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Nathu Puri Institute for Engineering and Enterprise

Annual Report 2021

Executive summary

Over the past year we have all continued to be impacted by the COVID-19 pandemic that has resulted in disruption and challenges across many aspects of our lives. In this context, the Nathu Puri Institute for Engineering and Enterprise at London South Bank University has continued to strive towards achievement of long-terms goals through delivery of operational activities and as part of the overall strategy of the institute. This has included delivery of our work across the education, research and knowledge exchange aspects of engineering and enterprise. The institute has also substantially increased its international reach and global presence through a range of research collaborations and other knowledge exchange activities.

In terms of the research activities of the institute, Dr. Paul Mansell successfully completed his doctoral research study and passed the PhD viva examination. Paul's research has substantially improved our understanding of how to measure sustainability impact for infrastructure projects and the study has continued to generate publications. Pavan Kumar Sala has completed his major phase of data collection for his doctoral research project through interviewing 57 entrepreneurs from high-tech start-up companies and has presented his findings at international conferences. Moreover, Prof. Philbin completed the supervision of four MSc in Mechanical Engineering research projects that involved the techno-economic assessment and numerical modelling of various renewable energy systems in Kuwait and Nigeria.

In regard of other research highlights, Prof. Philbin has continued with his international research collaborations with leading academic groups from the Pontifical Catholic University of Paraná (PUCPR) in Brazil, Chang'an University in China, University of Johannesburg in South Africa and Bahria University in Pakistan. In the case of the collaboration with the University of Johannesburg, Prof. Philbin was awarded joint funding from the Royal Academy of Engineering and the Newton Fund as part of the Engineering X – Transforming Systems through Partnership Programme. The research project is investigating how SMEs (small and medium-sized enterprises) from the food and beverage sector undergo the process of digital transformation and is a collaboration with

Prof. Arnesh Telukdarie from the University of Johannesburg.

The various research studies have resulted in a further strong year of research dissemination and academic outputs in terms of published journal papers and conference papers. Furthermore, collaborative research studies have been conducted by Prof. Philbin across a range of areas, including Industry 4.0 and open innovation; techno-economic assessment of renewable energy technologies; sustainable engineering and digital transformation for the infrastructure sector; sustainability assessment for the data centre industry; project management and leadership studies; sustainability risk management; and research on different aspects of engineering education.

In regard to educational activities, the institute has continued to support enterprise and professional skills development across the LSBU School of Engineering. Prof. Philbin has again delivered the Technology Evaluation and Commercialisation module for MSc in Mechanical Engineering students as well as the Technical, Research and Professional Skills module for MSc and final year MEng students from across the School of Engineering. As a Tutor, Sunita Selvarajan supported delivery of the Innovation and Enterprise undergraduate module in the School of Engineering. A particular highlight was that for the second year running, the 'Entrepreneurial Skills for Engineers' online course developed by the NPI team in partnership with the Institution of Engineering and Technology (IET) was incorporated in the module and was supported by Sunita Selvarajan. In the 2020/21 academic year, the online course was completed by 223 students who were each issued with a certificate of completion by the NPI. In the 2021/22 academic year, the online course is being undertaken by a further 231 students from across the School of Engineering. Sunita Selvarajan also supported as a Tutor delivery of the Professional Practice module in the Computer Science and Informatics Division. More recently, Sunita has gained approval from the School of Engineering to launch an innovative new pilot project focused on providing coaching for undergraduate students from different divisions in the School. The project will allow the coaching approach to be trialled in the School of Engineering and further initiatives in this area are planned for the future.

In terms of knowledge exchange, Prof. Philbin presented research studies at different international conferences, including the 2021 American Society for Engineering Management (ASEM) Virtual International Annual Conference and the 15th International Entrepreneurship Educators Conference (IEEC) – Virtual Event. Prof. Philbin gave invited Keynote Presentations at the LSBU Business School Virtual Conference on 'Changing the world; one project at a time!' and at the 3rd International Engineering and Technology Management Summit and Virtual Conference organised jointly by Istanbul Technical University, Bahçeşehir University and the American Society for Engineering Management. Additionally, Prof. Philbin presented at the Technical Symposium of the Middle East HSE and Sustainability Week Virtual Conference organised by the UK Energy Institute and presented a seminar for the ASEM Associate Engineering Manager Training Programme Virtual Event for the Polytechnic University of the Philippines.

In other highlights, Prof. Philbin successfully completed his term as the Past President of the American Society for Engineering Management (ASEM) as part of serving on the Society's Board of Directors for seven consecutive years from 2014 to 2021. Additionally, Prof. Philbin was awarded the Distinguished Faculty designation from the Society of Research Administrators (SRA) International. Prof. Philbin also edited a new book called 'Driving Sustainability through Engineering Management and Systems Engineering' that was published in 2021 by the publisher MDPI.

In conclusion, the NPI team has continued to generate major impact across academic as well as societal and industrial dimensions. This impact is evidenced through the enhanced educational provision in the School of Engineering in regard to enterprise and professional skills development and training. Further impact is evidenced through the many research publications in leading academic journals and through the various presentations at high profile conferences and other events. The NPI team continues to generate value for the School of Engineering through the academic outputs and support provided to different academic divisions in the School. Furthermore, the work of the NPI helps to promote LSBU internationally through the global presence of the institute and its members. Looking ahead, the NPI team is excited to continue with delivery of its overall strategy and tackle new and emerging opportunities as they arise.

Prof. Simon P. Philbin
Director of the Nathu Puri Institute for Engineering and Enterprise
School of Engineering
London South Bank University

Historical background of the institute

The NPI was originally established by LSBU in 2011 following a generous donation by the Puri Foundation in order to embed enterprise in engineering education and industrial practice. This was based on the premise that although engineers require a solid technical foundation for their education and practice, they can also benefit from access to a wider set of enterprise and professional related skills and knowledge. The original intent for the institute that still remains valid was summarised succinctly by Professor Nathu Puri at the institute's launch event as follows: *"Knowledge should be available to future engineers and engineering students so that more of them can break the glass ceiling and become entrepreneurs and our business leaders. Current demands are for engineers with a much wider knowledge base, hence this initiative today"*. The institute was established according to the original vision of the founder, Emeritus Professor Rao Bhamidimarri.

Members of the institute

The institute currently has the following members:

- Prof. Simon P. Philbin, Institute Director
- Mr. Pavan Kumar Sala, Doctoral Researcher
- Ms. Sunita Selvarajan, Project Administrator
- Dr. Safia Barikzai, Affiliated Staff *(LSBU Division of Computer Science and Informatics)*
- Dr. Sara Hasani, Affiliated Staff *(LSBU Business School)*
- Dr. Deborah Andrews, Affiliated Staff *(LSBU Division of Mechanical Engineering and Design)*
- Mr. Thomas Empson, Affiliated Staff *(LSBU Research, Enterprise and Innovation Division)*
- Prof. Jing-xiao Zhang, Visiting Fellow *(Chang'an University, China)*
- Prof. Arnesh Telukdarie, Visiting Fellow *(University of Johannesburg, South Africa)*
- Prof. Riaz Ahmed, Visiting Fellow *(Bahria University, Pakistan)*
- Prof. Fernando Deschamps, Visiting Fellow *(Pontifical Catholic University of Paraná, Brazil)*
- Dr. Saim Memon, Affiliated Researcher *(Department of Engineering and Technology, University of Huddersfield)*
- Dr. Radhakrishnan Viswanathan, Affiliated Researcher *(University of Johannesburg, South Africa)*
- Ms. Firdaous Ennami, Affiliated Researcher *(LSBU Business School)*
- Ms. Dominika Ptach, Affiliated Researcher *(LSBU Division of Mechanical Engineering and Design)*

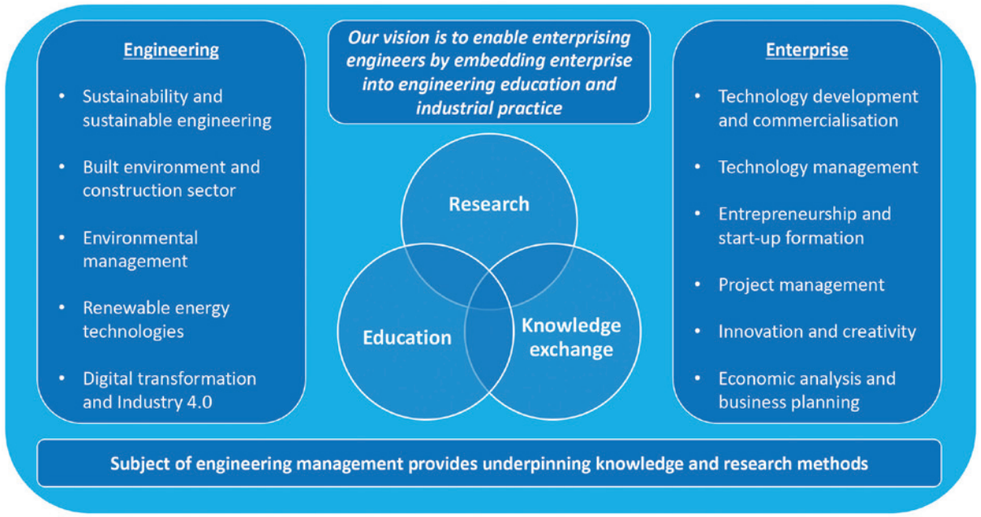
The institute is an integral part of the School of Engineering at LSBU and the Director of the NPI reports to the Dean of the School of Engineering (Prof. Asa Barber).

Strategic profile of the institute

The institute is responsible for providing a programme of work across engineering and enterprise, which includes research, education and knowledge exchange activities (see the figure below). The overall disciplinary focus of the institute is engineering management, which involves a portfolio of activities in areas such as sustainable engineering, technology management and innovation, entrepreneurship, and project management.

The engineering remit of the institute is principally focused on the application and adoption of new technologies and management systems for different engineering applications. This includes the area of sustainability, including application to the built environment and construction sector, environmental management and sustainable engineering as well as different forms of renewable energy systems, such as solar and wind power generation. In terms of the adoption of new technologies, this includes digital transformation as part of the wider Industry 4.0 technological paradigm as well as other forms of technology development.

The enterprise remit of the institute includes technology development and innovation, entrepreneurship and intrapreneurship as well as the development of broader professional related skills and knowledge. This is because being enterprising is not limited to new venture creation but also includes the ability to understand how to develop an idea into a new business area within an existing company. Enterprise also involves understanding how to commercialise research and technology towards new product development as well as the management of engineering projects.



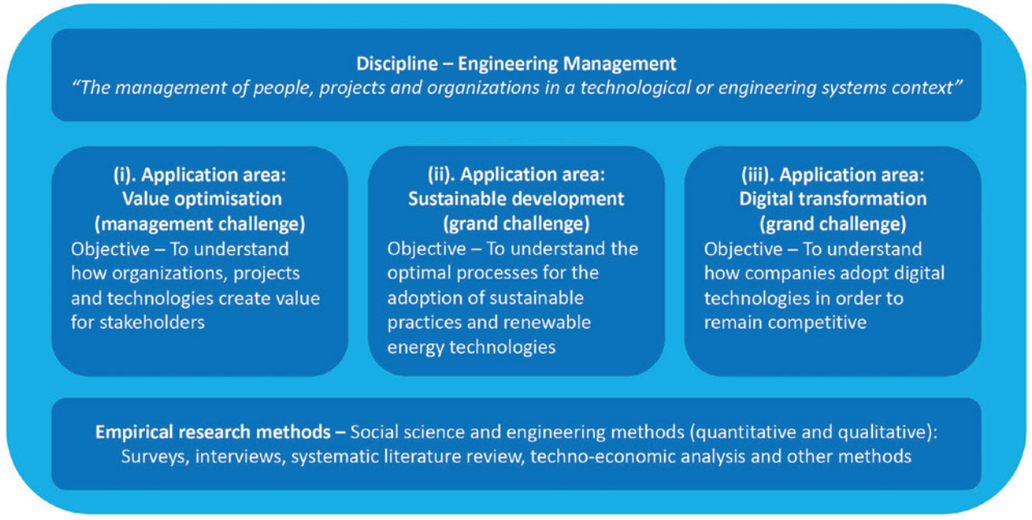
Research strategy of the institute

The research strategy of the institute is focused on addressing both management challenges and grand challenges (see the Figure below). Management challenges relate to the need to improve how organisations and projects utilize people, processes and technology; whereas grand challenges involve fostering innovation in order to address a major societal need. These challenges require the management of complexity as well as technological aspects and the subject of engineering management provides an ideal knowledge base to tackle such challenges. The objectives for the institute's research programme are summarised as follows:

(i). Value optimisation, which is a management challenge focused on understanding how organizations, projects and technologies create value for stakeholders. This application area includes research on entrepreneurial pivoting and the impact of technology; project and risk management; and studies on project leadership capabilities.

(ii). Sustainable development, which is a grand challenge focused on understanding the optimal processes for the adoption of sustainable practices and renewable energy technologies. This application area includes research on environmental management in the construction industry; measuring the sustainability performance of infrastructure projects; and techno-economic assessment of renewable energy technologies.

(iii). Digital transformation, which is a grand challenge focused on understanding how companies adopt digital technologies in order to remain competitive. This application area includes research on open innovation and digital transformation in high-tech industrial companies; and enabling digital transformation for SMEs from the food and beverage sector.



Research projects

Understanding how high-tech entrepreneurs successfully pivot as part of the entrepreneurial journey
Pavan Kumar Sala has been undertaking his doctoral research on understanding how high-tech start-up companies successfully pivot as part of the entrepreneurial journey. The project is supervised by Prof. Simon Philbin and Dr. Safia Barikzai. The research study focuses on the practice of high-tech entrepreneurs to understand how pivoting (i.e. changing direction) has impacted the entrepreneurial journey of start-up companies from the technology sector. The research considers the types of pivots available to a high-tech start-up company and the possible factors that trigger the start-up to pivot. Furthermore, the research is focused on identifying the impact of technology in pivoting through using the technology S-curve model. The qualitative research approach has been employed to understand the phenomenon of entrepreneurial pivoting of tech start-ups, including the type of pivots, factors that cause pivoting and the impact of technology maturity on pivoting. Pavan has conducted fifty-seven interviews with high-tech entrepreneurs from the UK as part of the research study and he is currently writing up his thesis.

Measuring infrastructure projects sustainable development goals impact
Dr. Paul Mansell has completed his PhD on 'Measuring Infrastructure Projects Sustainable Development Goals Impact' and successfully defended his doctoral thesis at the viva examination.

The project was supervised by Prof. Simon Philbin, Dr. Efrosyni Konstantinou (University College London) and Prof. Rao Bhamidimarri (Institute of Advanced Research Gujarat, India). The research sought to address the following question: Does existing infrastructure project measurement capture SDG (sustainable development goal) impact? The research study focused on understanding whether existing infrastructure project measurements capture SDG impact. The research used empirical evidence from a survey of 325 engineering project managers and 40 interviews with leaders from engineering organisations to analyse the current gap in measuring the societal objectives of SDGs at the project level. The development and testing of a theoretical model and proposed methodology were completed with the UK Environment Agency. The findings were further applied to demonstrate wider applicability of the SDG measurement approach across the Environment Agency's £5.2Bn flood prevention portfolio.

Enabling digital transformation for SMEs from the food and beverage sector
Prof. Philbin is involved in a research project with the University of Johannesburg in South Africa to investigate how SMEs (small and medium-sized enterprises) from the food and beverage sector undergo the process of digital transformation. Prof. Arnesh Telukdarie is leading the project from the University of Johannesburg and Dr. Radhakrishnan Viswanathan is the post-doctoral researcher. The project is funded by the Royal Academy of Engineering and the Newton Fund as part of the Engineering X – Transforming Systems through Partnership (TSP) Programme. The objective of the TSP programme is to build engineering teaching, research and innovation capacity with universities from partner countries and enable collaboration between local stakeholders towards meeting complex, interconnected SDG challenges in partner countries and at a global level.

SMEs and in particular those from the food and beverage sector face major challenges in regard to digital transformation and the wider adoption of emerging Industry 4.0 related technologies, such as the internet of things and machine learning. This collaborative research project involves a systematic investigation of the technology pathways for digitalization as well as identifying digital transformation best practice in order to develop an innovative digital platform. The project will also work with a number of collaborative network partners in South Africa in order to engage SMEs on digital transformation and share knowledge generated by the project.

Research on Industry 4.0 and open innovation

Prof. Philbin continues to collaborate with Dr. Clarissa Rocha, Prof. Carlos Quandt and Prof. Fernando Deschamps from the Pontifical Catholic University of Paraná (PUCPR) in Brazil. The aim of this research is to analyse how R&D collaborations contribute to business innovation in Brazilian and European industrial firms in the context of Industry 4.0 and digital transformation. The research utilised the open innovation theoretical concept in high-tech manufacturing, and used qualitative empirical evidence from interviews with managers of Brazilian and UK manufacturers directly involved in digital projects. The findings enable manufacturers to understand more about the antecedent factors in preparing for the change towards digitalisation through engaging with external actors to accelerate the operationalization of digital initiatives. The research has already resulted in a joint publication in the journal IEEE Transactions on Engineering Management and further publications are planned.

Research on renewable energy technologies

Prof. Philbin undertakes research into the adoption of various renewable energy technologies. This includes the use of techno-economic assessment and numerical modelling to investigate solar and wind power generation as well as studies on the adoption of carbon capture, storage and utilization (CCSU) technologies. During the 2020/21 academic year, Prof. Philbin supervised four MSc (Mechanical Engineering) research projects that investigated different aspects of renewable energy systems in Kuwait and Nigeria. In terms of new research on renewable energy technologies, Prof. Philbin is currently collaborating with Dr. Saim Memon from the University of Huddersfield (formerly LSBU Division of Electrical and Electronic Engineering).

Research on sustainable engineering

Prof. Philbin is involved in various international research collaborations exploring different aspects of sustainable engineering. This includes the environmental management of critical infrastructure and other studies focused on improving the sustainability of the built environment. In this regard, Prof. Philbin has continued to collaborate with Prof. Jing-xiao Zhang from Chang'an University in China and other researchers on various studies, such as investigating the role of emissions trading policy to reduce emissions and improve the efficiency of industrial green innovation. The collaboration has resulted in several joint publications related to the built environment, including studies focused on environmental management, BIM (building information modelling) as well as engineering education.

Prof. Philbin is also collaborating on a new research project related to the circular economy approach applied to data centres with Dr. Deborah Andrews from the LSBU Division of Mechanical Engineering and Design along with postgraduate researcher Dominika Ptach.

Highlights

January 2021 – 223 students successfully completed the IET Entrepreneurial Skills for Engineers online course as part of the Innovation and Enterprise Module with Sunita Selvarajan as the Tutor.

January 2021 – Prof. Philbin commenced teaching on the Technology Evaluation and Commercialisation (TEC) module for MSc in Mechanical Engineering students.

March 2021 – Dr. Paul Mansell successfully defended his doctoral thesis at the PhD viva examination.

April 2021 – The 'Enabling Digital Transformation for SMEs from the Food and Beverage Sector' project funded by the Royal Academy of Engineering and the Newton Fund commenced, which is based on a collaboration between Prof. Simon Philbin and Prof. Arnesh Telukdarie from the University of Johannesburg in South Africa.

May 2021 – Pavan Kumar Sala presented a paper at the IEEE Technology and Engineering Management Virtual Conference in Europe.

May 2021 – Sunita Selvarajan completed her Tutor role on the Professional Practice module that was delivered for level 4 undergraduate students in the Division of Computer Science and Informatics.

May 2021 – Pavan Kumar Sala completed 57 interviews of entrepreneurs from high-tech start-up companies as part of the data capture stage of his doctoral research project.

July 2021 – Prof. Philbin was notified by the Society of Research Administrators (SRA) International that he has been awarded the Distinguished Faculty designation.

August 2021 – The book 'Driving Sustainability through Engineering Management and Systems Engineering' was published by MDPI (edited by Prof. Philbin).

August 2021 – The LSBU School of Engineering approved the Coaching Pilot Project to be delivered by Sunita Selvarajan.

August 2021 – Prof. Philbin completed the supervision of four MSc in Mechanical Engineering research projects that focused on different aspects of the techno-economic assessment of renewable energy systems.

September 2021 – Prof. Philbin gave a keynote presentation at the 3rd International Engineering and Technology Management Summit, which was organised by Istanbul Technical University, Bahçeşehir University and the American Society for Engineering Management.

September 2021 – Prof. Philbin gave a seminar at the 15th International Entrepreneurship Educators Conference (IEEC) Virtual Conference.

September 2021 – Prof. Philbin gave an invited seminar on 'Perspectives on Engineering Management – Managing Technologies and Project Teams in a Complex World' for the Associate Engineering Manager Training Virtual Programme at the Polytechnic University of the Philippines.

September 2021 – Prof. Philbin gave a guest lecture on 'Managing Complex Engineering Projects – Tools, Techniques and Insights' at the LSBU School of Business.

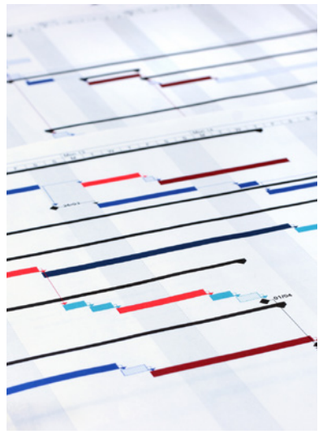
October 2021 – Prof. Simon Philbin successfully completed his term as the Past President of the American Society for Engineering Management (ASEM).

October 2021 – Prof. Philbin presented a paper at the American Society for Engineering Management (ASEM) Virtual International Annual Conference and 42nd Annual Meeting.

November 2021 – Prof. Philbin gave a keynote presentation at the LSBU Business School Virtual Conference – Changing the world; one project at a time!

November 2021 – Prof. Philbin gave a presentation at the Technical Symposium of the Middle East HSE and Sustainability Week Virtual Conference, which was organised by the Energy Institute.

December 2021 – Prof. Philbin completed the teaching on the Technical, Research and Professional Skills module for MSc and final year MEng students from the School of Engineering.



Research on project management
Prof. Philbin is involved in different research studies in the area of project management. This includes research on the impact of leadership on project management as well as other studies on developing improved risk management for projects. In this regard, Prof. Philbin has continued to collaborate with Prof. Riaz Ahmed from Bahria University in Pakistan on various studies on project management, such as understanding the moderating effect of senior management support on the relationship between schedule delay factors and project performance. Prof. Philbin is also collaborating on a new doctoral research project with Dr. Sara Hasani from the LSBU Business School. The research is being carried out by the doctoral researcher, Firdaous Ennami, and is focused on the area of sustainability risk management.

Research on engineering education
Prof. Philbin has an ongoing research focus in the area of engineering education, skills and industry alignment. This includes understanding the optimal methods available to embed enterprise in engineering education as well as the development of wider professional skills to improve the employability of engineers. Prof. Philbin's latest research on entrepreneurship education for engineers considered technology evaluation and commercialization through project-based learning and was presented at the Virtual International Annual Conference of the American Society for Engineering Management.

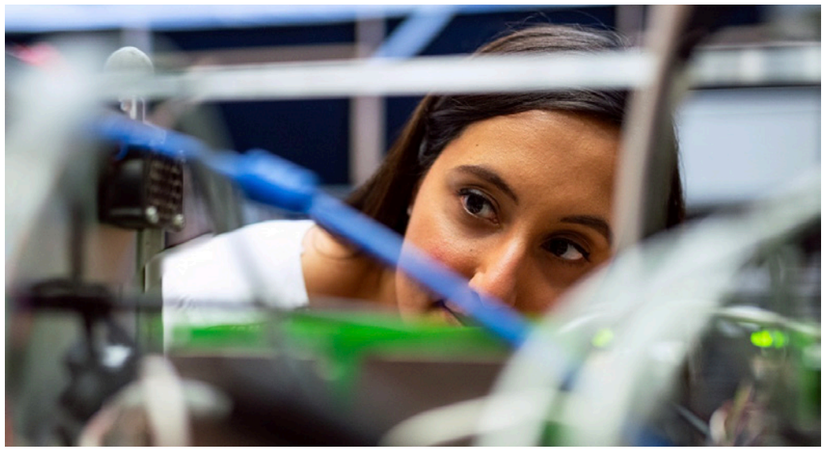
Education initiatives

Technology Evaluation and Commercialisation Masters' Level Module
Prof. Simon Philbin delivered the Technology Evaluation and Commercialisation (TEC) module for the School of Engineering in the second semester of the 2020/21 academic year. The module is part of the level 7 MSc in Mechanical Engineering and was delivered for 22 students. The module involves use of the TEC Algorithm, which was originally developed at North Carolina State University in USA. The TEC module enables the students to be guided towards identifying an emerging technology idea that is evaluated for its commercial potential. Detailed research and analysis is conducted according to a prescribed algorithmic model in order to evaluate the business potential of the technology. This approach allows the students to prepare the commercialisation strategy and write the business plan for the potential high-tech start-up company based on an emerging technology. The students work as part of teams of 4-5 students and this approach means there is adequate resource available in the team to conduct the detailed research and analysis to evaluate the business potential of technologies and prepare the commercialization strategy and detailed business plan for a high-tech start-up company.

The educational model adopted in the module represents a simulation exercise for start-up business planning although at the end of the course students are not required to actually launch a real company. Nevertheless, the students work as part of teams and so they encounter many of the real-world issues associated with team working in a start-up company and are required to meet deadlines through submission of the assignments. In addition to the algorithmic approach, students are provided with lectures across a range of business and technology management areas. The feedback received from the 2020/21 cohort of students that participated in the module was highly favourable.

Technical, Research and Professional Skills Masters' Level Module
Prof. Simon Philbin delivered the Technical, Research and Professional Skills (TRAPS) module for the School of Engineering in the first semester of the 2021/22 academic year. The module was delivered for 55 students from both MSc and final year MEng engineering programmes. The module enables development of the skills that are necessary for successful completion of the research dissertation in the near future and for professional development in the long-term future. The students are required to prepare a feasibility study report for their proposed research project and also present a summary of the report as part of meeting the requirements for the module assessment. More specifically, the aim of the module is to ensure that engineering students from Masters' programmes can undertake research and project work in a professional way and communicate their technical proposals effectively. Additionally, students are given support to enhance their technical and analytical skills that will enable them to manage complex technical projects.

The module aim is to ensure that engineering students from MSc and MEng courses undertake research and project work in a professional and ethical manner and are able to effectively communicate research proposals. Additionally, students are provided with support to enhance their technical and analytical background across a range of areas related to the professional engineering discipline, including project management, risk management, sustainability, engineering design, systems engineering and lean engineering. The module includes a diverse range of tutorial sessions across different technological areas and engineering applications to embed learning and the knowledge acquired in the corresponding lectures. This year included a new guest session delivered by three experienced visitors from a consultancy company from the telecommunications sector. The session focused on developing professional skills for engineers. The feedback received from the 2021/22 cohort of students that participated in the module was highly favourable.



Innovation and Enterprise Undergraduate Module
Sunita Selvarajan supported the delivery of the Innovation and Enterprise module, which is an undergraduate module in the School of Engineering led by Barney Townsend (Senior Lecturer in Engineering Product Design and Enterprise). The module was delivered online in the 2020/21 academic year to approximately 230 final year engineering students. As a Tutor on the module, Sunita facilitated student discussion during lectures, provided input during tutorial sessions and linked the subject material taught with workplace expectations.

In addition and for the second year running, the 'Entrepreneurial Skills for Engineers' online course developed by the NPI team in partnership with the IET (Institution of Engineering and Technology) continued to form an integral part of this module with marks awarded to students who successfully completed the course. Sunita supported students to complete the course and encouraged them to apply the knowledge gained from the assignments. Students completing the module remarked on the benefits of the online course. In the 2020/21 academic year the course was completed by 223 students who were each issued with a certificate of completion by the NPI. In the 2021/22 academic year the course is being undertaken by a further 231 students as an integral component of the Innovation and Enterprise undergraduate module. Also, Prof. Philbin gave a guest lecture for the 2021/22 cohort on 'Introduction to the IET Online Course – Entrepreneurial Skills for Engineers'.

Professional Practice Undergraduate Module
The Professional Practice module aims to equip undergraduate students with the skills, knowledge and abilities to develop an understanding of the social, ethical and legal issues that affect the development and use of information systems to support business processes. The module leader is Francis Babayemi from the Computer Science and Informatics Division. The module helps students to gain an awareness of teaming and professionalism to prepare the students for the world of work as IT professional graduates. As a Tutor, Sunita Selvarajan supported delivery of this module in the second semester of the 2020/21 academic year for some 140 undergraduate level 4 students. Sunita facilitated the main lecture discussions and provided group and one-to-one tutorial support to help students attain transferable workplace skills, including analysis, teaming, problem solving and communication.

Other teaching activities
Prof. Simon Philbin has continued to deliver several guest lectures and seminars in areas such as project management, research and technology management as well as other areas associated with engineering management and sustainability.

Coaching for student development

LSBU's strategy and vision is to transform lives, communities, businesses and society through applied education and insight. In particular, the university is also keen to help reduce the attainment gap and employment opportunities for students from an ethnic minority background. Sunita Selvarajan has been leading on a pilot initiative to introduce professional coaching to undergraduate students in the School of Engineering. The objective of the project is to provide students with the necessary tools and skills to develop and attain their academic and personal goals. The initiative aims to support students to grow in confidence as they discover their abilities to set goals and find solutions to problems. Prior to the pilot, coaching was introduced to a smaller set of PhD students within the university. Feedback received from these students provided highly positive indicators, enabling coaching to be introduced as a pilot initiative for undergraduate students in the School of Engineering.

Knowledge exchange

International Leadership Role with the American Society for Engineering Management
Prof. Philbin completed his term as the Past President of the American Society for Engineering Management (ASEM) in October 2021. Prof. Philbin served for seven consecutive years in several different roles on the ASEM Board of Directors. ASEM has its origins in the United States but also has international members and sections – the Society is focused on advancing the discipline of engineering management. ASEM has the objective to develop the tools, techniques and core knowledge to help with the management of people and projects in technology-driven organisations. During his tenure as the Past President of ASEM, Prof. Philbin was the Chair of various award panels, including best paper awards as well as other awards issued to reflect service to the Society. These awards were presented at a special awards ceremony of the ASEM Virtual International Annual Conference.

Recognition by the Society of Research Administrators International
Prof. Philbin has been recognised by the Society of Research Administrators (SRA) International through receiving the Distinguished Faculty designation. SRA International Distinguished Faculty members enhance the professional development of research administrators around the world by creating and presenting high quality education and training content that adds to the body of knowledge in the field of research administration. They also serve as 'thought leaders' to help the Society develop educational programming that is responsive to the significant events, complex issues and new trends impacting the field.

New edited book published
Prof. Simon Philbin edited a new book called 'Driving Sustainability through Engineering Management and Systems Engineering' that was published in 2021 by the publisher MDPI. The book is a printed edition of the special issue published in the journal Sustainability that was edited by Prof. Philbin.

Other academic activities of the institute
Prof. Philbin has been involved in various other academic activities. This includes continuing to serve alongside other colleagues in the School of Engineering as an External Moderator for several modules in the Faculty of Engineering, British University in Egypt (BUE).

Prof. Philbin served as an External Examiner for the Department of Management Studies at Bahria University from Islamabad in Pakistan.

Prof. Philbin has continued to serve as the Associate Editor (Program and Project Management) for the Engineering Management Journal (EMJ) and as a Member of the Editorial Board for the Journal of Research Administration (JRA).

Publications, conference and seminar presentations

1. Book – Philbin, S.P. (Editor). (2021). *Driving Sustainability through Engineering Management and Systems Engineering.* MDPI: Basel, Switzerland (pp.1-158), doi.org/10.3390/books978-3-0365-1531-1.

2. Journal paper – Ahmed, R., Hussain, A., & Philbin, S.P. (2021). Moderating Effect of Senior Management Support on the Relationship between Schedule Delay Factors and Project Performance. *Engineering Management Journal*, doi.org/10.1080/10429247.2021.1940033.

3. Journal paper – Zhang, J., Zhang, Z., Ballesteros-Pérez, P., Skitmore, M., Yang, G., Philbin, S.P., & Lu, Q. (2021). Factors influencing environmental performance: a bibliometric review and future research agenda. *International Journal of Urban Sciences*, DOI: 10.1080/12265934.2021.1899845.

4. Journal paper – Zhang, J., Sun, X., Li, H., Philbin, S.P., Ballesteros-Pérez, P., Skitmore, M., & Lin, H. (2021). Investigating the Role of Emissions Trading Policy to Reduce Emissions and Improve the Efficiency of Industrial Green Innovation, *Journal of Management Science and Engineering*, doi.org/10.1016/j.jmse.2021.09.006.

5. Journal paper – Rocha, C., Quandt, C., Deschamps, F., Philbin, S., & Cruzara, G. (2021). Collaborations for Digital Transformation: Case Studies of Industry 4.0 in Brazil. *IEEE Transactions on Engineering Management*, DOI: 10.1109/TEM.2021.3061396.

6. Journal paper – Zhang, J., Zhang, Z., Philbin, S.P., Huijser, H., Wang, Q., & Jin, R. (2021). Toward next-generation engineering education: A case study of an engineering capstone project based on BIM technology in MEP systems. *Computer Applications in Engineering Education*, doi.org/10.1002/cae.22448.

7. Journal paper – Ma, Z., Zhang, J., Philbin, S. P., Li, H., Yang, J., Feng, Y., Ballesteros-Pérez, P., & Skitmore, M. (2021). Dynamic Quality Monitoring System to Assess the Quality of Asphalt Concrete Pavement. *Buildings*, 11(12), 577.

8. Journal paper – Althuwaini, Y.E.Y.Y.E., & Philbin, S.P. (2021). Techno-Economic Analysis of Solar Power Plants in Kuwait: Modelling the Performance of PV and CSP Systems. *International Journal of Renewable Energy Research*, 11(4), 2009-2024.

9. Journal paper – Ahmed, R., Rafique, A., & Philbin, S.P. (2021). Cross Functional Integration between Organizational Structure and the New Product Development Process. *Organization Development Journal,* 39(4), 63-78.

10. Journal paper – Mansell, P., Philbin, S.P., Broyd, T., & Nicolson, I. (2021). Measuring Infrastructure Projects' Impact on UN SDG Global Goals: Development of an SDG Impact-Value Chain for the Infrastructure Sector based on the Triple Bottom Line. *International Journal of Sustainable Society*, 13(3), 163-183.

11. Journal paper – Philbin, S.P. (2021). Driving Sustainability through Engineering Management and Systems Engineering. *Sustainability*, 13(12), 6687.

12. Journal paper – Mansell, P., Van Rooyen, D., Philbin, S., & Sabini, L. (2021). Infrastructure Projects' Assessment Through SDG Targets: Towards a Comprehensive Framework. *Engineering Project Organization Journal*, 10(2), 1-34.

13. Journal paper – Zhang, J., Jin, W., Philbin, S.P., Lu, Q., Ballesteros-Pérez, P., Skitmore, M., & Li, H. (2021). Impact of Environmental Regulations on Carbon Emissions of Transportation Infrastructure: China's Evidence. *Cleaner and Responsible Consumption, 2*, 100010.

14. Conference paper – Philbin, S.P. (2021). *Entrepreneurship Education for Engineers: Technology Evaluation and Commercialization through Project-based Learning. Proceedings of the ASEM Virtual International Annual Conference (IAC) and 42nd Annual Meeting,* American Society for Engineering Management (ASEM).

15. Conference paper – Sala, P.K., Philbin, S.P., & Barikzai, S. (2021). Exploring entrepreneurial pivoting and the factors that trigger pivots by tech startups. *Proceedings of TEMSCON'21: IEEE Technology and Engineering Management Virtual Conference in Europe*. IEEE.

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17. Keynote presentation – Philbin, S.P. (2021). From the Physical Sciences to Engineering Management – Navigating a Career in Research, 3rd International Engineering and Technology Management Summit, Virtual event organised jointly by Istanbul Technical University, Bahçeşehir University and ASEM.

18. Keynote presentation – Philbin, S.P. (2021). Measuring Sustainability Impact for Infrastructure Projects from the Construction Industry, LSBU Business School Virtual Conference – Changing the world; one project at a time!

19. Conference presentation – Philbin, S.P. (2021). Investigating the Sustainability of Carbon Capture and Utilization (CCU), Technical Symposium at the Middle East HSE and Sustainability Week Virtual Conference, Energy Institute.

20. Conference presentation – Philbin, S.P. (2021). Enterprise Education with the Entrepreneurial Skills for Engineers Online Programme, 15th International Entrepreneurship Educators Conference (IEEC) – Virtual Conference Co-hosted by Aston University.

21. Seminar presentation – Philbin, S.P. (2021). Perspectives on Engineering Management – Managing Technologies and Project Teams in a Complex World, ASEM Associate Engineering Manager Training Programme (Virtual), Polytechnic University of the Philippines.

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