HOW TO SECURE COMPETENCE IN RADIATION SAFETY?

SSM:s view concerning Sweden
A national framework for knowledge management; the knowledge system

- Universities educate students and provide funding for researchers
- Dynamic research environments provide knowledge, and contribute to high quality education
- Students attracted to higher education and can expect being employed
- Employers recruit suitably educated people
  - Followed by internal training and deepened competence
A government assignment on long-term knowledge management

- Investigate the possibilities for maintaining national competence within the Authority’s area of responsibility
- Identify the stakeholder’s potential to recruit staff having sufficient qualifications
- Identify stakeholders that provide funding for research and education in relevant areas; - identify approaches to interaction on future areas on investment
Main background factors I

- International peer review (IRRS) showed that Sweden does not fully comply with IAEA standards for maintaining competence
  - No national strategy
Financiers

- The Nuclear Industry
- SSM, the Swedish Radiation Safety Authority
  - No TSO in Sweden, research budget instead
- Research funders:
  - The Swedish Research Council
  - The Swedish Energy Agency
  - The Swedish foundation for Strategic Research
  - VINNOVA - Sweden’s Innovation Agency
  - FORMAS - a government research council for sustainable development
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Research and higher education

Chalmers Institute of Technology, Gothenburg
Nuclear engineering
Nuclear chemistry

Göteborgs University
Radiation biology
...

Lunds University
Radiation biology
Radioecology
...

Uppsala University, Uppsala
Applied nuclear physics
Non-proliferation

Royal Institute of Technology, Stockholm
Nuclear safety
Rector technology
Nuclear physics
Nuclear chemistry

Stockholm University
Radiation biology
...

Lunds universitet
Complex matching

Areas of occupation
- Health care
- Nuclear Industry
- State authorities
- Other nuclear applications

Areas of knowledge
- Strålningfysik
- Strålningsbiologi
- Strålskyddsdosimetri
- Radioekologi
- Radiokemi
- Operativt strålskydd
- Måtmetoder
- Strålskyddsberedskap
- Icke-ioniserande strålning

- Kärndata
- Reaktorfysik
- Termohydraulik
- Svåra haverier
- Kärnkemi
- Utslåpsanalyser
- Bestrålningseffekter på material
- Kärnamneskontroll
- Militär tillämpning
Main background factors II

- The decisions of the nuclear power industry to shut down four out of ten operating nuclear power reactors up to and including 2020
  - Though, result shows there will be reactors still in 2040, needing competence according to parliamentary energy commission reached a long-term agreement in 2016
Swedish nuclear powerplants

- Barsebäck NPP
- Ringhals NPP
- Oskarshamn NPP
- Forsmark NPP

BWR (ASEA-Atom)
PWR (Westinghouse)
Other installations

NPPs to be closed 2017-2020
Challenges – nuclear safety

- Certain radiation safety competences – critical to society - are needed primarily in case of major radiological accidents
- Research is not considered scientifically interesting by the major research funders
  - Too applied
  - Not renewable
- The nuclear power industry has reduced its research budget due to financial pressure
The government assignment

Approach
Three perspectives investigated

- Employers’ needs for competence
  - Shapes the needs of the national system for knowledge management
- Universities’ programmes
- Society’s need for scientific expertise
Four sectors

- Nuclear power sector
- Other industrial applications
- Healthcare sector
- Government authorities
The data compiled includes

- SSM's former government assignments regarding knowledge management
- Professional skills assessments carried out by the major licensees of nuclear facilities
- Statistical data on employee competence
- Questionnaire responses from approximately 2,000 licensees
Interviews with 25 representatives of relevant universities

Discussions with the reference group
- Comprising attendees from the nuclear power industry, health and medical services, competent authorities, and universities.
- Several working meetings during the 18 months investigation time
A brief summary of the results
The nuclear power industry

- No decreasing recruitment needs within the industry
- Changing composition of skills:
  - Crews for the operation of nuclear power plants are decreasing
  - Increased need in nuclear waste, operational radiation protection and human factors (MTO)
- More difficult to recruit
- The majority of new employees receive sector-specific skills through internal training
Measures proposed
- 11 measures proposed to the Swedish Government
- 6 measures that SSM can carry out
- 2 recommendations to the licensees
Research and education crucial to society

Surrounding research environments

National Strategic Framework
Research and education crucial to society.
Research and education crucial to society

Surrounding research environments

National Strategic Framework
Critical subjects

- Reactor technology
  - Including reactor physics, thermal hydraulics
- Severe accidents and nuclear chemistry
- Nuclear non-proliferation
- Radiation biology
- Radio ecology
- Dosimetry
Measurements

- Increase SSM:s research budget by SEK 24 million
- Task SSM to investigate which education programmes need guaranteed availability, and which universities should offer them
Measurement

- Task the national research financiers to cooperate on funding and shared strategies

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Measures

- Task SSM to produce and maintain a national strategy for knowledge management
- Establish a separate chapter covering the field of radiation safety in the government’s research bill
Research and education crucial to society

Surrounding research environments

National Strategic Framework
SSMs measures

- Compile annual updates of the current status of the knowledge management framework
- Start a dialogue on consultation responses regarding the government bill on research strategies
- Start a dialogue on the national strategy for knowledge management
Recommendations for licensees

- Licensees should run campaigns to increase the attractiveness of jobs in the sector.
- Licensees should continue to develop opportunities for relevant employees to maintain and develop in-depth skills.
Changes since September 2018
Industry
Universities
SSM
Nuclear power industry

- Recruitment campaigns
  - It is possible to recruit, but the cost is higher

- Vattenfall, Uniper in Sweden and TVO in Finland: establishing a network for future competence supply
  - New recruitment campaign on its way
Universities

- Uppsala university starts its’ nuclear programme again
  - Two programmes out of three now running
  - Plans also for the third one in Gothenburg
Government’s measures

- A new government assessment might be on its way
Strålsäkerhetsmyndigheten

- Project started for compiling annual updates of the current status of the knowledge management framework
- The former reference group will be gathered annually
- Dialogue with the national research financiers to start
- Strategical choices to be made
Thank you for listening!

Questions?
The nuclear power industry

- No decreasing recruitment needs
- …on the other hand, changing composition of skills:
  - Crews for the operation of nuclear power plants are decreasing
  - Increased need in nuclear waste, operational radiation protection and human factors (MTO)
- More difficult to recruit
- The majority of new employees receive sector-specific skills through internal training
University programmes
- nuclear technology

- There is currently a capacity in teacher resources and infrastructures to educate more students
- The number of students decreases
- Only one of the previous three nuclear master's programmes is given
Research environments
- nuclear technology

Universities’ financial situation pressed:
- Research funding is decreasing, among other things because of reduced support from industry
- Decreasing number of students

The link between education, research & employers is not straightforward
- A large part of the education consists of in-house training and skills development at the employers
University programmes - radiation protection

- Limited training capacity in radiation biology and radioecology
  - do not have their own basic education
- Lack of critical mass
  - difficult to scale up education volumes when needed
- Radiation biology and radioecology are weak fields where SSM today is the sole financier
- The competence in Sweden today is dependent on single individuals