Radiation protection research: is Nordic cooperation a way forward to ensure sustainable competence and high-quality research?

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Sustain competence

An investigation on the sustainability of the national competence in radiation safety (SSM, 2018) concluded:

1. **Major grant suppliers explicitly lack interest in radiation protection**

2. **The need for RP expertise is most obvious in emergencies and non-normal conditions but is often ignored under normal circumstances**

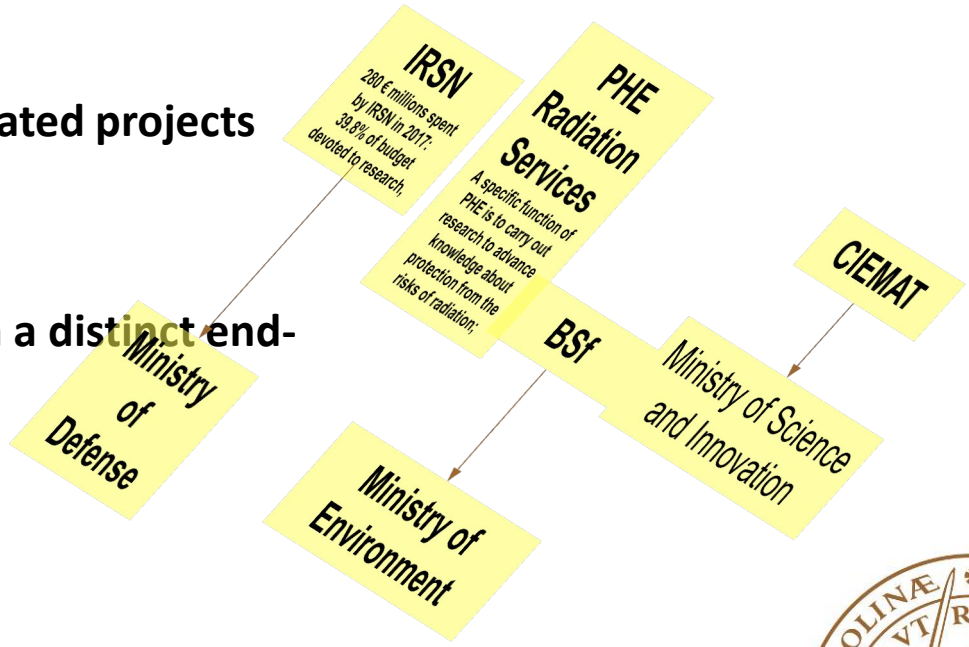
3. **Uncertain future for NP industry leads to less margins for RP research as large part of funding is generated by NPP production "quota"**

External grant providers (SE)

- The Swedish Radiation Safety Authority
- The Swedish Civil Contingency
- The Swedish Cancer Society
- EURATOM/EU-frameworks
- Nordic Nuclear Safety, NKS
- The Swedish Research Council, FORMAS, SFS, etc
- Crafoord, Wallenberg, etc

What is RP research?

- **Distinctly applied scientific field**
- **Tackling “well-known unknowns”**
- **Tradition of post-war RP related projects in Europe as a TSO function**
- **Well defined goals and with a distinct end-user perspective**

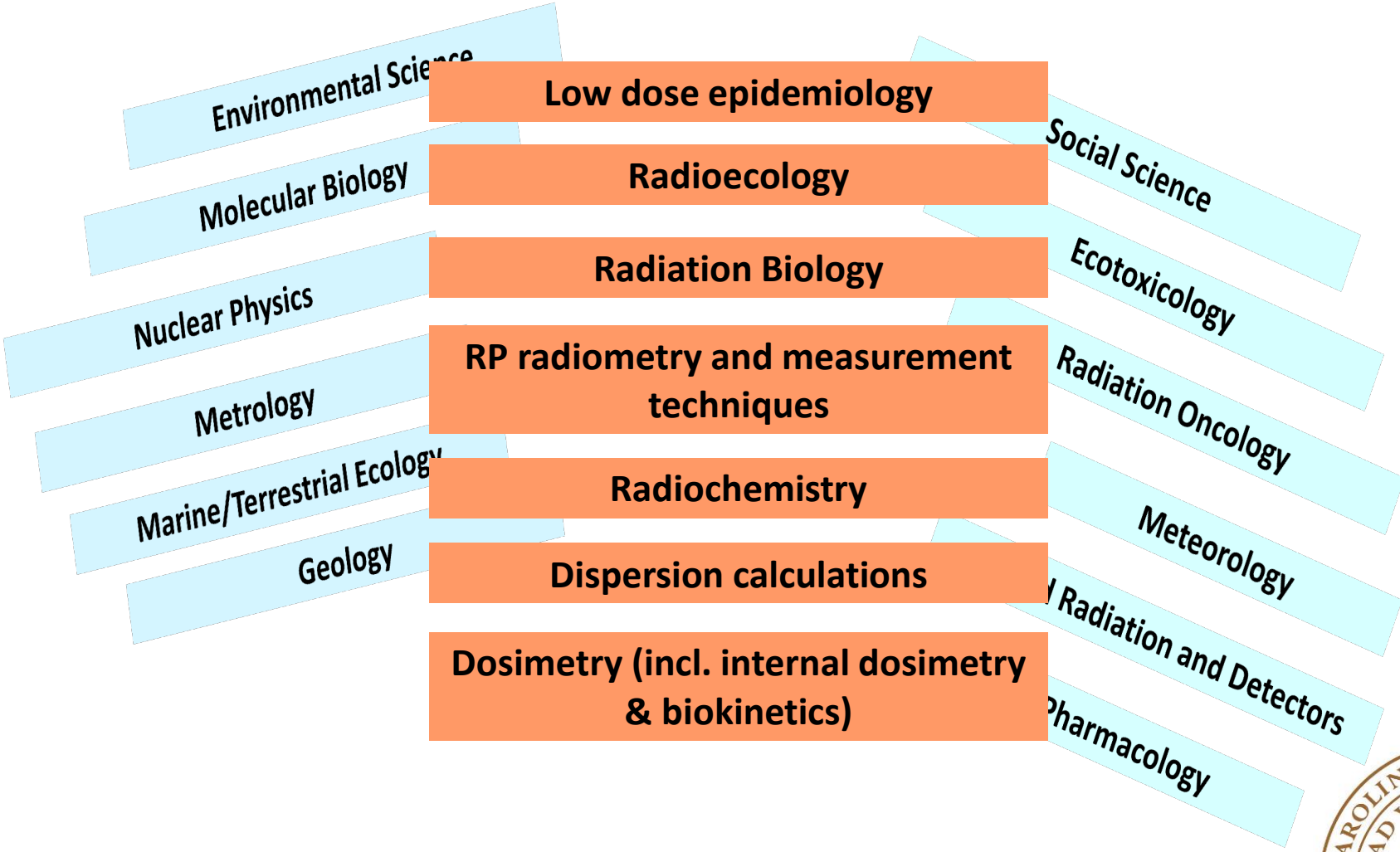


What is RP research?

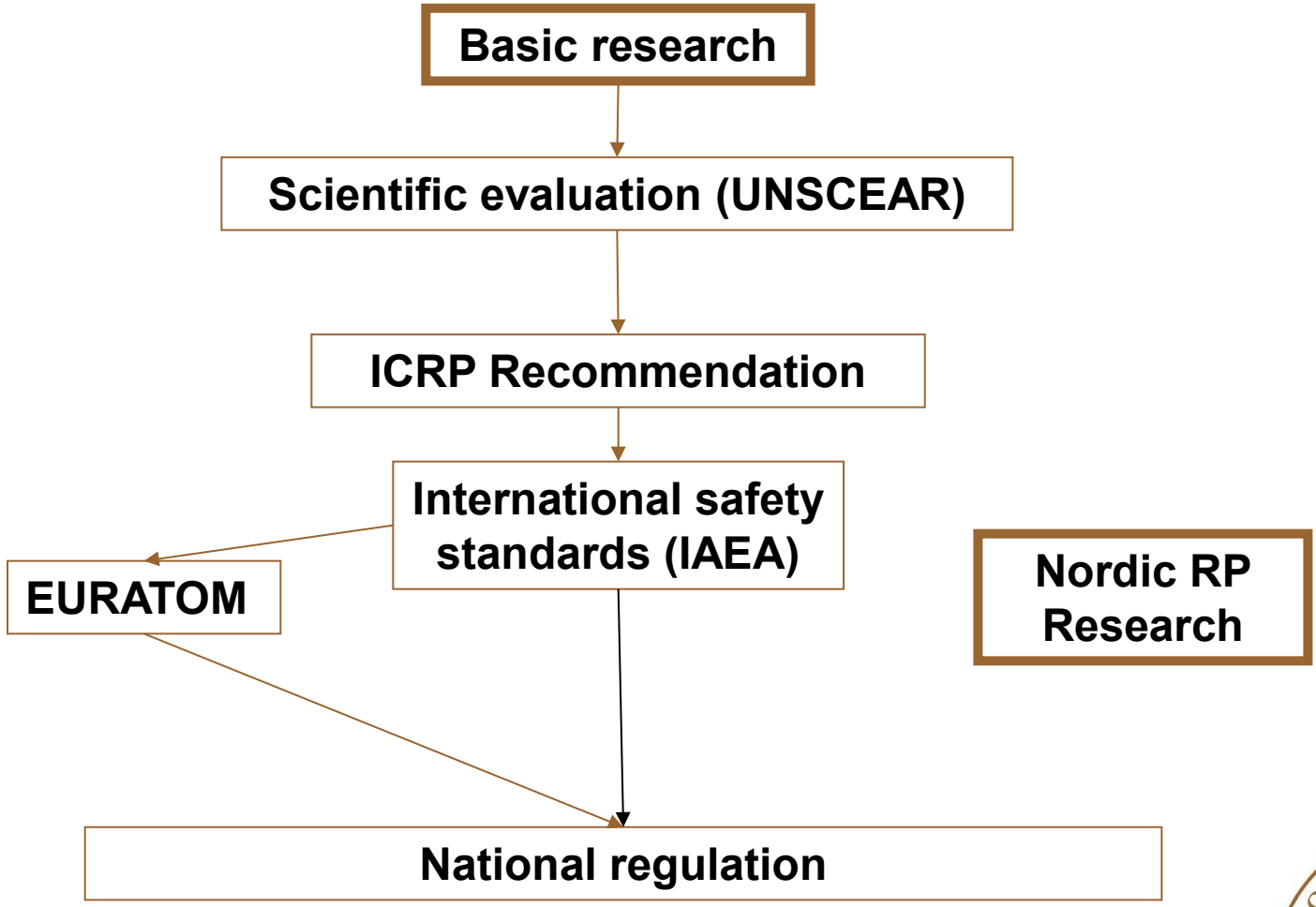
In Sweden SSM has outlined the following fields:

- **Radiation Biology**
- **Radioecology**
- **Low dose epidemiology**
- **Dosimetry (incl. internal dosimetry & biokinetics)**
- **Dispersion calculations**
- **RP radiometry and measurement techniques**
- **Radiochemistry**

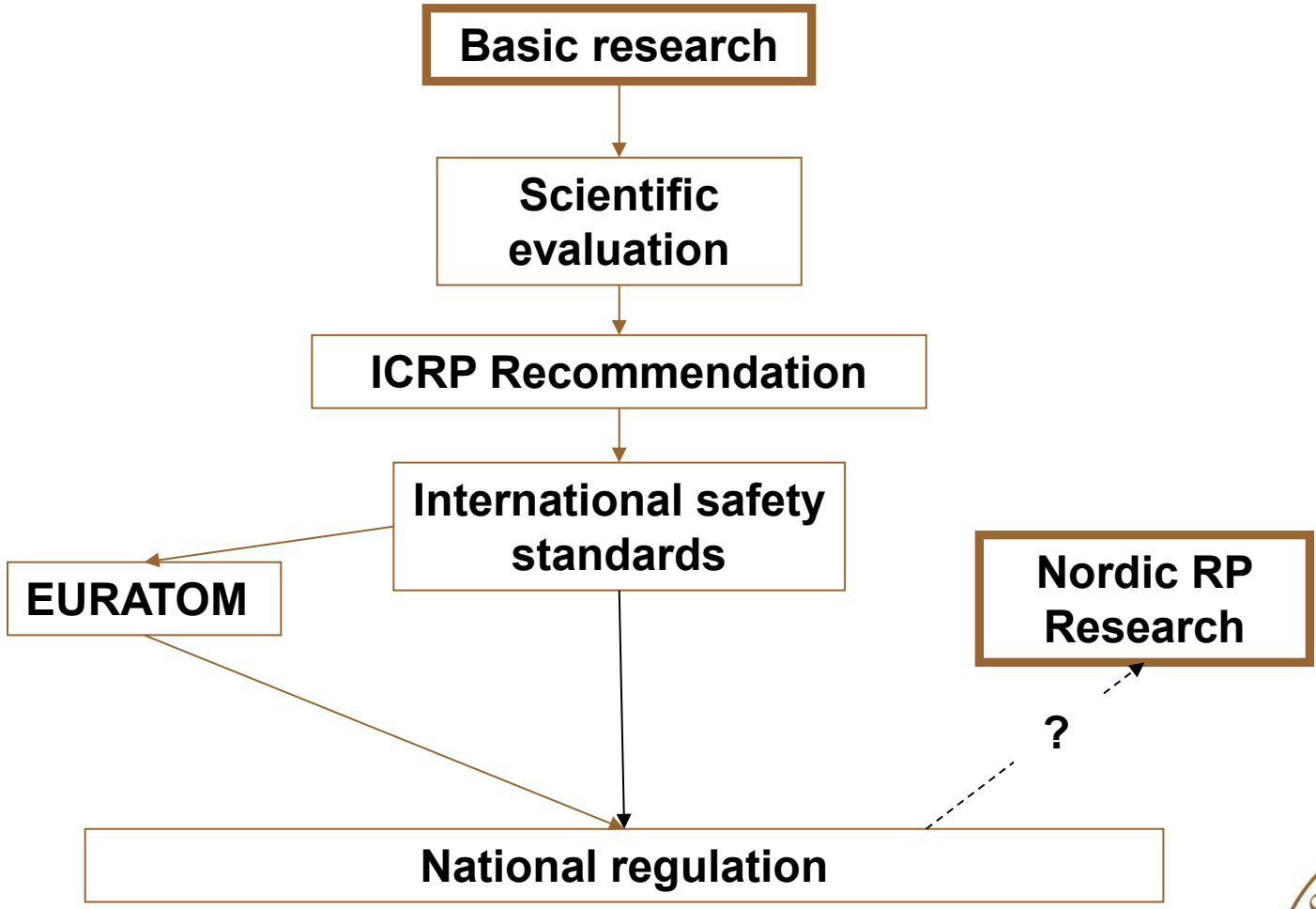
Multidisciplinary and cross-boundary scientific field



Sustain competence



Sustain competence



Sustain competence: Teaching

Education and teaching =>

regenerates future competence

safeguards position within faculty

Teaching – specifially directed towards RP

Sweden	Advanced level courses in applied radiation protection (30 HP)	GU+LU
	Basic level courses in Radiation Protection (5-7.5 HP)	Gu
		SAINT
	MSc programs in Medical Physics	LU, GU, Sthlm and Umeå
	Strålskydd och medicinska effekter av strålning,	UU, 5 HP
	…	
Finland	Radiochemistry BSc-level: https://www.helsinki.fi/en/researchgroups/radiochemistry/radiochemistry-education	University of Helsinki (25 HP)
	Radiation Protcetion: https://courses.helsinki.fi/en/matr309/120589569	University of Helsinki (5 HP)
	University of Jyväskylä, physics: jaana.k.kumpulainen(a)jyu.fi	?
	Medical Imaging, Phsyics and Technology: https://www.oulu.fi/medicine/mipt	University of Uleåborg
	MSc in Medical Phsyics program	University of Helsinki + University of Eastern Finland
Norway	https://www.nmbu.no/en/services/centers/cerad/education (MsC and PhD-levels)	University of Oslo
	Biological and Medical Physics	University of Oslo
	https://www.uio.no/studier/emner/matnat/kjemi/KJM5903/index.html	Strålevern (5 HP)
	Radiokjemi og radioaktivitet: https://www.uib.no/emne/KJEM260	University of Bergen (10 HP)
	Strålebiologi, stråleterapi og strålevern: https://uit.no/utdanning/emner/emne/597665/hel-3134	University in Tromsö
Denmark	No definitive MSc-programs according to https://dsmf.org/dsmf/english	
	Short/compact professional development courses are sold in a number of Danish research establishments – no apparent university level admission	E.g. DTU-Nutech
Iceland		

Join forces?

European platforms and network related to RP: MELODY, ALLIANCE, NERIS, EURADOS, …,

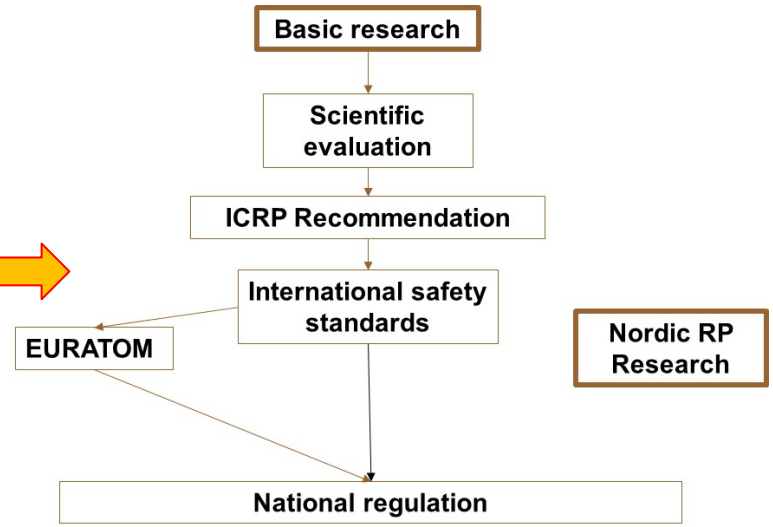
In Sweden similar platforms exist such as SFREK (*Svensk förening för radioekologi*), *Svensk förening för radiobiologi*, SAINT (*Swedish Academic Initiative in Nuclear and radiation Technology research and education*), etc. Less so in other Nordic countries.

Can NKS and NSFS and other platforms be a basis for Nordic cooperation for subcritical research areas?

Questions to be addressed in evaluation of long-term benefit of existing Nordic cooperation

Criteria – RQ20	
Research grants (faculty + external)	Excellence
Relationship between faculty teaching means/faculty research grants/external grants	Competence growth at the university
Academic staffing (tenure tracked)	No of professors, associate professors, postdocs and PhDs

?



Prolific Nordic RP research collaboration?

No evident intra-Nordic cooperation among highly cited researchers in RP-related research field.

Some RP research fields are evidently stronger and more prolific than in other countries. Ex: Radiochemistry in FI, NO and DK but not in SE.

	DK	NO	SE	FI
Radiochemistry				
JL	EX			-
EH	EX	SOME		
Radiobiology				
AW			-	
SS	SOME		SOME	-
HS	-			
KB		-		
HL		-		
Radioecology				
BS		-	SOME	
CB		EX	-	
SPN	-		EX	
Radiation Phsyics				
SM			-	
EFA			-	

Questions to be addressed in the near future for how to support sustainability in the RP research

- **Who should distribute and prioritize research grants in RP research?**
- **Cooperation vs autonomy?**
- **What criteria are to be used when prioritzing and rewarding?**

Concluding remarks and suggestions

- **Internal competition may be a large obstacle for a national resource consolidation**
- **Exploit existing platforms dedicated for RP research between the Nordic countries**
- **Define radiation protection research with a Nordic and European outlook (A bird´s eye view on research and education)**
- **Contemplate altogether new RP research constellations**

Concluding remarks and suggestions

[R1]

Photo: Gisle Bjørneby

The CERAD Centre of Excellence for Environmental Radioactivity was established at NMBU in 2013. CERAD is funded by the Research Council of Norway (2013-2022) for basic research.

CERAD in Norway and Cores in Finland may set examples for other Nordic countries

CONSORTIUM Cores
Consortium for Radiation Safety Research