
Royal Academy of Engineering
Leaders in Innovation Fellowships
Newton Fund
Five years of the
Leaders in Innovation Fellowships Programme

Contents

Foreword

Engineering matters. It underpins our daily lives, drives economic growth, plays a critical role in addressing major global challenges and helps ensure our readiness for the future.

Our goal is to harness the power of engineering to build a sustainable society and an inclusive economy that works for everyone. We believe that engineers can be influential agents of change in the drive for a more sustainable society, providing leadership both within and beyond the UK. They are also drivers of innovation and economic opportunity, leveraging advances in research to develop and deliver new products, services and enterprises that generate jobs and value to society.

The Leaders in Innovation Fellowships (LIF) programme builds on the success of the Academy's Enterprise Hub to expand this entrepreneurial ambition to a global scale, working with partners in the UK and in 17 countries across five continents, to create a thriving global community of engineering innovators, each building successful businesses, while tackling the UN's Sustainable Development Goals and supporting the economies of the UK and the partner countries.

We put partnership working at the heart of our approach. For the past five years the LIF programme has been funded by the Newton Fund, managed by the UK Department for Business, Energy and Industrial Strategy (BEIS). All activities are developed in collaboration with local governments and funders, which ensures that they meet local development priorities as part of the Official Development Assistance (ODA) eligibility.

As I write, the world is tackling the biggest public health crisis of our time, a pandemic that has called for rapid innovation to protect lives and livelihoods across the globe. There has never been a more urgent need for engineering expertise to inform public debate and provide workable solutions to our shared challenges.

"The programme is helping to mobilise the global engineering community and create strong international alliances to support sustainability."

As the UK's national academy for engineering, we have a responsibility to provide leadership for engineering and technology, and technical leadership for wider society. As President, I am committed to working with Academy staff, Fellows and partners to deliver this leadership with authenticity, inclusivity and empathy, so that the Academy can serve as a progressive force that keeps humanity at the heart of engineering and delivers tangible, meaningful benefits to society. The LIF Programme offers many fine examples of such progressive leadership and engineering enterprise in action.

Professor Sir Jim McDonald
FREng FRSE
President, Royal Academy of Engineering

Supporting the Academy's strategy

Science, research and innovation are crucial for finding solutions to societal challenges, helping us to deliver better quality of life, economic growth and environmental improvements.

However, when these solutions do not reach the people in need of them, they are not only redundant but costly to the funders and communities who never had the opportunity to be impacted by them.

Ideas, however brilliant and laudable, will not achieve their impact unless converted into innovations through entrepreneurship. This has been clearly demonstrated in the UK, and most notably by the Academy's Enterprise Hub that uses the tools of mentorship, coaching and education to enable innovators to:

- develop an entrepreneurial mindset
- become leaders and role models in their communities
- build global partnerships to help commercialise life-changing products and services for the benefit of society.

This holds equally true for achieving the UN's 17 Sustainable Development Goals (SDGs). LIF builds not only SDG impact but also esteem for (UK) engineering and increases the trade in innovations across the world.

A global network of leaders in innovation

Since 2015, LIF has worked alongside agencies in 17 ODA-eligible countries to produce a global network of over 1,100 innovators, each building their own businesses within a strong support structure, nationally, regionally and globally. LIF participants have become influencers and decision-makers and developed a huge range of solutions to tackle various SDGs, which have gone on to be produced, trialled and created more than 2,500 jobs.

A partnership with the UK diplomatic service

With diplomatic support, the LIF programme has benefited from working closely with the UK Ambassadorial and High Commission Teams in each ODA country. Their guidance and valuable local knowledge has been invaluable to the success of the LIF projects.

Supporting the Academy's strategy

Through international collaboration, the LIF programme attracts some of the most promising global science, research and innovation talent to the UK. International scientific partnerships have benefited the UK in countless ways, from better access to markets for products and services, to innovations that help advance the UK's economic and security priorities.

LIF participants have a lasting connection with the UK and the partnerships they build help to strengthen relationships between the UK and their own countries.

Nurturing an entrepreneurial mindset

Collaboration is a core skill of business and needed to make successful innovations. While many other training programmes focus on content only, from the onset LIF focused on the influence and impact an entrepreneurial mindset can have on an individual.

Working together and with peers to achieve common goals, sharing experiences and lessons learned not only improves each entrepreneur's chance of success but creates lasting trust, which if nurtured can go on to create bonds between countries.

We need engineering solutions to tackle the world's greatest challenges, yet without an entrepreneurial mindset it is very difficult to create products and services to benefit society. Moreover, without a supportive ecosystem and community of innovators to learn from and partner with, it is nearly impossible. To meet the SDGs we need entrepreneurial leaders who serve humanity, who are dedicated to improving the economic and social welfare of their communities and protecting our planet for future generations.

The LIF programme is a crucial vessel for the science, research and innovation community aiming to do just that.

Building partnerships and making connections is integral to the LIF programme. If you would like to find out more about how you can get involved, please get in touch at **info-lif@raeng.org.uk**

Sustainable development at the Academy

The Leaders in Innovation Fellowships programme is delivered as part of the Academy's sustainable development work.

The Academy's engineering for development activities and programmes are focused on advancing engineering's contribution to a safer, healthier, more prosperous world for people in developing countries and emerging economies, tackling the global challenges of our time.

In 2015 the United Nations published the Sustainable Development Goals (SDGs) as the blueprint to achieve a better, more sustainable future for all. Engineering makes a crucial contribution to each and every goal, and the Academy's activities engage with and support attaining them.

What is the Leaders in Innovation Fellowships programme?

The Leaders in Innovation Fellowships Programme (LIF) brings together emerging leaders in the global innovation community who have an engineering-based innovation that has the potential to contribute to the social and economic development of their country through commercialisation. The programme is delivered as part of the UK Newton Fund in partnership with in-country organisations.

It is uniquely placed in that it targets researchers and academics to build their capacity to turn ideas and research into products and take on an entrepreneurial mind and skill set. The LIF programme provides access to high-quality skills training focused on commercialisation, a network of peers in their own country, the UK and around the world, and a rich and varied experience with immediate and long-term benefits for their innovations.

It is a year-long programme of bespoke support including:

- expert mentoring
- on-going support at the home institution
- access to an international network of peer innovators and mentors
- access to resources, webinars and opportunities on the LIF online community
- in-country and regional events.

The training is highly tailored to each participant's own goals and challenges. It lays the foundations for launching a product and emphasises skills such as negotiation, teambuilding, resilience and effective communication.

Programme objectives

LIF helps researchers to commercialise their innovations

Through training, mentoring and networking activities, the LIF programme helps researchers to adopt an entrepreneurial mindset, acquire new knowledge and skills, and grow their networks.

Programme activities include:

Residential training (two weeks)
- Business skills training
- Experiential learning
- Peer-to-peer learning
- Mentoring
- Visits to partners / local experts

Follow-on support (six months)
- Workshops / masterclasses
- Networking
- 1:1 project support
- Work with role models

Promotion of LIF alumni
- Sharing alumni success stories
- Impact reporting

LIF online community
- Access to a global community of alumni
- Support resources
- Webinars and forums
- Listing of events and opportunities

Short-term outcomes

- Adoption of an entrepreneurial mindset and steps towards commercialisation
- Greater number of new products and services finalised
- Increased knowledge of entrepreneurial approaches in home organisations
- Adoption of evidence-based business practices
- Expanded and diverse networks

Long-term outcomes

- Increased business startups, survival and performance
- New and decent jobs created
- Greater adoption of engineering innovation to address economic, social, and environmental challenges
- Improved ecosystem to support entrepreneurship and innovation
- Increased local and international collaboration between firms and research institutions that advance and promote engineering innovation

Programme timeline

The Newton Fund is launched by the UK government's Department for Business, Energy and Industrial Strategy, to promote the economic development and welfare of the partner countries.

2014

LIF1 – The Royal Academy of Engineering launches the LIF programme in partnership with Brazil, China, India, Mexico, South Africa, Thailand and Vietnam.

8 partner countries

2015

LIF2 – The LIF programme expands to include China, Colombia, Egypt and Turkey.

12 partner countries

2015 to **2016**

2016 to **2017**

The LIF programme runs its first **regional hub – Southeast Asia Innovates – in Bangkok, Thailand** bringing together participants from Vietnam, Thailand and the Philippines.

LIF3 – The Philippines, Thailand, Indonesia and Malaysia join the LIF programme.

14 partner countries

Africa Innovates, a regional hub in Nairobi, Kenya with LIF participants from South Africa and Egypt, and Africa Prize for Engineering Innovation entrepreneurs.

LIF4 – Kenya joins the LIF programme.

15 partner countries

2017 to **2018**

over 1,000 new jobs have been created by LIF participants' companies

2018 to **2019**

South America regional hub is held in Rio de Janeiro, Brazil with alumni from Brazil, Chile, Colombia and Malaysia.

The **LIF Online Community** launches.

Over $60 million in funding has been raised by LIF participants in support of their innovations.

LIF5 – Peru joins the LIF programme.

16 partner countries

Asia Innovates is held in Kuala Lumpur, Malaysia for alumni across South-East Asia.

LIF6 – Jordan joins the LIF programme.

17 partner countries

2019 to **2020**

A total of $80m in further funding has been raised

2020

The **LIF Advance programme** is launched, with the theme of Disability inclusion and reducing healthcare inequalities.

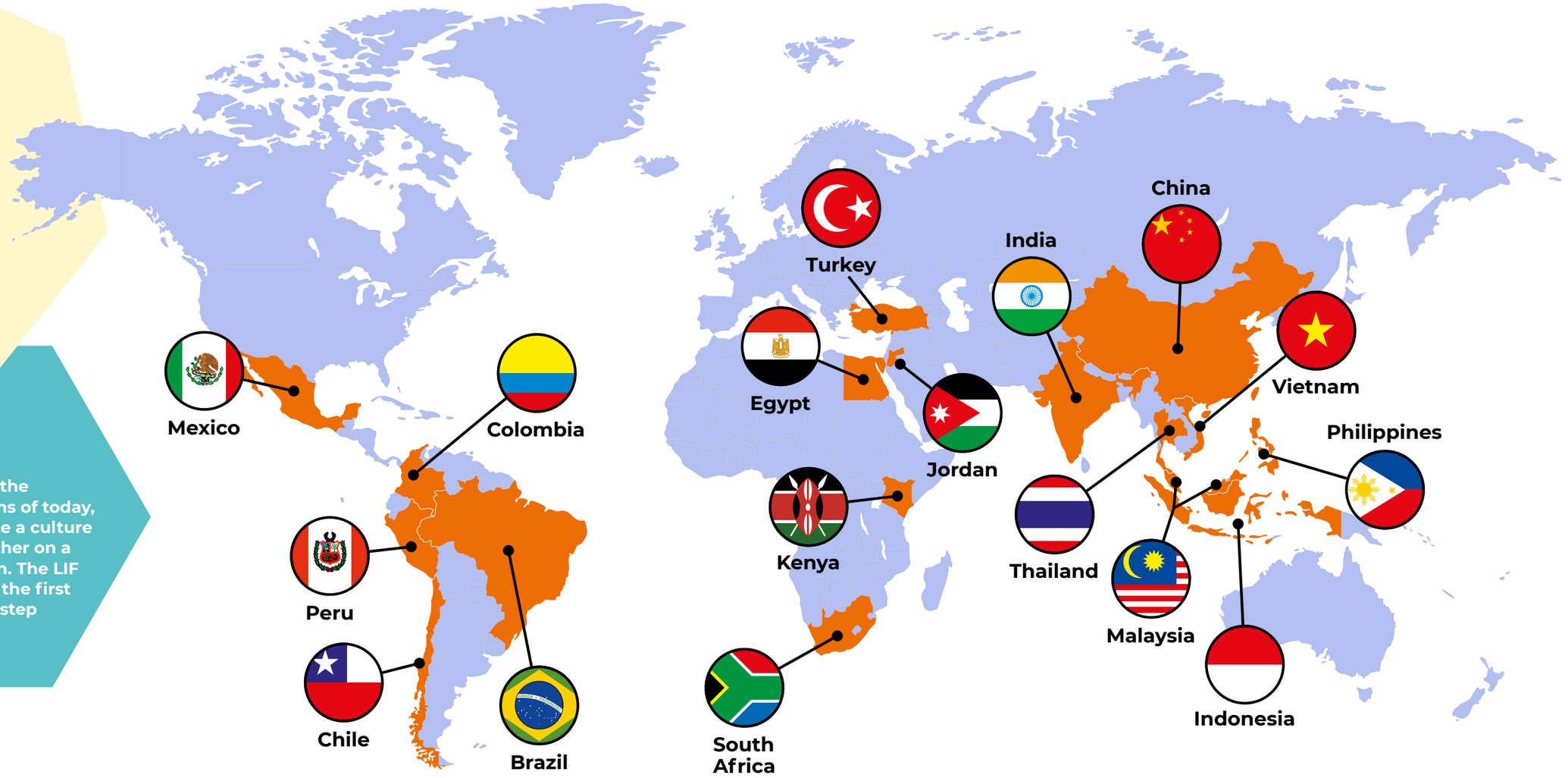
The **LIF Community Building grants programme** is launched, supporting LIF alumni to build entrepreneurial networks in their local and regional contexts.

A further 1,500 new jobs have been created by LIF participants' companies.

Bringing together emerging leaders from across the world.

We have supported more than 1,000 innovators from all 17 Newton Fund partner countries.

“In order to solve the complex problems of today, we need to create a culture of working together on a common solution. The LIF programme was the first and most useful step forward for us.”



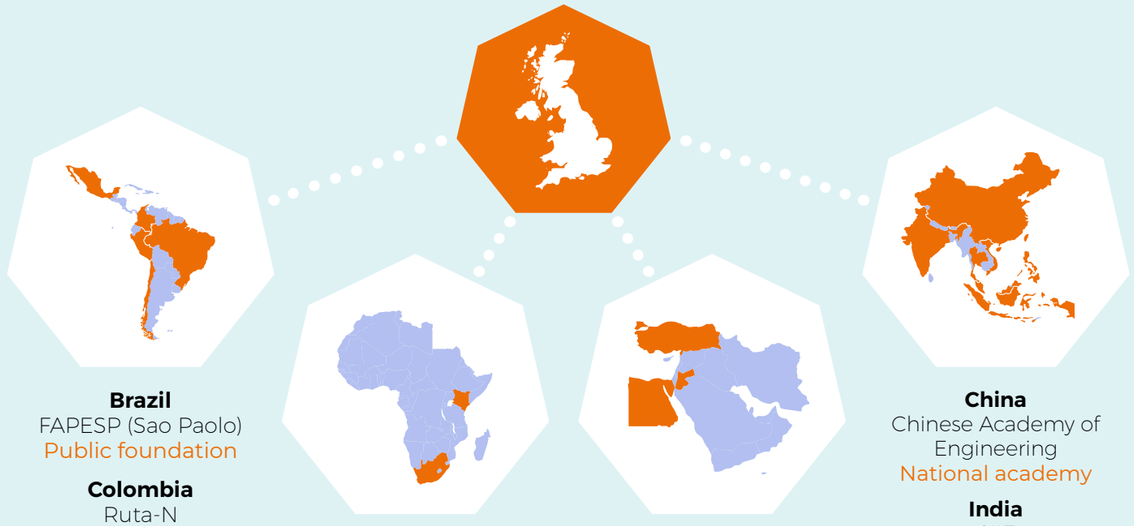
Our access to global innovation ecosystems

The LIF programme was set up to build international links through an innovation network, and it has surpassed these ambitions.

It has built new innovation networks internationally, as well as tapping into existing local and national ecosystems at the highest level for the benefit of its entrepreneurs.

The Academy has been able to work with government agencies and established innovation-support institutions in 17 countries. By connecting to the existing infrastructure at the highest levels, we have been able to build an international network that has real power to transform businesses with this support. The Academy has a firm understanding of the needs and appetite for innovation and commercialisation across all sectors in our countries of focus. It can identify where positive change can be developed or implemented through programmes like LIF, where the Academy plays a leading role in shaping content.

This has dramatically increased the international reach and influence of the Academy, creating many connections that would have otherwise not been possible.



Brazil
FAPESP (Sao Paolo)
Public foundation

Colombia
Ruta-N
Public joint venture

Mexico
Secretaría de Economía
Ministry

Peru
CONCYTEC
Governing institution

Kenya
Kenya National Innovation Agency
Ministry

South Africa
Technology Innovation Agency
National agency

Egypt
Science and Technology Development Fund
Ministry

Jordan
The Higher Council for Science and Technology / Industrial R&D Fund
Public independent institution

Turkey
TUBITAK
National agency

China
Chinese Academy of Engineering
National academy

India
CIIE
Centre of excellence backed by the government

Malaysia
Malaysian Industry-Government group for High Technology
National agency

Philippines
Department of Science and Technology
Ministry

Thailand
Thailand Science, Research and Innovation, and The National Science and Technology Development Agency
National agency

Vietnam
Vietnam Academy of Science and Technology
National academy and research institute

LIF Community

Our community of over 1,100 innovators from 17 countries are working to solve the most pressing sustainable development challenges for their countries, but also the UK and globally.

After the LIF programme residential training and follow-on support, participants join a network of alumni to continue their entrepreneurial journey.

Since 2015, we have established a global community of academic researchers, innovators, experts and mentors who support, inspire, teach and push each other forward in their entrepreneurial journeys.

Our community was created to:

ESTABLISH

Establish a global peer-to-peer network of innovators inspired to change and grow

INCREASE

Increase formal and informal collaborations with key actors in the UK innovation ecosystem

PROVIDE

Provide alumni with the tools and resources to help in their commercialisation journey

ENCOURAGE

Encourage alumni to take on leadership roles within their community

DEVELOP

Develop local communities of engaged innovators beyond LIF alumni, to share and apply an entrepreneurial mindset

About the community

We are proud of the network we have created, and have seen first-hand how powerful connections can lead to partnership, knowledge sharing and new opportunities.

The community makes it easy to connect with entrepreneurs who are passionate about tackling some of the world's biggest challenges and to transfer new research into real-world applications.

From agriculture and food to transportation and renewable energy, working prototype to early market traction and scaling up, our alumni cover a variety of sectors and different stages in the development of their startups.

We invite you to browse their innovation profiles, which showcase technology that covers the breadth of engineering for a sustainable society and an inclusive economy. Alumni profiles are available at **lif.raeng.org.uk**

> **"Aside from the technical learning I got from LIF, it's really the community that has had a huge impact on me."**

25
channels of communication established

Community grants

Through the Community Grants Programme, we have supported over 30 awardees to design and develop collaborative community projects to develop LIF networks nationally and internationally.

Our awardees are entrepreneurial leaders. Through their projects they have developed their local innovation ecosystems, motivated their peers, and generated new opportunities to raise the profile of alumni and further their commercialisation journeys.

over 530
alumni engaged in knowledge sharing
between January and March 2021

> **"By engaging with local incubators and policy makers as one LIF network with many members, we are hoping to get our members' needs and feedback taken more seriously and addressed in a timely way to benefit the whole local entrepreneur ecosystem."**
>
> Ahmet, Turkey

Awardees, known as LIF champions, are running 17 pilot projects, which received funding of up to £5,000 each for six months. They have:

- **engaged** over 530 alumni in knowledge sharing and networking activities, which resulted in 192 quality new business contacts for alumni
- **collaborated** or set-up new partnerships with 85 other organisations
- **established** 25 channels of communication via social media and received over 30 mentions about their projects in the local media
- **developed** their innovation ecosystems through through 38 events which engaged over 3,000 external stakeholders
- **enabled** 100 alumni mentoring relationships to benefit both LIF alumni and entrepreneurs within the local ecosystem.

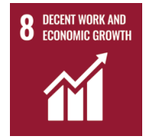
Engineering to meet the Sustainable Development Goals

The 17 SDGs are an urgent call for action by all countries in a global partnership. Our innovators are harnessing the power of engineering to meet the UN's SDGs.

The goals recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

Through the support of the LIF programme, our innovators have launched hundreds of remarkable products. These products and services align to various SDGs and have created credible impact, from providing clean water in disaster-affected areas and improving the safety of critical infrastructure, to widening access to healthcare and nutrition, making agriculture more sustainable and developing innovative ways to produce cleaner and more efficient energy.

Alumni innovations are working towards the achievement of all 17 SDGs and the LIF programme itself is also directly enabling SDG8, SDG9 and SDG17. Diversity and inclusion is embedded across all activities, and the LIF programme benefits greatly from having access to a global community of over 1,000 innovators to bring diverse and unique perspectives to tackling global issues.



SDG 8 Decent work and economic growth

Over 2,500 jobs have been created by alumni commercialising their innovations, contributing to a sustained and inclusive economic growth that can drive progress, create decent jobs for all and improve living standards.

SDG 9 Industries, innovation and infrastructure

We support alumni to promote new technologies and facilitate international trade. Through this we work towards inclusive and sustainable industrialisation – furthering global economic growth and social development.

SDG 17: Partnerships for the goals

LIF encourages governments, civil society, scientists, academia, and the private sector to come together at the global, regional, national and local levels to form multilateral partnerships with the shared purpose of innovating for a better society.

This means that for more than 1,100 entrepreneurs from 17 countries, the UK is now a partner of choice, and recognised as a valuable and trustworthy partner as we tackle existential problems to humanity.

Our programme has supported innovators working across all 17 SDGs to tackle the world's biggest challenges by transferring new research into real-world applications.

Engineering to meet the Sustainable Development Goals

SDG 3: Good health and wellbeing

Project CARE (COVID-19 African Rapid Entrepreneurs)

Entrepreneurial leaders have been critical in helping communities face the biggest public health crisis of our time.

The Academy has mobilised over 50 African entrepreneurs from its Africa Prize for Engineering Innovation and LIF programme to address the consequences and impacts of COVID-19 in their communities. LIF alumni responded to the call for rapid innovation and pivoted their businesses to manufacture and supply personal protective equipment (PPE) and addressed health and other challenges imposed by COVID-19 with their products and services.

Catherine Wanjoya (LIF6, Kenya)

Catherine pivoted her business Silmak Agencies, which manufactures biodegradable sanitary pads and disposal using eco-friendly incinerators. She has used her incinerators to safely dispose of used PPE on-site in homes, hospitals and other health facilities in Kenya. She has successfully piloted three incinerators and has safely disposed of over 4,400 masks.

Dr Maryam Amra Jordaan (LIF6, South Africa)

Maryam was one of the winners of the Scaling Out For Impact programme facilitated by Liminal in the UK and the Technology Innovation Agency (TIA) in South Africa. She is in the process of setting up a pilot plant to manufacture filament from thermoplastic polymer, polyethylene terephthalate (PET) for use in 3D printing applications and will be developing filament using renewable materials and recycled plastic, to provide cheaper and greener filament than existing options. She is considering sugar cane as a possible source, as well as other renewable sources..

SDG 4: Quality Education, and SDG 10: Reduced inequalities

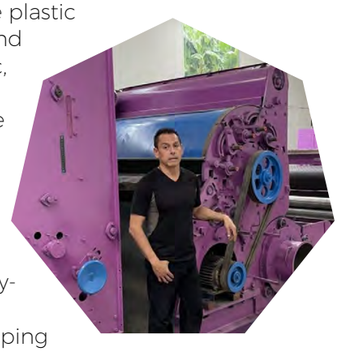
Petro Erasmus (LIF5, South Africa)

Petro Erasmus is addressing under-achievement in maths in South Africa with Maths Whartels, an innovative board game and app for primary school children to improve maths literacy and increase their chances of science, medicine and engineering careers.

Petro was awarded a research grant to collaborate with Loughborough University's Centre for Mathematical Cognition to test Maths Whartels material with children from the UK. The product range is available from Mindmuzik (www.mindmuzik.com) and has been on sale since December 2020.

SDG 12: Responsible consumption and production and SDG 13: Climate action

Enrique Alejandro Moreno Munetones (LIF3, Colombia)



Alex and Gabriel Moreno's company Fiquetex S.A.S is disrupting the plastic sector with a biodegradable and economic alternative to plastic, helping to reduce carbon emissions and combat climate change. The non-woven textile material is a plastic substitute, which uses the raw materials of fique fiber and natural rubber latex to create products including carry-on bags, packaging materials, scouring pads, cut flower wrapping and vegan leathers.

Fiquetex secured investment of £1.1 million and is currently setting up its production line. Fiquetex was granted a patent of invention for 20 years and countries around the world have expressed interest in distributing its products and buying materials. Its work was recently recognised as 'Best postgraduate idea' by a University of Oxford competition searching for the most innovative and impactful entrepreneurs.

LIF Advance

LIF Advanced launched in 2020 to compliment the original LIF training programme objectives. It offers bespoke training for selected alumni focused on UK relationship-building and business growth activities.

It brings together a carefully selected cohort that includes one innovator from each LIF country to focus on a theme.

Participants receive tailored relationship-building opportunities in the UK with people and organisations that can help them fulfil their commercial potential.

The programme has already initiated 100 connections into the UK. These included introductions to subject experts, which has led to many participants pivoting their offering in response to the input and feedback received. Many participants now see the UK as a primary initial market for their medtech innovations.

100
connections into the UK initiated

Andrea Siller (LIF5, Mexico)

Andrea has connected with Forte Medical and the University of Southampton to expand her network in the UK. She has published results and data to support marketing her product Recopad, a discreet urine sample collection for dependent patients.

Brian Mwenda (LIF6, Kenya)

Brian and his organisation Hope Tech Plus have built the ultimate walking companion for any visually impaired person anywhere in the world. He has collaborated with Blind Veterans in the UK to trial his personal navigation device with people who are blind and visually impaired and is working on the UK as his first market.

Boonrat Lohwongwatana (LIF2, Thailand)

Boonrat collaborated with the University of Oxford as part of the Academy's Transforming Systems through Partnership programme, which aims to build engineering teaching, research and innovation capacity through collaboration with local stakeholders and UK academics. His innovation, Meticuly, is a 3D printing medical device that creates personalised bone implants with AI-assisted technology. Boonrat has increased his staff to 35 people and increased production rates – the company is now making two custom implants a day.

Building partnerships

Building partnerships and forging connections are central to the LIF programme.

Through a collaborative approach, expanding and diversifying their networks, many alumni have furthered their innovations and developed as entrepreneurial leaders.

LIF alumni have partnered with universities, research institutions and organisations in the UK and internationally on collaborative projects that benefit innovation ecosystems through job creation and economic growth due to new products and services in the market, and influence research and policy.

Dr Aida Azmi (LIF6, Malaysia)

Dr Aida Azmi's innovation UnaCoffee, a functional coffee with less caffeine and added protein and vitamin B content, led to her signing a memorandum of understanding with the Malaysian Academy of Small and Medium Entrepreneurship Development (MASMED), Universiti Teknologi MARA (UiTM). In March 2021, she co-led the Feed Your Future Programme with MASMED to develop entrepreneurship culture and graduate employability skills for over 300 students.

The programme aims to encourage entrepreneurship culture among students as well as to help with graduate employability.

> **"The LIF programme has provided me with the skills and confidence to nurture and grow Malaysia's entrepreneurial ecosystem."**

Chirag Panchal (LIF6, India)

Chirag's company Enerlyf, an air conditioning system that uses machine learning and artificial intelligence to monitor users cooling needs, maintain room temperature and save up to 45% in air conditioning bills. He has collaborated with Ecosync, a UK-based heating management enterprise, to work on projects related to energy efficiency.

Wei Wang (LIF2, China)

In 2019, Dr Wang collaborated with St John's Innovation Centre, Cambridge and Cranfield University to set up a UK-based research company e on the recovery technology of waste Li-ion batteries for electric vehicles.

Devrim Pesen Okvur (LIF3, Turkey)

Devrim has expanded her startup INITIO to the UK. Her organ-on-chips device and assays provide an innovative approach to cancer diagnostics and drug discovery which can reduce costs ten-fold, achieve results ten times faster and minimise animal testing. The business is currently based in Aderley Park Cheshire, UK.

Building partnerships

Edgar Raygoza (LIF3, Mexico)

In 2017 Edgar partnered with the National Graphene Institute in the UK to develop lubricating additives using nanotechnology techniques to reduce CO_2 emissions and greenhouse gases.

Zinhle Ngidi (LIF6, South Africa)

Zinhle's company Igugu Clean Tech PTY(LTD) grows nicotine-free tobacco and converts its seed oil into biodiesel. During the LIF London Residential, Zinhle connected with Green Fuels, a UK-based bio-fuel processing equipment vendor.

Zeinab El Maadawi (LIF2, Egypt)

Zeinab and her team collaborated with researchers from University College London on a seed-funded transnational educational project to create digital and face to face educational materials to promote the concept and values of circular economy for children and adolescents in Egypt, Kenya, Turkey and the UK. The idea for the project was developed as part of a Frontiers event and has been featured at the UN global SDSN Edu Guide: Accelerating Education for the SDGs in Universities.

Frontiers of Engineering for Development is an interdisciplinary symposia that facilitates national and international collaboration to tackle global development challenges. Participants include 38 LIF alumni, who have worked alongside international collaborators from research institutes and organisations worldwide.

Ayyappan Asokan (LIF1, India)

Ayyappan's EdTech platform Ofabee is a Software as a Service platform that helps educators and coaching institutes to launch their own branded learning app to create and sell their courses online. It was acquired by OLIVE Group, an e-learning company based in Ireland.


Partnering
countries

Brazil

Eimi Arikawa, LIF6

The LIF programme has been running in partnership with the **Sao Paulo Research Foundation (FAPESP)** in Brazil since 2014.

FAPESP is a public foundation, funded by the taxpayer in the State of São Paulo, with a mission to support research projects in higher education and research institutions in all fields of knowledge.

In 2019 the LIF programme also partnered with **CERTI** to build on the successful collaboration with FAPESP in São Paulo and expand its national reach in Brazil.

CERTI is a technology-based institution, based in Florianopolis, Santa Catarina. Founded in 1984, CERTI supports the development of products, research and consulting services and has accumulated years of experience in hardware, software design and manufacturing.

The institution has also promoted the Brazilian technological ecosystem, supporting innovative entrepreneurship through incubators, startup accelerators and venture capital funds.

“In six months, I made two years progress with the help and support of my mentor. LIF gave me the support I needed to face the difficulties of being a woman in an engineering business in Brazil.”

Lisane Valdo, LIF2

Innovation spotlight

Paulo Pinheiro has created a wheelchair accessory called **The Wheelie,** which uses facial expressions to control a motorised wheelchair for users with restricted upper-body mobility.

- Mechanical, medical and health, systems and computing

Lisane Valdo’s fatigue and risk management system improves shift workers’ safety by monitoring signs of fatigue and sleep deprivation and providing employers with solutions to mitigate them.

- Systems and computing, biotechnology and bioengineering

Emily Shinzato’s company, **Treevia**, is an online SmartForest monitoring system that uses Internet of Things technologies to obtain real-time information such as forest growth, temperature and moisture in planted forests, enabling forestry managers to make faster and more effective decisions.

- Systems and computing, environment

Clockwise from left:
Paulo Pinheiro’s innovation The Wheelie; Paulo Pinheiro, LIF3; Emily Shinzato, LIF3.

89

LIF participants supported

Chile

The LIF programme partnered with the **Scientific and Technological Development Support Fund (FONDEF)** in Chile from 2014 to 2017.

The FONDEF program was established in 1991 to promote ties and partnerships among research institutions, corporations and other entities. Its goal is to develop applied research projects that can improve Chile's competitiveness and the population's quality of life.

When Chile graduated from the DAC list in 2017 and was no longer eligible to participate in activities funded by the Newton Fund, the partnership between the LIF programme and FONDEF ended. However, FONDEF continues to meet its objective of enhancing a culture of entrepreneurship and innovation within universities through the Programme for Valorisation of Research at Universities (VIU), which promotes creating new business ventures, or research-intensive enterprises among university students.

The LIF alumni community in Chile is still active, and the country continues to be supportive of LIF activities.

52

LIF participants supported

> **Without a doubt the participation in LIF was a turning point for me and for my company"**

China

60

LIF participants supported

The LIF programme has run with China since 2015 in partnership with the **Chinese Academy of Engineering**.

The Chinese Academy of Engineering is a national organisation composed of elected members, and election is the highest honour in the Chinese engineering and technological sciences community. By initiating and conducting strategic studies and consultancy for decision-making, the academy devotes itself to promoting the progress of engineering and technological sciences.

The Newton Fund forms the UK contribution to the UK-China Research and Innovation Partnership Fund.

Through LIF, I learned how to think like a businessperson as well as a scientist; evaluating the value of my research and thinking outside the box.

The LIF programme not only prevented us from wasting funds, but helped us accelerate the process of turning innovation into an enterprise."

Guangyin Yuan, LIF3

Case study

Guangyin Yuan

China, LIF3 participant 2016/17

Biodegradable bone implants

Traditional bone implants tend to be made of titanium and require a supplemental surgery to remove them after the bone has healed.

In addition to putting the patient through more pain, stress and risk, this second intervention also places an unnecessary burden on the global healthcare system, with 40% of over 50-year-olds likely to experience a bone fracture during their lifetime.

Aided by the LIF programme's business training, **Guangyin Yuan**'s company has developed biodegradable magnesium-based implants that gradually dissolve as the bone recovers.

Avoiding the second surgery improves the speed and quality of the patient's recovery, as well as reducing the cost of bone fractures to the healthcare system by 40%.

Moreover, trials have shown that magnesium alloys are stronger than other biodegradable polymers, present no side effects, and the release of magnesium around the fracture can aid healing, accelerating the rate of repair by 20%.

Ten years ago, I witnessed my nephew undergo surgeries to remove titanium plates for a facial fracture caused by a serious motorcycle injury.

At the time, I was researching the use of magnesium for the automotive industry, and I realised the material's unique properties would help others avoid the pain he was subjected to."

Colombia

The LIF programme has been running in Colombia since 2015. The LIF programme partners with **Ruta N** in Colombia.

Ruta N is a publicly funded organisation based in Medellin. It was founded in 2011 to streamline the city's innovation ecosystem, promoting the development of innovative, technology-based businesses to increase the competitiveness of the city and the region and improve the quality of life of its inhabitants.

Ruta N serves as a launch site for businesses operating in Medellin, works with universities and the private sector to promote innovation and support entrepreneurs, and provides technology training and education for young people, making the city and region the best place for entrepreneurship.

Between 2015 and 2016 the LIF programme was supported by Colciencias (now Minciencias, the Colombian Ministry of Science, Technology and Innovation).

Newton Fund in Colombia:

The partnership with Colombia is called the Newton-Caldas Fund, named after Francisco José de Caldas. Caldas was a mathematician, geographer, military engineer and inventor who is widely considered the first Colombian scientist, and a leader in the fight for Colombian independence.

Eliana Camargo, LIF6

"I don't think about innovation as just research projects and scientific papers anymore. Now I'm aware of the impact that I could have on society and the economy by taking my research from the laboratory to market."

Maria Rolden, LIF4

Innovation spotlight

Jimy Aguirre's innovation, **GreenyWave**, is a smart meter to improve water infrastructure and water resource use.

- Systems and computing, environment

Jennifer Rodriguez has created **VBraille**, a platform and braille device that automatically translates Braille to English or Spanish, ensuring quality education and inclusion in society for deaf, blind and deaf-blind people.

- Communications, education, electronics and sensors

Juan Correa's **Vortex Deflector** uses jet-blast control technology to reduce the carbon footprint and increase efficiency in the aviation industry.

- Environment, transport and infrastructure

Clockwise from left:
Jimy Aguirre's innovation GreenyWave; Juan Correa's Vortex Deflector, José María Córdova International Airport; Jennifer Rodriguez, LIF6.

78

LIF participants supported

Egypt

The LIF programme has run in Egypt since 2015 in partnership with the **Science, Technology and Innovation Funding Authority (STDF)**.

STDF stimulates Egyptian scientific society by funding research and establishing scientific partnerships in many countries. It aims to keep track of advancing technologies to help Egypt stay competitive internationally, as well as linking scientific research to technological and economic development and cooperating with civil society institutions.

Building on the success of the partnership with STDF, the **British University in Egypt** joined the LIF programme as an additional partner for one year in 2019.

Newton-Mosharafa Fund

Gamal Ammar, LIF5

39

LIF participants supported

Case study

Irene Fahim

Egypt, LIF5 participant 2018/19

Coflastic
Durable and low-cost biodegradable plastic from agricultural waste

Plastic pollution is a global issue. In 2016, over 320 million tons of plastic was produced worldwide – a figure set to double by 2034.

In many developing countries, such as Egypt, the move towards sustainable alternatives is rarely considered due to the high cost of implementing such policies. With this in mind, Irene Fahim and her team developed Coflastic, a low-cost biodegradable plastic made from agricultural and food waste, supported by the LIF programme.

It maintains the same properties as its synthetic counterpart – durable, flexible, and hygienic – and can be used to form craft products, food packaging, and homeware.

Plastic waste is often dumped in landfill, where it takes up valuable space and can cause serious damage to the environment and our health. Coflastic reduces the risk to the environment by reducing greenhouse gas emissions and soil contamination.

“The LIF programme was instrumental in helping my project reach new heights.

I worked closely with my mentor, engaging with plastics manufacturers and conducting market analysis, to fully understand the plastics supply chain in Egypt and find potential investors.”

India

CIIE
BUILT AT IIMA

The LIF programme has been running in India since 2014. In India, LIF is partnered with the **Centre for Innovation Incubation and Entrepreneurship (CIIE)**.

CIIE helps entrepreneurs turn ideas into viable businesses by incubating, accelerating, mentoring and funding innovative startups.

It supports the entrepreneurial landscape of India through initiatives that have attracted and supported businesses in various sectors, including incubators, accelerators, seed investments and publications.

Newton Fund in India:

The collaboration between the UK and India under the Newton Fund is known as the Newton-Bhabha Partnership, which was established in 2014.

It is a major bilateral initiative for facilitating research and innovation collaborations between two countries. It aims to address global challenges through collaborative efforts and brings world-class excellence together from both countries.

Newton-Bhabha Fund

Pankaj Parashar, LIF5

“The LIF programme included lots of great advice around the nuances of running a business, but also gave my project international credibility, which provided me with the confidence to continue down this path.”

Pankaj Parashar, LIF5

Innovation spotlight

Siddhant Tarawala has created a unisex pocket urinal that turns urine into a hygienic, odourless, non-liquid state. The urinal can be used in a wide range of scenarios including humanitarian emergencies and for people with limited mobility.

- Environment, medical and health

Hexpressions is a low-cost, modular housing system designed by **Abhimanyu Singh**, which uses honeycomb paper composite panelling as a replacement for traditional construction materials.

- Civil, environment, manufacturing and design

Soumalya Mukherjee has created a portable cold storage unit that reduces waste in the food supply chain and allows rural farmers in India to efficiently transport their produce.

- Agriculture and food, environment, medical and health

Clockwise from left: Soumalaya Mukherjee’s cold storage unit; Abhimanyu Singh, LIF5; Siddhant Tarawala’s innovation Peeschute.

96

LIF participants supported

Indonesia

RISTEK-BRIN

The LIF programme has been running in Indonesia since 2016 in partnership with **Ristek-BRIN**, a merger of two institutions – the Directorate General of Higher Education and the Ministry of Research and Technology.

Ristek-BRIN coordinates private and state universities, the Private University Coordinator (KOPERTIS) and other government agencies.

“LIF enabled me to develop as a leader. It provided me with tools and skills to measure performance and plan for business growth, as well as enabling me to lead, inspire my team and improve their performance.”

Farhaniza Farhan, LIF5

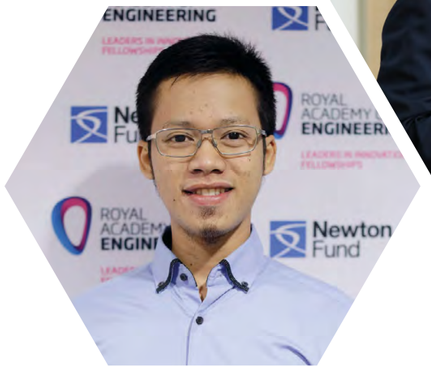
Innovation spotlight

Puffer is a device created by **Septian Suryo** to clean seawater or grey water, which has been used to provide clean water to coastal communities in Indonesia.

- Civil, environment

Ferry Sugandhi has created an aquaculture crowdfunding platform – **inFishta** – which provides equitable access to finance for fish farmers.

- Systems and computing, agriculture and food



Left: Ferry Sugandhi, LIF5
Middle: Septian Suryo and **(right)** his innovation, Puffer.

57

LIF participants supported

80%

of LIF participants

said the programme was very important to their personal development

Case study

Yolla Miranda

Indonesia, LIF6 participant 2019/20

PT. Sainsgo MASKIT
Carbon fibre face masks

Indonesia has the third highest rate of pollution and the second highest rate of tuberculosis – an airborne disease – in the world.

Combined with the COVID-19 crisis, the national demand for face masks is higher than ever. The LIF programme helped Yolla Miranda to adapt the resources and expertise of her company, Sainsgo Karya, to manufacture face masks that will help people breathe easier and live longer.

Yolla's industry-leading MASKITs have activated carbon-fibre filters with a nano-silver coating. The activated carbon side absorbs pollutants, including particulate matter and volatile organic compounds, while the silver nanoparticles act as antibacterial and antiviral agents.

They are used in more than 10 hospitals for doctors and nurses on the frontlines of the pandemic, as well as being available to commuters, contractors and patients.

With current manufacturing capacity at 100,000 masks per month, they are being rolled out in Indonesia, with plans to expand across Asia.

"Resilience was one of the key topics in the LIF6 residential training. Exactly one week later, the first COVID-19 case arose in my country. Many suppliers closed, unable to meet the higher demand for face masks.

I adapted my business model to be able to meet that demand and help my country. That resilience is something I would not have had without the LIF programme."

Jordan

المجلس الاعلى للعلوم والتكنولوجيا
صندوق دعم البحث العلمي والتطوير في الصناعة
Industrial Research and Development Fund

The LIF programme launched in Jordan in 2019 is delivered in partnership with the **Industrial Research and Development Fund (IRDF)** affiliated to the Higher Council for Science and Technology.

The IRDF aims to bridge the gap between industry and academia, promote innovation, enhance the competitiveness of national industries, and develop the capacity of Jordanian researchers. It was established in 1994 and operates under the Higher Council for Science and Technology, a national entity established to help integrate research and development and science and technology into the Jordanian economy.

Newton Fund in Jordan:

The Newton Fund in Jordan has been named the Newton-Khalidi Fund in honour of the Jordanian biochemist Dr Usama al-Khalidi who dedicated his life to teaching generations of scientists and medical students across the Arab world.

Newton-Khalidi Fund

Bayan Al-Btoush, LIF6

“The greatest value has been building relationships with fellows and individuals. Some of them have translated into personal friendships and others into professional relationships which have a high value for us.”

Bara Wahbeh, LIF6

Innovation spotlight

Saeed Albawab’s company **Green On** makes Life Cells, building bricks to create vegetation walls in households and back gardens.

- Environment, biotechnology and bioengineering

Feras Kafiah has developed **SmartCure,** a blanket used in the construction field to improve the speed and efficiency of the concrete curing process.

- Civil, manufacturing and design

Bara Wahbeh’s innovation, **AKYAS**, is a decentralised toilet that provides sanitation using no water, energy or pre-existing infrastructure and converts human waste to safe soil fertiliser in two days.

- Environment, chemical and process

Clockwise from left:
Feras Kafiah, LIF6;
Saeed Albawab, LIF6;
Bara Wahbeh’s innovation AKYAS.

separate store treat transform
akyas

14

LIF participants supported

Kenya

Kenya National Innovation Agency

Since 2017, the LIF programme has been running in Kenya in partnership with the **Kenya National Innovation Agency (KENIA)**. KENIA is established under the Science, Technology and Innovation (STandI) Act of 2013.

KENIA performs various functions, which include:

- supporting commercialisation of innovations and research outputs across all sectors of the economy
- scouting for and nurturing innovative ideas
- recognition and motivation of innovators through an award system for innovations
- increasing awareness of intellectual property among innovators
- engaging and partnering with universities, innovation hubs and incubation centres for purposes of nurturing innovators and entrepreneurs.

Newton Fund in Kenya:

The partnership between the UK and Kenya is known as the Newton-Utafiti Fund. 'Utafiti' is a Swahili word that means 'research'. The Fund in Kenya is administered in partnership with the Kenyan Ministry of Education.

Newton-Utafiti Fund

Samwel Kimani Mwaniki, LIF5

"My LIF mentor helped me to identify different funding sources, so that we are not relying solely on government grants. This means our project is much more sustainable and we can grow our business faster."

Joy Nyawire Riungu, LIF5

Innovation spotlight

Tambua is an app designed by **Levit Nudi** that uses barcode, QR code and location tracking technology to help consumers verify authenticity of products before buying them.

- Systems and computing, communications

Jack Oyugi has produced an affordable, high-value protein for livestock feed from water hyacinth, an invasive weed that covers nearly 70% of Kenya's lakes.

- Agriculture and food, biotechnology and bioengineering

Catherine Wanjoya's business, **Silmak Agencies**, produces end-to-end menstrual health products and services, including eco-friendly sanitary pads and home incinerators to dispose of the waste.

- Environment, medical and health

Clockwise from right:
Peter Mwangi LIF5;
Jack Oyugi's high-value protein;
Catherine Wanjoya, LIF6.

44

LIF participants supported

Case study

Kevin Mureithi Maina

Kenya, LIF5 participant 2018/19

Eco Blocks and Tiles
Sustainable construction blocks and roofing tiles

Over the last six decades, over eight billion tons of plastic has been produced worldwide, but only 9% is likely to have been recycled. The vast majority of plastic waste accumulates in landfills, polluting the natural and urban environment. With LIF's strategic business support, Kevin and his team developed Eco Blocks and Tiles, manufacturing environmentally friendly building materials from plastic waste.

The construction blocks and roofing tiles are better value than commercially available solutions such as clay and concrete, as they are lighter, more durable and enable clients to save up to 40% in timber trusses.

The company has also created job opportunities for young people and unofficial waste collectors in Kenya, engaging them in the principles of circular economy and building their capacity to create sustainable alternatives themselves. This not only alleviates some of the local demand for construction materials, but also Kenya's reliance on imports from other countries.

"I am passionate about solving urban issues with principles of circular economy and sustainability.

These practices are not widely applied in Kenya, and I've seen so much of our waste thrown away when it has a lot of potential to be reused and recycled – it shouldn't have to be that way."

Over 300

new partnerships reported by LIF participants to date

Malaysia

MIGHT
Malaysian Industry-Government Group for High Technology

The LIF programme has been running in Malaysia since 2016 in partnership with the **Malaysian Industry-Government Group for High technology (MIGHT)**.

MIGHT is a think-tank that plays a key role in developing Malaysia's high technology for business through its private-public consensus building and business nurturing platforms. It is an organisation built on the strength of public-private partnership with more than 80 local and international members from industry, government and academia.

In 2018, the Royal Academy of Engineering partnered with MIGHT to deliver the Leaders in Innovation Accelerator, an investment-readiness programme for Malaysian LIF alumni.

Newton Fund in Malaysia:

The Newton Fund is known as the Newton-Ungku Omar Fund in Malaysia. It is named after a well-known Malaysian scientist, Professor Datuk Dr Ungku Omar Ungku Ahmad, to commemorate his contribution to medical and health sciences research, which improved the health of the population, including eliminating malaria among poor and marginalised communities in Malaysia.

Newton-Ungku Omar Fund

Norziana Jamil, LIF5

"LIF helped us improve the focus of the innovation and gave us a better understanding of the market need and demand."

Fatimah Ibrahim, LIF4

Innovation spotlight

Rahinah Ibrahim's **Oceanori** is a support programme for coastal communities that incentivises and funds the use of wastewater treatment technology to clean up oceans and water sources through income from improved seaweed quality.

- Environment, agriculture and food

Azah Anir Norman has created a mobile-based content verifier to alleviate misinterpretation of content from the Quran shared on social media.

- Systems and computing, communications, education

Che Fai Yeong's innovation is a portable rehabilitation robot to help stroke patients recover through physiotherapy training at home to regain functional movement.

- Systems and computing, medical and health, biotechnology and bioengineering

Clockwise from left:
Rahinah Ibrahim's Oceanori;
Azah Anir Norman, LIF5;
Che Fai Yeong, LIF4.

60

LIF participants supported

Mexico

ECONOMÍA
SECRETARÍA DE ECONOMÍA

redOTT México

The LIF programme is supported by the **Mexican Ministry of the Economy.**

It has been running in Mexico since its inception in 2014, where it works in partnership with Red OTT (Mexican Technology Transfer Offices network). Red OTT is a national organisation with the goal of creating spaces of collaboration and participation for technology transfer offices and professionals since 2012.

“The training I received helped me to develop a new vision for my project and generate new important collaborations.”

Constantino III Roberto Lopez Macias, LIF5

Andrea Siller, LIF5

Innovation spotlight

RECOPAD is a urine sample collection device created by **Andrea Siller Gonzáles** for dependent patients. It is able to take a viable urine sample in a comfortable, effective, and non-invasive way.

- Medical and health, biotechnology and bioengineering, manufacturing and design

Constantino III Roberto López Macías has developed nanoparticles that improve a vaccine’s capacity to protect against important global diseases induced by the bacteria from the genus Salmonella.

- Medical and health, chemical and process, biotechnology and bioengineering

DermaGene is a pharmaceutical cream formulation created by **José Manuel Aguilar Yañez** for healing epithelial wound. The active ingredients prevent infection, promote cell division and migration, and the formation of new blood vessels.

- Medical and health, chemical and process, biotechnology and bioengineering

Clockwise from left:
Andrea Siller Gonzales’ RECOPAD;
Constantino Lopez Macias, LIF5;
Jose Manuel Aguilar Yanez.

117

LIF participants supported

Peru

The LIF programme has been running in Peru in partnership with the **National Council of Science, Technology and Technological Innovation (CONCYTEC)** since 2018.

CONCYTEC is the national institution that leads the science and innovation system in the country, bringing together academia, industry and business, communities, and civil society. It aims to regulate, position, promote, coordinate, supervise and evaluate research and technology development projects from public institutions, universities, social organisations, and private sector.

CONCYTEC works to build research and innovation capacity with a focus on goods and services that Peru can produce and – where possible – export in line with the National Plan for Science and Technology for Competitiveness and Human Development (PNCTI) 2006 to 2021.

Newton Fund in Peru

The Newton Fund in Peru is called the Newton-Paulet Fund to celebrate the Peruvian scientist and inventor Pedro Paulet who is credited with building the first liquid-fuel rocket engine in 1895.

Aldo Ruiz Bustos, LIF6, ICP

“For me it was so valuable to have the community. Sometimes in my work I feel I am inside a closed group surrounded by people all doing the same thing. It’s valuable to talk to people from other countries and other fields.”

Innovation spotlight

Miguel Malnati’s technology, **Life Cover**, is a natural, edible and biotechnological solution that improves the shelf life of post-harvest fruits to reduce waste and pollution.

- Environment, biotechnology and bioengineering, agriculture and food

Monica Alexandra Chavez Llancay has created **Tiscart**, a marketplace that empowers artisans to connect with large B2B buyers, giving them an opportunity to sell internationally and grow.

- Systems and computing

SaferLab is a novel system for monitoring newborn babies’ feeding behaviour, designed by **Paulo Vela**.

- Electronics and sensors, medical and health, systems and computing

Clockwise from left: Miguel Malnati, LIF5; Enzo Fernando Monica Alexandra Chavez Llancay, LIF 6; Paulo Vela’s innovation SaferLab.

29

LIF participants supported

I often get asked how my career took off and how I have managed to get this far; without doubt it started at the Royal Academy of Engineering in the UK.

They supported me every step of the way to understand that we are leaders in innovation, we must seek the greatest social impact and that nothing is impossible.”

Case study

Enzo Fernando Romero

Peru, LIF5 participant 2018/19,
LIF Advance participant

Giving a Hand

Affordable and bespoke hand prostheses

Prosthetic solutions are out of reach for many of the 2.4 million amputees living in developing countries. With the help of the LIF programme, Giving a Hand was consolidated.

The company creates personalised hand prostheses and aims to make solutions more affordable to those who need it. By taking advantage of digital manufacturing techniques, its custom prostheses are manufactured 75% faster than current processes and sold at a third of the price of other commercially available prostheses.

Accessible solutions are incredibly important for those who earn less than the minimum living wage and do not have the insurance or funds to cover the high cost of basic prostheses.

Physical injuries can also be detrimental to patients’ socio-economic wellbeing as they cannot return to work with an injury. The restored mobility offered by its mechanical and myoelectric models help patients to reintegrate into the workforce and regain their ability to support their families.

My experience at LIF was extremely valuable in shaping my business to what it is now.

I thoroughly enjoyed being in an environment with other researchers who were also interested in entrepreneurship as a path to real change, and we learned a lot from each other as well as the trainers.”

Philippines

Elmer Jose Pamisa Dadlos, LIF5

The LIF programme has run in the Philippines since its inception in 2014 in partnership with the **Department of Science and Technology (DOST)**.

As the premier science and technology department of the Philippines, DOST provides leadership, central direction, and coordination for all scientific and technological initiatives, policies, and programmes to sustain national development. DOST is also tasked with developing local capability for the Philippines to achieve technological self-reliance, as well as encouraging greater private sector participation in research and development.

With funding support from DOST, the Asian Institute of Management (AIM) provides LIF fellows with complementary training and support in taking their commercialisation plan forward, alongside the LIF follow-on support.

Newton Fund in the Philippines:

The partnership between the UK and the Philippines is called the Newton Agham Fund. Agham is the Filipino word for science.

Newton Agham Fund

“Aside from the technical learning I got from LIF, it’s really the community that has had a huge impact on me.”

Innovation spotlight

Pamela Tadeo produces an affordable, locally available and sustainable alternative protein source for swine, poultry, and aquaculture from coconut oil production by-products, reducing agricultural waste.

- Environment, biotechnology and bioengineering, agriculture and food

Romualdo Martinez has created a solar dryer system with a biomass furnace for drying coffee and other agricultural products, creating a more environmentally sustainable production and export system.

- Environment, energy and power, agriculture and food

LAPARA, **Nilo Bugtai**’s innovation, is an affordable robotic surgical device designed for highly precise and specialised operations.

- Biotechnology and bioengineering, manufacturing and design, medical and health

Clockwise from left: Pamela Raye Mislos Tadeo, LIF5; Romualdo Martinez’s solar dryer system.

ASIAN INSTITUTE OF MANAGEMENT

91

LIF participants supported

South Africa

technology innovation AGENCY
Innovating Tomorrow Together

The LIF programme has been running in South Africa since 2014, in partnership with the **Technology Innovation Agency (TIA)**, an initiative of South Africa's Department of Science and Technology.

TIA was established in 2008 with the objective of enabling and supporting technological innovation across all sectors to support positive socio-economic development, improve the quality of life for South Africans, and enhance the country's global competitiveness.

"The LIF programme gave me a strong foundation as a young entrepreneur. The opportunity given to me to share my challenges, aspirations, weaknesses, and strengths with the group was a huge boost to my confidence."

Khutso Bapela, LIF2

Khaya Cokoto, LIF5

Innovation spotlight

Mareka Mokoena is developing an affordable, quick and simple treatment for cataracts using eye drops produced from plant extracts.

- Medical and health, biotechnology and engineering

Bernard Naude's company **Aegis Environmental** provide food waste management services, separating waste at the source and converting food waste into nutritious animal feed, recovering nearly 70% of water content.

- Environment, agriculture and food

Khaya Cokoto has created a platform that allows users to make phone calls for free on any network, paid for using advertising revenue.

- Systems and computing, communications

Clockwise from left:
Mareka Mokoena, LIF5;
Bernard Naude's company Aegis Environmental

86

LIF participants supported

Thailand

The LIF programme has been running in Thailand since 2014. Its partners are **Thailand Science, Research and Innovation (TSRI)** and the **National Science and Technology Development Agency (NSTDA)**.

TSRI operates as an independent organisation under the Ministry of Higher Education, Science, Research and Innovation, which works to empower the nation's science, research and innovation (SRI) system through policy, funding, and facilitating domestic and international collaboration.

NSTDA was established in 1991 under the National Science and Technology Development Act 1991. The agency is affiliated with the Ministry of Higher Education, Science, Research and Innovation, and has been working to accelerate science, technology and innovation development in Thailand.

NSTDA responds to the needs of the industry, aims to enhance the country's competitiveness in the global economy, and contribute to Thailand's economic and social development.

Katawut Namdee, LIF5

"My experience at LIF encouraged me to become an entrepreneur. The business skills we learned and networking opportunities along the way have proven to be invaluable. They have given me the courage to create my company and I am proud of where we are now."

Boonrat Lohwongwatana, LIF2

Innovation spotlight

Through synthetic biology, **Pimchai Chaiyen** has found a sustainable solution for turning waste into value, helping the waste management industry in Thailand.

- Environment, energy and power

Boonrat Lohwongwatana's innovation **Meticuly** is a bespoke implant service for orthopedic, neuro and reconstructive surgery in Thailand by using predictive design, biomechanic simulation and 3D printing techniques.

- Medical and health, biotechnology and bioengineering

Nalinee Kovitwanawong has created **DRN Medigel**, which uses bacterial luciferase as a gene report to create a latex polymer gel to prevent pressure ulcers.

- Medical and health, chemical and process, biotechnology and bioengineering

Clockwise from left:
Pimchai Chaiyen, LIF3;
Wirulda Pootakham's innovation HybridSure.

90

LIF participants supported

Case study

Wirulda Pootakham

Thailand, LIF5 participant 2018/19

HybridSure – DNA-based plant paternity test

Hybrid vegetable seeds with desirable characteristics are produced by crossing two very good parental varieties.

Seed production companies make sure that the hybrid seeds that they are selling came from the intended parents, and that the plants will have the desired characteristics.

Wirulda Pootakham created a ‘plant paternity test’ – HybridSure – which enables seed production companies to assess the genetic purity of hybrid seeds faster than traditional methods. Using DNA marker technology, the companies can be sure that only high-quality hybrid seeds make it to the market.

A conventional approach to seed purity testing is a ‘grow-out’ test. This process is extremely time-consuming and not very accurate. The use of DNA markers (called marker-assisted breeding) helps shorten each selection cycle, enabling a rapid development of a new elite cultivar.

The conventional seed purity testing approach takes six months to a year, while the HybridSure technology can perform the same test within two to three days.

> “LIF took me from being frightened about being an entrepreneur to actually becoming one”

Turkey

TÜBİTAK

Katip Çelebi Newton Fund

Mustafa Kahraman, LIF5

The LIF programme has been running in Turkey since 2015, in partnership with **Scientific and Technological Research council of Turkey (TÜBİTAK)**.

TÜBİTAK is the leading agency for management, funding and conducting research in Turkey. It was established in 1963 with a mission to advance science and technology and support Turkish researchers. TÜBİTAK is responsible for promoting, developing, organising, conducting and coordinating research and development in line with national targets and priorities, which they do through policy, supporting research and development institutions, implementing private and public sector support programmes, and publishing a wide range of journals, magazines and books.

Many of the Turkish LIF participants come to the programme through TÜBİTAK's Tech-entrepreneur support programme (BiGG), which aims to foster the emerging technology-based entrepreneurship ecosystem in Turkey. Working with accelerators across the country, the programme encourages and supports entrepreneurs to rapidly commercialise technological inventions and enter the market.

Newton Fund in Turkey

The collaboration between the UK and Turkey is called the Newton-Kâtip Çelebi Fund, named in honour of the celebrated Ottoman-Turkish encyclopaedist Muṣṭafa ibn 'Abd Allāh who was generally known as Kâtip Çelebi (the Gentleman Scribe).

"The LIF training was the best in my entrepreneur adventure because of the great networks I built with the amazing mentors and other entrepreneurs."

Asiye Aksense, LIF4

Innovation spotlight

Asli Zulug has created **PACHA**, a tasty and affordable crisp, made up of collagen and protein with no preservatives to provide a healthy snack with a long shelf life.

- Agriculture and food, manufacturing and design, medical and health

Devrim Pesen Okvur has created a lab-on-a-chip device for drug discovery, helping to reduce lab and fabrication costs at least 10-fold.

- Medical and health, biotechnology and bioengineering

Asiye Karakullucu has developed an innovative diagnosis system for early and rapid diagnosis of hospital-acquired infections, preventing infections from progressing in the patient and spreading, leading to a decrease in infection mortality rates and cost savings for hospitals.

- Environment, transport and infrastructure

Clockwise from left:
Asili Zulug's innovation PACHA; Devrim Pesen Okvur's lab-on-a-chip device; Asiye Karakullucu, LIF4.

68

LIF participants supported

Vietnam

The LIF programme has been running in Vietnam since it began in 2014. The programme is currently being delivered in partnership with the **Vietnam Academy of Science and Technology (VAST)**.

Previous cycles of the LIF programme have been supported by the **National Agency for Technology Entrepreneurship and Commercialisation (NATEC)**.

Under the Vietnamese Ministry of Science and Technology, NATEC has an advisory role to develop the technology market and support the establishment and development of technology enterprises in Vietnam.

NATEC also promotes science and technology commercialisation through training, mentoring, and funding programmes.

Newton-Viet Nam Fund

“Through LIF I learned the power of networking. Before this programme I only thought about the Vietnamese market, and now I am thinking globally.”

89

LIF participants supported

Case study

“As a biochemist working closely with infectious disease physicians, I have seen many patients dying of sepsis without knowing why.

I wanted to invent better therapies for patients, so we can give them the proper care they need.”

Ngo Tat Trung

Vietnam, LIF4 participant 2017/2018

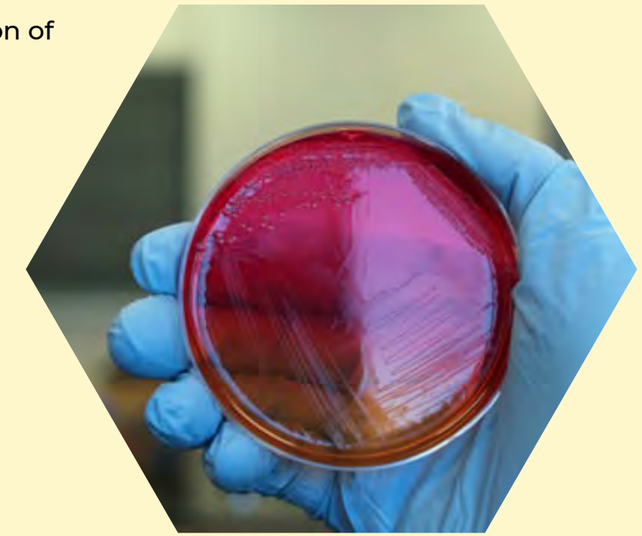
Sepsis@Quick-diagnosis

Diagnosis kit for faster detection of sepsis-associated pathogens

Sepsis is a life-threatening illness caused by an immune system’s response to infection. It affects over 30 million patients annually.

It can rapidly progress to septic shock and mortality, and early diagnosis and treatment is essential to a successful recovery. With business support from the LIF programme and sponsorship from **ST&ST Light**, Ngo Tat Trung developed Sepsis@Quick, a diagnostic kit that can identify sepsis-causing bacteria quicker and more accurately than traditional means.

Conventional blood culture diagnosis is a time-consuming method that can cause delays in treatment. Yet, it is often used in clinical practice because of the lack of reliable alternatives. Sepsis@Quick combines human DNA removal with polymerase chain reaction based techniques to detect several pathogens associated with sepsis.



The team’s studies have shown that this diagnostic tool is not only much faster, receiving diagnosis in less than five hours, but also less influenced by external factors – such as previous antibiotic treatment – significantly reducing sepsis-related mortality.

Conclusion

Since the LIF programme started in 2015, I have seen it grow from working with eight partner countries in its first year to 17 partner countries at present.

The programme now supports a global community of over 1,000 innovators who are delivering tangible impacts through the creation of new jobs and securing further funding. This global community shows that there is real potential to form lasting connections, collaborations and partnerships.

The Academy values these global partnerships, which enable us to work together to solve some of today's biggest challenges.

Our close collaboration on the LIF programme enables us to support excellent researchers and entrepreneurs to develop and bring to market innovations that advance this objective and deliver impact and value to communities around the world.

As we celebrate the programme's work over the last five years, it is the perfect opportunity to reflect on what we have learned, how we can continue to grow the valued partnerships we have developed, and how we can ensure that engineering and innovation continue to be key contributors to the global drive towards a more sustainable future.

Dr Hayaatun Sillem CBE
CEO of the Royal Academy of Engineering

The scale and ambition of the LIF programme is extraordinary.

None of the incredible achievements of the last five years would be possible without the Academy's Fellowship, a team of experts, many of whom volunteer their time, and a dedicated staff. Thank you. And to the incredible alumni of entrepreneurs, we are proud to work with you, and will continue to champion and enable your growth and impact in the years to come.

Mahmoda Ali
Senior Manager, Entrepreneurship for Development

“The LIF programme has allowed individuals embarking on what is commonly known as ‘the lonely journey of entrepreneurship’ to connect to their peers locally and nationally through the Academy. This connection relies on meeting and interacting with like-minded individuals and feeling empowered to make a sustainable positive impact on pressing global challenges.”

Acknowledgements

A valued network of individuals and partner organisations support and work with the Academy to deliver the LIF programme, each bringing something special to the LIF Community.

We would like to extend our gratitude to Academy Fellows, judges and reviewers, and in-country organisations and Newton Fund teams for their ongoing support.

The Academy has worked with five training and mentoring providers to deliver the LIF programme since its inception in 2015, and would like to acknowledge the contribution and support of the trainers, mentors and coaches who have helped the LIF participants develop their skills, knowledge and potential as entrepreneurs.

Oxentia
(LIF1 to 6)

Oxentia works in partnership with individuals and teams to build capacity, develop capability and create opportunities to enable innovation. Oxentia started life as an operating division of Oxford University Innovation, the University of Oxford's technology transfer company.

Since 2004 Oxentia have supported and empowered clients in over 70 countries.

Source
(LIF1 to 3)

Source Institute is a global network, dedicated to peer-to-peer learning for startups.

Its work is recognised all over the world, from Leancamp and Village Accelerator to The Sources.

Source Institute educates, it doesn't just teach. Its focus is on developing peer-to-peer education that stays relevant in our fast-changing world.

FarStar
(LIF4 to 6)

Farstar is a company with a network of seasoned, values-driven entrepreneurs who believe positive change is possible.

It engages in venture development, education, and international development programmes with a focus on nurturing entrepreneurial ecosystems, innovation and stimulating research activities leading to products on the market that bring social good.

The international team is based across seven countries and hold substantial business experience in more than 25.

Shine Consortium
(LIF6)

Many great ideas and technologies do not fulfil their innovation potential. Shine supports the growth of innovators and entrepreneurs across the world through bespoke education, mentoring, and innovation ecosystem-building.

Shine is a consortium specialising in commercialisation training, mentoring and community development and includes the University of West of England, ChangeSchool and Mowgli Mentoring. The partners have delivered entrepreneurship and mentoring programmes in 37 countries and have broad experience in designing, managing and delivering international development and learning programmes.

SETsquared
(LIF Advance)

SETsquared is a unique enterprise partnership and a dynamic collaboration between the five leading research-led UK universities: Bath, Bristol, Exeter, Southampton and Surrey.

Ranked as the global number one business incubator, it provides a wide range of highly acclaimed support programmes to help turn ideas into thriving businesses.

The LIF steering committee

The Royal Academy of Engineering brings together the most talented and successful engineers, in business and academia – our Fellows – to advance and promote excellence in engineering for the benefit of society.

The Academy's Fellowship has supported the LIF programme since its launch, from their active participation in pitching events, panel reviews for selecting LIF cohorts, and helping us to expand our networks and generate opportunities for the LIF community.

There are many other individuals and organisations who have helped us build this community and without their contributions and a collaboration-first approach, we would not have achieved the impact we have made to date. We take this opportunity to acknowledge and thank all who have contributed over the years and will continue to do so in the future.

Our current steering committee bring expertise and experience from across the UK innovation ecosystem. They have helped us steer LIF through the years and set a strategic vision for the future.

Professor Norman Apsley OBE FREng, Chair

Professor Norman Apsley OBE FREng is former Chief Executive Officer of Catalyst in Belfast, formerly known as the Northern Ireland Science Park, and Director of Electronics in the Defence Evaluation and Research Agency (now split between QinetiQ and DSTL). He also served the Northern Ireland government as a board member of various groups, formal and informal, advising on science and innovation. Professor Apsley chairs the steering group for a combined university, industry and government project that seeks to establish a major centre in support of innovative manufacturing in Northern Ireland.

Professor Roger Benson FREng

Professor Roger Benson FREng has had over 40 years in industry with Imperial Chemical Industries (ICI) as Chief Engineer Technology and Head of the Global Control / Electrical Function and ABB. In addition, he was a Visiting Professor at Imperial College, Newcastle and Teesside universities and a judge for the UK Best Factory Awards. This involved visiting and benchmarking over 200 of the best UK manufacturing plants.

Ms Priya Guha MBE

Priya is a Venture Partner at Merian Ventures, investing in women-led innovation, a member of the Innovate UK Council, non-executive director at the Digital Catapult & GB Badminton and Adjunct Faculty at the Ashridge Hult Business School. She was previously General Manager for RocketSpace, launching their UK operations. Priya was a career diplomat, as British Consul General to San Francisco and previously in India and Spain. She is on the Althea Foundation Board, Tech London Advocates Advisory Board. She chairs the Board of Trustees of Modern Muse and is an Advisor to The Youth Group. Priya was recently named in the 2020 Top 50 Most Influential Women in Technology for the third year running.

Professor Michael Lowe FREng

Professor Michael Lowe FREng is the Head of the Department of Mechanical Engineering at Imperial College London. He is a founding Director of Guided Ultrasonics Ltd, a spin-out company that was set up in 1999 to commercialise the outputs of research in ultrasonic guided waves. Since 2003, he is a founding board member of the UK Research Centre in Non-Destructive Evaluation.

Professor Jacqui Murray

As Deputy Director of the £318 million Faraday Battery Challenge, Jacqui helps lead government investment into the research, innovation and commercialisation ecosystem that is establishing the UK as centre of battery science and manufacturing. Named as one of Autocar's Top 100 Women in Automotive based on Seniority and Influence and a Visiting Professor (University of Leicester) in 2020.

We also thank historic members of the LIF steering committee:

Ana Avaliani, Elspeth Finch MBE, Professor Florin Udrea FREng, Janet Geddes, Dr Jessica Stacey, Professor Nigel Brandon FREng, and Paul Bermester.

About the Newton Fund

The Newton Fund builds research and innovation partnerships with 17 active partner countries to support their economic development and social welfare, and to develop their research and innovation capacity for long-term sustainable and equitable growth.

By fostering world-class collaborations between academics and innovators in the UK and developing countries, it aims to address critical development challenges including: poverty, access to healthcare, climate change, and peace and security.

As well as growing the research and innovation capacity of developing countries, the programmes it funds contributes to the continued strength of the UK's research and innovation system, and support our wider prosperity and global influence.

The Newton Fund was launched in 2014 and originally consisted of £75 million each year for five years. In the 2015 UK Spending Review it was agreed to extend the Newton Fund from 2019 to 2021 and double the investment, leading to a £735 million UK investment up to 2021, with partner countries providing matched resources within the fund.

The Newton Fund is managed by the UK Department for Business, Energy and Industrial Strategy (BEIS) and delivered through seven UK delivery partners and 87 in-country funding partners.

Newton Fund

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Mr Malcolm **Brinded CBE FREng**
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Cheng	Shuyi	LIF2
Dr Baodong	Wang	LIF2
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