Executive Summary
July 2019

Engineering Growth: An evaluation of the Enterprise Fellowship Programme

The Royal Academy of Engineering
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**Headline Summary**

**Outputs**

- **88** Fellowship Hub Members
- **£4.9m** Funding granted to Enterprise Fellows
- **93%** Fellows agree that Programme offers money-can’t-buy support

**Outcomes**

- **50+** Researchers transformed into job and wealth creators
- **75** Companies started by Enterprise Fellows
- **500+** Jobs created by Fellows’ companies
- **£40m** Turnover from sales by Fellows’ companies

**Impacts**

- **£105m** Investment secured towards UK Grand Challenges
- **£21 : £1** Ratio of £21 further investment for every £1 of funding
- **£40m** Gross Value Added to the UK economy – a RoI of 7+
Executive Summary

Context

Engineering is a vital building block of the UK economy, accounting for 23% of the UK’s turnover and employing 5.6 million people. As a discipline, it supports and influences a diverse range of sectors and has key role to play in improving the resilience of the UK economy.

The UK has a world class engineering research base, producing a wealth of valuable Intellectual Property (IP). There are, however, significant challenges that can prevent the commercialisation of research. Most notably, researchers often lack the appropriate skills and commercial ‘know-how’ to convert their IP into a business operation, and investors are often wary of projects that are complex, capital intensive and require long-term finance prior to delivering a strong return.

As such, whilst engineering researchers and innovators have proven themselves when it comes to generating new ideas, they often struggle to move this beyond the laboratory and into the market. Ideas tend to get ‘stuck’ at Technology Readiness Level 4 - basic validation in a laboratory environment.

The Enterprise Hub

The Royal Academy of Engineering’s Enterprise Hub (the Hub) was launched in 2013, with a mission to drive sustainable wealth creation in the UK through supporting the development of an enterprise ecosystem that fosters a culture of entrepreneurship amongst UK-based engineers.

The objectives of the Hub are to:

- Accelerate innovation and wealth creation for the benefit of society by supporting founders of engineering and technology enterprises with grants, bespoke training and mentoring from Academy Fellows;
- Inspire and encourage business minded UK-based engineers to pursue entrepreneurial endeavours by celebrating and promoting successes; and
- Enhance the climate for engineering and technology entrepreneurs and growth of technology enterprises in the UK.

The Hub works to achieve these objectives through tailored support in the following three programmes:

- The SME Leaders Programme: grant funding and coaching to help SME leaders in executive roles develop leadership skills and scale up;
- The Launchpad Competition: A competition for 18-25-year olds to pitch to win £15k to turn an idea into a business; and
- The Enterprise Fellowship Programme: supporting entrepreneurial engineers to develop innovations and bring them to market.

It is the two latter programmes, The Launchpad Competition and The Enterprise Fellowship Programme (hereafter collectively referred to as ‘the Programme’ as they seek broadly the same aims through the same support mechanisms), that are the focus of this evaluation.
Aims and approach

The study has explored the impact, competitiveness and value for money of the Programme, drawing out insights and reflections to inform its future development. The evaluation method is grounded in a ‘logic model’ approach, consistent with HM Treasury’s Green and Magenta Books, the definitive UK guidance on appraising and evaluating the spend of public funds.

At the outset of the evaluation, Steer Economic Development worked with the Academy to develop a logic chain for the Programme (see Figure 2, page 8) and an associated evaluation framework, to enable a robust assessment of the outputs delivered, and the resulting outcomes and impacts. The evaluation was conducted between January and June 2019, and comprised desk-based analysis, a survey of Enterprise Fellows and consultation across stakeholders.

About the Programme

The Programme has been designed to deliver support not available elsewhere by leveraging the unique assets of the Academy. Specifically, the knowledge, skills and experience of the Academy’s Fellowship, plus its international network of like-minded individuals (for example, the Academy’s Leaders in Innovation Fellows and the Africa Prize for Engineering Innovation) and the Academy’s London premises. The individual elements of support Enterprise Fellows receive are shown in Table 1 below.

Table 1: The Programme’s Offer

<table>
<thead>
<tr>
<th>Programme offer</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailored Mentoring</td>
<td>Each awardee is appointed a mentor, a Fellow of Academy, who is tasked with the role of offering support, encouragement, advice, and where needed, a ‘dose of reality’. Whilst the scope of the relationship is defined, the mentor-to-mentee relationship is not overly prescriptive, and there is flexibility around the frequency and form of meetings.</td>
</tr>
<tr>
<td>Access to a network of 1,600 Academy Fellows</td>
<td>Enterprise Fellows have access to the Academy Fellowship of nearly 1,600 engineering researchers, innovators, entrepreneurs, business and industry leaders, to use as a sounding board, source of advice, and a route through which to contact key investors, suppliers and customers.</td>
</tr>
<tr>
<td>Training programme</td>
<td>The training comprises of a blend of practical teaching sessions, expert clinics, mentor sessions and experienced advice and support from leading entrepreneurs and innovators.</td>
</tr>
<tr>
<td>Non-repayable funding</td>
<td>Enterprise Fellows receive up to £60,000 of equity free funding for 12 months towards the continued development of an innovation or technology and establishment of a new company. The funding can be used for salary support and costs for the continued development of the innovation and associated company.</td>
</tr>
<tr>
<td>Lifetime Enterprise Hub Membership</td>
<td>Each awardee is granted lifetime membership of the Hub, which includes opportunities to participate in further training and events, maintaining access to the network of Academy Fellows, and ongoing access to the Taylor Centre, a purpose-built flexible meeting and workspace in the Academy’s Central London premises.</td>
</tr>
</tbody>
</table>
The Programme is unique in the UK\(^1\), being the only one to offer support that can run up to or beyond 12 months as well as equity-free funding and specialising in engineering and manufacturing. There are, however, a small number of comparator programmes, which whilst not having an ‘engineering’ specialism, do specialise in technology or deep-technology and offer support over similar time-periods; almost all aimed at pre-start-up, start-up or early stage ventures. Fourteen such programmes were identified and reviewed in the study.

### Table 2: Comparable programmes

<table>
<thead>
<tr>
<th>Programme Name</th>
<th>Organisation Name</th>
<th>National/International</th>
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</thead>
<tbody>
<tr>
<td>Climate-KIC Innovation Accelerator</td>
<td>Climate-KIC</td>
<td>International</td>
</tr>
<tr>
<td>Deep Science Ventures</td>
<td>Deep Science Ventures</td>
<td>National</td>
</tr>
<tr>
<td>Entrepreneur First</td>
<td>Entrepreneur First</td>
<td>International</td>
</tr>
<tr>
<td>General Wayra Call</td>
<td>Wayra UK</td>
<td>National</td>
</tr>
<tr>
<td>I-Cure Programme (SETsquared)</td>
<td>Various (Universities of Bath, Bristol, Exeter, Southampton and Surrey)</td>
<td>National</td>
</tr>
<tr>
<td>InnovationRCA</td>
<td>Royal College of Art</td>
<td>National</td>
</tr>
<tr>
<td>KQ Labs Accelerator</td>
<td>Innovate UK/Francis Crick Institute</td>
<td>National</td>
</tr>
<tr>
<td>Mass Challenge UK</td>
<td>Mass Challenge</td>
<td>International</td>
</tr>
<tr>
<td>Microsoft Accelerator</td>
<td>Microsoft</td>
<td>International</td>
</tr>
<tr>
<td>NHS Innovation Accelerator (NIA)</td>
<td>UCL Partners; NHS England, Network of Academic Health Science Networks</td>
<td>National</td>
</tr>
<tr>
<td>Seedcamp</td>
<td>Seedcamp</td>
<td>International</td>
</tr>
<tr>
<td>STFC CERN Business Incubation Centre</td>
<td>STFC</td>
<td>National</td>
</tr>
<tr>
<td>Tech Nation Rising Stars Growth Programme</td>
<td>Tech Nation</td>
<td>National</td>
</tr>
<tr>
<td>Techstars London</td>
<td>Techstars</td>
<td>International</td>
</tr>
</tbody>
</table>

In terms of the support offer, most of the comparator programmes offered mentoring and access to a network of specialist advisors, just over half provided access to office space, and half also offered a training programme. The greatest differential with the comparator schemes was in the provision of non-repayable finance; provided by only four of the 14 programmes. However, none of the comparators provided the same combination of support as the Enterprise Fellowship Programme.

\(^1\) Amongst those organisations listed on the Department for Business, Energy and Industrial Strategy (BEIS) UK directory of business incubators and accelerators
Fellows’ perspectives on the Programme

In our survey, 93% of Enterprise Fellows agreed that “The Royal Academy of Engineering's Enterprise Fellowship Programme provides early stage entrepreneurs with unique support that money-can’t-buy elsewhere” - none disagreed.

When queried as to what aspects of the Programme’s offer led to their application, the reputation of the Academy, the provision of non-repayable finance and the access to the Academy’s network were chosen by the highest proportion of respondents.

Respondents also had an opportunity to cite any other attractive Programme attributes. Several Enterprise Fellows mentioned the opportunity to step away from academia to concentrate on commercialisation as a rare and valued opportunity, as a full-time academic, as well as the chance to be amongst an inspiring cohort of entrepreneurial engineers.

In terms of the usefulness and applicability of the different elements of the Programme, introductions to expert advisors, the mentoring, and introductions to potential investors had the highest usefulness ratings. However, whilst introductions to expert advisors and investors are highly valued, take-up of this type of support is relatively low, at 35%.

Use of support to connect with customers and with PR is also relatively low, but where this has taken place, its usefulness is highly valued. In contrast, take-up of the grant funding, training programme, workshops and networking is high, and while all are considered useful, it is to a lesser degree than the other aspects of support.

Figure 1: Use and usefulness of different aspects of support

Note: Usefulness rating plotted on secondary axis, 1 = Not at all useful and 4 = Very useful
Source: Survey of Enterprise Fellows 2019

Most Enterprise Fellows responding to the survey made use of the Taylor Centre workspace, the majority of whom use it monthly. As this is a national programme this is not surprising, with one of only two reasons for people are not using it being that it is too far away from
them. The only other reason given for not using the Taylor Centre was that participation in the Programme was prior to the workspace being built, and not subsequently using it.

**Value created by the Programme**

Since 2011 the Programme has awarded 88 Enterprise Fellowships, 70 of which have been to researchers employed in Universities and 18 have been to engineering graduates. A total of £4.9m funding has been granted to the Fellows, who have received an average of £56k each. On average, Fellows have progressed 3 TRL levels as a result of the support offered, enabling them to develop successful prototypes and form successful ventures.

From the 88 Fellowships awarded, 75 new companies have been formed, 57 of which have been university spin-outs and 18 start-ups by graduate entrepreneurs. Of the 75 started, 66 remain active, 6 have since dissolved and 3 have been acquired.

These companies have subsequently achieved considerable outcomes in terms of jobs created, turnover generated and additional funding/investment secured, as shown in Table 3 below. The companies formed range from sound engineering to virtual reality, biotechnology and agri-tech, though the highest proportion (35%) are in a health-related field.

**Table 3: Outcomes achieved by Enterprise Fellows**

<table>
<thead>
<tr>
<th></th>
<th>Jobs</th>
<th>Turnover</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross</td>
<td>501</td>
<td>£36m</td>
<td>£102.8m</td>
</tr>
<tr>
<td>Net</td>
<td>356</td>
<td>£26.9m</td>
<td>£70.3m</td>
</tr>
<tr>
<td>Additional in-direct effects</td>
<td>170</td>
<td>£13.1m</td>
<td>£34.2m</td>
</tr>
<tr>
<td>Net + additional</td>
<td>526</td>
<td>£34.2m</td>
<td>£104.5m</td>
</tr>
</tbody>
</table>

Source: Enterprise Hub Monitoring Data 2018 & Survey of Enterprise Fellows 2019

The majority of Enterprise Fellows responding to the survey felt that continuing to work on the business (or the project, if the company was not yet formally registered) best represented their plans for the next five years. A small proportion (17%) noted that they had already returned to academia, or that they intended to, and a similar proportion (21%) noted that they intended to do both; combining active involvement in the business with their research role in academia.

Improving the skills of Enterprise Fellows is also a key outcome of the programme, and all who participated in the survey noted improvement in one or more of the core skillsets the programme seeks to develop. Most frequently, Enterprise Fellows note development of leadership, business development and business planning skills (each noted by 80% of survey respondents), with negotiation and pitching (at 73%) also frequently noted. However, those skills which Enterprise Fellows note as being *most improved* through the Programme are financial modelling/forecasting, pitching, communications and networking.

By their very nature, the Programme’s intended longer-term impacts take time to realise. They include tangible impacts such as: increasing the number and quality of high-growth engineering companies, developing new products and services and generating gross value added, along with more in-tangible impacts such as: fostering a culture of entrepreneurship, increasing the desire and capability of academics to spin-out businesses from their research work and contributing to increased societal wealth, health and wellbeing through bringing to market products and services which add to national and international prosperity.
One quantitative way of estimating the impact of the Programme, is considering the Gross Value Add (GVA) it generates. Based on the number of net additional jobs created, the Programme has generated £40m of net additional GVA. However, this is a relatively simplistic measure, based on the potential output of the jobs created by the Programme. The contribution to prosperity goes much further than this. For example, several Enterprise Fellows surveyed had used the knowledge they had gained through the Programme to start more than one business. These companies are not captured as part of the estimates in this report but will also generate jobs and GVA for the economy.

Value for Money

As set out above, the Programme has created 526 net additional jobs. These jobs have been created with Programme cost of £6.2m, equating to a cost per job of £11.9k. This is significantly lower than the average for public sector interventions. The total of £105m net + additional effects of investment that Enterprise Fellows have secured equates to an average of £1.2m investment funding per Fellow and a ratio of £1: £21 Programme funding granted: investment leveraged. Further, considering the return for the UK of the Programme of £40m GVA, an investment of £4.93m in Fellows’ businesses has yielded a 710% return.

The majority of spend in the Programme is directed to Enterprise Fellows in the form of equity free funding. Staff and overheads make-up a very small proportion of the budget. A key driver of this is that, except for grant finance, support provided by the three-person Programme team and the training programme, the majority of support is provided at no cost to the Programme by Academy Fellows, who volunteer to give their time freely as mentors. This enables the Programme to achieve considerable impact, at minimal cost.

Conclusion

The study tells a positive story of a Programme with an offer that is unique in the direct market in which it operates and highly valued by its participants in the development of their businesses. The Programme has awarded 88 Fellowships, 75 of which have gone on to create businesses and the majority of which are still trading or have been acquired. In our survey, 93% of Enterprise Fellows agreed that “The Royal Academy of Engineering’s Enterprise Fellowship Programme provides early stage entrepreneurs with unique support that money-can’t-buy elsewhere” - none disagreed.

It is undoubtedly successful at bringing innovations to market, successfully unlocking IP and enabling a movement of, on average, three technology readiness levels. More than 500 people are working in jobs that exist because of the Programme, £40m of gross value added has been contributed to the UK economy and for every £1 of grant funding received, Enterprise Fellows have secured a further £21 in follow-on funding and further investment (including grants and equity investment), all of which contribute to addressing the Grand Challenges articulated by the UK Government in the Industrial Strategy.

The rationale for delivering a commercialisation support programme remains strong, with the foundational issues that create a challenging environment within which to commercialise research still prevalent. The Enterprise Fellowship offer is clearly differentiated; most explicitly via the programme length, the access to facilities it offers and the prestige of the Royal Academy of Engineering brand. This strong brand reputation, along with access to the Academy’s Fellowship as a pool of mentors and advisors, are the Programme’s key and genuinely unique assets, leveraging them should be at the core of everything it does.
Figure 2: The Programme's Logic Chain

Context
- There is valuable IP in the UK's universities, which is not being fully utilised within the UK, or by UK companies, or is slow to be used.
- Academics and graduates are keen to start companies, but don't know how, lacking the required business skills and appropriate support and as such, failure rates for the industry as a whole are high.
- Foster a culture of entrepreneurship in the UK's engineering sector, with inspirational role models which help to encourage more businesses creation.
- Advancement and promotion of excellence in engineering for the benefit of society
- Lack of high-quality enterprise support for academics, graduate engineers and engineering SMEs.

Rationale
- Solving co-ordination failure. The Academy's Fellowship is unique cohort of engineering business leaders with experience to share with the next generation of engineering entrepreneurs. RAE can provide independent, objective support to bring parties together via charitable status and non-equity finance.
- Solving information failures. Typically researchers will not seek or pay for support from the private sector, lacking information about the value and quality of support, and potential benefits. Therefore they may not access support even when it could be beneficial for the business.
- Solving access to finance information failures. Investor tendency to look for quick returns means that they often don't invest in projects that have a longer gestation period, which in turn means IP intensive, complex innovations can be overlooked.
- Positive externality. Supporting entrepreneurs in the sector will have wider benefits for the UK economy, such as sector development, job creation, new business starts which, without intervention may fail to be realised.

Objectives
- To bring engineering innovations to market for wider public benefit.
- To improve the skills of awardees, to improve business success rates, and give them the confidence to try in enterprise.
- To develop inspirational entrepreneurial role models.
- To develop a wider alumni network to further the aims of the Enterprise Hub.
- Hub to award 200 Enterprise Fellowships by 2026.
- Hub to have raised its annual operating budget to £10m by 2026.
- Companies founded by Hub Members to create 5,000 jobs and raise £0.5bn.
- Raise the profile of the engineering profession, the Academy, and the Hub.

Impacts
- Increase in the number and quality of high-growth engineering companies in the UK.
- New products and services developed.
- Foster a culture of entrepreneurship in the UK's engineering sector, with inspirational role models which help to encourage more businesses creation.
- Contributing to national prosperity through additional gross value added.
- Increase in desire and capability of university staff to spinout businesses.
- Advancement and promotion of excellence in engineering for the benefit of society
- Increased wealth, health and wellbeing of society.

Outcomes
- Improved skills of individual beneficiaries.
- New business starts in engineering/tech sector.
- Increase in the number of jobs created at engineering/tech startups in the UK.
- Net additional jobs created.
- Turnover generated in new tech businesses.
- Amount of further funding raised by companies supported.
- Awardees staying in entrepreneurship vs returning to academia.
- Movement through Technology Readiness Levels.

Outputs
- Applicants being awarded Enterprise Fellowships.
- Fellows receiving business support.
- Fellows receiving funding from the Programme.
- Fellows receiving mentoring advice.
- Policy reports and thought leadership.
- Fellows with access to work / business space.

Activities
- Core training modules, plus ad-hoc workshops, seminars, 1-2-1s from contracted training providers and Enterprise Hub contacts.
- Use of Enterprise Hub rooms and network.
- Staff time, mentors' time.

Inputs
- Under inputs change to
  - £5.3m funding from BEIS
  - £0.86m funding from Trusts and Foundations
  - £0.15m from corporate sponsorship
  - £0.1m from private donations
- Core training modules, plus ad hoc workshops, seminars, 1-2-1s from contracted training providers and Enterprise Hub contacts.
- Use of Enterprise Hub rooms and network.
- Staff time, mentors' time.

Source: Steer Economic Development and the Enterprise Hub, 2018
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