NKS in the future:
Length, number and funding of projects – discussion paper

Introduction

This paper is developed by the PC's in consultation with the NKS Chair as a reflection on the different views that were presented under the topic "NKS in the future - Length, number and funding of projects" at the NKS Board meeting in Reykjavik on 18 January 2018.

The following suggestions to improve the use of available funding were highlighted at the January meeting:[1]

- DEMA: *Fund larger projects, lasting up to three years. This would, other things equal, reduce the number of projects and thereby administration and would make it possible to fund Ph.D. projects in cooperation with research institutions, a step which could further enhance the quality of NKS' work.*
- SSM: *One way of increasing the efficiency and thus use the funds better, could be to let projects run on a longer term than one year, thus avoiding some of the administration.*
- SIS: *Reduce the funding for each NKS-project allowing more projects to receive funding.*
- VTT: *It might be reasonable to concentrate on fewer topics in NKS*

Some additional input was received in response to the first draft of this paper that was sent to the NKS Board on 23 March 2018.

- Vattenfall: *No additional comments. Agree with conclusions.*
- DTU: *The draft is an excellent platform for discussions. No additional comments.*
- NRPA: *The process with annual projects like today is beneficial. Successful projects can apply for a continued financing, if they have delivered the report and application for further financing on time. Having projects with longer duration and no annual deliverable, would not be desirable as it might slow down the activity pace and it would take longer for the PC to discover any problems in deliveries. The amount granted to each project is appropriate, as is the number of proposals for the time being. We do not see any need to change this. Annual calls will ensure the possibility for the Board to change focus on a short notice if new, emerging topics arise that they would like to address specifically. There should be a maximum sum for arranging workshops/seminars, e.g. 250 or 300 000 DKK. If a series of workshops is financed, it would be appropriate to have it not more often than once every two years.*
- SSM: *The correct title is "Decomissioning incl. Decomissioning Waste", which means research on spent fuel is not included.* (The comment is handled in the discussion paper on "Division between NKS R and B").

This paper is intended to provide input for further discussions on this topic at the next NKS Board meeting in Copenhagen in June 2018. Data from the NKS Board decisions following the Calls for

[1] Draft minutes, Appendix A: "*Proposals and suggestions from reflections over NKS future directions by owners and board members" dated 17 January 2018 including "Conclusions – NKS Board 18 January*".

Proposals (CfPs) during the years 2010-2018 are presented together with an analysis on the funded networks and activities within the different research areas of the R- and B-programmes. Some aspects related to the above suggestions are discussed to support the general recommendation from the PC's to keep the current funding model.

Data on funded activities in CfP 2010-18

Below are some statistics on the length and number of funded activities in NKS-R and NKS-B during the years 2010-18.

NKS-R

There are 30 activities labelled as "new" from the NKS board decisions within NKS-R during the years 2010-18. There were 42 decisions on continued activities during the period, of which five proposals were selected in 2010 as continued activities from previous years.

The distribution between new and continued proposals is shown in Figure 1. On average half the approved proposals in each call are new and the other half are continued activities. The average length of the projects that were started 2010 or later and that have been completed until now, is ca two years.

The total number of launched activities is 72 and 35 different acronyms are found for NKS-R activities during this period, see Table 1. The 35 acronyms are represented by ca 12 networks, i.e. groups of organizations. The most active organizations are VTT, IFE, KTH, CTH and Chalmers (CTH). Risk Pilot, Risö and Lund University (LU) are also involved in several activities.

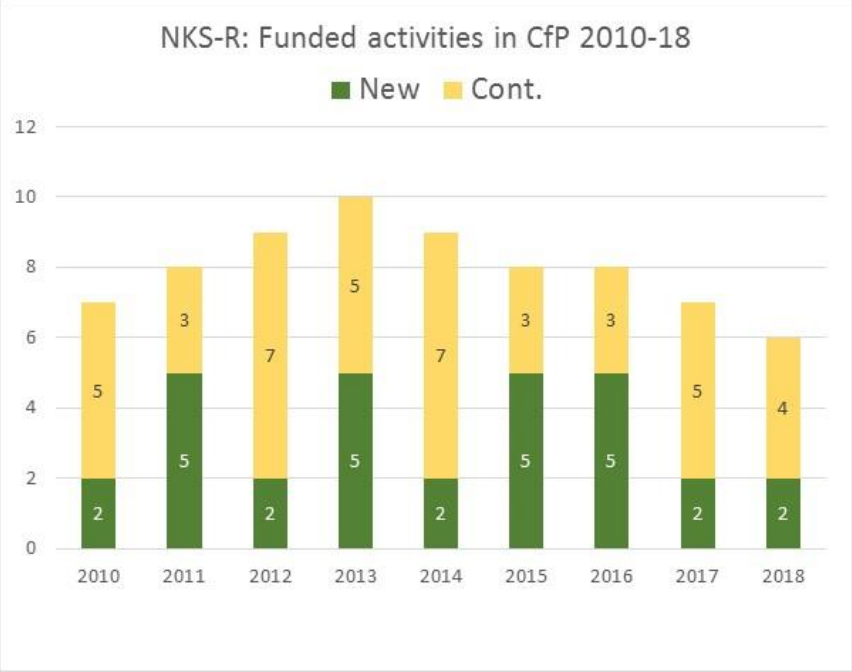

Figure 1. New and continued activities for NKS-R in 2010-18.

NKS-B

There are 55 activities labelled as “new” from the NKS board decisions within NKS-B during the years 2010-18. There were 24 decisions on continued activities during the period, of which three proposals were selected in 2010 as continued activities from previous years.

The distribution between new and continued proposals is shown in Figure 2. On average about 70 % of the approved proposals in each call are new and the rest are continued activities. The average length of the projects that were started 2010 or later and that have been completed until now, is ca 1.3 years.

The total number of launched activities is 79 and 55 different acronyms are found for NKS-B activities during this period, see Table 2. The 55 acronyms are represented by a relatively high number of individual activity networks, although some longer-term networks (with a few changing members) have existed in the period. The most active organizations are NRPA, SSM, STUK, DTU, DEMA, IRSA, IFE and FOI, although, e.g., DMI, U. Gothenburg, U. Lund and SIS have also been involved in many of these activities.

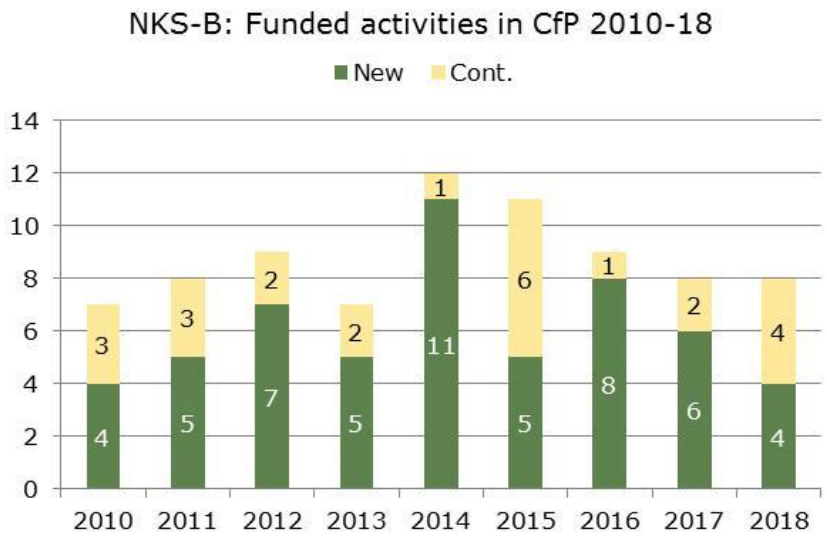

Figure 2. New and continued activities for NKS-B in 2010-18.

NKS-R Research areas

Thermal Hydraulics (TH)

The area has been dominated by the collaboration between Lappeenranta University (LUT), VTT and KTH. LUT is providing data from thermal hydraulics experiments from a unique facility relevant to Finnish and Swedish boiling water reactors (BWR). VTT and KTH are using the data for analytical work with computational models. The POOL project started in 2007 and was followed by ENPOOL in 2011 and COPSAR in 2015.

The network between Lund University (LU), VTT and some other partners is also found in this area (POOLFIRE). This network is also found under Risk Analysis and Probabilistic Methods (FIREBAN).

Severe Accidents (SA)

There are essentially two networks within this area that have been supported by NKS, one network for fission product chemistry (NROI, AIAS and ATR by CTH and VTT) and one coupled to physical phenomena during severe accidents (INCOSE and DECOSE by KTH, VTT and SPARC, which also involves LRC).

RASTEP, which was run in 2011-12 used Probabilistic Methods but is classified as a Severe Accident project due to the application in this area. DPSA and SPARC are also involving Probabilistic Methods in severe accident research.

Risk Analysis and Probabilistic Methods (RA/PM)

There are about four networks involved in this research area.

There is an overlap in some activities where Probabilistic Methods are used for studies of Severe Accidents (e.g. SPARC). The network between KTH, VTT and LRC appears also in this area in the project DPSA and L3PSA.

Another network is found between Lund University (LU), VTT and some other partners. There projects (POOLFIRE and FIREBAN) are classified as different research areas, thermal hydraulics and risk analysis, respectively.

A third network is found between VTT, Risk Pilot and some other partners (DIGREL, MODIG and SITRON).

A fourth network is found between VTT and some other partners (ADdGrOUND and SYNTAGMA).

Exam-HRA was a one-year activity led by ES-konsult/ÅF.

Organisational Issues and Safety Culture (Org/SC)

There are essentially two organisations leading activities in this area.

There is one network led by VTT (MOSACA, SADE and SC_AIM).

Another network is led by IFE (MoReMo, HUMAX, ProCom, LESUN and PLANS).

Reactor Physics (RP)

There is one network between IFE and Chalmers (IACIP and HYBRID).

Plant Life Management and Extension (PLMX)

New reactors was a topic included in this area with project from a network between VTT, IFE and Risö (NOMAGE and Nordic-Gen4 (Seminars)).

Lately projects related to ageing have involved KTH, Inspecta and others (BREDA-RPV and WRANC).

Decommissioning incl. Decommissioning Waste (Decom)

IFE has led workshop/seminar activities with many partners (Decom-seminars and NORDEC).

NKS-R characteristics

Some of the research areas are represented by a handful of partners from the major organisations in the Nordic countries. This is apparent with Thermal Hydraulics, Reactor Physics and Severe Accidents since many years, which are areas that are covering topics that are specific for reactor safety but not to other areas. Many activities are highly specialized and performed at a high international level. The activities receive continued funding simply because they are delivering good research. The level of co-funding is usually high. The POOL-ENPOOL-COPSAR collaboration between LUT, KTH and VTT in the area of Thermal Hydraulics is one example of a long term engagement from NKS-R. The collaboration of KTH, VTT and LRC is also representing a strong axis in Severe Accident research, which has received long term support from NKS-R.

A high degree of reactor specific research is also found in the area of Plant Life Management and Extension and the area of Decommissioning incl. Decommissioning Waste. The areas of Risk Analysis & Probabilistic Methods and Organisational Issues & Safety Culture show more variety in partner constellations. A reason for this difference might be that the latter two areas are not solely related to reactor safety. They most likely involve aspects from other business areas as well, which makes room for a larger variety of collaboration partners.

NKS-B Research areas

Emergency Preparedness (E)

Many different topics have been dealt with in E activities in this period. However, some networks have carried out several activities in the period. These include a network headed mainly by SSM on dosimetry (PIANOLIB, THYROID, THYROIDSEM) – this was placed under the E heading although it might be a better fit under the M (measurements) heading, a network headed by DMI on atmospheric dispersion (MUD, FAUNA, MESO, AVESOME), and two networks headed by NRPA on respectively mobile measurements (MOBELAD, GAMFAC) and measurement exercises (ORPEX, GASMAT) - both under E and not M. There is also a network headed by Lund U. on identification of radioactive material out of regulatory control (MOMORC, AUTOMORC).

Measurement Strategy, Technology and Quality Assurance

Here there have been quite many activities, but only one real long-term network. This is however the longest living of all on the NKS-B side, producing the gamma spectrometry seminars/workshops that have run in 8 of the 9 nine years, although the activity name has usually been changed from year to year, and activities have had many different leaders from five organisations/countries (IFE, DTU, FOI, IRSA, STUK). The network has following a decision made at the January 2018 NKS Board meeting been informed that no proposals will be accepted on this topic for activities in 2019.

Radioecological Assessments (R)

Here the long-term network activities have primary focused on releases to the aquatic environment (COSEMA, EFMARE) – headed by NRPA, VTT or DTU, and radiochemistry methods for various applications (RADIOANALYSIS, RAPID-TECH, STANDMETHOD, OPTIMETHOD) – headed by DTU. The

former of these networks has emerged (with some changes) from the earlier PARDNOR network, which however worked with an entirely different topic: consequence modelling parameters for contaminated agricultural areas.

Waste and Discharges (W)

While there have been a few proposals in the W area over the period in question, none of these have been supported for financing.

NKS-B characteristics

Compared with the parallel R area, the NKS-B seems to have had more activities that are not strongly related to each other. The reason for this may be sought in the typical co-financing models, where NKS-R financing often enters a large money pool that is used together with larger sums from other financiers to finance more ambitious – and thus often more long-lasting projects. However, it is also clear from this analysis that more ambitious NKS-B activities can run over a number of years, producing valuable 'stand-alone' results each year. By changing focus somewhat in each year such networks have managed to keep proposals attractive, and results can together constitute a bigger picture.

Since gamma spectrometry proposals with (mostly) new titles have been submitted for nearly all years as 'new' proposals, the numbers of actually new NKS-B activities can be said to be slightly overrated in Figure 2. Another feature of NKS-B is that proposals can often fit under several of the NKS-B research areas. For instance, a radioecology (R) activity to investigate radioecological (perhaps radionuclide uptake) model parameters may also be placed under the M research area, as it would typically involve measurements, and under the E research area if the radioecological model is intended for emergency management decision support. Sometimes, for instance gamma seminar proposals have been submitted under E, although mostly under M.

Discussion

Financial stability - Funding for several years would make it easier for partners to have a long term planning for their projects as the financial situation would be more secure.

Less funding in the annual calls - However, there would be less funding available for other applicants in the annual calls if a portion of the funding is already taken by activities that are running for more than one year. This might reduce the level of interest for researchers to apply to NKS.

Less flexibility for NKS board to shift focus - Less available funding in the annual call would provide less flexibility for the NKS board to support upcoming areas of interest or to change priorities

Less new networks - Less available funding is also affecting the opportunities to support new networks and collaborations.

Minor effects on PC workload - The effect on the workload for PCs would depend on the level of reporting we would expect from an activity that are running for several years. Status reporting would be unaffected but the question comes whether we would still ask for an annual report, or if it would be sufficient with a final report after the final year. However, the final report after several years of research is likely to be more extensive than after one year, so the workload for PCs may not be affected after all.

Less efficient quality control - Quality control would be affected negatively if less reporting is expected for continued activities. The one-year maximum for funding offers an annual check-point for quality control of the projects. The evaluators and the board are taking part in this quality control by approving continued proposals. It would be difficult to stop an ongoing project after the first year, in case it does not meet the quality expectations. Also, if there is not a requirement to deliver annual progress reports in fully publishable quality for upload on the NKS website, and no understanding that the project will not continue without this, there is a risk that the timely delivery and quality of progress reports will decline, and not make it possible to adequately judge the quality of the ongoing work.

Minor effects on evaluators' workload - The number of proposals for evaluation would decrease slightly as the continued activities do not need to participate in the calls the following years. However, the number of rejected proposals is likely to be the same, unless we have less applicants submitting proposals. For example, if three out of six activities are continuing for more than one year, then there would be the option of selecting three new proposals for funding. If the application rate is unaffected, then there would still be about twelve proposals for evaluation every year instead of fifteen.

Minor effects on contracts and invoicing – There would be less contracts but contract writing is not very time consuming. The number of invoices would not be affected by the length of the contract, unless the full amount is paid at the beginning of each year instead of having it divided into two parts.

Funding more activities each year – This might be possible if we lowered the maximum funding for each activity. This might increase the diversity of activities (depending on proposals), but reduce the achievable progress in one year. As it takes time to write a proposal, we should not expect that the number of proposals would increase accordingly. We could thus end up financing some proposals of less quality.

Funding fewer activities each year – This would make it possible to do more each year in an activity. However, to increase funding for each activity significantly, a reduction would be needed of the number of possible operating networks from the current typically 6-8 to probably maximum 4-5 in each programme, which would mean a serious reduction in diversity compared with the topics we have covered under the many research areas so far.

Recommendations

The recommendation is to keep the current model with one-year contracts. Single exceptions may possibly be justified if there are clear reasons to support an activity for several years. However, on the background of current experience it is difficult to see that the advantages of such a change would generically outweigh the disadvantages.

The maximum level of funding is reasonable based on the current NKS budget. For NKS-R it normally allows funding for about six activities per year, and for NKS-B for about eight activities per year. More details from the applicants on how the funding is to be used could give better understanding of whether the funding requests are reasonable. However, this would also make the application writing and reviewing processes more complex and time-consuming.

Table 1.

Area	2010	2011	2012	2013	2014	2015	2016	2017	2018	Networks
TH	POOL[a]									LUT, VTT, KTH
TH		ENPOOL	ENPOOL	ENPOOL	ENPOOL					
TH						COPSAR	COPSAR	COPSAR		
SA	INCOSE[b]									KTH, VTT, LRC and others
SA			DECOSE	DECOSE	DECOSE	DECOSE				
SA							SPARC	SPARC	SPARC	
SA				DPSA	DPSA					
SA		RASTEP	RASTEP							
RA/PM				L3PSA	L3PSA	L3PSA	L3PSA			
SA	NROI[c]									CTH, VTT
SA		AIAS	AIAS							
SA					ATR	ATR				
RA/PM	DIGREL	DIGREL	DIGREL	DIGREL	DIGREL					VTT, Risk Pilot and others
RA/PM						MODIG				
RA/PM									SITRON	
TH		POOLFIRE	POOLFIRE	POOLFIRE						LU, VTT and others
RA/PM							FIREBAN	FIREBAN	FIREBAN	
RA/PM						ADdGROUND	ADdGROUND			VTT and others
RA/PM									SYNTAGMA	
RA/PM				Exam HRA						

a) POOL began in 2007.
b) INCOSE began in 2009.
c) NROI began in 2008.

(Yellow marks the first year of the activity)

Area	2010	2011	2012	2013	2014	2015	2016	2017	2018	Networks
Org/SC	MOSACA[d]									VTT, KTH and others
Org/SC		SADE	SADE	SADE						
Org/SC							SC_AIM	SC_AIM		
Org/SC		MoReMO	MoReMO							IFE, VTT and others
Org/SC				HUMAX	HUMAX					
Org/SC					ProCom					
Org/SC						LESUN				
Org/SC						PLANS				
RP	IACIP[e]									IFE, CTH
RP							HYBRID	HYBRID		
PLMX		NOMAGE								VTT, IFE, Risö
PLMX			Nordic-Gen4		Nordic-Gen4					
PLMX							BREDA-RPV		BREDA-RPV	KTH and others
PLMX								WRANC		
Decom	Decom-sem			Decom-sem						IFE and many others
Decom								NORDEC	NORDEC	

d) MOSACA began in 2008.

e) IACIP began in 2008.

(Yellow = first year activity)