

# Follow-on case studies from the survey for NMS private business users

## EXECUTIVE SUMMARY

This document is focused on analysing case studies that provide the examples of NPL's interactions with its clients and is supplementary to the 2024 NMS Survey for UK-based businesses titled "Assessing the reach and impact of the NMS laboratories on UK private sector businesses" by Dharani Katanguru & Mike King. It justifies and categorises the case studies by the impact mechanisms of the NMS logic model, areas of attention, and suggestions for improvements.

The case studies were developed by Briscoe Advisory from October 2023 to February 2024. The study involved senior leaders, managers, and technical specialists who consented to be interviewed from the NMS Survey fieldwork in 2023. Briscoe Advisory provided NPL with 36 case studies, each of which addressed the interactions, benefits, barriers, opportunities, evidence, and links to the logic model.

By reviewing the 36 case studies, the following key findings and suggestions were identified:

1. Every company (to a greater or lesser extent) acknowledges the value of inputs from NPL and recognises our contributions.
2. Clients identify the importance of NPL's knowledge transfer function and wish for greater offerings in this area. Knowledge transfer is often noted as the secondary theme in our interactions with the private sector.
3. In the short term, more outreach events could be organised, and wider access could be facilitated to enhance client familiarity and awareness of NPL capabilities.
4. In the long term, a centralised point of contact (account manager) could be established. This could help in a range of ways such as strengthening relationships, providing accessible and "bite-size" projects, and reducing bureaucracy.

## 1 INTRODUCTION

This document presents the initial findings from the Impact Assessment & Case Study Research Project for the NPL-NMS, highlighting the nature of NPL's interactions with its customers. It focuses on justifying and categorising case studies by themes within the NMS logic model and highlighting the areas of attention. This builds on and complements the work done in Katanguru & King (2024). However, it is important to acknowledge a potential source of bias in the study. Participation in this study is limited to individuals who not only participated in the survey but also willingly joined this subsequent study and consented to share their information. This leads to potential self-selection issues as these organisations may not represent the whole population of NPL users. This should be noted when considering the findings of this study in comparison to the Katanguru & King (2024), which does account for the population of users.

The evidence gathered in this study will help test and validate the Logic Model and Theory of Change which underpins the NMS's evaluation framework. It should be noted that the case studies were carried out by Briscoe Advisory between October 2023 and February 2024.

To develop the case studies, NPL sent an email to the survey respondents informing them of the purpose of the study and inviting them to participate in the interviews. They are mainly senior leaders, managers, and technical specialists from their respective companies.

Briscoe Advisory conducted interviews with each of the selected individuals. The interviews were semi-structured to respond appropriately to the interests and backgrounds of the interviewees, lasting from 20 minutes to over an hour, with an average of 45 minutes. Open-ended questions dominated the discussion.

After summarising interviews, a total of 36 case studies were delivered to NPL. Every case study includes the following key contents:

- a. NPL's interactions with customers
- b. NPL's impact/benefits to them
- c. Barriers and opportunities (Areas of attention)
- d. Evidence and impacts for the Logic Model

## 2 FINDINGS

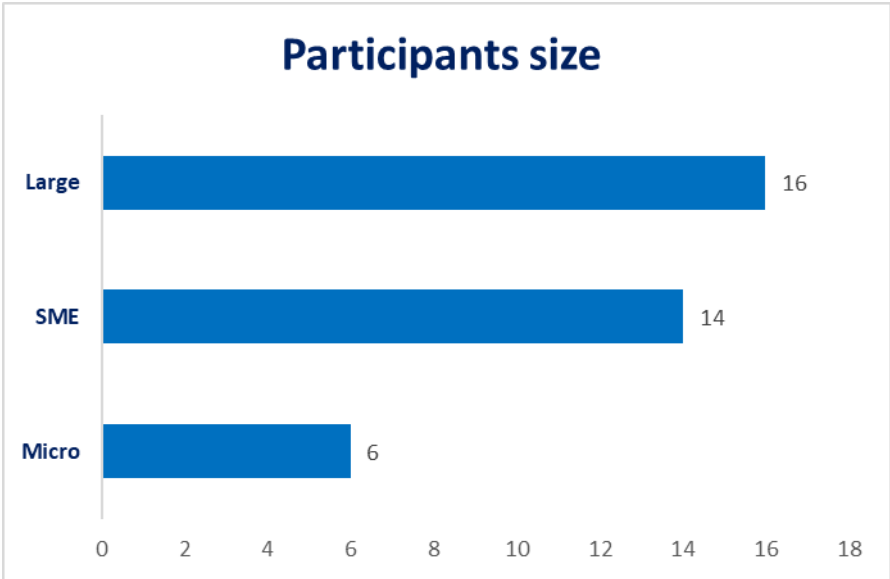
### 2.1 PARTICIPANT PROFILE

This section contains the participants' company size, primary business, sectors, and type of interactions.

#### 2.1.1 Participant size

Company size is classified based on the number of employees:

- A micro company employs 1 to 9 people.
- SMEs have 10 to 249 employees.
- Large companies employ 250 or more people.

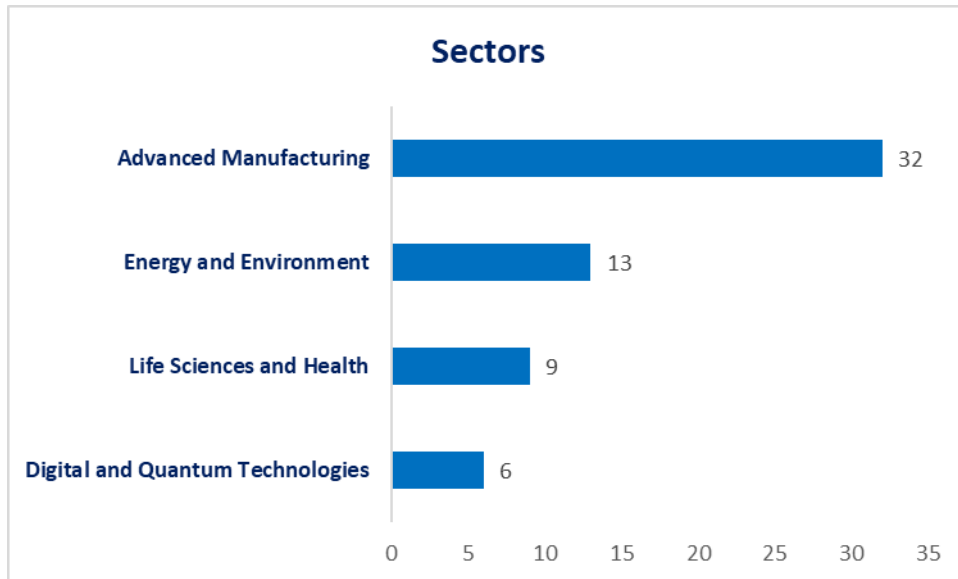


#### 2.1.2 Primary business

The primary business of a company refers to its main area of activity or the core operations that generate most of its revenue, which also include research and development and/or innovation technologies. For instance, a battery producer's primary business is contributing essential knowledge and innovation that directly impacts the advancement and efficiency of battery technologies.

#### 2.1.3 Sectors

The sectors aim to align with the UK's current and future requirements. The private businesses that the NMS labs work with connect to four sectors or strategy areas: Advanced Manufacturing, Energy and Environment, Life Sciences and Health, and Digital and Quantum Technologies. Each company's sector is categorised based on its primary business activity and may encompass involvement in multiple sectors.

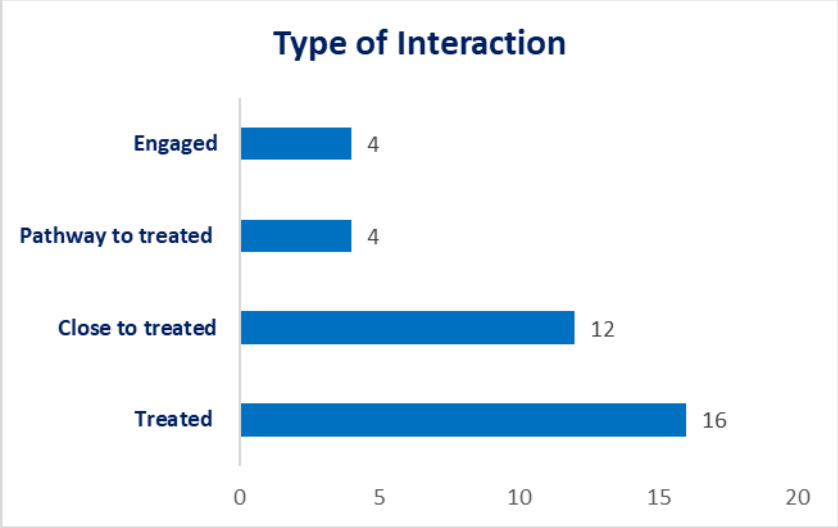


The following technical areas i.e., Science and Engineering Directorates (SEDs) support the four sectors or strategy areas:

<p><b>Advanced Manufacturing</b></p> <ul style="list-style-type: none"> <li>• Engineering</li> <li>• Chemical &amp; Biological Sciences               <ul style="list-style-type: none"> <li>○ Surface Technology</li> </ul> </li> <li>• Data Science               <ul style="list-style-type: none"> <li>○ Digital Manufacturing</li> </ul> </li> <li>• Materials &amp; Mechanical Metrology</li> <li>• Electromagnetic &amp; Electrochemical technologies               <ul style="list-style-type: none"> <li>○ Electronic and Magnetic Materials</li> <li>○ Electrochemistry</li> </ul> </li> <li>• Thermal &amp; Radiometric Metrology               <ul style="list-style-type: none"> <li>○ Temperature &amp; Humidity</li> </ul> </li> </ul>	<p><b>Life Sciences &amp; Health</b></p> <ul style="list-style-type: none"> <li>• Chemical &amp; Biological Sciences               <ul style="list-style-type: none"> <li>○ Biometrology</li> <li>○ National Centre of Excellence in Mass Spectrometry Imaging</li> <li>○ Surface Technology</li> </ul> </li> <li>• Medical, Marine &amp; Nuclear               <ul style="list-style-type: none"> <li>○ Medical Physics, Radiotherapy, Nuclear Medicine</li> </ul> </li> </ul>
<p><b>Energy &amp; Environment</b></p> <ul style="list-style-type: none"> <li>• Atmospheric Environmental Science</li> <li>• Medical, Marine &amp; Nuclear               <ul style="list-style-type: none"> <li>○ Underwater acoustics</li> <li>○ Nuclear Energy</li> </ul> </li> <li>• Electromagnetic &amp; Electrochemical technologies               <ul style="list-style-type: none"> <li>○ Electrochemistry</li> <li>○ Electromagnetic Technologies</li> </ul> </li> <li>• Thermal &amp; Radiometric Metrology               <ul style="list-style-type: none"> <li>○ Optical Radiometric Metrology</li> <li>○ Climate &amp; Earth Observation</li> </ul> </li> </ul>	<p><b>Digital &amp; Quantum Technologies</b></p> <ul style="list-style-type: none"> <li>• Data Science               <ul style="list-style-type: none"> <li>○ Data Analytics &amp; Modelling</li> <li>○ Informatics</li> </ul> </li> <li>• Electromagnetic &amp; Electrochemical technologies               <ul style="list-style-type: none"> <li>○ Electromagnetic Measurements</li> <li>○ Electromagnetic Technologies</li> </ul> </li> <li>• Quantum Technologies</li> <li>• Time &amp; Frequency</li> </ul>

2.1.4 Type of interactions

The type of interaction category is based on the number of years that a company has been supported by NPL in a 6-year moving window.



- Treated – It can be referred to as regular support. It indicates that the company has been supported for at least 5 years in a 6-year moving window.
- Close to treated – It indicates that the company has been supported for 3 or 4 years in a 6-year moving window.
- Pathway to treated – It indicates that the company has been supported for 1 or 2 years in a 6-year moving window.
- Engaged – Low-intensity support such as classroom trainings, e-learnings, events, and free downloads i.e., anything that is not an invoice or a collaboration.

## 2.2 IMPACT MECHANISMS

The impact mechanisms account for the four themes within the NMS logic model: Research, Innovation, Trade and standards, and Knowledge transfer. It is worth noting that companies can belong to more than one theme while working with us.

Meanwhile, feedback from most companies emphasised the importance of knowledge transfer. Typically, this theme appears as a secondary theme within company engagements with NPL.

Themes	Number of cases	Examples
Research	4	Research programmes, for example, a satellite manufacturer joined a consortium in one of NPL's events that led to a proposed research programme.
Innovation	15	New technologies, products and services, and entry to new markets, which improve competitive position, increase, or maintain turnover.
Trade and Standards	23	Where NPL's services gives users confidence in their data, equipment, measurement practices, product claims and other areas. This underpins their commercial viability and is often a key driver of their competitive advantage.
Knowledge Transfer	17	Where NPL is acknowledged as the UK's ultimate source of expertise in the field of metrology, for example, conferences and Special Interest Group (SIG) participation are highly regarded and valued by participants.

## 2.3 FEEDBACK

This categorises the general feedback from clients into the following categories: Perfectly content, Improvements, Barriers, Complaints, Growth opportunities, and Ceased to provide the services. It should be noted that the respondents who are not perfectly content does not mean that they were completely dissatisfied. Rather, each case study shows that they recognised NPL's inputs and valued NPL's support to an extent.

Feedback type	Number of comments	Explanation	Examples
Perfectly Content	5	No areas of attention or no suggestions and highly recognised and valued NPL's inputs.	Reputation of the NPL helps with sales and customer trust.
Growth Opportunity	19	New products/services or some new interactions which benefit the business/market.	Expecting engagement and new types of interaction.
Improvements	11	Generic areas to improve, some comments are called as "reflections".	Better communication.
Barriers	16	Because of these barriers, users choose to go somewhere else or they had some problems with interactions i.e., external restrictions or limited capabilities.	Issues following the UK's exit from the EU, such as the uncertainty surrounding the UK's involvement in Horizon.
Complaints	5	Internal problems occur during interactions, "Are not working as well as they could".	Unable find the information and felt less responsive.
Ceased to provide the services	6	The discontinuation of services often stems from commercial considerations, evolving market conditions, and shifting business priorities.	Barriers such as costs and miscommunications.

## 2.4 STANDARDS AND ACCREDITATIONS

Given the critical importance of standards and accreditations for most companies, follow-on questions were posed to interested interviewees. One example involves a company whose primary responsibility is providing services to carry out energy efficiency testing within NPL's premises. The respondent stated that having the NPL brand on a testing certificate is critical for trade because customers expect to see a UKAS accredited lab. Working with NPL enables the company to provide more reliable services.

When a traceability problem was identified, NPL was approached to provide support for some companies. For example, a technical committee was formed with a designer of torque equipment. They highlighted a lack of standards in the field of torque and therefore have benefited indirectly through working with NPL, helping enhance their credibility and reputation. They also felt that there would be wide-ranging benefits in terms of improved quality and industry knowledge through the application of these standards for better torque measurement. Since then, involvement with NPL has led to revenue generation for the company.

In this context, the following key findings have been identified:

1. Formal (BSI & ISO) standards are the most important form of standards.
2. Standards are strongly connected to measurements/testing.
3. Beyond domestic standards, NPL helps exporters meet international standards, thereby decreasing costs for our clients.
4. Collaboration with NPL helps them in a range of ways such as gaining knowledge/information on industry/sectoral standards, helping to comply with and develop standards through relevant committees.

## 3 SUGGESTIONS

### 3.1 LOGIC MODEL

A logic model is a visual representation of the relationships between the resources invested, the activities undertaken, and the anticipated results of a project which are described in the Theory of Change (the narrative). The logic model includes four main sections:

- Activities - the actions and processes.
- Outputs - the direct products of those activities.
- Outcomes - the short and medium-term effects.
- Impacts - the long-term, socio-economic impacts resulting from the programme.

It illustrates and lists which activities can generate which outcomes and impacts, while accounting for different types of inputs/resources. The theory of change expands on the logic model, detailing the causal connections between the four sections detailed above, while also providing added context that a logic model does not, due its graphical nature.

The current logic model is organised around four main impact mechanisms: Research, Innovation, Trade and standards, and Knowledge transfer. Briscoe Advisory pointed out that from the perspective of the users, there is good clarity around activities (e.g. services), outputs, and deliverables, and these were as expected". As far as this sample is concerned, NPL's record of delivery is very positive. The latter stages of the model (outcomes and impacts) were also positively spoken about but less easy to gather detailed evidence around.

There are several reasons for why the outcomes and impacts of a firm's engagement with NPL can be challenging to define and document. For example, "Outcomes are dependent on multiple factors (not just NPL's input)" and "timescales for projects are relatively lengthy which makes it difficult to qualify the impacts in one interview and provide meaningful information". In addition, companies are "not required to collect evidence and report softer impacts and outcomes" such as benefits to society or downstream benefits that are anticipated and perceived to be happening but often aren't qualified or quantified.

Overall, the existing logic model is effective but may sometimes oversimplify complex situations. It struggles to capture instances where actions and consequences differ from what was anticipated. For example, the linkages and overlaps between impact mechanisms and themes can be beneficial but are not always linear. One way to account for the non-linearity would be to include links between the themes and account for the work that may crosscut them. For example, a designer of torque equipment engaged with experts and standards committees through its interactions with NPL, falling under trade and standards. However, this work also led to innovation-based outcomes and impacts such as developing new products, improving its processes, and entering new markets.

Consequently, the ideas and interventions described in the Theory of Change (the narrative) are well considered and accurate but not reflected in the simplicity of the logic model. Briscoe suggests enhancing and expanding the logic model to suit a broader range of applications and impacts and better express the flows, causal links, and the richness of activities, which would consequently help improve its pertinence.

## 3.2 FURTHER CONSIDERATIONS

10 cases studies expect short terms actions, with two notable points:

- A. **Participate and organise more events and conferences.** After Covid-19, our users feel that NPL hasn't raised the profile amongst various communities. An instrument manufacturer suggested that NPL could do more to promote themselves, especially on a world stage, outside of the UK.
- B. **Facilitate access for clients.** NPL can work on making it easier for clients to interact with the right people by providing better information about its technologies and capabilities. A satellite company suggested it will be beneficial for building connection and encouraging cooperation, especially for accessing available schemes such as Analysis for Innovators (A4I). An organisation that provides scientific support to the F&B industry mentioned that they would like to know or understand what technologies NPL is working on or will be working on in the future. An engineering contractor also pointed out that "NPL's resources, whilst highly valued can be somewhat hard to locate and are not widely understood or accessed, which is a wasted opportunity".

30 cases studies expect long term actions, with four notable points:

- A. **Establish a centralised point of contact or account managers.** When dealing with multiple partners or stakeholders, establishing research and development partnerships with organisations that span a mix of public/private ownership (such as NPL, the Catapults, and Universities) seems to be difficult. This structural issue is not a criticism on NPL itself, however, a designer of torque equipment believes that NPL could better address and mitigate these challenges by streamlining processes, reducing timescales, and so on, through its own efforts. An engineering services company also reports that "dealing with NPL is a bit like dealing with a university where there is no real central point of contact or account management function, so making new contacts and establishing new relationships is time-consuming and sometimes difficult".
- B. **Enhance relationship management.** It may be worth considering the increased demands and requirements for communication and development. A respondent from an engineering contractor doesn't "have the confidence that there is long-term commitment to the mechanisms people benefit from", and this is due to the belief that "NPL does tend to make changes without properly communicating them".
- C. **Offer "bite-sized" pieces of NPL's capabilities and continue to remain accessible for SMEs.** A sensors company mentioned that micro firms and SMEs may need more support as they don't have the access to resources in the same way as large organisations do. They may also have limited knowledge of and contacts with NPL. Smaller-scale projects (like A4I) would be beneficial to these clients. These types of projects are described as "ice breaker work packages", "tiered access arrangements", or "taster sessions", in few case studies.
- D. **Streamlining bureaucracy when engaging with customers.** Adopting a more "get things done" attitude is one of recommendations from an aeronautics company. They also suggested NPL could move towards a "light touch approach to commercial and management services which support research work".

## 4 CONCLUSION

These 36 case studies offer an overview on the working relationship between NPL and its customers, which helps test and validate the Logic Model and Theory of Change that underpins the NMS programme. Furthermore, the interviewees have provided feedback and recommendations based on their interactions with NPL, with relevant details of a few case studies communicated to the Marketing and Commercial Excellence teams respectively.

When assessing by sector, the majority of our interviewees (32 out of 36) described their primary business activity as being linked to advanced manufacturing. A plurality of the firms, 16 in total, were regularly supported or “treated”. The main focus of these companies is on “Trade and standards”, as highlighted by 23 participants. Additionally, 17 firms identified “Knowledge transfer” as a significant secondary theme in their interactions with NPL.

Briscoe Advisory provides evidence to prove the functionality of the current Logic Model but also identifies certain limitations. While the Theory of Change provides a comprehensive and accurate narrative, this clarity is not evident in the simplicity of the Logic Model. Improvements to the logic model that would better capture causal connections and the flows between the four impact mechanisms, along with improved acknowledgement of softer impacts like societal and downstream benefits, have been suggested by Briscoe Advisory.

Feedback from the case studies indicates that every customer appreciates and values our contributions. While five customers expressed complete satisfaction, the rest of case studies identified potential growth opportunities. They suggested that we could benefit from greater attendance at events and conferences to enhance NPL’s visibility and fostering collaboration, streamlining client access to resources and personnel, and establishing centralised communication points to strengthen ties with organisations utilising several NPL services.

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