



**National Measurement System Programme
for
Knowledge Exchange**

Programme Proposal Document

April 2014 – March 2017

Version 1 – March 2014

National Measurement System Programme

for

Knowledge Exchange

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The Knowledge Exchange programme - an overview

The Knowledge Exchange (KE) programme plays a vital role within the portfolio of NMS programmes, ensuring that the knowledge and outputs from the science programmes are disseminated in an effective way to the stakeholders that can benefit from and apply this knowledge to drive:

- innovation,
- economic growth, and
- improvement in quality of life.

The Knowledge Exchange programme aims to maximise the impact and benefit of the Government's investment in the NMS, supporting the NMS science programme in knowledge exchange. As an integral part of the knowledge exchange activity, the programme enables strategic leadership and influence in the international metrology arena in order to exploit and maximise the leverage from international activity to the benefit of the UK.

By delivering the national and international knowledge exchange activities through a single programme, we ensure that a coherent and joined-up approach is taken across all the NMS programmes. The Knowledge Exchange programme focuses on two-way interaction with key stakeholder groups, industry sectors and technologies that align with market needs and Government strategies. We will apply expertise in the areas of communication (including digital media), training, impact measurement and stakeholder engagement, and bring together measurement expertise and industry knowledge, including through collaborations, to address the topics and issues that are important to NMS users.

Our 2012 customer survey provided some valuable insights into the people and organisations that make use of NMS services, which has informed the work of this programme. For example:

- 87% of users of NPL products and services would like to be kept up-to-date with NPL's work
- Our most popular products are those that can be accessed quickly and easily, such as guides, events, training and on-line resources
- 88% said that technical information was pitched at the right level in our publications. Most users read publications to answer a particular question or keep up-to-date with measurement issues.
- 37% of those who had read a publication said they had accessed the Good Practice Online Modules and 93% of those found them helpful.
- Networking events remain very popular, with 36% of those contacted making use of events to learn about best practice, tools, techniques and new technologies, and engage with scientists
- 93% have seen improvements since attending an NPL training course, but 21% of trainees would prefer online accredited training
- 66% of NPL users interviewed had taken measurement improvement actions in the last year that have led predominantly to new or improved processes or products.

The 2012-14 pan-programme knowledge transfer (PPKT) programme responded to this feedback with a number of initiatives. Over the next three years we will build on the success of the previous programme and its initiatives to increase the impact made by the NMS, with areas of focus on:

- Engaging with key stakeholders at both national and international levels to build partnerships and maximize the potential of the NMS for the benefit of the UK
- Maximising the impact of science outputs through a range of knowledge transfer and awareness raising activities
- Addressing the measurement skills shortage in industry by continuing to expand our programme of classroom-based and e-learning products, and an assessment of the feasibility of metrology apprenticeships
- Addressing metrology deficiencies in the advanced manufacturing sector, essential for increasing quality and competitiveness, through the Product Verification Programme
- Promoting the benefits and opportunities for measurement in the areas of energy, environment and low carbon technology
- Continuing to measure the impact of the NMS, providing data that demonstrates the benefits of the Government's investment in the NMS.

This document presents the proposed programme of Knowledge Exchange (KE) activities for the National Measurement System (NMS) for the period 1 April 2014 to 31 March 2017.

The KE programme is divided into knowledge exchange themes, with one or more projects in each, addressing:

- (i) Awareness, Engagement and Strategy
- (ii) Knowledge Transfer Products,
- (iii) International Influence, and
- (iv) Impact Assessment.



The proposed projects are listed in Table 1 and detailed later in the document. This programme also includes contract and programme management projects to ensure its effective delivery for the NMS and its stakeholders.

The total value of this Knowledge Exchange programme (1 April 2014 to 31 March 2017) is £11,947k.

Table 1: Knowledge exchange programme themes and projects

Theme	Project Number	Project Title	Start Date	End Date	Price, £k
Awareness, Engagement and Strategy	KE/2014/01	Raising awareness	04/14	03/17	2050
	KE/2014/02	NMS Stakeholder engagement	04/14	03/17	692
	KE/2014/03	NMS Strategy developments	04/14	03/17	307
	KE/2014/04	Centres of Excellence	04/14	03/17	373
Knowledge Transfer Products	KE/2014/05	Benefits realisation – pulling through the impact	04/14	03/17	1005
	KE/2014/06	Measurement skills for industry	04/14	03/17	1486
	KE/2014/07	Product Verification (PV) development – products and PV hub	04/14	03/17	702
International Influence	KE/2014/08	International liaison and influence: EURAMET, CIPM and Horizon 2020	04/14	03/17	501
	KE/2014/09	International secondments	04/14	03/17	436
Impact Assessment	KE/2014/10	Impact assessment for the NMS	04/14	03/17	956
Management	KE/2014/11	Contract management and UK fee contributions to EMRP and EMPIR	04/14	03/17	3227
	KE/2014/12	Programme formulation	04/14	03/17	212
Programme Total			04/14	03/17	£11,947k

National Measurement System Knowledge Exchange Programme Strategy

February 2014

Programme Type: Knowledge Exchange
Delivered by: NPL

Programme Size: c. £4M p.a.

Top Level Themes

- Theme 1: Awareness, Engagement and Strategy
- Theme 2: Knowledge Transfer Products
- Theme 3: International Influence
- Theme 4: Impact Assessment
- Theme 5: Management

Main aims and objectives

The principle aim of the Knowledge Exchange (KE) programme is to increase the impact of the National Measurement System (NMS) portfolio of science programmes to the UK. It addresses one of the goals of the NMS strategy:

“to translate advances in measurement science into knowledge that can be exploited to fuel economic growth from business-led technology innovation” [NMS Strategy 2011-15].

This is to be achieved by specific and targeted activities in knowledge exchange at both national and international levels.

The objectives are, more specifically, to:

- Provide the infrastructure and appropriate products for successful NMS knowledge transfer
- Increase engagement with existing and new stakeholders and beneficiaries
- Assess and provide evidence of the impact of the NMS portfolio: demonstrating impact to key stakeholders and enabling optimisation of methods and engagement channels

Although the knowledge exchange activities are targeted at the UK audience, there is recognition of the need for representation of the NMS at the international level to maximise benefits to the UK. The international objectives of this programme are to provide strategic leadership and influence to ensure on behalf of the UK that the international scientific metrology infrastructure:

- Underpins the future of the SI and the integrity of worldwide traceability systems
- Addresses technological priorities and societal challenges of importance to the UK
- Harnesses international resources efficiently and effectively to the benefit of the UK

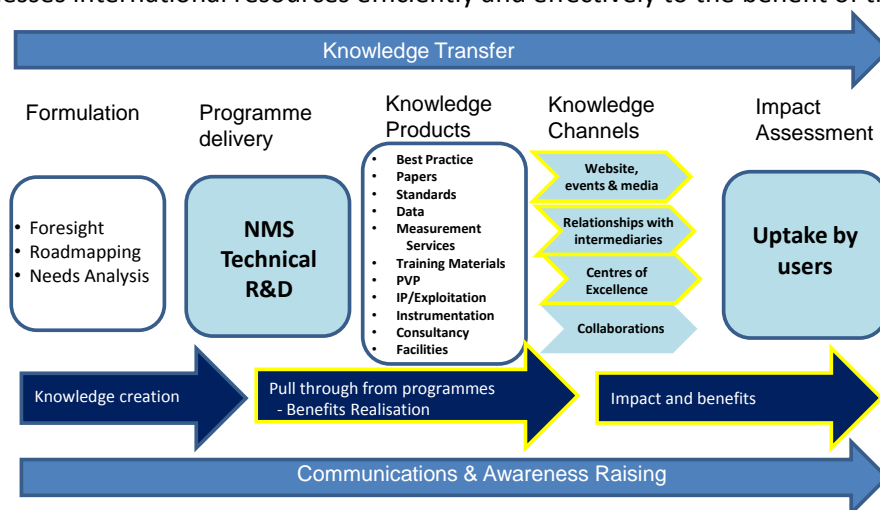


Figure 1 Schematic of NMS Knowledge Transfer process with elements delivered primarily by the Knowledge Exchange programme highlighted in yellow.

Strategy Executive Summary

The Knowledge Exchange programme is focused on maximizing the benefit of the NMS science programmes to the UK economy and quality of life through a range of strategically focused engagement and knowledge exchange activities, with key sectors targeted in alignment with Government priorities. The programme also enables UK leadership and influence in international metrology thereby maintaining the international influence of the NMS to the benefit of the UK. The programme contributes to the delivery of the NMS Strategy 2011-2015, and supports the development of the next strategy.

At a more detailed level, the Knowledge Exchange programme addresses, for example, the skills agenda of Government by providing materials for educating the industrial workforce in basic metrology skills to complex training interventions for metrology specialists. A particular theme is the support to Government supply chain initiatives and their drive for innovation and increased competitiveness, achieved in this programme through introducing measurement capability to improve the quality of product, reduce re-work and minimise waste. Such activity supports industry and trade by, for example, providing metrological controls for verification and quality control. The knowledge exchange activities directly support BIS industrial strategies such as aerospace, construction and automotive as well as addressing priorities of other Government departments such as DECC's low carbon agenda.

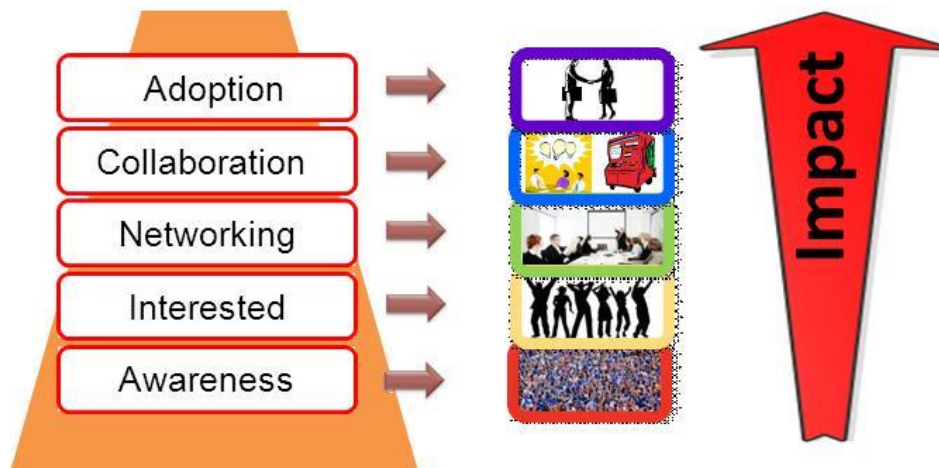


Figure 2 The Knowledge Exchange audience: the many is the base of the pyramid of engagement rising to the collaborative relationships: by increasing the engagement greater adoption of knowledge and products will result that will ultimately drive innovation and economic growth.

Description of Themes

THEME 1: AWARENESS, ENGAGEMENT AND STRATEGY

This theme aims to build the awareness and engagement of stakeholders in the NMS and its programmes of activity, focusing on sectors highlighted by Government and NMS priorities. Furthermore, this theme will generate information from stakeholders that can be fed into the development of the NMS strategy, via the NMO, and thus influence the formulation of future NMS science programmes.

The **Awareness** activity focuses on raising awareness of the value of measurement and facilitating engagement with the NMS programme portfolio through a range of knowledge exchange mechanisms and with a broad and diverse audience. The raising awareness activity is fundamental to the knowledge exchange process, opening up channels for impact to be

achieved, and underpins many of the other knowledge exchange activities within this programme and the individual science programmes.

The **Stakeholder Engagement** activity aims to build strategic partnerships and engage with key stakeholders in order to maximize the impact of the NMS programmes by:

- Delivering more effective knowledge transfer through partners - knowledge transfer can often be delivered most effectively by working in partnership with organisations that have strong and more extensive connections with key industry sectors.
- Building partnerships so that the range and scope of NMS work and thus its impact can be increased and extended through partnerships and collaborative working.
- Raising awareness amongst key organisations and individuals of the scope and impact of the NMS programmes, and their benefits to the UK economy and society, in order to ensure that the importance of the NMS work continues to be recognised.

The awareness raising and engagement activities will both provide valuable information contributing to improved understanding of UK measurement needs, even though they are targeted at maximizing the impact of the NMS programmes. That information will complement and inform additional activity, e.g. consultation with BIS, BIS Innovation Partners, OGDs and industry, to understand the future requirements for the NMS, thereby supporting the NMO in their development of the **NMS strategy** that will steer future NMS science programmes.

This theme also provides knowledge exchange support for the development of **Centres of Excellence** - knowledge exchange focal points for specific areas of NMS science that address Government and NMS priorities. By supporting the development of Centres of Excellence in priority areas and their focused and co-ordinated knowledge exchange activity, the generation of impact arising from the NMS portfolio will be enhanced. Future Centres of Excellence potentially include ones on Mass Spectrometry Imaging, Quantum Metrology and Innovation, and Medical Physics. This activity flows from the success of the first Centres of Excellence, the Centre for Carbon Measurement, which was established as a result of a recommendation of the NMS Strategy 2011-2015. It provides a focus for the low-carbon and climate science work of the NMS and the related community, enhancing the impact through coordination of knowledge exchange activities to disseminate and promote the portfolio of relevant NMS work to relevant stakeholders.

THEME 2: KNOWLEDGE TRANSFER PRODUCTS

This theme focuses on the development of appropriate knowledge transfer materials and 'products' that will generate greater benefit from the investment in the NMS portfolio by creating more impact from the science programmes. Science projects also have knowledge transfer activities built into them. This activity aims to increase the knowledge transfer impact of projects by enhancing the knowledge transfer activities through identification of additional dissemination routes and providing co-ordinated, expert support to translate the science outputs into suitable formats for knowledge transfer. The activity within this theme is comprised of benefits realisation, the development of training materials for measurement skills, and the development of measurement tools for product verification.

Benefits Realisation - the process which aims to pull through technical outcomes currently being developed, as well as those that have not been fully exploited from completed projects, into products having impact by:

- Bridging the divide between the technical outcome and exploitable products
- Identifying and engaging with new audiences
- Packaging products for new audiences' requirements and needs

This is achieved not through direct technical work but through packing, promoting and finding new audiences for products from the science programmes. The work involves actively managing the process of getting the outputs of high impact potential to target communities in a form that enables them to be most readily taken up. The activity on realising the benefits of NMS Programmes will start with project formulation, focusing on exploitation plans which identify and target specified needs, but will go beyond the exploitation plans to maximise impact.

Training Materials for Measurement Skills - activity that translates the knowledge generated by the NMS science programmes into useable and industry accessible training formats, thereby addressing the decline in measurement skills identified in the *NMS Strategy 2011-2015*. The activity addresses the development of materials in a range of formats to meet the needs of a range of audiences, from apprenticeship training to doctoral courses including accreditation. This is an essential element in maximizing the benefits from the research carried out within the NMS portfolio as adoption of new measurement knowledge is heavily dependent on end-users ability to use the knowledge created. The development of training materials in digital formats enables large audiences to be targeted cost effectively, thus increasing the impact of the NMS portfolio.

The development of metrology capability for **Product Verification**, aimed at the advanced manufacturing sector, addresses the need to improve UK supply chain quality through improving measurement systems and thus competitiveness. By its nature and route for dissemination via intermediaries, it has the potential to introduce science programme knowledge and outputs to a large manufacturing sector and be wide reaching in its impact.

THEME 3: INTERNATIONAL INFLUENCE

The objectives of this theme are to provide strategic leadership, influence and participation to ensure on behalf of the UK that the international scientific metrology infrastructure:

- underpins the future of the SI and the integrity of worldwide traceability systems,
- addresses technological priorities and societal challenges of importance to the UK,
- harnesses international resources efficiently and effectively to the benefit of the UK,

thereby contributing to the international aims stated in the NMS Strategy 2011-15 including to “*maintain its [NMS] leading international status in measurement*”.

The theme encompasses activity for leadership and influence in EURAMET (EMRP and EMPIR), BIPM, CIPM, Horizon 2020 and for wider engagement with NMIs at all levels through support to the CIPM MRA and via international secondments.

THEME 4: IMPACT ASSESSMENT

The overarching objective of the Knowledge Exchange programme is to increase the impact of the NMS portfolio. Achieving this is an essential outcome for the programme. This theme aims to demonstrate, quantitatively and qualitatively, the impact of the NMS. Impact assessment provides the data that enables the UK Government to have the confidence that the NMS is delivering real value for money to the UK. We will work closely with Government to understand Government priorities and provide the necessary impact data to help inform and assist the decision makers. Furthermore, impact assessment provides the knowledge necessary to focus developments in the Knowledge Exchange and Science programmes to improve the impact of the NMS. The theme will feed into the development of future programmes and strategies for increased impact.

THEME 5: MANAGEMENT

The programme includes a management theme with projects to ensure the effective delivery of the programme for the NMS and stakeholders, and thus maximise the overall impact of the programme to UK interests in line with the NMS strategy.

The required UK contribution to the EMRP and EMPIR fees are also paid via the contract management project.

Alignment with Government and other strategies

The programme addresses the NMS Strategy (2011-2015) in which it is stated that knowledge exchange activities will:

- Connect technology-driven businesses (from multi-national to micro), and technically-based public sector organisations, to measurement expertise,
- Support the application of measurement best practice,
- Adapt to satisfy the changing needs for guidance and support,
- Extend awareness of measurement knowledge and make it accessible to broader market-based audiences,
- Translate the knowledge into more accessible forms,
- Deliver the knowledge through channels with which users can readily engage,
- Involve intermediaries (professional, trade, sector-based, regional) in reaching a broader audience.

The programme addresses these issues, with focus on the many sectors of the economy that already interact with the NMS but will also focus on sectors that have limited exposure but are of Government priority.

In terms of current Government industrial priorities the programme provides knowledge transfer products that directly support the BIS Industrial Strategy in the key sectors that have the potential to make a significant contribution to future economic growth in the UK:

Advanced manufacturing

- Aerospace
- Automotive
- Life sciences

Knowledge services

- Education
- Information economy
- Professional/business services

Enabling sectors

- Energy: nuclear and oil and gas
- Construction.

The KE programme also supports priorities of other Government departments, for example in healthcare and environmental protection, reflecting the portfolio of the NMS science programme activities.

International strategy

The programme addresses implementation of the international component of the NMS Strategy (2011-15), maintaining and developing the NMS as a significant force in international metrology. The programme enables representation of the UK at the highest levels in international metrology, whilst also enabling lead scientist access to international NMIs to the benefit of the UK.

Documentary Standards, Legislative requirements, Regulations and Directives

The programme will provide input and evidence on future needs to the NMS, thereby contributing to the development of NMS strategy and thus future NMS science programme activity, gathered through consultation with key stakeholders in BIS, OGDs, the Innovation Infrastructure Partnership, industry, academia and international NMIs.

Support for the SI

The programme provides support for the SI, in particular through its role in influencing the international metrology arena.

Knowledge Transfer and Exploitation

The Knowledge Exchange programme is primarily about knowledge transfer and enabling exploitation of the outputs of the NMS portfolio to maximise the return on investment for the UK Government and the tax payer.

Annex - Programme activity by theme and project

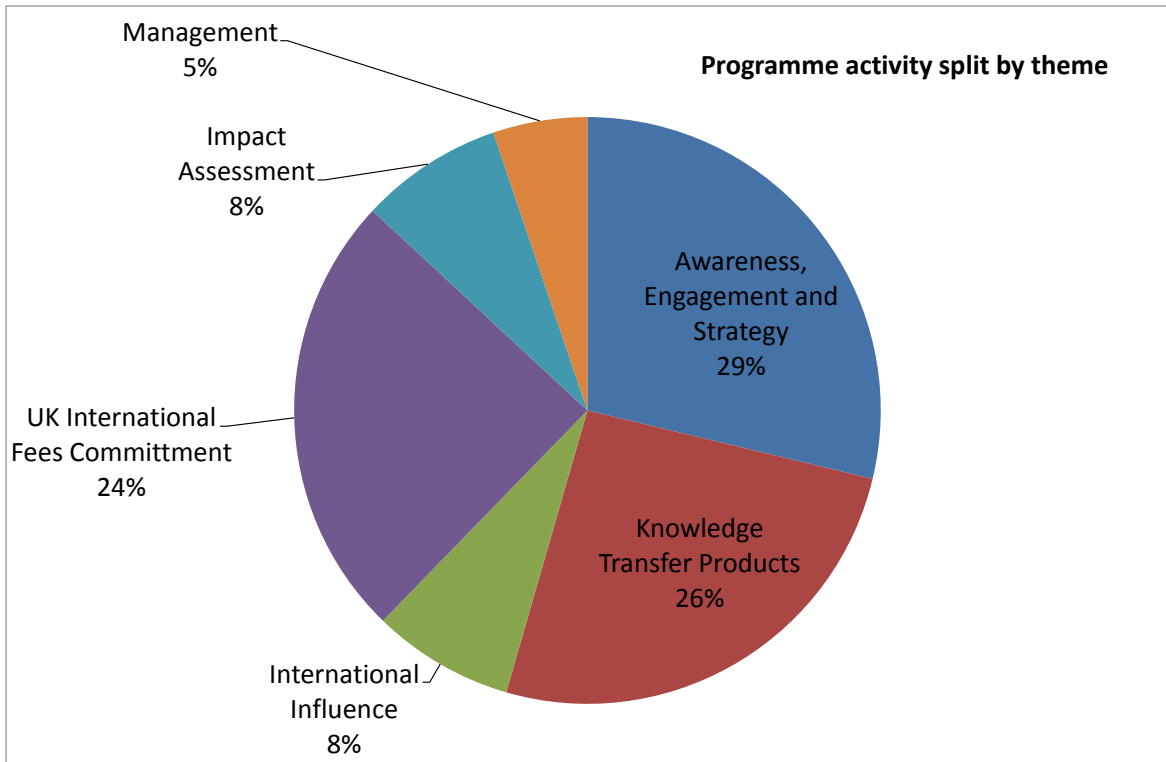


Chart 1: Programme activity split by theme

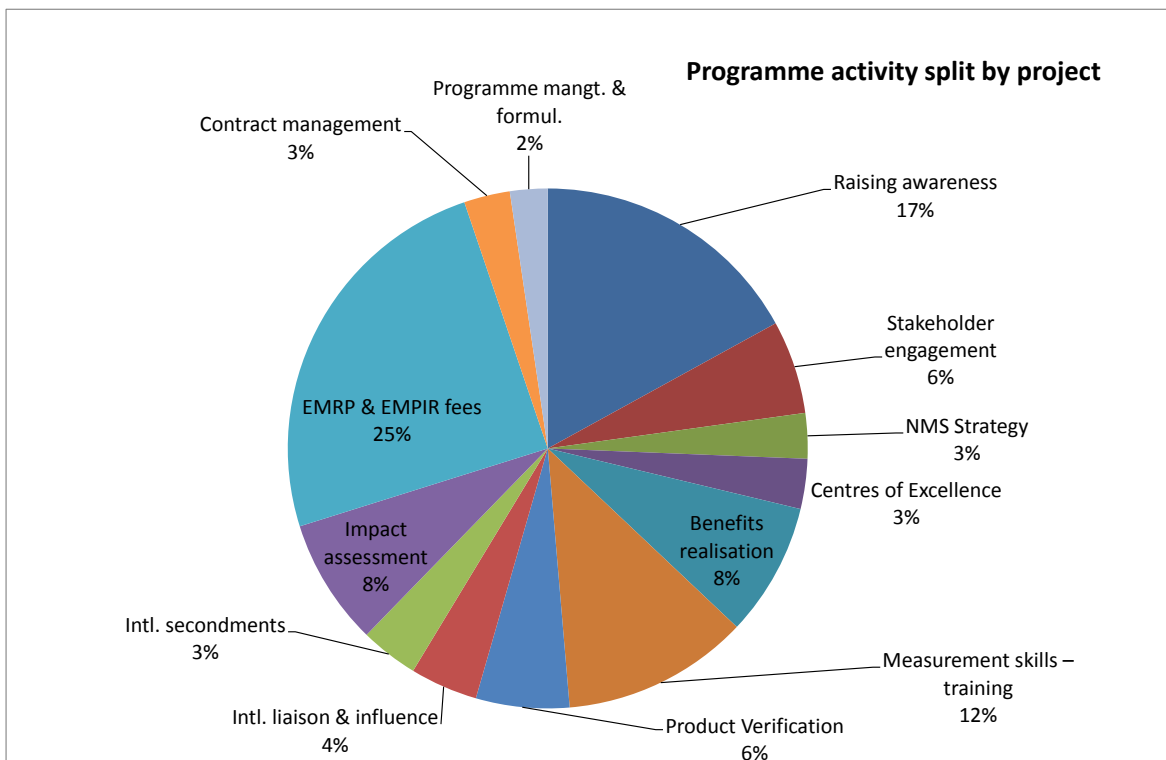


Chart 2: Programme activity split by project

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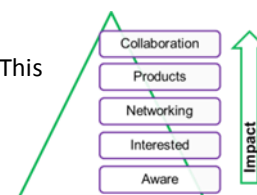
Appendix 1 Project Outlines

Project No.	KE/2014/01	Price to NMO	£2050k
Project Title	Raising Awareness	Co-funding target	Co-funding from NPL activities
Lead Scientist	Fiona Auty	Stage Start Date	01/04/2014
Scientist Team	NPL Communications Team	Stage End Date	31/03/2017
		Est Final Stage End Date	
Sector	Knowledge Exchange	Activity	Knowledge Exchange

Summary

This project has the remit to raise awareness and interest in Measurement and the NMS offering, with chosen stakeholders as outlined in the NMS strategy, through a series of communications and events. This project specifically engages with a broad community to widen reach and support all other projects in focused communications to bespoke communities.

NMS science with impact can only be achieved if stakeholders can engage with the NMS work and know what exists and why it is important as the first step in this technology transfer process. Key success will be measured by the number of new people it brings to the programme and the interest that it delivers to the other knowledge exchange projects and knowledge transfer products.



The Need

The recent Databuild survey (2012) of 534 users of the outputs of the NMS highlighted two key points to continue addressing: Making users aware – 71% don't currently receive any updates and 77% would like to.

Engaging with new stakeholders – 100% of responders have known us for five years or more. There is need to increase our engagement with the community, raising awareness in new industries and with new entrants to industry.

- We need to continue to address these facts, building on communications that target the current and potential NMS users.
- Responding to the continuing pressure on Government finances we need to raise the profile of NMS science and ensure its impact and in particular how it helps deliver Government aspirations is well communicated to stakeholders.
- If the UK wishes to remain on a world stage with a top three NMI, and exert the influence that such a position offers, we need to ensure the NMS's international reputation is upheld through positive communications beyond the UK.

The Solution

We intend to address these areas:

1. Continue to bring new relevant users to measurement and the NMS focusing upon science, engineering and manufacturing companies (in the last year ~9000 new, good contacts were gained across all our social network platforms of which ~3400 are good contacts in the database)
2. Encourage and increase engagement with NMS products by the current user base. While we have made many new contacts the effort needs to be in converting them into active members – therefore we need to concentrate in the campaigns on lifting contacts over the “don't know much about measurement or its potential” hurdle
3. Deliver awareness raising activities for other KE projects, in particular for out puts from the Benefits Realisation project, Training, PVP and Centres of Excellence
4. Define and raise the NMS profile within Government and internationally

Each year, an annual plan of activities will be developed in consultation with the NMO.

The last eighteen-month programme of communications has enabled us to evaluate some new methods of communication so that we better understand what works and what is popular. In this project we will build on this to:

1. Take advantage of all electronic broadcast channels that are available to us – reusing and repacking information for many different mediums including Twitter, PR, web, e-newsletters, videos, etc
2. Work with intermediaries, who 'have the ear' of chosen audiences – to jointly promote the role of measurement and NMS support such as through joint publications, news and events
3. Build upon the positive feedback of the Good Practice Guides from the Customer survey, ensuring the most popular guides are kept up to date and promoted widely, and that new guides are identified and developed
4. Build upon focused events and campaigns that maximize impact by tailoring media, publications, events, collaborations with clear impact-focused goals, such as take up of training course, joint projects in a chosen science field, or support for measurement focused legislation
5. Continue to share best practice within the NMS, to ensure that as many scientists as possible continue to become excellent communicators to expand the delivery team.

We have also learnt some important lessons that we wish to take forward:

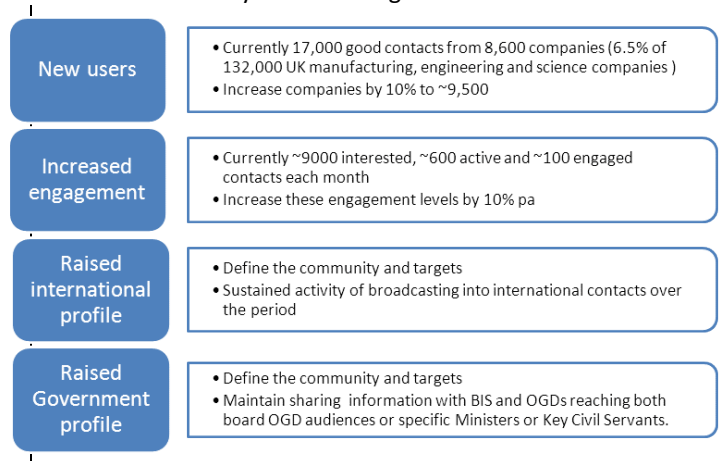
1. Provide more time to promote individual products into as wide a range of communities and remember that once is not enough – each year new people start university courses or join companies – we need to continue to push communications and some of the most successful NMS outputs.
2. Concentrate on the engagement of current users and encouraging them to take up products such as training.
3. Use channels that are getting most interest – e.g. on-line video – which receive significantly more hits than newsletters

Project Description

The project will run the following process:



But be measured by the following metrics:



We define the market as the ~132,000 companies based in the UK that are classed as manufacturing, science or engineering: NPL's database currently holds ~17,000 good contacts from ~8,600 companies (i.e. 6.5% "market share"). Good contacts are those who have signed up for at least one newsletter and/or have identified their sector/interests enabling focused targeting. Engagement is defined as: **Interested** - Contacts who, for example, open a newsletter, view a video or download a guide; **Active** - Contacts who undertake an activity requiring an investment of effort e.g. on-line questionnaire or webinar; and **Engaged** - Participation in activities that we know, through the customer survey, make a difference, e.g attending events or training courses. Within each year we expect our communications campaigns to deliver activities such as bespoke sector, product or event newsletters, events, videos, posters and web landing pages, and best practice guides. These will be outlined in the annual plans.

Impact and Benefits

The benefit of a coordinated communications programme is that stakeholders will recognise and be aware of the NMS and feel positive towards the information received – we have an exceptionally low 'opt out' rate from mailings (compared with industry standards) indicating that people are happy to hear from us. Coordinated, more effective communications to stakeholders will result in greater uptake of NMS knowledge and thus increased economic and quality of life benefits. The benefit to the programme is the cross fertilisation of products across wider groups and the ability to tailor communications more effectively.

Support for Programme Challenge, Roadmaps, Government Strategies

The communications will be guided by NMS Strategy, programme roadmaps and wider Government communication aspirations.

Synergies with other projects / programmes

This project provides comprehensive communications support to all other knowledge exchange projects, providing awareness raising activities focused on particular sectors or stakeholder groups, or promoting specific products such as training or events. It also supports the Science Programmes impact aspirations where awareness is required through governance and best practice.

Risks

Shortage of content – low risk: we have not encountered this and have good systems in place for finding great stories. Inappropriate content or systems – low risk: good processes in place that oversee content approval and professional delivery systems with procedures in place covering aspects such as data protection and management. Poor impact through lack of uptake – low risk: indicators for the last 18 months have been very positive and there are many opportunities that can be exploited.

Knowledge Transfer and Exploitation

This project is focused on opening channels of communication to achieve knowledge transfer.

Co-funding and Collaborators

This project uses the corporate communications channels and systems that NPL invests in – website, stakeholder management system and design and print facility. Collaborators will be the networks/institutes that we engage with on communications.

Deliverables

1	Start: 01/04/14	End: 31/03/15
Annual plan, prepared in consultation with NMO, to be presented in Q1. Raising Awareness and engagement activities report year 1, demonstrating an increase in market share to 10% (from 6.5%) and engagement by 10%, incorporating targets for International and Government focused communications, and a review of Good Practice Guides.		
2	Start: 01/04/15	End: 31/03/16
Annual plan, prepared in consultation with NMO, to be presented in Q1. Raising Awareness and engagement activities report year 2, demonstrating an increase in market share to 10% and engagement by 10%, incorporating lessons learn, progress against International & Government targets.		
3	Start: 01/04/16	End: 31/03/17
Annual plan, prepared in consultation with NMO, to be presented in Q1. Raising Awareness and engagement activities report year 3, demonstrating an increase in market share to 10% and engagement by 10%, progress against International and Government targets.		

Project No.	KE/2014/02	Price to NMO	£692k
Project Title	NMS stakeholder engagement	Co-funding target	£50k
Lead Scientist	Jane Tebbey	Stage Start Date	1/4/2014
Scientist Team		Stage End Date	31/3/2017
		Est Final Stage End Date	
Sector	Knowledge Exchange	Activity	Knowledge Exchange

Summary

This project builds on the stakeholder engagement project initiated in the 2012-14 PPKT programme, aiming to support the delivery of the Government's strategies in areas such as industry, health and energy.

This will be achieved through:

- Developing partnerships with organisations that align with key government strategies, e.g. industrial strategy, that enable NMS capability to be disseminated (through these partners) to wider audiences
- Providing NMS knowledge to support BIS initiatives and assist the development of government-funded organisations such as the Catapults and other industry focused organisations, thus increasing the impact of the NMS. This may include secondments to BIS and other OGDs where NMS expertise can support a strategic initiative.
- Developing partnerships and collaborations with key government funded organisations and other RTOs in order to deliver enhanced value from the government investments in science and innovation
- Gaining input from important stakeholders to the delivery of the NMS
- Work with the innovation infrastructure partners to identify international opportunities that may provide benefit to UK companies.

The Need

UK Government has identified through its industrial strategy some key sectors and technologies that have high potential to deliver future economic and employment growth. The NMS already engages with and offers research and measurement services that are relevant to all of these sectors and technology areas, and is therefore in a strong position to offer input to the many strategies, initiatives and organisations that are also currently focused on providing support in these areas.

The Government also increasingly expects partner organisations such as the BIS Innovation Infrastructure partners to work together and to take a joined up approach that will deliver increased benefit and value from government funding. NMS funding has decreased in real terms and yet at the same time the NMS is being asked to demonstrate increased value for money and impact from its work. This can only be achieved through focusing efforts strategically on the areas that are of top priority to government and industry, and collaborating with organisations throughout the UK to share skills, knowledge and resources and leverage additional funding sources nationally and internationally.

The NMS also continually needs to demonstrate that it is relevant to and is engaging with the sectors that we provide support and services to throughout the UK, to ensure that the NMS reflects the current and future needs of those sectors. Thus there will also be activity focused on regional engagement, recognizing that certain industries tend to cluster in particular regions, to reduce barriers to adoption of NMS knowledge and thus maximize the impact to the UK as a whole.

The Solution

Building on the programme of engagement initiated within PPKT in the 2012-14 programme, NPL will continue to establish new relationships, as well as to build and extend the existing relationships that have been established with organisations such as the Catapults (e.g. HVM and Satellite Applications Catapults), other industry-focused bodies such as AIRTO, Financial Services Authority, BIS Innovation Infrastructure partners, universities and other RTOs throughout the UK. Engagement with the wider industry will be achieved via these industry bodies, providing significant fan-out of knowledge exchange and a conduit for canvassing views on metrology needs, as well as providing contacts with select companies to complement NPL's existing contacts. Each year we will develop a strategic engagement plan for the year ahead, as well as a longer-term strategic view, identifying both the additional organisations that we wish to engage with and further development of existing relationships. This plan, developed in consultation with and agreed by the NMO, will outline the goals for the engagement and how these will be achieved. The delivery of this plan and benefits gained will be reviewed as part of the annual project review and will feed into the following year's plan. In addition, for certain key stakeholders or groups a specific engagement plan will be developed, focusing on the goals for that particular relationship and how these will be achieved.

The project also allows for additional engagement opportunities or activities to be added to the plan during the year – for example, new stakeholders that we have identified as being important to the NMS, or additional activities to further develop an existing relationship.

A new area of focus in this project will be the international metrology infrastructure, which is one of the best developed infrastructures and a key enabler of business, innovation and R&D. Building on the relationship with the BIS innovation partners the project will seek to identify and develop/exploit international opportunities of benefit to UK companies.

Project Description

As described in the previous section, the project will be planned and reviewed on an annual basis. Annual deliverables will be:

- Overall stakeholder engagement plan, identifying the organisations and where appropriate the specific individuals we aim to engage with, and NPL's key objectives for each organisation

- Specific Stakeholder engagement plans – for key stakeholder organisations and also for key industry sectors, technologies or regions, a plan will be developed to outline aims for the relationships and identify how these will be achieved.
- A review of delivery against plan, assessment of benefits obtained and recommendations for future engagement which will feed into the plan for the subsequent year.

Engagement activities will be defined in more detail in the plans, but are likely to include: advice and input to projects and initiatives, hosting high-level visits by strategically important stakeholders to NPL in order to increase engagement with the NMS offering, small consultancy projects and initiatives, secondments, and proactively identifying opportunities for collaboration or partnership. NPL to liaise with NEL and LGC to ensure duplication of activities is avoided and, where appropriate, stakeholder engagement is co-ordinated.

The project will also include scope to respond reactively to requests for engagement activities from stakeholders, or to opportunities that arise during the course of the programme, provided that they fit with and contribute to the overall objectives of the project.

During the first year of the project, there will be a focus on looking for opportunities for regional and international engagement, where a significant benefit is identified for UK industry, building on the studies from the previous programme focusing on opportunities in Scotland and the Huddersfield University partnership. We expect that this work will be developed and expanded within this project in subsequent years.

Impact and Benefits

This project will result in increased economic and quality of life benefits and increased adoption of innovation through the development of strategic partnerships that will facilitate and accelerate the uptake of the NMS outputs by key stakeholders. The project will:

- Increase engagement with the NMS, and a better understanding of its impact and benefits, by key stakeholders
- Broaden dissemination of NMS knowledge to sectors via industry bodies
- Increase utilisation of NMS knowledge to support Government and key government funded organisations
- Input to the delivery of the NMS through feedback and engagement with key stakeholders
- Increase output and impact from the NMS through the benefits and leverage obtained from collaboration with other organisations.

Support for Programme Challenge, Roadmaps, Government Strategies

This project aligns with the Government’s industrial strategy and will support the implementation of the sector strategies and the eight great technologies. It also aligns with NMS strategic aim of supporting and responding to national challenges. In addition, the NMS strategy is to involve intermediaries (professional, trade, sector-based, regional) in reaching a broader audience.

Synergies with other projects / programmes

This project supports and will interact with the following other projects within the programme:

- International liaison and influence project
- Awareness Raising project – as we build our network of contacts within key stakeholder organisations we will ensure that they are kept informed and updated through the Awareness Raising project on NPL developments, invited to key events and provided with information about NMS outputs such as guides, training and other products.
- Impact Assessment project – many of our stakeholders will be important contributors to our work on measuring the impact of the NMS
- Benefits Realisation – the stakeholders targeted by this project will be an important channel through which NMS products and services could be disseminated.

Risks

We will monitor the delivery of the annual plan and key stakeholder plans to ensure the focus remains on the key target organisations, that benefits are being achieved through the engagement, and to ensure the long term sustainability of solutions developed. Regular review meetings will be scheduled to look at the benefits being delivered and agree changes to the plans if necessary.

Knowledge Transfer and Exploitation

This is a knowledge transfer project, establishing relationships for the communication and exploitation of the outputs of the NMS programmes.

Co-funding and Collaborators

Co-funding will be sought if appropriate e.g. if NPL staff are deployed for significant periods of time onto a stakeholder’s site or project.

Deliverables

1	Start: 01/04/14	End: 31/03/15	
Development, delivery and review of annual stakeholder engagement plans – year 1			
2	Start: 01/04/15	End: 31/03/16	
Development, delivery and review of annual stakeholder engagement plans – year 2			
3	Start: 01/04/16	End: 31/03/17	
Development, delivery and review of annual stakeholder engagement plans – year 3			

Project No.	KE/2014/03	Price to NMO	£307k
Project Title	NMS Strategy developments	Co-funding target	
Lead Scientist	Bill Nimmo	Stage Start Date	01/04/2014
Scientist Team	Kimberley Steed German Leon Rogers	Stage End Date	31/03/2017
		Est Final Stage End Date	31/03/2017
Sector	Knowledge Exchange	Activity	Knowledge Exchange

Summary

The NMS Strategy (2011-2015) has successfully driven the NMS portfolio to respond to the challenges facing the UK, to underpin business growth and innovation through excellent science, to work increasingly in partnerships, and to exercise a leading role in metrology both nationally and internationally. However, the NMO has recognised that they will need to revise the Strategy during this programme to reflect recent changes in Government policy and BIS strategy and to provide the NMS with a clear vision continuing into the future. NPL, through its leading role in metrology as the UK's National Measurement Institute and its many interactions with its many stakeholders, is able to provide valuable evidence to the NMO to inform their revision of the NMS strategy so that it demonstrates how it will support the future delivery of Government priorities and maximise the impact and benefit to the UK of the Government's investment in the NMS.

Given the increased commitment to collaborative European metrology projects through EMRP, and in the future through EMPIR, it is essential that the NMS strategy has a coherent international element that is focused such that it maximises the benefits to the UK achieved through leverage of European opportunities.

As part of the NMS strategy, the proposed Advanced Metrology Laboratory (AML) at NPL provides an outstanding opportunity to engage with the best academic science to meet the most complex and difficult challenges in the field of quantum metrology. For the AML to achieve its full potential, further work is required to develop strategic relationships with partners in order to firmly establish the vision for the AML and its operational plan. This project provides for developing these relationships, the vision and the operational plan.

The Need

The current NMS strategy (2011-15) was the first of its kind and has proved invaluable in 1) focussing the NMS budget on the key areas of metrology that need to be maintained or developed, 2) enabling the planned reshaping of the portfolio of programmes and 3) delivering new concepts, such as the Centre for Carbon Measurement, the initiation of the design for the AML, the EMRP programme and the Strategic Capability portfolio.

The current NMS strategy runs until 2015 and the NMO needs to revise it to align with the future ambitions for the NMS, as indicated by recent government actions, including the rationale behind the new operational methods for NPL. The new document will provide a clear statement of intent for the future of the National Measurement System to guide UK Government spend and engage with collaborative partners who can co-fund projects and improve links with academia. The information gathered to support the revised strategy will also provide evidence to the NMO in preparation for the 2015 CSR.

One of the most significant NMS co-funders is the EMRP, and it is anticipated that 40% of the NMS budget available for co-funding will be used to engage with the follow-on programme, EMPIR. Many UK companies now work globally and require seamless integration of their national and international operations, consistent with government action, to maximise the benefits. It is a stated aim of the EU to create a European Research Area to support Strategic Research Agendas, implemented by networks of organisations that share research interests and have complementary expertise. This approach accelerates technical progress and increases value for money by focusing a coherent effort towards achieving a set of clearly identified objectives for the delivery and maintenance of the European metrology infrastructure. Given the increased commitment of the NMS to the EMPIR and the impact that can be generated by participation in Horizon 2020 projects, it is essential that the NMS strategy now has a coherent international element that is well focused such that the UK fully benefits from these international opportunities with targeted cofunding. This International element can be put into action ahead of the publication of the new NMS strategy, in order to accelerate the delivery of benefits.

The AML represents a significant investment in infrastructure for the NMS in the field of quantum metrology, and as such an ambitious vision that describes the science objectives for the AML needs to be developed with partners, in particular those involved in the government's national quantum technologies initiative. This is necessary to inform the AML's design and enable the NPL and partners to plan their engagement in terms of collaborative working methods, roadmaps and funding. For example, Government commitments to a capital investment in Quantum Technologies for the AML have been agreed based on collaborations between NPL and UK academia. These opportunities need to be developed and incorporated into an AML vision and operational plan.

The Solution

It is essential to firstly develop a UK perspective for the NMS strategy. Consultation with UK stakeholders needs to be carried out to gather information and views on UK requirements, impact and benefits from experts in a range of fields, in particular those aligned with Government priorities. The strategic directions and priorities suggested by the combined views will need to be validated using evidence based methods as the process develops. The BIS innovation partners will be engaged in this process, providing advice to ensure the developed strategy supports the UK Government's Innovation agenda. The current state of the art of UK metrology capabilities, together with the research agendas of the UK and specific European and International entities, will be researched and presented using tools such as "heat maps" to understand how UK requirements can best be met using NMS

investment and how the European Strategic Research Agenda can best be developed and exploited to achieve maximum leverage and benefit to the UK. Input to the NMO will also be provided based on the vision expounded by *Metrology for the 2020s*, developed in consultation with government, academia and industry. This work may also identify the need for further revision of *Metrology for the 2020s*.

The focus of funding for the AML will be to develop further and cement the relationships with Government, academic and industry partners around an agreed vision and operational plan for quantum technologies in the UK that aligns with government and NMS strategy. This project will support the development of that vision and operational plan and also the relationships with stakeholders in the AML. This will ensure delivery of world class metrology capability that will support innovation in quantum technologies in the UK in alignment with Government priorities.

Project Description

The project will gather, collate, analyse and present evidence to the NMO to inform their revision of the NMS strategy. Working with the NMO, we will agree the evidence required and then implement a programme of information gathering and consultation. Evidence will be collected through, for example, engagement and consultation with stakeholders including the BIS Innovation partners but also extending more widely.

It is anticipated that the European element of the strategy will focus on grand challenges already outlined in the current NMS strategy and the most likely candidates are health and energy. The stakeholder group for the NMS strategy will, of course, be centred on the UK's needs. The views of this group will be used to ensure that the UK perspective is seamlessly integrated into the wider European context, by both supporting and influencing a more European-wide group of the stakeholders.

The development of the vision and operational plan for the AML, aligned with NMS and government strategy, will involve:

- A more detailed definition of the selected quantum technologies priority areas for the AML in its first decade of operation
- Engagement with the partners to develop the science vision for the AML, and the consequent roadmaps
- Plan the collaborations, capital investments, joint projects etc to deliver the roadmaps

Impact and Benefits

The project supports the entire NMS portfolio and will benefit the UK by enabling the NMO to target the NMS budget on strategic objectives and outstanding capability developments. It will position the NMS, and thus the UK, for future growth, innovation and economic benefit, maximising the value of the NMS to the UK. It will enable optimisation of the benefits and leverage that can be brought to the UK using the international metrology infrastructure. It will enable the UK strategy to have a stronger influence on the direction of EMPIR and the scope of future calls, in support of UK interests and enhanced UK participation and benefit. The engagement with BIS partners will enable UK government collaborations to be developed that will, through coherent decision making, provide better support to UK industry.

Support for Programme Challenge, Roadmaps, Government Strategies

Supports Government strategies through ensuring alignment of NMO strategy. The proposed AML supports government initiatives, such as that in quantum technologies.

Synergies with other projects / programmes

Engaging with the BIS Innovation partners and other government departments in the stakeholder engagement project ensures that the NMS strategy supports, and is supported, across government. This project will make use of the International Influence project, with its role on leadership of EURAMET, to influence key European decision makers on the need for aligned strategic action for mutual benefit. The AML activity raises significantly the aspirations of the quantum metrology elements of the NMS portfolio and positions the NMS for the future metrology challenges.

Risks

The main risk is the time taken to develop clear strategy concepts from the wealth of information provided by stakeholders. This can be mitigated by allowing sufficient time for information gathering and consultation, and ensuring that the strategy ideas are validated as the project progresses, rather than leaving it to the end.

Execution of the AML activity may be impacted by dependencies on partners and potentially the new NPL model. Delays in establishing the next stages of the AML's design and specification could mean that that the development of the AML is delayed.

Knowledge Transfer and Exploitation

The activity described here is a two-way knowledge transfer process that gains insight into the needs of stakeholders, whilst at the same time raises awareness of the NMS, its capability, and the benefits of metrology.

Co-funding and Collaborators

In providing evidence in support of the NMO's development of the NMS strategy and discussions on the development of the AML it is expected that the non-NMS stakeholders will freely give their time: this in-kind contribution is invaluable.

Deliverables			
1	Start: 01/04/14	End: 31/12/15	
Provide evidence to the NMO underpinning their revision of the NMS strategy			
2	Start: 01/04/14	End: 30/09/15	
International objectives and action plan			
3	Start: 01/04/14	End: 31/03/17	
A vision and operational plan for the AML, prepared as required in alignment with the AML scheduling.			

Project No.	KE/2014/04	Price to NMO	£373k
Project Title	Centres of Excellence	Co-funding target	
Lead Scientist	Jane Tebbey	Stage Start Date	1/4/2014
Scientist Team	Lead scientists for Centres, Sue Oakley, Jane Burston	Stage End Date	31/3/2017
		Est Final Stage End Date	
Sector	Knowledge Exchange	Activity	Knowledge Exchange

Summary:

This project supports the development of Centres of Excellence at NPL in areas of Government priority, as mechanisms for maximizing the impact and benefits of the NMS programmes.

NPL's first Centre of Excellence, the Centre for Carbon Measurement (CCM), was a major recommendation in the NMS Strategy (2011-15). The Centre aims to increase the impact and benefits of the NMS investment through a joined-up approach to carbon metrology activities at NPL. This has been supported in the previous PPKT programme with a targeted programme of dissemination and knowledge transfer activities with relevant stakeholders.

This project aims to build on the success of the work delivered in the 2012-14 PPKT programme to support the CCM. The project will continue to support the development of the CCM, building on the profile and impact it has achieved to date, and will also identify and define programmes of focused knowledge exchange activities to support the development of other metrology Centres of Excellence at NPL.

The Need

As part of its science strategy, and in support of the NMS Strategy 2011-15, NPL is aiming to create science focal points for the UK that, working in partnership, will also deliver knowledge transfer to relevant communities. Development of these Centres of Excellence will involve identifying priority areas for investment to develop new scientific capabilities with a critical mass of world-leading research expertise. Building on the Centre for Carbon Measurement and the National Centre for Excellence in Mass Spectrometry, NPL will look to develop a Quantum Metrology and Innovation Centre, and a Centre of Excellence for Medical Physics.

Key drivers for the Centre for Carbon Measurement are the UK emission reduction targets which were set at 20% of 1990 levels by 2020 and 80% by 2050. To achieve these milestones, the UK Government set out a series of Carbon Budgets, spanning 2008 to 2027, which are enshrined in the Climate Change Act 2008. To achieve these reductions will require accurate measurement and modelling of environmental emissions, informed policy decisions and regulations, and the introduction of new low carbon technologies to ensure compliance with the legislation. The NMS's energy, environment and low carbon technology portfolio aims to have a significant impact and influence in all these areas and an ongoing programme of influencing and knowledge transfer is therefore required.

The Solution

The programme of knowledge transfer activities delivered from 2012-14 for the Centre for Carbon Measurement (CCM) has delivered high profile events, strong partnerships and clarity of vision in relation to NMS capabilities in Energy, Environment and Low Carbon Technology. Significant profile and impact for both the NMS and the Centre for Carbon Measurement has been achieved to date. It is therefore proposed to continue a programme of KT activities within the 2014-17 Knowledge Exchange programme, designed to support the aims of the Centre.

To achieve even greater impact from the NMS portfolio, the extension of the successful CCM knowledge transfer model to other areas of NMS priority is proposed. A programme of knowledge transfer activities will be defined and delivered for other Centres of Excellence as they are established.

Once the programme of KT activities for these Centres is defined, e.g. awareness raising, stakeholder engagement and impact assessment, these will be delivered by the corresponding projects within this Knowledge Exchange programme, and coordinated by this project. However, dependent on the agreed level of activity of each Centre, additional funding and/or cofunding may be sought.

Project Description :

In collaboration with the activities of other projects within this Knowledge Exchange programme, this project will provide focused support to the Centres of Excellence to:

- (i) Increase stakeholder engagement through advisory fora, and awareness of the NMS portfolio through regular communications and participation in relevant conferences.
- (ii) Deliver impact through hosting (or co-hosting) high-profile meetings in areas of high priority to the Government and the NMS.

(iii) Prepare vision papers through roadmapping and consultation exercises, which will identify and articulate industrial requirements, inform future formulation of relevant NMS programmes, and ensure that metrology is not a bottleneck in the achievement of innovation and economic growth in the UK.			
Impact and Benefits:			
The project will increase the benefits and economic impact of the NMS portfolio to the UK in priority areas through:			
<ul style="list-style-type: none"> • Focused, effective knowledge transfer activities increasing adoption of measurement technology. • Positioning the NMS at the heart of science and technology solutions in UK priority areas. • Directly influencing NMS programme formulation, and thus eventual outputs, by providing feedback on technical and investment priorities identified through events, and ensure NMS working groups are informed of these priorities. • Engaging existing and new stakeholders, to raise awareness of NMS science programmes and projects. • Establishing and strengthening external partnerships which may lead to funding/co-funding opportunities that will further enhance the impact of the NMS programmes. • Further establishing the Centre for Carbon Measurement as the authority on carbon measurement while providing a co-ordinated and comprehensive focus for carbon related work within the NMS. 			
Support for Programme Challenge, Roadmaps, Government Strategies:			
<ul style="list-style-type: none"> • Support for Government and NMS priorities • Supports UK/EU legislation to meet challenging carbon reduction targets by 2020 and 2050. • Support for various science projects across the NMS portfolio. 			
Synergies with other Projects/Programmes:			
<ul style="list-style-type: none"> • This project will work in collaboration with other projects within the Knowledge Exchange programme, e.g. awareness raising, stakeholder engagement and impact assessment, for delivery of those knowledge exchange activities. • This project seeks to support both the shape of future science programmes and projects and contributes to successful demonstration, exploitation and take up of their outputs. • Continuous support to NMS roadmapping by providing key, co-ordinated measurement vision papers. 			
Risks:			
The CCM has a small team. Although low risk, the impact of losing senior staff with a high external profile is significant and external recruitment would be required to replace these staff.			
The CCM model does not apply equally well to other Centres of Excellence that do not have such strong political drivers and a tailored approach will be required for each Centre.			
Knowledge Transfer and Exploitation:			
<ul style="list-style-type: none"> • This project is aimed at developing mechanisms to maximize the knowledge transfer of NMS outputs. • The work on vision papers will be based on stakeholder consultation and provide clarity and transparency on the needs for measurement in supporting specific national and international challenges. 			
Co-funding and Collaborators:			
The delivery model for all events and activities is one of partnership with like-minded organisations. This approach maximises network reach and shares the costs of running events. This also increases opportunities for successful collaboration after the events.			
Deliverables			
1	Start: 1/4/14	End: 31/7/16	
Preparation of CCM vision papers positioning metrology at the heart of UK solutions for future National and International challenges in Low Carbon and Climate Science. Target – at least two.			
2	Start: 1/4/14	End: 31/3/17	
CCM to deliver impact via a series of high profile, partnered meetings over three years in areas of high priority to the UK and in line with the National Measurement System strategy recommendations. Target – at least six.			
3	Start: 1/4/14	End: 31/3/17	
Develop and coordinate delivery of Knowledge Transfer plans for up to three additional Centres of Excellence			

Project No.	KE/2014/05	Price to NMO	£1005k
Project Title	Benefits realisation – pulling through the impact	Co-funding target	
Lead Scientist	Özlem Lopes	Stage Start Date	1/4/2014
Scientist Team	Hannah Carter, Fiona Jones, Tricia Wilson, NPL Programme Managers	Stage End Date	31/3/2017
		Est Final Stage End Date	
Sector	Knowledge Exchange	Activity	Knowledge Exchange

Summary: This project builds on the Benefits Realisation project initiated in the 2012-14 PPKT programme which delivered a pipeline of about 40 underexploited science products developed in NMS programmes and established a new NPL science outputs impact pipeline management process. The benefits realisation project will continue to implement the impact pipeline management process through NPL and bring measurement products to end users, managing a successful pipeline of products that are assessed through user surveys and needs analysis.

This project will bring the individual strands of the Knowledge Exchange and NPL's science programme/project management processes together in order to maximise the eventual impact of NPL science projects outputs. It will do this by:

- identifying science projects with potential for high impact products to generate greater benefits from the investment in the NMS portfolio; focusing on benefits and how they will be managed;
- utilising the most effective knowledge transfer mechanisms, and channels to market, to ensure increased product take up by stakeholders;
- establishing a common understanding of mechanisms to ensure benefits are fully realised; and the importance of achieving and providing evidence of ultimate impact.

The Need: A key part of the formulation of every NMS project is the identification of the target audience and the benefits the work will deliver to end users. The identification of target audience needs is central to the success of a project's impact and the knowledge transfer and exploitation plan is the route by which benefit realisation is accomplished. However, opportunities that were unplanned (and hence not resourced) often emerge during or after the end of the project. Typically, these might be opportunities to apply outputs to different economic sectors, changes in market requirements during the life of a project, or unanticipated beneficial science outcomes that sometimes arise during research. In some cases, scientific research takes longer than expected and support from technical programmes ends having achieved dissemination of knowledge through scientific publication and take-up by early adopters, but before the expected full beneficial outcomes are fully realised. This can result from the technical outputs not being in a form suitable for consumption further down the supply chain or in different sectors. The large pool of expertise and knowledge that the NMS has developed can be mined to provide innovative solutions to new industrial challenges but requires a mechanism within technical programmes to support this activity so that these opportunities can be taken.

Unlike the early adopters, who often have the resources to adapt and translate the results into their context, the wider audience needs the knowledge or output to be in a more readily useable form. NMS technical projects typically have the resources to deliver in a suitable form to target audiences but reaching beyond those specific communities is beyond the reasonable expectation for the scope of a project. In these cases, an additional 'productisation' step can avoid an exploitation gap and increased beneficial outcomes can be achieved.

Realising the full potential of measurement knowledge is dependent on many factors from the form of the technical output, the economic sector, to the end-user community. Knowledge of exploitation best practice in the many different circumstances faced by scientists and KT professionals needs to be captured and a systematic understanding of how impact is best generated fed through into the design of projects and their exploitation and dissemination plans.

The Solution: Programme managers and scientific delivery teams are always searching for new opportunities from both completed work and current projects to deliver existing and novel outcomes from the technical portfolio in new forms and to new audiences. Sometimes this is within the scope of existing technical projects but often to realise the potential benefits that have been identified these opportunities will need to be addressed by this project. Identified underexploited and high-potential outputs will be disseminated to wider audiences for increased take-up and impact. The potential of each output will be assessed and prioritised. Those outputs that have the most potential for substantial impact will be actively managed through the lifetime of this project to ensure they are developed into a suitable form and take-up is realised. The final part of the work will be to collate experience and best practice from the experience of exploiting outputs enabling continuous improvement in the design of technical projects.

Project Description

1. Identifying the knowledge outputs and developing the exploitation plans

We will work with programme managers and scientists to prospect across all the NMS programmes and projects at NPL to identify new outputs with additional potential for adoption. An 'output' is typically a prototype instrument, software, IP, or measurement method – a piece of NMS knowledge that can be codified. Increasing the take up will involve working with scientists and others to fully understand the project and identify the audiences and routes to market. A preliminary plan to

increase the impact of each output will then be developed to be actioned in Deliverable 2. The aim is to generate additional benefits from the 'back catalogue' of NMS research.

2. Focusing on the high impact products – realising the benefits

It is envisaged that around two thirds of these outputs will be communicated to new audiences through networks and trade associations with some limited repackaging – a light touch approach. The result will be increased adoption by new users giving demonstrable impact. However, one third of the outputs will have the potential to achieve significant impact but require further development for widespread adoption, for example, through making IP available in suitable forms for potential end-users, documenting a measurement method so that new measurement services are established for industry, or working with partners to make novel NMS-developed instrumentation available to the metrology community. This work package will develop the process and criteria for identifying the high value products in collaboration with key stakeholders. The identified outputs will then be sifted on an on-going basis to select those suitable for more intensive development. Appropriate market research will be undertaken to establish for the technical output the best final form and route to adoption for the target community. A longer term plan will be developed to ensure that the output is fully exploited; this will be reviewed as appropriate. It is envisaged that, once well established, around 10 outputs/products will be actively managed at any point in time.

Further scientific or technical work required for productisation will not be funded by this project but will be supported by the NMS programmes or NPLML depending on the potential impact, degree of market failure and technology readiness level. Similarly, any marketing or implementation of commercial NPL services will be paid for by NPLML. This project is to bridge the gap between the technical outcome and the delivery of benefits and will ensure that a systematic process is in place to make certain that outputs are fully exploited.

3. Spreading good impact practice – continuous improvement in project design

Excellent science needs to be coupled with excellent impact. The objective of this deliverable is to improve project knowledge transfer and exploitation plans within technical programmes. We developed and delivered an internal communication campaign to reinforce the importance of focusing on the needs of users and the productisation of outputs. In particular, we will use the lessons learnt from the impact case studies from Deliverable 2 to enable continuous improvement. Delivery channels will be scientist induction training, formulation meetings and materials for staff communication cascades.

Impact and Benefits

- Significantly improves impact of NMS portfolio with greater exploitation of existing and new NMS products by industry
- Captures and exploits existing NMS Knowledge for exploitation in new forms and economic sectors
- Actively manages potential high-impact NMS technical outputs through to adoption by users leading to innovation and economic benefits
- Supports the underlying adoption of impact best practice

Support for Programme Challenge, Roadmaps, Government Strategies: The NMS strategy has a strong emphasis on maximising the impact of the research that it supports. This project is totally focused on supporting this theme.

Synergies with other projects / programmes

- Supports the continuous improvement of impact from projects and programmes
- Supports other areas of Knowledge Exchange programme by providing exploitable content to other projects (e.g. Measurement Skills, PV), and utilising of KE projects, e.g. Raising Awareness project for communications activities.

Risks: Project prospecting/funnel/selection process does not deliver the expected number of exploitable outputs – mitigate by basing target on experience to date in Knowledge Management project.

Insufficient buy-in from NPL product owners or science leaders to ensure exploitation happens – mitigate by involving science teams and product owners in the development of the process and selection of outputs for productisation.

Knowledge Transfer and Exploitation: This project is focused on knowledge transfer in its entirety and its focus is on exploiting the outputs of NMS technical programmes.

Co-funding and Collaborators: It is expected that some of the outputs will be delivered through partnerships with other organisations to deliver maximum uptake and benefits.

Deliverables

1	Start: 01/04/2014	End: 31/03/2017
Identifying the knowledge outputs and developing the exploitation plans - managing NPL Impact pipeline. Evidence: 10 new outputs identified per annum and recorded to NPL impact pipeline; exploitation plans generated.		
2	Start: 01/04/2014	End: 31/03/2017
Focusing on the high impact products – realising the benefits. Evidence: Increased adoption of 5 outputs per annum by new users giving demonstrable impact. Documented processes for managing the products lifecycle, 10 products actively managed through the process per annum.		
3	Start: 01/04/2014	End: 31/03/2017
Spreading good impact practice – continuous improvement in project design Evidence: Staff training delivery. Develop NMS programmes formulation process support materials. Draft, support and manage the Impact/Benefits deliverable workpackages during NMS programmes formulation process working closely with scientists.		

Project No.	KE/2014/06	Price to NMO	£1486k
Project Title	Measurement Skills for Industry	Co-funding target	In-kind
Lead Scientist	Suzanne Wells	Stage Start Date	1/4/2014
Scientist Team	Hannah Carter, Hannah Edmunds, Joan Hall, Keith Bevan, Michael Lingard	Stage End Date	31/3/2017
			31/3/2017
Sector	Knowledge Exchange	Activity	Knowledge Exchange

Summary

The benefits that end-users derive from the research carried out within the NMS portfolio depends on their ability to use the knowledge created. This project will encapsulate NMS knowledge and translate it into accessible and engaging training content for industry and academia, with accreditation or recognition for CPD as appropriate. The overall aim of this project is to deliver measurement skills training materials to help provide a pipeline of talented, skilled metrologists across industry to generate real impact on the UK's productivity and global competitiveness. This project builds on the success of the 'Measurement Skills for Industry' project (PPKT 2012-14), where NMS training was adopted by over 1000 industry learners in 150 companies in 2013 alone. This project takes NPL training products through an important industry-led transition, from being tailored for 'face-to-face/classroom learning' to products suited for a 'blended learning' approach that combines e-learning material with practical hands-on sessions. This enables industry to access training online, on-demand (saving time and money) but with the added benefit of being able to access practical training sessions to apply the e-Learning knowledge. Furthermore, there is a Government drive to increase the number of Industrial Apprenticeships to drive economic growth. This project will assess the need for and define an industry-led Apprenticeship Programme in Metrology for the advanced manufacturing sector.

The Need

There is a lack of formal measurement training in academic and vocational qualifications and in work place learning schemes meaning generations of workers have gaps in measurement skills, especially hands-on experience of applying good measurement practices. In addition, the ageing workforce means that key measurement skills are being lost as people retire. Proficiency in measurement good practice is increasingly being recognised by industry as a missing underpinning skill which is vital to increase productivity and competitiveness. There is a need to translate more NMS research into new training materials, to ensure the measurement skills gaps are addressed. As an indicator of the size of the industrial need, there are approximately 132,000 manufacturing, engineering and science establishments in the UK employing 1.7 million people*. In addition, there are 68,000 undergraduate and postgraduate students studying STEM subjects in the UK who would benefit from measurement training**. The NMS training materials therefore need to be made readily accessible to industry and academia. This project centralises the production of new training materials, delivering economies of scale across the NMS programmes. This is a value-adding activity that ensures NMS training materials are of 'excellent quality', accredited or recognized for CPD where appropriate, and are packaged in a consistent, accessible way; helping to maximize take-up and deliver impact from NMS investment.

The Solution

This project will continue to invest in the development of specially designed training materials that cater to different learning styles and provide valuable education and training resources to address immediate measurement skills gaps. NPL will work collaboratively with industry, professional institutions, trade associations and education establishments to create materials for:

- **National Qualifications in Metrology**, practical, application-based accredited courses to improve skills and competencies.
- **Continued Professional Development**, short courses to increase knowledge and skills.
- **e-Learning**, interactive, online courses (self-paced) and 'How to' procedural guides.
- **CDT Curricula**, modules for inclusion into the curricula for the Centres for Doctoral Training.
- Scope the need for **e-Books**, online books in popular metrology topics.
- A specification for **Metrology Apprenticeship Programmes** and fit-for-purpose delivery infrastructure

The inclusion of Centres for Doctoral Training (CDTs) will provide 'measurement modules' for Post-Doctoral Degree programmes to reach learners earlier in their career

Project Description

WP1 Internal and external outreach: (1) Internal scouting for 'training materials' for qualification by Benefits Realisation, (2) Case studies with industry to demonstrate impact, (3) Learner Management System data mining /exploitation.

WP 2 Centres for Doctoral Training (CDT) curricula: (1) CDT working group engagement, (2) Produce modules for inclusion into academic curricula,

WP 3 Face-to-face learning: (1) Maintain NPL's EAL awarding body status, (2) Produce national qualifications (NQs) for work based learning, and (3) Blended Learning - produce hands-on practical session materials to accompany e-Learning modules and (4) Produce materials for short courses for continued professional development (CPD).

WP 4 e-Learning: (1) Script and produce e-learning courses, (2) Script and produce e-learning 'How to' modules, (3) Assess scope for metrology e-books, (4) Additions to Glossary of Metrology Terms in Learner Management System (LMS), (5) Migrate web based bite sized guides into LMS.

WP5 Metrology apprenticeships: (1) Assessment of need through industry consultation. (2) Stakeholder Engagement: e.g. UKCES, National Apprenticeship Service, Professional Institutions, Universities/Colleges, skills councils, awarding bodies e.g. QCF, public funding providers and industry, (3) Propose operational model for Metrology Apprenticeship and the 'follow-on' project.

<u>WP6 On-line assessment</u> : Development of an on-line system for self-assessment of metrology capability and skills, with signposting to relevant learning resources, NPL good practice guides, products and services.			
Impact and Benefits This project will increase the uptake of measurement knowledge rooted in the NMS, directly impacting on the skills base yielding improved productivity and competitiveness, leading to economic benefits. Examples include:			
<ul style="list-style-type: none"> ▪ Increased productivity in industry as a result of better quality measurement practices leading to reduced waste. ▪ Increased competitiveness and Gross Value Added from ability to create higher value products and services. ▪ A skilled and competitive workforce, trained in good measurement practice and familiar with BS and ISO standards. ▪ A mobile and adaptable workforce, benefitting from the uptake of quality assured national qualifications in metrology. ▪ Graduates entering industry with a greater knowledge of metrology and with practical, hands-on experience. 			
Support for Programme Challenge, Roadmaps, Government Strategies			
<ul style="list-style-type: none"> ▪ NMS Strategy; developing training to increase measurement science and technology skills ▪ BIS Skills for Sustainable Growth; national skills strategy for up-skilling industry / increasing number of apprenticeships ▪ ESPRC: Centres for Doctoral Training ▪ BIS Richard Review on Apprenticeships: improving the quality of apprenticeships ▪ UK Commission for Employment and Skills: five year strategic plan 2009-2014 ▪ National Apprenticeships Service: strategy for the future of apprenticeships in England 			
Synergies with other projects / programmes			
Benefits Realisation : to provide pipeline of training topics/ themes from across the NMS knowledge base, with evidence of impact/market need, which can be packaged into materials for new training courses or curricula by the training team.			
Product Verification Programme and Sector Managers : to provide evidence of generic industrial measurement challenges and skill needs to inform course materials development.			
Raising Awareness : to provide the communications channel to industry to maximise the uptake of new courses. Also, joint projects to develop the next online, bite-sized guides.			
Stakeholder Engagement : to engage with the stakeholder industry groups, professional institutes, trade bodies and government, and to obtain feedback on market needs.			
Risks			
<ul style="list-style-type: none"> ▪ Timely identification of NMS knowledge with evidence of market need by the Benefits Realisation (BR) project, to enable production of training content in the project time frame. Work closely with BR team to identify pipeline early. ▪ Timely engagement with CDTs to enable the development of curricula in the project time frame. Work closely with University Liaison Manager to engage with the CDTs at the earliest opportunity and to define content for production. ▪ Identifying champions within Operations Directorate, willing to help produce and quality assure new content. ▪ New courses created have a lack of planned up-take and demonstrable impact. Only develop courses that have robust evidence of market need (from BR project) and ensure each course has a dedicated launch plan which is implemented. 			
Knowledge Transfer and Exploitation			
The training courses developed will be exploited to industry to ensure the uptake is sufficient for them to become self-sustaining. Up-take of the courses will be maximised via NMS e-alerts and the other channels. In addition, each new course will have an exploitation plan aimed to maximise awareness and take-up amongst key beneficiary groups through our stakeholder networks.			
Co-funding and Collaborators			
Industry and Trade Bodies : working in partnership with industry to develop the training that meets their immediate needs, the needs of their supply chains, and the needs for metrology apprenticeships. Working across the trade bodies such as the Aerospace Growth Partnership and the High Speed Sustainable Manufacturing Institute to raise awareness of training.			
Centres for Doctoral Training : working in partnership with the CDTs to create curricula for their Post Doc students which is quality assured by their awarding bodies and the Quality Assurance Agency for Higher Education.			
Professional institutes : working with the professional institutes to gain their approval of content as suitable for their membership's Continued Professional Development and with the award of professional status e.g. Chartered Engineer, to create joint content and to raise awareness of training through their membership networks.			
Deliverables			
1	Start: 01/04/14	End: 31/03/17	
Produce outreach case studies with a key beneficiary (target four per year) and assessment of industry needs for metrology apprenticeships training products.			
2	Start: 01/04/14	End: 31/03/17	
Engage with a minimum of five CDTs with the aim of producing metrology modules for inclusion into their academic curricula			
3	Start: 01/04/14	End: 31/03/17	
Produce blended learning courses (target at least three per year) incorporating e-learning modules and materials for practical sessions. Produce a minimum of two short courses for Continued Professional Development per year.			
4	Start: 01/04/14	End: 31/09/15	
On-line metrology capability self-assessment system, trialed with selected stakeholders.			

* UK Sector Skills Assessment December 2010, SEMTA. ** HESA Statistics 2010/11

Project No.	KE/2014/07	Price to NMO	£702k
Project Title	Product Verification: Product Development and PV Hub	Co-funding target	£200k
Lead Scientist	Tim Jones	Stage Start Date	1/4/2014
Scientist Team	Phil Cooper, Graham Topley, Lisa Leonard	Stage End Date	31/3/2017
		Est. Final Stage End Date	31/3/2017
Sector	Advanced Manufacturing / Engineering	Activity	Knowledge Exchange
Project Champion	Steve Burgess (Director Manufacturing Innovation, Rolls-Royce)		

Summary

This project aims to improve the competitiveness of UK advanced manufacturing by making NMS metrology knowledge available to industry through improvements in product verification capability. It is the next stage of the NPL-led Product Verification Programme (PVP), initiated with PPKT and industry funding in 2013-14. The PVP mission is to support manufacturing supply chain companies to reach world-class product verification (PV) capability through access to PV expertise and through effective knowledge sharing between relevant UK organisations. This project will enable NPL to directly meet industry-specified requirements by:

- Identifying and developing knowledge products that will apply NMS with other manufacturing knowledge to address priority PV capability improvement needs of the advanced manufacturing sector
- Facilitating a two-way knowledge flow between NPL/NPL stakeholders and industry, enabling measurement best-practice and solutions to reach industry, and industry requirements and case studies to flow to NPL.

The outputs of the project have been recommended by key academic, innovation support and industry stakeholders, including Rolls-Royce. The ultimate impact will be increased competitiveness of UK manufacturing companies as a result of improved PV capability based on sound metrology, leading to reduced cost, enhanced quality and delivery performance to their customers.

The Need

An effective advanced manufacturing supply chain operation requires the ability to undertake effective product verification. Product verification is the process of assuring that a manufactured product conforms to the design specification and is critically dependent on measurement capability. The increasing complexity of manufacturing requires advances in product verification capability. Evidence from some leading UK manufacturers is that the UK supply chain is losing out to competitors as a result of their inability to compete on Quality, Cost and Delivery (QCD). Industry needs an improved way to access and introduce new product verification (measurement based) technologies, best practice processes, skills and standards. The opportunity exists to integrate NMS developed PV products into the much larger-scale industry improvement programmes being targeted by the PVP. The PVP Advisory Board has identified a need to improve the flow of PV measurement knowledge and coordination of activities between academia (1), the UK skills development base (2), UK standards bodies (3), key elements of the UK manufacturing innovation infrastructure (4), technology OEMs and most importantly PV end users across industry. These four areas of innovation, R&D, skills and standards comprise the Knowledge Hub priority themes. NMS funding is sought to enable the PVP to develop the knowledge products and get the Knowledge Hub running as companies will not fund this alone due to technological barriers and potential spill-over benefits (market failure).

The Solution

The solution is to build on the success of the previous project and continue to develop PV products and provide industry with access to measurement knowledge through the PVP Knowledge Hub. This project will draw on the first-hand experience gained in industry through the Sharing in Growth contract interactions. The PVP Knowledge Hub will both gather industry needs and provide co-ordinated responses that provide practical support to industry. The Knowledge Hub will interface with NMS Programme Managers to help formulate NMS projects to address these needs. The proposal is for the Knowledge Hub activity to receive NMS funding for 18 months, and Product Development will continue for 3 years. After 18 months we anticipate being able to sustain the Knowledge Hub activity using funding from a combination of industry and TSB. This funding will only be triggered once the PVP has developed a track record of large scale delivery to industry over this period.

Project Description

Product Development: the project will draw on NPL metrology expertise to develop new knowledge-based products over the funding period. Based on current understanding and industry feedback, potential products include: supporting industry to understand and implement measurement systems analysis and processes effectively; technical translation of aerospace industry in-house standards (based on NPL Good Practice Guides, previously developed under the NMS) so that they can be made more accessible to and used by the wider manufacturing sector; and toolkit(s) for preparing industry for emerging industry standards e.g. the National Aerospace and Defense Contractors Accreditation Program (NADCAP) Measurement & Inspection standards. The specification and choice of products will be refined using feedback from direct interactions with industry (e.g. SiG) and the PVP Knowledge Hub. These products will be defined by the PVP Advisory Board and confirmed with NMS Programme Managers and NMO during the respective formulation cycles for the relevant NMS research programmes. In addition, additional work aimed at accelerating pull-through of new products from the NMS programme will be carried out.

The **PVP Knowledge Hub** facilitates a two-way information flow of best-practice and solutions outwards to industry, and case

<p>studies and industry-wide priority support requirements inwards to NPL. Through a structured series of activities, each of the four priority themes of the Knowledge Hub will work to agreed terms of reference, engage Hub members, hold PVP Hub workshops aimed at potential industry beneficiaries, and produce reports detailing activities and deliverables from each Hub that can be used by stakeholders to action responses to needs. This activity will be coordinated with the support of the PVP Advisory Board. The NPL Events team and PVP partners will also be engaged to design and deliver PVP development and awareness raising events, and to develop the PV website to provide evolving functionality.</p>																																			
<p>Impact and Benefits</p> <p>This project will play an important part in maximising the end-user benefits of the first wave of company interventions delivered by the PVP, and once established, support the growth of the PVP to the planned scale of at least 500 company interventions over the next 4 years. The creation of the PV Knowledge Hub will provide a channel for two-way information flow, providing direct input into the NMS (and other Government funded programmes) relating to measurement innovation for manufacturing. It will inform the development of new PVP interventions, informed by a cross-academia and innovation-space view of current and emerging support capabilities. The project will:</p> <ul style="list-style-type: none"> • Sustain the international competitiveness of UK advanced manufacturing companies by transferring NPL knowledge to many hundreds of key manufacturing companies; • Use sector-specific best practice metrics to demonstrate improvements in company PV capability. 																																			
<p>Support for Programme Challenge, Roadmaps, Government Strategies</p> <ul style="list-style-type: none"> • Innovation and Research Strategy for Growth (BIS, 2011), High Value Manufacturing Strategy (TSB, 2012) • <i>Lifting off – implementing the strategic vision for UK Aerospace</i>. HM Government and the AGP, March 2013 • The Society of Motor Manufacturers and Traders’ Motor Industry Facts 2013 • Nuclear Industrial Strategy: the UK’s nuclear future, HM Government, March 2013 • The project will enable improved visibility and alignment between NMS research activities and those taking place across UK academia, in relation to manufacturing engineering measurement. • It will contribute to the alignment of future NMS investment in the areas of training relating to advanced manufacturing with those being developed by UK Universities, the HVM Catapult and by the larger UK manufacturing companies. 																																			
<p>Synergies with other projects / programmes</p> <ul style="list-style-type: none"> • This project will provide high quality information into the formulation of the NMS Programmes. • It will support and benefit from other activities in the Knowledge Exchange programme, in particular: NMS Stakeholder Engagement, Raising Awareness, Benefits Realisation, Measurement Skills for Industry and Impact assessment. 																																			
<p>Risks</p> <ul style="list-style-type: none"> • Insufficient commitment by PVP stakeholders (below the level of the established Advisory Board). This risk will be mitigated by engagement with a wide range of organisations through the PVP Knowledge Hub. • Inability to engage with sufficient numbers of PVP end users to obtain a properly representative list of priority intervention support requirements – availability of on-line tools, PVP intervention data and informed opinion from the PVP Advisory Board will mitigate sufficiently. • Lack of co-ordination with other Knowledge Exchange projects would lead to reduced impact from overall programme investment – where required, components of this project will be delivered by those projects in order to minimise this risk. 																																			
<p>Knowledge Transfer and Exploitation</p> <p>This project is aimed at maximising the transfer of knowledge developed by the PVP. This will enable significant exploitation by PV end users of the knowledge and best practice identified and developed by NPL, UK Academia, the HVM Catapult, measurement equipment OEMs and other PVP intervention beneficiaries.</p> <p>This project will create the infrastructure for building and maintaining a growing body of codified knowledge, best practice, case studies and supporting information for immediate adoption by the Advanced Manufacturing Sector.</p>																																			
<p>Co-funding and Collaborators</p> <p>A major UK manufacturer has committed co-funding to the PVP (subject to funding from the KE programme). We will seek co-funding from the TSB given the close alignment of aims of the Knowledge Hub and the TSB’s emerging KTN in Advanced Manufacturing, in the run to self-sustaining non-NMS funding. TSB have acknowledged interest in working together.</p>																																			
<p>Deliverables</p> <table border="1"> <thead> <tr> <th>1</th> <th>Start: 01/04/14</th> <th>End: 31/03/15</th> <th></th> </tr> </thead> <tbody> <tr> <td colspan="4">A set of PV support products to meet industry needs specified from SiG and PVP Knowledge Hub activities – target 2 PV products.</td> </tr> <tr> <th>2</th> <th>Start: 01/04/15</th> <th>End: 31/03/16</th> <th></th> </tr> <tr> <td colspan="4">A set of PV support products to meet industry needs specified from SiG and PVP Knowledge Hub activities – target 2 PV products.</td> </tr> <tr> <th>3</th> <th>Start: 01/04/16</th> <th>End: 31/03/17</th> <th></th> </tr> <tr> <td colspan="4">A set of PV support products to meet industry needs specified from SiG and PVP Knowledge Hub activities – target 2 PV products.</td> </tr> <tr> <th>4</th> <th>Start: 01/04/14</th> <th>End: 31/09/15</th> <th></th> </tr> <tr> <td colspan="4">Set up the Knowledge Hub priority themes, hold PVP Hub workshops aimed at potential industry beneficiaries, report on activities and deliverables, generate case studies, flow through requirements to NPL. Develop an archive of evolving case studies and best practice, a set of academic roadmaps for all relevant RC funded research across the UK. Develop mechanisms for interfacing activities (knowledge flow) between the Hubs and with the TSB Advanced Manufacturing KTN.</td> </tr> </tbody> </table>				1	Start: 01/04/14	End: 31/03/15		A set of PV support products to meet industry needs specified from SiG and PVP Knowledge Hub activities – target 2 PV products.				2	Start: 01/04/15	End: 31/03/16		A set of PV support products to meet industry needs specified from SiG and PVP Knowledge Hub activities – target 2 PV products.				3	Start: 01/04/16	End: 31/03/17		A set of PV support products to meet industry needs specified from SiG and PVP Knowledge Hub activities – target 2 PV products.				4	Start: 01/04/14	End: 31/09/15		Set up the Knowledge Hub priority themes, hold PVP Hub workshops aimed at potential industry beneficiaries, report on activities and deliverables, generate case studies, flow through requirements to NPL. Develop an archive of evolving case studies and best practice, a set of academic roadmaps for all relevant RC funded research across the UK. Develop mechanisms for interfacing activities (knowledge flow) between the Hubs and with the TSB Advanced Manufacturing KTN.			
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Project No.	KE/2014/08	Price to NMO	£501k
Project Title	International liaison and influence: EURAMET, CIPM and Horizon 2020	Co-funding target	
Lead Scientist	Fiona Redgrave	Stage Start Date	01/04/2014
Scientist Team	Kamal Hossain, Ian Severn, Fiona Redgrave, Kimberley Steed German	Stage End Date	31/03/2017
		Est Final Stage End Date	
Sector	International	Activity	Knowledge Exchange

Summary

The aim of this project is to enable and maximize UK influence in international metrology to the benefit of UK interests and in areas of importance to the UK - areas critical to innovation, quality of life, energy and the delivery of the SI system to address the UK's grand challenges. This will be achieved by influencing international metrology developments through strategic representation and liaison with EURAMET, the CIPM Consultative Committees (CCs), EURAMET Technical Committees (TCs) and the Horizon 2020 programme, in order to influence the key international stakeholders for the benefit of the UK. This project also enables mutual recognition under the CIPM Mutual Recognition Agreement to ensure the international acceptability of UK measurements and to maximise the impact of the NMS investment in the CIPM MRA and the Metre Convention.

The Need

The UK NMS is a significant player on the European and global metrology stage with a keen focus on impact. This is maintained and enhanced by continually exerting influence on international metrology matters and the associated initiatives where metrology has a significant impact on technology, innovation, national challenges and regulation. This high level of influence on the international stage provides a springboard of opportunities to leverage co-funding and increase the impact of the NMS.

The CIPM Mutual Recognition Agreement (CIPM MRA) is a key tool for underpinning the global system of trade and associated regulatory compliance. The UK has international obligations as a CIPM MRA signatory. NPL is the designated lead body and represents all the UK NMS laboratories at the highest level. As the CIPM MRA develops, the UK must retain the ability to influence the process and outcome, for example through the Steering Committee of EURAMET's TC-Quality, to ensure that any developments are in the UK's interests. Furthermore, there is need to ensure that calibration certificates issued by overseas NMIs and Designated Institutes (DIs) that are important to the UK are of an appropriate standard for UK acceptance, and to ensure that certificates issued by UK NMS laboratories are accepted as widely as possible internationally. Peer review and accreditation of NMIs/DIs is an increasingly common element in top-level international metrology, and this project enables UK participation in that process in support of UK interests.

The Solution

The project will provide international leadership and influence by:

- 1) chairmanship of EURAMET until 2015 and representation beyond,
- 2) liaising with the Interdisciplinary Metrology Technical Committee (INTMET), EURAMET TCs and CIPM CCs,
- 3) initiating a programme of influencing activities related to the metrology aspects of the Horizon 2020 programme and positioning the UK to take full advantage,
- 4) supporting and maintaining a system of critical review of the performance of NMIs/DIs under the CIPM MRA including peer review and accreditation of NMIs and DIs.

Project Description

- Provide the chair and delegates to EURAMET. This enables leadership in: a) overall governance of EURAMET eV to meet regulatory requirements, b) the development and implementation of EURAMET Strategy, c) meetings of Board of Directors BoD, BoD/TC chairs and the General Assembly of EURAMET, d) close working relationships with the European Commission, European Standards Bodies, European Accreditation and other major European Stakeholders. The Chair promotes EURAMET and metrology to raise the profile and impact of metrology and is the principle point of contact for the Commission.
- Liaise with the EURAMET Interdisciplinary Metrology Group (INTMET). This has responsibility for providing the underpinning support work for EURAMET policy activities making recommendations to the EURAMET Board of Directors. This project will work in liaison with the NMS Technical Programmes, which provide the scientific input to, for example, the EURAMET TCs and the CIPM CCs. NPL will also provide UK representation on the EURAMET focus group "Facilitating National Metrology Infrastructure Development" providing a link to the less developed metrology areas within Europe.
- Develop high level relationships with the Horizon 2020 programme to influence the programme priorities and the content of the calls that bring benefit to the UK. This will be achieved by identification of and engagement with key stakeholders to ensure that measurement needs are included where metrology is key to the delivery of Horizon 2020. This requires that action plans are developed with the NMO to respond to opportunities, threats and issues.
- Provide a secretariat function to inform the NMS on the outputs and recommendations of the various international fora.
- As part of enabling mutual recognition under the CIPM MRA, NPL to continue as a member of the Technical Committee for Quality (TC-Q) steering committee (representing the UK), to coordinate the annual QMS reporting by the UK NMI/DIs to EURAMET's TC-Q, and to provide for and manage participation of UK NMS experts (approx. 54 days) in international peer review and accreditation activities of quality systems (QS) and calibration and measurement capabilities (CMCs).

Impact and Benefits

This project will enable exploitation of international metrology opportunities to accelerate the impact on UK businesses in manufacturing, trade and compliance with regulations, innovation and growth, and meeting national challenges such as health, energy, sustainability. It will:

- Maximise the UK's return on investment in European research by strategically influencing committee decisions in support of UK interests and leverage of European co-funding.
- Enhance the UK's reputation as a centre of excellence for measurement through high visibility of UK experts at the highest levels, raising the international profile and influence of the UK, promoting UK excellence overseas, and influence overseas approaches to quality systems.
- Increase exposure of UK experts to the latest developments within overseas NMIs/DIs to the benefit of the NMS
- Ensures confidence is maintained in the CIPM MRA.
- Increase acceptance of UK Calibration and Measurement Capabilities (CMCs) and Quality Systems (QS) by overseas NMIs/DIs.
- Increase the quality and acceptance by the UK of Quality Systems (QS) and CMCs declared by overseas NMIs/DIs.
- Ensure that the NMO are informed on international opportunities, enabling decision and policy making processes to maximise the benefit of the NMS to the UK.

Support for Programme Challenge, Roadmaps, Government Strategies

This project supports the BIS Innovation and Research Strategy for Growth statement; *"The NMO, NPL and the BSI will work with international measurement and standards bodies and committees to promote the UK's strengths in measurements and standards and of the UK businesses associated with them"*.

Synergies with other projects / programmes

This project benefits from the expertise developed in the NMS Knowledge base programmes, in particular for providing peer review expertise for the CIPM MRA, and aims to provide strategic support for them. It also links to the stakeholder engagement and NMS strategy projects to define and validate priority areas.

Risks

- 1) The UK faces strong international opposition or is unable to prevent initiatives detrimental to the UK. Experienced staff will lead this activity to ensure a co-ordinated effort to prevent the escalation of any contentious issues and by building on the UK's track record of effective a priori networking, noting that most international activities are consensual by nature.
- 2) The UK is not effective in intelligence gathering. Ensure use of experienced NMI staff.
- 3) The CIPM MRA imposes an unreasonable burden on UK NMI/DIs: representation via the programme will press for an appropriate effort/return balance. Demand for NMS experts will be regularly reviewed and opportunities prioritised.

Knowledge Transfer and Exploitation

Networking with the EMRP, EMPIR, EURAMET, TC-INTMET and FNMID Focus Group and knowledge transfer through the NMS International Forum, NMS publications, and Technical Committee members as well as EURAMET communications. Exploitation will be through the EMRP, EMPIR, and Horizon 2020.

In particular, the outputs of the activity on enabling mutual recognition under the CIPM MRA will be exploited through:

- Publication of accepted data in the key comparison database (KCDB) and certificates issues by NMIs/DIs
- Publicising the CIPM MRA through presentations, networks, face-to-face interactions, papers and leaflets.
- The peer review / accreditation activities are themselves a knowledge exchange activity. Peer review / accreditation support activities will be actively promoted within the UK NMS.

Co-funding and Collaborators

- NMO, EURAMET, relevant EURAMET TCs and focus groups, UK EURAMET contact persons, BIPM, CIPM consultative committees, EC, RMOs, the Horizon 2020 programme;
- Scientific review of CMCs by NPL, LGC, NEL, NMO; UK NMI quality experts will be involved in QS reviews

Deliverables

1	Start: 01/04/14	End: 31/03/17	
Leadership and influencing of EURAMET at the highest level.			
2	Start: 01/04/14	End: 31/03/17	
Statements to NMO on initiatives, issues, opportunities, threats and achievements in Europe related to liaison and influencing activities in EURAMET TCs, CIPM CCs and Horizon 2020 that impact the NMS, including NMO technical support.			
3	Start: 01/04/14	End: 31/03/17	
Calibration and Measurement Capabilities and Quality System mutual acceptance, review and declaration by NMIs and Dis under the CIPM MRA.			
4	Start: 01/04/14	End: 31/03/17	
Provision of NMS expertise for peer review and accreditation of overseas NMIs/DIs and key international organisations under the CIPM MRA.			

Project No.	KE/2014/09	Price to NMO	£436k
Project Title	International secondments	Co-funding target	
Lead Scientist	Kimberley Steed German	Stage Start Date	01/04/2014
Scientist Team		Stage End Date	31/03/2017
		Est Final Stage End Date	
Sector	International	Activity	Knowledge Exchange

Summary

The aim of this project is to facilitate the building of strategic relationships with partners, with a focus on nurturing links between individuals and their international counterparts. International secondments enhance delivery of current NMS Programmes, projects and goals by providing a gateway through which capabilities may be shared and future projects developed. The project will deliver opportunities to increase access to resources worldwide, share and accumulate knowledge available for NMS programmes and raise the profile of the NMS on the global stage, so that NMS projects are delivered more effectively, with greater impact to the UK, and the ability to tackle more challenging projects may be realised.

The Need

International collaboration has always been important to the NMS laboratories: the need for a seamless flow of information and sharing of resources on a global scale is a trend that is expected to increase. The preceding international secondments project exceeded its target of delivering 240 weeks of international secondments over 18 months and its success provides a solid foundation on which to build this successive project, which has a more strategic element. International secondments, both inwards and outwards, are a highly effective tool for developing the strategic relationships that will continue to enable the NMS to position itself as a key organisation in the global metrology market. Effective relationships with partners provides access to additional resources and facilitates the ready transfer of knowledge between metrology specialists, which all serve to support the NMS programmes and deliver added value to the UK NMS.

The Solution

To provide funding through an International Secondment Scheme to support relationship building via international secondments, focussing not only on science, but on encouraging collaborations in strategically important areas e.g. NMIs in emerging countries.

Project Description

The scheme will be managed by NPL Programmes Directorate on behalf of the NMS. It will be open to NPL, LGC, NEL and NMO, supporting incoming or outgoing international secondments between NMS laboratories and overseas NMIs/DIs and appropriate international organisations. The aim is to provide direct benefit to the UK NMS, so individual secondments will either be directly related to a project within an NMS Programme or demonstrably beneficial to NMS Programmes. Secondments for the purposes of personal development may also be considered if added value to the NMS strategy can be demonstrated. The scheme will provide funding to cover T&S costs (subject to a cap) for both incoming and outgoing secondments. Secondment time costs (secondee and laboratory mentoring) will not be covered by the scheme. Incoming secondments will be of 3 weeks duration or longer, whilst outgoing secondments will be of 2 weeks duration or longer. The maximum funded length will be 6 months; however, we will encourage those activities which would benefit from a longer period of collaboration to be wholly or partially funded by the partner organisation for the period beyond 6 months. Additional provisions may be available for applicants with dependents, considered on a case by case basis.

Summary of work:

- Review of scheme procedures including secondment aims, T&Cs, appraisal criteria, and document templates.
- Publication/distribution of updated documentation to NMS laboratories.
- Provision of guidance on scheme to potential applicants on a one-to-one basis, including pre-review/filter of suitability of potential secondments for inclusion under the scheme.
- Review/evaluation of applications against the list of published criteria by an NPL Programmes Directorate review board.
- Borderline cases referred to NMO (unsuccessful applicants having the right to appeal directly to NMO).
- Liaison with secondees, host and home organisations.
- Monitoring, review, reporting and financial management.
- Collation of "impact" stories from secondees.
- Consultation service offering advice on building relationships in line with the NMS international strategy.

Impact and Benefits

Impact and benefits shown to date by precursor secondment projects include:

- Increased resources and access to facilities and knowledge available for NMS Programmes – thus NMS projects will be delivered more effectively, efficiently and with greater impact to the UK
- Ability to tackle more challenging projects and investigate new areas through partnership, leading to greater innovation within the UK
- Improved international collaboration and awareness of the NMS on a global scale, strengthening the position and thus influence of the UK on a global state.

<p>Individual secondments also have their own specific impact, depending on the technical area and rationale and aims of the secondment. The project feeds into the NMS Value Indicators in the areas of 'Reputation' where overseas laboratories seek to spend time in the UK to learn from our acknowledged leadership; 'Capabilities' where the project helps UK NMIs to improve their skills and capabilities, and 'Knowledge' where aspects of knowledge creation, dissemination and engagement are all delivered.</p>																											
<p>Support for Programme Challenge, Roadmaps, Government Strategies</p> <p>This project supports government strategies by helping UK NMIs and DIs to ensure that their staff are exposed to knowledge and practices developed in other countries, thereby maintaining the NMS' world leading skills and capabilities to underpin traceability and future measurement developments.</p>																											
<p>Synergies with other projects / programmes</p> <p>This project builds on the successful NMS International secondment scheme operated under the 2012-2014 NMS International Programmes. The project links closely to projects in the NMS technical programmes supported by the secondments and, in particular, supports the development of an NMS-wide international strategy. There are also clear synergies with the projects addressing international liaison and influence through EURAMET and CIPM and NMS stakeholder engagement.</p>																											
<p>Risks</p> <ul style="list-style-type: none"> • Insufficient take up – not possible to deliver 480 weeks. <i>Promote the scheme with NMIs. Encourage senior management to actively support scheme. Review and if necessary revise the project.</i> • Misunderstandings between the NMI and partner organisation and/or the partner organisation and secondee regarding expectations, rights, obligations and funding from the scheme. <i>Require participating laboratories to use an appropriate guest worker agreement which includes a clear work schedule. Ensure that appropriate guidelines including secondment aims, terms and conditions, appraisal criteria etc are maintained and publicised.</i> • Selection of inappropriate secondees. <i>Ensure that appropriate guidelines including secondment aims, terms and conditions, appraisal criteria etc are maintained and publicised. Encourage sponsors to ensure that appropriate applicants apply. Apply the selection criteria effectively. Ensure incoming secondees have a well-defined programme of work which directly benefits an NMS Programme.</i> • Health and Safety risks in some countries. <i>Take FCO and local Health & Safety Office advice.</i> • Changing UK Government immigration/visa rules. <i>Check current requirements with Home Office.</i> 																											
<p>Knowledge Transfer and Exploitation</p> <p>Secondees will be required to write a short report and non-technical impact story and will be encouraged to give a presentation on their secondment experience at their home institute. The impact stories will be made available to NMO and secondees will be encouraged to make use of them. Outgoing secondees will also be encouraged to give a presentation to as wide an audience as possible to promote the UK NMS and their NMI as well as to present on technical issues. Publication of collaborative papers will be encouraged.</p>																											
<p>Co-funding and Collaborators</p> <p>Time costs associated with the secondment are typically covered by the parent organisation (for the secondee) and host organisation (for mentoring). Where possible co-funding of the T&S will be sought. Whilst we typically limit the funding provided by this scheme to 6 months, we will encourage those activities which would benefit from a longer period of collaboration to be wholly or partially funded by the partner organisation for the period beyond 6 months.</p>																											
<p>Deliverables</p> <table border="1"> <thead> <tr> <th>1</th> <th>Start: 01/04/14</th> <th>End: 31/03/15</th> <th></th> </tr> </thead> <tbody> <tr> <td colspan="4">Annual review and report on impact and use of resources.</td> </tr> <tr> <th>2</th> <th>Start: 01/04/15</th> <th>End: 31/03/16</th> <th></th> </tr> <tr> <td colspan="4">Annual review and report on impact and use of resources.</td> </tr> <tr> <th>3</th> <th>Start: 01/04/16</th> <th>End: 31/03/17</th> <th></th> </tr> <tr> <td colspan="4">Final project review and report on international secondments</td> </tr> </tbody> </table>				1	Start: 01/04/14	End: 31/03/15		Annual review and report on impact and use of resources.				2	Start: 01/04/15	End: 31/03/16		Annual review and report on impact and use of resources.				3	Start: 01/04/16	End: 31/03/17		Final project review and report on international secondments			
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Project No.	KE/2014/10	Price to NMO	£956k
Project Title	Impact Assessment for the NMS	Co-funding target	
Lead Scientist	Glenis Tellett	Stage Start Date	01/04/2014
Scientist Team	Michael King	Stage End Date	31/03/2017
		Est Final Stage End Date	
Sector	Knowledge Exchange	Activity	Knowledge Exchange

Summary

This project will demonstrate the value to the UK of the NMS through a fit-for-purpose system of impact evaluation. We will collate, review and critique existing evidence to assess its robustness and continued relevance. A number of new policy relevant impact statements will be communicated to key stakeholders based on newly developed evidence from the project. The portfolio of impact assessment studies will cover a mix of 'demand-side' and 'supply-side' studies. Furthermore, it should enable the NMS to boost its impact performance by making targeted changes to its activities.

The Need

All recipients of public funds are under pressure to deliver greater value from Government investment. The NMS is an important part of the science and innovation infrastructure of the UK and it is essential to provide strong evidence of the benefit to stakeholders. This requires us to:

- demonstrate the value and breadth of involvement of the NMS across industry, health and the environment in the UK,
- establish greater understanding of how the NMS can improve the impact of its technical programmes and Knowledge Exchange programme, and
- provide clear examples of the financial and other benefits of working with the NMS, to encourage increased user engagement and adoption of best practice.

Establishing pathways for the successful delivery of impact is crucial to the development of best practice in terms of future project design. The evidence captured in this project will enable us to challenge ourselves to produce greater impact in the most effective and efficient way. Best practice captured through evaluation will be communicated to the science community through the programme managers and Benefits Realisation project (KE/2014/04).

The Solution

There are a number of tried and tested methods for evaluating the impact of the NMS:

- rich case studies of the impact and benefits for specific companies,
- surveys of users,
- development of models that give insight into the role of measurement knowledge within the innovation ecosystem, and
- macroeconomic studies.

This project will deliver a coherent package of evaluations, studies and surveys. Best practice originating from this work will be communicated to science teams and the knowledge exchange project teams.

This project seeks to balance 'breadth' and 'depth' by combining exploratory studies with a smaller number of in-depth pieces of work aimed at providing both clear evidence and quantification of the impact of the NMS. The aim is to deliver one well worked up 'killer fact' per year, while at the same time building up a progressively better understanding of the place of the NMS in the wider innovation ecosystem.

Project Description

WP1: Developing the impact portfolio

The current portfolio of evidence will be reviewed to look at its coherence and continued relevance, particularly reviewing best practice on our approach to measuring carbon impact. The information will be structured and accessed for relevance and confidence in the outputs. It will be essential to the success of the project overall that relationships are built with other organisations in the innovation landscape with a view to delivering individual studies in partnership where appropriate.

WP2: User led 'demand side' studies

A number of studies will be conducted where the role of measurement is explored with users and set within the context of their requirements and processes.

- (1) Study to look at the role of measurement in a NHS hospital seeking to quantify the scale of measurement i.e. numbers of measurements, value of equipment etc and its importance in treatment outcomes.
- (2) Study developing our understanding of the impact of measurement on manufacturing supply chains, specifically looking at impact on manufacturing efficiency and customer reject rate.
- (3) Survey of NMS customers to evaluate economic benefit achieved through NPL support and the effectiveness of current products and services.

- (4) Ten company based, in-depth case studies targeted at a number of policy priorities, with evidence and quantification of impact.

WP3: Impact of NMS products and services ‘supply side’ studies

The NMS will explore the up-take and impact of its products and services with users.

- (1) Deliver the value scorecard for 2013/14, 2014/15 and 2015/16.
- (2) Bibliometric evaluation of impact of papers on academia and industry.
- (3) The fan out of standards through measurement services underpins trade. This study will attempt to quantify the fan out for a number of key measurements.
- (4) Assess the impact of the knowledge transfer activities.

Impact and Benefits

- The project will provide the evidence to BIS and the NMO to enable more informed decision making on funding priorities resulting in better value for money from the NMS
- The project will enable the NMO and NPL to communicate more effectively the benefits of the NMS to stakeholders
- It will increase the awareness and credibility of our impact evidence through developing relationships and partnerships
- Through feedback into formulation processes and the ‘Benefits Realisation’ project, it will create additional benefit from technical programmes by illustrating and enhancing the impact of projects through case studies, providing good practice for achieving high impact.

Support for Programme Challenge, Roadmaps, Government Strategies

This project will deliver the following NMS requirements:

- Continue to develop an evidence base of impact, including economic modelling, cost-benefit analyses, case studies and surveys
- Maintain a scorecard for NMS research and development programmes to record the outputs and the evidence of impact in the form of outcomes

Synergies with other projects / programmes

- Evidences the impact of NMS programmes and projects which can be communicated through the raising awareness (KE/2014/01) and stakeholder engagement (KE/2014/02) projects.
- Supports technical programmes with impact best practice
- Supports the development and integration of new approaches to impact delivery
- Supports knowledge transfer activities in understanding and evidencing their impact and in more effectively targeting their resources

Risks

It should be noted that much of this research breaks new ground and is difficult and risky in the scope and scale of its ambition. This will be ameliorated by drawing on expert advice both through internal consultation and external collaboration and partnership. The main factors that could jeopardise delivery are technical in nature with problems with certain analyses being insurmountable and failure of partners to deliver. This would impact individual elements but can be managed without affecting the whole project. It is anticipated that LGC and NEL will supply data for various studies.

Knowledge Transfer and Exploitation

The results from this project will be disseminated to NMS scientific teams and other partners within the innovation ecosystem. It will also be communicated to Government through NMO.

Co-funding and Collaborators

Our objective is to carry out the studies, where appropriate, with other actors within the innovation ecosystem.

Deliverables

1	Start: 01/04/14	End: 30/03/17	
Developing the impact portfolio			
2	Start: 01/04/14	End: 31/03/17	
User led ‘demand side’ studies			
3	Start: 01/04/14	End: 31/03/17	
Impact of NMS products and services ‘supply side’ studies			

Project No.	KE/2014/11	Price to NMO	Estimated £3227k (see Risks)
Project Title	Contract Management and UK fees to EMRP and EMPIR A185	Co-funding target	N/A
Lead Scientist	Jane Tebbey	Stage Start Date	1/4/2014
Scientist Team	Metrology Programmes	Stage End Date	31/3/2017
		Est Final Stage End Date	
Sector	Management	Activity	Programme Management

Summary

This project will deliver effective contract management for the Knowledge Exchange programme and will also make payment of the UK fees to EMRP and EMPIR A185 thereby meeting the national obligation to EURAMET.

Work in this project will ensure timely invoicing and reporting to the NMO each month and delivery of an annual progress report to the NMO and programme working group.

The project will also enable the UK NMS to meet its obligations to EURAMET for the:

1. Annual UK EMRP A185 cash contribution to the European Metrology Research Programme (EMRP) management and coordination costs and researcher grants. Commitment to pay the UK EMRP A185 national commitment has already been made at UK ministerial level. Fees for the EMRP A185 Programme will continue until 2016.
2. Annual UK cash contribution for the European Metrology Programme for Innovation and Research (EMPIR) contributing to the EMPIR management and coordination costs. The value, number of and scheduling of payments has not yet been finalised. It is anticipated that the first payment will not be until 2015, but this is dependent on a number of factors including the schedule of EMPIR through the European Co-Decision process. The price estimate in deliverable 4 is based on the current EMRP fees. However, EMPIR is a larger programme and will run for longer than the EMRP: the actual fees may be smaller or larger than the estimate given.

The Need

Contract management is essential to ensure seamless delivery of the science projects in the programme while attending to all reporting and invoicing requirements of the NMO. A central point of control is also required for effective operational oversight and governance of the programme.

With respect to the EMRP and EMPIR fees, the UK NMS is an active player in the EMRP and plans to participate similarly in EMPIR and this places a contractual obligation on the UK NMS regarding payment of the UK fees. The management and coordination costs for the EMRP and EMPIR are funded solely by the participating Member States through fees collected by EURAMET. Part of the fees for EMRP A185 participating Member States also includes an obligatory 10% cash contribution towards the researcher grants. Commitment to pay the UK EMRP A185 national commitment already exists at UK ministerial level and a commitment for the EMPIR A185 national commitment is currently being sought by NMO.

The Solution

This project will deliver effective contract management through a contract manager dedicated to this programme. They will have oversight of all:

- Project delivery;
- Invoicing;
- Contract status and variations;
- Monthly and annual reporting.

The project will also meet the costs of the UK fees to EMRP and EMPIR A185 for all UK NMI/DIs.

Project Description

Contract management activities will include:

1. Attend meetings as necessary to support contract delivery and the needs of the NMO
2. Prepare reports monthly (invoices, progress report and financial forecasts)
3. Liaison with working group, industrial advisory groups & clubs
4. Manage delivery of the contract and submit change requests and contract amendments as necessary
5. Analysis of programme performance and revenue forecasts for the financial year
6. Ensure that the contract is managed to NPL's ISO 9001 accredited quality system
7. Deliver annual report and present programme progress to working group and the NMO as required.

This project will also ensure that the EURAMET invoices covering the annual UK EMRP and EMPIR A185 fees are paid. Associated activity includes:

1. Review of invoices from EURAMET for the UK's EMRP and EMPIR A185 cash contributions.
2. Arranging payment in euros of the UK's EMRP and EMPIR A185 cash contribution.

3. Liaison with NMO regarding any significant developments or required changes, including and in particular related to the fees commitment for EMPIR.

Impact and Benefits

This project will ensure that all operational, financial and reporting requirements for the programme are met. The work in the programme covers the oversight of delivery from all the technical projects and hence is where ultimate responsibility lies for the success of the programme.

Payment of the EMRP and EMPIR A185 fees enables the UK to access the significant EC co-funding available for Joint Research Projects and also other types of projects in EMPIR. Participation in the EMRP and EMPIR, particularly with the increased emphasis on non-NMI contributions planned within EMPIR, will bring strong benefits to the European metrology infrastructure and significant benefits to the UK.

Support for Programme Challenge, Roadmaps, Government Strategies

This project supports government strategies by ensuring that the UK's NMI/DIs are supported in their access to European collaborative research calls on metrology. It also helps to ensure that the NMS can build future collaborations and agreements to secure its long-term international position.

Synergies with other projects / programmes

Participation in this project will help other NMS Programmes build strategic links to enhance their opportunities for further collaboration.

Risks

The main risks associated with the contract management are the inability to deliver the monthly reports and invoices to the NMO and the failure to deliver the annual report to the programme working group. Both of these risks are mitigated by the availability of a large pool of senior managers who are available to step in to assist or take over delivery if adverse circumstances are causing problems with the completion of the key tasks of this project.

The main risks associated with the UK EMRP and EMPIR 185 fees are:

1. Fluctuations in the euro exchange rate result in changes to the sterling cost of the fees. A variation in the fees from the values stated will result in the need for a contract amendment to re-price this project.
2. Commitment to pay the UK EMPIR A185 national commitment is currently being sought at UK ministerial level. The scheduling of payments and their value has not yet been finalised. It is anticipated that the first payment will not be until 2015, but this is dependent on a number of factors including the progress of EMPIR through the European co-decision process. The estimate given here for the EMPIR fees is based on the current fees for the EMRP. The actual cost of the annual EMPIR fees could be lower or higher and is dependent on the total UK commitment to EMPIR and the number of payments required.

Knowledge Transfer and Exploitation

Key developments in EMRP and EMPIR will be reported to NMO and the NMS laboratories through the International Influence project (KE/2014/7).

Co-funding and Collaborators

Payment of the EMRP and EMPIR A185 fees will enable the UK to participate in European collaborative projects and access the significant EC co-funding available.

Deliverables

1	Start: 01/04/14	End: 31/03/17	
Contract management including production of monthly invoices and reports to the NMO			
2	Start: 01/04/14	End: 31/03/17	
Produce annual reports and present progress to the NMO			
3	Start: 01/04/14	End: 31/03/16	
UK fee contribution to A185 EMRP Secretariat and grants (two annual fees: 2015 & 2016).			
4	Start: 01/01/15	End: 31/03/17	
UK fee contribution to A185 EMPIR Secretariat (three annual fees: 2015, 2016 & 2017, estimated cost based on current EMRP fees).			

Project No.	KE/2014/12	Price to NMO	£212k
Project Title	Programme Formulation	Co-funding target	N/A
Lead Scientist	Martin Rides	Stage Start Date	1/4/2014
Scientist Team	Metrology Programmes	Stage End Date	31/3/2017
		Est Final Stage End Date	
Sector	Management	Activity	Programme Management

Summary

This project will engage with key stakeholders to ensure maximum impact is achieved from the work delivered by the Knowledge Exchange programme and will formulate a proposal of work for inclusion in the 2017-20 Knowledge Exchange programme. To achieve these objectives the project will:

- Maintain and develop the Knowledge Exchange programme strategy;
- Consult with key stakeholders in government, industry, academia, regulators and other end users in order to determine future requirements or other related issues that need to be addressed by the programme;
- Develop a series of project proposals for the NMO

The Need

New measurement related knowledge transfer requirements are constantly emerging from all areas of UK life. For example, new technologies require new underpinning metrology and standards, as do new regulations or environmental targets. To underpin areas such as growth in the economy, public health issues or mitigation of environmental impacts these measurement requirements must be successfully addressed as early as possible and the key outputs communicated to potential beneficiaries. In order to achieve these objectives effectively an overview of the changing industrial, societal and environmental landscapes and how to address and engage with them is required. Maintaining and developing a programme strategy achieves this objective and allows, in conjunction with knowledge of specific KT requirements obtained through stakeholder consultation, the formulation of a work programme that address UK measurement KT needs. Both the careful design of any programme of work coupled with the continual review of opportunities for increased impact are essential in order to make sure that the maximum value possible is extracted from the investment made in the portfolio of NMS programmes.

The Solution

The views of a wide range of stakeholders from industry, regulators, government and other end users will be sought through a wide ranging consultation process in order to capture current and emerging measurement KT requirements. This process will include looking at independent evidence of measurement KT needs as expressed in government reports, foresight activities, industry roadmaps etc. as well as conducting meetings, surveys and interviews as required that focus on specific topics of interest. Collation and assessment of information from all sources will enable the programme strategy to be developed which will guide the future direction of the programme. The detailed requirements will then formulated into a series of projects for the NMO.

Project Description

- Horizon scanning, capture and analysis of Industry and Societal needs to feed into current and future programme direction;
- Development and updating of programme strategy;
- Engagement with programme stakeholders to:
 - Realise outputs and maximise benefits to the UK;
 - Ensure alignment of programme with UK Government, Industry and Societal drivers;
- Oversee preparation of project proposals for review by the NMO;
- Submission of final programme proposal for contracting;
- Liaison with the NMO programme supervisor to deliver maximum impact and efficient delivery.

Impact and Benefits

Effective programme management will maximise the outcomes to key stakeholder communities from the outset of the programme and ensure knowledge transfer activities in the programme are efficient and effective. The programme as a whole addresses many challenges across the broad sweep of the UK economy and society.

Support for Programme Challenge, Roadmaps, Government Strategies

This project underpins the work of the whole programme through development of an overview of key societal drivers and measurement KT requirements as captured in the programme strategy. This key programme document is utilised during development of projects to guarantee that all the knowledge exchange activity in the programme is aligned to addressing the metrology needs of the UK via broad dissemination of the outputs of the technical programmes and engagement with a broad and diverse range of user communities.

Synergies with other projects / programmes

This project will interact with the other NMS programmes so that synergies and common goals can be identified to ensure that the maximum value is returned from the investment in the NMS portfolio.

Risks		
This project has no specific risks but is dependent on the availability of key staff to assess and interpret the societal drivers in order to develop the programme strategy and hence determine the future direction of the programme.		
Knowledge Transfer and Exploitation		
The main functions of this project are to ensure the development of a new programme of work and to increase the impact of the programme.		
Co-funding and Collaborators		
Not applicable.		
Deliverables		
1	Start: 01/04/14	End: 31/03/17
Programme Management and Formulation		

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National Measurement System



The National Measurement System delivers world-class measurement for science and technology through these organisations



The National Measurement System is the UK's national infrastructure of measurement Laboratories, which deliver world-class measurement science and technology through four National Measurement Institutes (NMIs): LGC, NPL the National Physical Laboratory, TUV NEL The former National Engineering Laboratory, and the National Measurement Office (NMO).