Nuclear Decommissioning Authority

STEM Engagement across the NDA Estate

Credible Options– Issue 1

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Executive Summary

There is a predicted skill shortage in sectors that depend on Science, Technology, Engineering and Maths (STEM) subjects across the UK – an issue that Government and various industries have recognised, and are working to address[1]. These skills are essential for the delivery of the Nuclear Decommissioning Authority (NDA) mission and due to the long term nature of the work, investment in the current and future generations is imperative.

Within the NDA mission, STEM engagement falls under three distinct strategic areas: People (as part of the wider Skills and Capability area), Research and Development (R&D) (for the development of subject matter experts) and Socio-economics (in supporting communities local to our sites). In the absence of an estate-wide strategy for STEM engagement, each organisation (NDA, subsidiary or Site Licence Company (SLC)) currently independently carries out activities on an ad-hoc basis or determines an appropriate level and format for STEM engagement. This has resulted in the development of a range of approaches by individual organisations with minimal coordination, consistency or in most cases any method to measure and determine benefits. It is therefore timely that NDA considers what an appropriate strategy could look like and what our role in this area could be.

Under the Energy Act (2004), the NDA is obliged to ensure the maintenance and development of a workforce capable of delivering the NDA mission. The development and subsequent implementation of a strategy in relation to STEM engagement programmes will better enable us to meet these legal obligations, to minimise risks associated with current arrangements, and to improve consistency across the estate.

The Nuclear Skills Strategy Group (NSSG) is the strategic lead on skills for the nuclear sector as a whole, and any strategy developed by NDA will align with NSSG plans and priorities.

The proposed strategic objective for this strategy is to inspire current and future generations in STEM subjects so that they are better informed about our mission and industry, and encouraged to help us achieve the NDA mission in their careers.

Potential options, which identify the roles both the NDA and the SLCs and subsidiaries could play, for an NDA estate wide engagement strategy are laid out in this Credible Options paper, and assessed against an initial set of constraints and assessment criteria to eliminate non-credible options. Two options remain as ‘Credible Options’ for an NDA STEM engagement strategy. Both these options identify that NDA should take the strategic lead role in a STEM engagement strategy, and are as follows:

- **NDA strategic lead, SLCs manage strategy and SLCs deliver with support from third parties**

  NDA would set an overarching framework for the strategy and monitor its implementation, outcomes and outputs. SLCs and subsidiaries would share strategy management responsibilities, generally for activities within their own organisations. It would be the responsibility of all SLCs to engage with each other within the estate, alongside relevant external organisations in their locality and nationally. SLCs and subsidiaries would deliver their own activities, using third parties where required.

- **NDA strategic lead, SLCs manage strategy with support from third parties and SLCs deliver with support from third parties**

  NDA would set an overarching framework for the strategy and monitor its implementation, outcomes and outputs. SLCs and subsidiaries would share strategy management responsibilities, generally for activities carried out within their own organisations. SLCs may use external third parties to aid in strategy management. It would be the responsibility of all SLCs to engage with each other within the estate, alongside relevant external organisations in their locality and nationally. SLCs and subsidiaries would deliver their own activities, using third parties where required.

The scope of an engagement strategy is defined as engaging in activities beyond the nuclear sector in generic STEM activities, as this best supports the ability to facilitate an appropriately broad skills pipeline, due to the majority of skills requirements being generic, transferable, cross-industry skills. Furthermore, there is a need for a broad pipeline to facilitate the development of much fewer, yet highly specialised Subject Matter Experts (SMEs). An option to set an education level limit whereby resources only go to supporting specific skills development for decommissioning activities was discussed.

This paper outlines NDA's proposal for a STEM engagement strategy at this time, considering the current environment around skills and wider issues. It is our view that this strategy will evolve and so should remain flexible to accommodate for changes in the STEM environment should they arise during further strategy development or in the future.

After considering comments from stakeholders on this credible options study, the next stage of strategy development would be to assess the remaining credible options to determine the 'Preferred Option' for an NDA STEM engagement strategy.

1 Introduction

The Nuclear Decommissioning Authority (NDA) is a Non-Departmental Public Body (NDPB), tasked with ensuring that the UK's nuclear legacy sites are decommissioned and cleaned up safely, securely, cost-effectively and in ways that protect people and the environment. The NDA currently has no strategy in place for Science, Technology, Engineering and Maths (STEM) engagement. There is a predicted skill shortage in sectors that depend on STEM subjects across the UK – an issue that Government and various industries have recognised, and are working to address[1]. These skills are essential for the delivery of the NDA mission and due to the long term nature of the work, investment in the current and future generations is imperative.

A wide range of definitions can be used for STEM and as such, the NDA considers STEM engagement to be:

> *An activity that falls within the Science, Technology, Engineering or Mathematics area and of which the primary aim is to encourage, inspire and motivate individuals towards further learning or careers within a STEM related sector.*

The Energy Act (2004)[2] provided the NDA with a duty, and hence legal obligation, when carrying out its functions, to:

"Promote, and to ensure, the maintenance and development in the United Kingdom of a skilled workforce able to undertake the work of decommissioning nuclear installations and of cleaning up nuclear sites"[i]

The NDA recognises it has a role to play in developing suitably engaged STEM individuals to enable us to deliver our mission, and to deliver to the remit outlined above in the Energy Act (2004).

The Energy Act (2004) also lays out other supplemental functions which are relevant to the development of this STEM strategy. In addition to delivering the required workforce, the NDA should:

"Carry out research into matters relating to the decommissioning of nuclear installations, the cleaning-up of nuclear sites and the other activities in relation to which it has functions"[ii]

"Educate and train persons about those matters"[iii]

"Give encouragement and other support to activities that benefit the social or economic life of communities living near designated installations, designated sites or designated facilities or that produce other environmental benefits for such communities"[iv]

[i] Energy Act 2004, s 9(2)(a)

[ii] Energy Act 2004, s 7(1)(a)

[iii] Energy Act 2004, s 7(1)(d)

[iv] Energy Act 2004, s 7(1)(e)

These responsibilities are captured within the People (incorporating Skills and Capabilities), Research and Development (R&D), and Socio-economic strategies.

To enable the delivery of its mission, NDA must be able to attract technical Subject Matter Experts (SMEs), have suitably qualified individuals with both nuclear specific and generic STEM type skills, and have suitably qualified individuals in the supply chain, on sites and within the NDA whilst also delivering on our socio-economic remit. Effective STEM engagement will enable us to deliver to all of those themes. Further to this, STEM engagement provides valuable Continued Professional Development (CPD) opportunities for staff within the NDA and across the estate. Therefore, the value of STEM activities should be recognised, not only for external parties (such as students, teachers and parents), but also for the nuclear decommissioning workforce as an opportunity for staff development.

There are a number of wider NDA objectives that STEM engagement programmes can help to reach. A diverse workforce has been proven to work more effectively[3], and current UK legislation (Equality Act 2010[4]) places a duty on all public sector organisations to improve equality, diversity and inclusion (ED&I). As an extra goal, STEM engagement can be used as a way to help encourage people into the sector, regardless of background.

Initial research and discussion of this topic determined that there were sufficient reasons to further explore the development of a strategy in this area to better understand what role NDA and the estate should play. The major reason to continue strategy development in this area came from the assessment of the current situation across the estate in terms of STEM engagement activities, and the associated risks with the current approach. This information is shortly summarised in Section 2.3, and more fully in Appendix 2.

Therefore, the next stage of strategy development is the identification of all potential options, before initial screening against a set of constraints to define a set of 'Credible Options' for a STEM engagement strategy. Determining these credible options is the purpose of this paper.

The proposed strategic objective for this strategy is to inspire current and future generations in STEM subjects so that they are better informed about our mission and industry, and encouraged to help us achieve the NDA mission in their careers.

It should be noted that the purpose of this paper is not to define a set of tactics that will be used for STEM engagement by the NDA and its estate, but to attempt to determine a strategy and roles which different organisations could play moving forward. Tactics – such as external organisations used, target audiences, and types of engagement (i.e. careers advice) carried out – will be developed as the strategy evolves in later work.

The scope of this work will not include knowledge transfer, re-deployment and upskilling for the current workforce, as those themes are covered by the NDA's People strategy. NDA recognise that there are still areas of overlap between this strategy and the People strategy, and would look to ensure alignment as far as possible should this strategy develop further. Therefore, this document outlines credible options for what a strategy could be for the following education levels and activities:

- Education – primary, secondary and tertiary education;

- Broader STEM initiatives – such as science fairs and sponsorship of events, awards and bursaries etc.

This strategy is focussed on engagement with young people; however this does not exclude or preclude engagement with existing, new or potential workforce and will support recruitment and mobility within and into the nuclear sector.

Specific types of activities that are covered under the 'STEM engagement' banner are given in Appendix 3.

2 The Strategic Case Summary

The current situation within NDA and the estate, and the issues and risks associated with this is summarised below, alongside commentary on the UK nuclear skills landscape. This sets out the case for change.

2.1 Skills landscape

Studies have shown[5] that there is a shortage of teenagers, and subsequently adults, taking up careers in STEM related subjects in the UK. A report by the Nuclear Skills Strategy Group (NSSG)[v] published in 2017 highlighted a forecasted rise in the demand for skilled workers in the nuclear sector from 87,560 (2017) full time equivalent (FTE) people to a peak demand of 100,619 in 2021[6]. As mentioned in the study by the NSSG, this workforce cannot be supplied from our current recruitment routes alone. The vast majority, a predicted 81%, of this shortage comes at the generic skills level (Tier 1) which is defined as 'ready market skills, principally for construction activities', or 'Skills for Nuclear'. These skills can be directly applied to industries other than nuclear. The remaining minority is largely made up of nuclear specific skills (Tier 2 – 18%) with a predicted 1% of this total accounting for 'Subject Matter Experts' (Tier 3). Personnel of this calibre typically have 10+ years of niche training/experience. Figure 1 represents the tier system for describing nuclear skills that are required.

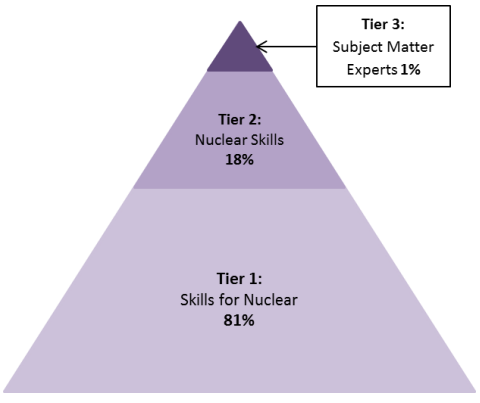


Figure 1: Categories of skills required across the nuclear industry[6]

[v] the nuclear industry's strategic group who works with employers, government and trade unions to address skills challenges in the industry

With a number of large scale projects within the UK planned for the near future, including infrastructure (for example, HS2) and nuclear new build (for example, Hinkley Point C) it is more important than ever to ensure that not only STEM careers, but the nuclear decommissioning industry is attractive to the upcoming generations. Without this, NDA run the risk of facing tough competition for a limited supply of individuals, including subject matter experts that take a long time to train, which may ultimately compromise the NDA's ability to deliver its mission effectively.

2.2 Notes on STEM in the UK

2.2.1 Government and STEM

Numerous businesses, and indeed government, are suitably aware of the need to develop STEM skills, with schemes being introduced to train up the next generation of individuals. The NDA's sponsoring department, the Department for Business, Energy and Industrial Strategy (BEIS) recently published the UK Government's Industrial Strategy white paper[1], where it lays out its approach for tackling the national STEM skills shortage. It does so in the comprehensive 'People Section' of the Industrial Strategy, which lays out the skills initiatives in place across the UK to tackle skills issues, including issues in STEM subject areas. Furthermore, Government announced that 2018 was to be the 'Year of Engineering'[7], a national campaign to raise awareness in children, young people, their parents and teachers of what engineers do.

The UK's Department of Education have recently published a careers strategy[8] which specifically highlights the importance of engaging positively in STEM and tackling gender stereotypes across STEM subjects.

The Scottish Government also outlined their strategy for STEM in education and training in 2017[9]. The strategy aims for encouragement and support in STEM subjects to grow STEM literacy and drive economic growth in Scotland, and lays out the approach for doing so.

The Welsh Government outlined their approach to working with different education organisations and partners to support STEM offerings in schools across Wales in 2016[10], setting out key priorities for future actions, including 'increasing interest and participation in STEM learning, particularly with girls'.

2.2.2 Government and national STEM in nuclear

In 2015, Government's Nuclear Sector Skills Strategy 'Sustaining our Nuclear Skills'[11] was published, which laid out common goals for the industry in the skills area, with reference to STEM skills. The NSSG, the nuclear sector's strategic lead on skills issues, recognises the paper as the skills strategy for the nuclear sector in their recent Nuclear Skills Strategic Plan[12]. The paper recognised the difficulties in developing Tier 2 and 3 level skills, and the need to foster a pipeline to deliver those skills. It also notes that individual organisations are taking action to meet their specific skills needs, however organisations alone cannot deliver the required talent against the long lead time issues.

The Nuclear Industry Council (NIC)[vi] published proposals to BEIS for a Nuclear Sector Deal[13] (NSD) in December 2017. This proposal covers the area of 'Skills and Training', and gives details of how both government and industry could meet the forward demand of skills requirements, ensure there is a coordinated and strategic delivery of initiatives through the use of the NSSG, and meet ED&I initiatives set out by the Government[11]. The proposals made by the NIC to BEIS included, in the 'Skills and Training' area, a stream detailing 'Nuclear Involvement in STEM Education'. One of the intended benefits of this particular workstream is to improve diversity across the sector, including aiming for 40% women in the nuclear industry by 2030[13], of which involvement in STEM education is seen as a priority to improve the attractiveness of the industry to a diverse range of people.

The Royal Academy of Engineering published a report titled 'The UK STEM Education Landscape'[14] in 2016, which gives a comprehensive overview of STEM in the UK, including issues affecting the supply of engineers, attainment and progression in schools in STEM subjects, and an overview of the hundreds of organisations offering STEM support in the UK.

2.2.3 STEM in other government sectors

The Ministry of Defence promote STEM initiatives through strategic partnerships with national organisations such as 'STEM Learning' and 'Tomorrow's Engineers', aiming to 'promote the uptake of STEM subjects in schools by inspiring young people and demonstrating that a career in STEM, regardless of sector, is an exciting and rewarding opportunity'[15].

The UK Space Agency (UKSA), which acts on behalf of the Government and is responsible for the UK's civil space programme, has set out its strategy for developing young people in STEM subjects[16]. The strategy outlines two themes for getting involved in STEM, the first; to leverage the ability of Space to inspire interest in STEM subjects by 'providing exciting contexts for the teaching of a range of subjects', and the second; to develop a pipeline of suitably engaged STEM graduates and technicians with the relevant skills and qualifications to aid in the hampered growth of the sector due to the scarcity of suitable candidates. The objective of the strategy is to:

"ensure that as many young people as possible are inspired by space so that they will study, and keep studying, STEM subjects to tertiary level ensuring a skilled and enthusiastic workforce for high tech industries (including space) in the future"

2.2.4 Summary

The short discussion above gives an overview of how Government departments and the nuclear industry are engaged in delivering STEM initiatives and encouraging people into STEM careers. These considerations on a government level highlight the importance of the STEM issue and how it fits into broader skills considerations. It is therefore important that NDA considers what our strategy and role should be as a part of that bigger picture.

[vi] The Nuclear Industry Council provides strategic leadership to the nuclear industry and is the main forum for engagement between the nuclear industry and government. It is made up of representatives from across the nuclear industry and government bodies, including the NDA.

There are countless numbers of organisations involved in STEM initiatives at both a national and local level, which presents plenty of scope for collaboration, not only within the NDA estate, but cross-sector. This theme should be explored during further strategy development as a more tactical consideration; however it is acknowledged that drivers for STEM engagement may differ for commercial and public sector organisations.

2.3 Current situation and ultimate impacts

2.3.1 Estate wide STEM activities

At present, there is no NDA estate-wide strategy for STEM engagement. There is often very little in individual client specifications (explicit contractual sets of requirements that Site Licence Companies (SLCs) must satisfy) regarding STEM engagement. What is mentioned within these is very generic, with no details and so each SLC and subsidiary individually determines an appropriate level and format for engagement activities. This has resulted in the development of a range of approaches by individual organisations.

Some SLCs and subsidiaries[vii] have developed strategies for STEM engagement, whilst others have no strategy and/or carry out limited activities. The SLCs that do have strategies generally have a more organised approach to STEM engagement, and have clearer objectives for carrying out activities. Whilst STEM engagement offers a valuable personal development opportunity for staff, it is often carried out by early career and graduate level staff, with a lack of senior level support to complete STEM activities, which are largely completed on a voluntary basis. This lack of senior level support can also lead to minimal resources or funding for completing STEM activities.

There is also little evidence of a coordinated approach to STEM engagement across the estate, with little collaboration between SLCs, even though there is a general desire for greater collaboration to occur, especially between sites that are located close to others. This lack of collaboration between organisations, in terms of sharing best practice, resources, ideas and general information (i.e. what schools are being targeted, or materials being covered), means there is a risk of ineffective STEM engagement activities. This could be in terms of delivering conflicting messages or duplication of efforts in the same communities. Further to this, little opportunity is being taken to share and learn from best practice and also to cut down on costs by a more efficient use of resources.

It is recognised across the estate that STEM engagement is beneficial, however it is not seen as a priority for the majority of sites, and often there is generally a poor understanding of the advantages of completing STEM engagement activities. Lack of prioritisation is more of an issue for some businesses over others, due to the varying drivers behind the delivery of their respective missions. Further to this, a number of SLCs have identified that they struggle to deliver a coherent message that reflects their values through STEM engagement.

[vii] SLCs and subsidiaries will be referred to jointly as SLCs throughout

NDA itself carries out STEM work largely on an *ad-hoc* basis, with limited coordination but often in support of personal development. The NDA has already recognised the importance of skills through several of its existing strategies: People, R&D, and Socio-economics (see Section 3.1), of which details can be found in the third issue of NDA Strategy[17]. The NDA has also recently published its Draft Business Plan for financial years 2018 through 2021[18]. Key activities outlined include implementation of our strategic people delivery plan to ensure the right skills are delivered at the right time. A STEM engagement strategy would help to further support the People strategy in its objectives.

Further, extensive observations relating to existing STEM activities across the NDA estate identified in the initial research stage are outlined in Appendix 2.

2.3.2 Key risks and ultimate impacts associated with the current situation

An overview of the causes, key risks and immediate and ultimate impacts associated with the current situation are shown in Figure 2.

Further to this, the costs of not having an appropriate STEM engagement strategy and programme of activities in place are potentially significant, yet difficult to financially quantify. Not having a robust strategy in place could have an impact on programme and schedule costs should the appropriate workforce not be available, due to issues such as:

- Salary inflation through under-supplied market for skills;
- Rework and inefficiencies attached to an underprepared workforce;
- Impact on ability to innovate and improve productivity through the lack of a developed high level skills workforce.

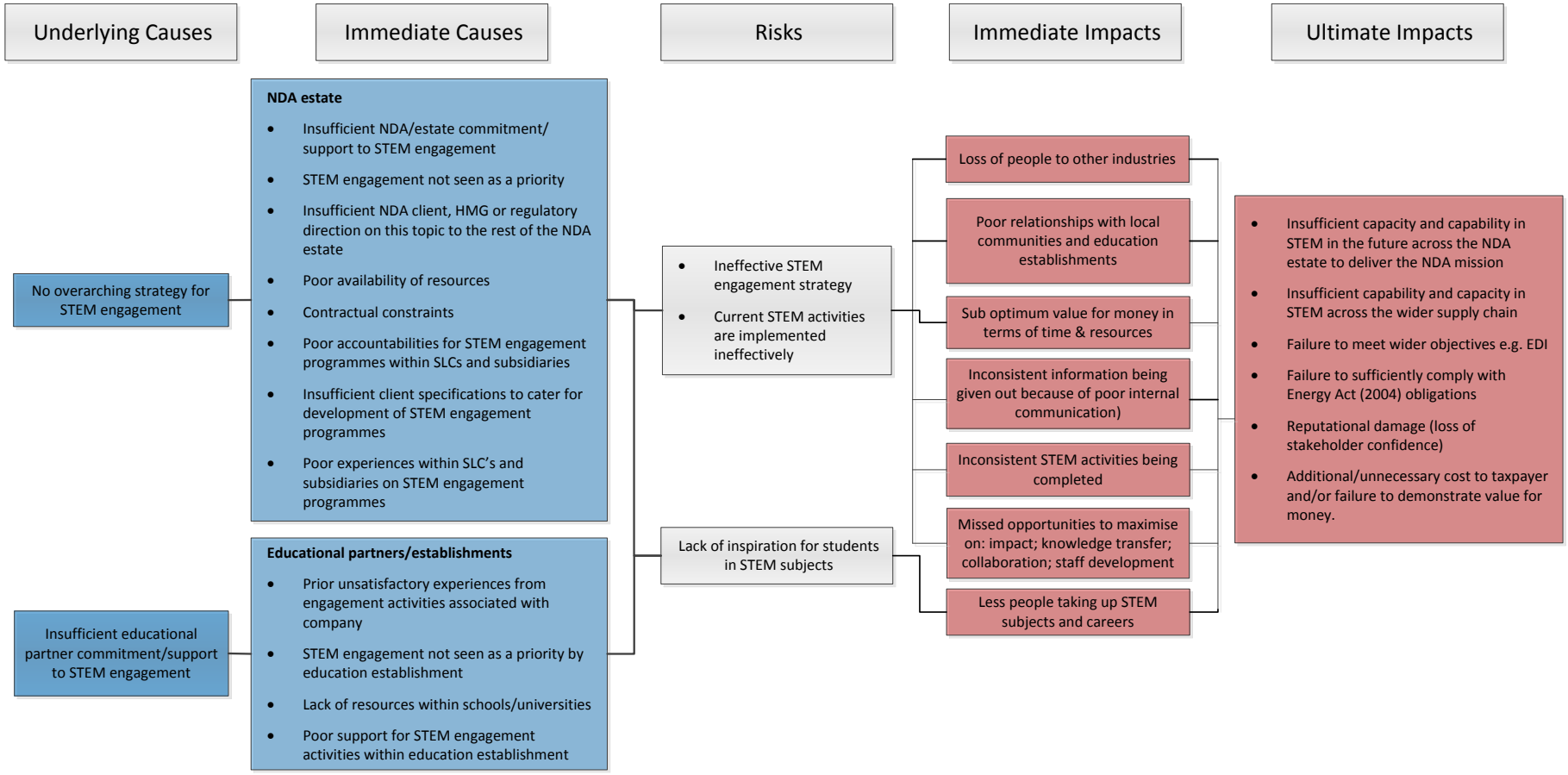


Figure 2: Key risks to the NDA associated with the current situation for STEM engagement.

The major, potential ultimate impacts from the current situation identified were:

- Failure of the NDA to comply with the Energy Act (2004) obligations to ensure a workforce able to deliver our mission (see Section 1);
- Insufficient capacity and capability in STEM subjects preventing the NDA estate and its supply chain to deliver the NDA mission on a medium to long term timescale;
- Potential reputational damage to the NDA due to:
    - Inability to attract a suitably qualified workforce;
    - Inability to contribute further towards wider objectives such as socio-economics and ED&I;
    - Failure to demonstrate value to the taxpayer due to the lack of coordination of activities and potential duplication of effort;
    - Loss of stakeholder confidence through inconsistency of information and activities, and;
    - Failure of the NDA to demonstrate our commitment to tackling an issue which impacts our mission, in the absence of a conscious strategy in this area.

2.4 Case for change

An uncoordinated approach to STEM engagement across the estate risks sub-optimal value for money and decreased interest from NDA stakeholders, not only in STEM engagement delivery, but from the potential for sub-optimal work delivery and salary inflation across the estate in future due to the difficulty in attracting the required skilled workforce. As the nuclear sector expands, competition for suitably qualified personnel within (and also outside) the sector may increase. By encouraging people to study STEM subjects, NDA hope to increase the number of people entering nuclear and in particular decommissioning related careers. Not only does this help to ensure the availability of workers to fulfil the NDA mission, but the local communities would benefit from more coordinated engagement.

A single, estate wide strategy would reduce the risks associated with current arrangements and encourage a more collaborative and coordinated approach to STEM engagement across the estate. An NDA STEM engagement strategy would allow NDA to fulfil its obligations under the Energy Act (2004) to ensure we facilitate the development of an adequate workforce to complete our mission, whilst also supporting the economic development of the local communities where the estate operates. A coordinated STEM engagement strategy would help the estate to facilitate healthy relationships in their communities, increase the diversity of the workforce, ensure a healthy supply of workers for the future, and an opportunity to supply personal development opportunities for staff. By developing a strategy in this area, NDA will also be able to demonstrate a clear direction, and that activities are beneficial and deliver value.

2.5 Aspirational outcomes and benefits

It is anticipated that the development and implementation of a robust, coherent strategy for STEM engagement will allow the following outcomes to be achieved:

- Evidence that STEM engagement has been recognised by the NDA as an area that is of strategic importance to the delivery of our mission, which should be suitably resourced and financed;
- Improved ability to demonstrate fulfilment of our Energy Act (2004) and strategic obligations that relate to STEM engagement;
- Improved ability to demonstrate our commitment to and strategic role in the Nuclear Sector Deal, specifically the People element of the deal;
- Improved availability of a large and diverse pipeline of suitably qualified individuals to support the delivery of the NDA mission;
- Evidence of a clear, organised, aligned and strategic STEM engagement offering by the NDA and its estate;
- Improved collaboration across the estate, with better communication between SLCs to share approaches and best practice, improving efficiency;
- Improved collaboration and links within the three, relevant strategic areas within internal NDA (People, R&D and Socio-economics);
- Improved ability to deliver effective STEM outreach offerings, that sends a clear, informative message;
- Improved understanding of the benefits of STEM engagement across the estate, including by line managers and leadership teams to understand the personal development benefits that delivering STEM offerings could give to their staff, and;
- Improved relationships with communities affected by the delivery of our mission through STEM outreach activities.

3 Credible Options Development

The strategic case (see Section 2) outlined several issues with the current situation in the area of STEM engagement across the NDA estate and that there is a sufficient need for the NDA to take a look at the potential for developing a STEM engagement strategy. At this stage in the process, a number of potential options will be presented for initial assessment against a list of criteria.

3.1 Introduction to potential options

All potential options are laid out in such a way as to identify different roles relevant organisations could play in the delivery of a STEM engagement strategy. These roles may be:

- **Strategic lead** – responsible for determining and setting the overarching strategic framework for STEM engagement and ensuring that this framework is followed across the estate by monitoring implementation, outcomes and outputs. Responsibility would also include influencing on a national level;
- **Strategy management** – the management organisation would be responsible for strategy implementation, including the coordination, implementation, monitoring and appropriate stakeholder engagement (both across the estate and externally, locally and nationally) required to ensure adequate delivery, and also should ensure the correct capabilities (internally and/or externally) are in place for delivery;
- **Strategy delivery** – delivery of the engagement activities by those with the appropriate capabilities. This would include appropriate stakeholder engagement required for effective delivery.

The identified parties are:

- NDA
- SLCs and subsidiaries *(Note, SLCs and subsidiaries will be referred to jointly as SLCs throughout)*
- Third party(ies)

It is worth noting at this stage that the NSSG is the strategic lead for the whole UK nuclear sector in the skills area. The ‘strategic lead’ role, as identified above, would only look to take the lead across the NDA estate, essentially the nuclear decommissioning sector. The strategic lead organisation for this NDA estate STEM engagement strategy will ensure alignment with NSSG plans for any strategic framework developed.

3.1.1 Pre-screening of potential options

It has already been highlighted that STEM engagement is on the national agenda, and therefore it important that the NDA considers its role in contributing towards this issue. At this early stage of strategy development, whilst NDA are still developing the preferred approach and considering options, NDA believe it would be inappropriate to devolve whole responsibility for developing, leading, managing and delivering this strategy to any external third party organisation at this time.

Furthermore, this topic is an estate-wide issue, which will potentially have an impact on all SLCs. As NDA is the strategic body for the estate, NDA should take strategic

leadership of this area at this time. As this strategy develops, this position can be reviewed. Therefore, the list of potential options will not include options where the NDA are not the strategic lead. Further to this, in line with the NDAs approach to decommissioning activities in its role as a strategic body, which is primarily delivering through others, it is not appropriate to consider options where NDA solely will manage and/or deliver STEM engagement activities for the entire estate.

NDA also do not want to consider options where SLCs do not have an established role in a STEM engagement strategy, as removing their role may cause complications in current programme deliveries and hinder good work currently being carried out.

Further to this, a single SLC will not be best placed to manage and/or deliver a STEM engagement strategy and associated activities on behalf of all SLCs. This is not only due to geographical considerations. Individual SLCs are more likely to be familiar with (and already have strong links within) their local communities, and their own skills and socio-economic requirements. This approach would present a risk that one SLC will benefit more than others and that inefficiencies, including missed opportunities in delivery, may arise.

Therefore, in the initial list of potential options, the following scenarios will not appear:

- Options which do not identify the NDA as the strategic lead;
- Options in which the SLCs do not have a role;
- An option which devolves all responsibility to a third party organisation;
- Options which identify the NDA as a management organisation or in a sole delivery role.
- Options which identify a single SLC in a management or delivery role where they are expected to manage and/or deliver a STEM engagement strategy for the entire estate.

Note, it is understood that limiting SLCs to strategy delivery solely in-house may be inappropriate across the estate. Limiting organisations to in-house delivery may limit the scope of activities that could be carried out due to differing capabilities for each organisation, and may not make best use of capabilities outwith the SLCs and subsidiaries. Therefore, all options which identify the SLCs as the delivery organisation will state that third party organisations may be used to aid in delivery.

Further to this, options that are immediately identifiable as unable to satisfy the strategic objective (see Section 1), such as withdrawing from STEM activities, will not be considered in the list of potential options.

3.1.2 List of potential options

1. No strategic lead, NDA monitor and SLCs deliver

No strategic framework is developed, NDA and SLCs continue with the current approach, however NDA monitor activities across the estate.

2. NDA strategic lead, SLCs manage strategy and SLCs deliver with support of third parties

NDA sets an overarching framework for the strategy. SLCs manage the strategy, generally for the activities carried out within their own organisations. It is the

responsibility of all SLCs to engage with each other within the estate, alongside relevant external organisations in their locality and nationally. SLCs deliver their own activities, using support of third parties where required.

3. NDA strategic lead, SLCs manage strategy and third parties deliver

NDA sets an overarching framework for the strategy. SLCs manage the strategy, generally for the activities carried out within their own organisations. It is the responsibility of all SLCs to engage with each other within the estate, alongside relevant external organisations in their locality and nationally. Third parties deliver all activities.

4. NDA strategic lead, SLCs manage strategy with support from third parties and SLCs deliver with support from third parties

NDA sets an overarching framework for the strategy. SLCs manage the strategy, generally for the activities carried out within their own organisations. SLCs may use external third parties to aid in strategy management. It is the responsibility of all SLCs to engage with each other within the estate, alongside relevant external organisations in their locality and nationally. SLCs deliver their own activities, using support of third parties where required.

5. NDA strategic lead, SLCs manage strategy with support from third parties and third parties deliver

NDA sets an overarching framework for the strategy. SLCs share management responsibilities, generally for the activities carried out within their own organisations. SLCs may use external third parties to aid in strategy management. It is the responsibility of all SLCs to engage with each other within the estate, alongside relevant external organisations in their locality and nationally. Third parties deliver all activities.

6. NDA strategic lead, third party manage and SLCs deliver with support from third parties

NDA sets an overarching framework for the strategy, a nominated third party is responsible for strategy management, including to coordinate and monitor all STEM activities across the estate and the SLCs deliver, with support of third parties where required.

Note: in options which specify that ‘SLCs deliver’, this would also include a delivery programme of NDA specific activities by the NDA.

Table 1: Summary of the role of each party for each potential option

Role/Option	1	2	3	4	5	6
Strategic lead	None	NDA	NDA	NDA	NDA	NDA
Strategy management	NDA	SLCs in house	SLCs in house	SLCs (& third party)	SLCs (& third party)	Third party
Strategy delivery	SLCs Third parties	SLCs Third parties	Third party(ies)	SLCs Third parties	Third party(ies)	SLCs Third parties

3.2 Assessment of potential options

3.2.1 Absolute constraints

An initial high-level screening of all the identified potential options involves the assessment of the options against an initial set of constraints called the 'absolute constraints', which are used to eliminate non-credible options, in turn producing a shorter list of options which satisfy the strategic objective. Few constraints were identified that could qualify as absolute, and are as follows:

1. Does the option ensure that the NDA abides by its legal obligations as laid out in the Energy Act 2004 (see Section 1)?
2. Does the option enable the NDA to meet the strategic objective *"to inspire current and future generations in STEM subjects so that they are better informed about our mission and industry, and encouraged to help us achieve the NDA mission in their careers"*?

3.2.2 Further assessment criteria

Further assessment criteria were identified through the NDA's Value Framework[19], which are a set of criteria used for robust decision making. The relevant criteria to this strategy are as follows:

Socio-economic impact: The impact on local communities around the sites. Will there be a positive or negative impact on the local communities should NDA progress with the considered option?

Finance: What are the potential capital and maintenance costs of the considered option? The return on spend in terms of reduced costs and value for money should also be considered.

Enabling the mission: Does the option allow NDA to maintain and/or develop capabilities and set clear direction for the rest of the estate? Reputational considerations should also be included here.

Implementability: Is the option implementable, in terms of resource capability and compliance with regulation and/or policy? The policy consideration is covered under Absolute Constraint 1 and hence will not be considered under this criterion. The capability in terms of available skills to carry out the option will be considered here.

3.2.3 Application of screening criteria

Several assumptions have been set in the assessment of the options against the screening criteria:

- Appropriate commercial arrangements can be put in place;
- Engagement activities are effective;
- Engagement is delivered effectively – i.e. the individuals delivering activities have been sufficiently trained, and are delivering the correct message;
- Any strategies developed are comprehensive and effective, and;
- Any external organisations identified in further stages will be available for use.

The application of the screening criteria is shown below in Figure 2, with the following scoring system:

- **RED** – Negative impact on criteria or does not meet criteria;
- **AMBER** – Neutral or slightly negative impact on criteria or may not meet criteria or there is some risk or uncertainty;
- **GREEN** – Positive impact on criteria or meets the criteria.

		Absolute Constraints		Further constraints			
Option descriptor	**Option Number**	**Does the option ensure that the NDA abides by its legal obligations as laid out in the Energy Act 2004?**	**Does the option enable the NDA to meet the strategic objective?**	**Socio-economic impact - Across entire estate**	**Finance - Cost - Value for money**	**Enabling the mission - Reputational - Maintain/develop capability - Setting clear direction**	**Implementability - Availability of capability**
No strategic lead, NDA monitor and SLCs deliver	**1**	Risk of no further engagement work being carried out as there is no strategic oversight, hence risk the current situation is maintained	The strategic objective may still be met, but not by direct intervention from the development of this strategy, hence a major risk. Knowledge of activities may encourage increased collaboration and minimised duplications	Continues with current socio-economic situation. Will not contribute to socio-economic improvement	Information gathering may allow for better coordination across the estate if information is fed back to all SLCs. Therefore this option could have a positive impact on the value for money aspect. However there will be costs incurred from activites required to monitor and gather information	No set direction for the estate. Negative reputational impact from an innefficient current approach. Will not encourage the further development of capability if current situation continues	Required skills to monitor activities are available within the NDA, however resources are low
NDA strategic lead, SLCs manage strategy and SLCs deliver with support from third parties	**2**	NDA strategic ownership can ensure a clear direction is set, with a clear framework to deliver the required skills. There are no specific barriers presented by this option to the meeting of the legal obligations, however this is inherently uncertain due to other factors	This option does not present any specific barriers to meeting the strategic objective. Programme delivery will have the ultimate impact on whether the strategic objective is met. This can be driven by the management and delivery organisations and monitored by the NDA as the strategic lead	Delivery by SLCs in their local communities will have a positive impact on the communities in which they operate as SLCs will engage directly with their local communities. More resources will be input with a more coordinated approach and a developed strategy in this area	Management in house will make use of the current capabilities across the estate, with no further external costs. Delivery by SLCs makes use of estate resources, however SLCs may decide to make use of third parties to aid in delivery. The cost of this will depend on each specific case, but may present greater value for money in terms of efficiencies and availability of capability	SLC delivering in their local communities will have a positive reputational impact. CPD opportunities for estate staff. NDA set clear direction with strategic lead	Availability of third party organisations to deliver engagement. Availability of capability within NDA and SLCs.
NDA strategic lead, SLCs manage strategy and third parties deliver	**3**	NDA strategic ownership can ensure a clear direction is set, with a clear framework to deliver the required skills. There are no specific barriers presented by this option to the meeting of the legal obligations, however this is inherently uncertain due to other factors	This option does not present any specific barriers to meeting the strategic objective. Programme delivery will have the ultimate impact on whether the strategic objective is met. This can be driven by the management and delivery organisations and monitored by the NDA as the strategic lead	Approach will be highly coordinated and delivered effectively with a suitable third party(ies), resulting in a positive socio-economic impact in communities local to the sites. More resources will be input with a more coordinated approach and a developed strategy in this area	Management in house will make use of the current capabilities across the estate, with no further external costs. Cost will be high to nominate third party to deliver engagement activities. Value for money may be minimised as there is no use of internal resources in delivery	Clear direction set, however no involvement in delivery by SLCs and NDA, resulting in potential reputational impact due to no direct engagement in communities. No opportunities for estate staff CPD	Availability of third party organisations to deliver engagement. Availability of capability within NDA and SLCs.
NDA strategic lead, SLCs manage strategy with support from third parties and SLCs deliver with support from third parties	**4**	NDA strategic ownership can ensure a clear direction is set, with a clear framework to deliver the required skills. There are no specific barriers presented by this option to the meeting of the legal obligations, however this is inherently uncertain due to other factors	This option does not present any specific barriers to meeting the strategic objective. Programme delivery will have the ultimate impact on whether the strategic objective is met. This can be driven by the management and delivery organisations and monitored by the NDA as the strategic lead	Delivery by SLCs in their local communities will have a positive impact on the communities in which they operate as SLCs will engage directly with their local communities. More resources will be input with a more coordinated approach and a developed strategy in this area	Management in house will make use of the current capabilities across the estate, and with support from third parties may result in greater efficiency. Delivery by SLCs makes use of estate resources, however SLCs may decide to make use of third parties to aid in delivery. The cost of this will depend on each specific case, and may present greater value for money in terms of efficiencies and availability of capability	SLC delivering in their local communities will have a positive reputational impact. CPD opportunities for estate staff. NDA set clear direction with strategic lead	Availability of third party organisations to support with strategy management and strategy delivery. Availability of capability within NDA and SLCs.
NDA strategic lead, SLCs manage strategy with support from third parties and third parties deliver	**5**	NDA strategic ownership can ensure a clear direction is set, with a clear framework to deliver the required skills. There are no specific barriers presented by this option to the meeting of the legal obligations, however this is inherently uncertain due to other factors	This option does not present any specific barriers to meeting the strategic objective. Programme delivery will have the ultimate impact on whether the strategic objective is met. This can be driven by the management and delivery organisations and monitored by the NDA as the strategic lead	Approach will be highly coordinated and delivered effectively with a suitable third party(ies), resulting in a positive socio-economic impact in communities local to the sites. More resources will be input with a more coordinated approach and a developed strategy in this area	Cost high to nominate third party to deliver engagement. Value for money minimised as no use of internal resources in delivery	Clear direction set, however no involvement in delivery by SLCs and NDA, resulting in potential reputational impact due to no direct engagement in communities. No opportunities for estate staff CPD	Availability of third party organisations to deliver and support with management of engagement. Availability of capability within NDA and SLCs.
NDA strategic lead, third party manage strategy and SLCs deliver with support from third parties	**6**	NDA strategic ownership can ensure a clear direction is set, with a clear framework to deliver the required skills. There are no specific barriers presented by this option to the meeting of the legal obligations, however this is inherently uncertain due to other factors	This option does not present any specific barriers to meeting the strategic objective. Programme delivery will have the ultimate impact on whether the strategic objective is met. This can be driven by the management and delivery organisations and monitored by the NDA as the strategic lead	Delivery by SLCs in their local communities will have a positive impact on the communities in which they operate as SLCs will engage directly with their local communities. More resources will be input with a more coordinated approach and a developed strategy in this area	Cost of third party to soleley manage the strategy will not be as high as nominating a third party to deliver and may result in greater efficiencies in coordination. Delivery by SLCs makes use of estate resources	SLC delivery in their local communities will have a positive reputational impact. CPD opportunities for estate staff. Clear direction set by NDA strategic lead, however, no management oversight by SLCs may result in an uncoordinated and inneficient approach to delivery. It would be unusual for NDA to nominate an external third party to manage a strategy that would require delivery by SLCs	Availability within SLCs to deliver engagement. External organisations to manage available Required skills available within NDA

Figure 3: Application of Screening Criteria to List of Potential Options

3.3 Results of assessment of potential options

3.3.1 Discarded options

Application of the assessment criteria have been applied and ruled out the following options:

Option 1: No strategic lead, NDA monitor and SLCs deliver

This option does not encourage a coordinated, comprehensive and collaborative approach to STEM engagement as no strategic framework will be set out and no further engagement or change in engagement work will be required. This presents the risk that the current situation will continue, with potential negative socio-economic, financial and reputational impacts, therefore eliminating option 1.

Option 3: NDA strategic lead, SLCs manage strategy and third parties deliver

Option 5: NDA strategic lead, SLCs manage strategy with support from third parties and third parties deliver

The potential cost to nominate a third party to deliver all STEM engagement activities across the NDA will be high, due to the amount of resource required and the geographical challenge of the various site locations. No benefits from estate staff engagement will be realised, with no opportunities for staff CPD. Delivery by third parties will also eliminate delivery of activities by estate staff in local communities, which may result in a negative reputational impact, therefore eliminating options 3 and 5.

Option 6: NDA strategic lead, third party manage and SLCs deliver with support from third parties

It would be unusual for the NDA to nominate a third party to be responsible for strategy management, whilst expecting the SLCs to deliver to that strategy. This option may result in a disjointed, inefficient and ineffective approach to delivery, where opportunities may be missed. SLCs would miss out on the opportunity to drive their engagement activities, when they may be in the best position to manage the strategy implementation as they are best placed to know their needs and local communities.

3.3.2 Credible options

The final, credible options are as follows:

Option 2: NDA strategic lead, SLCs manage strategy and SLCs deliver with support of third parties

Option 4: NDA strategic lead, SLCs manage with support from third parties and SLCs deliver with support from third parties

4 Strategic Scope and Boundaries

Further to the options laid out above, it is important to consider the scope of any engagement in any options going forward. Engagement activities could be carried out as follows:

- Supporting only the mission of the NDA: only carrying out STEM activities specific to nuclear decommissioning;
- Supporting the wider nuclear industry: only carrying out STEM activities specific to nuclear;
- Supporting activities beyond the nuclear sector: generic STEM activities;
- Supporting activities beyond the nuclear sector: STEAM activities, which incorporate the arts.

The selected scope for the activities carried out in this strategy, with the reasons behind this selection discussed below, is:

- Supporting activities beyond the nuclear sector: generic STEM activities
  - Option to set an education level limit, where, beyond the agreed limit NDA would expect resources to only go towards activities which further our mission and encourage people to take an interest in nuclear decommissioning;
  - Specific nuclear decommissioning activities can and should be carried out over all education levels where deemed appropriate to align with the strategic objective;
  - The NDA looks to remain flexible with regard to specific activities due to the differing nature of each of the SLCs.

It is important to note that the scope of this work is not only limited to children and young adults engaged in primary through tertiary education, but is aimed at people of all ages.

4.1 Discussion on scope of STEM engagement activities

The scope outlined above was determined by considering the following information and discussion.

Tier 1 level skills (generic skills not specific to nuclear) are forecasted to make up 80% of the requirements in the nuclear sector (see Figure 1). These skills are required to carry out our mission and therefore engaging and encouraging interest in these areas is vital to creating an appropriate pipeline of individuals with the necessary skills. There is always the risk that the NDA and its estate will be competing with other sectors for these skills. However, encouraging people to enter into STEM professions will help in creating a larger pool from which to recruit, to reduce the risk of facing tough competition for a limited supply of candidates.

Tier 2 & 3 skills levels should be considered in a different light. NDA cannot be expected to develop SMEs out-with our sector interests as it does not further our mission and would not present value for money. However, one of the main drivers behind this piece of work is the ability to create subject matter experts (SMEs), and it is accepted that the creation of SMEs is dependent on a wide, high quality pipeline of STEM educated individuals. Tier 2 skills can be addressed via graduate and apprenticeship schemes which specifically relate to nuclear skills or skills shortages

in the sector, which also require an adequate pool of suitably engaged individuals interested in STEM. In continuing to drive interest in STEM and in associated education programmes, NDA can hope to drive uptake of and interest in programmes developing Tier 2 and 3 level skills.

The ability to attract the appropriate people to the nuclear decommissioning industry will require that they are aware of our mission and inspired to help us achieve it. Hence, activities which showcase the nuclear decommissioning industry can and should be carried out where appropriate.

Aligning with both the Socio-economic and People strategies of both the NDA and the estate is an important factor to consider in STEM engagement. From a point of view of NDA, it is in our remit from a socio-economic perspective to both ensure the sustainability of the communities that we operate in up to, and after, site closures. Delivering a broad range of STEM activities would align with that strategy. The People strategy is to ensure we can attract the right people at the right time, which will include the Tier 1 skills level, and also aiding in the mobility of skills across the nuclear industry. Carrying out both non-nuclear and nuclear specific STEM activities would therefore align with that strategy. Further discussion of these strategic themes is given in Section 5.1.

Each SLC has different drivers in terms of its socio-economic objectives, and it is within their remit to not only attract the right people at the right time, but to ensure the sustainability of local communities in which they operate. The proposed strategy should therefore remain flexible as the amount and type of activities carried out in the STEM area by the SLCs, but the SLCs should have demonstrable, clear drivers for carrying those out.

A more recent trend towards Science, Technology, Engineering, Arts and Maths (STEAM) rather than STEM is emerging[20], with suggestions that this more integrative and interdisciplinary approach would lead to improved problem solving skills, critical thinking, creativity and innovative thinking. However, the recently published Government Industrial Strategy[1] and the NSD[13] discusses its strategy for STEM, and engaging in STEAM activities will not address the skills shortages across the industry specifically, with particular reference to the development of SMEs, however it may align more generally with the socio-economic drivers of the SLCs.

It is important to note that other NDA strategies, such as the People strategy, already cover skills issues such as re-deployment, upskilling and succession planning, therefore these issues should remain under the scope of the People strategy. Wider objectives such as socio-economics and ED&I should be considered during further strategy development and implementation, to ensure that conflicts are minimised and strategies are aligned as much as possible.

4.2 Tactical considerations

The following aspects of the strategy are considered tactical, and therefore have not been discussed in this paper:

- Involvement in any capacity of *specific* third parties;
- Types of engagement – i.e. funding routes, direct engagement in schools;
- Locations targeted, i.e. specific local authorities.

4.3 Potential strategic framework inclusions

A framework, as set out by the strategic lead, could include the following information and guidelines:

- Reasons for carrying out STEM engagement and the intended benefits across the estate;
    - This may be different for each 'education level', i.e. the drivers for carrying out primary school activities may be different to the drivers for providing tertiary education.
- Scope of engagement activities;
- Responsibilities of both the NDA and the SLCs;
- Strategic priorities, such as:
    - Targeted engagement in terms of location;
    - Targeted engagement in terms of ED&I;
    - How we will collaborate across the estate;
        - Ensuring development of good practice;
        - How we will work on shared delivery.
- Setting out how we can aim to measure the value of STEM engagement through impact assessments;
- How we will align with other relevant national strategies;
- Strategic partnerships on a national level.

4.4 Impact assessment

In the Strategic Case it was outlined that there was a need to measure the impact of STEM engagement, however it is generally accepted that this is difficult to measure and identify specific cause and effect correlations due to a number of other factors.

Where success or value of engagement activities are measured across the estate, it is mostly qualitative in the form of feedback from students or teachers at the events themselves, which give initial indications of the success of an event or lesson, which is valuable feedback, but perhaps does not indicate potential long-term outcomes.

Quantitative measures such as number of activities carried out, number of students reached by activities and numbers of schools involved, are very easy to measure but provide no data as to whether the STEM interventions are delivering impact in the long term, and are not measuring the quality of activities, so efforts should be taken to monitor the impact of STEM activities and outcomes in the long term, where possible or feasible. Impact assessment may also lead to wider benefits realisation, such as understanding how activities may be addressing gender imbalances, minority imbalances and general ED&I in STEM.

It should be noted that it is easier to measure outcomes from tertiary education level STEM activities, such as tracking the number of PhD students who continue to work in nuclear decommissioning after graduation.

5 Initial Implementation Considerations

During further strategy development; financial, commercial and management considerations will be identified and considered. At this stage of strategy development, it is useful to consider internal NDA interdependencies, where responsibility for this strategy and its development should fall, and any risks associated with strategy development.

5.1 Internal interdependencies

There are three strategic areas within NDA that have an interest in the development of a STEM engagement strategy, those being:

- People (incorporating Skills and Capability);
- Research and Development (R&D), and;
- Socio-Economics.

There are also implicit links with the NDA Public and Stakeholder Engagement strategy, which will become more of a factor during further strategy development and implementation of a STEM engagement strategy.

People (incorporating Skills and Capability)

The strategic objective is "*to ensure that the NDA, its subsidiaries and the estate can attract and retain the necessary skills, diversity of talent and capability to deliver the NDA mission efficiently and effectively through leading the estate-wide People strategy"*

Crucial to the delivery of our mission is the ability to maintain sufficient skills on our sites, and this is covered in our People strategy. This includes not only the development of skills, but the transition of skills from other industries or areas within nuclear, and the retention of skills in and around our sites.

It is understood that although the overall demand for skills is forecast to reduce in the coming decades to facilitate our mission, the impacts of an ageing workforce and competition from other sectors will require that we continue to attract and retain an able workforce.

One strategic priority is to ensure the attraction and supply of the right people in the right place at the right time at optimum cost and quality; skills in STEM are one area we will need in our potential future workforce.

In terms of wider objectives on behalf of the NDA, there are a number of objectives that STEM engagement programmes can help to reach. A diverse workforce has been proven to work more effectively, with higher employee satisfaction, improved decision making and ultimately, better financial performance[3]. Current UK legislation (Equality Act 20104[4]) places a duty on all public sector organisations to improve ED&I. As an extra goal, STEM engagement can be used as a way to enhance the demographics of the nuclear sector, by encouraging people into the sector regardless of background.

Support for STEM initiatives from a young age will also ensure that we can attract a quality pipeline of suitable individuals to become subject matter experts. This is where the People strategy interacts with the Research and Development strategy.

Research and Development (R&D)

The strategic objective is "*to ensure that the delivery of the NDA's mission is technically underpinned by sufficient and appropriate Research and Development*"

R&D is fundamental to ensuring the cost-effective delivery of our mission. Together with innovation and the sharing of good practice both nationally and internationally, the intelligent application of R&D can improve safety and security and reduce costs, timescales and environmental impact.

Part of our R&D strategy concerns the support of University research, which includes funding university research programmes that develop skills required in the medium to long term. One of the reasons for investment in STEM engagement at a tertiary level is to maintain and develop the vital technical skills and SMEs required in our workforce over the required timeline. Without this, it is highly likely that decommissioning and clean-up plans will be both more expensive and delayed. We will seek to create an environment where the relevant technical skills are available when required.

As such, a robust strategy for STEM engagement will aid the NDA in achieving its strategic objectives for R&D.

From the discussion above, it is important that this STEM engagement strategy does not duplicate work which is already being done through the three relevant strategic themes, but try to encourage collaboration and conversation between these themes to ensure effective alignment and delivery.

Socio-Economics

The socio-economic strategic object is "*to support the maintenance of sustainable local economies for communities living near our sites*"

The decommissioning and clean-up of our sites may have an adverse social and economic impact on communities, particularly as job numbers decline. A STEM strategy that helps to maintain high levels of diverse skills in both the workforce and our nuclear communities will help minimise reliance on the nuclear industry, attract inward investment and support a more diverse economy.

This strategy needs to complement the work being completed at our SLCs and subsidiaries, to ensure that there is an alignment of vision.

The current socio-economic strategy is to delegate funding amounts and decision-making responsibility to each of the SLCs, so that they can use their extensive local knowledge to deliver well-informed socio-economic decisions to support local needs, including increasing attractiveness of areas near SLC sites, supporting diversification of communities near sites to reduce reliance on the nuclear sites for employment, whilst also increasing the ability of local people to gain employment in decommissioning related roles where appropriate. This funding amount varies by SLC. Some funding remains within the NDA to support strategic projects and external initiatives.

Support from a socio-economic perspective does not only come from funding, but from support to other strategies which have the potential to deliver socio-economic benefits. One such strategy is the People strategy, which is also closely interlinked with the STEM offering across the estate.

Links between the three areas should be strengthened to ensure sharing of information and to minimise on conflicting and duplicate activities, ensuring value for money.

5.1.1 Internal NDA responsibility for strategy development in this area

At this time, it is proposed that responsibility for this strategy will best fit within the scope of the People strategy, due to its ongoing engagement and links with local and national initiatives, and experience in developing strategic initiatives in this area. Strong links will need to be retained with both Socio-economics and R&D strategies, as this strategy has overlaps with work going on in those areas.

For any strategy developed, it is currently proposed that the governance and assurance route outlined in Figure 4 would be implemented for any programme of activities developed by NDA for the NDA Corporate Centre (not including subsidiary and SLC STEM programmes). Any STEM strategies and programmes developed and carried out by SLCs and subsidiaries would also be ultimately governed by the People Strategy Board under this proposed route, of which members consist of HR Directors from across the NDA estate, to govern matters relating to skills and capabilities across the NDA estate.

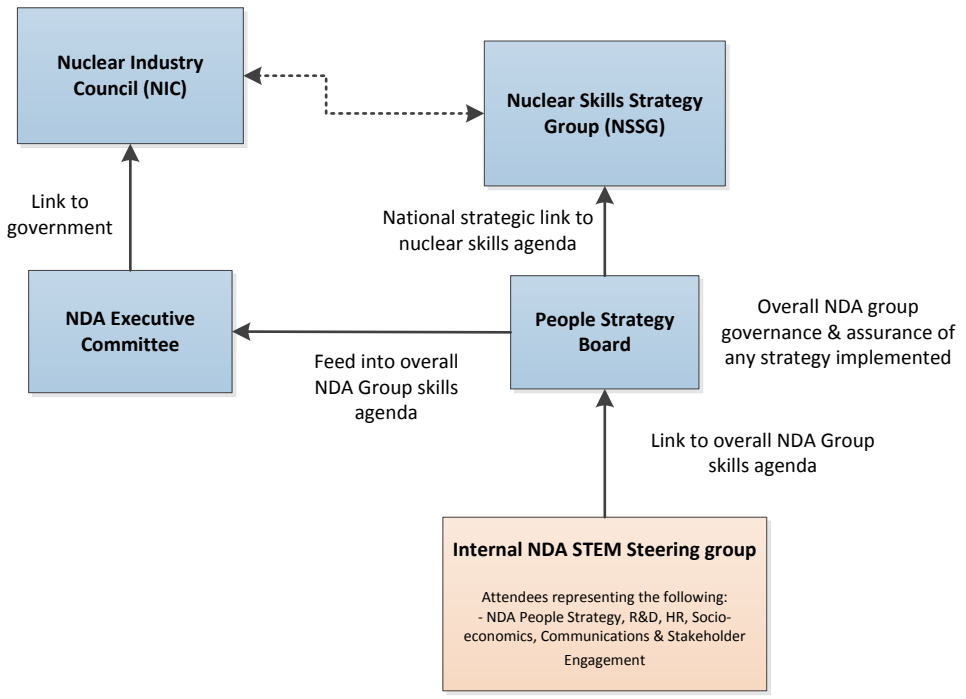


Figure 4: Governance and assurance route for any STEM programme implemented at NDA Corporate Centre

5.2 Risks associated with strategy development

The risks associated with the development of a new strategy in this area include:

- Use of internal and external stakeholders time in developing, reviewing and selecting credible and preferred options;
- A risk that stakeholder and local community expectations could be raised at a time when funding is limited;
- Risk that SLCs and subsidiaries having already created comprehensive STEM strategies that may have to be revised, resulting in wasted time and resources;
- Risk of non-alignment with national strategies and plans for skills, i.e. NSSG strategies and the NSD;
- Risk of non-alignment with dependent strategies, i.e. conflicts with the socio-economic strategy of diversifications of local workforces.

Due to the nature of this subject, it is worth noting that this strategy should remain flexible over time, to accommodate for changes in the external environment, in terms of both skills requirements and available resources.

6 Summary

Potential options were laid out for an NDA STEM engagement strategy, by looking at the different roles the involved organisations could play in such a strategy. Options were assessed against an initial set of criteria to determine their suitability for inclusion in the set of 'Credible Options', which resulted in two options for consideration moving forward. Both of these credible options identify that NDA will take the strategic lead role in a STEM engagement strategy and that SLCs will be involved in both a strategy management and delivery capacity. NDA, as the identified strategic lead for the NDA estate, will ensure alignment with NSSG plans, as the overall strategic lead for the nuclear sector in the skills area.

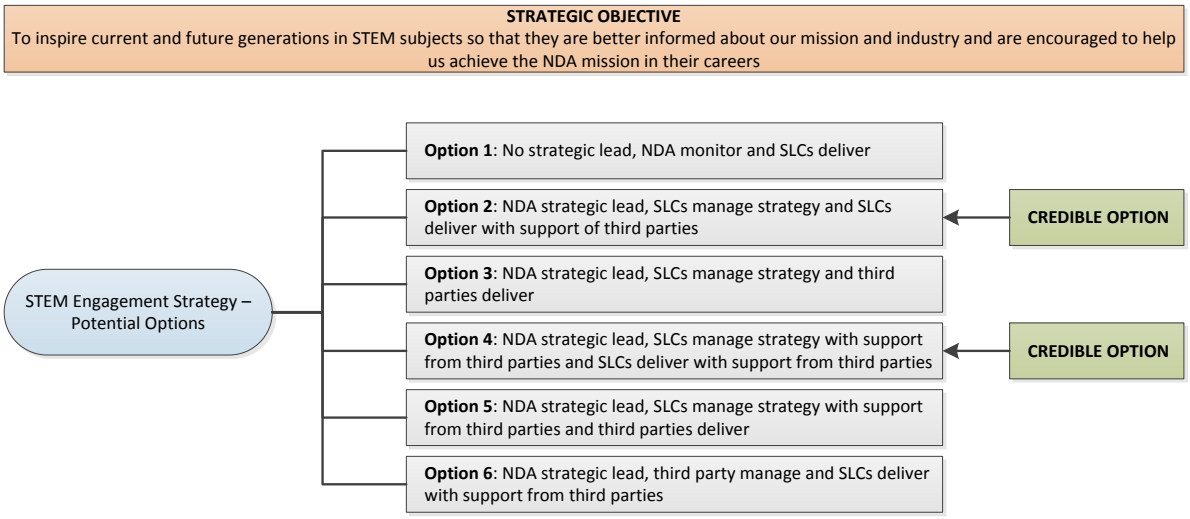
The scope of a STEM engagement strategy was defined as engaging in activities beyond the nuclear sector in generic STEM activities, as this best supports the ability to facilitate an appropriately broad skills pipeline, due to the majority of skills requirements being generic, transferable, cross-industry skills, and the need for a broad pipeline to facilitate the development of much fewer, yet highly specialised subject matter experts (SMEs). An option to set an education level limit whereby resources only go to supporting specific skills development for decommissioning activities was discussed. It has also been recognised that this strategy and any developed framework should remain flexible to accommodate the different needs of each SLC and subsidiary.

NDA will now consider comments and feedback from stakeholders on this Credible Options paper, before moving forward to identifying the Preferred Option for this STEM engagement strategy.

Glossary

BEIS	Department for Business, Energy and Industrial Strategy
CPD	Continued Professional Development
DSRL	Dounreay Site Restoration Ltd
ED&I	Equality, Diversity and Inclusion
FTE	Full Time Equivalent
NDA	Nuclear Decommissioning Authority
NDPB	Non-Departmental Public Body
NIC	Nuclear Industry Council
NSD	Nuclear Sector Deal
NSSG	The Nuclear Skills Strategy Group
R&D	Research and Development
SLC	Site Licence Company
SME	Subject Matter Expert
STEM	Science, Technology, Engineering and Mathematics
STEAM	Science, Technology, Engineering, Art and Mathematics
UKSA	UK Space Agency

Appendix 1 – Strategic Options Diagram



Appendix 2 – Observations and High Level Summary of Current Estate Wide Situation and Associated Risks

The following information and observations were gathered during the initial research and discussion phase of this strategy development in 2017.

A2.1 Estate wide situation

At present, there is no estate-wide strategy for STEM engagement. A review of current documents indicated that there is very little in individual client specifications (explicit contractual sets of requirements that SLCs must satisfy) regarding STEM engagement. What is mentioned within these is very generic, with no details and so each SLC and subsidiary individually determines an appropriate level and format for this. This has resulted in the development of a range of approaches by individual organisations. Provided below are observations relating to existing STEM engagement activities across the NDA estate.

Strategy and company culture

- In the absence of an estate wide strategy, there is no coordinated approach to STEM engagement across the estate.
- The majority of organisations do not have a strategy that encompasses STEM engagement. The sites that do generally have a more organised approach and proactive attitude to STEM engagement with clearer objectives.
- Drivers for undertaking STEM engagement vary by SLC.
- A number of SLCs struggle to deliver a coherent message that reflects their businesses aims and values through STEM engagement.
- There is a general lack of senior level support for members of staff to complete STEM engagement activities, although some companies recognise that volunteering for engagement events can be a useful development opportunity for members of staff.

Implementation and delivery

- Sites that have a dedicated ‘outreach co-ordinator’ type role have a more established approach to STEM engagement.
- STEM engagement can be the responsibility of a number of different functions within an organisation – for example, Socio-economics or People.
- There is little collaboration across the estate relating to STEM engagement, though there is a general desire for this to occur, especially between sites that are located close to others. Collaboration can include sharing of resources (e.g. people and materials), knowledge and best practice.
- For all companies, training for individuals completing STEM activities is done through an external company (National STEM Learning Network, by registration as a STEM ambassador), with very little to no ‘company specific’ training offered.
- In many of the organisations, STEM engagement activities are carried out predominantly by early career staff.

STEM engagement activities

- There are a range of STEM activities being completed, from practical demonstrations and careers workshops, to supporting national initiatives and science fairs. However, generally, STEM engagement within education establishments (e.g. schools) is of a higher priority than broader initiatives (for example, national science fairs).
- In terms of the number of activities, the majority of STEM engagement is completed at the primary and secondary level. However, the highest planned expenditure is within the tertiary area (i.e. provision of funding for PhD projects). Though it should be noted that funding within the tertiary area isn't driven by the STEM objective.
- Primary and secondary engagement is generally completed within communities near to each site. Tertiary engagement is almost exclusively completed on a national basis, as most sites don't have universities close to them and quality of research is a driver rather than location of research establishment.
- Tertiary outreach is likely to be prioritised by organisations that sponsor R&D programmes, or have identified a future need for subject matter experts (for example, at sites that have specific technical needs).

Benefits of STEM engagement and obtaining feedback

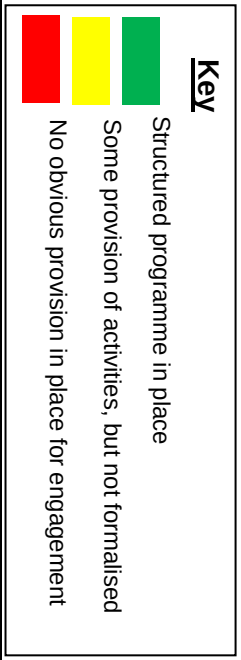
- There is universal recognition across the NDA estate that STEM engagement is a good thing to do, however it is not seen as a priority for the majority of sites. As each site has a different mission, lack of prioritisation is more of an issue for some businesses over others.
- There is generally a poor understanding and articulation of the advantages of completing STEM engagement activities within organisations.
- Across the estate there is an issue with defining benefits of various engagement activities and routes, with very little quantitative feedback obtained. Whilst some seek qualitative feedback, this is usually not used to help refine the programme.

A lot of the points above are interconnected and largely a result of an underdeveloped strategy, resourcing issues and poor communication.

Detailed in the table below is the correlation between NDA estate organisations and STEM engagement activities. More specifically, details on whether they complete primary, secondary, tertiary or broader engagement locally to their sites or on a national basis. Colour coding depicts if: there is a structured programme in place (green); some provision of activities with no formalised plan (yellow); no obvious engagement taking place (red).

Figure 5: Correlation between NDA estate organisations and education level at which STEM engagement activities are being performed. * = strategy is either in development or non-specific.

			Company						
			NDA	Sellafield	RWM	INS	LLWR	Magnox	DSRL
Education level	Primary	Local							
		National							
	Secondary	Local							
		National							
	Tertiary	Local							
		National							
	Broader activities	Local							
		National							
Company Strategy for STEM engagement			No	Yes	Yes*	No	No	Yes*	Yes*



A2.2 Issues and Risks with Current Situation

An overview of key risks and ultimate impacts has been summarised in Section 2.3.2, with a summary of the current issues and associated risks given below.

Organisational approach

Across the estate, there is inconsistency between how much support and prioritisation there is for STEM engagement at the top levels within an organisation. Generally, cost-benefit analysis is performed at a low level. Members of staff will usually have to seek approval from their line manager due to the largely voluntary nature of activities. The majority of companies across the estate experience issues with a lack of support for this, with line managers and senior staff not recognising the benefits in the completion of STEM engagement activities and therefore not encouraging, or sometimes allowing, participation.

Many of the companies across the NDA estate have graduate schemes, with a requirement for members of these to complete a number of hours on community engagement activities, which can include STEM related initiatives. It is these graduates that make up the bulk of the voluntary numbers needed.

The lack of support from top level management can also lead to a deficiency in resources or funding for completing STEM activities.

The risk of these is that STEM engagement activities are not completed, or completed on an inconsistent basis. Lack of resources can also lead to poorly developed STEM activities. There is also a risk that STEM ambassadors will not engage with activities, even if there is company appetite because of a lack of time on behalf of the volunteer, and lack of support from line managers.

The major impact of this is poor stakeholder confidence, from either the cancellation of events, the lack of events or the delivery of poor quality engagement due to lack of resources. This can also lead to poor relationships within the local communities if organisations are not seen to be engaging effectively or putting in a reasonable amount of effort.

Collaboration and Communication

The current approach to STEM engagement across the estate does not encourage collaboration between organisations in terms of the following areas:

- Best practice in STEM engagement;
- Resources. This can mean both physical items (for example, presentations, equipment) but also manpower and ideas.

Currently, there is very little to no discussion between sites over, for example, which schools are being targeted by which site, what material is being covered, or of best practice.

The risk of this is ineffective STEM engagement activities caused by, for example, conflicting messages being sent to the same communities or duplication of efforts. The impacts of this are similar to what has been previously mentioned, but with emphasis on: waste of resources; a dilution of the message that individual organisations are trying to portray (through sending out mixed messages); and,

missing out on the opportunity to learn from best practice, continually improve and cut down on costs by more efficient use of resources.

Strategic View

There is currently no overarching view of STEM engagement activities being completed across the estate. The major risk associated with this is, again, ineffective STEM engagement being completed. This doesn't allow for identification of gaps that can be exploited, for duplication to be spotted and prevented/stopped and for collaborative opportunities to be identified. The ultimate impacts are similar to those mentioned previously.

Appendix 3 – Types of STEM engagement

Shown in the table below is a non-exhaustive summary of the different types of STEM engagement activities that can be carried out from the point of view of the SLCs, subsidiaries and NDA.

Table 2: Types of STEM engagement activities by education level

Level of education		Engagement type
Primary		Lectures
		Workshop
		Money/sponsorship
		Development and/or delivery of curriculum based material
		Science fairs
Secondary		Lectures
		Workshop
		Money/sponsorship
		Development and/or delivery of curriculum based material
		Science fairs
		Work experience (organised through school)
		Work experience (organised through company)
		Work experience (organised through external company/trust)
		Industry based projects
		Recruitment events (for e.g. apprenticeships)
		Summer schools
		Work with UTC's
Tertiary	Undergraduate	Placement opportunities
		Money/sponsorship
		Careers fairs
		Bursary schemes
		Lectures
	Postgraduate	Careers fairs
		Money/sponsorship
		Lectures
		Postgraduate bursary schemes (directly)
		Postgraduate bursary schemes (indirectly)
Other		Sponsorship of programmes, competitions and events
		Engagement with museums etc.
		Charitable donations (to organisations directly involved in STEM engagement)
		Provision of STEM ambassadors

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