

Evaluation of the Industrial Masters in AI (IMAI) programme

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Contents

Executive Summary	4
1. 7	
1.1 Policy background	7
1.2 Programme background	8
1.3 Programme objectives	8
1.4 Delivery responsibilities	10
Theory of Change	11
2. Evaluation background	12
2.1 Evaluation questions	12
2.2 Methodology	14
2.3 Limitations	17
3. 19	
3.1 Quantitative Outputs	19
3.2 Participation	23
3.3 Outcomes	28
4. 31	
4.2 Programme Scope	33
4.3 Alternative funding and administrative arrangements	34
4.4 Expanding beyond brokerage role	35
4.5 Combining with other programmes	35
5. 36	
6. 39	

List of figures

Figure 1: Theory of Change logic model	11
Figure 2: Contact pathways for all industry	22
Figure 3: Contact pathways for participating industry	22

List of tables

Table 1: Evaluation Questions	12
Table 2: Stakeholder qualitative sample	16
Table 3: IMAI support offerings	20

Executive Summary

- The Industry-funded Masters in AI (IMAI) programme was developed to respond to a need to improve AI skills at a postgraduate level. According to the initial business case, the programme aim is to “boost the opportunities available for applied training in artificial intelligence in the UK” and close the AI skills gap.
- The programme started in 2019 and is in its third and final year of funding AI scholarships. It aims to leverage industry funding to (i) provide AI master’s places and work placements and (ii) create links between industry and higher education institutions (HEIs).
- This report presents the lessons learned from the IMAI programme which can be applied to similar programmes leveraging industry funding to develop skills.

Evaluation approach

- The evaluation used a primarily qualitative approach to collect feedback from a range of programme stakeholders including the programme team, policy stakeholders, previous and current higher education institutions (HEIs), and previous and current industry partners.
- Due to low levels of engagement, the number of stakeholders interviewed (23) was lower than planned. Therefore, the data presented and analysed in this report should be interpreted largely as an insight into the experiences of individual stakeholders.

Programme delivery

- The Office for Artificial Intelligence (OAI) selected the Institute of Coding (IoC) to deliver the programme due to its established network across UK universities and key industry stakeholders.
- To date, the IMAI programme has resulted in 125 funded scholarships and placements over three years, from 19 industry partners. This compares to a Business Case aim to deliver 200 offerings in year one, although this was not a delivery target. Some of these industry funded scholarships may have taken place in the absence of the programme, so these figures may overstate the additionality of the programme.
- The IMAI programme has leveraged approximately £1.3 million of industry funding. Although this figure could not be independently verified by the evaluators

as money did not flow through the IoC and therefore exact figures were not recorded.

- The programme enabled participation from HEIs across the four UK nations. In terms of regional diversity, 12 of the 17 participating English universities were located outside of the south of England, although there was no participation from universities in northern regions.
- Industry partners had a range of motivations for taking part, most notably to access new talent, with secondary reasons being to support the wider AI sector, diversify their workforce, and strengthen links with universities.
- A key barrier to industry participation was the uncertainty on their return on investment, as there was no guarantee that funded students will work for their sponsor company. Secondary barriers included lack of time and financial costs, as well as uncertainty due to COVID-19.
- The IoC were described by industry partners as “supportive”, although they also felt that the IOC could have had more regular engagement.
- The IoC expressed that COVID-19 was a central challenge as it created uncertainty for employers and meant that discussions with industry were put on hold. They also noted that the year-to-year funding model had created staffing disruption and reported wider industry hesitancy to invest money.

Outcomes

- Industry stakeholders and HEIs who took part in the IMAI programme generally thought it helped them create relationships which would not have formed otherwise, thereby providing reputational benefits. One HEI noted that the programme provided introductions to large companies which they had previously struggled to engage.
- The IoC felt that, while the programme did not achieve the £5 million industry funding figure included in the original Business Case, it still provided good return on investment given relatively low funding inputs. It leveraged industry investment of £1.3 million from a government investment of £394,000 over three years, resulting in a Benefit Cost Ratio of 3.3 from these two elements (although government investment may have resulted in other financial benefits beyond industry investment).
- The IoC built connections with 442 potential industry partners, and feedback from the team highlighted the success of engagement events, especially in the first year. This included regional events in the north of England and devolved

administrations, which were positively received by industry, although it is not possible to tell from the data whether these events led to subsequent investment from attendees. Out of the industry partners who the IoC made connections with, 60% were through AI-specific summits and conferences.

- Student outcomes were out of scope for this evaluation, in part due to data limitations as the IoC was not required to collect student-level data. This report therefore does not include analysis on the effectiveness of the programme to encourage uptake of AI roles or to address the lack of representation from certain groups in the AI sector.

Proposed updates to the model

- Feedback from both industry and HEIs indicated that the programme is not well known amongst its intended audiences. There were suggestions from industry, HEIs, and the IoC that more should be done to publicise the programme, not only to industry and HEIs but also to students.
- Industry stakeholders with experience of delivering their own AI skills initiatives suggested that the student experience could be increased through strengthening the cohort learning experience and incorporating a mentorship element.

Financial sustainability

- Industry suggested that a model which matched industry and government funding would allow them to work with more universities for the same investment. Another suggestion was that larger companies could pay more, to ensure that smaller companies are not excluded from taking part.
- Several industry stakeholders mentioned that apprenticeships were a more appealing route, as large companies already pay the apprenticeship levy and it leads to direct employment.

1. Policy and programme background

1.1 Policy background

The UK AI sector is worth £15.6bn, with the UK one of the leading countries in terms of AI, ranking third behind the US and China. It is estimated that the AI sector could contribute £630bn to the UK economy by 2035, with sectoral growth bringing substantial benefits to industry, healthcare, and public services.¹ Announced in 2021, The National AI Strategy² demonstrates the Government's commitment to supporting the development of the AI sector over the next 10 years to ensure that the UK remains a global leader in AI. Increasing the skill and talent of the UK workforce is central to the future development of the sector, with AI skills and talent a core policy objective for the Office for AI.

A key challenge identified in relation to the AI sector is the lack of availability of skills. There is a specific and continued need for AI expertise, including “high end” skills gained from post-graduate qualifications. Demand for AI specialists has grown rapidly in recent years but has not been matched by increased supply. According to analysis conducted by Indeed, the number of AI jobs in the UK listed on its online job boards grew 485% between 2014 and 2017³. This accounts for more than two jobs per qualified individual and six jobs for every qualified jobseeker. Research on AI firms conducted for the Office for Artificial Intelligence (OAI) found that half of surveyed firms' business plans had been impacted by a lack of suitable candidates with the appropriate AI knowledge and skills, and two-thirds of firms expected that the demand for AI skills in their organisation would increase in the next 12 months.⁴

The independent AI Council for the Government included as one of the 16 recommendations in their AI Roadmap 2021, the need to “scale up and commit to an ongoing 10-year programme of high-level AI skill-building. This would include research fellowships, AI-relevant PhDs across disciplines, industry-led master's, and level 7 apprenticeships.”⁵ The Roadmap stated that current figures indicated an unmet demand for graduate-level AI learning which would justify a five to tenfold increase in graduate places compared to the figures presented in the AI review.

According to the 2017 AI sector review, “AI in the UK appears to lack effective levels of non-competitive collaboration both between businesses and between businesses and academia”.⁶ Research conducted by OAI found that businesses report that new graduates

¹ <https://www.gov.uk/government/publications/growing-the-artificial-intelligence-industry-in-the-uk>

² <https://www.gov.uk/government/publications/national-ai-strategy>

³ <https://www.bbc.co.uk/news/technology-41489643>

⁴ <https://www.gov.uk/government/publications/understanding-the-uk-ai-labour-market-2020>

⁵ <https://www.gov.uk/government/publications/ai-roadmap/>

⁶ <https://www.gov.uk/government/publications/growing-the-artificial-intelligence-industry-in-the-uk>

often lack practical workplace experience and are unable to immediately apply their academic training to real-world situations. By partnering with industry to deliver master's provision, the aim is to create a pipeline of "business ready" graduates with Level 7 skills. This is expected to drive growth in companies and support development of the UK AI sector.

1.2 Programme background

The need for interventions at post-graduate level to improve AI skills was recognised in the 2017 AI sector review⁷, where a key recommendation was that the UK should provide more places for AI Masters courses, which industry should fund. The 2018 AI Sector Deal⁸ committed to supporting industry to invest in a master's programme, and the 2019 AI skills and talent package⁹ introduced the Industrial Masters (IMAI) in AI which included support for up to 200 AI Masters places at UK universities starting in September 2019.

DCMS selected the Institute of Coding (IoC) to deliver the programme due to its established network across UK universities and key industry stakeholders, potentially providing economies of scale in broadening awareness and engagement. The IoC introduced companies willing to sponsor master's students and/or placements for those students within the IMAI project to HEI providers, with OAI responsible for sponsorship and placement targets as a result of the scheme.

Three separate grants were provided to fund the IoC to deliver the IMAI programme for 2019-20, 2020-21, and 2021-22 academic years. Grants were £132,000 for each of the first two years, and £130,000 for the third year.

1.3 Programme objectives

According to the Business Case, the key strategic objective of the IMAI programme is:

- "[T]o boost the opportunities available for applied training in artificial intelligence in the UK, and therefore, to tackle the skills gap reported by industry. An increase in the number of professionals, with applied AI skills, is expected to drive growth in the companies in which they are employed."

⁷ <https://www.gov.uk/government/publications/growing-the-artificial-intelligence-industry-in-the-uk>

⁸ <https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal>

⁹ <https://www.gov.uk/government/news/next-generation-of-artificial-intelligence-talent-to-be-trained-at-uk-universities>

Additional objectives are summarised in the 2019 Business Case:

- increase the number of AI Masters places by 200 for 2019
- broaden inclusion and accessibility through affirmative measures supported by all stakeholders
- achieve a regional distribution of opportunities which stretches the objective beyond a London / Southern concentration for investment. In the 2021 Business case, this objective is linked to the Government's Levelling Up agenda
- support universities to adapt the application process to proactively encourage diverse and underrepresented backgrounds over the longer term, broaden to include a STEM-conversion and non-STEM conversion variant which will increase pathways into AI careers, include online provision, and utilise the Apprenticeship Levy more effectively

The main IMAI target is to deliver 200 extra places. However, it should be noted that this was not included in the grant agreement. An additional target listed in the Business Case is to convert positive industry engagement into support for the programme.

The Business Case also details expected benefits. While these are not explicit objectives, they allow assessment of the programme against intended outcomes. The expected benefits were:

- more suitable AI master's courses and graduates of greater relevance to business application
- the creation of opportunities to study suitable AI master's courses more evenly and broadly across UK regions
- the leveraging of Industry funding for the Masters. Based on discussions with industry experts, there was an expectation that the programme would elicit industry contribution which could equate to around £5m worth of support, for 200 places. This included paid placements which will provide better business training for candidates
- the facilitation of sustainable longer-term collaborative relationships between universities and employers for longer term growth of skills base, and more adaptable and business responsive supply system of master's education

1.4 Delivery responsibilities

The key objective role of IoC in programme delivery was defined as follows:

- match partners in industry interested in sponsoring places on Industrial Masters in AI (IMAI) with higher education institutions (HEIs) able to provide additional places on master's programmes which meet industry need. The courses themselves and supervision of students (including placements) will be managed by individual HEIs rather than the IoC

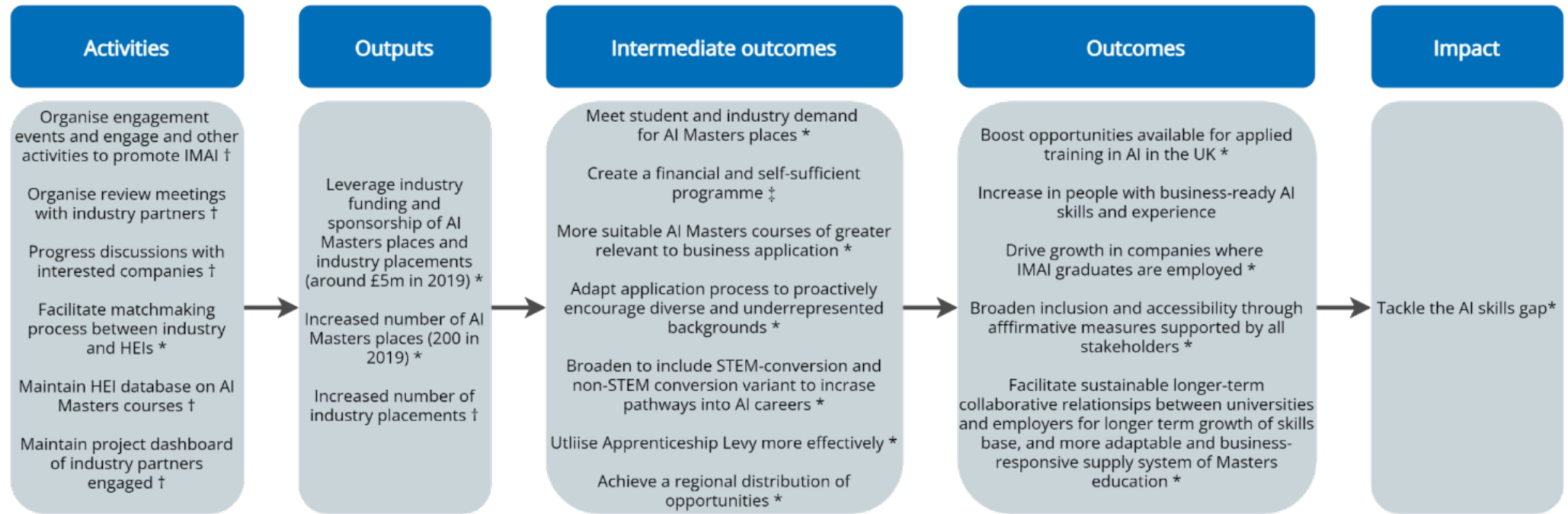
Key IoC activities were to:

- facilitate the matchmaking process through which industry sponsors and academic providers identify and make contact with each other
- organise 7 engagement events across the UK to raise awareness of IMAI and attend others of project relevance
- maintain the list of interested industry partners & the list of academic partners
- organise a review meeting during 2020

There were no hard delivery targets for number of places funded, and total funding leverages was only included as an informal soft target for 2021/22. There was also no target around regional diversity. There were no requirements for the IoC to support a shift to apprenticeship funding, and sales and marketing were explicitly excluded from their grant agreement.

Theory of Change

Figure 1: Theory of Change logic model



Sources:
 * Business Case 2019
 † IMAI Evaluation Report 2021
 ‡ Business Case 2020

2. Evaluation background

This section provides a short background to the evaluation, outlining the evaluation questions, the methodology, and the key limitations to the data collected during the evaluation.

It is important to note that the programme was evaluated against the aims set out in the Business Case, not against the objectives and KPIs agreed between OAI and the IoC. Not all the original Business Case objectives were translated into the grant agreement and therefore where the programme has not delivered against certain aims this does not necessarily reflect on the performance of the IoC.

2.1 Evaluation questions

The evaluation questions and sub-questions outlined below are largely based on those included in the evaluation Invitation to Tender, with a small number of additional questions identified following discussion with the client. The questions are centred around the overall programme objectives and correlate broadly with the activities, intermediate outcomes, and outcomes outlined in the Theory of Change (ToC). Due to the objectives of the evaluation and the limited resources available for this study, the evaluation questions do not assess in detail every element of the ToC. They are instead designed to capture stakeholder perceptions of programme activity and outcomes relating to the core objectives.

Table 1: Evaluation Questions

Evaluation Questions	Sub-questions
1. Is the programme delivering on its current objectives?	What elements of the programme are working well or less well?
	What are the barriers to the programme being even better?
	What are the enablers of programme successes?
2. How can we make the programme more effective?	How can the programme deliver on its current objectives more effectively? <ul style="list-style-type: none">• What can we do to increase the number and diversity (e.g. region, sector, size) of industry partners?• How can we increase the level of funding and other non-financial support that each industry partner commits?• How can we grow existing relationships between industry and

Evaluation Questions	Sub-questions
	<p>HEIs to lead to more funding being invested?</p>
	<p>How much investment has been targeted to those underrepresented within AI, and what is the regional breakdown of investment?</p> <ul style="list-style-type: none"> • How do we ensure funding is invested into both regionally diverse locations and for underrepresented groups?
	<p>What value (services/products) can be added to the IMAI programme so that it is not just a brokerage function?</p>
	<p>How can the programme's industry engagement events be improved to increase interest from industry?</p>
	<p>Is the programme providing any unanticipated value and how can this be maximised, and is it causing any unanticipated consequences (positive or negative)?</p>
<p>3. How can the programme become financially independent and sustainable?</p>	<p>Are there proposed models of financial sustainability drawing on best practice from other programmes?</p> <ul style="list-style-type: none"> • How can we engage industry in creating a sustainable model?
	<p>What is the impact of the programme on industry partners getting a return on their investment?</p>
	<p>Do industry partners view IMAI as competing against other similar initiatives for investment, and where else could they/have they invested?</p>

2.2 Methodology

A mixed methods approach was adopted for the evaluation of the IMAI programme, involving both qualitative and quantitative data collection. The evaluation consisted of four

separate phases: **initial scoping and research; data collection; data analysis; and reporting and dissemination.**

Initial Scoping and Research

The main objectives of the initial scoping and research phase were to provide a general overview of the available evidence and data relating to the IMAI programme, and to outline the programme's aims, achievements, history, and context. This phase began with a rapid evidence review, involving a desk review of key programme documents provided by DCMS. The key documents in the review included:

- 2019-20 Business Case
- 2021-22 Business Case
- 2021-22 Grant Agreement
- DCMS IMAI Evaluation Report (March 2021)
- a list of engaged industry partners (including information on whether they were directly involved in the programme or not)
- a list of AI master's courses

The research team also identified and reviewed several additional documents, including:

- Growing the artificial intelligence industry in the UK (DCMS/BEIS, 2017)
- Artificial Intelligence Sector Deal (DCMS/BEIS, 2018)
- AI Roadmap (Office for AI, 2021)
- ALGORITHM (Office for AI, 2021)

Information from relevant documents was used to identify the key activities, outputs, outcomes, and impacts of the programme. These were formulated into a programme ToC, included above. After this stage, a Rapid Evidence Review Report was provided to DCMS which included an analysis framework, an indicative qualitative sampling approach, and a programme ToC.

Management information (MI) data

IoC provided access to two datasets containing relevant programme MI. These were used to sample participants for qualitative fieldwork and were analysed to quantify programme outputs.

- The **industry CRM database**. This database contained 442 companies, all of which the IoC had previously engaged with in relation to the IMAI programme. For companies which were currently or previously participating in the programme (defined as involved), the database contained variables to indicate the number of

scholarships/placements provided across the three years and the universities hosting each scholarship/placement. For non-participating companies (defined as uninvolved), there was information around current status (e.g. discussions live or on hold). For all companies there was information on how the IoC came into contact with the company.

- The **HEI list**. This list contained information on all UK universities offering AI master's courses. Information included specialisms, course content, and previous participation in IMAI.

Primary data collection

Primary data collection consisted of two separate elements: in-depth interviews with stakeholders who had varying levels of engagement with the IMAI programme, and a survey of industry partners who did not take part in the programme.

The in-depth interviews were conducted with 22 stakeholders including policy specialists, higher education institutions (HEIs), industry partners, and the IoC. Interviews covered the key challenges, successes, and developments of the IMAI programme. A semi-structured approach was used so respondents could provide detailed qualitative data on new issues that arose during the interview.

Fieldwork was conducted remotely (via Microsoft Teams) from November 2021 to January 2022. Online interviews were recorded with the consent of participants and recordings were used by researchers to produce detailed transcripts. Whilst most stakeholders were interviewed alone, some stakeholders were paired together in one interview where it was appropriate to do so (for example, when interviewing two colleagues from the same university).

The sample for interviews was obtained using the industry CRM database and HEI list. Due to low levels of engagement from potential interviewees, we interviewed all industry partners and HEIs who responded to our invitation to interview. A purposive sampling approach was used to select representatives from the IoC and the Office for Artificial Intelligence (OAI). These representatives were selected due to their involvement in designing and running the IMAI programme, to ensure that the evaluation captured the perspectives of those most heavily involved with the programme's implementation.

The following table shows the total number of stakeholders engaged through qualitative interviews.

Table 2: Stakeholder qualitative sample

Stakeholder	Subgroup	Interviews	Total
IMAI Project Team	-	3	3
Policy Stakeholders	OAI Policy Stakeholders	4	6
	Wider Policy Stakeholders	2	
HEIs	Attached	2	4
	Previously Attached	2	
Industry Partners	Active Sponsors	3	10
	Previous Sponsors	4	
	Never Engaged	3	
Total no. of Stakeholders	-	-	23

The initial plan was to conduct two focus groups towards the end of the fieldwork period to test emerging findings and recommendations, one with previous industry partners and one with industry who had never taken part in the programme. However, due to low engagement from industry partners, we were unable to engage a sufficiently large sample to hold planned focus groups and instead held individual interviews only.

Due to the low levels of engagement from industry contacts who had never taken part in the programme, an additional short online survey was designed to be distributed to companies. While it was anticipated that the response rate would be low given the difficulties engaging contacts with qualitative interviews, it was felt this would maximise the data collected and allow participants to consent to be contacted about taking part in qualitative interviews. The survey was designed so that respondents did not require knowledge of the IMAI programme. Instead, questions were included to understand what AI skills initiatives respondents take part in, what would motivate them to take part in future initiatives, and what they see as the barriers to future participation. The survey was distributed by the IoC to all the companies in their IMAI mailing list (n=442) through one initial and one reminder email. The survey was live from 10th January to 10th February 2022.

In total, 12 responses were received (a response rate of 3%), three of whom agreed to be contacted for a qualitative interview, all of whom went on to be interviewed.

Data Analysis

Interview data was analysed using an analysis framework. The framework was organised by the main evaluation questions and sub-questions so that interview content could be clearly matched to important areas of the evaluation. This approach allowed us to systematically assess the views of different groups of stakeholders.

The survey was primarily used as a tool to sample uninvolved industry for interviews. Quantitative findings for the survey are not reported due to the small sample size (n=12), with data from open text responses being included where relevant.

2.3 Limitations

There are several limitations which affect the interpretation of the data:

- **Response rates.** The response rate from potential qualitative participants contacted through the IoC database was relatively low, particularly from industry partners who had not been involved with the IMAI programme. The response rate for the additional survey was also low (3%) – as noted, this was largely anticipated, with one of the main aims of the survey being to gain consent for qualitative interviews. The issues with engagement throughout the research suggest a need for caution in assuming results are representative of any wider population.
- **No single set of qualitative interviews** should be taken as providing a definitive viewpoint on programme effectiveness, particularly given the small numbers involved and the fact that each set of stakeholders (IoC, policy stakeholders, HMEI, and industry) have different levels of engagement with the programme, perspectives, biases, and understandings.
- **Measuring outcomes.** As pre and post surveys were not possible within the study parameters, all data on outcomes relies on qualitative feedback, with additional management information data supplementing this where possible. As a result, the outcomes information relies on self-reported perceptions of change among a small number of interview participants.
- **Discrepancies and lack of clarity in MI data.** There were a number of discrepancies between the data in the IoC database and the information provided by stakeholders in interviews. These discrepancies often related to level of engagement with the IMAI programme. For example, one HEI labelled as previously involved in the IoC database reported during interviews that they had not actually ever received any students through the IMAI programme.
- **Lack of data around participating students.** Collecting data on students was out of scope for the IoC and the evaluator. This meant that we were not able to conduct analysis to understand the demographic and educational profile of the cohort,

including identifying whether the programme was engaging students who are from groups underrepresented in AI. Lack of data on student outcomes (both education and post-master's career pathways) meant that analysis could not be conducted on final attainment and whether students went on to a job in AI. Again, this was not a planned element of the evaluation.

Due to these limitations, the data presented and analysed in this report should be interpreted largely as an insight into the experiences of individual stakeholders, and not as a set of generalisable and representative findings.

3. Programme performance against objectives

This section draws on quantitative MI data and qualitative data from stakeholder interviews to assess programme performance against key objectives and targets as set out in the business case. This includes the targets of 200 funded offerings (so far achieving 125) or of leveraging £5 million of industry funding (currently £1.3 million). The section then summarises stakeholder views around programme engagement, including motivations, associated costs, and challenges to participation and delivery. Finally, it explores programme outcomes as experienced by industry, HEIs, the IoC, and policy experts.

3.1 Quantitative Outputs

This section uses MI data to assess the programme against targets and objectives. The evaluation identified issues with the completeness, accuracy, and reliability of the MI programme data collected and provided to Ecorys. This means that we cannot provide exact numbers on key quantitative metrics (number of master's places provided, total amount of funding leveraged). Analysis of the data currently available from IoC suggests that the programme has not met its overall aim of delivering 200 funded offerings (125 to date) or of securing £5 million in industry funding (£1.3 million to date). However, neither of these targets were grant agreement objectives and therefore do not necessarily reflect performance by the IoC as delivery partner. Examination of the ways that stakeholders initially found out about the IMAI programme suggests that the OAI played a key role in engaging companies who later went on to sign up to the programme, although this may reflect that the OAI already had links with some of the organisations and was therefore the most appropriate point of contact. Review of participating HEIs indicates that the programme did not fully meet the objectives of regional diversity, with no representation for any northern English region. While regional diversity was an objective listed in the Business Case, it was not included in the grant agreement as a target for delivery by the IoC.

Number of funded master's places provided

The original target for the programme was to provide 200 funded support offerings in the first year (2019-20) of the programme. Initial analysis of the available MI data (in Table 3) shows the amount of industry support secured over the three years from 2019-20 to 2021-22. The data refers to when support was secured, with this not necessarily relating to the academic year – for example, an industry partner would be included in the table for 2019-20 if they agreed to provide support in that year, even if the support was actually delivered in 2020-21. Figures for 2021-22 are provisional to date as the academic year is continuing and further funding may be secured in this period.

Table 3: IMAI support offerings

Support	2019-20	2020-21	2021-22 to date	Total to date
Scholarship	13	29	17+*	125 (target of 200)
Placement	41	20		
Scholarship and placement	1	3		
TOTAL support offerings	55	52	17+	
Industry partners	10	13	3	19 unique industry partners
Average support per partner (students per industry partner)	4.5	3.2	5.7+	-

**Figures for 2021-22 were not broken down by scholarship/placement, and exact figures were not provided for one industry partner, so it is possible that the true number of scholarships/placements was higher.*

This table shows that the IMAI programme did not meet its intended target of 200 funded offerings in 2019-20 (achieving 55) and has not yet reached this number (currently at 125). This may indicate that original targets were unrealistic, that industry demand was not as high as anticipated, or that the original design was not sufficiently appealing. Feedback from the IoC suggested that it was hard to set targets given the lack of comparative projects.

Management Information data suggests that the number of funded offerings that have been secured in each year has stayed relatively static at best. The first year (2019-20) had the highest number of placements and scholarships (55), with a further 52 in 2020-21, then reducing considerably so far to 17+ in 2021-22, although it is possible this might increase if further support for future years is secured during 2021-22. The distribution of offerings changed slightly in the first two years: in 2019-20 there were 13 scholarships and 41 placements, while in 2020-21 the number of scholarships increased to 29 while placements reduced to 20. The reduction in placements is largely due to one industry partner reducing its placements offering from 20 to 3, while the increase in scholarships was largely due to one new industry partner supplying 13 scholarships. The pattern for industry partners

shows that 10 were involved in 2019-20, with this growing to 13 in 2020-21, and then declining to three so far in 2021-22. In total, 19 partners have been involved at some point, with some partners taking part in multiple years.

The data shows that overall numbers have depended largely on a small number of industry partners, with these partners sometimes rebranding pre-existing offerings as part of the IMAI programme. It is therefore likely that at least some of the provision would have taken place without the programme. Provision in 2019-20 was largely dependent on the involvement of two industry partners, one who provided 20 scholarships/placements and the other who provided eight, with these 28 accounting for roughly half the total 55 scholarships/placements. The organisation providing 20 scholarships/placements reported that they already had an existing relationship with the university and effectively continued this relationship in 2019-20 as part of the IMAI programme without any substantial change taking place. Additionally, this support was only open to existing employees of the organisation, meaning that eligibility for these places was heavily restricted. One organisation provided thirteen scholarships in 2020-21 without it being clear at this stage whether these would have taken place without IMAI existing. These figures suggest that at least some support industry support would have happened regardless of the programme, reducing the additionality provided by the programme.

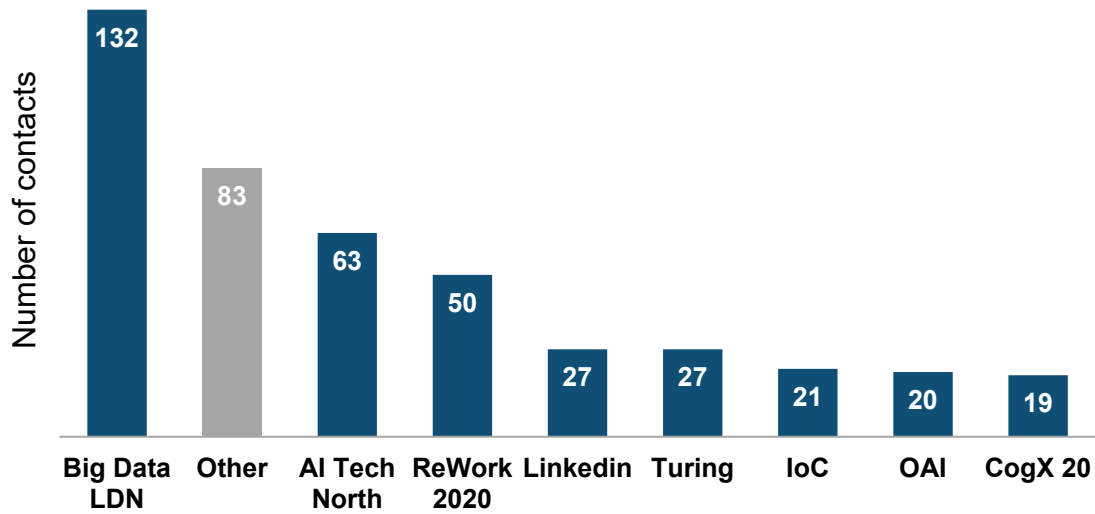
Amount of industry funding generated

The IoC did not have a record of the exact amount of industry funding leveraged through the IMAI programme, partly as funding was transferred directly from industry partners to learners and was not administered by the IoC. These costs cannot be accurately estimated from the number of placements and scholarships as the cost of each placement or scholarship varied according to the exact nature of support provided by individual industry partners. The IoC estimated that the total funds leveraged to date since 2019 were nearly £1.3 million, against a £5 million target for 2019-20 in the programme Business Case.

Contact pathways for industry

The industry CRM database included information on contact pathways, namely how the IoC engaged with different companies. The following chart shows the contact pathways for all 442 companies. If a pathway occurred fewer than 10 times, it was reclassified as “Other” for sake of clarity. Potential pathways generally involved making contact through exhibitions, conferences or other organisations.

Figure 2: Contact pathways for all industry

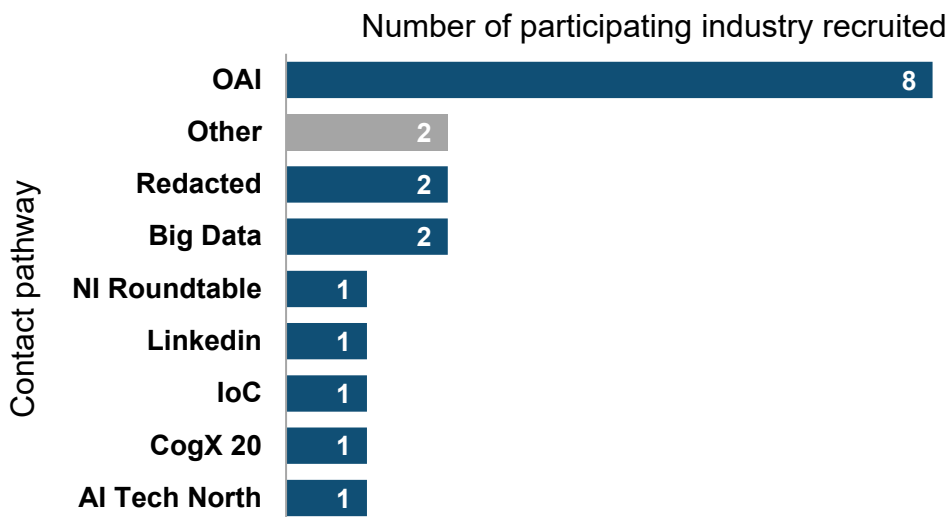


Source: IMAI industry CRM database. Base: 442

AI-specific summits and conferences were the most effective ways for engaging companies in terms of overall numbers: together, Big Data, AI Tech North, ReWork 2020, and CogX 20 accounted for 60% of contacts (264 contacts out of 442).

Further analysis was undertaken to understand which channels were used to engage companies who later participated in the IMAI programme. This is displayed in the following chart.

Figure 3: Contact pathways for participating industry



Source: IMAI industry CRM database. Base: 19.

Of the 19 industry partners, eight were initially engaged through the OAI, while five were initially engaged through AI-focused conferences, summits, or events (Big Data, AI Tech North, CogX 20, NI Roundtable). Evidence from interviews indicates that two of the largest industry partners in terms of support, who together account for 43 scholarships and placements, first heard about the programme through the OAI. Both quantitative and qualitative evidence therefore suggests that the OAI played an important role in engaging companies who later went on to sign up to the IMAI programme. This may reflect the fact that large, established companies are more likely to have existing contacts with the OAI.

Number and diversity of participating HEIs

In total, 17 universities took part across the three years, of which 12 were based in England, two in Wales, two in Scotland, and one in Northern Ireland. Two thirds of the universities (11 out of 17) belong to the Russell Group of universities, while two are post-1992 universities and the remaining four fell into neither category. Of the 12 English universities, three are in London, three in the East of England, two in the South East, two in the South West, and two in the West Midlands. No participating universities were situated in the North East, North West, Yorkshire and the Humber, or East Midlands, which account for 33% of the England population.¹⁰ This suggests that while the programme was not dominated by the South (12 of the 17 universities coming from outside the South) there were notable gaps in geographic provision meaning the programme was not wholly successful in achieving its stated aim of "regional distribution of opportunities".

3.2 Participation

The stakeholder interviews explored motivations for taking part in the IMAI programme, experiences of the engagement process between the IoC and HEIs and industry, views on the costs of participation and challenges and barriers to participating.

Industry and HEI's motivations for taking part

Many industry stakeholders said they wanted to take part so they could access new talent with specialised skills. Other less common motivations included wanting to engage with universities, to diversify their AI workforce, and to invest in research and innovation.

Several interviewees from HEIs thought that taking part would benefit students and their respective departments. One HEI explained that they were attracted to the programme because they thought:

¹⁰ Population statistics taken from <https://www.statista.com/statistics/294729/uk-population-by-region/>. Figures were not available for number of students per region, which may differ from the number of people living in each region.

“This is actually what we need for our students.” *HEI partner*

The same HEI commented that the IMAI programme was the first government-backed scheme of its type that they had come across and since they had been advocating industrial master’s for some time, they felt involvement would be beneficial for their department. Another HEI also spoke about the marketing value that is added to their master’s course by participating.

“AI is a very popular subject at the moment, but it gives prestige, to say we’re working with big companies like DeepMind and Quantum Black.” *HEI partner*

Organisations who had not taken part in the programme were asked in the survey about factors that would motivate them to take part in future initiatives. Responses included collaboration and knowledge sharing with other organisations, the ability to build on emerging business opportunities, and supporting knowledge creation in the AI sector.

Industry and HEIs experience of the engagement process

Industry stakeholders who took part broadly felt that they had a positive experience of the IMAI engagement process, describing the IoC as “very supportive” and “keen to engage with a broad range of people”. Although experiences were generally positive, interactions were sometimes felt to be “sporadic”.

HEI interviewees also reported engagement from the IoC to be less regular and frequent than they ideally wished. One HEI interviewee felt the inconsistent engagement was related to financial year pressures of the IoC. Another HEI who attended a roundtable commented that they would have liked to be more engaged in the overall strategy with other universities and other employers, but they felt they were kept at “arm’s length” in these discussions.

Industry and HEI views on costs associated with participating in IMAI

Generally, HEI stakeholders felt that their main costs relating to the programme were time and administrative costs which included marketing and managing scholarship funding. Most industry stakeholders also cited time as a key cost of the programme, alongside salary and scholarship costs, although some felt their time commitments to the programme were relatively light touch. Industry time costs generally related to time taken for interviewing, hiring, and training.

Multiple industry stakeholders that had not been involved with the programme felt costs were or would be a key barrier to their potential involvement. One of the uninvolved industry partners added that the “biggest blocker” would be the businesses capability to provide appropriate work and resources for the candidate, not the actual cost of funding them. The variety of views highlights that different companies have varying levels of available financial

and time resources, suggesting that what may be seen as an acceptable cost for some organisations may be unfeasible for others. However, uninvolved industry stakeholders' opinions on costs were based on perceived costs rather than actual costs.

Industry and HEI views on challenges to participating

Industry partners who did not engage with the programme reported a variety of challenges to participating in the programme, including lack of time, location, business resource, and an uncertain return on investment.

Interviewees who mentioned time as a barrier to participating specifically referred to time costs for training, hiring, and finding appropriate work for students. One industry partner was previously involved with the programme but decided not to continue with involvement, as they could not find universities with appropriate courses close to their office location. A smaller industry stakeholder, who wanted to engage in the programme but could not due to limited resource and business size, explained that they did not have the resource to take part and felt that they weren't "big enough to be wanted" by the IoC. They were keen to stress that their lack of engagement was not due to interest, stating that "if that support was there, it is something that they absolutely would have done".

Multiple industry partners mentioned that a barrier to participating was that they were uncertain about the possible return on investment, as they could not know in advance whether students would remain in their employment after the programme ended. Another industry stakeholder also suggested that although having a master's student was appealing, as they were a consultancy company, they did not always need highly specialised people. They found from experience that it worked better to train people on the job and that the IMAI model may therefore not provide them with the required return on investment.

Currently involved partners felt that uncertainty due to COVID-19 and the brevity of a master's course were both challenges. The uncertainty of COVID-19 meant that they were unable to predict how many students they would be able to support. They also felt that because a master's programme lasts for one year, the industry partner does not get much time to work with the student to give them the best experience possible and hopefully convince them to think about working for the partner longer-term.

Opinions around challenges to participation were similarly mixed among HEIs. Challenges cited included "sparse engagement" from the IoC, administration workload, and misalignment of academic and industry timelines. Sparse engagement meant that HEIs were uncertain about what they could offer to students. The interviewee who highlighted administration workload as a challenge specifically referred to the admin required for marketing, the selection process of students, and management of payments to students. Another HEI emphasised the misalignment between academic timelines and industry

timelines as a particular challenge. For example, the HEI had very promising conversations with an industry partner, but the industry partner wanted students to start at the company in September which was before students would have started the master's course.

IoC experience of engaging industry and HEIs

IoC stakeholders recalled attending events to promote the IMAI programme and raise awareness of it among potential partners. While these events were initially held face to face since the start of the COVID-19 pandemic they have moved online. Opinions about the switch to online events were mixed. While IoC stakeholders felt that online events were well-attended and less resource intensive, they did not lead to many conversions because it was more difficult to build those relationships with partners.

IoC stakeholders felt that the programme being government-directed helped to attract potential partners as they could say that they were associated with a government programme. One interviewee felt that it would be beneficial to have further activity to reward industry for their involvement, although did not provide specific examples. Several team members noted that COVID-19 had a large impact on industry engagement. Due to all engagement events moving online and changing business priorities, the number of placement and sponsorship activity decreased. One interviewee recalled approximately 50% of placements being cancelled on a national level.

IoC stakeholders reported not having any issues with getting universities on board however all interviewees did report some challenges. One team member felt that they would benefit from updating the contact details of who is associated with each course and contacting them to refresh their memories of the programme. It was also commented that it can be difficult to get the right contact. One team member felt that the programme needed to be promoted much more and recalled attending events about AI conversion courses with universities and no one else knew about the programme. They felt that this suggests that the programme lacks visibility among universities.

IoC and policy stakeholders' views on barriers and challenges

When asked about barriers and challenges, all interviews with IoC stakeholders cited the impact of COVID-19 on the programme. Several participants felt that the pandemic slowed the programme down. For example, one team member explained that:

“The pandemic has been a huge challenge – everybody has had to shift the way they work, the job market is uncertain, companies have put everything on hold. There has been a huge hiatus in the relationships we had been developing – people have put us on hold. Being able to maintain relationships through that has been very challenging.” *IoC stakeholder*

Lack of industry engagement was also felt to be a barrier, with COVID-19 again suggested as a contributing factor:

“While there seems to be a good narrative to invest into scholarships and diversity, in practice, when it comes to investing the money, some companies seen hesitant. It would be good to know what is holding these companies back and whether it is COVI-19 or something else.” *Policy stakeholder*

An IoC stakeholder also felt that the pandemic had negatively impacted industry engagement, and highlighted the impact on engagement with smaller businesses in particular:

“COVID-19 has had huge impact – employer needs have changed. Smaller employers in particular (SMEs) have not been able to look at this – they have had to prioritise their own business interests.” *IoC stakeholder*

One interviewee felt that the year-to-year funding also slowed the programme down. They explained that after the end of each funding period:

“everything stops, and then you have to pick it up again and re-hire. It’s an incredibly slow process – the stop-start every time is extremely challenging. Anything other than a year-to-year model would be much more beneficial.” *IoC stakeholder*

Some of the IoC stakeholders also noted as a challenge that the pace at which the AI industry is growing and the rate at which new specialties appear made it difficult to respond to changes. There were often new courses appearing which the IoC needed to record, with there being associated challenges for HEIs in finding qualified lecturers to teach new specialisms.

One IoC stakeholder felt that smaller companies struggled with organising placements and would benefit from more support such as a guide or process pack. On the other hand, they thought larger companies tended to be well-versed in arranging placements, and already had the relevant processes in place that they could use to organise placements for master’s students. A policy team member commented that in some cases where the industry partners didn’t have internships already in place, they would end up funding the student through a master’s without ever having them work for them.

“Some of them [industry partners] came with a kind of an internship, so you’ve got the student [working] for some period of time, but others potentially didn’t. And therefore, you’re funding somebody through a master’s but not potentially even [having] that person coming to work for you, or there is no obligation additional to that.” *Policy stakeholder*

The IoC also reported potential challenges when industry partners had specific requirements, most notably only wanting to work with a certain HEI. In practice, this has meant that the IoC has needed to be led by the industry partners regarding which universities they would like to be put into contact with. Subsequently, this places limitations on which HEIs the IoC can pair with industry partners.

Increasing the scale of the IMAI programme was a common theme across interviews with the IoC and policy officials. The IoC, DCMS policy officials and wider policy officials felt the programme needed to scale-up to make a notable impact on AI skills in the UK. In an Interview with an IoC stakeholder, the interviewee felt that without increased funding for the programme, “it will be extremely challenging” to grow it.

3.3 Outcomes

As detailed in the ToC, the anticipated intermediate outcomes for the IMAI programme included increased financial sustainability of the programme; an increase in relevant skills; more suitable AI master’s courses and graduates of greater relevance to business application; a growth in AI provision at master’s level; and an alignment with other AI skills initiatives. This section draws on interviews with industry partners, HEIs, the IoC and policy stakeholders and presents each group’s views on the outcomes associated with involvement in the IMAI programme.

Outcomes for industry

The outcomes self-reported by industry partners who were involved with the programme mainly covered improved and sustained relationships with academia and the benefits of attracting diverse talent.

One industry partner explained that they would not normally work with a particular HEI but their positive experience through the IMAI programme raised awareness and built their confidence in working with a more diverse range of partners.

“The role that the IMAI or OAI played is to help us to understand that there are some universities that already attract a diverse student population and have a reasonably good computer science department and we should consider working with those universities.” *Industry partner*

Finding shared, mutually beneficial objectives for both parties, such as shared focus on diversity or specific technologies, was identified as a key way to ensure long-standing relationships were established between industry partners and HEIs.

Another industry partner noted that engaging a more diverse range of students through the IMAI programme added new perspectives to their work. Although this partner only had

limited involvement in the programme, they observed that the student dissertation projects added value to their company, as students often thought about things the company hadn't previously considered, especially in emerging fields such as sustainability and cryptocurrency.

Outcomes for HEIs

As with industry, evidence from HEIs suggested that the IMAI programme had facilitated relationships with industry partners that would not have formed otherwise. One HEI noted that through the IMAI programme, they were introduced to well known, large companies which they had struggled to reach out to previously. They said these connections with industry gave their AI courses prestige and helped market their offerings. They felt this would not have happened without a government-backed scheme, which maintains interest from industry partners through ongoing opportunities to contribute to strategic discussions.

A further theme was that the programme helped to increase the number of students and level of engagement on AI courses. For one HEI, the IMAI funding enabled several female students to go on to pursue PhDs. They saw this as evidence of an upward trajectory for participants relating to the removal of financial barriers and their increased confidence to pursue research pathways which they wouldn't have considered without the guidance they received from industry partners. An additional outcome was that mentorship offered to students through their IMAI placement increased their confidence to pursue AI pathways, which they had not previously considered.

A minor theme was that attending roundtable events helped industry partners become "looped in" to government thinking. A separate minor theme was that involvement in the programme allowed HEIs to plan their AI courses with more confidence as they trusted that they were delivering the right kind of training to meet the needs of the country.

"We do genuinely feel like we are part of something larger in filling the skills gap in our society." *HEI*

Perceived programme performance

This section reflects on stakeholder perceptions of how well the programme has performed against its objectives across all three years. It draws largely on interviews with the IoC and policy stakeholders and is supplemented by quantitative feedback from industry partners and HEIs.

IoC stakeholders generally felt that the programme had performed well. Although the programme did not meet the target, one team member felt that £1.3 million of industry investment was a positive return for a pilot. It was noted that as there are no programmes with similar objectives, it is difficult to assess performance as there is no benchmark against

which to make comparisons. Other overall achievements were felt to be the programme meeting all the targets set by OAI every year and growing lists of parties that were interested in the programme.

The programme was felt to have accumulated a significant network of industry partners and HEIs, which in turn generated positive and often long-lasting relationships between industry and academia. Policy stakeholders highlighted the value of the IoC's relationships with HEIs, which meant they were able to "open doors" and connect industry partners. The IoC felt the programme developed a strong campus network, which helped establish positive collaboration between all relevant stakeholders: industry, academia, and government. They felt that this was helped by the team being based in a university, with this making it easier to find the right contact to speak to [at an HEI] and understand academic timetables and priorities.

The IoC also highlighted that the programme successfully engaged industry partners through channels such as roundtables, although it was noted that these were more successful in year one and engagement has since dropped. One interviewee explained that in the first year of the programme, these were held regionally, including Northern Ireland and Scotland and it was felt that partners in these areas valued having face-to-face events outside of London. Utilising existing networks, such as the UK Tech Cluster Group (UKTCG) was also reported to be a successful channel, as it gave the programme credibility and helped to raise awareness throughout the UK.

Industry partners and HEIs were asked on a scale of 1-5 from 'very unlikely' to 'very likely', how likely they were to take part in IMAI again and recommend to IMAI to others. Of the three industry partners who had been actively involved in the IMAI programme and were able to answer the question, one said they were very likely to take part again and the remaining two said they were quite likely. Two partners said they were very likely to recommend the programme to others and one said they were quite likely. Of the two HEIs who had been actively involved in the IMAI programme, one said they were very likely to take part again and recommend the programme to others; the other said they were quite likely.

4. Proposed updates to model

Throughout the data collection process, stakeholders from all categories offered recommendations for how to improve the IMAI programme. The recommended changes outlined in this section reflect the feedback provided by stakeholders and are not those of the Ecorys research team. The most common recommendations related to improving publicity and programme structure; expanding the scope of the programme; new funding and administrative arrangements; expanding beyond the brokerage role; and combining the IMAI programme with AI and data science conversion courses.

4.1 Publicity and programme structure

Increased visibility and outreach

The general feeling amongst industry partners and HEIs was that the IMAI programme is not well known amongst its intended audiences of companies with AI skills needs and universities offering AI master's courses. Several industry stakeholders had little to no awareness of the programme and had therefore not been able to consider whether to take part or not. Awareness was spread largely by "word of mouth" and some felt that not enough had been done to publicise and market the programme. Several stakeholders got involved through existing connections to a particular organisation or individual, without which they would likely never have come across the IMAI programme. While we have not generally reported quantitative findings from the survey given the small number of respondents (n=12), there is some indicative evidence to support qualitative feedback around lack of industry awareness of the programme. Six of the twelve industry respondents had not heard of the programme previously, and a further five had heard of the programme but did not know much about it.

A small number of HEIs stated that many students do not know about the IMAI programme at all, which limits the opportunities available to them. They reported that master's students think about employability, and a lack of clarity about the IMAI accreditation process makes it difficult for them to decide whether to take part in the programme. For HEIs themselves, poor publicity surrounding the programme makes it challenging to market internally to their students and externally to prospective industry partners. One HEI noted the difficulty of trying to explain the benefits of taking part in the programme to smaller companies, which typically do not know about the IMAI programme.

Several HEIs also felt that low levels of publicity and a lack of marketing meant that any reputational benefits they might have experienced as a result of taking part were limited. Having missed the initial deadline three years ago to apply for their course to be listed on the IMAI website, one HEI expressed frustration at being told that this could not be rectified for the next 5 years. This was felt not only to be a missed opportunity to build the reputation

of this HEI, but also a failure to “serve the British public” by preventing students and industry partners from discovering this course.

Considering the perceived lack of awareness, industry and HEI stakeholders suggested various ways that the IMAI programme could make itself more visible through increased publicity and outreach. Stakeholders spoke about the potential value of the IoC running a “national level career event”, such as an AI Conference, where companies and students interested in the programme would be given the opportunity to interact. One industry partner suggested a ‘hackathon’ style event where the goal would be to produce a specific software or hardware output by the end of the event. The possibility of uniting students, relevant companies, and recruitment teams through such an event was understood to be of great potential value in improving the visibility of the IMAI programme.

Several stakeholders also recommended that testimonies from previous participants be published and shared to help attract potential industry partners and students:

“One of the best ways of doing effective outreach – both to companies who might wish to employ these students, but also the students who might want to consider the courses – is actual real-life stories about how other companies have got value from it and the types of careers that people have had.” *Industry partner*

Cohort learning

A small number of industry partners identified the lack of a cohort learning experience as a current weakness of the IMAI programme, with one noting that, “one thing that I think is missing is having a cohort experience.” These stakeholders recommended integrating an element of shared learning into the programme by placing multiple students on the same course and industry placement. It was suggested that this would enhance the quality of education by allowing students to “bounce things off each other” and could have a positive impact on course retention.

“If you think of the incoming IMAI scholars this year, is there a way to actually bring them together so they have that community and share their learning experiences and challenges and how they are looking for jobs?” *Industry partner*

Increased flexibility

Several stakeholders from industry and HEIs felt that the IMAI programme needs to be more flexible regarding the timing of industry placements. Industry partners expressed some frustration with the limited windows throughout the year during which IMAI master’s students can begin their placements. Whilst they recognised the unavoidable restraints determined by the structure of the academic year, industry partners felt that the programme might have more success in securing placements for students if there was “a bit more flexibility of when the internships start”.

This sentiment was reflected in an interview with an HEI stakeholder who felt that students would benefit more from being able to start their placement with a company towards the end of their master's course, after having completed their dissertation project. This stakeholder explained that there is an optimal point during the academic year where students have accumulated sufficient experience to perform well in an industry placement, without risking a low dissertation mark by taking on an industry project too soon. It was felt that the IMAI programme in its current iteration does not utilise this optimal window effectively.

4.2 Programme Scope

Non-STEM pathways and emerging fields

A small number of industry partners the programme could be broadened to include non-STEM pathways, potentially diversifying the programme by offering new and different perspectives to those from traditional pathways. The general consensus amongst industry and HEIs, however, was that it would be difficult to avoid STEM dependency given that most relevant companies require a certain level of STEM competency from their employees. One industry partner noted that they would be especially interested in receiving candidates with more creative skills such as website and dashboard design but emphasised that these candidates would “still need to have the STEM background and STEM abilities”. Sustainability, cryptocurrency, and data governance were identified by industry partners as emerging fields which the IMAI programme could expand into to diversify its offering.

Mentorship

A small number of stakeholders felt it was very important to consider incorporating a mentorship scheme into the project. One industry partner explained that they have introduced a mentorship element into their own internal scholarship programme, with feedback showing that many students found it to be very valuable. This stakeholder recommended that the IMAI programme identify individuals “who can actually mentor the scholars throughout the year”. This sentiment was echoed by an HEI, who also noted the perceived value of mentoring schemes amongst students.

Diversity

Industry partners presented mixed views on diversity and whether the IMAI programme should focus on increasing diversity in the sector. Interviews suggested that a major theme was the importance of diversity. One industry partner said they would probably not be part of the programme if diversity was not a focus. Industry partners emphasised different aspects of diversity. For example, interviews identified a theme relating to the need to encourage more females to work in the AI sector, particularly in tech development roles.

However, one partner felt this was difficult to address at master's level and needs to be addressed at an earlier stage, for example at school. A minor theme was the value of attracting talent from different backgrounds, for example one partner said that AI architecture is less reliant on maths and engineering and benefits from people from more creative backgrounds, and another noted the potential to retrain candidates from general management or public sector backgrounds.

In contrast, a minor theme emerged where partners placed little importance on diversity as they said they saw little value in trying to convince people to work in AI if they didn't want to. They felt diversity was the responsibility of HEIs, more so than industry.

"Diversity doesn't matter. If they have the skill, it doesn't matter where they are from."
Industry partner

One potential way stakeholders felt diversity could be improved was by combining IMAI with other programmes (see Section 4.5).

4.3 Alternative funding and administrative arrangements

A major theme among stakeholders was that alternative funding arrangements may increase the number of industry partners and HEIs taking part in the programme. There was a common feeling amongst industry partners who have had little to no engagement with the programme that reduced costs would make the programme more enticing for industry partners: "Us paying less would obviously be more attractive".

Recognising that reducing costs might be difficult, industry partners and HEIs proposed alternative ways of structuring the funding. One industry partner proposed a matched funding model, similar to the Centres for Doctoral Training (CDT) funding system, which clearly outlines the financial responsibilities of all involved parties. An HEI stakeholder suggested making the programme more affordable for industry partners through a beneficial tax arrangement or covering half of the cost per student to make programme involvement more affordable for industry partners.

A further adjustment which could be made to entice more engagement from industry would be to transfer some of the administrative responsibilities involved with the programme away from industry partners. One industry partner suggested that they would appreciate HEIs taking on the responsibility of vetting potential candidates to reduce the administrative burden shouldered by industry partners and ensure that candidates are of high quality. One HEI stated that they would be willing to undertake more administrative work if the IoC provided them with relevant materials to distribute, indicating that at least some HEIs might be receptive to accepting a higher level of administrative responsibility. Another industry partner noted that engagement with the IMAI programme involved "slightly more manual work" on their part compared to other similar programmes. This stakeholder explained that

other programmes provided more detailed information to industry partners about potential candidates in the form of CVs and summaries of their skills.

4.4 Expanding beyond brokerage role

Stakeholders from the IoC and HEIs felt that the role of the IMAI programme could expand beyond its current brokerage function. One stakeholder from the IoC identified the potential value of undertaking more scoping and outcome tracking work to create a broader learner community beyond simply connecting one company to one HEI at a time. Another IoC stakeholder considered the possibility of developing an app which would enable match universities industry partners to match with each other so that the IMAI programme would then have a product to market as opposed to just a brokerage service.

One HEI stakeholder felt that the core brokerage function itself needs to be improved before the IoC attempts to expand into performing other functions. This stakeholder described the need for more personal introductions between universities and industry partners, and further support from the IoC in providing relevant materials and information to universities to be disseminated amongst their students.

4.5 Combining with other programmes

One suggestion raised by OAI policy stakeholders was that the IMAI programme could be merged with the existing AI and data science conversion courses, which are currently delivered by the Office for Students but owned by the OAI.

One HEI explained that the IoC had signposted them to an Office for Students postgraduate conversion course a few years ago, through which the HEI has enjoyed considerable success in placing master's students with industry. The HEI implied that this success was attributable to the connection made through the IMAI programme, highlighting the existing links between the IMAI programme and conversion courses. Wider policy stakeholders responded positively to this proposal, with one noting that combining conversion courses with the IMAI programme could help to increase the pipeline of people with AI skills.

Several OAI policy stakeholders also noted that combining IMAI courses and conversion courses could increase diversity within the IMAI programme. Stakeholders across all categories noted the difficulty of increasing the diversity of the AI workforce when the diversity of students undertaking computer science degrees is already limited. Given that conversion courses bring in people from non-computer science backgrounds, OAI policy stakeholders felt that these courses could be of great value in diversifying the IMAI participant pool. One wider policy stakeholder felt that efforts to increase diversity so far have been strong but would benefit from an increased focus on neurodiversity.

5. Financial sustainability

Interviews with stakeholders explored partners' future plans, their views on value for money, and programme sustainability.

Industry and HEI's future plans

When currently involved industry partners were asked about their plans to continue their involvement in IMAI, most partners responded very positively with one partner remarking that:

“When we do try to bring in more interns, the IMAI programme will be at the top”.
Industry partner

A minority felt that there were other and more effective ways to address their talent needs and so were not planning on continuing involvement. All the HEIs that were interviewed expressed an appetite for continued or increase involvement in the programme.

Industry and HEI's feedback on value for money

Generally, HEIs were positive when asked whether the outcomes justified involvement in the IMAI programme. One involved industry partner's testimony spoke positively about the “opportunities to be seen as an industrial partner of the university, speaking at events and being seen alongside other prestigious companies through their academic link networks” as a way of building a reputation with students and the public. Another industry partner commented that the “benefits outweigh the costs” and that it may be “too early to tell but could imagine that it could be really positive if an industry partner finds someone that really adds value to their company.”

However, other responses from industry partners that were not involved with the programme showed some felt the value for money of the programme was uncertain and a potential risk, especially for a small business. For example, one stakeholder said that:

"Smaller businesses can't afford to do a scholarship with someone and then they go off and take a job somewhere else" *Industry stakeholder*

Another uninvolved stakeholder felt apprenticeships were much more affordable:

“We can afford to bring through, you know, a whole cohort of 20 generalists [as apprentices] and be confident that we can keep them busy, or at least the ones that complete the course and decide to work with us [...] we couldn't afford to take through that many master's in AI because we just don't have the work for that many and they are more expensive”. *Industry stakeholder*

Several involved industry partners said that they were already making a financial contribution to increasing AI skills via the apprenticeship levy and were unsure whether involvement in the IMAI programme was duplicating this. This perspective had also been highlighted during the original scoping phase of the programme through discussions with industry stakeholders where they felt confused as to why they should invest in a programme like IMAI when they were already contributing to the apprenticeship levy.

OAI feedback on value for money

OAI stakeholders generally found it difficult to comment on the value for money of IMAI as it was challenging for them to accurately monitor and quantify the programmes effects beyond the brokerage function. For example, direct benefits might include increased productivity, employability, and better student outcomes whereas indirect benefits may include increased business productivity, increase tax revenue, additional revenue to universities. Calculating these benefits and the different costs for different stakeholders was felt to be complicated. However, these direct and indirect benefit have not been quantified.

OAI stakeholders generally felt that the government input of £130,000 per year was relatively low considering the level of investment from industry leveraged from industry and that this could illustrate value for money at the government level. A simplified Benefit Cost calculation, where Present Value Benefits is the £1.3 million industry funding and Present Value Costs are £394,000 over three years, indicates a Benefit Cost Ratio of 3.3.¹¹ It is possible that there may be other benefits and costs not represented in these figures, so this assessment should be seen as indicative.

One stakeholder emphasised that they thought there should be more alignment between IMAI and conversion courses to streamline government spending and achieve better cost synergies. OAI stakeholders and the IoC generally felt that the benefits of the programme were largely dependent on its ability to be scaled up to involve more HEI and industry partners to help close the AI skills gap.

Views on programme sustainability

When the programme's sustainability was discussed with industry stakeholders, some interviewees suggested a matched funding model in partnership with government, which would allow them to work with more universities with the same level in investment. However, a stakeholder from a smaller company who was unable to take part due their size suggested that a means tested approach would make the programme more viable as

¹¹ Information on Benefit Cost Ratios is included in *The Green Book: Central Government Guidance on Appraisal and Evaluation*, HM Treasury. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf

smaller companies would pay less than larger ones. A similar approach was suggested by some policy stakeholders as a means of increasing the diversity of companies involved.

OAI and IoC stakeholders felt it was difficult to develop a clearly sustainable model given the unique nature of the programme and the lack of relevant learning from other models. Some OAI stakeholders felt unsure about the programme sustainability. While, as noted earlier, some industry stakeholders that more networking could lead to increased industry funding, OAI stakeholders felt that the programme may have reached a saturation point in network connections and that the initial buzz of a new initiative that attracts partners could wear off. This potentially runs counter to the claims from industry and HEI that the programme has not achieved sufficient awareness among its intended audience.

Potential for shifting to a fully industry-funded model

As discussed in the previous section, several involved industry partners felt that they were already making a financial contribution to increasing AI skills via the apprenticeship levy. This may suggest that industry partners would be less willing to move towards a fully industry-funded model. In an interview with an OAI stakeholder, the concern was raised that if the programme did become fully funded by industry, there would be no requirement for evaluation.

Furthermore, several industry partners felt that from their experience, apprenticeships were a more secure return on investment since students were more likely to remain in their employment. Industry stakeholders, on several occasions, suggested that there could be events to facilitate networking and employment opportunities. These suggestions could potentially incentivise more industry funding.

Several IoC stakeholders felt that there should be more incentive for industry funding, saying that industry did not feel it was their responsibility to fund a programme that is primarily motivated by national interest. As noted earlier, some industry stakeholders felt they were already making a financial contribution via the apprenticeship levy and some were concerned about the return on investment of the programme. One interviewee suggested that they could introduce a university membership fee, however they flagged that this may not work if an industry partner wants to partner with a specific university partner that doesn't want to commit to membership. One interviewee felt that building incentive by demonstrating impact would be effective, although they also felt that demonstrated impact could take time to manifest:

“If we get to a point in future where we have enough people who have gone through it [the IMAI programme] and we can demonstrate impact through case studies, then we would start to be able to persuade more people that this is a route they want to invest in, but that takes time.” *IoC stakeholder*

6. Recommendations

There are three options for the future of IMAI:

- 1. End the IMAI programme.** The programme has not met its targets on number of support offerings or amount of industry funding leveraged, which raises concerns about the viability of the model. Given the decline in support in the most recent year, it is possible that industry support has reached a “saturation point” or that some industry partners are reluctant to invest money when there is no guarantee that beneficiaries will later work for them.
- 2. Continue the IMAI programme in its current state.** Despite underperforming relative to targets, the programme has still successfully delivered 125 places and roughly £1.3 million (although evidence suggests some of this activity would have happened anyway in the absence of IMAI). There is some awareness of the programme among industry and HEIs, and industry feedback suggests that the OAI’s involvement makes the scheme attractive. There is also a continued need for Level 7 support to address the UK’s AI skills gap.
- 3. Continue the IMAI programme following updates to the model.** Feedback from industry, HEIs, the IoC, and policy experts has generated a range of suggestions for how the programme could be adapted to incentivise industry participant, improve engagement processes, and enhance the student experience. Key recommendations for a future programme are summarised in the following section.

Recommendations for an updated IMAI programme

These recommendations relate to the third option provided, continuing with an updated version of the IMAI model. Any decision to proceed with this approach needs to account for:

- likely future levels of engagement given different opinions as to whether the market is currently saturated or not, and the possible recent plateau in engagement figures
- whether a revised model can include sufficient new aspects to encourage participation while adopting a costing model that is not prohibitive

Engagement

- A future programme should adopt a more proactive approach towards marketing, publicity and outreach with a focus on relationship building e.g. through career/networking events, publishing testimonials, etc.
- A future programme should consider including more opportunities for interactions between students and industry. This might include conferences, hackathons, or careers fairs, which would facilitate networking opportunities for students and

recruitment opportunities for industry. These additions would not only help to market the programme but also create reputation benefits for participating industry which might incentivise more companies to take part.

- There is evidence that regional outreach activities were positively received, but if regional diversity remains an objective, more should be done to engage universities in the north of England.

Programme model

- If possible, a future programme should seek to integrate an element of cohort learning (to create shared learning experience), mentoring, and increased flexibility of placement start times and timelines.
- A future programme should explore the feasibility of transferring some administrative responsibilities away from industry partners (and onto either the IoC or HEIs) to reduce burden and encourage industry partners to take part.
- A future programme should explore the potential of combining data science and AI conversion courses with the IMAI programme, to offer a unified brand and enable cost efficiencies. This could combine the benefits of industry funding with the diversity focus of the conversion courses.

Other recommendations

- The OAI should ensure that for any future programme, delivery targets and KPIs are aligned with overall programme aims. As part of this, the delivery partner should have a responsibility to capture granular management information (MI) data on industry support, HEI participation, and student demographics and outcomes. This will be useful to track progress during delivery and support future evaluation activities.