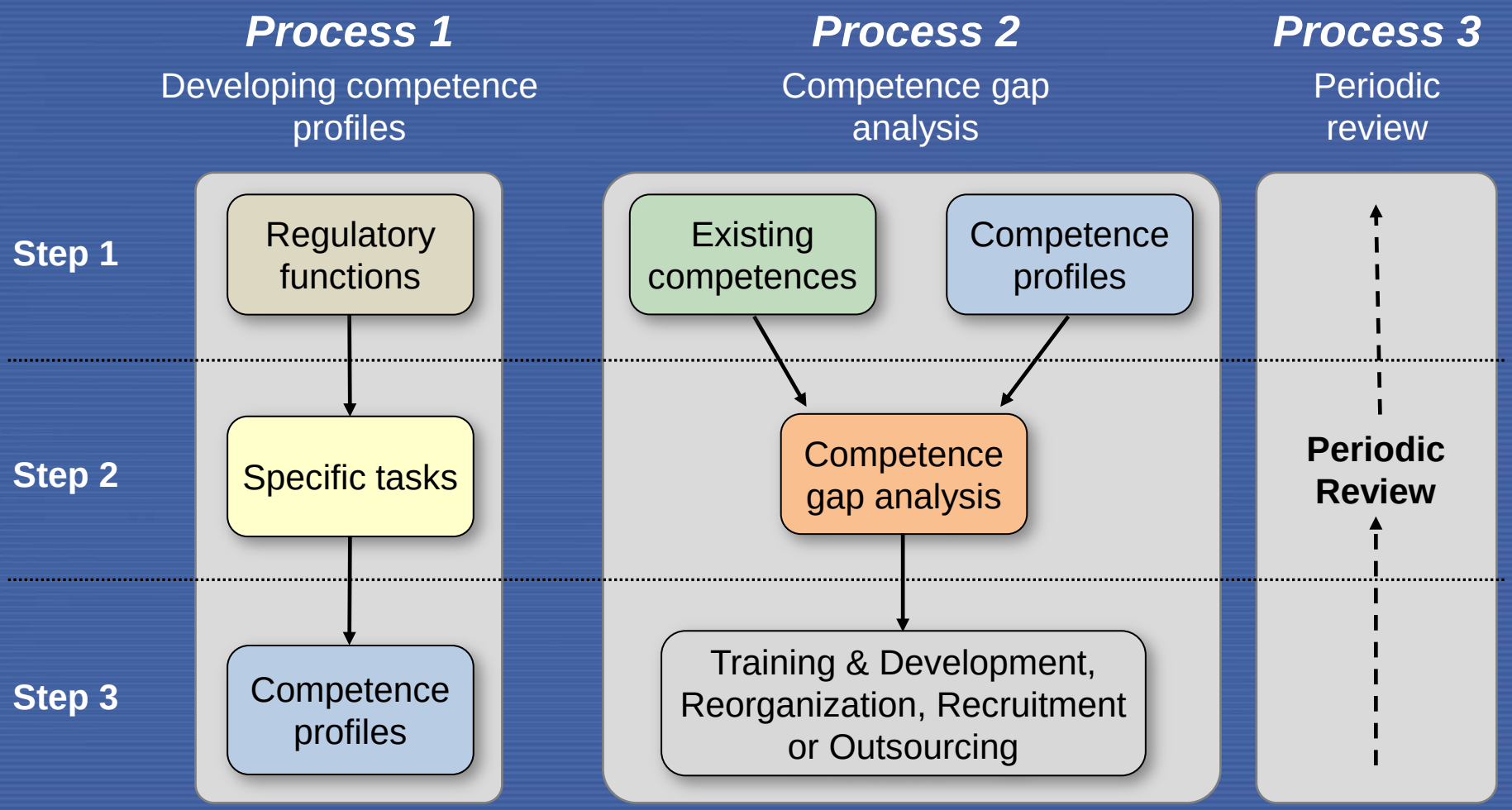
The step based approach



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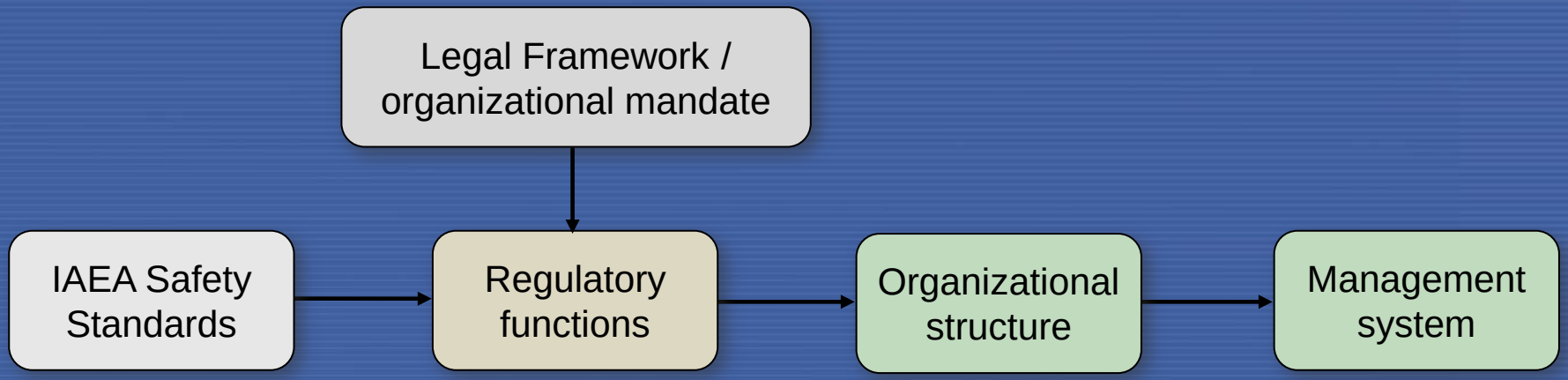
Process 1 - Step 1

Regulatory functions

Determine the regulatory functions of the organizational unit



IAEA guidance through Safety Standards:

- GSR Part 1
- GS-R-3
- GS-G-1.1
- GS-G-3.1

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Process 1 - Step 1

Regulatory functions

Functions of a regulatory body

Core Functions:

- Authorization and notification
- Review and assessment of facilities and activities
- Inspection of facilities and activities
- Enforcement of regulatory requirements
- Development of regulations and guides
- Emergency preparedness
- Communication and consultation with interested parties

Supplementary Functions:

- Administrative support
- Legal assistance
- External expert support
- Advisory committees
- Research and development
- Liaison with other organizations
- International cooperation

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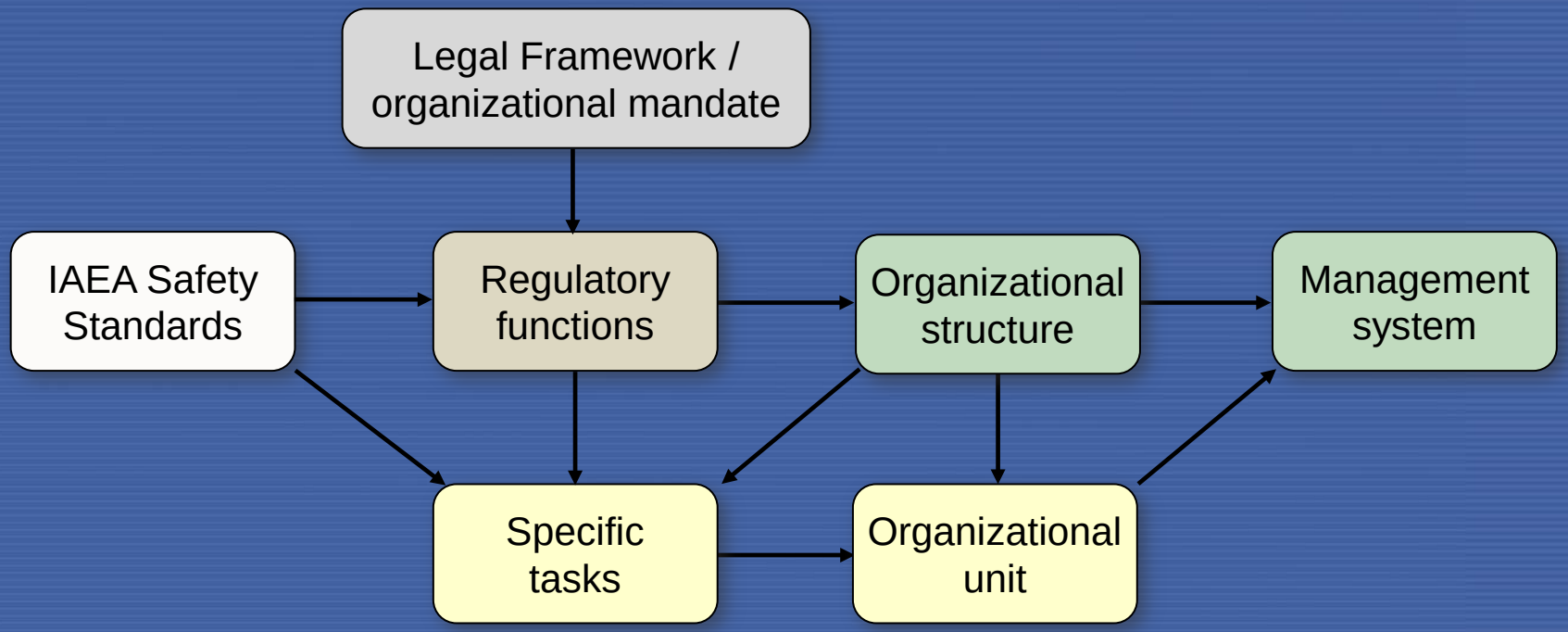
Process 1 - Step 2

Specific tasks

Determine the specific tasks of the organizational unit



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Process 1 - Step 2

Specific tasks

Determine the specific tasks of the organizational unit

- These tasks should be collected in the management system (GS-R-3)
- Appendix 1 of Safety Reports Series No. 79 provides examples of tasks for the main functions
- These are some examples:
  - “Monitoring national and international researches and developments in nuclear field;”
  - “Assessment of convenience of aims and politics of Authority;”
  - “Provide, co-ordinate and monitor related projects.”

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Process 1 - Step 2

Specific tasks

Determine the specific tasks of the organizational unit

TABLE 1. EXAMPLE OF A TEMPLATE FOR A LIST OF TASKS

	List of task for the organization	Lead organizational unit	Support organizational unit	Comments
TA001				
TA002				
TA003				
…				

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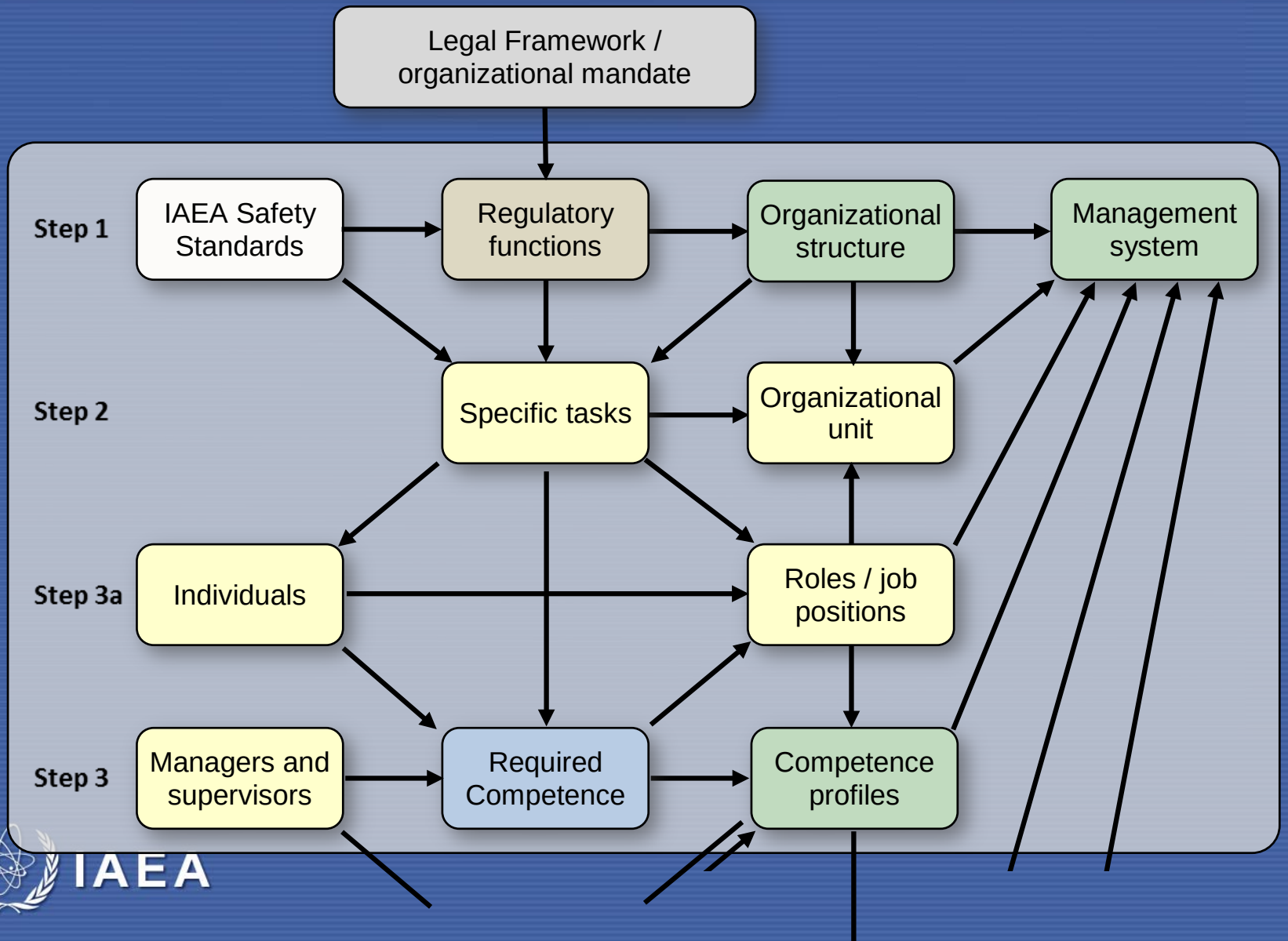
Process 1 - Step 3

Required Competences



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Process 1 - Step 3

Required Competences

Step 3: Developing competence profiles

This step consists of three parts that can be conducted consecutively or separately.

- The first part consists of assessing the required level of competences for each task on the basis of quadrant areas or KSAs;
- The second part consists of assigning tasks to positions or organizational units;
- The third part consists of assigning positions to individuals or to organizational units.

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Process 1 - Step 3

Required Competences

The first part consists of assessing the required level of competences for each task on the basis of quadrant areas or KSAs

KSAs	Task001	Task002	Task003
KSA001	Level of Competence	Level of Competence	Level of Competence
KSA002	…	…	…
…			

TABLE 1. EXAMPLE OF A TEMPLATE FOR RECORDING THE REQUIRED LEVEL OF COMPETENCE ON THE BASIS OF THE QUADRANT AREAS

	Quadrant area	Level of competence for tasks on the basis of quadrant areas				Comments
		Task001	Task002	Task003	…	
Q1	1.1	B	…	…	…	
	1.2	M	…	…	…	
	1.3	H	…	…	…	
	1.4	B	…	…	…	
Q2	2.1	B	…	…	…	
	2.2	M	…	…	…	
	2.3	M	…	…	…	
Q3	3.1	H	…	…	…	
	3.2	M	…	…	…	
	3.3	NA	…	…	…	
	3.4	NA	…	…	…	
	3.5	B	…	…	…	
Q4	4.1	M	…	…	…	
	4.2	B	…	…	…	
	4.3	B	…	…	…	
	4.4	M	…	…	…	
	4.5	B	…	…	…	
	4.6	M	…	…	…	

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Process 1 - Step 3

Required Competences

The second part consists of assigning tasks to positions or organizational units.

Consecutivo:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
GSN	GSN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
DE	JDE	20	21	30	31	32	33	34	35	36	37	38	39	40	41	42	60	61	62				
DVO	JVO	20	21	30	31	32	33	34	35	36	37	38	45	46	47	48	49	50	60	61	62		
DAR	JDA	20	21	30	31	32	33	34	35	36	37	38	53	54	55	60	61	62					
DE	ABL	20	61	62	70	71	72	73	74	75	76	77	78	79	80	81	82	84	100				
	AL	20	61	62	70	71	72	73	74	75	76	77	78	79	84	85	86	100					
	AEO	20	61	62	70	71	72	73	74	75	76	77	78	79	84	87	88	100					
DVO	ACO	20	61	62	70	71	72	73	74	75	76	77	78	79	89	93	94	95	100				
	AVD	20	61	62	70	71	72	73	74	75	76	77	78	79	89	90	92	93	95	100			
	API	20	61	62	70	71	72	73	74	75	76	77	78	79	89	93	95	96	97	98	100		
	ALV	20	61	62	70	71	72	73	74	75	76	77	78	79	89	93	95	99	100	101	102		
DAR	AIS	20	61	62	70	71	72	73	74	75	76	77	78	79	103	104	105	106					
	ANR	20	61	62	70	71	72	73	74	75	76	77	78	79	103	106	107	108	109				
DE	ABL-A	20	62	70	110	111	112	113	114	115	116	117	119	120	121	122	123	124	125	126	127		
	AL-A	20	62	70	110	111	112	113	114	119	120	121	122	123	124	125	126	127	128	129	130	131	
	AEO-A	20	62	70	110	111	112	113	114	119	120	121	122	123	124	125	126	127	132	133	134	135	136
DVO	ACO-A	20	62	70	119	120	123	124	125	126	127	137	138	139	140	141	142	143	144	145	146	147	148
	AVD-A	20	62	70	119	120	123	124	125	126	127	137	138	139	140	141	142	148	149	150	151	152	
	API-A	20	62	70	119	120	123	124	125	126	127	137	138	139	140	141	142	148	153	154	155	156	157
DAR	AIS-A	20	62	70	103	106	119	120	121	122	123	126	127	148	158	159	160	161	162	163			
	ANR-A	20	62	70	103	106	119	120	121	122	123	126	127	148	164	165	166	167	168	169			
DE	ABL-B	62	70	110	111	112	113	114	119	122	123	124	125	126	127	170	171	172	173				
	AL-B	62	70	110	111	112	113	114	119	122	123	124	125	126	127	170	171	172	174				
	AEO-B	62	70	110	111	112	113	114	119	122	123	124	125	126	127	170	171	172	175				
DVO	ACO-B	62	70	119	123	124	125	126	127	141	171	172	176	177	178	179	180	181	182	183	184	185	
	AVD-B	62	70	119	123	124	125	126	127	141	176	177	178	179	180	186	187	188					
	API-B	62	70	119	123	124	125	126	127	141	176	177	178	179	180	189	190	191	192	193			
	ALV-B	62	70	119	123	124	125	126	141	176	194	195	196	197	198	199	200	201	202				
DE	ABL-C	70	110	111	112	113	114	122	124	125	127	170	172	173									
	AEO-C	70	110	111	112	113	114	122	124	125	127	170	172	175									
DAR	AIS-C	70	106	122	172	176	203	204	205	206	206	207											
	ANR-C	70	106	122	126	172	176	208	209	210	211	212											

Process 1 - Step 3

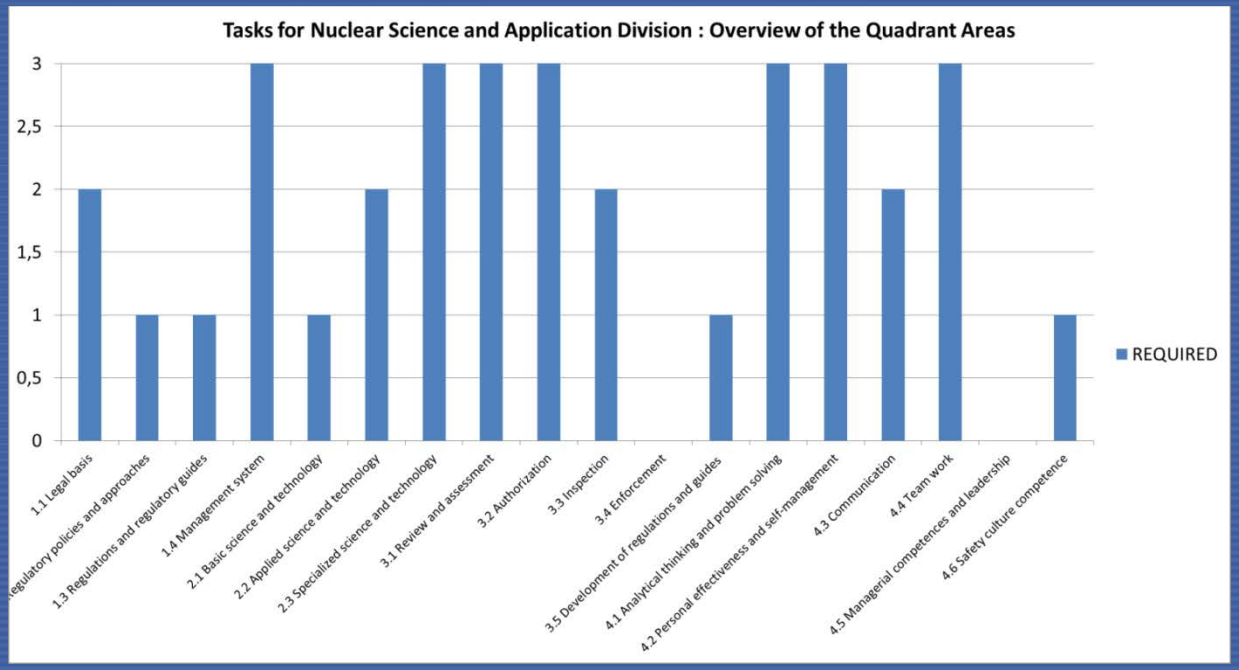
- The third part consists of assigning positions to individuals or to organizational units.
  - Translation and adaptation of 4-Q approach:
    - Definitions of competences,
    - Definition of KSAs
    - New KSAs?
    - Develop a Matrix

Process 1 - Step 3

Required KSAs

Assessment of the required knowledge, skills and attitudes

- Carried out by managers
- The outcomes are competence profiles for tasks or generic job positions



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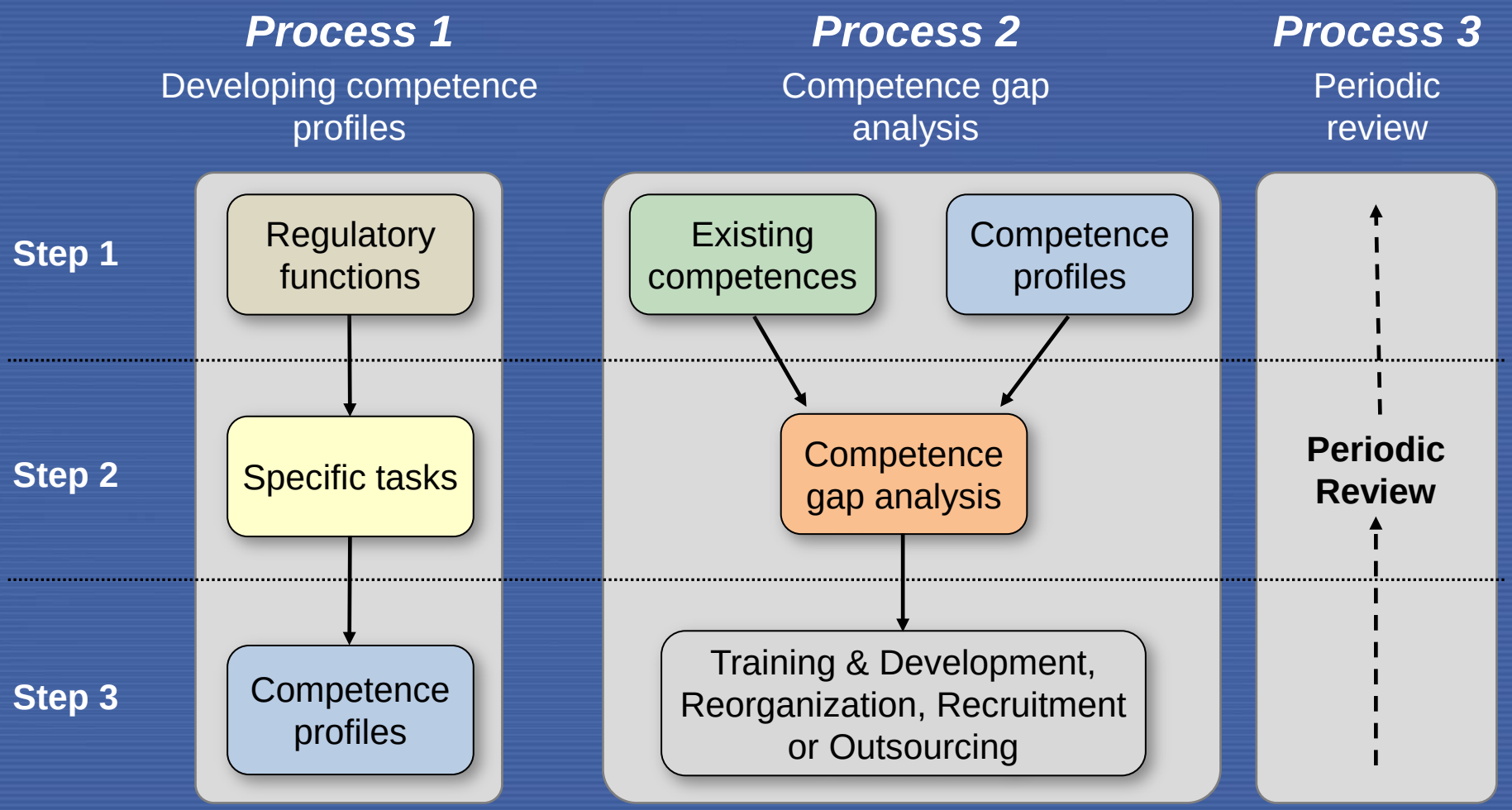
The step based approach



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Process 2 - Step 1

Existing personnel KSAs

Assessment of the existing knowledge, skills and attitudes

- Self-assessment by the staff
- With support and reviewed by the managers
- Other methods: interviews
- Discuss differences
- Can also be done in groups
- The outcomes are competence profiles of the existing staff for the defined tasks

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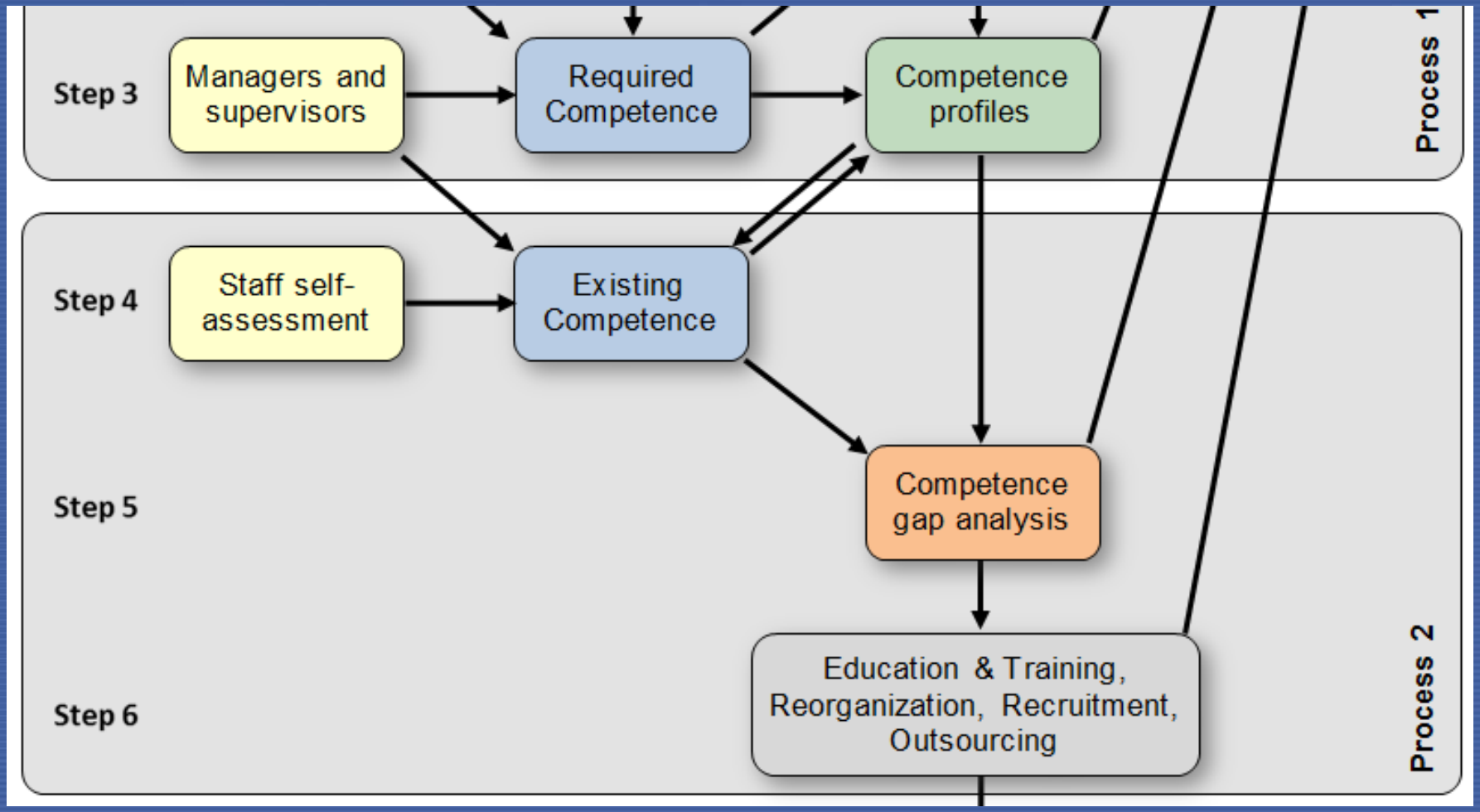
The step based approach

Management system



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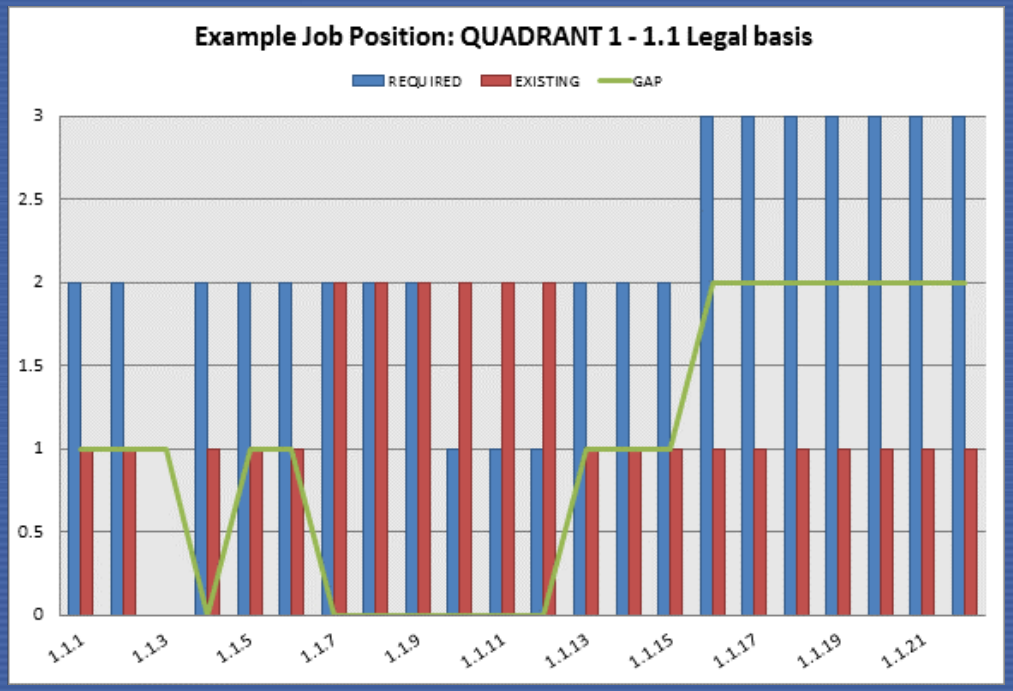
Process 2 - Step 2

Competence gap analysis

Comparison of existing and required competences

- The Training Coordinator needs to analyse the assessment of both existing and required competences
- SARCoN comes with a tool that helps to show these gaps



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Process 2 - Step 3

Training & Development, Reorganization, Recruitment or Outsourcing

Developing a plan for acquiring competences

Methods of acquiring competence defined in SRS-79:

- ✓ Reorganization and Mapping
- ✓ Establishing training and development programmes
- ✓ Outsourcing (use of external support)
- ✓ Participation in knowledge networks
- ✓ Recruitment

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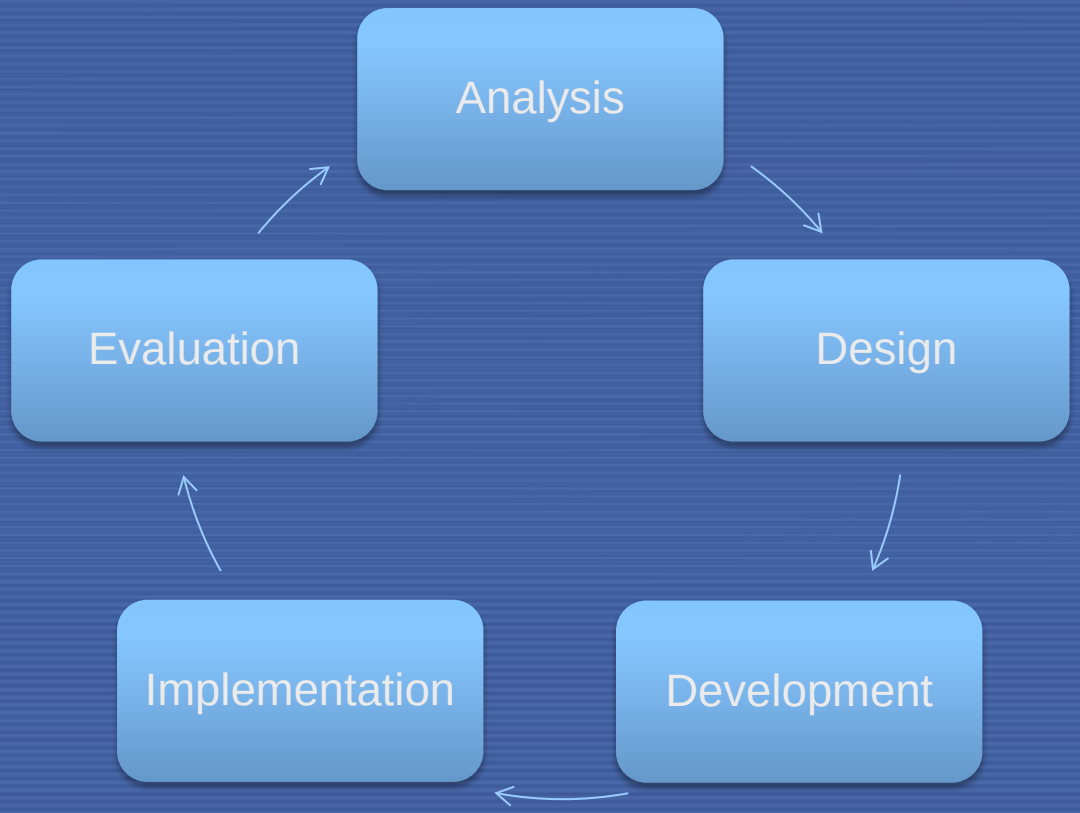
Process 2 - Step 3

Training & Development, Reorganization, Recruitment or Outsourcing

Developing a plan for acquiring competences

- Using the Systematic Approach to Training (SAT)



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Process 2 - Step 3

Training & Development, Reorganization, Recruitment or Outsourcing

Developing a plan for acquiring competences

- Training needs and learning points related to specific competences are converted to
  - learning objectives, including evaluation strategies,
    - organized into training plans, taking into account the available options and methods for training.

Choice of Training depends on factors such as:

✓ the geographical location of the participants,
✓ availability of leave for training purposes,
✓ the costs and availability of equipment and materials.

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Process 2 - Step 3

Training & Development, Reorganization, Recruitment or Outsourcing

Developing a plan for acquiring competences

Possible training methods depend on:

- ✓ Internal classroom training;
- ✓ External classroom training;
- ✓ Distance learning, using manuals, computers and videos, among others;
- ✓ On-the-job training (OJT);
- ✓ Structured self-study;
- ✓ Laboratory training, such as instrument use;
- ✓ Coaching and mentoring.

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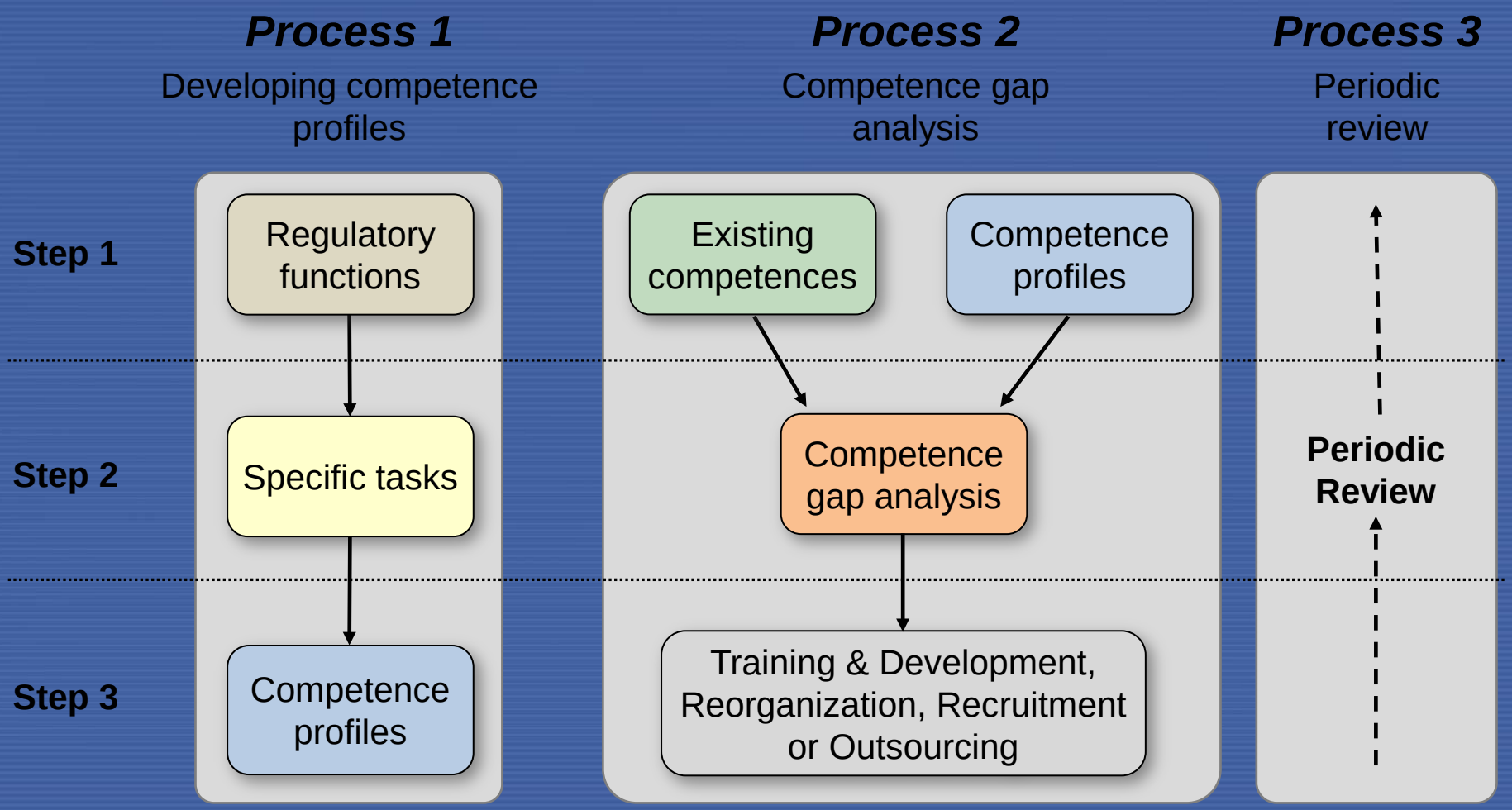
Process 3

Periodic Review

- Due to changes within the organization and to monitor the success of the acquired competences, the assessment needs to be repeated periodically.
- It is recommended to repeat the assessment every 3 years

Process 3


Process 1
Developing competence profiles
Process 2
Competence gap analysis
Process 3
Periodic review
Step 1
Step 2
Step 3
Regulatory functions
Specific tasks
Competence profiles
Existing competences
Competence profiles
Competence gap analysis
Training & Development, Reorganization, Recruitment or Outsourcing
Periodic Review

Assessment criteria

- Basic = General competence in the area concerned
- Medium = A competence level sufficient in routine cases
- High = A competence level needed for more sophisticated cases or at the strategic level within the RB
- More detailed examples of definitions can be found in Appendix II of SARCoN TECDOC 1757

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SARCoN- Conclusions (1)

- The SARCoN methodology provides a systematic approach for:
  - defining competence profiles,
  - identifying competence gaps,
  - assessing the training needs
  - establishing training programmes.
- IAEA provides the necessary elements to implement the SARCoN methodology: reference list of competences, quadrant model, software tool….
- Commitment of the upper management is an important element to make sure that the SARCoN methodology is properly implemented in a regulatory body. Procedures for its use should be developed with clear definitions of responsibilities within the RB and embedded in the Human Resource process of the Integrated Management System

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SARCoN - Conclusions (2)

- The SARCoN methodology has been used successfully by many regulatory bodies all over the world in different levels of detail.
- For instance:
  - the competence profiles defined by SARCoN are used mainly for HR planning and HR recruitment in embarking countries,
  - the competence gaps serve as inputs in countries with NPPs for taking decisions and managing any of the four possible strategies for filling the gaps and acquiring the missing competences: training of the staff, reorganizing, recruiting or outsourcing.
- In both cases, the training programmes can be established in a more systematic way thanks to the implementation of the SARCoN methodology.

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Modular aspect of SARCoN (1)

MODULAR TOOL

- ✓ Experience of different countries with different needs, financial situation, challenges, etc.
- ✓ Use common sense, graded approach
- ✓ 4 Quadrant model as a common language
- ✓ Just developing competence profiles is a step forward for many countries
- ✓ Decide the depth within the quadrants you need to go

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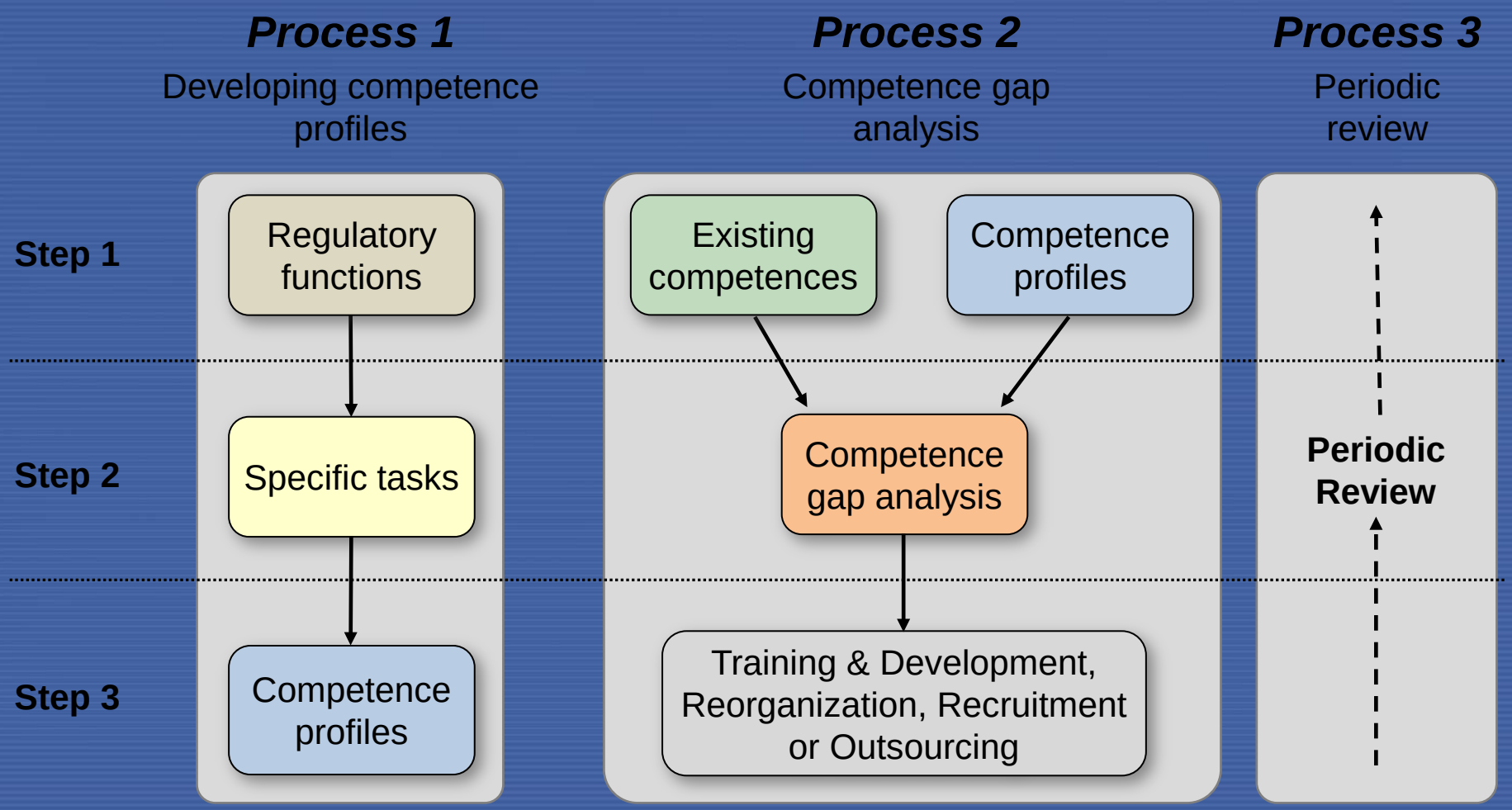
Modular aspect of SARCoN (2)



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SARCoN for Regional Harmonisation

SARCoN successfully used in Ibero America (CREaN project)

- ✓ Regional Competence Profiles were identified,
- ✓ Basis for common regional training needs assessment
- ✓ Priorities for support at a regional level,
- ✓ Identifying IAEA and regional resources to fulfil the gaps

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Thank you for your attention!

- For more information visit: http://www-ns.iaea.org/training/ni/sarcon.asp
- Or contact us at: NIS-Training.Contact-Point@iaea.org

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