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Interim Evaluation of NMIS

Final Report
Scottish Enterprise
19th December 2023

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Executive Summary

The National Manufacturing Institute Scotland (NMIS) is a significant recent addition to the advanced manufacturing support landscape in Scotland. Operated by the University of Strathclyde, it is a key element of the Advanced Manufacturing Innovation District Scotland, which seeks to achieve national economic growth and prosperity by helping to grow Scotland's manufacturing sector. This is expected to be achieved through a combination of support for existing Scottish based manufacturers and through the attraction of inward investors.

£65.5m of Scottish Government investment was contractually approved in May 2020, as part of a wide £87m funding package and NMIS started to provide support from late 2020 onwards. As part of the approval process, a three-year interim evaluation was stipulated. This report presents the findings of this interim evaluation, which was commissioned by Scottish Enterprise on behalf of One Scotland Collaboration Group (OSCG) partners and is based on research carried out between August and October 2023. The research included feedback from 46 qualitative stakeholder discussions (including 19 companies) and 50 additional companies responding to a structured company survey, conducted by telephone and online. The scope of NMIS, for the purposes of this evaluation was specified as the Manufacturing Skills Academy, Digital Factory, Collaboration Hub and the SME outreach programme used to engage manufacturers. This is the scope of the NMIS business case approved in May 2020 and does not include activities and support provided by pre-existing centres, such as the Advanced Forming Research Centre and Lightweight Manufacturing Centre.

Progress to date of NMIS to the end of quarter two of 2023 (the half-way point in the five-year total target period), aligned to the seven SMART objectives included in the business case, includes:

	SMART Objective	Target to Q2 2023	Actual to Q2 2023
1	Delivery of a fully operational NMIS by August 2021	Completed with delay due to Covid	
2	Implementation of an industrial outreach programme by August 2021	Completed with delay due to Covid	
3	Development and delivery of Industry 4.0 skills programmes to 500 industry leaders, 1,000 employees and 600 SME trainees over 5 years	250 industry leaders	217 industry leaders
		500 employees	951 employees
		300 SME trainees	423 SME trainees
4	Engagement with 2,000 manufacturers across Scotland over 5 years through awareness-raising events, consultancy and project delivery, at least 50% of which will be SMEs.	1000 manufacturers	514 manufacturers
		50% SMEs	80% SMEs
5	Increase of £23.5M-£29M in planned R&D investment over 5 years	£11.7m to £14.5m	£17m
6	Increase of £77M-£88m in planned business and sector capital asset investment in Industry 4.0 over 5 years	No interim target in MEF	£1.13m
7	Increase of £68M-£102M in planned turnover from innovation over 5 years	No interim target in MEF	£1.55m

Table 1: SMART Objective actual performance to end Q2 2023 versus planned

Performance against some SMART objectives can be regarded as very positive, such as the NMIS facility delivery, implementation of the SME outreach programme, the development and delivery of the Manufacturing Skills Academy skills programmes and the increase in planned R&D investment. It is worth noting, however, that only half the planned R&D investment will take place in Scotland according to NMIS Monitoring and Evaluation Framework data. This is subject to some error as the CRM data records geographical location based on registered office rather than operational site.

Performance relating to unique engagement with manufacturers, is assessed as the SMART Objective most at risk of not meeting the target and, indeed at current rates, it could be significantly below target. This is concerning as the level of engagement, to date, was achieved during the period where the SME outreach programme was running, employing ten SME advisors. With this resource no longer available there is a risk that the rate of engagement could fall further, affecting both absolute numbers engaged and the proportion of these that are SMEs.

The objectives relating to increasing planned capital investment and increasing planned turnover are assessed as challenging. This can partially be explained by the lag between NMIS support activities and outputs and industrial outcomes being realised, which is typical of public sector innovation support interventions. It has also proven difficult to obtain forecasts for both of these objectives due to uncertainties faced by the companies involved. Efforts are ongoing to improve the data capture to support reporting.

Companies are making use of a range of NMIS services including the Manufacturing Skills Academy, Collaboration Hub and Digital Factory. Due to limitations in the NMIS CRM system, the Monitoring and Evaluation Framework performance reports also include an element of support received via other centres such as the Advanced Forming Research Centre and the Lightweight Manufacturing Centre, which pre-exist the scope of NMIS for which the MEF was designed. It is not possible to identify the extent to which these activities contribute to the overall NMIS performance reported. Although Scottish Enterprise is aware of this data limitation, it is not clear that this situation is more widely known to other NMIS partners.

One of the most significant issues facing NMIS is the lack of ongoing public sector funding for SME engagement. The need for this was clearly stated in the business case, approval papers and also features highly in the ongoing project risk register maintained by Scottish Enterprise. The objective of being self-sustaining, following the initial five-year funding period, was also clearly stated in the business case and approval papers but was caveated with statements that ongoing public sector funding would be required for the SME engagement. This assertion is consistent with public sector funding being required to support the viability of other innovation interventions, such as the free 1-to-2-day SMAS diagnostic audits, long term public sector funding of Scottish Innovation Centres and the internationally renowned Fraunhofer model, which operates on the basis of continuous public sector funding of, typically, one-third of its costs. Scottish Government finance rules prevent monies being committed beyond agreed budgetary cycles, so it is understandable that no such commitment to ongoing funding was made at the time of approval. However, stakeholders have very different perceptions about how this issue was to be addressed after the initial funding. This is a key lesson for future development of similar interventions and it should be recognised that a financially self-sustaining business model for innovation support interventions targeted at SMEs is highly unlikely to be viable without a level of continuous public sector funding. It is understood that NMIS and partners are in discussion about how best to address this critical

issue. Even with ongoing public sector funding for SME engagement, the economic growth potential of Scottish based SME manufacturers will be challenging to achieve.

The main areas of use of NMIS, identified through the structured company survey, include consultancy and advice (70%), awareness raising events (34%) and R&D projects (34%). Additional in-depth discussions with nine companies, identified by NMIS as having participated in R&D projects, has highlighted a range of different reasons for their engagement, including:

- Four advanced manufacturing equipment suppliers, whose main reason for engaging is to access potential customers (and who could not identify an actual R&D project that they were involved in)
- One company seeking to develop improvements to their product handling processes that would reduce carbon emissions
- One company offering automation systems integration whose main driver for engagement was to access potential customers (and who could not identify an actual R&D project that they were involved in)
- One company seeking help to identify a supplier of a specific component
- One company developing an intelligence-based asset monitoring system to provide additional services to clients to reduce their power demand and carbon emissions
- One company seeking to improve productivity and address skilled labour shortages through the introduction of robotic cells into their production process

Overall, 8% of companies that participated in this research report already having benefited from the NMIS support, with a further 31% stating they will or may benefit in future. Most of the benefits relate to improved knowledge and networking.

Overall, 64% of companies engaging with NMIS are satisfied, 8% are dissatisfied and 28% describe satisfaction levels as neutral. The satisfaction rate increases (to 78%) when considering solely the technical ability and knowledge of NMIS staff but remains around the two-thirds level when considering satisfaction with customer communication and delivery. There is, therefore, an opportunity to increase overall levels of satisfaction through improving the reliability of customer communication and delivery against what has been agreed.

A good level of partnership working has been identified, particularly with respect to the Manufacturing Skills Academy, where numerous private and public sector organisations have been involved in the collaborative development of advanced manufacturing skills development courses. Broader NMIS partnerships have been identified to demonstrate geographical outreach, such as the collaboration with ETZ Ltd in Aberdeen to develop an energy incubator and scale-up hub. However, some stakeholders stated that there was a lack of awareness and communication about NMIS outreach activities in different geographical regions of Scotland.

Ongoing monitoring of NMIS has benefitted greatly from the contractual requirement to fund a Data Reporting Officer position to gather and report performance data. This can be regarded as good practice for an intervention of this scale and complexity. There are, however, a number of issues with the current reporting system that should be addressed.

There is mixed feedback about the effectiveness of communication between the NMIS Board and the OSCG partners. It is recommended that high level discussions about this take place involving, as a minimum, the University of Strathclyde and the Scottish Government. From a governance perspective some stakeholders also sought clarity about the role of the OSCG, in light of the development of several workstream groups as part of the delivery of the Making Scotland's Future programme. Other stakeholders identified the potential to improve communication about NMIS activities and performance to eco-system support providers that are not currently members of the OSCG or the Making Scotland's Future workstream groups.

Whilst there are several positive examples of NMIS successfully bidding for funding from sources such as Innovate UK and City Regional Deal, there is also some stakeholder feedback about the presence of competition between public sector organisations operating in the advanced manufacturing support eco-system. The pressure to be fully or partly self-financing has, according to some stakeholders, led to instances of competition where collaboration could have better served Scottish manufacturing companies. There does not appear to be a forum or process, by which, public sector support providers can discuss which organisation is best placed to lead and participate in competitive funding bids.

Improving communication with manufacturers and support intermediaries has also been identified as a key area for improvement. Better clarity is required about the capabilities and services that NMIS can offer and how this is differentiated from the support available from other support providers in the advanced manufacturing eco-system. The latter point is likely to require collaboration with the wider eco-system and stakeholders have identified an opportunity to do this through the Making Scotland's Future eco-system workstream.

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1 Introduction

This report presents the findings of an interim evaluation of the National Manufacturing Institute Scotland. The interim evaluation was commissioned by Scottish Enterprise in August 2023 with the research fieldwork taking place between August and October 2023. A study steering group was formed, involving representatives of Scottish Enterprise and the Scottish Government.

The study has been carried out by Optimat Limited, CJM Research and the Centre for Engineering Education & Development (CeeD).

1.1 Research Objectives

The objectives of the evaluation were set out in the Invitation to Tender for the study and include:

- Assessment of the rationale for intervention by gathering and analysing early evidence from stakeholders and users around the rationale for intervention
- Assessment of the strategic fit and the contribution to key strategies and noting any changes in the policy landscape that is relevant to the successful delivery of the project
- Review of project inputs, activities to date as well as any early outputs
- Review of early implementation including looking specifically at project approval, governance structures, partnership working, monitoring processes, reporting and early user satisfaction
- Gather and analyse qualitative feedback from companies supported by NMIS
- Draw out wider policy lessons and make any recommendations for future project delivery

The scope of the study was aligned to the inputs, activities, outputs, and outcomes described in the business case that was approved by Scottish Enterprise in July 2019 and contractually commissioned in May 2020. The main elements of this include:

- Manufacturing Skills Academy
- Digital Factory
- Collaboration Hub

All supported by ring-fenced funding provided for an SME Outreach Programme.

Pre-existing centres, operated by the University of Strathclyde, such as the Advanced Forming Research Centre and the Lightweight Manufacturing Centre were not included in the scope of the evaluation as their activities, outputs and outcomes do not count towards NMIS MEF targets (within the scope of NMIS described above)

1.2 Research Method

The research method consisted of the following main activities:

Initial desk research covering approval documentation supplied by Scottish Enterprise, including quarterly MEF reports, up to and including quarter two of 2023.

Stakeholder discussions with 27 stakeholders from partners involved in the One Scotland Collaboration Group and the wider advanced manufacturing support eco-system. These stakeholders represented 15 different organisations.

Qualitative interviews with 11 supported companies, based on contact made with more than 30 companies included in the NMIS Monitoring and Evaluation Framework report. Nine of the 11 interview were with companies that were described, by NMIS, as having participated in an R&D project with NMIS support. The remaining two were described as having had 'an engagement' with NMIS, meaning unspecified support lasting for two or more hours. Appendix A contains a brief summary about each of the 11 companies and the key insights they provided.

Qualitative interviews with eight companies that had not been supported by NMIS but were manufacturing companies that could potentially do so. This group were identified, mainly by CeeD, based on knowledge of their membership. One of the eight non-supported companies was identified from the list of companies recorded as having engaged with NMIS but, on further discussion with them, it was identified that they had not.

A structured company survey targeting all companies on the Q1 2023 NMIS MEF as having been 'engaged', i.e. having received support of two or more hours and therefore included against the target for SMART objective 4. This list contained 463 entries with contact details being extracted from the NMIS CRM as no personal information is included in the MEF reports, for GDPR compliance reasons. Data cleaning identified:

- Five duplicates
- 15 non-manufacturers (for example, Skills Development Scotland, Zero Waste Scotland, etc.)
- 104 records with no contact name (essential for the approach to participate in the survey by either telephone or online). This included all 43 entries where the 'Lead Reference' field was MSA. It was subsequently noted that the NMIS operate a separate data recording system and do not enter data into the NMIS CRM. Contact names could, therefore, not be extracted from the CRM. This has introduced a level of non-participation bias into the structured survey where users of MSA support are under-represented compared to reality.

Removing the above records left a list containing 339 companies. It was then identified that the NMIS CRM system only collected email addresses and not telephone numbers. Additional research was carried out to identify the contact numbers but, in 76 cases either no number could be identified or a wrong/dead number was allocated to the contact. Therefore, the effective sample was 263.

A total of 93 companies provided some level of feedback through the structured survey (35% response rate). However, 43 of these did not recall receiving support from NMIS or that the contact was so minimal that they decided that they could not provide any further feedback. Of these 43:

- 24 provided no further relevant information
- 11 stated the contact was so minimal they did not feel able to provide meaningful feedback
- 4 tried to engage with NMIS but without success
- 2 stated they were not manufacturers and NMIS was not relevant to them
- 2 stated they had not engaged but may do so in the future

Removing the 11 stating they had contact (but it was minimal) means there are 32 of the 91 companies initially interviewed (35%) do not recall receiving any support from NMIS. For comparison, a recent evaluation of a Scottish Development International internationalisation intervention found that 25% of beneficiaries could not recall receiving support.

Throughout the remainder of this report the analysis focuses on the feedback from the 50 companies that could recall support and fully completed the structured survey and the other 43 partial responses are not included, except where explicitly stated.

A small number of the initial stakeholder discussions took place before the main primary research phase. This provided input into the development of discussion topics for wider stakeholder consultation and the structured company survey. Following these initial stakeholder discussions all other primary research occurred in parallel.

A thematic analysis of company experiences of early delivery was carried out and the results included in section 6.

A complete list of responses to the structured survey is included in Appendix B, with relevant insights brought forward into the main body of the report, where appropriate. A list of stakeholders and companies that contributed to the study is included in Appendix C. Note that for confidentiality reasons the names of companies participating in the qualitative interviews are not included to prevent them being identified from the description of their experiences of NMIS.

2 The development of NMIS and its approval process

In 2016, the Manufacturing Action Plan: A Manufacturing Future for Scotland, identified a number of strategic actions to support Scottish manufacturing companies to raise productivity through increased investment and innovation, embracing new digital technology and products and ensuring the necessary skills are present to enable this to happen. Within the Technology and Innovation workstream of the plan there was a commitment for the Scottish Government to *"establish a multi-partner approach to take forward the development of a joint Manufacturing Centre of Excellence and Skills Academy. The first stage will be development of detailed business plan in consultation with industry".*

Following publication of the Manufacturing Action Plan, stakeholders report that this commitment was initially taken forward by representatives of several organisations, including the Scottish Government, Scottish Enterprise, Skills Development Scotland and the University of Strathclyde. The inclusion of the University of Strathclyde in these early-stage discussions is reflective of their role in developing an outline concept for what was to become NMIS.

In June 2017 an announcement to fund the Lightweight Manufacturing Centre (LMC) at the University of Strathclyde was made by the Scottish Government stating that it was *"a first step towards creating a National Manufacturing Institute for Scotland"* and *"The National Manufacturing Institute for Scotland is being developed by the Scottish Government and Strathclyde University, in association with the Scottish Research Partnership in Engineering, our Enterprise agencies, Skills Development Scotland, the Scottish Funding Council and the private sector."*

In December 2017, the Scottish Government announced that *"Renfrewshire will be home to the new £65m National Manufacturing Institute for Scotland with Strathclyde University announced as the anchor university"* and that *"work to build the centre, which will help manufacturing businesses throughout Scotland become world leaders in innovation, will begin next year".*

At this level of Scottish Government investment (in December 2017 the stated Scottish Government investment was £48m, although the final figure was £66.5m), the Scottish Public Finance Manual

classifies it as a Major Investment Project that should have Scottish Government Gateway Review support (with a major investment being defined as one that has a total anticipated whole-life cost of more than £5M inclusive of fees and VAT). According to Scottish Futures Trust guidance on Project Assurance, *"Gateway Reviews are managed by the Scottish Government's Programme and Project Management Centre of Expertise (PPM CoE). Key Stage Reviews (KSRs) managed by SFT and apply to revenue funded projects (both Non-Profit Distributing and hub Design-Build-Finance-Maintain (DBFM) projects. Both processes support the Scottish Government Infrastructure Investment Board's remit of ensuring that project delivery is appropriately monitored and supported."* Stakeholder feedback, gathered during this interim evaluation of NMIS, highlights that, due to time pressures to address critical challenges faced by Scotland's manufacturing sector, the Scottish Government decided to delegate project assurance to Scottish Enterprise. Scottish Enterprise would use its own internal project lifecycle process, which adheres to the guidance on major investment projects specified in the Scottish Public Finance Manual. The monies would flow through Scottish Enterprise outside the normal Grant in Aid payments with Scottish Enterprise taking responsibility for contractual aspects for the setup and delivery of NMIS during the initial funded period.

In 2017, a Programme Board was established to formalise input from key public sector stakeholders. This built on the early involvement of Scottish Government, Scottish Enterprise and Skills Development Scotland to include the Scottish Funding Council, Highlands and Islands Enterprise and Renfrewshire Council. As the governance of NMIS transferred to a University of Strathclyde chaired Board (post approval, in 2020), the Programme Board, with the subsequent addition of South of Scotland Enterprise, would transform into the One Scotland Collaboration Group.

In November 2017, Scottish Enterprise appointed a senior Responsible Officer and Project Manager for NMIS. However, at this stage, the Programme Management Office was the responsibility of Scottish Government, including chairing the Programme Board. At this time Scottish Enterprise had responsibility for negotiating the contract with the University of Strathclyde on behalf of the Scottish Government.

In 2018, the University of Strathclyde was tasked with developing a business plan for NMIS. The first version of this was presented. Several stakeholders have stated their view that the original version of the business plan provided high-level details but that significant work was still required at this stage to provide the information required by the Scottish Enterprise project lifecycle process. Some stakeholders also highlighted an ongoing tension between the competing objectives of research excellence and economic development at the early planning stages. It took some time to define the NMIS capability/service provision to a level that could be tested as part of the assessment of market demand. A period of iterative development of the business case followed, involving the University of Strathclyde, Scottish Enterprise and other public sector partners. Some stakeholders identified that, early in the business planning phase, there was a lack of clarity about which individuals had project management responsibility and delegated decision-making authority within the University of Strathclyde and, more broadly across partners, that there was insufficient resource to develop the business case at the speed anticipated.

Skills Development Scotland assumed leadership of the skills element of the NMIS proposal and secured monies from Scottish Government and Scottish Funding Council to provide dedicated internal resource to develop plans for the Manufacturing Skills Academy. Skills Development Scotland developed a skills plan based on Sector Skills Investment Plans for sectors where manufacturing took place (e.g.,

engineering, food and drink, textiles, construction, etc.). The Sector Skills Investment Plans had been developed in collaboration with industry, ensuring a private sector input to the Manufacturing Skills Academy development. Skills Development Scotland also worked with the Scottish Research Partnership in Engineering and the Scottish Manufacturing Advisory Service to identify the skills proposition for NMIS.

Some stakeholders highlighted that good relationships were developed due to the early involvement of public sector partners in contributing to the development of the NMIS business plan. The relationship between Scottish Enterprise and the University of Strathclyde developed into one of 'applicant and assessor' when the Scottish Government delegated project approval authority to Scottish Enterprise. Stakeholders report that, although it took longer than expected to develop the business case for NMIS, the process of working together to go through the Scottish Enterprise project lifecycle process helped to develop good working relationships between key members of both organisations.

In September 2018, the Scottish Enterprise Board Urgent Approvals Committee approved £65.5m (incl. VAT). Although immediate release of up to £2.3m was granted for detailed design work on the NMIS building, it was recognised that the business case for NMIS was not fully developed, so authority was delegated to the Scottish Enterprise Executive Leadership Team to approve the final business case following a Stage 4 Review. Commitment in principle was obtained by Scottish Government ministers and a nominal budget was provided for budgetary planning and an external consultancy was appointed to develop the business case further, including providing further evidence of demand for NMIS services from manufacturers.

In July 2019, full approval was granted for NMIS by the Scottish Enterprise Executive Leadership Team Approvals Group. A condition of this approval was that the Programme Management Office be transferred from the Scottish Government to Scottish Enterprise and this transfer was completed.

The SMART objectives for NMIS, agreed at approval stage were:

1. Delivery of a fully operational NMIS by August 2021
2. Implementation of an industrial outreach programme by August 2021
3. Development and delivery of Industry 4.0 skills programmes to 500 industry leaders, 1,000 employees and 600 SME trainees over 5 years
4. Engagement with 2,000 manufacturers across Scotland over 5 years through awareness-raising events, consultancy and project delivery, at least 50% of which will be SMEs
5. Increase of £23.5M-£29M in planned R&D investment over 5 years
6. Increase of £77M-£88M in planned business and sector capital asset investment in Industry 4.0 over 5 years
7. Increase of £68M-£102M in planned turnover from innovation over 5 years

Key underpinning milestones to deliver these SMART objectives were:

1. Detailed design team commissioned by end November 2018
2. Full planning consent granted by September 2019
3. Customer journey and processes agreed by May 2019

In May 2020, following extensive contractual negotiations, a final contract was sent to the University of Strathclyde by Scottish Enterprise. The contractual requirements include objectives 1 and 2 and milestones 1 to 3, above. It should be noted that objectives 3 to 7 listed above are reported in the quarterly Monitoring and Evaluation Framework (MEF) but are not contractual requirements. In addition to this, there was an additional contractual requirement to include a dedicated data evaluation and monitoring role within NMIS to support the collection and reporting of MEF data. An earlier review of the Lightweight Manufacturing Centre intervention had been carried out, to identify lessons learned from development and early delivery phases. These lessons were incorporated into the development of the NMIS MEF.

Progress on SMART objectives and milestones is included in later section 5.

The lessons learned from the process of developing the NMIS proposal and assessing it via the Scottish Enterprise project lifecycle process are discussed in more detail in section 9.1.

3 Rationale for intervention

The original approval documentation identifies the rationale for intervention included:

- Equity – Scotland lags across key indicators including manufacturing and trade balance, BERD, productivity and investment in manufacturing.
- Imperfect information - companies may not know who to approach for research, not understanding the benefits of adopting industry 4.0 and skills issues regarding internationally competitive businesses and on exporting.
- Externalities - reluctance to invest in technology or processes that could be “poached” and in skills where investment could benefit future employers.

This section examines whether the rationale for intervention, as originally stated, is still valid.

3.1 Equity

The NMIS Logic Model, Economic Impact Assessment and Performance Monitoring Framework report, produced in 2016, described the equity rationale for intervention as follows:

“When benchmarked with European and international comparators, Scotland lags behind across a number of key indicators, including:

- *manufacturing as a percentage of GDP;*
- *trade balance as a percentage of GDP;*
- *business Enterprise Research & Development (BERD);*
- *productivity - Manufacturing GVA per head; and*
- *investment in manufacturing.”*

Stakeholder feedback was unanimous that these equity issues are still relevant for NMIS. The only caveat was around productivity, with some stakeholders stating that the manufacturing productivity metric was more relevant when comparing internationally than with the UK as a whole.

The current status of these indicators is summarised below.

- Data from the Scottish Government GDP Quarterly National Accounts – Supplementary Tables for Quarter 2 2022, indicate that manufacturing output in Scotland represents 10.1% of total Scottish output. World Bank data, on manufacturing as a percentage of GDP for 2022, identifies that in the European Union, the average is 15% and the world average is 16%. World Bank data highlights that the average for low-income countries is 10%.
- Data from The Global Economy website (based on World Bank data) identifies that the UK trade balance as a percentage of GDP (2022) UK is -3.5%, ranking 65th in the world.
- OECD data, for 2019, on UK Manufacturing BERD identifies total spend of £9,565.9m. Scottish manufacturing BERD for the same period, identified in the Scottish Government BERD Scotland report, is £344m. This means Scottish manufacturing BERD is 3.6% of UK manufacturing BERD, despite representing 6.9% of manufacturing output (based on comparison of UK and Scottish manufacturing GVA using data from the Office for National Statistics data on regional GVA (balanced) per head and income components).
- Office for National Statistics data on region by industry labour productivity identifies that (for 2019), output per job (at 2018 constant prices) for UK manufacturing was £71,747. The equivalent manufacturing output for job at a Scottish level was £83,918 (17% higher than the UK).
- Office for National Statistics data on regional fixed capital formation (2020 data) identifies that in Scotland, manufacturing Gross Fixed Capital Formation (GFCF) is 6.1% of total GFCF. For the UK as a whole, manufacturing GFCF represents 8.0% of total GFCF. Scottish manufacturing GFCF is 6.3% of UK manufacturing GFCF, compared to representing 6.9% of manufacturing output.

It is clear, therefore, based on both stakeholder feedback and published data, that the rationale for intervention, relating to equity, is still valid.

3.2 Imperfect information

Stakeholder feedback unanimously agreed that imperfect information was still a significant market failure to the adoption of advanced manufacturing processes and technologies. Asked about barriers to adopting advanced manufacturing technologies and processes, 20% of respondents stated that they lacked time to look at possibilities, 20% didn't have the internal skills to assess and/or implement advanced manufacturing and 20% identified that the lack of independent advice about options was a barrier. However, it should also be noted that 76% identified that they didn't have the investment required to implement advanced manufacturing.

Many stakeholders highlighted that the range of support initiatives for advanced manufacturing had increased significantly since the time of NMIS approval. The Advanced Manufacturing Challenge Fund projects and Robotarium were mentioned as examples of this. This adds to the support network that already existed, which includes the Scottish Manufacturing Advisory Service, parts of the Innovation Centre offerings and membership support organisations, such as CeeD and Scottish Engineering. One stakeholder described this as a *"bewilderingly packed landscape, which makes it hard to navigate for companies. NMIS would appear to be the central player amidst the support, but it is not entirely clear if this role has been fulfilled as yet"*. This observation is consistent with work carried out for Scottish Enterprise on the advanced manufacturing innovation support ecosystem which highlighted a complex network of competing organisations that companies found it very difficult to navigate.

Several stakeholders also highlighted the work of the Making Scotland's Future programme and, specifically the ecosystem workstream (which NMIS is leading). This is at the stage of developing its terms of reference and improving the clarity of the roles of each support organisation would be a useful contribution to addressing the issue for companies of not knowing who to approach for advanced manufacturing support.

3.3 Externalities

Stakeholders broadly agreed that the externalities described in NMIS economic impact assessment were still valid. Some stakeholders questioned whether technologies and processes could be 'poached' in the same manner that employees could be poached. Several stated that the rationale for intervention was stronger now than it had been at the time of approval. It was highlighted that labour participation is dropping, there are skills shortages and supply chain disruption and that these factors mean that the requirement for investment in automation is even higher now. However, Figure 14, shows that only one respondent (2%) identified the risk of losing staff when they invest in developing advanced manufacturing skills.

Overall, the rationale for intervention in NMIS is as strong, if not stronger than at the time of the initial approval. As one stakeholder stated "*NMIS could play a significant role for engineering companies that don't have a development budget and do have skills shortages*". However, the addition of NMIS to an already complex innovation support landscape means that further work on clarifying roles of the different organisations is required to optimise signposting and help overcome the continuing information failure about who companies should approach for help with advanced manufacturing.

4 Strategic fit and the contribution to key strategies

This section assesses the fit of the NMIS project with the policy environment now and at the time of NMIS approval.

The policy landscape at the time of application (2018/19), and the key strategic documents of relevance (starting 2015), centred around productivity, innovation, and skills development, most notably in the Scottish Government's Manufacturing Action Plan (MAP) and the UK Government's Industrial Strategy for the UK: Building a Britain Fit for the Future.

An assessment has been conducted to determine NMIS' fit and alignment with the strategy and policy objectives at the time of the approval process and up to the recent and present day. The methodology for assessing fit and alignment involves, (1) comparing the strategic priorities of the strategy/policy documents to the five key objectives that underpin NMIS, and (2) comparing the strategic priorities of the strategy/policy documents to the NMIS contribution to MAP Action Themes (as presented in the NMIS application, see below). The table further below provides details of the assessment.

NMIS objectives are as follows:

1. **Increase the productivity and innovation performance of manufacturing businesses** based in Scotland and reduce the perceived individual company risk associated with innovation.
2. **Stimulate manufacturing investment**, both inward and from businesses already located in Scotland, to increase the competitiveness of Scotland's manufacturing base over the medium to longer term in a highly advanced manufacturing environment.

3. **Catalyse job creation and strengthen supply chain linkages**, increasing the relative manufacturing contribution to Scotland's overall economy.
4. **Inspire and attract a diverse talent pool to work in manufacturing**, equipping existing and future employees with the skills, both technical and practical, to prosper in an increasingly digital and automated manufacturing environment.
5. **Minimise displacement of companies and jobs**, including through outreach initiatives which spread benefits and impact across Scotland and beyond.

Evidence of alignment between NMIS and MAP is as follows (based on review of the NMIS approval process documentation):

MAP Action Theme	NMIS Contribution to the Action Theme
Leadership	Provides leaders with first-hand experience on what Industrial Digital Technologies (IDTs) are and how they might be applied to their business Links into the appropriate Industry Leadership Groups for manufacturing
Skills & Jobs	Provides teaching in a 'real-life' manufacturing environment Mirrors actual firms' manufacturing plants (digital twin) Interacts with cutting-edge and developing technology Provides new models of integrated education ('change the way we learn') Delivers an accessible STEM Demonstrator Provides an ability for leading-edge manufacturing firms and education providers to jointly shape education offering
Circular Economy	Advanced Remanufacture and design for (re)manufacture will be core specialisms
Energy Efficiency	Delivered in conjunction with Zero Waste Scotland Demonstrated through BREEAM 'Very Good' rated NMIS facility
Investing in Smart Manufacturing	De-risks firms' investments through being able to trial processes, equipment and plant layout and identify targeted workforce upskilling On-site financial advice and business support
Competitive Infrastructure	Advise firms on the specification and layout for existing and future facilities Help developers set the specification for future advanced manufacturing space provision in Scotland Support One Scotland partners in devising Scotland's Future Infrastructure needs
Supply Chain Capability	Innovation Collaboratory and DF2050 will engage potential supply chain partners in joint projects Provide exposure for SMEs to equipment, supported by expertise, to which they would not otherwise gain access AMIDS will attract leading Scottish, UK and Global manufacturing firms increasing supply chain connectivity
Technology and Innovation	Stimulate investment in collaborative R&D by Scottish businesses that will be focused on both global opportunity trends and known leading Scottish research strengths

MAP Action Theme	NMIS Contribution to the Action Theme
	Identify and help address firms' challenges Link with other specialist organisations (academia, innovation centres etc.,) to maximise effectiveness of manufacturing focused research and business impact. Proactively lead a range of collaborative research programmes Leverage funding from external sources (UK and world-wide) to support manufacturing research

Table 2: NMIS Contribution to the Manufacturing Action Plan themes

The table below summarises the key strategic documents at the time of NMIS application (2015-2018/19) and to the present day (2020-2023), highlighting the strategic priorities of each document and assessing alignment with NMIS' strategic objectives.

Document Title	Description	Strategic Priorities	Year(s)	Fit/Alignment with NMIS Strategic Objectives
Government Economic Strategy for Scotland (2015)	A strategy focused on promoting innovation, infrastructure development, internationalisation, inclusive growth, and skills development.	• Innovation • Infrastructure development • Internationalisation • Inclusive growth • Skills development	2015	Alignment with NMIS objectives in innovation, infrastructure development, and skills development.
A Manufacturing Future for Scotland (2016)	A plan emphasising productivity, innovation, internationalisation, advanced manufacturing, skills development, and supply chain integration.	• Productivity • Innovation • Internationalisation • Advanced manufacturing • Skills development • Supply chain integration	2016	Strong alignment with NMIS objectives, especially in productivity, advanced manufacturing, skills development and supply chain development.
Making Things Last: A Circular Economy Strategy for Scotland (2016)	A strategy promoting circular economy principles, waste reduction, sustainability, and resource efficiency.	• Circular economy promotion • Waste reduction • Sustainable practices • Resource efficiency	2016	Alignment with NMIS objectives, especially in sustainability, circular economy and efficiencies.
Industrial Strategy for the UK: Building a Britain Fit for	A UK-wide strategy focusing on growth and productivity, innovation support, skills development, and	• Productivity • Innovation support • Skills development • Infrastructure development	2017	Strong alignment with NMIS objectives, especially in productivity, innovation, skills development and

Document Title	Description	Strategic Priorities	Year(s)	Fit/Alignment with NMIS Strategic Objectives
the Future (2017)	infrastructure investment.			infrastructure development.
Made Smarter Review (2017)	A review centred on digitalisation of manufacturing, innovation support, skills and leadership development, and increased productivity.	• Digitalisation of manufacturing • Innovation support • Skills development • Leadership development • Increased productivity	2017	Strong alignment with NMIS objectives, particularly in digitalisation ('smart manufacturing'), innovation, skills development and productivity.
Scottish Enterprise Business Plan 2018-2019	A business plan aiming for inclusive growth and productivity, innovation support, export and internationalisation, and improved business environment.	• Inclusive growth / productivity • Innovation support • Export / internationalisation • Improved business environment	2018-2019	Alignment with NMIS objectives, especially in productivity and innovation.
Scottish Enterprise Strategic Framework 2019-2022	A framework focusing on productivity enhancement, innovation promotion, international expansion support, and regional competitiveness.	• Productivity enhancement • Innovation promotion • International expansion support • Regional competitiveness	2019-2022	Alignment with NMIS objectives in productivity, innovation and competitiveness.
Highlands & Islands Enterprise Strategy 2019-2022	A strategy targeting sustainable economic growth, job creation, community support, infrastructure development, innovation, and skills and leadership.	• Sustainable growth • Job creation • Innovation support • Infrastructure development • Skills development	2019-2022	Alignment with NMIS objectives, especially in job creation, infrastructure development and skills development.
UK Innovation Strategy (2021)	A strategy promoting innovation across sectors, R&D investment, talent attraction and development, collaborative innovation,	• Innovation promotion across sectors • R&D investment • Collaborative innovation	2021	Alignment with NMIS objectives, especially in R&D and collaborative innovation.

Document Title	Description	Strategic Priorities	Year(s)	Fit/Alignment with NMIS Strategic Objectives
	and establishing a global innovation hub.	• Global innovation hub		
Making Scotland's Future: A Recovery Plan for Manufacturing (2021)	A plan for manufacturing sector recovery, collaborative innovation, supply chains and competitiveness, productivity, digitalisation, sustainability, skills development, and internationalisation.	• Manufacturing sector recovery • Innovation support • Sustainability • Skills development • Internationalisation	2021	Strong alignment with NMIS objectives, especially in post-pandemic recovery, collaborative innovation, supply chains and competitiveness, productivity, and skills development.
Scottish Enterprise Strategic Priorities (2022)	Priorities broken down into three key areas: international, investment, innovation.	• Internationalisation • Innovation stimulation • Investment in business	2022	Alignment with NMIS objectives, specifically around innovation.
Scottish National Strategy for Economic Transformation (2022)	A strategy focusing on economic, social and environmental dimensions, including fair work and equality, innovation, net zero initiatives, productivity, inclusivity and equality, and skills and workforce.	• Fair work and equality • Innovation focus • Net zero initiatives • Productivity • Inclusivity / equality • Skills and workforce development	2022	Strong alignment with NMIS objectives, especially in innovation, productivity, skills development, and net zero.
South of Scotland Enterprise Five Year Plan 2023-2028	A plan focusing on fair work and equality, empowering communities, attracting investment, skills and talent development, innovation, productivity, and net zero.	• Fair work and equality • Community capacity • Regional investment • Skills and workforce development • Innovation • Productivity • Net zero	2023-2028	Alignment with NMIS objectives in innovation, productivity, skills development, and net zero.
Scotland's National	A strategy with long-term innovation goals, R&D	• Long-term innovation goals	2023-2033	Strong alignment with NMIS objectives, specifically

Document Title	Description	Strategic Priorities	Year(s)	Fit/Alignment with NMIS Strategic Objectives
Innovation Strategy 2023-2033	investment, productivity, innovation culture, and sectoral strengths utilisation.	• R&D investment • Productivity • Innovation culture • Sectoral strengths		innovation, productivity and R&D.
Scotland's National Performance Indicators	A set of key measurements used to track Scotland's performance in various areas, including the economy.	N/A	Ongoing	Alignment with performance indicators, e.g., - Innovation: 'Innovative businesses in manufacturing (45% in 2016 to 60% in 2020)' - Skills: 'Skills shortage vacancies (30% in 2015, 5% in 2020)'.

Table 3: Summary of key strategic documents and alignment with NMIS objectives

There are commonalities between the priorities of the strategy documents pre- and post- NMIS implementation, in particular regarding innovation, growth and productivity. There is a potentially greater focus on skills development in the pre-implementation strategy documents albeit skills and workforce development are still important within the context of the recent and current policy landscape. The recent independent review of the skills landscape, led by James Withers, made 15 recommendations for future adaptations to the skills landscape and work to address these is ongoing. As an active participant in the skills landscape, NMIS will play a role in this.

During the post-implementation period of NMIS, there is evidence of an ongoing shift towards net zero, sustainability, inclusive growth, fair work and equality as strategic imperatives.

Stakeholder feedback was unanimous in the view that NMIS had a strong strategic fit with policy at the time of approval and has responded positively to changes in the policy environment, particularly in response to the market opportunities presented by the increased focus on Net Zero.

5 Project inputs, activities to date and early outputs

This section examines the project inputs, activities carried out to date to support the achievement of SMART objectives and milestones and analysis of the latest MEF data (Q2 2023) showing associated progress against targets. The relationship between project inputs, activities, outputs, outcomes and impacts is shown in the logic model in Figure 1, below.

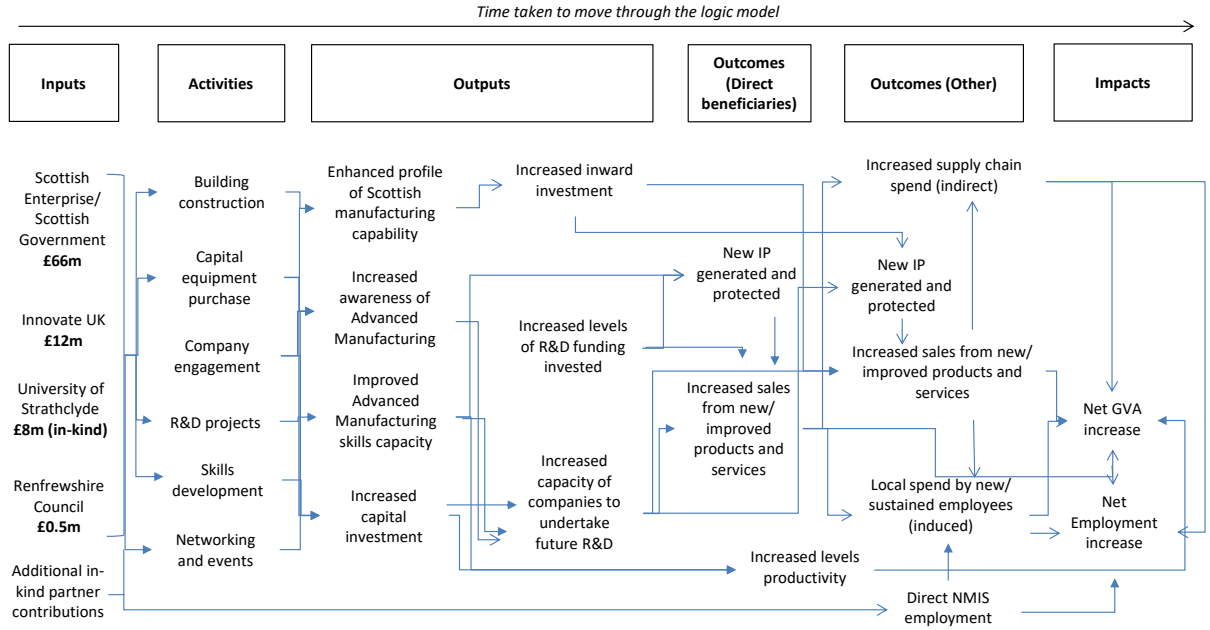


Figure 1: NMIS logic model illustrating the conceptual route to economic impact

Figure 1, above, shows how NMIS inputs and activities lead to outputs, outcomes and economic impacts for the Scottish economy (net increase in Gross Value Added and employment).

Based on the funding sources and values in the NMIS Approval papers (and modified to reflect the final contractual value of investment from Scottish Enterprise/ Scottish Government) a total of £86.5m was invested in NMIS (including £8m of in-kind contribution from the University of Strathclyde). Additional in-kind partner contributions, in the form of time committed during the development and approval process, can also be regarded as valuable inputs. The key activities included constructing and equipping the physical building, engaging with manufacturing companies (large and SMEs), conducting R&D projects, developing skills and hosting networking activities and events.

These activities lead to an enhancement of the reputation of Scotland as a location for advanced manufacturing, adding to the inward investment attractiveness of the wider Advanced Manufacturing Innovation District Scotland. The activities also lead to increased levels of awareness of the benefits and technical deployment of advanced manufacturing technologies and processes, improved advanced manufacturing skills and increased capital investment. In turn, this leads to increased advanced manufacturing inward investment and increased research and development funding by indigenous manufacturers.

These outputs then lead to several outcomes, both for direct NMIS beneficiaries and the wider sector, as learning and experience of advanced manufacturing spills over into non-beneficiary companies through peer learning, movement of employees between companies, etc. These outcomes include improvements in productivity, new IP generated and protected and increased sales from new/improved products and services.

Additional employment will be required to support company growth in sales. These direct benefits also lead to indirect benefits through increased spending with company supply chains and induced benefits

resulting from increased local spending through additional employee wages. Ultimately the impacts can be seen as increased net Gross Value Added and net employment increases within the Scottish economy.

5.1 Inputs, key milestones and set up/delivery of support programmes

This section presents the actual versus planned expenditure and funding drawdown from Scottish Enterprise.

5.1.1 Inputs and main expenditure

The total NMIS project costs, at time of approval (from the NMIS ELT Approval Paper final) is shown in Table 4, below:

	Previous Year(s)	(19/20)	(20/21)	Future Years	Cumulative Total
Nature of Expenditure	**£'000**	**£'000**	**£'000**	**£'000**	**£'000**
Development Funding	57	33			90
Site Acquisition*	500				500
Building including site preparation and utilities	344	8,559	40,500	4,995	54,398
Equipment (new)			11,705	6,145	17,850
Operations		1,225	2,589	2,348	6,162
In kind expenditure on equipment and operations				8,000	8,000
Total Project Costs	**901**	**9,817**	**5,4794**	**21,488**	**87,000**

*Site acquired by Renfrewshire Council as part of City Deal, working assumption is 99-year lease with peppercorn rent.

Table 4: Planned NMIS annual expenditure profile at time of ELT approval (2019)

An actual expenditure profile, using the same structure as Table 4 to allow comparison, was requested from NMIS as part of the interim evaluation. However, the data could not be collated within the study timetable.

The planned funding sources for the £87m total project costs (from the July 2019 Executive Leadership Team approval paper) are shown in Table 5, below.

Project Funding Sources	Prior Approval(s) £'000	This Approval £'000	Cumulative Total £'000
Scottish Enterprise	90	66410	66500
Renfrewshire Council	500		500
University of Strathclyde		8000	8000
Innovate UK (Catapult)		12000	12000
Total Project Funding	**590**	**86410**	**87000**

Table 5: Planned funding sources for NMIS

The actual annual budget draw-down from the planned £66.5m Scottish Enterprise/ Scottish Government funding is shown in Table 6, below.

	Year 1 (18/19)	Year 2 (19/20)	Year 3 (20/21)	Year 4 (21/22)	Year 5 (22/23)	Year 6+	Total
	£'000	£'000	£'000	£'000	£'000	£'000	£'000
Planned	449	4,086	41,637	19,461	876		66,500
Actual	344	1,215	13,707	39,962	8,603	1,504	65,336

Table 6: Comparison of Planned and Actual Funding from Scottish Enterprise/Scottish Government

The final value of the NMIS contract between Scottish Enterprise and the University of Strathclyde was £66m. A breakdown of the actual and estimated future claims compared to contractual values is shown in Table 7, below.

	Contract value	Total claimed to date	Est 2023/24 Q3/4	Est 2024/25	Final expected claim
	£	£	£	£	£
General Revenue	3,400,000	3,400,000			3,400,000
SME Support	1,600,000	896,814	*24,183*	*14,690*	935,687
Capital Construction	54,500,000	54,500,000			54,500,000
Capital Equipment	6,500,000	6,500,000			6,500,000
	66,000,000	65,296,814	24,183	14,690	65,335,687

Table 7: Breakdown of actual and estimated future claim values to Scottish Enterprise

The variation in planned versus actual expenditure reflects delays in:

- Moving from the point of approval (July 2019, when ELT Approval was granted) to the point when the contract to deliver the NMIS project was completed (May 2020)
- The construction of the physical NMIS building caused by the Covid pandemic and associated restrictions. It should be noted that the capital construction cost actual of £54.5m was on budget. This was despite the construction occurring during the pandemic and through a period of material and labour inflation. Stakeholder feedback was that this is a very positive aspect of the project delivery
- Recruiting the ten person SME engagement team, reported by one stakeholder as happening just under one year after the planned timing. It should be noted that the planned SME support budget was £1.6m, to be spent within a three-year window. The actual amount claimed, to date, is £896,814 with estimated final claims projected to take this to £935,687. Therefore, the variance in the total budget versus actual, shown in Table 7, above, is due to this underspend in SME support. Note that the actual contract value was finalised at £66m.

Several stakeholders also identified what they viewed as high levels of staff turnover in the strategic management team, which lead to general delays in decision making. However, other stakeholders have provided positive feedback about the stable senior management team that is now in position.

These delays impacted the timing of achievement of the first two of the NMIS SMART Objectives:

- Delivery of a fully operational NMIS by August 2021 (revised to April 2022 with the NMIS building opening in June 2023)
- Implementation of an industrial outreach programme by August 2021 (delayed by several months, primarily due to COVID-19. The funding for the industrial outreach programme has now, substantially, been spent)

5.1.2 Key milestones

The timing of the delivery of underpinning milestones to support these SMART objectives is summarised as:

- Detailed design team commissioned by end November 2018 (appointed November 2018)
- Full planning consent granted by September 2019 (secured March 2020)
- Customer journey and processes agreed by May 2019 (The Stage 5a Review identified that the that this was due to be in place by December 2020)

Progress towards achievement of the remaining SMART objectives (those reported in the MEF) is detailed in section 5.2.

5.1.3 Set up and delivery of support programmes

The stage 3 business case for NMIS (Appendix 1 – NMIS Business Case Stage 3 Submission) identifies different three main elements of NMIS:

- Manufacturing Skills Academy (MSA) – A hub for advanced industry 4.0 manufacturing skills and education linking to existing and future providers across Scotland.
- Digital Factory 2050 (DF2050) – Industry led centre for collaborative manufacturing research, technology and solution development, drawing in supply chain partners and SMEs and connecting research and skills centres across Scotland.
- Innovation Collaboratory (IC) – Industry-led centre for manufacturing technology demonstration, application and process development. This incorporates the "Street" – NMIS's interface to on-site financial advice, business support and links to external organisations such as the High Value Manufacturing Catapult, SMEs, schools, Zero Waste Scotland, Scottish Institute for Re-Manufacture and the One Scotland Partners, which forms part of the Innovation Collaboratory.

Based on feedback from stakeholders, it is clear that the MSA and Digital Factory elements of NMIS have progressed well, with both having named directors in the organisational structure. The Innovation Collaboratory has not been individually developed to a similar extent. Several stakeholders highlighted that the Innovation Collaboratory was not intended to be something different to the Digital Factory but a space for Industry 4.0 solution providers, and others in the supply chain, to engage manufacturers to demonstrate their solutions. It is noticeable that whilst the MSA and Digital Factory have significant income generating targets in the business plan (through provision of skills training and delivery of collaborative and contract R&D projects) there is no specific planned income generated from the Innovation Collaboratory.

From an MSA perspective, the set up and delivery of programmes has benefitted from the availability of funding via the National Transition Training Fund (NTTF). In 2020, the Scottish Government launched

the NTTF to support individuals, sectors and businesses affected by the Covid pandemic. It provided a source of funding for individuals to learn new skills to help them transition to new roles or help the businesses they worked for address challenges and take advantage of new opportunities, such as those associated with Industry 4.0, for example.

This availability of funding coincided with the MSA creating skills development content addressing different aspects of advanced manufacturing. Whilst this included training that could be delivered face-to-face and online, it was the latter that took on a new focus as Covid restrictions came into place and furlough schemes began to be used by employers. MSA skills delivery is explicitly done in partnership with existing providers such as universities, colleges and private sector providers. Several examples of NMIS MSA skills training, developed in partnership with a variety of public and private sector providers, can be viewed on the NMIS website.

Stakeholder feedback suggests that the availability of the NTTF and a significant number of furloughed employees having time available to develop their skills has contributed to the MSA exceeding business plan revenue expectations.

Stakeholder discussions highlighted that NMIS is working in partnership with a number of Scottish universities to set up a 20 credit micro-credential course 'Digital Manufacturing to Net Zero'. This is being publicly funded initially and NMIS is deliberately putting in NMIS generated content to make the process of adding non university content in future easier. This could also include where employers have content of their own. So, in future NMIS would seek to generate revenue from these courses, with revenue shared between the content creators and, in the cases where companies generate their own content, have participation restricted to these company's employees.

Stakeholder feedback on the MSA was typically positive about its partnership approach and its early development and delivery of face-to-face and online skills development courses. However, it was also noted that ongoing access to funding for SME trainees is critical to the MSA continuing to meet SME skills development targets.

From a Digital Factory perspective, evidence from the MEF and stakeholder feedback highlights involvement in a range of research and development projects with both SMEs and large companies. The survey of companies, engaged by NMIS, also highlights a significant level of consultancy and advice being provided.

It is also noted that manufacturers, with up to 500 employees, seeking to grow and scale through innovation can access up to £15,000 from the High Value Manufacturing Centre to work with Research and Technology Organisations. This provides up to 100% of eligible costs and has helped to catalyse company projects with the Digital Factory.

NMIS has demonstrated an ability to successfully bid for funding to support the delivery of strategic objectives. For example, it is leading two of the 11 projects funded as part of the Glasgow City Region Innovation Accelerator programme:

- ReMake Glasgow – creating a circular manufacturing hub (involving Boeing, BA Maintenance Glasgow, SSE Renewables, Baker Hughes Howden and ATS Global)
- D3M_CoLAB – Data Driven Design and Manufacturing CoLAB – a hub to provide manufacturers with advanced data analytics capability (involving Babcock, BAE Systems, Infor and Anaconda)

These projects generate income for NMIS and support them to engage with SME manufacturers, where the company's need align with the objectives of the project.

Like the MSA, the Digital Factory benefited from the two years of funding for the SME outreach and engagement programme. This was provided as a ring-fenced element of the £66.5m investment by the Scottish Government and it funded ten posts for two years. There was a significant delay, reported by one stakeholder as almost one year, in filling these posts. This was due to issues caused by the Covid pandemic and associated restrictions. The SME Engagement team helped to promote awareness raising events, seminars, skills development training offered by the Digital Factory and the MSA. It also provided resources to respond to SME enquires about support and help identify company's needs before either developing a support offer from NMIS or signposting them to a more relevant support provider.

The SME engagement resource was planned to be an ongoing part of NMIS operations. The business plan included an ongoing level of funding for this activity of just under £1m per annum (including all salary costs, overhead and events/materials budget). The business plan stated:

"It is proposed that Scottish Government revenue funding will be used to fund a team of up to 10 NMIS SME engagement personnel. They will be dedicated to "translating" NMIS priorities into actions that are engaging for SMEs and to deliver the SME-focused products. It will be seen in the Financial Model section below that ***the SME activity must attract on-going, dedicated funding if it is to be viable for NMIS to deliver****. It is assumed that the Scottish Government will fund the first three years of provision…… Thereafter, other public funding for this activity is expected to be provided."*

The NMIS board approval paper stated:

"The ***key operating risk*** *identified is that the funding commitment for SME engagement (Scottish Government) and Catapult (Innovate UK) is only secured for the next 3 years in line with budgetary cycles. A longer-term in principle commitment for support has been sought from Scottish Government. The financial risk for this resides with UoS and the project has been approved by their University Court on that basis."*

THE NMIS Risk Register states: *"Funding from Scottish Government to deliver support to SMEs is only currently available for 3 years resulting in an operating deficit from year 4 onwards. Catapult funding operates on a similar funding cycle, so currently no certainty on long-term funding after year 4."*

Mitigation actions for this risk were defined as *"Partners to work with University to help attract external funding beyond the current cycle. SE role will be to ensure SG and Ministerial awareness/visibility of NMIS to ensure ongoing support. University to liaise with Catapult to secure future funding commitment."* Further explanation was provided that *"High Value Manufacturing Catapult funding secured from UK Government for 3 years and* ***comfort being sought from Scottish Government on ongoing operational costs beyond year 3****."*

Analysis of the approval documentation suggests that there was widespread awareness and appreciation that public sector funding would be required on a continuous basis to enable SME outreach and engagement. Evidence from this study shows that imperfect information (e.g. relating to lack of internal skills to assess advanced manufacturing and lack of independent advice available to companies) is acting as a barrier to adoption. This need for ongoing public sector funding is consistent with other innovation support interventions such as the Fraunhofer model (which is based on a continuous public sector contribution of one third of total expenditure) and the Scottish Innovation Centres (some of which

are receiving a third phase of public sector funding taking the public sector support beyond the ten-year phase). Other public sector interventions providing support to SME manufacturers include the Scottish Manufacturing Advisory Service, which is operated by Scottish Enterprise and subsidised to enable SMEs to be offered 1-2 days free diagnostic advice. The market failure that necessitates these public sector interventions to receive continuous public sector funding for SME engagement also, unsurprisingly, exists for NMIS.

Although the documentation appears to show widespread awareness of the risk of lack of ongoing funding for SME engagement, some stakeholders had different interpretation of what was likely to happen after the initial funding period. Some stakeholders thought it had been agreed that, although Scottish Government were unable to commit budget so far ahead, they would likely provide further support if NMIS performed well against SMART objective targets. Other stakeholders thought that it had been made very clear that the Scottish Government support was limited to the £66.5m initial investment and no further monies were to be made available to NMIS.

One lesson for future interventions, particularly those providing innovation support to SMEs, is to

- Acknowledge that achieving a self-sustaining business model to provide this is exceptionally challenging, if not impossible, based on lessons from similar public sector interventions,
- Hold frank discussions about the sources of future operational funding after the initial public sector 'pump priming' investment has been exhausted.

Feedback from stakeholders, gathered during this interim evaluation, has highlighted that this is the single most significant risk for NMIS being able to deliver economic benefit to Scotland through supporting SME manufacturers. Even though the issue was widely accepted at approval stage, no resolution has yet been identified. Although funding has been raised from other public sector sources, it is piecemeal in nature and focused on specific objectives and outcomes which may, or may not, align with the individual needs of SME manufacturers seeking to engage with NMIS. It is acknowledged that NMIS representatives and its public sector partners are working to address this issue.

5.2 Early delivery to companies and individuals

The NMIS MEF data has been provided for review, with updated information up to 2023 Q2, which represents the halfway point of the 5-year period over which the targets are being assessed. It is noted that SMART objectives 1 and 2 cover the delivery of a fully operational NMIS and implementation of an industrial outreach programme, respectively, both of which have been completed.

Objective 3

Objective 3 covers the development and delivery of a skills programme to 500 industry leaders, 1,000 employees and 600 SME trainees over 5 years. The information is broken down, in Table 8, below, by year and quarter and distinction has been made by 'seniority/experience level' between employees, leaders and trainees for the period since 2021.

Year and Quarter	Employees	Leaders	SME Trainees
2021	520	84	110
2021 Qtr1	114	28	16
2021 Qtr2	16	5	26
2021 Qtr3	262	19	26
2021 Qtr4	128	32	42
2022	349	98	205
2022 Qtr1	75	42	41
2022 Qtr2	76	10	22
2022 Qtr3	86	19	56
2022 Qtr4	112	27	86
2023	82	35	108
2023 Qtr1	20	20	48
2023 Qtr2	62	15	60
Total to Date	951	217	423

Table 8: Number of Employees, Leaders and SME trainees who have accessed NMIS training

Table 8 shows the current progress to date (2023 Q2) on each of these, where progress to target at the halfway point (2.5 years) is 217/500 (43.4%) for leaders, 951/1000 (95.1%) for employees and 423/600 (70.5%) SME trainees. This surpasses the linear progression expected for employees and SME trainees, while the target for leaders trained is behind target. Figure 2 show the progress of each of these metrics within Objective 3 compared to the relevant targets. It should be noted that the targets are given to date, which is why they are half of the values outlined above.

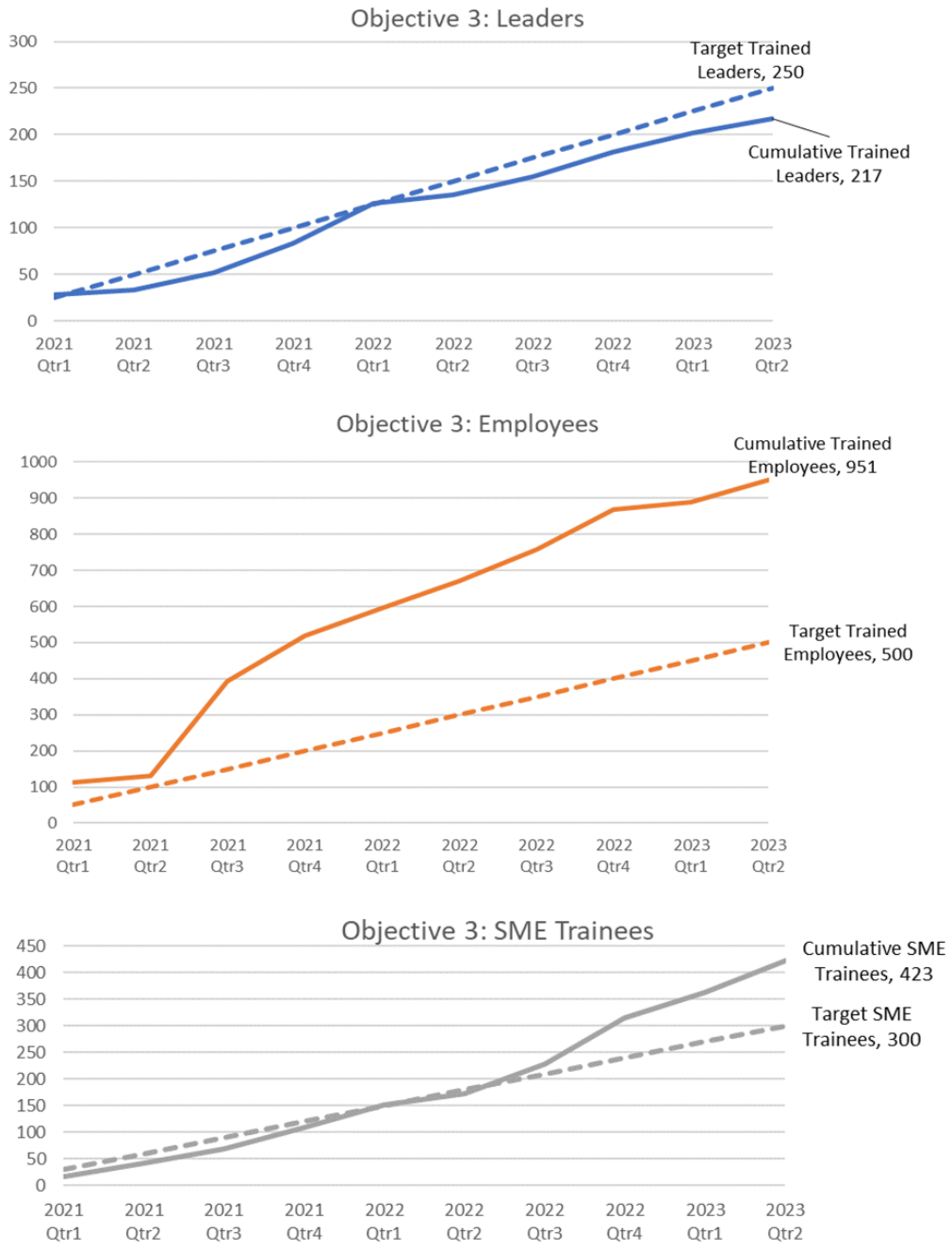


Figure 2: NMIS Progress to date in delivering skills training to Leaders, Employees and SME Trainees

Some stakeholders noted that funding from the National Transition Training Fund was mainly targeted at employees rather than leaders and this accounts, in part, for the overperformance on this element of the target.

Stakeholders involved in the production of the quarterly MEF have noted that it is challenging to extract data about numbers of leaders trained from the information recorded about skills and training provision activities. As a result of this, an agreement has been put in place (between Scottish Enterprise and NMIS) that approximations will be made based on an expected ratio (80:20, leaders: employees).

Objective 4

Objective 4 covers target engagement with 2,000 manufacturing businesses across Scotland over 5 years through awareness raising events, consultancy and project delivery, at least 50% of which will be SMEs. The dashboard filters for unique (non-duplicates), Scottish companies with a cumulative total of 514 based on the most recent 2023 Q2 data, this represents 51.4% of the target, currently, and 25.7% of the overall target (2,000 manufacturers). Figure 3, below, outlines the current SME / Non-SME / Unreported split. There is a general trend of decreasing percentage of companies classified as SME over time, with an increase in 'Unreported', as highlighted in Table 9, below.

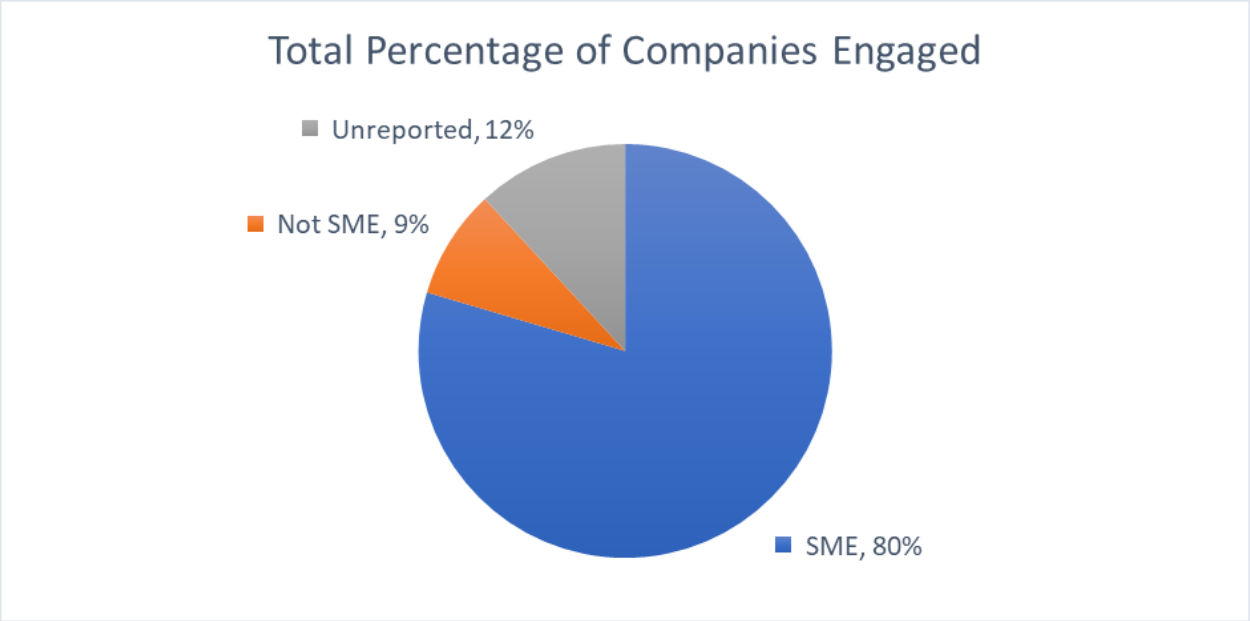


Figure 3: Split of companies engaged by SME status as at Q2 2023

Year and Quarter	SME	Not SME	Unreported
2021 Qtr1	86%	7%	7%
2021 Qtr2	91%	9%	0%
2021 Qtr3	84%	7%	9%
2021 Qtr4	90%	3%	7%
2022 Qtr1	75%	12%	14%
2022 Qtr2	81%	10%	10%
2022 Qtr3	67%	3%	31%
2022 Qtr4	82%	8%	10%
2023 Qtr1	66%	13%	21%
2023 Qtr2	62%	15%	23%
	80%	**9%**	**12%**

Table 9: SME status of new companies engaged with NMIS over time

With a target of 100 new companies per quarter, it is evident that NMIS has not managed to hit this target to date, based on the performance shown in Figure 4, below.

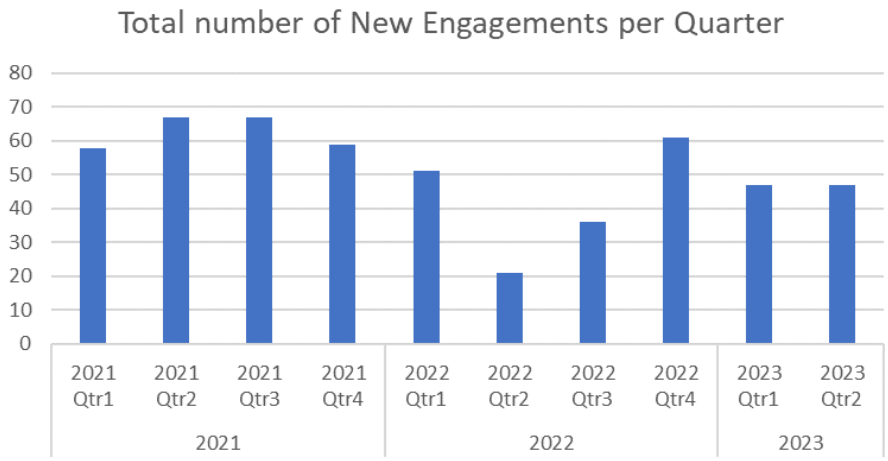


Figure 4: New company engagements per quarter

The most recent data (2023 Q2) has been analysed with 47 new entries compared to the Q1 2023 report. where A number of these additional 47 records have been identified as non-manufacturers. This includes an industry body, recruitment company, marketing specialist, managed IT services, solicitors and estate agents, experiential learning environments, architects and a wholesaler of audiotapes, records, etc. Whilst this data is valuable and should be retained within a CRM, this inclusion of non-manufacturing companies overstates the numbers for this specific objective. There are also a number of companies which may not traditionally be considered as manufacturers which are directly of interest and a number of these have been identified. It is time-consuming to determine what should be included as a manufacturer. Company SIC codes are not wholly representative and only 377 of the 514 companies (73%) have any SIC attributed within the MEF data. The SIC codes have been analysed and where multiple SIC codes have been included for each, these have been assessed as individual data points to more accurately identify the sectors which NMIS is currently supporting, Figure 4 shows the most frequent entries. It should also be noted that some entries have multiple values, and some do not

contain the correct data type (i.e., a website, 6 company numbers, some with too many digits and a declaration of a dormant company, which is unlikely to be eligible for support). Data cleansing has been required as where multiple entries have been input, these have all been in differently delimited formats. A total of 156 unique SIC code have been identified within the data.

Therefore, if retaining SIC codes, some data validation may be required. It is also possible to extract these from Companies House directly using the API and Company Number. Further, SICs can be challenging in covering the activities that companies are involved in (this is especially true with large complex organisations, niche sectors or emerging sectors). It is outside the scope and resources available to this study to review all individual entries in the Obj4 MEF tab, but this is worth further consideration to ensure improved data accuracy.

SIC Code	Explanation	No of MEF entries
74100	Specialised Design Activities	15
82990	Other business support service activities n.e.c.	15
32990	Other manufacturing n.e.c.	14
70229	Management consultancy activities other than financial management	14
72190	Other research and experimental development on natural sciences and engineering	13
71121	Engineering design activities for industrial process and production	12
71129	Other engineering activities	12
28990	Manufacture of other special-purpose machinery n.e.c.	11
70100	Activities of head offices	11
74909	Other professional, scientific and technical activities n.e.c.	11
96090	Other service activities n.e.c.	10
25110	Manufacture of metal structures and parts of structures	9
71122	Engineering related scientific and technical consulting activities	9
22290	Manufacture of other plastic products	8
26110	Manufacture of electronic components	7
25620	Machining	6
62090	Other information technology service activities	6
11010	Distilling, rectifying and blending of spirits	5
25990	Manufacture of other fabricated metal products n.e.c.	5
30920	Manufacture of bicycles and invalid carriages	5
71111	Architectural activities	5
72110	Research and experimental development on biotechnology	5
26400	Manufacture of consumer electronics	4
26701	Manufacture of optical precision instruments	4
29100	Manufacture of motor vehicles	4
30300	Manufacture of air and spacecraft and related machinery	4
32500	Manufacture of medical and dental instruments and supplies	4
35110	Production of electricity	4

Figure 5: NMIS SIC Code Analysis showing the most common codes (over 3 individual entries)

Within the MEF, related companies appear to be treated as individual entities. This methodology likely makes sense given different divisions of say large companies may be represented by different legal entities within a group and this can aid NMIS in targeting appropriate companies/service users. However, some documentation/notes clarifying this position may be beneficial for users and reviewers as best practice, this should also ensure the correct figures are attributed where companies are added to the dataset.

It is useful to compare the most commonly identified SIC codes of the companies engaged by NMIS with the proportionate size of manufacturing sub-sectors in Scotland. Table 10, below, summarises manufacturing employment data from the 2021 Scottish Annual Business Statistics publication.

Division (SIC 07)	Description	Total Employment (in Thousands)	% Employment (of total manufacturing)
10	Manufacture of Food Products	35.5	20.0%
25	Manufacture of Fabricated Metal Products, except machinery and equipment	21.0	11.8%
33	Repair and Installation of Machinery and Equipment	12.6	7.1%
11	Manufacture of Beverages	12.2	6.9%
26	Manufacture of Computer, Electronic and Optical Products	10.7	6.0%
28	Manufacture of Machinery and Equipment (not elsewhere classified)	10.7	6.0%
16	Manufacture of Wood and of Products of Wood and Cork except furniture; manufacture of articles of straw and plaiting materials	9.9	5.6%
30	Manufacture of Other Transport Equipment	8.9	5.0%
22	Manufacture of Rubber and Plastic Products	7.9	4.5%
20	Manufacture of Chemicals and Chemical Products	6.6	3.7%
13	Manufacture of Textiles	5.2	2.9%
32	Other Manufacturing	4.8	2.7%
23	Manufacture of Other Non-Metallic Mineral Products	4.7	2.7%
17	Manufacture of Paper and Paper Products	4.5	2.5%
21	Manufacture of Basic Pharmaceutical Products and Pharmaceutical Preparations	3.8	2.1%
27	Manufacture of Electrical Equipment	3.3	1.9%
29	Manufacture of Motor Vehicles, Trailers and Semi-Trailers	3.3	1.9%
18	Printing and Reproduction of Recorded Media	2.9	1.6%
14	Manufacture of Wearing Apparel	2.4	1.4%
31	Manufacture of Furniture	2.4	1.4%
24	Manufacture of Basic Metals	1.8	1.0%
19	Manufacture of Coke and Refined Petroleum	1.6	0.9%

Division (SIC 07)	Description	Total Employment (in Thousands)	% Employment (of total manufacturing)
15	Manufacture of Leather and Related Products	0.6	0.3%
12	Manufacture of Tobacco Products	No data	No data

Table 10: Relevant size of Scottish manufacturing sub-sectors by proportion of overall manufacturing employment in Scotland

The top three largest manufacturing sub-sectors (SIC codes 10 – food products, 25 – Fabricated metal products and 33 – Repair and installation of machinery and equipment) represent 38.9% of total manufacturing employment. Of the 377 engaged companies included in the NMIS MEF, with SIC codes recorded, there are a total of 33 companies in SIC codes 10, 25 and 33 (8.8% of the total engaged companies). It is clear that there is under-representation of at least the three largest manufacturing sub-sectors in the cohort of engaged companies. Obviously, different sub-sectors will have different propensities to innovate and this will impact on self-selection of companies to engage.

Awareness raising events, consultancy and project delivery are specifically outlined as activities within this objective however, there does not appear to be a simple way to categorise the data and understand what support has been provided. Whilst this does not appear to be a requirement within the original MEF remit, this could better showcase the work undertaken by NMIS and possibly be used to identify additional support activities or allow NMIS to readily identify companies within its network for specific projects. Given that some stakeholder feedback indicated that there was a degree of uncertainty about what capabilities NMIS has, this could be a useful metric that not only improves the MEF but supports wider NMIS activities.

Interestingly, the 'Obj4 Data' and 'Obj4 Data (Pivot)' tabs in the MEF do not appear to have a Column entitled 'Topic' however when a new sheet is generated directly from the Dashboard, a 'Topic' column is accessible, and contains a brief description of what appears to be the initial contact reason. Some examples include:

- 'NMIS membership for tech startup'
- 'Repurpose/remanufacture of wind turbine'
- 'Tentative enquiry regarding membership'
- 'A referral to the RTO/Catapult Growth fund'

These appear to be client generated and broad in scope. Consideration could be given to whether there is potential to alter how this information is sought which could make it more readily analysed, such as by developing a list of predefined categories that could be selected in the CRM system.

Objective 5

The Obj5 Data tab contains planned R&D investment values across all NMIS Centres and the Dashboard filters for those relevant (DIGF, NMIS and MSA), in accordance with requirements of this interim evaluation. The data has been filtered to ensure the investment value is above zero and a contract has been signed. 'Contract Value' is the direct cash value of project whereas 'In-kind' is in-kind contributions. The total value is simply these values added together.

Year / Quarter	In Kind Value	Contract Value (Direct)	Total Value (In Kind + Direct)
2021	**£639,500**	**£6,136,570**	**£6,776,070**
2021 Qtr1	£200,000	£1,956,015	£2,156,015
2021 Qtr2	£ -	£3,040,773	£3,040,773
2021 Qtr3	£225,000	£746,888	£971,888
2021 Qtr4	£214,500	£392,894	£607,394
2022	**£3,793,683**	**£ 2,004,527**	**£5,798,210**
2022 Qtr1	£216,650	£365,431	£582,081
2022 Qtr2	£55,500	£594,152	£649,652
2022 Qtr3	£3,141,000	£590,711	£3,731,711
2022 Qtr4	£380,533	£ 454,233	£834,766
2023	**£518,700**	**£3,916,246**	**£4,434,946**
2023 Qtr1	£271,500	£2,440,541	£2,712,041
2023 Qtr2	£247,200	£1,475,705	£1,722,905
Total	**£4,951,883**	**£12,057,343**	**£17,009,226**

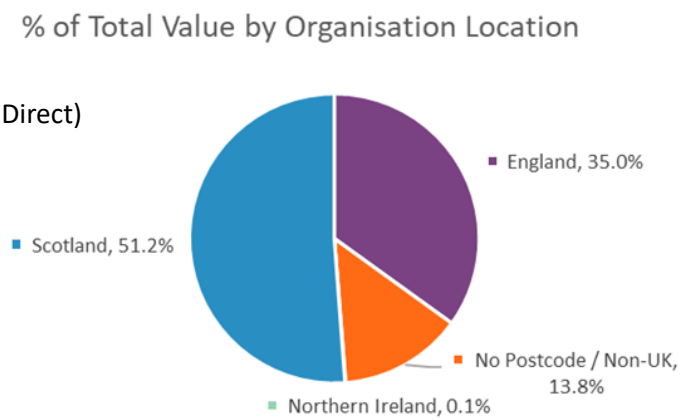
Table 11: In-kind and direct planned R&D investment for relevant NMIS centres

Objective 5 is related to increased investment in R&D with the specific goal of an increase of £23.5 million - £29 million in planned R&D investment over 5 years. Cumulative R&D investment targets have been based on the lower target value (£23.5million), where the current level of investment, £17,009,226, at the halfway point is 74.2% of the lower target (and 58.7% of the higher target).

In-kind contributions represent almost 30% of the total value. In-kind contributions could be of various forms and it may be prudent to outline what these in-kind contributions consists of in the MEF. It should be noted that, where companies provide In-Kind support, the Direct contract value is generally low or zero. Of the 42 companies providing in-kind contribution (£4,951,883), a total of £267,000 of direct value is attributed, of which £242,000 has been provided a single entity.

Figure 6, below, shows a) the % of the total value by organisation location and b) the organisation location for only In-kind contributions, highlighting that a substantial number of the companies providing in-kind support are geographically located within England. It is unclear whether this is as a result of the type of activities undertaken with these companies or indeed if this is due to larger companies being located across the UK but headquartered in England. Given that a number of the key objectives of NMIS are directly related to Scottish operations, it would be prudent to determine a method whereby the split between Scotland and wider UK support is evident. Although it is recognised that this may be difficult given the range and type of support and may be dependent on how companies have been setup, which may not be wholly apparent to NMIS.

a) Total (In-kind + Direct)



b) Only In-kind Contributions

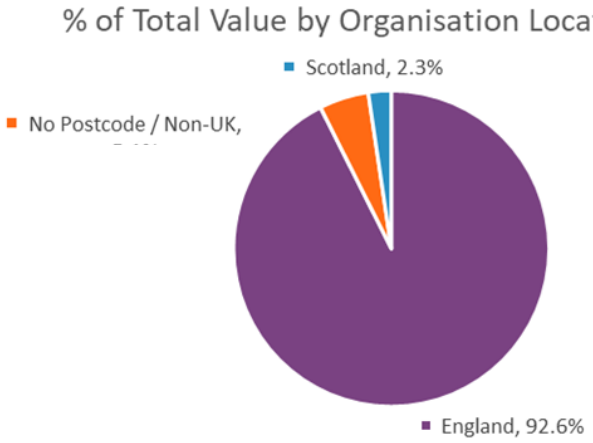


Figure 6: Organisation location for a) total investment in R&D and b) in-kind contributions.

There are 137 Projects detailed in the MEF data, with R&D Investment via each of the centres (NMIS, MSA and DIGF) outlined in Figure 7, below.

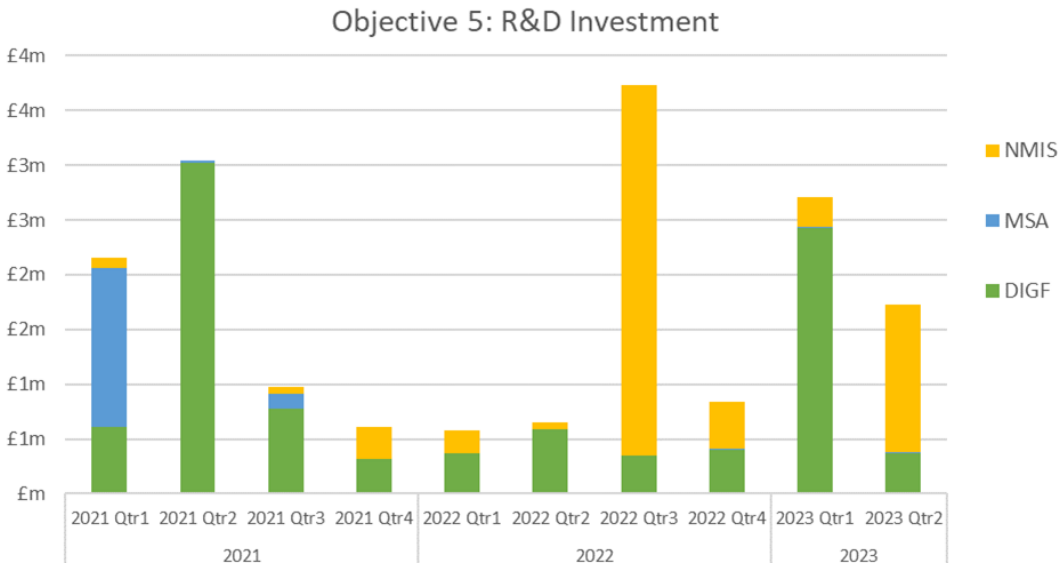


Figure 7: R&D investment over time, segmented by relevant NMIS centres

Of the 137 projects outlined, 70 were attributed to the Digital Factory, DIGF, (combined value of £9,233,422), 18 to MSA (£1,641,217 combined) and 51 to NMIS (£6,134,587 combined).

Feedback from interviews with companies included in the Objective 5 tab of the MEF, identifies that some of the projects included in this tab actually relate to projects carried out with AFRC and LMC. This means that the related performance data for Objective 5 includes projects carried out by NMIS Centres not within the scope of the £66.5m investment by the Scottish Government, which the MEF is designed to report against. Further detail on this can be found in section 7.

Objectives 6 & 7

Objective six is to achieve an increase in planned business and sector capital investment over 5 years of £77m - £88 million. At the halfway point, this value is £1,132,000 which is considerably below the level anticipated to reach the targets outlined. Objective seven is an increase of £68m - £102million in planned turnover from innovation over 5 years, where again it is evident that the planned turnover identified to date is very low in comparison to the target values. It is recognised, and as noted earlier, that the time taken for a public sector innovation intervention to go from inputs and activities to outputs and outcomes from beneficiary companies can take many years to be realised. A breakdown of these values is shown in Table 12, below.

Year, Organisation	Objective 6: Planned Capital Investment	Objective 7: Planned Turnover
2021	**£1,020,000**	**£600,000**
NMIS	£1,000,000	
Confidential	£20,000	£600,000
2022		**£950,000**
Confidential		£500,000
Confidential		£450,000
2023	**£112,000**	
Confidential	£112,000	
Grand Total	**£1,132,000**	**£1,550,000**

Table 12: Objectives covering planned capital investment and planned turnover as a result of NMIS engagement

It should also be noted that two of the five entries have project titles beginning with 'AFRC', which suggests that these involve NMIS centres outside of the scope of NMIS as defined in the £65.5m investment by the Scottish Government. Whilst this could be as a result of where the customer lead was initiated, rather than the centre where the project was actually carried out, it is currently not possible to ascertain whether this is truly the case or if these capital investment projects have been incorrectly assigned to NMIS (as defined within the £65.5m Scottish Government investment) rather than AFRC, LMC, DPMC, etc. Given that these 'AFRC' projects represent £1,112,000 of the total Capital Investment (total value of £1,132,000), this could have a significant impact on the actual increase in capital investment occurring due to activities funded by NMIS as defined in the £65.5m Scottish Government investment project. It should also be noted that £1million has been attributed to NMIS, for a Digital Process Manufacturing Centre.

For Objective 7, it should be noted that this data is generally challenging to obtain from companies for a variety of reasons including, but not limited to, individual inability to calculate the impact of one of many projects undertaken that subsequently lead to increased turnover, unwillingness to attribute success externally, uncertainty in attributing direct and indirect impacts and/or a reluctance to share financial information. Our experience of conducting economic evaluations suggests that these challenges arise across sectors and is not limited to manufacturing. Discussions with NMIS staff indicated that this metric was obtained after the project completion where response rates often taper off. These factors both likely impacted the number and therefore value of meaningful responses obtained. It is understood that NMIS are actively investigating alternative methods of gathering data that can be reported against this objective.

6 Early implementation and delivery

This section assesses different aspects of the early implementation and delivery of NMIS. This includes:

- Company usage of NMIS
- Source of enquiries and referrals
- Perceptions of project success
- Early change in company knowledge
- Operational arrangements for delivery
- Partnership working
- Effectiveness of ongoing monitoring procedures

Each of the above is discussed below.

6.1 Company usage of NMIS

In addition to the analysis of company usage of NMIS, based on MEF data provided in earlier section 5.2, the following section provides a summary of the key findings on company usage of NMIS from the structured company survey.

The companies surveyed as part of this evaluation have used a range of NMIS services and capabilities. Figure 8, below summaries the relative spread across the NMIS centres.

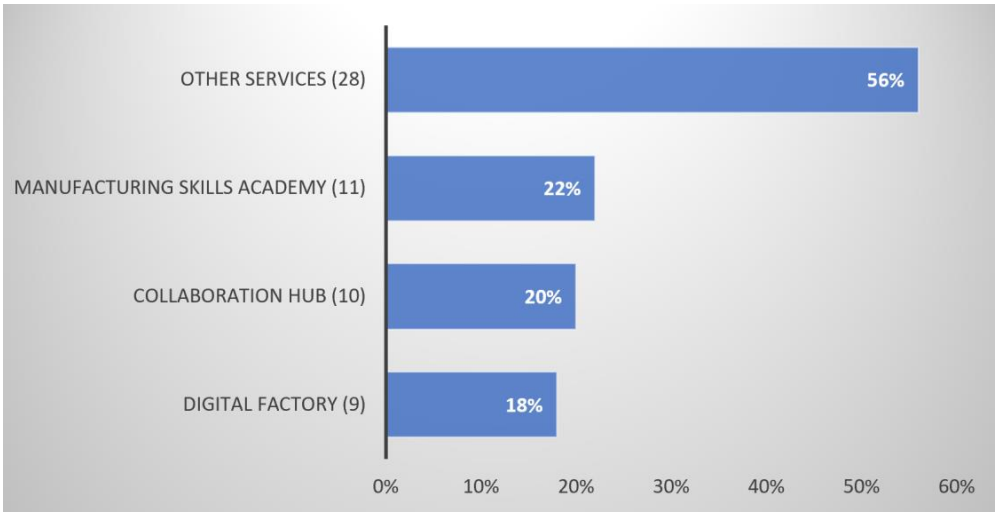


Figure 8: Respondents' use of NMIS centres and capabilities

Respondents were able to select more than one centre and were provided with the option of naming a centre or capability in addition to the MSA, Collaboration Hub and Digital Factory. The most often cited capability was 'consultancy and advice (18 respondents). Capabilities offered via the Advanced Forming Research Centre (AFRC) and Lightweight Manufacturing Centre (LMC) were also identified. This is consistent with the finding that NMIS company engagements, captured in the MEF reporting under 'Objective 3' of the SMART objectives, included AFRC and LMC engagements due to the NMIS CRM system not being able to differentiate between these.

Respondents were also asked to identify the type of support they received from NMIS. Figure 9, below, summarises the results from this question.

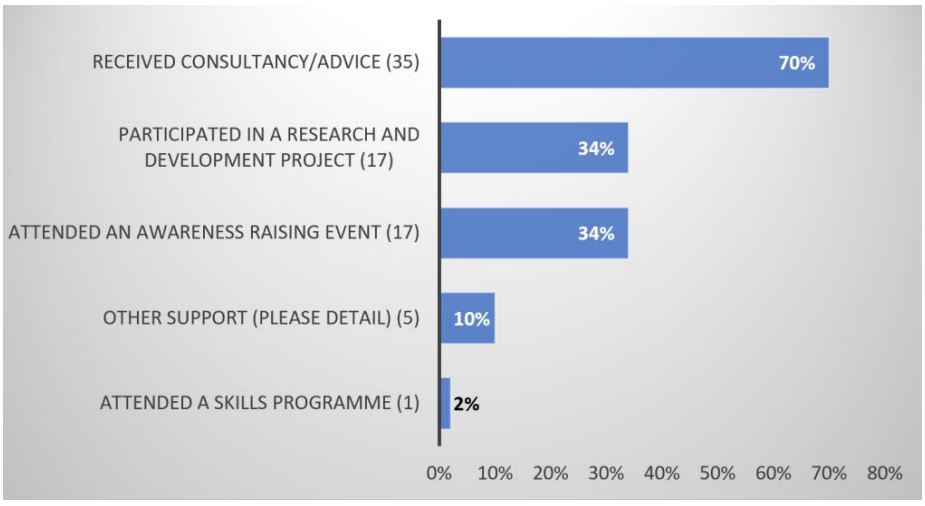


Figure 9: Type of support received from NMIS

Respondents were able to select more than one type of support received.

Clearly, consultancy and advice were the most common type of support received with over two thirds of respondents selecting this. R&D project participation and attendance at awareness raising events

were used by one third of respondents. Attendance at a skills programme was only selected by one respondent. It should be noted that there is a significant element of non-participation bias amongst companies known to have received support from MSA. This is a result of the way in which data about these participants is recorded. The MSA operates its own data recording system, developed to meet the requirements of reporting for the National Transition Training Fund and other specific sources of skills funding. The data that is then passed on, for inclusion in the NMIS MEF reporting, does not include names and contact details of those participating in MSA skills programmes. Therefore, it was not possible to include this cohort of supported companies and individuals in the company survey, meaning results relating to MSA capabilities and services are likely to be lower than actual.

Respondents were then asked whether they could have received similar support from sources other than NMIS. Figure 10, below, summarises the response to this question.

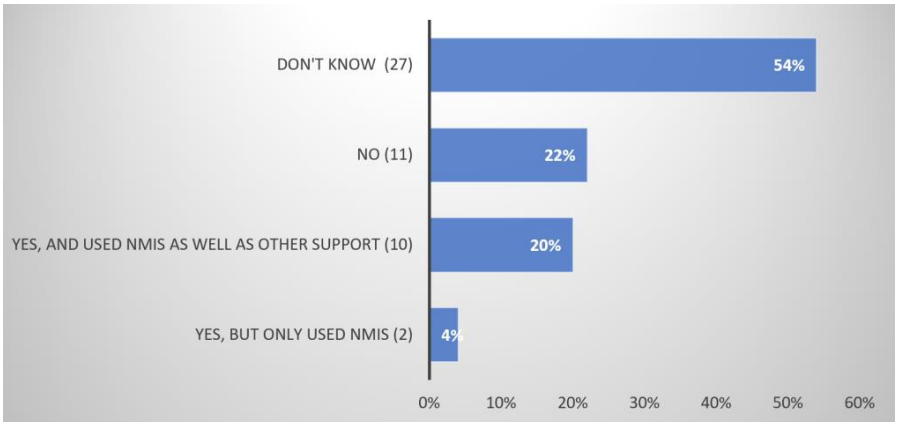


Figure 10: Views on whether respondents could have accessed similar support from other sources

12 respondents (24%) stated that they could have accessed similar services, with 10 of these (20%) utilising these services alongside the NMIS support. The providers identified included SMAS (3), CeeD (2), Other university departments (2), private providers (2) and a sector support network.

6.2 Source of enquiries and referrals

Respondents were asked to identify how they became aware of, and subsequently approached, NMIS. Figure 11, below, identifies the main sources of enquiries and referrals.

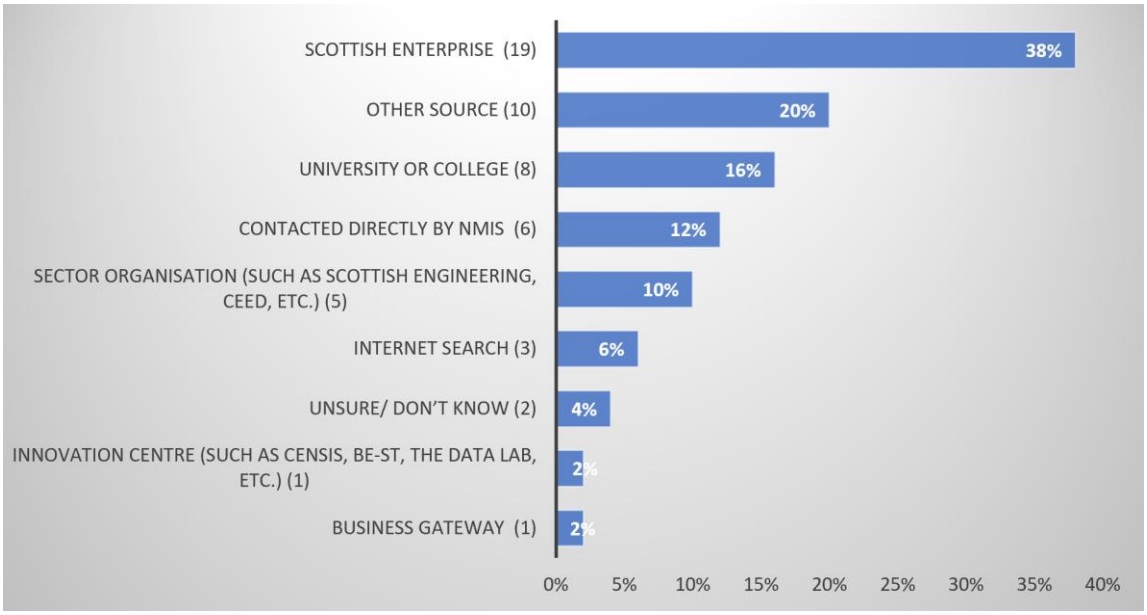


Figure 11: Sources of referral to NMIS

It should be noted that the percentages add up to more than 100% as some respondents highlighted more than one source of referral. Scottish Enterprise has been the most significant source of referral. In-depth company discussions suggest this includes signposting by both Scottish Enterprise Account Managers and the Scottish Manufacturing Advisory Service (SMAS). NMIS outreach was also responsible for a significant number of engagements.

Universities and colleges are also identified as a source, as are sector support organisations such as Scottish Engineering and CeeD. A diverse range of 'Other sources' were named, including Interface, Scottish Edge, Innovate UK, LinkedIn, a robotics manufacturer, networking event, Techex, Product Design Scotland, Zero Waste Scotland and a business contact.

Some stakeholder feedback identified an issue, in some cases, where companies were being referred to NMIS without a full understanding by the referrer of what capabilities NMIS offers. This has, on occasion, lead to the company having expectations about NMIS capabilities that cannot be met and/or where it would have been more realistic to refer them to a different support service. Several stakeholders stated that there was a need to better communicate NMIS capabilities to companies and intermediaries so that there was a more focused flow of enquiries that better reflect the remit of NMIS.

6.3 Perceptions of project success

Respondents were asked to identify whether their engagement with NMIS had already resulted in benefits to their company or was expected to do so in future. Table 13, summarises the responses.

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA	% Benefitted or may benefit
Base	1424	8%	31%	45%	16%	39%
Knowledge	294	21%	43%	18%	18%	64%
Networking	246	13%	28%	44%	15%	41%
Innovation	396	4%	30%	52%	14%	34%
Sales	194	1%	31%	56%	11%	32%
Finance	294	1%	21%	59%	20%	21%

Table 13: Overview of level of achieved and future benefits arising from NMIS support

In terms of benefits already achieved, as a result of engaging with NMIS, companies reported that the main areas of benefit already achieved were increased knowledge (21%) and improved networking (13%). A limited level of innovation (4%), sales (1%) and finance (1%) benefits had already been achieved.

Respondents were also asked to briefly describe what the best aspect was about the support they received from NMIS. The responses have been used to generate the following word cloud.

Figure 12: Word cloud summarising respondent views on best aspects of support

Further feedback was provided, highlighting that the impartiality of NMIS was a key strength with lack of commercial bias and provision of honest opinions.

It is clear from this feedback that the support provided by NMIS is regarded as beneficial, or potentially beneficial, to many of the engaged companies. For example, 64% of companies identified that they have, or may in future, benefit from increased knowledge and 41% through improved networking. Around one third reported that they had benefitted or may benefit in the areas of innovation and sales.

Several stakeholders stated a view that innovation support interventions could take a significant number of years between the intervention being delivered to a particular company and economic benefit arising from it. This is consistent with the findings of a study by Frontier Economics, for BEIS, titled, 'The impact of public support for innovation on firm outcomes (2017)' that *'it takes around 1–3 years for firms to turn new innovation into new revenue streams, and that it would take more time for firms to translate innovation support into new innovation. This suggests that impacts in terms of productivity could take even longer to materialise, consistent with evidence from other evaluations which have found productivity impacts typically after around 4 or more years.'*

As NMIS is in the early years of delivery it is reasonable to expect the profile of benefits already achieved by companies as detailed in above Table 13.

Respondents to the structured company survey were asked for their views on how NMIS could improve the support delivered. A total of 11 of the 50 provided usable responses. The most significant theme from these comments (mentioned by 3 respondents) was more funding for companies to engage with NMIS and clarity about how to access this funding.

> *"Understanding support from Scottish Enterprise to finance the engagement of business to work with NMIS in design and manufacture of novel products will be of great value."*

Two respondents highlighted the need to increase staff resources within NMIS to deal with company enquiries.

> *"It was an exploratory conversation about some product consultancy, the team were overworked and there were delays in getting the info back."*

Two respondents suggested costs needed to be more competitive compared to other providers.

> *"The costs were higher and did not cover all the requirements for our project". "There were cheaper options."*

The remaining comments included individual suggestions covering: the location not being central enough, the need for NMIS to be more proactive, sorting out insurance issues about using NMIS equipment in client premises, more staff to support design and manufacture of novel products and being less academically focused.

6.4 Early changes in company knowledge

Respondents were asked about the degree to which knowledge benefits have been achieved or will/may be achieved in future. The responses to this question are summarised in Table 14, below.

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA
Base	294	21%	43%	18%	18%
Improved understanding of NMIS capabilities	50	44%	38%	12%	6%
Improved knowledge and skills about assessing the business potential of advanced manufacturing	50	26%	46%	20%	8%
Improved knowledge and skills about assessing technical potential for advanced manufacturing in your business	50	16%	52%	16%	16%
Improved knowledge and skills about implementing advanced manufacturing in your business	50	16%	52%	16%	16%
Improved knowledge and skills about using specific advanced manufacturing technologies and processes in your business	50	16%	58%	16%	10%
Other knowledge and skills benefit (please detail)	44	7%	7%	32%	55%

Table 14: Degree to which knowledge benefits have been achieved or will/may be achieved in future, by type

The main knowledge benefits already achieved are an improved understanding of NMIS capabilities (44%) and improved knowledge and skills about assessing the business potential of advanced manufacturing (26%). A majority of respondents also stated that their engagement with NMIS would (or may) result in other benefits in future including:

- Improved knowledge and skills about using specific advanced manufacturing technologies and processes in their business (58%)
- Improved knowledge and skills about assessing technical potential for advanced manufacturing in their business (52%)
- Improved knowledge and skills about implementing advanced manufacturing in their business (52%)

In a small number of cases, respondents also highlighted other tangible benefits from the increase in knowledge arising from their engagement with NMIS.

> *"Through participation with NMIS and Strathclyde University we have just recently been granted a Patent for our Company, which we would not have had the knowledge otherwise, which provided the confidence and reassurance to press on for 4 years and eventually gain our Patent".*

6.5 Operational arrangements for delivery

The following structure is taken from the approval paper considered by the Scottish Enterprise Executive Leadership Team Approvals Group that met on 2nd July 2019.

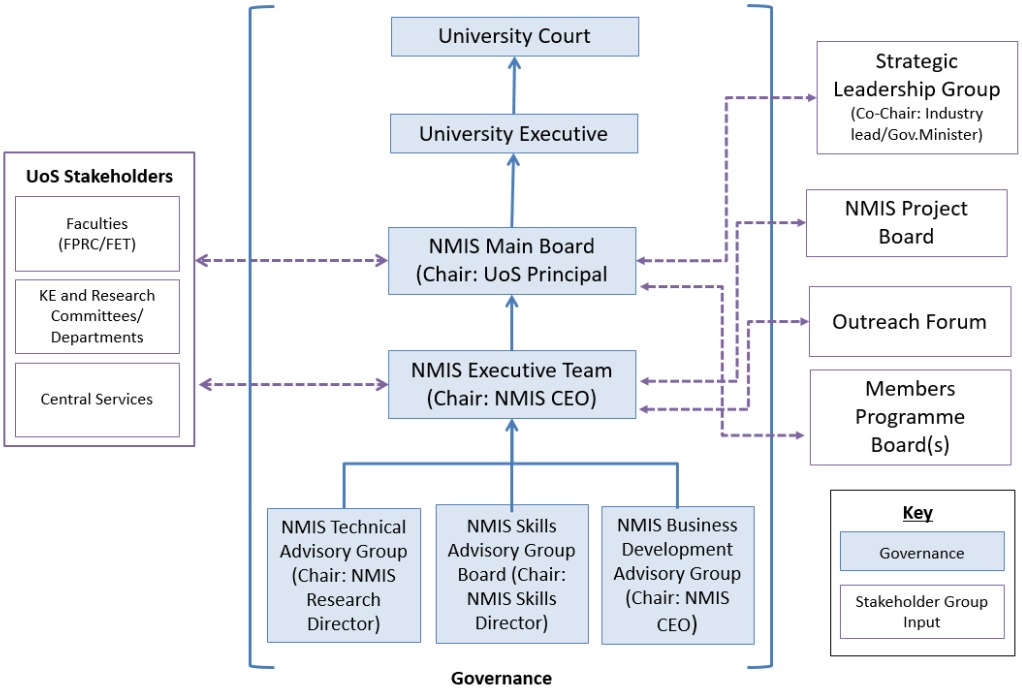


Figure 13: NMIS structure from approval papers

Stakeholders described how, following approval, the governance of NMIS was transferred from the NMIS Project Board (later renamed the One Scotland Collaboration Group - OSCG) to the University of Strathclyde. In forming the NMIS Main Board, the objective was to have balanced representation between public and private sectors. As such a maximum of two board positions were offered to the NMIS Project Board/OSCG with the facility for these positions to be rotated between members of the NMIS Project Board/OSCG after an unspecified time period. Stakeholders were unaware of any process to trigger such a rotation. It was agreed by the NMIS Project Board/OSCG that Scottish Enterprise would take up one of the NMIS Main Board, given its contractual role. After a period of debate within the NMIS Project Board/OSCG, it was decided that a Skills Development Scotland representative would fill the second position.

Some stakeholders describe levels of communication between NMIS and OSCG as an area for improvement. There appears to be no systematic process for ensuring Board minutes are shared with OSCG members. There is an informal process in place intended to enable OSCG partners to discuss NMIS Board meetings prior to them occurring and be debriefed afterwards on key decisions and actions arising from the meetings. This involves separate meetings between representatives of Scottish Enterprise and Scottish Government before and after NMIS Board meetings. However, these meetings have not always occurred, due to time availability of the individuals involved.

These initial decisions, at the stage of creating the NMIS Board, have led to no direct representation of the Scottish Government on the NMIS Board. The Scottish Government plays a key role as funder of interventions in the advanced manufacturing support ecosystem and involvement in the delivery of the Making Scotland's Future Programme, through participation in various workstreams. Several stakeholders indicated that direct Scottish Government representation on the NMIS Board would improve communication to the benefit of the overall Scottish ecosystem and provide opportunities to

optimise strategic alignment. This could be in the form of formal Board membership or observer status, for example. This would need to be discussed by the key parties involved including NMIS (University of Strathclyde) and Scottish Government.

Several stakeholders also suggested that the role of the OSCG be reviewed and clarified. This suggestion is related to perceived areas of duplication between the activities of the Making Scotland's Future workstream groups and the OSCG. Some OSCG members are also members of the Making Scotland's Future workstreams.

Other stakeholders also questioned how the activities and performance of NMIS and the Making Scotland's Future workstreams was being communicated to other players in the Scottish advanced manufacturing ecosystem, and that this is an opportunity for improvement.

At an operational level, the NMIS senior management team roles align well with the structure outlined in Figure 13, with director level positions for the MSA and Digital Factory alongside a Chief Operating Officer and Chief Commercial Officer. During stakeholder consultations with several NMIS staff it was not clear who had responsibility for the Collaboration Hub activities described in the original business case.

Several stakeholders highlighted that there was an initial period of turnover in senior management roles, but this had lessened now with some stakeholders stating that the current leadership team was bringing stability to strategic and operational decision making.

Several stakeholders highlighted that there were different interpretations of the scope of NMIS which could, on occasion, hinder communication between partners. From the perspective of this interim evaluation, the scope of NMIS is limited to the key areas of activity included in the business case that was approved for £66.5m of Scottish Government investment, i.e. the MSA, Digital Factory, Collaboration and the ring-fenced SME Engagement programme. However, the internal NMIS operational delivery team view NMIS as having a wider offering, taking into account centres developed previously and activities funded by a wider set of organisations, including Innovate UK, with a UK wide remit. The NMIS website reflects the latter definition of scope, and communicate that NMIS consists of five centres:

- Advanced Forming Research Centre
- Digital Factory
- Digital Process Manufacturing Centre
- Lightweight Manufacturing Centre
- Manufacturing Skills Academy

Based on discussions with supported companies, it is also clear that their perception of NMIS aligns more with the way in which it is portrayed by the NMIS website. Companies talked interchangeably about support received across these centres and directly from the University of Strathclyde itself. In some cases, attempts to discuss NMIS, as defined for this evaluation, created an artificial boundary that the companies found challenging to give feedback on. It is anticipated that this constraint will also be present in future evaluations of NMIS, that follow the scope as defined in this study.

With respect to the issue of companies referring interchangeably between NMIS and the University of Strathclyde, it is noted that this is consistent with an issue included in the risk register for NMIS, maintained by Scottish Enterprise on behalf of the OSCG: *"Dilution of the NMIS brand so that it is*

perceived as a University of Strathclyde initiative rather than a One Scotland multi-partner programme." One stakeholder pointed out that all NMIS staff continue to use @strath.ac.uk email domain names and that this was something that contributed to confusion about whether external parties were dealing with NMIS or the University of Strathclyde (in terms of branding).

6.6 Partnership working

Stakeholder feedback on partnership working of the MSA highlighted numerous examples, including:

- Work with West College Scotland to carry out a meta skills commission for NMIS
- Collaboration with the University of the Highlands and Islands, University of Strathclyde and University of Edinburgh to develop a 20 microcredit online course titled 'Digital Manufacturing to Net Zero'. This involves 200 hours of self-directed online learning. Learners successfully completing the SCQF Level 7 course you will receive a formal University of Strathclyde Continuing Professional Development (CPD) certificate
- The creation of a range of Continuous Professional Development type online and in person skills training offerings in collaboration with a range of delivery partners from the private sector, colleges and universities
- The MSA is also working with Skills Development Scotland, Scottish Engineering and others on the Making Scotland's Future skills workstream.

The MSA is also working with Scottish Engineering, Skills Development Scotland, and others, to develop a pilot programme to help facilitate apprenticeships in supply chain companies. The 'Pre-Approved Talent Scheme' (PATS) is being established to link up SME supply chain companies with individuals that were previously interviewed for apprenticeship roles by large manufacturers but were unsuccessful at that stage. This recognises that there is a high-quality talent pool that has shown an interest in manufacturing as a career with the potential to undertake apprenticeships with related supply chain companies.

Stakeholder feedback on partnership working by NMIS, beyond the MSA, was mixed. Some stakeholders identified that NMIS liaises with several Advanced Manufacturing Challenge Fund projects, have good working relationships with SMAS and are involved in other Making Scotland's Future workstreams, such as the ecosystem workstream. Partnership activities, such as with ETZ Ltd, to help deliver an energy incubator and scale-up hub in Aberdeen, were also identified as good examples of serving different geographical areas.

Some other stakeholders stated they were uncertain about the effectiveness of NMIS activities related to geographical and sectoral outreach, as they had low awareness of what was happening.

Some stakeholders highlighted a need to create a better understanding across the advanced manufacturing support ecosystem about the demarcation of who provides what services to Scottish SME manufacturers. It is understood that the ecosystem workstream within the Making Scotland's Future Programme is in the process of establishing its terms of reference and could include this task.

Several stakeholders highlighted that there could be some tension between partners in the advanced manufacturing support network. This arises in situations where opportunities to bid against external funding calls with objectives aligned with adoption of advanced manufacturing technologies and processes. Stakeholder identified that it should be the case that the best placed support organisation

should bid to access this funding but there is no formal process in Scotland to liaise between public sector support organisations to ease the pressure to generate revenue as part of achieving full, or partial, financial self-sustainability. This reality can lead to friction and sub-optimal outcomes from the point of view of companies with the potential to access future services based on these funding opportunities.

Several stakeholders stated that there were good relationships between operational teams in NMIS, Scottish Enterprise, Skills Development Scotland, in areas such as communication, skills, etc.

6.7 Effectiveness of ongoing monitoring

The ongoing monitoring of NMIS has been investigated through review of the initial Monitoring and Evaluation Framework guidance document drafted by Scottish Enterprise, analysis of MEF performance data using the Q2 2023 report and discussions with project partners and NMIS operational staff with responsibility for collating MEF data.

This section includes a discussion about the MEF process, identifying issues and opportunities for improvement. Earlier, section 5.2 includes an analysis of actual versus target performance up to Q2 2023.

The quarterly MEF reporting is designed to report on progress towards the SMART objectives defined at funding approval stage. It covers:

- Objective 3 Development and delivery of Industry 4.0 skills programmes to 500 industry leaders, 1,000 employees and 600 SME trainees over 5 years
- Objective 4 Engagement with 2,000 manufacturers across Scotland over 5 years through awareness-raising events, consultancy and project delivery, at least 50% of which will be SMEs
- Objective 5 Increase of £23.5M-£29M in planned R&D investment over 5 years
- Objective 6 Increase of £77M-£88m in planned business and sector capital asset investment in Industry 4.0 over 5 years
- Objective 7 Increase of £68M-£102M in planned turnover from innovation over 5 years

It is noted that objectives 1 and 2 have already been completed, covering 'Delivery of a fully operational NMIS' and 'Implementation of an industrial outreach programme', respectively.

It is also noted that whilst the MEF targets themselves are not a contractual requirement of funding, the employment of a Data Reporting Officer to collate and report performance is. It is further noted that this has resulted in a good level of resource being available to constantly develop the MEF procedures and deliver timely quarterly reports.

The Data Reporting Officer sources performance data from the NMIS CRM system, which is kept up to date by a small number of NMIS business development personnel with quality control oversight by the Chief Commercial Officer.

The NMIS customer journey, tracked through the NMIS CRM system, is based on assigning contacts as either:

- Engagement
- Lead (minimum of two hours of engagement)
- Opportunity

- Project

NMIS business development staff engage in outreach activities, partners refer companies to NMIS and companies themselves approach NMIS for support. This results in an 'Engagement' being created on the CRM system.

If an Engagement is 2 or more hours, it then becomes a Lead. A Lead (with a unique reference number) is created. New Leads created within a MEF reporting period are extracted from the CRM and counted as engagements in the Objective 4 tab (if the company is not already on the cumulative list of unique Scottish manufacturers engaged). It is not clear how the depth of company engagement can be represented in the MEF report, i.e. if one company has multiple 'leads' on the CRM system across several MEF reporting periods. A Lead can then subsequently be upgraded to an 'Opportunity' then a 'Project'. Projects are then added to the Objective 5 tab of the MEF on a quarterly basis.

The MSA has developed its own data recording system in response to specific reporting requirements of specific funding sources, such as the National Transition Training Fund. When compiling quarterly MEF reports, the NMIS Data Reporting Officer extracts data from the CRM and enters it into the appropriate tab of the MEF spreadsheet for objectives 4 to 7. Data is then provided separately by the MSA to allow reporting on performance of objective 3.

Once completed the MEF is provided to Scottish Enterprise, who then circulate it to partners in the OSCG. Quarterly meetings are arranged between Scottish Enterprise and NMIS to discuss the latest MEF performance data.

Feedback from stakeholders and analysis of the Q2 2023 MEF data has identified that partners are broadly positive about the MEF process and the quarterly reports this delivers. It is clear that the contractual requirement for NMIS to employ a Data Reporting Officer has been very beneficial in producing and sharing the quarterly MEF reports.

Feedback from stakeholders has also identified a number of observations, issues and opportunities for improvement of the MEF. These are discussed generally and then issues with data relating to specific SMART objectives is described.

It has been identified that the process of establishing MEF guidelines has been beneficial to both Scottish Enterprise and NMIS. There is a very good relationship and level of communication between the Scottish Enterprise and NMIS teams involved in ongoing monitoring and evaluation. Initially, Scottish Enterprise produced a guidance note to clarify the scope and boundaries of data to be included in the MEF. This has been a collaborative process rather than a 'top-down' set of rules and can be regarded as good practice. It has provided clarity for both organisations and allowed the MEF process to be iteratively improved as challenges with practical implementation have arisen. Some of the key changes agreed are discussed below.

An opportunity for improving this process would be to convert the initial MEF guidance document into a live document where agreed changes can be recorded in one place. This would be helpful if personnel were to change in either organisation, ensuring there was an easily accessible record of what amendments had been agreed to the MEF data recording process.

One of the key issues with the data being reported on impacts across SMART objectives 4 to 7 arises from the different definitions of NMIS. To clarify: the MEF targets relate only to the activities, outputs

and outcomes arising from the delivery of the NMIS business case approved by Scottish Enterprise and obtaining £65.5m of Scottish Government investment. The actual scope of NMIS, in a practical operational delivery sense, is wider than this. It also includes activities, outputs and outcomes arising from other separately developed interventions, with different sources of funding, including the AFRC, LMC and DPMC. Operationally, 'NMIS' covers a wider scope than that used in relation to the MEF. Therefore, it operates a central CRM system that is designed to record data relating to a growing number of interventions across, currently, five centres. Two of these centres (MSA and the Digital Factory) align with the intervention approved and funded definition of NMIS that is the subject of this evaluation.

As a result of this reality, NMIS has stated that there have been challenges with extracting data its CRM system and the separate data recording system operated by the MSA. It has been difficult, in some circumstances, to attribute and record the 'ownership' of activities, outputs and outcomes to individual NMIS centres in cases where individuals from multiple centres have engaged with companies over time.

This evaluation has identified that, across the data included in the MEF for objectives 4 to 7, there are activities, outputs and outcomes recorded that actually arise from engagement with the AFRC, LMC and DPMC, in addition to the data recorded as a result of engagement with the MSA and Digital Factory. Whilst the collaborative approach to developing the MEF data reporting means that both parties are aware of, and accept, this data limitation, it is not clear that this is communicated more widely to partners. The outcome of this is that the quarterly MEF data across objectives 4 to 7 overstates, by an unknown level, the actual activities, outputs and outcomes arising from NMIS as it was defined in the business case that attracted £66.5m of investment from the Scottish Government.

This is clearly an issue that has been considered for some time by NMIS and Scottish Enterprise, so there is unlikely to be a simple change that can be made in the NMIS CRM system. In the absence of such a resolution, consideration should be given to caveating the MEF data to make it clearer that the performance data includes an unknown level of activity, outputs and outcomes from AFRC, LMC, DPMC, etc. as well as from the MSA and the Digital Factory.

Issues, observations and opportunities for improvements in the MEF data specific to each of the SMART objectives, 3 to 7, are discussed below.

Objective 3 Development and delivery of Industry 4.0 skills programmes to 500 industry leaders, 1,000 employees and 600 SME trainees over 5 years

It was highlighted that the MSA does not record job roles as part of its monitoring system so it has been agreed with Scottish Enterprise that a proxy split of roles can be applied to total number of participants in NMIS training programmes of 80% employees and 20% industry leaders. However, analysis of the Q2 2023 MEF data identifies that this ratio is not applied consistently across all quarters. Where the split is not 80%/20% employees to leaders, it is not clear how this is calculated.

Inspecting the 'Extra MSA' tab within the MEF data indicates that the 80:20 split is simply based on leaders and employees, i.e. a total number has been identified and split between employees (80%) and leaders (20%). There has been no material change to the overall values as a result of rounding with the calculations herein. It should also be noted that this 80:20 calculation only appears relevant for 2021 Q1 and 2021 Q2. The 'MSA Amended Data' tab highlights this calculation with the values in the Table for 2021 Q1 and Q2 all 'amended figures'. It is unclear whether the figures input from the MSA for subsequent dates have been calculated similarly or indeed where this data has been extracted from.

The 'SME Trainees' figures (15 in 2021 Q1 and 2 in 2021 Q2) has been attributed to courses with no titles with Column H 'Online Course' as 'AMCF', which is likely to represent courses under the Advancing Manufacturing Challenge Fund, however this is not clear from the MEF explanations. It should also be noted that many of the Columns are simply entitled 'Column1' which may prove to be a challenge in the event of for example, personnel change, thus more comprehensive documentation would therefore be suggested.

Within the 'MSA Sample Formulas' tab, Column K is titled 'Intensity of Engagement' but appears to be represented by a date. It should also be noted that the date format across columns is inconsistent with column J (Start Date of Engagement) formatted as MM/DD/YYYY and Column K (Intensity of Engagement) in the UK DD/MM/YYYY format. For consistency of communication, it would be preferrable if one date format was used throughout the MEF spreadsheet.

There is a lack of completeness about the titles of courses completed by trainees. There is an opportunity to improve this data so the MEF can provide an overview of the type of training being undertaken.

Objective 4 Engagement with 2,000 manufacturers across Scotland over 5 years through awareness-raising events, consultancy and project delivery, at least 50% of which will be SMEs

Inspection of the MEF 2023 Q2 Objective 4 tab identified that approximately 35% of records had the NMIS Centre field missing. In addition, there were 20 company engagements identified as LMC for the NMIS Centre and 29 identified as AFRC.

Where the LEAD Reference is MSA, the 'Company Sector' field is blank (in 43 instances). This is likely a function of the data collected and there may be opportunities to include this data in future or to include questions pertaining to this upon sign up to the MSA courses. The NMIS centre for all of these is similarly blank. Of the other Leads, there are 19 of those with 'NMIS Centre' of MSA. It is unclear whether both of these selections are MSA referrals or indeed why these have been treated differently.

The wording of Obj 4 is *"Engagement with 2,000 manufacturers across Scotland over 5 years through awareness raising events, consultancy and project delivery, at least 50% of which will be SMEs".* A number of the organisations listed in the Objective 4 tab are not manufacturers. Fourteen sector support bodies, innovation centres and publicly funded support bodies were identified in the Q2 2023 MEF Obj 4 tab.

Approaching the companies included in Objective 4 tab of the MEF to participate in the structured company survey resulted in two companies highlighting that they were consultancy companies rather than manufacturers.

In addition, a small number of duplicate entries in the Objective 4 tab were identified. This is due to minor differences in the name recorded in the CRM system, with some companies appearing to have more than one record. For example, 'Widgets Ltd' and 'Widgets Limited'. An additional simple quality control step could be added to identify these instances, such as extracting the company name column from the MEF and sorting that column alphabetically.

Within a MEF quarterly reporting period there have been instances of new companies being engaged and a 'project' identified immediately so that a 'Lead' is never created. This has led to some projects involving Scottish based companies appearing on the Objective 5 tab of the MEF, detailing an R&D project but that company never appearing on the Obj 4 tab (unique Scottish manufacturer

engagements). A cross-check of the companies associated with new opportunities and projects created within a MEF quarter could be carried out to ensure they are also appearing on the Obj 4 tab to ensure no unique Scottish manufacturer engagements are missed.

There is an increasing trend in the number of companies not having their SME/Non-SME status reported within Objective 4 of the MEF. It would be helpful to remind those involved in data entry to the CRM system and the MSA reporting system that this data is necessary to help report performance.

Similarly, only 73% of records have a SIC code recorded in Objective 4. In cases where a SIC code is recorded it is typically a five digit SIC code. To aid with future analysis, consideration should be given to improving completion rates for this field and also to create categories that align with 2 digit SIC codes, which makes aggregating data easier and more meaningful (e.g. to identify under-represented manufacturing sectors). The following categories could be used rather than the current 5 digit SIC codes:

- Division 10: Manufacture of food products
- Division 11: Manufacture of beverages
- Division 12: Manufacture of tobacco products
- Division 13: Manufacture of textiles
- Division 14: Manufacture of wearing apparel
- Division 15: Manufacture of leather and related products
- Division 16: Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- Division 17: Manufacture of paper and paper products
- Division 18: Printing and reproduction of recorded media
- Division 19: Manufacture of coke and refined petroleum products
- Division 20: Manufacture of chemicals and chemical products
- Division 21: Manufacture of basic pharmaceutical products and pharmaceutical preparations
- Division 22: Manufacture of rubber and plastic products
- Division 23: Manufacture of other non-metallic mineral products
- Division 24: Manufacture of basic metals
- Division 25: Manufacture of fabricated metal products, except machinery and equipment
- Division 26: Manufacture of computer, electronic and optical products
- Division 27: Manufacture of electrical equipment
- Division 28: Manufacture of machinery and equipment n.e.c.
- Division 29: Manufacture of motor vehicles, trailers and semi-trailers
- Division 30: Manufacture of other transport equipment
- Division 31: Manufacture of furniture
- Division 32: Other manufacturing
- Division 33: Repair and installation of machinery and equipment

An analysis of the manufacturing sub-sectors engaging with NMIS was carried out using results from the structured company survey. This can be seen in earlier Figure 29.

To help partners understand how NMIS is engaging companies it would be helpful to have another field detailing the type of support provided. For ease of analysis this would best be a set of pre-defined categories that could be added to the CRM and the MSA data recording system.

Objective 5: Increase of £23.5M-£29M in planned R&D investment over 5 years

Several stakeholders highlighted that the MEF data may be under-reporting the amount of R&D spend being carried out in Scotland through NMIS projects. The explanation provided for this is that the CRM records location of the R&D based on the address on the company purchase order number or project contract. So, for example, a company registered in London but with an operational site in Scotland, where the research will actually be carried out, may be recorded as taking place in England if the registered address is included in the documentation instructing the project. This process is followed for audit robustness reasons. Consideration should be given to how this process might be changed to provide an auditable level of documentation that states the true location of the research project. For example, this could be in the form of a letter from the company stating where the research will be carried out or an additional question in an application form. Whatever process options are developed they should be agreed between NMIS and Scottish Enterprise, as a minimum.

The MEF guidance states that the categorisation of companies carrying out R&D includes Scottish indigenous (with HQ in Scotland) and inward investors (with HQ beyond Scotland). It is not clear that there is a process by which companies based outside Scotland seeking to carry out an R&D process are classified as a potential inward investor. It would be helpful to clarify whether all non-Scottish companies were classified as inward investors or whether there is a screening process before these non-Scottish companies are included in the objective 5 data.

Based on in-depth discussion with some of the companies included the objective 5 tab, it is clear that several suppliers of equipment to NMIS are included. In these cases, an in-kind contribution to an R&D project is noted, typically without an additional cash contribution. It is not clear why these companies are being included in the objective 5 tab as discussions with them have not identified specific R&D projects. This situation should be clarified.

In the MEF, there appear to be two columns that cover the type of projects undertaken, these are visible when data is extracted from the dashboard, creating a new tab. Columns H and I within this are entitled ‘Project Type’ and ‘Project Type (Project) (Project)’, it is unclear why the second column exists and whether it is an incomplete/altered version of ‘Project Type’. However, there are inconsistencies between both columns. ‘Project Type’ aligns with the ‘Reference’ (Column D) code, where ’Related Business’ code number (Column G) appears to similarly be an extraction from the project ‘Reference’.

Project type has been categorised as either CAPB, CATP, CATX, CIMP, CORD, CORE, CRAD, DIRF, ENGD or MEMB. It is uncertain what each of these represents without making assumptions however this information is likely to prove beneficial in understanding the type of support provided by NMIS and could be better utilised within the evaluation to wholly understand the nature of NMIS services. It should also be noted that only CAPT, CATX, CORD, CRAD, DIRF, ENGD, MEMB selections are used within the Obj5 data (Column E).

Within the data there are a number of entries which appear to relate the same organisation (e.g. ‘High Value Manufacturing Catapult (HVMC)’ and ‘HVM Catapult’), this is evident in Column C of the Obj5 data tab and implies that there are multiple records for this organisation.

NMIS itself is also represented differently, as both ‘National Manufacturing Institute Scotland (NMIS)’and ‘Digital Factory NMIS’, it is unclear what the underlying reasons for this are and it is

suggested that where possible, deliberate instances of multiple entries for the same organisation should be made explicit and follow a standardised format for consistency.

Objectives 6/7 Increase of £77M-£88m in planned business and sector capital asset investment in Industry 4.0 over 5 years and Objective 7 - Increase of £68M-£102M in planned turnover from innovation over 5 years and

Stakeholder feedback has noted that data for Objective 6 (planned capital investment) and Objective 7 (planned increased turnover) is difficult to obtain. Currently, at project completion stage, the companies are contacted by email to ask that they provide estimates for these metrics. If no reply is received, then a reminder email is sent. The response rate to this has typically been low. Some of the feedback from companies in response to this request is that there is a lack of a credible pathway from the engagement to these metrics, it is too early in the TRL development process to estimate, etc. NMIS is currently speaking with peers to investigate alternative methods of data capture for these metrics, whilst balancing the desire to avoid overburdening the companies. This is being considered also in the context of additional data requirements from other funders.

In addition to the issues, observations and opportunities for improvement, about the MEF data described above, stakeholders queried whether it is possible to track referrals made to other parts of the support ecosystem to help demonstrate how integrated NMIS is. This question should be considered by the NMIS data reporting team.

Stakeholders have also highlighted that the measurement of Net Zero impacts from NMIS engagements and projects is an emerging activity. Although measurement methodology guidance has been developed and questions asked at project closure, there is an opportunity to improve reporting of carbon reduction from both engagements and R&D projects.

7 Feedback from supported companies

Qualitative interviews were carried out with eleven companies. Nine of these were included in the objective 5 tab of the NMIS MEF report. This means they are companies recorded as participating in R&D projects with a monetary value consisting of cash and/or in-kind contributions. The other two companies interviewed were included in the objective 4 tab of the MEF, meaning that they had 2 or more hours of engagement with NMIS. An anonymised summary of each company's experience is provided in Appendix A. In addition to the analysis of the qualitative surveys, this section also includes findings from the structured company survey provide insights into the various themes, including

- Barriers and challenges faced by companies
- Company objectives from support
- Early views around customer satisfaction
- How companies believe support will deliver business objectives
- Achievement of any outputs and outcomes (such as new products, processes or services)
- How companies expect productivity to be improved
- Progress towards net zero ambitions

7.1 Barriers and challenges faced by companies

The original case for NMIS identified several aspects of imperfect information including capacity of SMEs to engage in advanced manufacturing and uncertainties about potential benefits. The company survey carried out during this evaluation confirmed the presence of these, and other barriers to adoption, as shown in Figure 14, below.

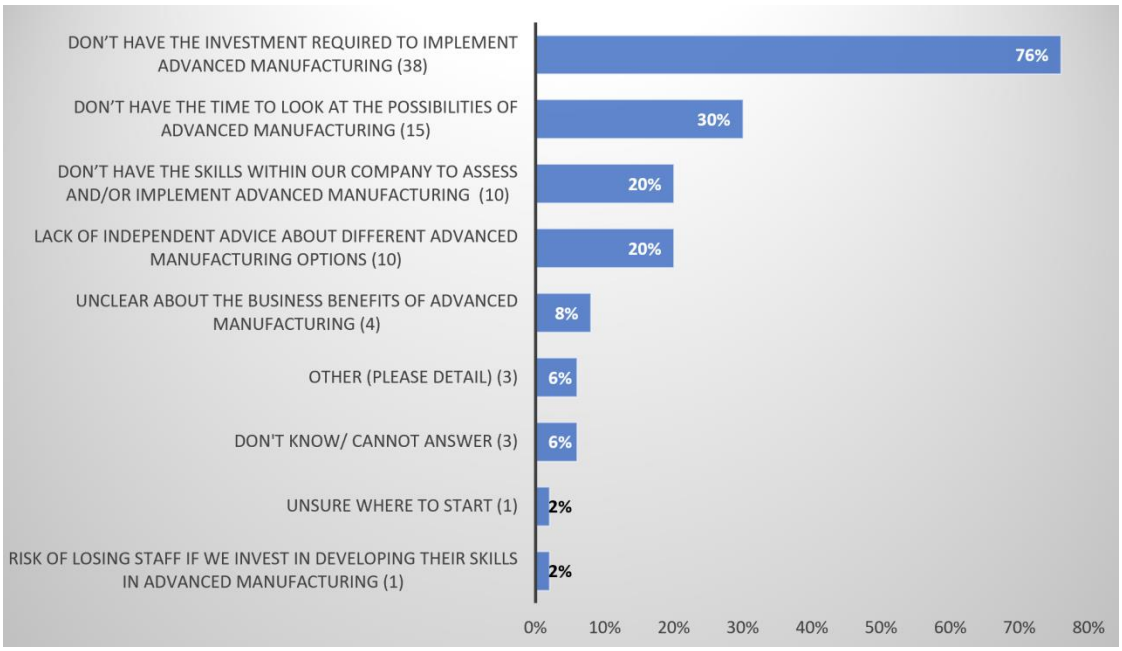


Figure 14: Barriers to adapting or implementing advanced manufacturing

Inspection of the above figure clearly shows the main barriers to implementing advanced manufacturing as investment, time to investigate possibilities, availability of the skills required and a lack of independent advice about different options.

7.2 Company objectives from support

Respondents to the structured survey were also asked to identify the reasons why they engaged with NMIS. Figure 15, below, summarises the responses to this question.

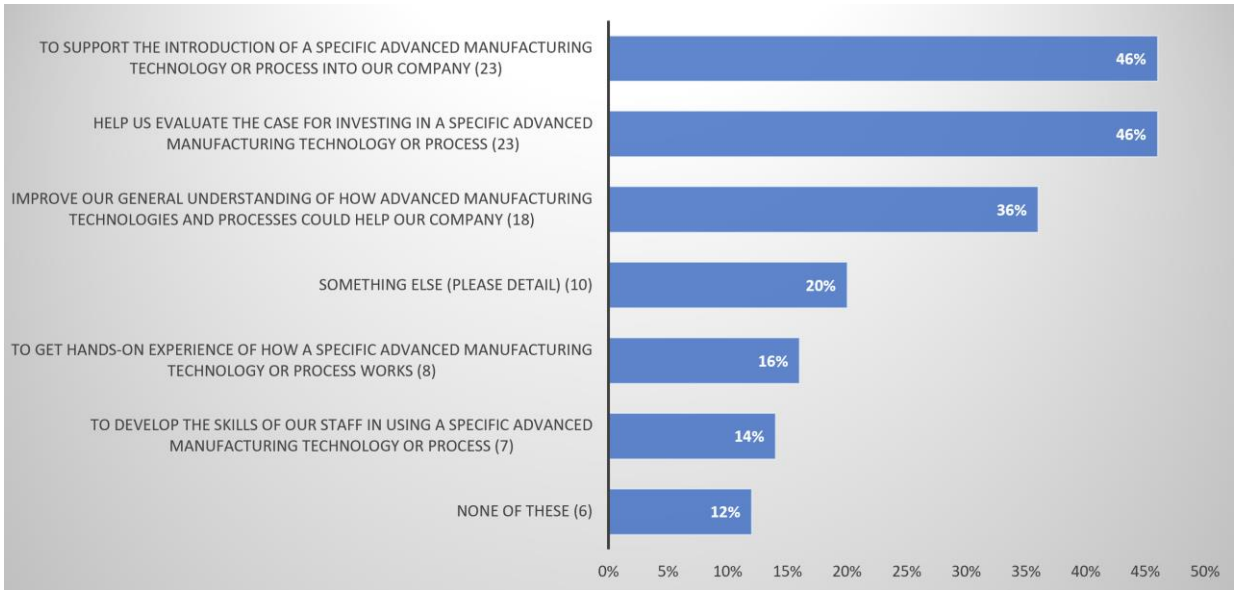


Figure 15: Reasons for companies engaging with NMIS

The most common reasons for engaging with NMIS, selected by just under half of respondents, were to evaluate and support the introduction of a specific advanced manufacturing technology or process. Just over one third of respondents wanted to improve their general understanding of how advanced manufacturing technologies and processes could help their company. As with the previous question, the relatively limited proportion of respondents that identify skills development may reflect the non-participation bias of companies engaging with the MSA. Where respondents answered 'Something else' this included accessing funding (3) and meeting new clients (2).

Qualitative interviews with companies also identified a range of objectives sought through engaging with NMIS. These include:

- Equipment suppliers seeking to access potential customers
- Companies seeking to overcome skilled labour shortages and improve productivity
- Companies looking to reduce their operational carbon emissions and costs
- Companies trying to identify alternative, lighter material options to improve user experience
- Companies looking to identify new suppliers
- Companies looking to use digital monitoring technologies to help customers reduce carbon emissions and costs and generate additional revenue through selling this service

7.3 Early views around customer satisfaction

Respondents to the structured company survey were asked to identify how satisfied they were with different aspects of their engagement with NMIS. Figure 16, below, summarises the responses to the question of overall levels of satisfaction with the NMIS engagement.

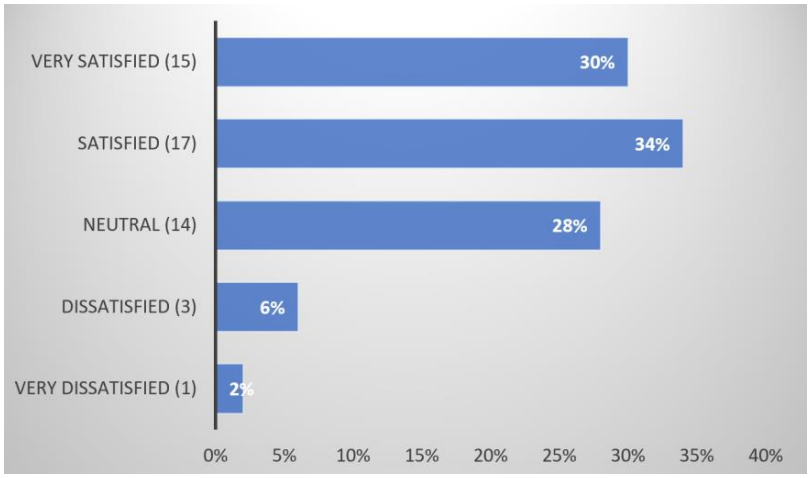


Figure 16: Overall level of satisfaction with NMIS engagement

Just under two thirds of respondents stated that they were either satisfied or very satisfied. Whilst a relatively low proportion (8%) stated they were dissatisfied or very dissatisfied, there were a significant minority (28%) that selected a neutral level of satisfaction.

Respondents were then asked to indicate their level of satisfaction with different aspects of their engagement with NMIS. Respondents were asked about their: level of satisfaction with the responsiveness of NMIS to their initial enquiry; level of satisfaction with NMIS doing what they said they would do and; level of satisfaction with the technical ability and knowledge of the NMIS staff engaged. Figure 17, Figure 18 and Figure 19, below summarise the responses to these questions.

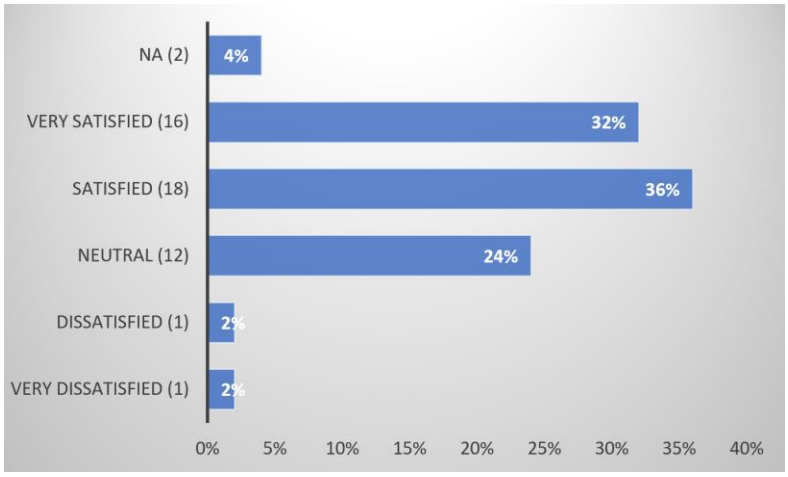


Figure 17: Level of satisfaction with responsiveness of NMIS when contacted

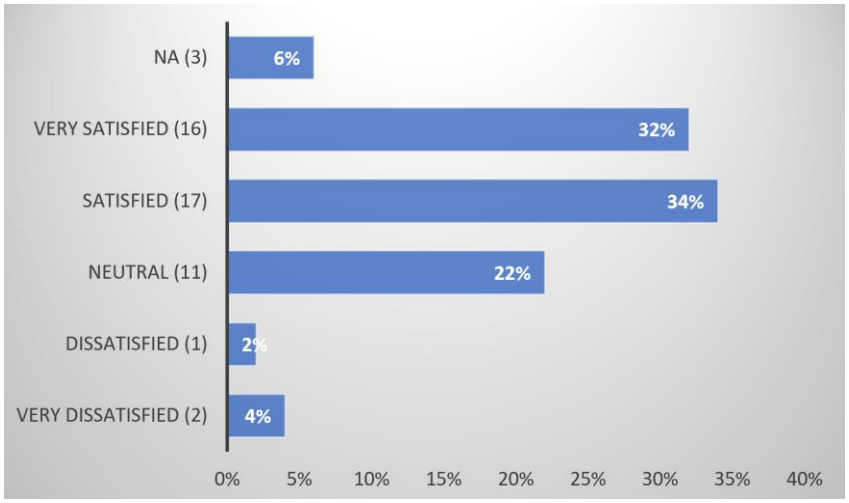


Figure 18: Level of satisfaction with NMIS doing what it said it would do

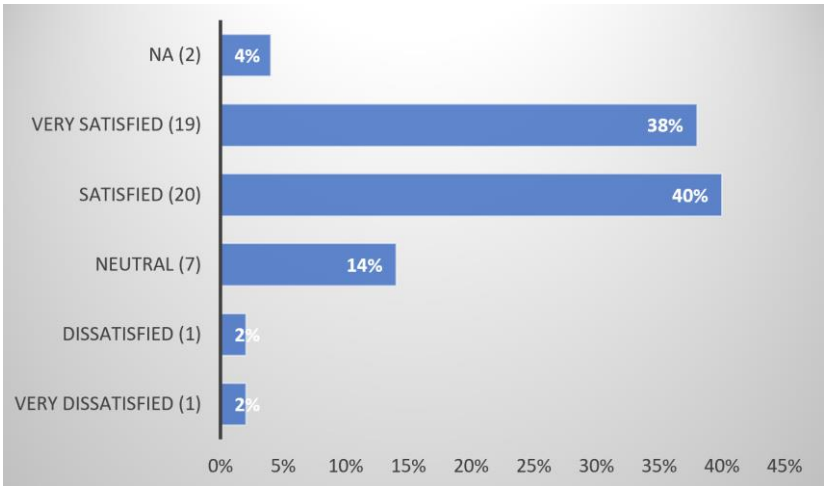


Figure 19: Level of satisfaction with the technical ability and knowledge of the NMIS staff engaged

Inspection of the three figures, above, identifies that there is a relatively higher level of satisfaction (78%) with the technical ability and knowledge of NMIS staff compared to the level of satisfaction with the process of engagement: 68% were satisfied with the initial responsiveness and 66% with NMIS doing what they said they would do. This suggests that NMIS staff have a high level of technical competence but there is an opportunity to improve the customer engagement processes.

This is consistent with findings from qualitative company interviews carried out in parallel to the structured company survey. There was a mixed view on customer satisfaction with a significant majority being satisfied:

"We consider ourselves VERY fortunate to have been given the opportunity to interact with NMIS for what is currently a small company. All the NMIS individuals we have had the pleasure of learning from have been of the highest calibre with a genuine focus on our needs."

"Very impressed with NMIS and their skillset."

"The NMIS people we dealt with were exceptional."

"Fantastic opportunities for networking, very impressed"

However, there were also instances of the customer engagement process being at a standard below what was expected by some companies.:

"I tried repeatedly to make contact with NMIS earlier this year, by phone and by email and never received the courtesy of a reply. We had a serious proposition to discuss and are a very long-established business in the Scottish manufacturing sector. I was not impressed!"

"I had a meeting with NMIS to discuss support, but they never got back to me."

Likelihood of using NMIS in future

Just under two-thirds of those who had engaged with NMIS said they were likely or very likely to use NMIS in future. Although only 8% said they were unlikely or very unlikely to use NMIS again a significant proportion (30%) were unsure.

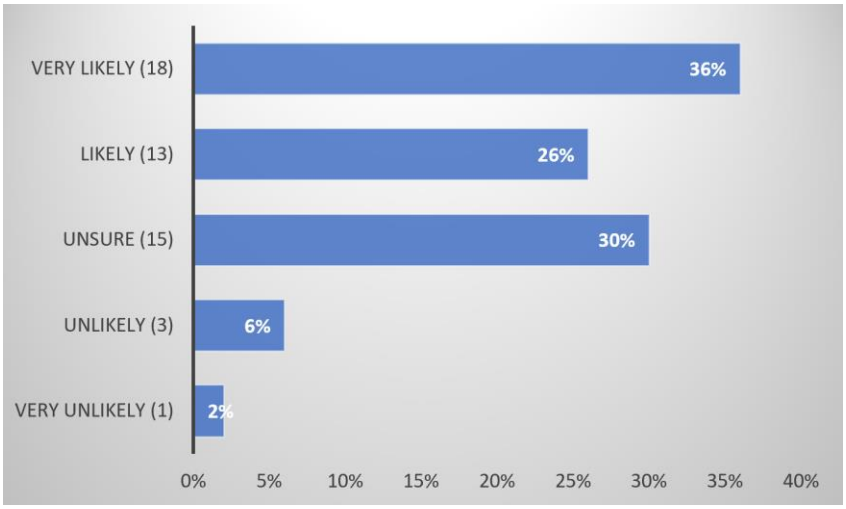


Figure 20: Likelihood of respondents using NMIS again in future

Which of the following best describes why NMIS would likely be used again?

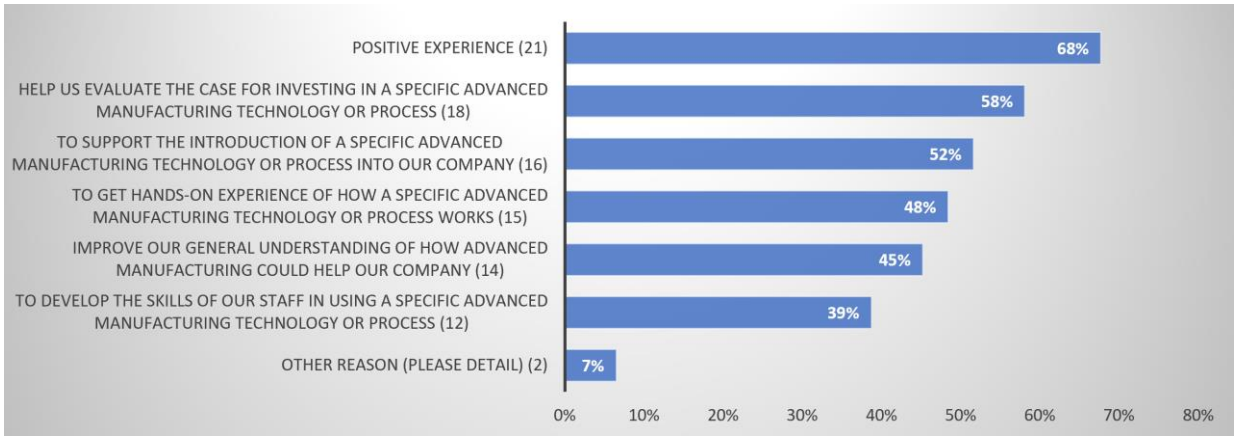


Figure 21: Views on why respondents would be likely to use NMIS again

It should be noted that the above question was only asked of the 31 respondents who stated they would be likely or very likely to use NMIS again. Multiple responses could be selected.

Several respondents to the structured company survey highlighted the need for support to be funded as a prerequisite to using them again:

> *"Without more funding and further investment this facility will come under increased scrutiny regards its ability to support Scottish and other overseas countries."*
>
> *"The only reason that I was able to use NMIS was because it was 100% funded through Innovate UK. NMIS can deliver help but a cost too high for a small company."*

Which of the following best describes why you would be unlikely to use NMIS services again?

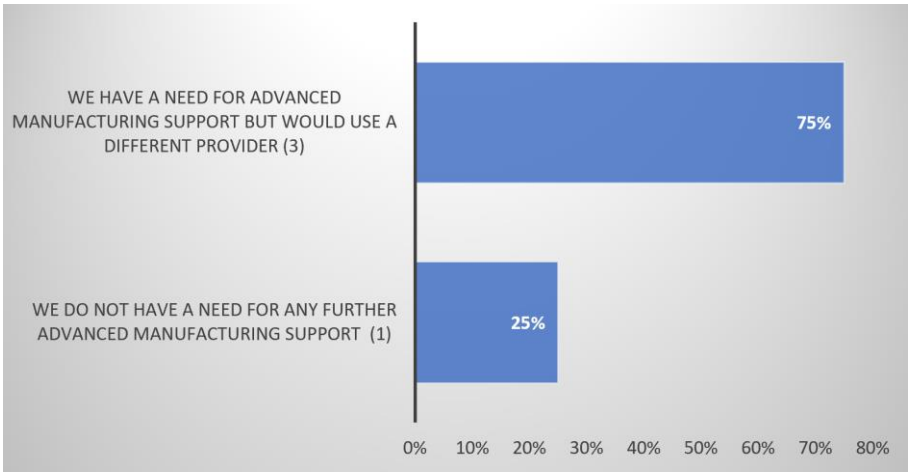


Figure 22: Views on why respondents would be unlikely to use NMIS again

Note that the above question was only asked of the 4 respondents who stated they would be likely or very likely to use NMIS again. Multiple responses could be selected. For illustration, one respondent provided this additional commentary:

> *"NMIS is very expensive when the same skills/expertise are available in the market and from other university departments, but in order to access grant funding to secure these types of services, micro-SMES are pushed towards NMIS as an RTO. Also, there is little understanding of the practicalities of running a micro-SME. While NMIS present ideal solutions and processes, this has to be tempered with the reality of running a lean start-up process."*

Would you recommend NMIS to other companies looking for support?

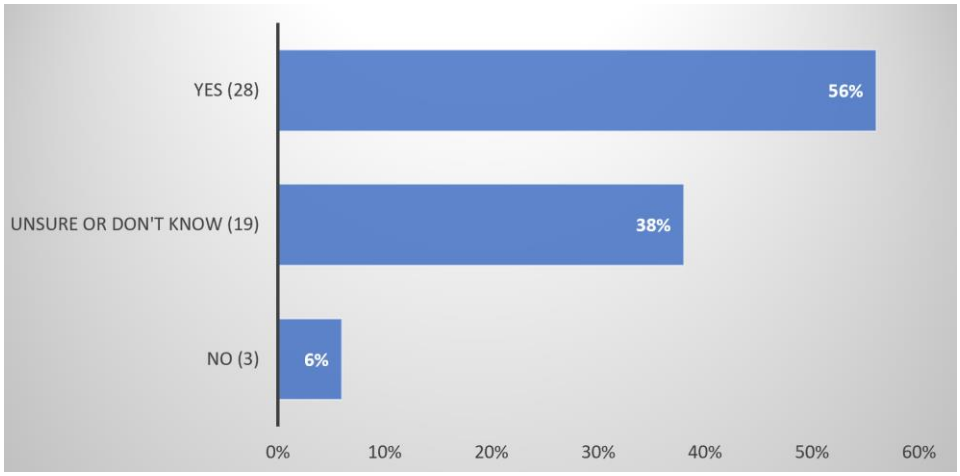


Figure 23: Whether respondents would recommend NMIS to other companies

Just over half (56%) said they would recommend NMIS to other companies. There is a high proportion of those unsure or don't know (38%).

7.4 How companies believe support will deliver business objectives

Based on the qualitative company interviews, there were a range of ways in which NMIS support would deliver business benefits:

- Four of the 11 companies that participated in the qualitative interviews supplied advanced manufacturing equipment and their path to meeting business objectives was by getting better access to potential customers
- Some respondents highlighted that NMIS engagement would result in developing more attractive products and services to their customers and that would increase sales
- One respondent stated that NMIS support would help reduce carbon emissions and this would result in cost savings and improved image in the market
- One respondent identified that the engagement with NMIS would increase productivity through automation, help reduce labour costs and overcome labour shortages

- One respondent said that there was no path to business benefit as NMIS engagement was unsatisfactory

7.5 Achievement of any outputs and outcomes

Qualitative company interviewees typically stated that it was too early to have achieved outputs and outcomes. An example of the time lag between a company receiving NMIS support and outcomes being achieved is as follows: A company received support to define options for deploying robots in their production process. Although the support was very well received and the company intend to implement automation, their current facility is very limited for space and the intention is to integrate robotic cells into their planned new factory, which is likely to take a couple of years before it is ready to start production.

Some feedback identified that there was the potential for new or improved products and services in future, but these developments were at a relatively early stage.

Respondents to the structured company survey were asked about outcomes related to job creation and diversity of the workforce. Figure 24, below summarises the responses to the question about job creation.

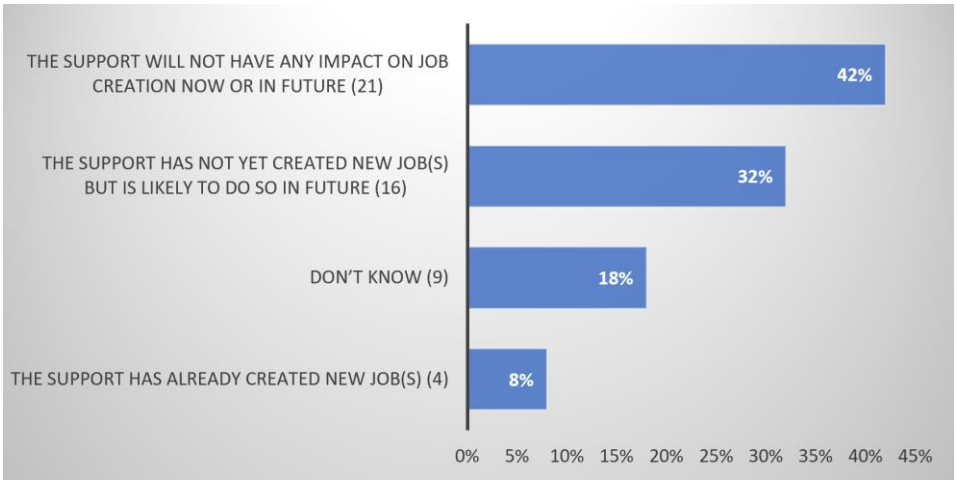


Figure 24: NMIS support contribution to job creation

A small percentage (8%) of companies stated that the NMIS support had already contributed to job creation, with a further 32% saying it is likely to do so in future.

Figure 25, below, summarises the responses to the question about diversity of the workforce.

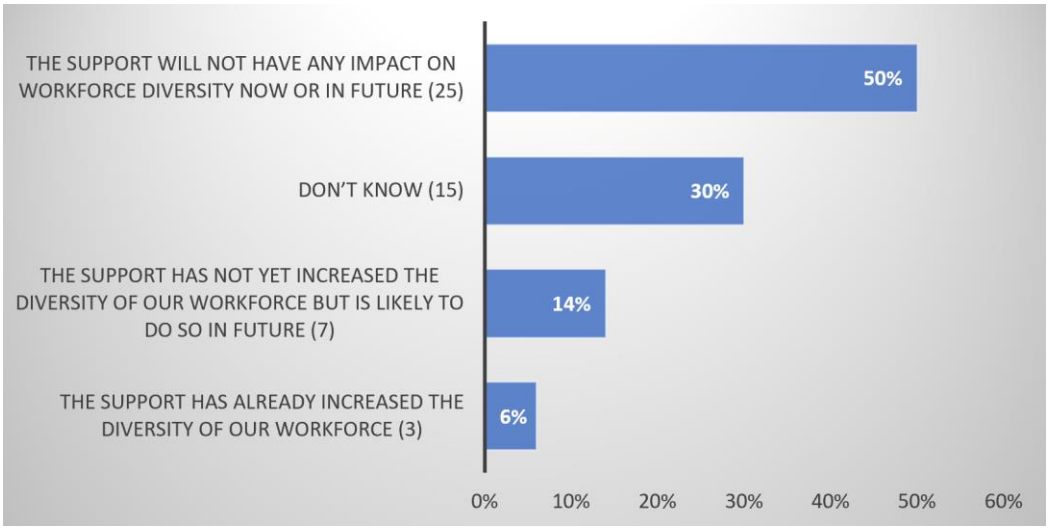


Figure 25: NMIS support contribution to diversity of the workforce

A small percentage (6%) of companies stated that the NMIS support had already contributed to diversity of the workforce, with a further 14% saying it is likely to do so in future.

7.6 How companies expect productivity to be improved

Table 15, below, summarises the responses from the structured company survey to a question about innovation benefits being achieved or having the potential to be achieved.

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA
Base	396	4%	30%	52%	14%
Made a new capital investment in advanced manufacturing technologies and processes	50	2%	34%	48%	16%
Increased R&D/ innovation investment	50	6%	40%	44%	10%
Developed new Intellectual Property	50	4%	34%	52%	10%
Improved the productivity of the business	50	4%	36%	50%	10%
Reduced carbon emissions from business operations	50	6%	26%	58%	10%
Developed new products or services for markets relating to Net Zero	50	6%	32%	50%	12%
Developed new products or services for other markets	50	4%	32%	52%	12%
Other R&D benefit (please detail)	46	2%	4%	59%	35%

Table 15: Degree to which innovation benefits have been achieved or will/may be achieved in future, by type

One of the options that respondents were asked about was 'improved productivity of the business'. Only 4% of respondents stated that they had already improved productivity as a result of the NMIS engagement. A further 36% stated that productivity will, or may be, improved in future.

Only two of the 11 companies participating in the qualitative interviews highlighted that productivity improvement would arise from their engagement with NMIS. In both cases productivity was expected to be improved through automation of processes. However, the productivity improvements had not yet been achieved as the advanced manufacturing technologies had not yet been implemented.

7.7 Progress towards net zero ambitions

Inspection of Table 15, above, shows two potential innovation benefits relevant to net zero. Firstly, respondents were asked about benefits from reduced carbon emissions from business operations. Only 6% stated that they had already achieved such a benefit from NMIS engagement. A further 26% stated that reduced operational carbon emissions will, or may be, improved in future.

Secondly, respondents were asked about benefits from developing new products or services for markets related to net zero. Only 6% stated that they had already achieved such a benefit from NMIS engagement. A further 32% stated that this benefit will, or may be, achieved in future.

Feedback from the qualitative interviews of supported companies highlights that one of the respondents was anticipating a reduction of net zero emissions in their operations as a result of engaging with NMIS. A further two respondents highlighted that their engagement with NMIS would likely result in improvements to the products and services they offer that would mean lower carbon emissions for their customers.

The measurement of net zero impacts has been an area that NMIS and Scottish Enterprise have been developing. A guidance paper has been produced by Scottish Enterprise on 'Data Collection Tools on carbon'. This presents different methods for measuring carbon emissions depending on the level of engagement with the supported company. The guidance includes set questions on carbon reduction impacts to be asked, by NMIS, at project closure stage. It is understood that this is being carried out alongside questions to gather data on planned capital expenditure and planned increase in turnover from innovation (for reporting against SMART Objectives 6 and 7). However, it is also understood that levels of response rates to these project closure questionnaires is low.

8 Feedback from non-supported companies

To provide a counterfactual point of view, a total of eight companies, which were not on the NMIS list of engaged companies, provided feedback through qualitative interviews. In addition to this, some feedback was obtained from companies that stated they had not had support from NMIS despite being included in the NMIS MEF reports. This section summarises some of the key points of this feedback.

Awareness of NMIS and the capabilities it offers

Across the companies interviewed, there is typically a high-level awareness that NMIS exists. However, there is a mixed level of more detailed awareness about the capabilities and services offered by NMIS.

"We are highly aware of NMIS and were involved in early consultations at scoping phase"

"We didn't realise that they offered upskilling, that could be exactly what we are looking for."

"We think NMIS could prove useful to us, but in all honesty, I'm not sure what they can do for us, what size of projects are they looking for?"

"We're not brainy enough for these academic-type guys"

"Our perception is that NMIS is needed and they do good work in this area. I have a general awareness but probably not aware of the whole remit"

"NMIS hadn't been marketed to us, so we assume that the services aren't relevant for us"

"We haven't really heard of them, and neither have our contacts, which is frustrating as it sounds like they have some great facilities, is it because it's quite a Glasgow focus?"

"The NMIS facilities are really impressive and definitely of interest, and the factory tour was a great way to develop mutual understanding and contact, definitely worthwhile."

Potential applicability of NMIS services to the challenges and opportunities your company faces or might face in future?

The limited detailed awareness of the capabilities and services meant that some of the non-supported companies could not comment about potential applicability. However, some observations were made.

"The current level of service offering, in terms of the technologies, equipment and capabilities available, does not meet the needs of our company"

"*The areas that definitely don't align with us are the advanced manufacturing, additive manufacturing, lightweight manufacturing, and AI. These do not align with our 'shop floor' activities."*

"Looking at where the company strategy is going, one type of product portfolio to another, we will be investing in equipment, infrastructure, and looking to get involved in better data analytics, suspect this is where NMIS can play a big role."

"NMIS are good and get a decent reputation. I think we could do a lot together in the future. However, up until recently, it has been time and ongoing business that's kept us busy. We don't spend a lot of time networking and going to random events which has prevented us from having much of an engagement."

"We have a really interesting project that we want to deliver within a year that NMIS partnership would be ideally suited to, but we want to start ASAP and we're not sure that'll work for NMIS."

Feedback on attempts to engage with NMIS

Non-supported companies were asked to provide feedback on any attempts they may have made to engage with NMIS. A small number had attempted to engage with NMIS but nothing substantial had resulted from this.

> *"We made an enquiry, which we had to chase as no response was received. We finally got allocated a lead number (not very customer friendly being called a "lead"), NMIS asked for more information, which we supplied and then received a response to say, come back later when you have more reports and propose how NMIS could help. We had hoped they would have shown more interest and enthusiasm, even to pick up the phone and discuss the project. Surely, it's the role of NMIS to propose how they can help us - we don't really know what they can do. At that point, we decided not to pursue the project any further and we haven't heard from them since."*

As part of the structured company survey, feedback was also captured from some of the 43 companies that could not recall receiving any support (or a meaningful level of support) from NMIS, despite being on the list of companies engaged by NMIS, supplied as part of this evaluation. A sample of comments from those that did not recall receiving support is provided below.

> *"I tried repeatedly to make contact with NMIS earlier this year, by phone and by email and never received the courtesy of a reply. We had a serious proposition to discuss and are a very long-established business in the Scottish manufacturing sector. I was not impressed!"*
>
> *"Unfortunately, NMIS didn't support us and, to be honest, from our point of view, weren't all that keen to engage, which was disappointing."*
>
> *"I had a meeting with NMIS to discuss support, but they never got back to me."*

Non-supported companies were also asked to identify whether they worked with any other organisations they would regard as more relevant than NMIS to their company with regards to adopting advanced manufacturing technologies and processes. Feedback included the following.

> *"We have used SMAS, for continuous improvement, which has provided useful training. Also CeeD's mentorship programme has been valuable. Strathclyde University's Design and Manufacturing Engineering Department has provided the company with access to masters students who have worked on solving problems with us. South Lanarkshire College provided us with access to collaborative robots (co-bots) to trial, which was useful."*
>
> *"Typically, we will go to the OEM of any equipment and see what they suggest rather than look at upgrading things ourselves."*
>
> *"We don't generally interface with support agencies, it is too complex to know who is who and who to go to for what."*
>
> *We work with the usual suspects, Scottish Enterprise, SMAS, CeeD and some of the catapult centers."*

Other organisations mentioned, in addition to the above, include:

- Technology Scotland
- Techworks – UK wide
- Energy Systems Catapult
- Manufacturing Technology Centre
- Various Universities (Strathclyde, Aston, Edinburgh)
- Skills Development Scotland
- University of Dundee

It should be noted that CeeD assisted in the selection of non-supported companies which means most of the non-supported companies taking part in the qualitative interviews were already CeeD members.

Views on how NMIS could make themselves more relevant/attractive to Scottish manufacturers that have not yet used its services

Non-supported companies made the following observations and suggestions:

> *"I feel like we are too small. Will NMIS want to deal with us when they have big projects with the likes of Rolls Royce? But I'm aware that this might also just be a perception and not reality"*
>
> *"It's a function of us being busy and internally focused, not having the time or urgency or a specific project"*
>
> *"Usually, we are looking for a solution after a problem has come up. We would then have to talk and understand. We don't have 3 weeks to explain before we can get any support"*
>
> *"I can absolutely see the value in working with them, but you need the culture (within the company), to look externally and not forcing that project on someone. And that someone is probably" already busy"*
>
> *"It feels like for step or incremental changes, we should do those ourselves, i.e. upgraded processes but for big changes, say looking at the forefront of technology, that's when we would seek support from NMIS or the likes"*

9 Policy lessons and recommendations

This section describes the policy lessons from the initial development, approval and launch phase and the early delivery phase. Where appropriate, recommendations are provided where opportunities for improvement have been identified.

9.1 Lessons from initial development, approval and launch

Some stakeholders report that the **close working partnership between different organisations during the development of the businesses case has developed good relationships** between the contractual parties (Scottish Enterprise and the University of Strathclyde). This has benefitted the early development of NMIS due to the trust that has been built over a number of years. Whilst there does seem to have

been some tension arising through the 'applicant – assessor' relationship, resulting from the use of the Scottish Enterprise major investment approval process, this does not appear to have had a lasting effect.

Some stakeholders suggested that **the process could have been improved if clearer project management and decision-making responsibilities had been defined earlier in the process**. This particularly relates to the development of the business case. Stakeholders also report that, at the early stage of business case development, limited resources meant that the process was slower than anticipated. One stakeholder suggested it may be better, in future, if a budget was made available to develop the business case for major investments so that it was not left to individuals within organisations to try and do this alongside their normal activities.

Some stakeholders report **a level of defensiveness and reluctance by some colleges and universities to engage with NMIS**, due to it being part of another university. One stakeholder suggested that it may have been helpful to ring-fence some of the initial investment in NMIS to fund a number of posts within other Scottish universities and colleges with the most relevant manufacturing related capabilities. This would have resulted in a network of individuals hosted by these universities and colleges with a remit to establish effective working relationships and partnerships.

Evidence about the scale and nature of demand, particularly from Scottish SME manufacturers, appears to have been gathered quite late in the approval process and after the main elements of the business case had been developed. This includes developing an understanding of the **ability and willingness to pay for advanced manufacturing advice and consultancy support by Scottish SME manufacturers**. This is an important aspect of the business case for a self-sustaining NMIS, beyond the initial funding period, and would have helped to raise the fundamental question about how economic impact can be generated through providing advice and consultancy to a Scottish SME manufacturing base with a limited ability and willingness to pay.

The requirement for ongoing public sector funding for SME engagement was clearly stated by the University of Strathclyde and acknowledged in the NMIS project risk register by Scottish Enterprise as one of the major risks to future success of NMIS. At the same time, approval documentation stated that NMIS would be financially self-sustaining after the initial five-year funding period. This 'financially self-sustaining' objective allowed the Scottish Government to make its significant investment without committing to ongoing funding, which was not possible due to restrictions on allocation of monies beyond budgetary cycles. The caveats included in the business case about ongoing public funding being required allowed the University of Strathclyde to take comfort that this issue had been acknowledged. It is apparent that this issue was not fully addressed during discussions at approval and subsequent contractual stages as stakeholder discussions identifies that different interested parties have different perceptions about what had been agreed. Some stakeholders perceived that, if the performance against SMART objectives relating to SME engagement were achieved, further ongoing public sector would be provided. Other stakeholders perceived that it had been made *"absolutely clear"* that the Scottish Government investment was limited to the initial £65.5 million.

Some stakeholders referenced the SMAS Industry 4.0 advice and consultancy model, where free advice (of one to two days duration) is provided to SME manufacturers about how to optimise the assets and data already held by the company to improve productivity and help them to assess off-the-shelf technologies for potential investment. However, there is currently no dedicated public sector funding stream available to NMIS that recognises the limited ability and willingness to pay of SME manufacturers

seeking support to assess an innovation opportunity. It is also the case that the some of the Scottish Innovation Centres are still receiving substantial public sector funding beyond their tenth year of operation. **It is highly questionable if an innovation support intervention specifically targeting SMEs can ever be truly financially self-sustaining without ongoing public sector subsidy.** This is recognised in the internationally renowned Fraunhofer model, which operates on the basis of continuous public sector funding of one-third of its budget.

In the absence of an ongoing stream of funding to support NMIS deliver economic impact in Scotland via SME manufacturer engagement, progress has been made in bidding against relevant challenge funding opportunities as they arise (e.g. via funding from the UK Government via City Regions). This provides useful project support where the nature of the enquiry and company match the constraints of the funded project. However, **the SME demand generated by NMIS still requires funding to resource the initial assessment of enquiries and then help those whose objectives do not fit into any of the specific funding streams available.**

This is a key challenge for NMIS and potential solutions are being discussed with funding stakeholders. One avenue being investigated is whether SME support can be enabled by partnering with Tier 1 contractors willing to financially support the development of their supply chain, in terms of adoption of advanced manufacturing technologies and processes.

9.2 Lessons from early NMIS delivery

Stakeholder feedback has highlighted that there are **opportunities for improvement in the flow of information between the NMIS Board and the partners involved in the OSCG**. Dissemination of information about NMIS activities and performance to wider advanced manufacturing eco-system support providers is also an opportunity for improvement.

There is an informal process in place to try and ensure information is shared between the NMIS Board and OSCG. There is mixed feedback on how effective this has been from stakeholders. Some regard the process as working well whilst others report a level of dissatisfaction with the current process. **It is recommended that the possibilities for improving this situation are discussed, at a high level, between partners, particularly the Scottish Government, University of Strathclyde and Scottish Enterprise.**

Some stakeholders reported that they could not provide feedback on how well NMIS was delivering against its SMART objectives as they were unaware of what NMIS was doing and how this impacted on targets. Other stakeholders felt that this information was already being shared amongst members of the OSCG. This difference in views could be discussed further at the OSCG meetings. With respect to awareness amongst other players in the advanced manufacturing support eco-system, consideration should be given as to the whether **a process can be introduced to share and agreed level of activity and performance updates with this wider group**.

Some stakeholders also questioned the **ongoing relevance of the OSCG**, particularly with the formation of various workstreams under the Making Scotland's Future workstream. It is understood this is currently being considered.

Several stakeholders stated that **NMIS had worked very well to deliver the early SMART objective relating to delivery of the NMIS building and facilities.** Positive feedback was received about their ability

to do this when faced by issues such as the Covid pandemic and, latterly, material inflation pressures and increasing labour costs associate with construction.

Feedback on the other early SMART objectives, relating to implementation of the SME outreach programme, identified that there had been delays in recruiting the SME advisors. Some stakeholders stated that the Covid pandemic had hindered the establishment of this team. Several stakeholders believed that a key lesson was that **the two-year SME engagement was started too early, before NMIS had full capabilities to offer**. Now that the building is open and service/capability is more developed, the funding for SME engagement is greatly reduced, as discussed earlier.

Stakeholder feedback suggests that **NMIS is aligning with the fair work agenda**. It is reported that there is good engagement with the MSA on this and NMIS have embraced the equality and inclusion agenda. They have worked with Equate on gender and the Association of MBE Engineers on ethnicity.

Early provision of skills development support (online and in person) is viewed by stakeholders as good, involving different types of delivery partner and a good amount at SCQF 6 and 7, which is viewed as critical for technician level skills development. This is viewed as being an example of good practice in including existing private sector providers in delivery and setting up university accredited learning that can incorporate third party content.

The development of the skills offering by MSA also demonstrates good practice in partnership working with other public sector organisations. This includes good relationships with Skills Development Scotland, the Scottish Research Partnership in Engineering (involving ten Scottish Universities) and SMAS (which has significant experience of supporting SMEs with Industry 4.0).

NMIS is dealing with a **large volume of enquiries from SME manufacturers**, many of which will not lead to a project at the end of the engagement but will **consume a significant level of resources**. This advice and signposting service does not generate income directly from SMEs to support the financial self-sustaining objective of NMIS. In the absence of ongoing ring-fenced funding for this type of activity, NMIS has successfully bid for funding from programmes targeting specific outcomes. For example, bids to lead two Innovation Accelerator pilot projects for Glasgow City Region aimed at increasing circular economy practices in manufacturing and improving the data analytics capabilities of manufacturers. This can help to fund in-depth engagement with SME manufacturers, if their need aligns with the objectives of these funds but there are constraints when a relevant funding route isn't available. Often, even the 'triaging' of SME manufacturer enquiries requires technical skills to help the companies define their actual need in more precise terms. This service is being delivered by the same pool of staff tasked with developing and delivering company R&D projects and participating in collaborative research projects.

As discussed previously in this section, the lack of ring-fenced funding to support SME manufacturers with advice and signposting is a current issue that partners are negotiating to resolve. Several stakeholders highlight that, without further public funding to support SME engagement, the NMIS performance against MEF targets relating to SMEs will not be at the same level as was achieved when specific funding was available to engage SME manufacturers. Several stakeholders highlighted that the **ongoing provision of free/heavily subsidised initial advice and consultancy support was key to maximising the economic development benefit arising from NMIS working with Scottish based SME manufacturers.**

Several stakeholders suggested that **improved communication and clarity about how NMIS can support companies is required**. It was repeatedly stated that the advanced manufacturing support eco-system had improved significantly since the time of NMIS approval. For example, recent additions include the Advancing Manufacturing Challenge Fund projects and the National Robotarium. This has added to existing eco-system support providers such as SMAS, Innovation Centres, Scottish Engineering, CeeD, etc. Improved clarity and communication about the role of NMIS in this landscape will help to streamline the enquiries received by NMIS, helping to ensure company expectations are met. It is understood this could be included in the terms of reference being developed by the Scottish Government's Making Scotland's Future eco-system workstream. Once a clear message has been developed about which eco-system organisation provides which capabilities and **services this needs to be effectively communicated to both companies and intermediary advisers**.

A specific issue related to communication has been highlighted, relating to **differentiating NMIS from the University of Strathclyde**. Several companies interviewed stated a level of confusion about knowing who they were dealing with and distinguishing between NMIS staff and University of Strathclyde staff. It is recognised that all staff are actually University of Strathclyde employees but, in terms of branding and differentiating NMIS as a national asset, then consideration should be given to whether NMIS staff can operate under @nmis.scot email domains rather than @strath.ac.uk domains.

Some stakeholder feedback identifies the **potential for competition between NMIS and other parts of the advanced manufacturing eco-system** when public sector funding calls appear from sources such as Innovate UK, City regions, etc. Stakeholders report that there can be a tension between organisations with revenue generating pressures and there can be different opinions about where the boundaries lie between these organisations in terms of the scope and remit of their support. The pressure to generate revenue can lead to barriers to collaboration between eco-system support providers even when collaboration may be the optimal approach from a company and national economic development point of view. There is no formal process to manage this tension. Whilst there are networking opportunities for senior decision makers through activities such as the Making Scotland's Future workstreams, not all eco-system players are represented on these workstreams. Consideration should be given to **how to improve comprehensive connections between decision makers in different advanced manufacturing eco-system support organisations.**

Several stakeholders highlighted **potential areas of improvement within the monitoring and evaluation framework**. These are described in detail in section 6.7, above.

Appendix A – Supported companies – qualitative insights summary

This appendix contains anonymised summaries of the experiences of companies included on the NMIS MEF as having participated in R&D projects. In the case of 'Company 5' and 'Company 6', the interaction with NMIS was at the level of an 'engagement' rather than an R&D project and therefore these companies were included in the Objective 4 tab of the MEF (unique manufacturer engagements = two plus hours of support) rather than Objective 5 (R&D projects).

Company 1 – Service provider, offering goods handling services to third parties

Company 1 approached NMIS following a recommendation by their local council. The reason for the initial contact was to get an independent assessment of the company's plans to move towards Net Zero. NMIS produced a report evaluating the technical options to reduce operational carbon emissions and this was helpful in persuading the board to approve several projects. The report was also used to help the company secure new equity investment. The improved Net Zero performance is also important to a segment of the market that the company serves.

Since this initial contact, the company has been supported by NMIS with skills development and a project to increase waste recycling. A project involving data analysis is currently being planned with the Digital Factory.

The company is very satisfied with the support they have received from NMIS: *"We are very impressed by the professionalism and knowledge of the people we work with at NMIS".*

An opportunity for improvement was identified to improve the communication of the wide range of capabilities that NMIS has. The company had come across additional capabilities "by accident" and felt that some form of account management would be useful to let individual companies know about the range of capabilities and identify a programme of support rather than just individual projects.

Company 2 – Engineering service provider working in the field of automation

Company 2 has worked with NMIS to improve access to advanced manufacturing technologies and processes. They were first introduced to NMIS through previous engagement with the University of Strathclyde, including with AFRC.

They attend NMIS networking events as this is beneficial for meeting potential customers. Their interaction, to date, has not been on specific R&D projects (even though they are included on the MEF objective 5 tab, recording R&D investment) and they could therefore not identify any productivity or net zero impacts from their engagement.

The company is positive about their interaction with NMIS and about the overall NMIS facility.

Company 3 – Manufacturer based in the South of England

Company 3 was introduced to NMIS by Scottish Enterprise, who they had originally approach for help in identify a supplier of a specific component. The company had recently experienced disruption in their supply chain for this component, which they previously imported and were now seeking options to source it from the UK.

The NMIS project was a supply chain analysis project rather than a technical R&D project.

NMIS were unable to identify a supplier of the component required. Some companies were identified as having manufacturing capabilities that had the potential to produce the component, but this was not followed up by NMIS or the company within the project.

The company sees the project as successful even though a Scottish supplier was not identified. They were positive about the NMIS people delivering the project and the effort they put in. The company now source the component from mainland Europe.

Company 4 – Manufacturer of industrial equipment

Company 4 developed a project with NMIS to capture data from assets in the field and develop an intelligence-based monitoring system to optimize the power demand of those assets.

NMIS helped the company to access a PhD student at the University of Strathclyde and this has provided a cost-effective way to apply the findings of the PhD student's research output in their business. After the initial introduction by NMIS the interaction is now directly with the student and their academic supervisor, with no further NMIS involvement.

The company is very positive about the support they have received from the PhD student, complementing their work ethic, drive and intellect. Having had this positive experience, they would be keen to replicate to address other challenges in the business.

The output of the project will help reduce operational costs and carbon emissions for customers and make their product more attractive on the market.

Company 5 – Provider of digital engineering services

Company 5 initially approached NMIS for support but reported negative experiences of doing so: *"when it was apparent that we had no money to spend at NMIS they stopped talking….it is set up for large companies who can afford to pay for large projects"*

They expressed the view that *"the NMIS facility needs to be made available to small companies at zero cost, to enable innovation".* They also stated that equipment suppliers are *"using NMIS as a marketing tool"* and that, in their experience *"the utilization of demonstration equipment is very low"*.

Finally, the respondent expressed concern, based on their experience, that NMIS is competing against private providers for third party contracts and questioned whether this is supportive of building the advanced manufacturing supply chain in Scotland.

Company 6 – Manufacturer

Company 6 approached the Lightweight Manufacturing Centre (which they regard as NMIS) for support in identifying lighter weight material options for a key component of their product. Such a change would improve user experience.

Public sector funding was obtained from the Scottish Government and a paper-based study was carried out. The respondent reported that communication was poor and there was a three-month delay in completing the study. They also stated that *"they seemed to struggle to address the question. We wanted to know about the optimum material to use but they kept getting sidetracked into the design of the components……. they seem to want to drift into what interests them, rather than do want they are being paid for"*.

Despite this feedback, the company stated that they would work with NMIS again but would manage any future projects more tightly in terms of confirming NMIS's understanding of the brief, communication and delivery timescales.

Company 7 – Advanced manufacturing equipment supplier

Company 7 is an advanced manufacturing equipment supplier, based outside of Scotland, that uses NMIS *"as base from which it can showcase its' kit and equipment to potential customers".*

The company was first introduced to NMIS via a contact within the University of Strathclyde. No specific R&D projects with NMIS could be identified (even though the company appears in the MEF tab recording R&D investment), although the respondent would be willing to do so in future. The company is using NMIS as a facility to showcase equipment and hold business meetings. The objective for the company is to increase sales.

The company are very positive about the relationships they have developed with NMIS: *"The staff have been great, and very personable. Lots of face-to-face contact and regular visits from NMIS staff to our base as well!".*

Company 8 – Manufacturer of equipment supplied into the electronics sector

Company 8 is a manufacturer of specialist equipment used in electronics manufacturing. The process they use involves a combination of craft skills and CNC Machining. The part of the process involving craft skills faces a challenge in obtaining employees with a sufficiently high level of skill. Such employees are not frequently available on the labour market, so the company must recruit then train their own employees. This can take significant time to get them to an acceptable standard and this is an issue, exacerbated by significant growth in their market.

The company had purchased a number of second-hand robots with the idea of automating some of the craft skill processes but were unsure where to start in terms of introducing them to the production line.

They were made aware of NMIS through a sector trade body and developed a project to investigate options to introduce robots to their process. A detailed report was produced considering options from a semi-manual single robot solution to a fully automated robotic process involving four robots. The company were very positive about the support received from NMIS: *"They impressed us big time…. they thought about things we didn't think about".*

The company now plan to implement the robots into their production line and expect this to improve productivity and capacity, helping to address the shortage of skilled craft labour. This could take up to two years as the introduction is limited by space on the production floor and is dependent on moving to larger premises, which the company is planning to do. This provides an example of the length of time it can take from an NMIS intervention and changes in outputs and outcomes.

Company 9 – Advanced manufacturing equipment supplier

Company 9 has supplied advanced manufacturing equipment to NMIS on a commercial basis. Despite being included on the objective 5 tab of the MEF, recording details of R&D project investment, the company was unable to identify any R&D project being undertaken, by them, with NMIS. As such there were no outputs relating to productivity or net Zero.

The main benefit for the company is the access to potential customers that arises from them seeing, and potentially trialing, their equipment at the NMIS facility. The company report that they have proposed and developed demonstration events to promote their equipment but that these are all driven by the company and not NMIS.

The company state that they are not able to clearly distinguish between the capabilities and services offered by different parts of NMIS.

Company 10 – Advanced manufacturing equipment supplier

Company 10 supplies advanced manufacturing equipment to NMIS on a commercial basis and has helped NMIS to deliver projects for customers, where this involves use of the company's equipment. Despite being included on the objective 5 tab of the MEF, recording details of R&D project investment, the company was unable to identify any R&D project being undertaken for their own company, by NMIS. As such there were no outputs relating to productivity or net Zero.

The company has also been involved in promotional events to showcase their equipment and the main benefit of their engagement is to access the market.

Company 11 – Advanced manufacturing equipment supplier

Company 11 is a manufacturer of control and automation solutions, operating across numerous sectors. The relationship with NMIS has grown from an initial relationship the University of Strathclyde to working directly with NMIS as natural progression. The company has been involved in a number of industry-led projects with NMIS, but they were unable to determine exactly who these activities originated with (i.e., different parts of NMIS, wider stakeholders).

The company has undertaken a demonstrator project with NMIS and would be keen to access further opportunities with a more commercial focus. They contribute in-kind and are generally very supportive of NMIS and its offerings but expressed some areas of improvement such as the fact it is time consuming to engage as: customer processes are unclear, NMIS's structure is opaque from an external perspective and there is a natural tension between types of projects suitable for PhD students and shorter, more innovative projects. Further, the company stated that it is difficult to tell who works for NMIS and who works for the University of Strathclyde as they all have Strathclyde email addresses.

Appendix B – Detailed structured survey responses

A total of 50 companies were interviewed that could recall the support from NMIS and were able to answer all the survey questions. A further 43 provided only partially completed surveys due to either an inability to recall the NMIS support (32) or they assessed the engagement to be so minimal it would not be possible for them to provide useful feedback for the evaluation (11). The analysis that follows is therefore based on the 50 fully completed surveys, which were carried out predominately by telephone, although a small number opted to complete it online.

Location of respondents by enterprise agency

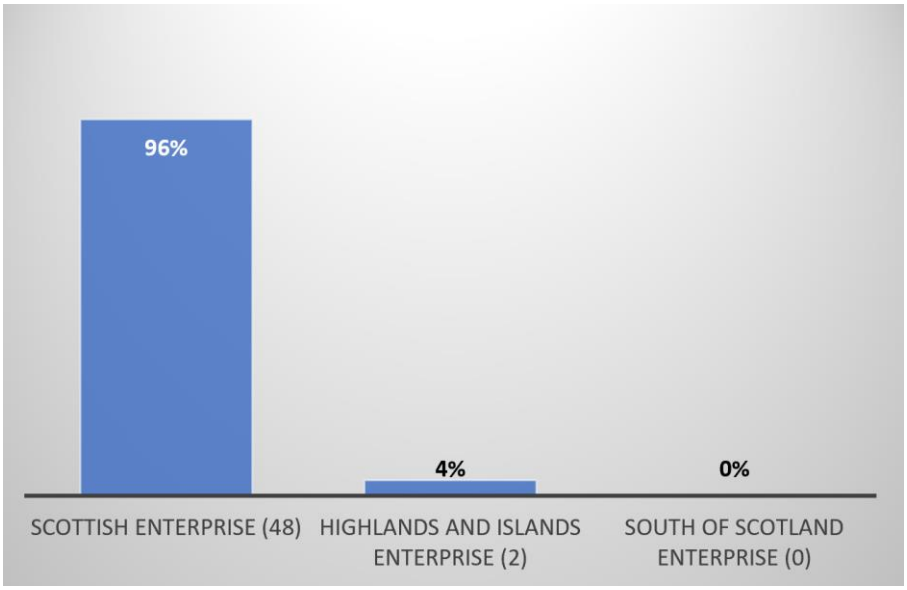


Figure 26: Location of respondents by enterprise agency

Location of respondents by local authority area

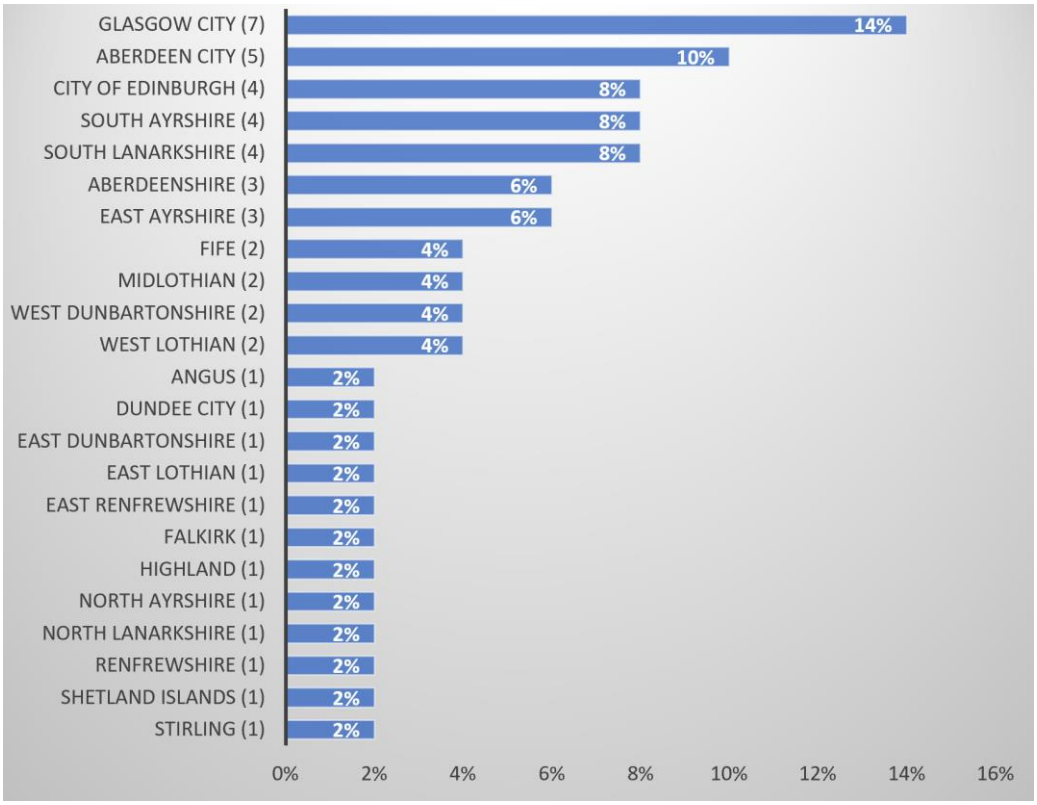


Figure 27: Location of respondents by local authority area

Number of staff currently employed by sizeband

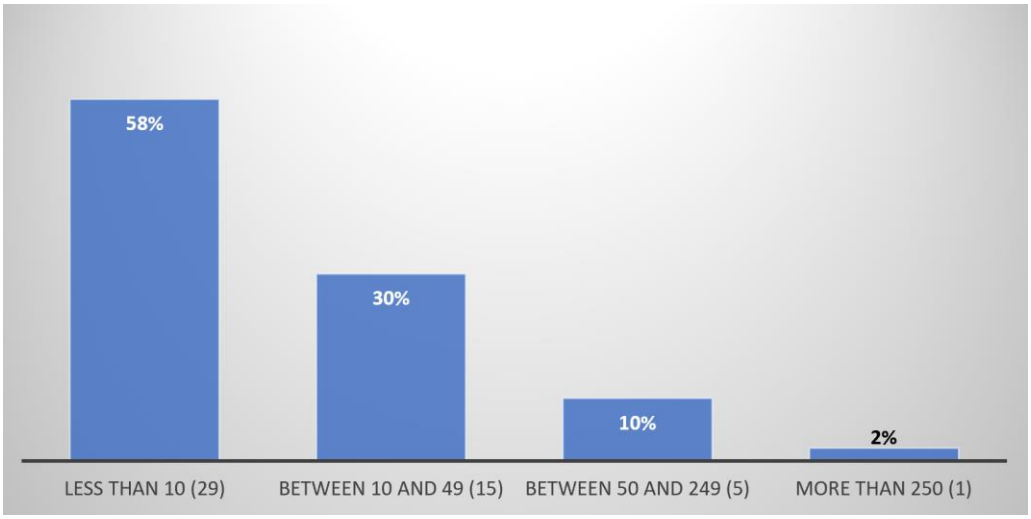


Figure 28: Respondents by employee sizeband

Respondents by area of economic activity

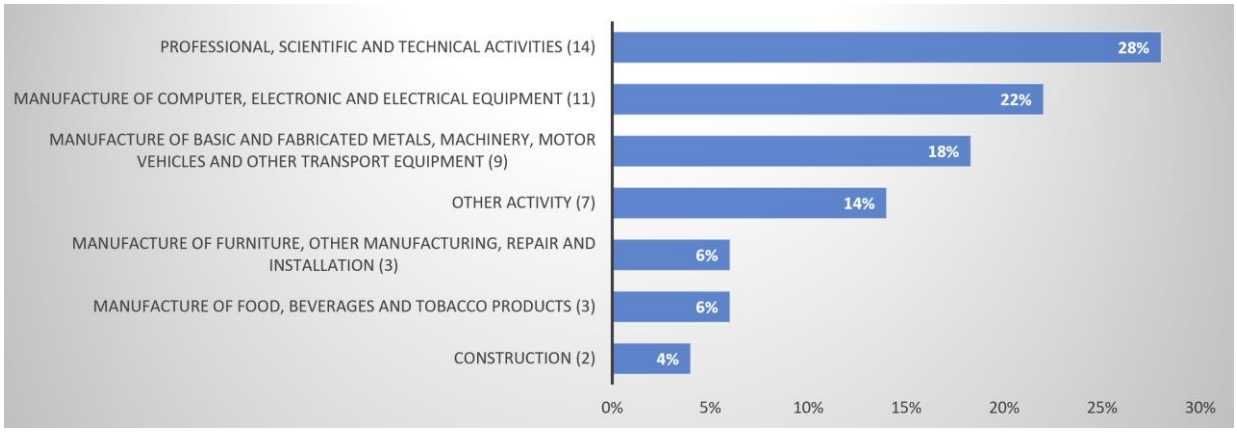


Figure 29: Respondents by area of economic activity

Note that 'Other activity' included R&D, renewable energy, composite material repurposing, robotics and automation, manufacture of robotic systems, environmental cleaning and collection of hazardous waste.

Sources of referral to NMIS

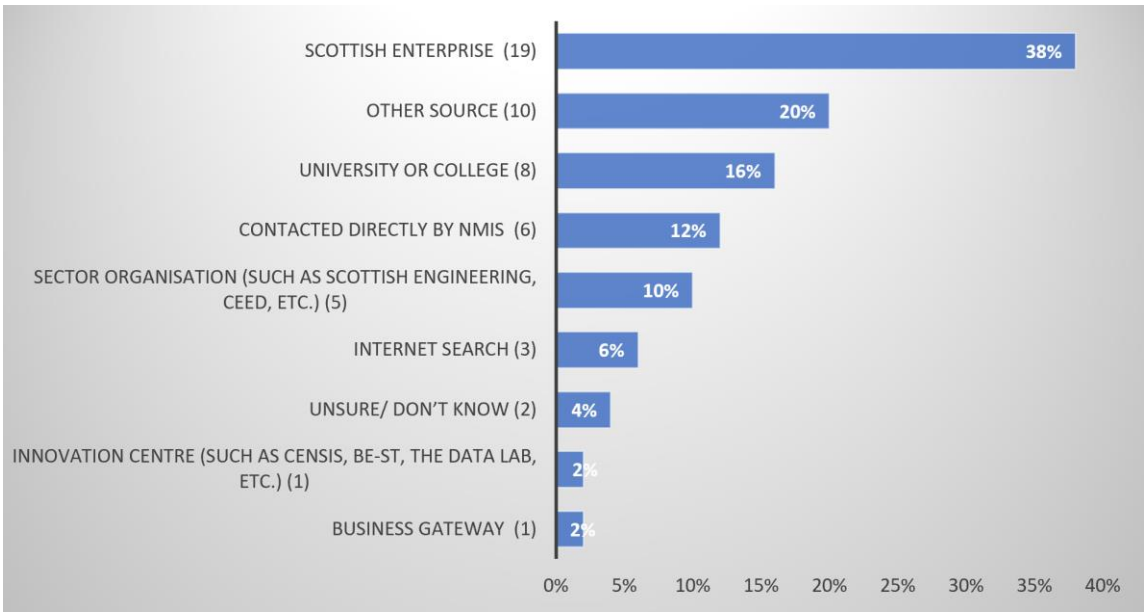


Figure 30: Sources of referral to NMIS

Note that the percentages add up to more than 100% as some respondents highlighted more than one source of referral. Other sources included: Interface, Scottish Edge, Innovate UK, LinkedIn, a robotics manufacturer, networking event, Techex, Product Design Scotland, Zero Waste Scotland and a business contact.

Respondent generated descriptions of NMIS capabilities and services

Respondents were asked to describe, in a few words, the capabilities and services NMIS offer. The word cloud generated from these responses is provided below.

Figure 31: Word cloud summarising respondent descriptions of NMIS capabilities and services

Respondents' awareness of different NMIS centres and capabilities

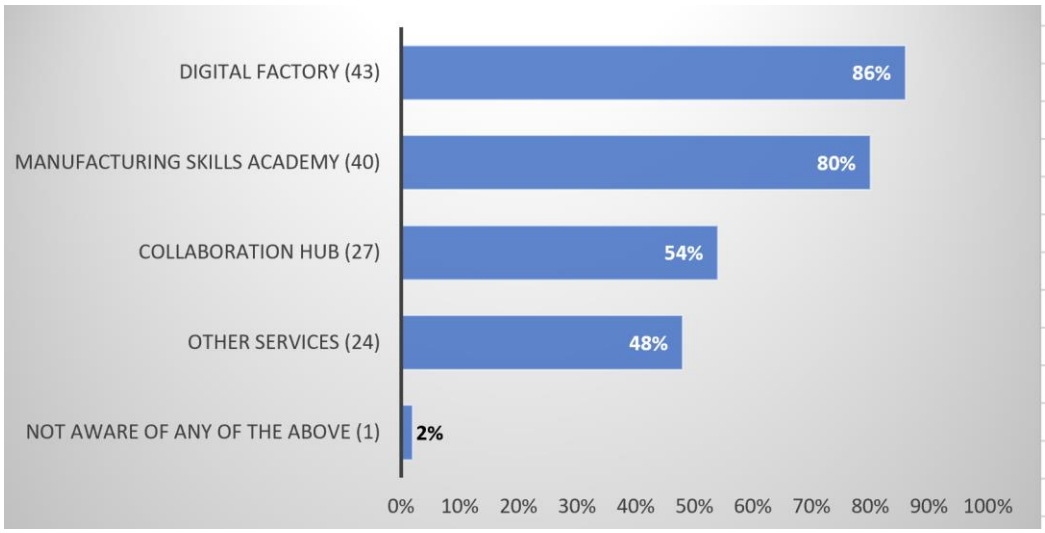


Figure 32: Respondents' awareness of NMIS centres and capabilities

Note that 'Other services' included: advice & consultancy (14), product/process design (3), lightweight manufacturing, advanced forming, DPMC, materials testing and project funding.

Respondents use of NMIS centres and capabilities

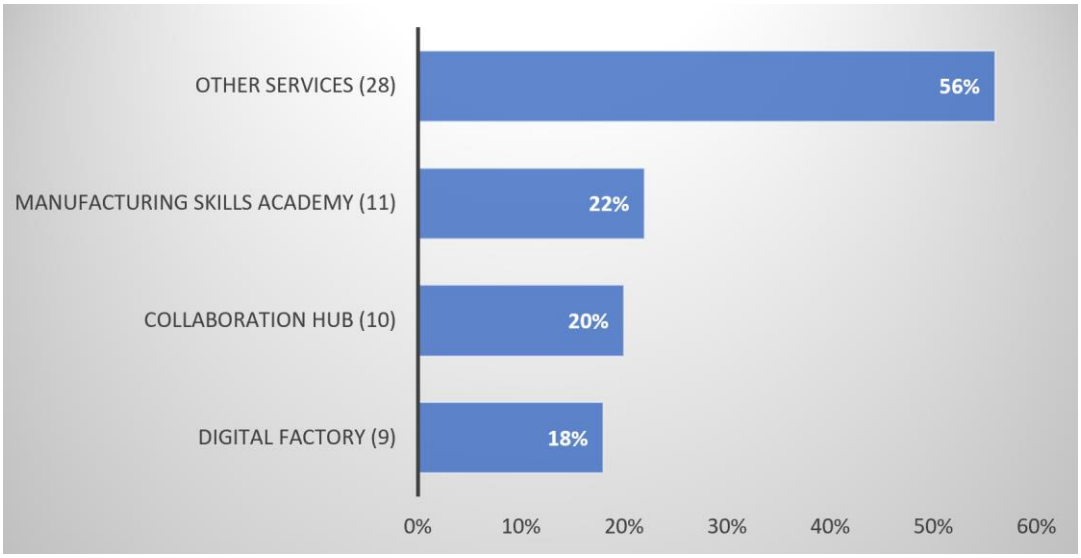


Figure 33: Respondents' use of NMIS centres and capabilities

Note that the percentages add to more than 100% as some respondents had used more than one of the NMIS capability options provided. Other services included: consultancy & advice (18), product design (3), finite element analysis (2), lightweight manufacturing, D3M Colab, DPMC, material testing and student project.

Type of support received from NMIS

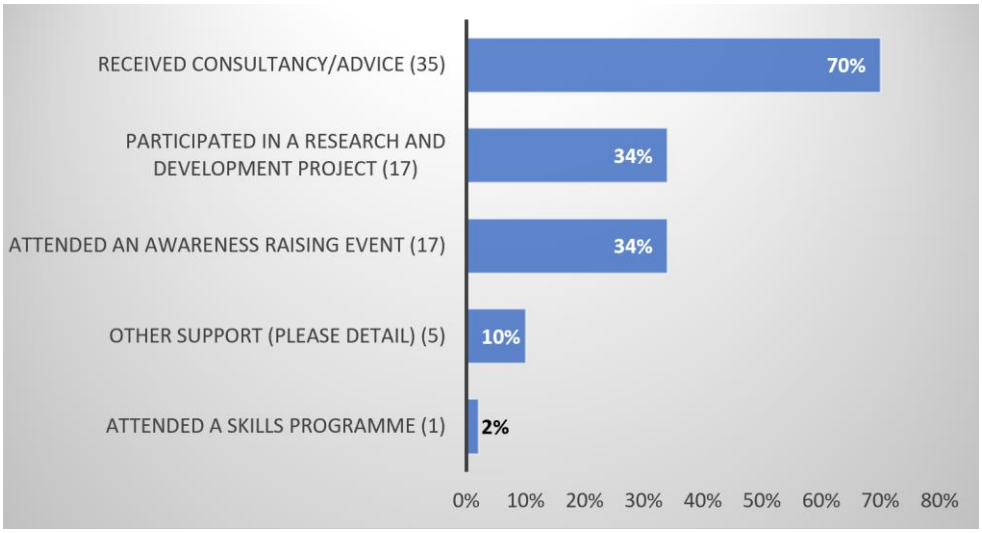


Figure 34: Type of support received from NMIS

Note that the percentages add to more than 100% as some respondents had used more than one type of support. Other support included: a student project, hosting of training of undergraduate apprentices at the company facility, finite element analysis from AFRC, visit to the Manufacturing Technology Centre in Coventry and a brief discussion about a manufacturing process.

It should be noted that contact names were not available for all 43 records in Objective 4 of the MEF where the Lead Reference was 'MSA' (which was used to construct the target database for the structured company survey). This meant that these companies could not be included in the structured survey and it is likely the instances of attendance of skills programmes is lower as a result.

Reasons for companies engaging with NMIS

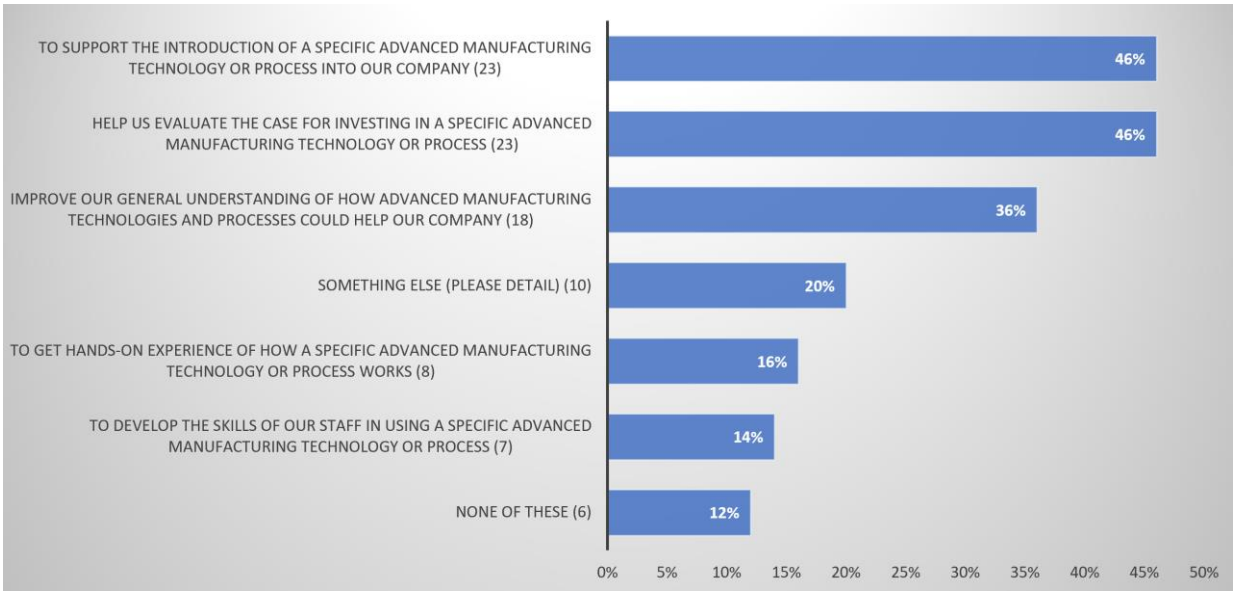


Figure 35: Reasons for companies engaging with NMIS

Where respondents answered 'Something else' this included: related to accessing funding (3), to meet new clients (2), to meet potential recruits, fact-finding, material testing, KTP association and a manufacturing process enquiry.

Main barriers to adapting or implementing advanced manufacturing technologies and processes

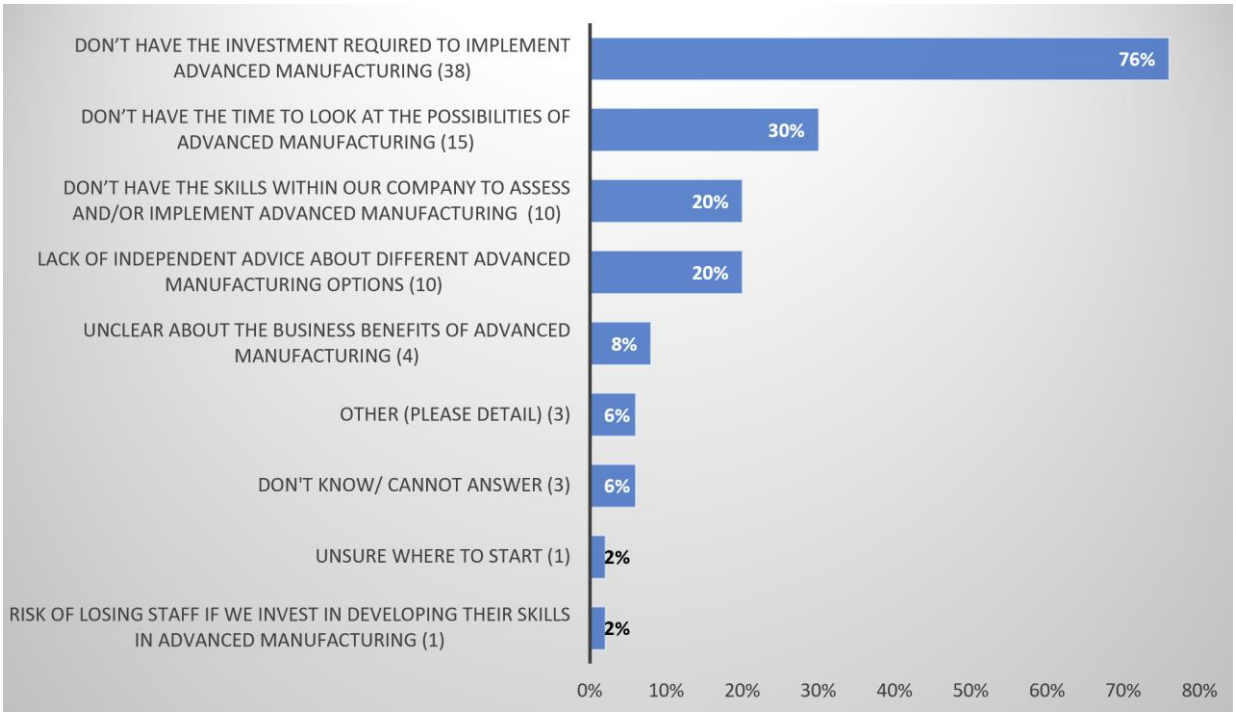


Figure 36: Barriers to adapting or implementing advanced manufacturing

Note that the responses classed as 'other' include: not seeking to introduce advanced manufacturing but to work with NMIS on an external project, lack of access to physical equipment and space for experimental/development purposes and lack of product volume being manufactured to justify investment.

Overall level of satisfaction with NMIS engagement

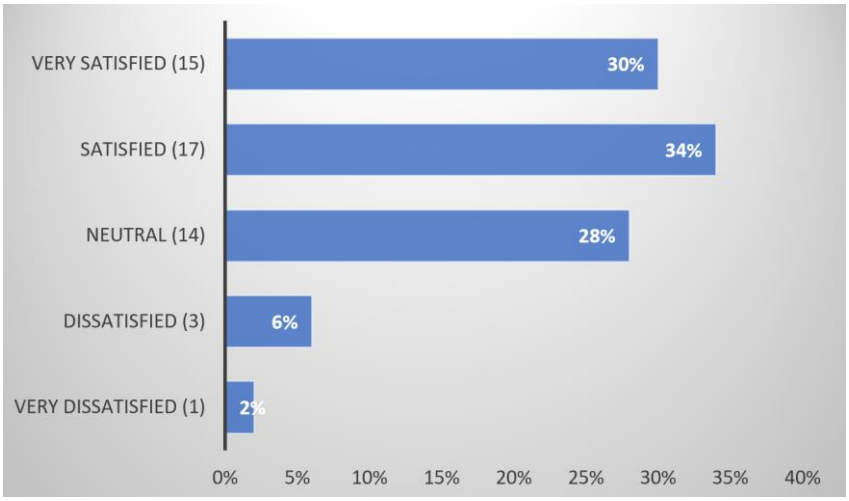


Figure 37: Overall level of satisfaction with NMIS engagement

Level of satisfaction with responsiveness of NMIS when contacted

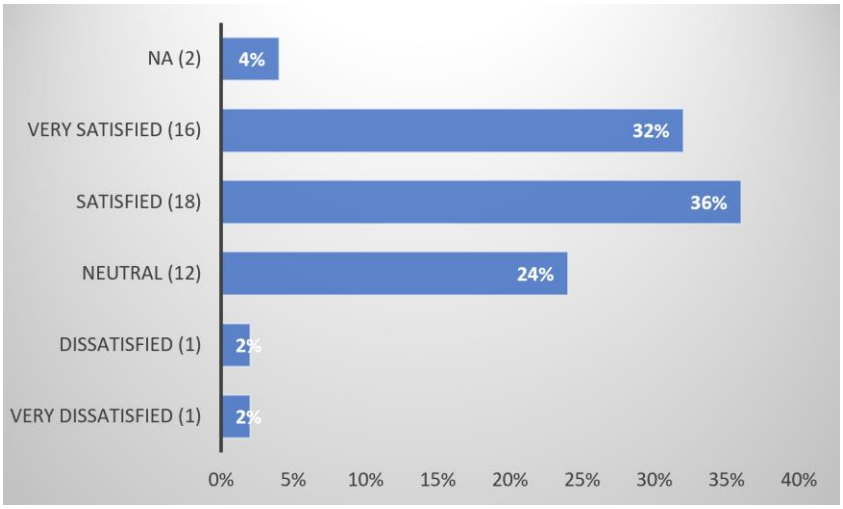


Figure 38: Level of satisfaction with responsiveness of NMIS when contacted

Level of satisfaction with NMIS doing what it said it would do

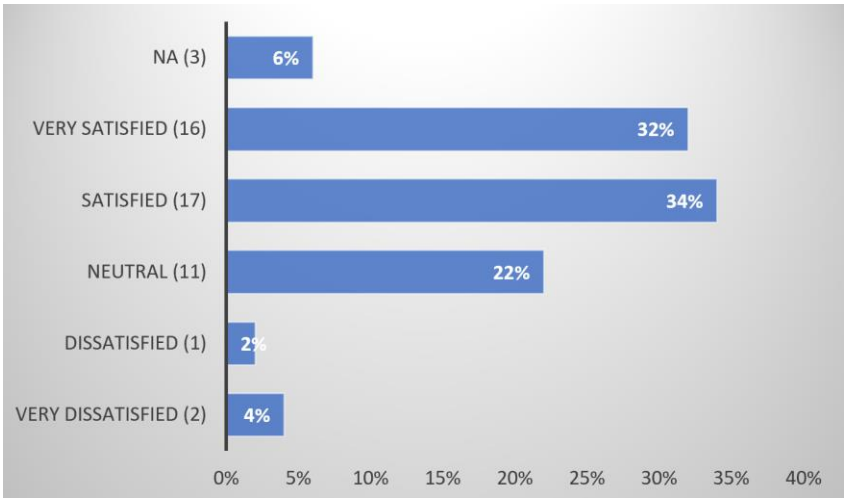


Figure 39: Level of satisfaction with NMIS doing what it said it would do

Level of satisfaction with the technical ability and knowledge of the NMIS staff engaged

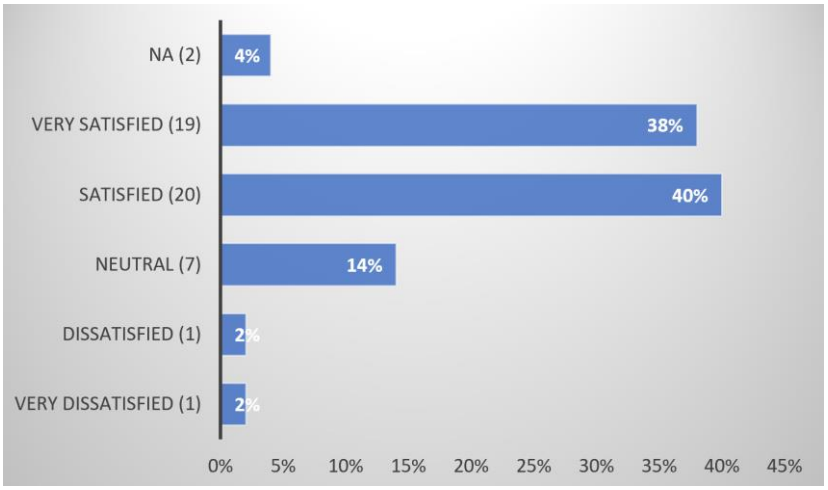


Figure 40: Level of satisfaction with the technical ability and knowledge of the NMIS staff engaged

Overall view of how beneficial the NMIS support has been

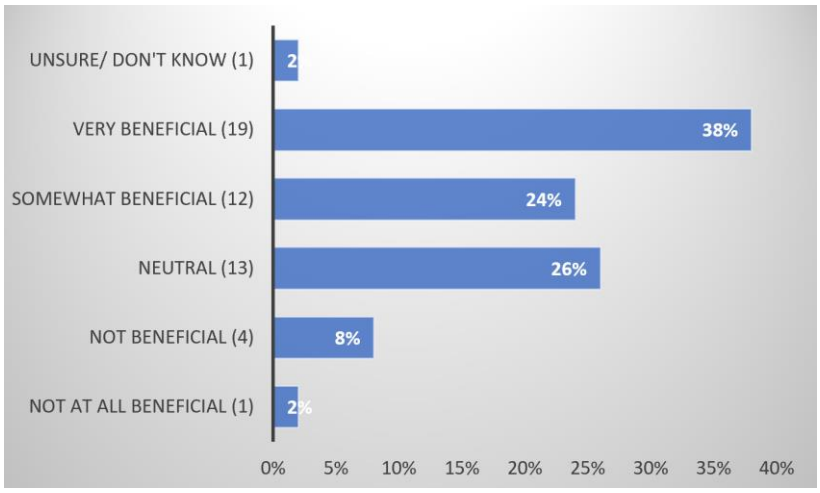


Figure 41: Overall view of how beneficial the NMIS support has been

Views on the best aspect about the support received from NMIS

Respondents were asked to briefly describe what the best aspect about the support they received from NMIS. The responses have been used to generate the following word cloud.

Figure 42: Word cloud summarising respondent views on best aspects of support

A sample of the individual comments about the best aspect of NMIS support include:

> *"The feasibility study we received didn't just deliver a conclusion it helped develop understanding into the decision-making process that was applicable to our specific requirement."*
>
> *"The advice is applicable to our challenges and is given by qualified and knowledgeable people. We also very much value that the advice is honest, independent and without any commercial bias."*
>
> *"Access to lab testing equipment we wouldn't have otherwise been able to access."*
>
> *"Honest opinions"*

Overview of the degree to which the company has already benefitted or will/may benefit in future from NMIS support, by different types of benefit

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA	% Benefitted or may benefit
Base	1424	8%	31%	45%	16%	39%
Knowledge	294	21%	43%	18%	18%	64%
Networking	246	13%	28%	44%	15%	41%
Innovation	396	4%	30%	52%	14%	34%
Sales	194	1%	31%	56%	11%	32%
Finance	294	1%	21%	59%	20%	21%

Table 16: Overview of level of achieved and future benefits arising from NMIS support

Degree to which knowledge benefits have been achieved or will/may be achieved in future, by type

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA
Base	294	21%	43%	18%	18%
Improved understanding of NMIS capabilities	50	44%	38%	12%	6%
Improved knowledge and skills about assessing the business potential of advanced manufacturing	50	26%	46%	20%	8%
Improved knowledge and skills about assessing technical potential for advanced manufacturing in your business	50	16%	52%	16%	16%
Improved knowledge and skills about implementing advanced manufacturing in your business	50	16%	52%	16%	16%
Improved knowledge and skills about using specific advanced manufacturing technologies and processes in your business	50	16%	58%	16%	10%
Other knowledge and skills benefit (please detail)	44	7%	7%	32%	55%

Table 17: Degree to which knowledge benefits have been achieved or will/may be achieved in future, by type

Degree to which networking benefits have been achieved or will/may be achieved in future, by type

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA
Base	246	13%	28%	44%	15%
New or improved contacts with technology suppliers	50	16%	30%	42%	12%
New or improved contacts with other manufacturing businesses	50	16%	36%	40%	8%
New or improved contacts with academics/researchers	50	10%	36%	46%	8%
New or improved links with public sector support organisations	50	14%	26%	50%	10%
Other networking benefit (please detail)	46	7%	11%	41%	41%

Table 18: Degree to which networking benefits have been achieved or will/may be achieved in future, by type

Degree to which innovation benefits have been achieved or will/may be achieved in future, by type

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA
Base	396	4%	30%	52%	14%
Made a new capital investment in advanced manufacturing technologies and processes	50	2%	34%	48%	16%
Increased R&D/ innovation investment	50	6%	40%	44%	10%
Developed new Intellectual Property	50	4%	34%	52%	10%
Improved the productivity of the business	50	4%	36%	50%	10%
Reduced carbon emissions from business operations	50	6%	26%	58%	10%
Developed new products or services for markets relating to Net Zero	50	6%	32%	50%	12%
Developed new products or services for other markets	50	4%	32%	52%	12%
Other R&D benefit (please detail)	46	2%	4%	59%	35%

Table 19: Degree to which innovation benefits have been achieved or will/may be achieved in future, by type

Degree to which sales benefits have been achieved or will/may be achieved in future, by type

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA
Base	194	1%	31%	56%	11%
Increased sales in Scotland	50	4%	34%	56%	6%
Increased sales in the rest of the UK	50	-	42%	52%	6%
Increased sales internationally	50	-	42%	52%	6%
Other sales benefit (please detail)	44	-	5%	66%	30%

Table 20: Degree to which sales benefits have been achieved or will/may be achieved in future, by type

Degree to which finance benefits have been achieved or will/may be achieved in future, by type

Analysis % Respondents	Total	Has already benefitted	Will or may benefit in future	No	NA
Base	294	1%	21%	59%	20%
Improved business case for investment in advanced manufacturing	50	-	36%	48%	16%
Secured internal funding for investment in advanced manufacturing	50	-	24%	58%	18%
Secured new external equity investment for advanced manufacturing (business angels, etc.)	50	-	18%	64%	18%
Secured new debt funding for investment in advanced manufacturing (bank loans, etc.)	50	-	20%	62%	18%
Secured new funding from the public sector for investment in advanced manufacturing	50	4%	22%	60%	14%
Other finance benefit (please detail)	44	-	2%	59%	39%

Table 21: Degree to which finance benefits have been achieved or will/may be achieved in future, by type

How the support received from NMIS contributes to job creation

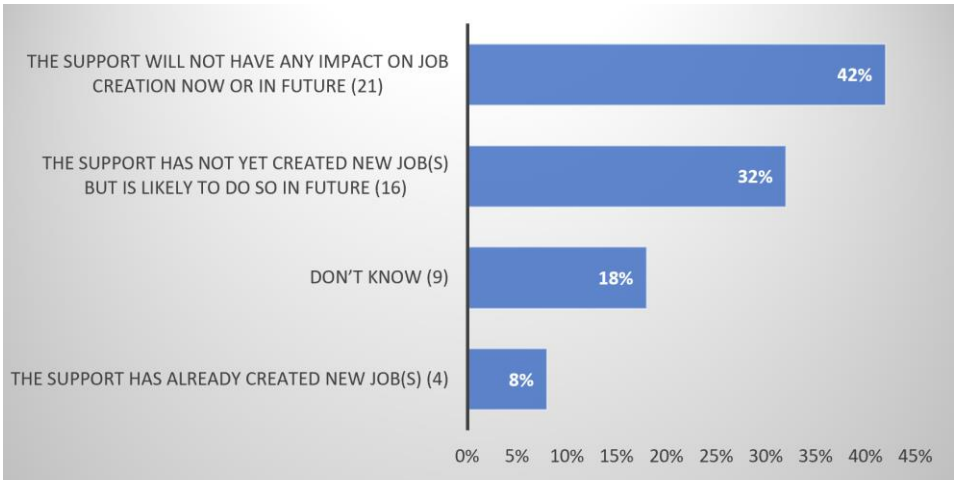


Figure 43: NMIS support contribution to job creation

How the support received from NMIS contributes to diversity of the workforce

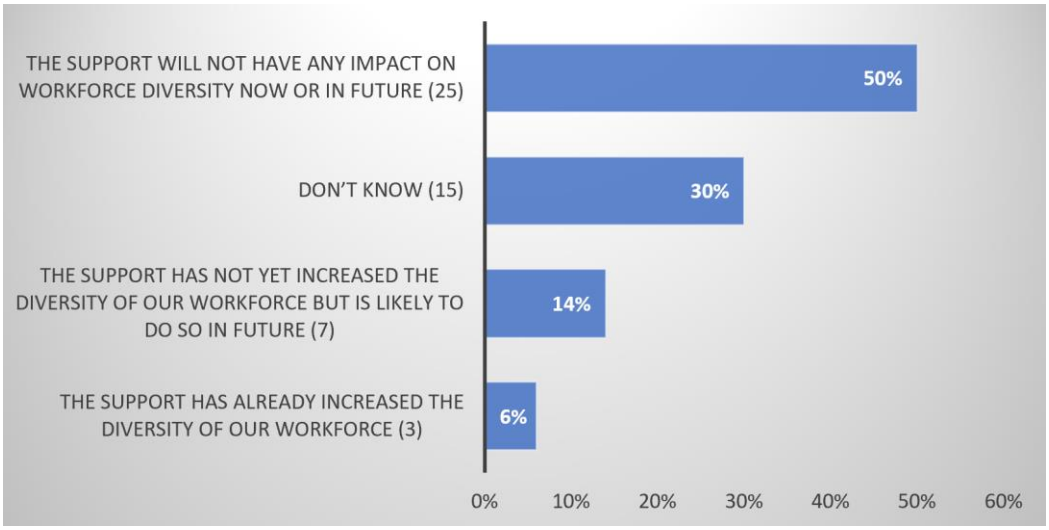


Figure 44: NMIS support contribution to diversity of the workforce

Views of companies on how NMIS could improve the support delivered

Respondents were asked if they could provide any suggestions about how NMIS could have improved or done better to support their company. A total of 11 of the 50 provided usable responses. The most significant theme from these comments (mentioned by 3 respondents) was more funding for companies to engage with NMIS and clarity about how to access this funding.

> *"Understanding support from Scottish Enterprise to finance the engagement of business to work with NMIS in design and manufacture of novel products will be of great value."*

Two respondents highlighted the need to increase staff resources within NMIS to deal with company enquiries.

Two respondents suggested costs needed to be more competitive compared to other providers.

> *"The costs were higher and did not cover all the requirements for our project". "There were cheaper options."*

The remaining comments covered individual suggestions covering: the location not being central enough, the need for NMIS to be more proactive, sorting out insurance issues about using NMIS equipment in client premises, more staff to support design and manufacture of novel products and being less academically focused.

Likelihood of using NMIS in future

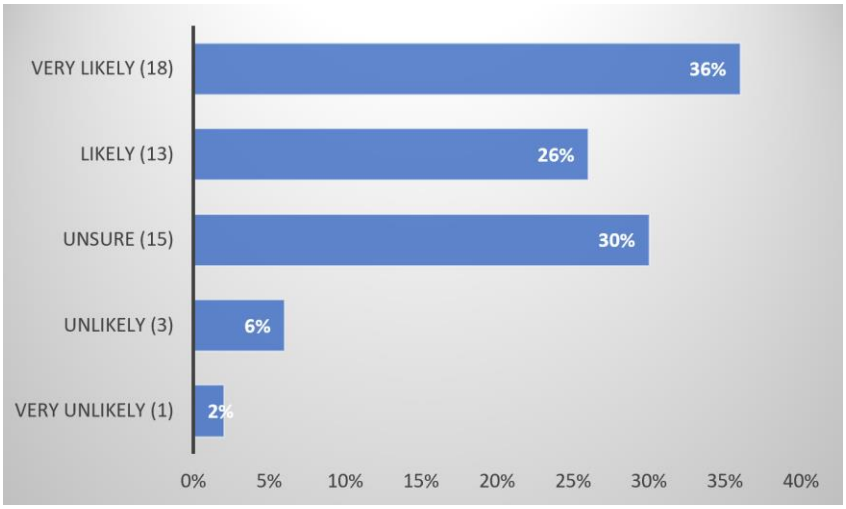


Figure 45: Likelihood of respondents using NMIS again in future

Which of the following best describes why NMIS would likely be used again?

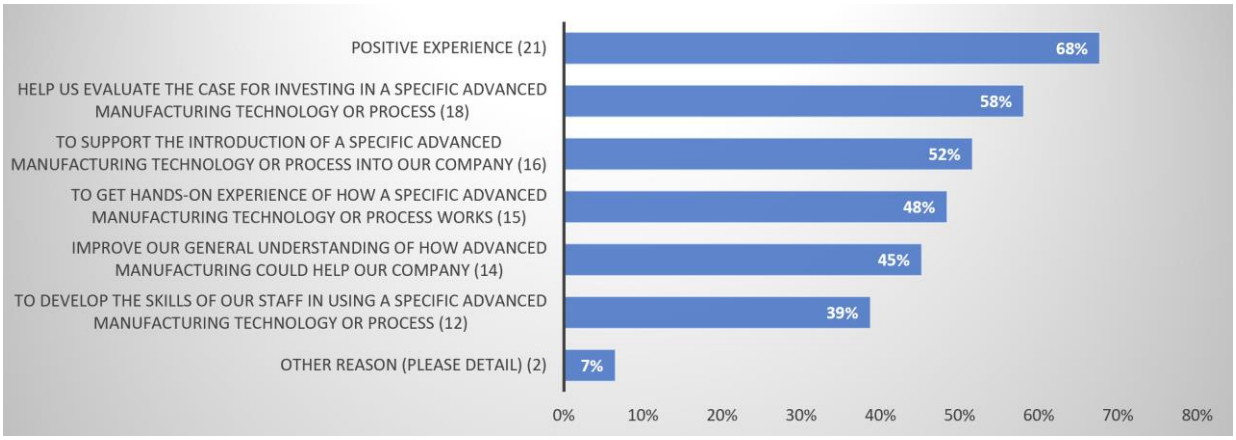


Figure 46: Views on why respondents would be likely to use NMIS again

Note that the above question was only asked of the 31 respondents who stated they would be likely or very likely to use NMIS again. Multiple responses could be selected.

Which of the following best describes why you would be unlikely to use NMIS services again?

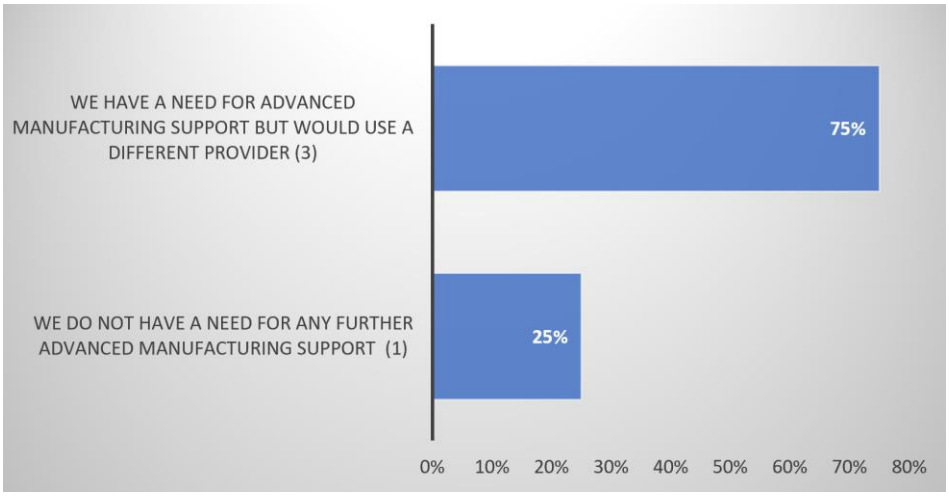


Figure 47: Views on why respondents would be unlikely to use NMIS again

Note that the above question was only asked of the 4 respondents who stated they would be likely or very likely to use NMIS again. Multiple responses could be selected. For illustration, one respondent provided this additional commentary:

> *"NMIS is very expensive when the same skills/expertise are available in the market and from other university departments, but in order to access grant funding to secure these types of services, micro-SMES are pushed towards NMIS as an RTO. Also, there is little understanding of the practicalities of running a micro-SME. While NMIS present ideal solutions and processes, this has to be tempered with the reality of running a lean start-up process."*

Would you recommend NMIS to other companies looking for support?

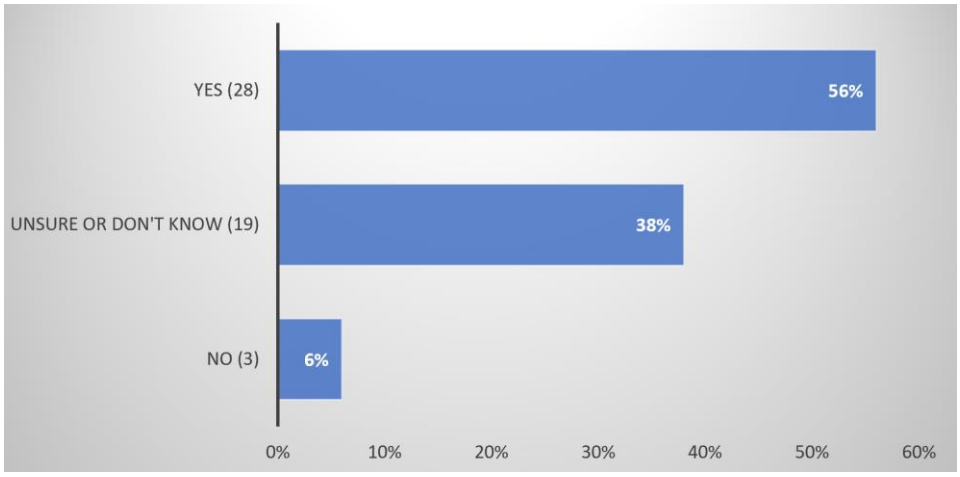


Figure 48: Whether respondents would recommend NMIS to other companies

Could you have received similar support from other sources other than NMIS?

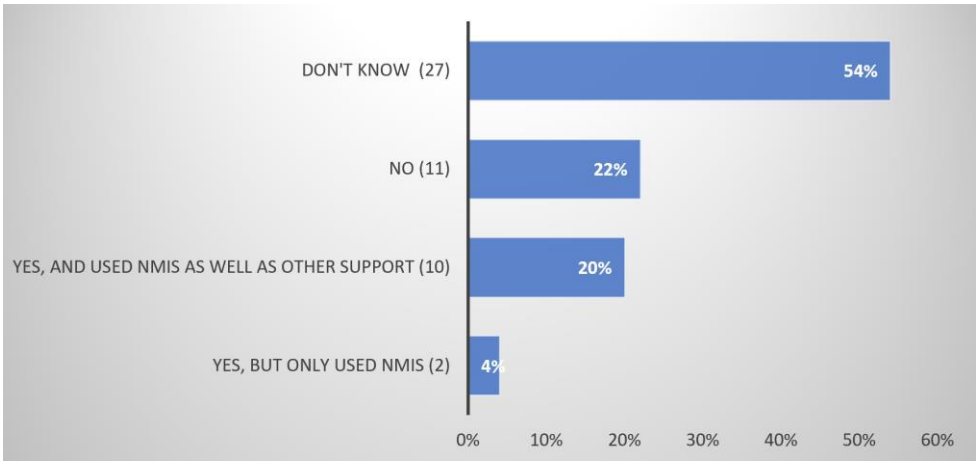


Figure 49: Views on whether respondents could have accessed similar support from sources other than NMIS

Ten of the 12 respondents that stated they could have accessed similar services provided more detail about these alternative providers. The providers identified included SMAS (3), CeeD (2), Other university departments (2), private providers (2) and a sector support network.

Was the alternative support available from private sector providers and/or organisations funded by the public sector?

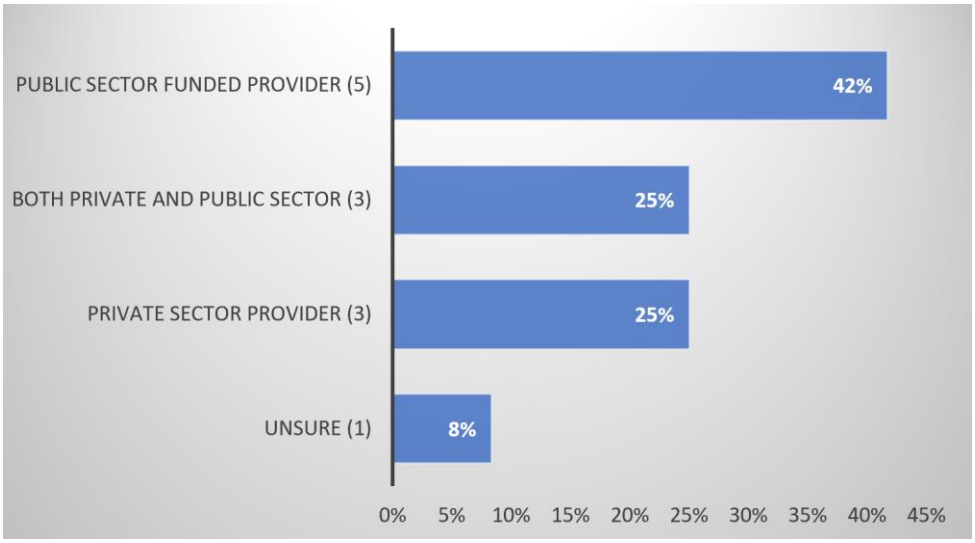


Figure 50: Source of similar support

Why did you choose to work with NMIS when there was other support available?

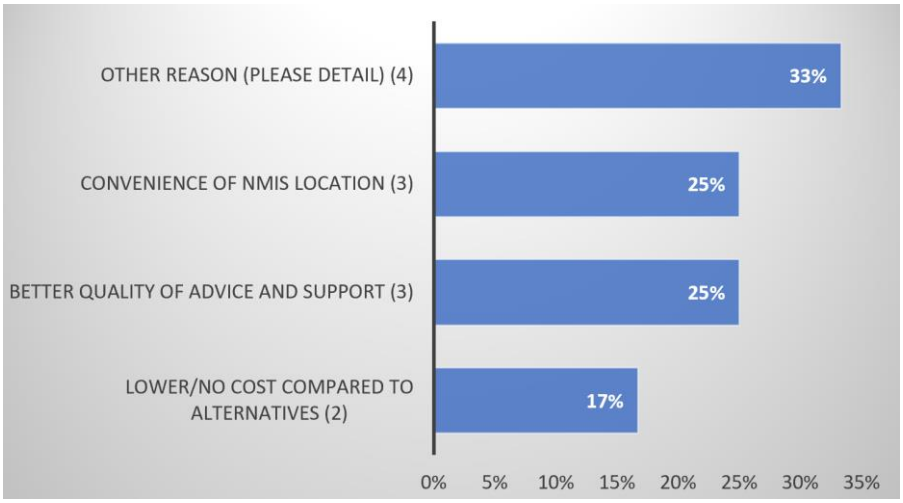


Figure 51: Reasons for choosing to work with NMIS when other support was available

No usable responses were received to the request to provide further detail on the 'Other reason' option.

Respondents were then asked if they would like to provide any further comments or feedback. A representative sample of responses are shown below.

"The only reason that I was able to use NMIS was because it was 100% funded through Innovate UK. NMIS can deliver help but a cost too high for a small company."

"We consider ourselves VERY fortunate to have been given the opportunity to interact with NMIS for what is currently a small company. All the NMIS individuals we have had the pleasure of learning from have been of the highest calibre with a genuine focus on our needs."

"We have had detailed discussions with NMIS. No collaboration as yet nor any tangible benefits other than some knowledge transfer and some ideas."

"Through participation with NMIS and Strathclyde University we have just recently been granted a Patent for our Company, which we would not have had the knowledge otherwise, which provided the confidence and reassurance to press on for 4 years and eventually gain our Patent"

"NMIS is fantastic for the engineering sector."

"Fantastic opportunities for networking, very impressed"

"Without more funding and further investment this facility will come under increased scrutiny regards its ability to support Scottish and other overseas countries."

"Very impressed with NMIS and their skillset."

"The NMIS people we dealt with were exceptional."

Feedback was also captured from some of the 43 companies that could not recall receiving any support (or a meaningful level of support) from NMIS despite being on the list of companies engaged by NMIS, supplied as part of this evaluation. Note that these 43 companies are additional to the 50 companies completing the survey, all of which could recall receiving support. A sample of comments from those that did not recall receiving support is provided below, to reflect that this evaluation has identified some evidence of negative experiences when companies have tried to engage with NMIS.

> *"I tried repeatedly to make contact with NMIS earlier this year, by phone and by email and never received the courtesy of a reply. We had a serious proposition to discuss and are a very long-established business in the Scottish manufacturing sector. I was not impressed!"*
>
> *"Unfortunately, NMIS didn't support us and, to be honest, from our point of view, weren't all that keen to engage, which was disappointing."*
>
> *"I had a meeting with NMIS to discuss support, but they never got back to me."*
>
> *"I tried several times to contact NMIS but with no luck."*

In addition to these examples of negative experiences when trying to engage NMIS, a number of others could simply not recall receiving support (28) or stated that the contact was so minimal that they did not feel able to provide meaningful feedback (11).

Appendix C – Contributors to the study

Representatives from the following organisations contributed to the study. Some organisations preferred not to be named and others have not been included for confidentiality reasons, to avoid attribution of anonymised opinions where there is a small sample size of organisational type.

ACS Clothing Limited
ADS Scotland
Ailsa Reliability Solutions
Almond Engineering Ltd
AMMA Solutions
Atlas (Scotland) Limited
Backlit Films Ltd
BE-ST
CeeD
Cobra Simulation Limited
Confidence Plus Ltd
ESP
Fort William UTC Ltd
Highlands and Islands Enterprise
Inductight Ltd
Innovate UK/ High Value Manufacturing Catapult
IntelliDigest Ltd
Macdeck Landscaping Limited
Malin Marine Consultants
MCS
MEP Technologies Ltd
Napkin Innovation Limited
New Energy Scotland Ltd
NMIS
PeachyKeen Ltd
Precision Tooling Services Ltd
Puls8 Ltd
Quartztec Europe
ReBlade Limited
Renfrewshire Council
Ritchie Precision
Route Cycles
Scottish Engineering
Scottish Enterprise (incl. SMAS)
Scottish Government
Skills Development Scotland
Soltropy Limited
South of Scotland Enterprise
Space Scotland
Tannlin UK Ltd
The Edrington Group Limited
Virtual Manufacturing UK Ltd
WashR Ltd
WEEE Scotland Ltd
Wideblue Ltd
Windswept and Interesting Limited
Zeo Concept ECE Ltd

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