

**ANNUAL  
REPORT**  
2021





“None of what we seek to do would be possible without the enthusiasm, passion and commitment of our people.”

## Foreword

Margot James, Executive Chair

WMG has a unique perspective on the challenges of our times, as we combine outstanding education and skills with applied research and innovation to help our students and partners transform the world around them.

Over the last year, the value of that approach has been demonstrated, perhaps as never before. As a result of the Covid-19 pandemic, our partners adapted to new ways of working, while our educators and students found new ways of teaching and learning.

I am proud of the way WMG and our people responded to this challenge, whether helping organisations like RamFoam adapt their business model to produce PPE during the crisis, working as part of the Ventilator Challenge UK, or keeping our students engaged and motivated.

Just as the pandemic demonstrated the urgent need for innovation and education to support public health, the same principles apply to equally pressing global and national challenges.

Reaching Net Zero requires a shift to sustainability for industries of all kinds. Alongside this, we must also ensure the power of digital technology is used to improve the productivity, agility and security of our industry and public services.

We also need advances in innovation to help ‘level up’ the prosperity and growth of communities who might otherwise be left behind. We need to ensure that everyone is able to benefit from the opportunities created by the shift to a sustainable and connected society.

It’s vital we at WMG play a leading role in society’s response to these shifts. Over the last year, we have done just that. Investment was attracted into our community by bringing Lotus’s Advanced Technology Centre to our Wellesbourne Campus and supporting the launch of the UK Battery Industrialisation Centre. Furthermore, access to industrially-focused education was expanded by opening our Degree Apprenticeship Centre, launching the exciting new National Electrification Skills Framework and seeing our first cohort



Artist's impression of the Advanced Technology Centre.

of Degree Apprentices graduate at the Dyson Institute with University of Warwick degrees.

To continue meeting the needs of society and industry, we must take our research in fields such as Energy, Materials and Manufacturing, Intelligent Vehicles, Digital Technologies and Organisational and Societal Transformation to new sectors, as we’re doing in Very Light Rail (VLR), forensics, cyber-security, healthcare, aerospace and marine.

We will need to create new industry partnerships, as we’ve done with Electroflight, Lotus, and through the Made Smarter programme for West Midlands SMEs.

We will need to work with partners across further, higher and professional education to offer tailored pathways to access education and develop skills, as we’re doing with our new WMG Skills Centre, which brings together short courses and custom programmes for industry.

None of what we seek to do would be possible without the enthusiasm, passion and commitment of our people. Our staff deserve a working environment that supports growth, rewards achievement and is respectful and diverse. We made progress on this front throughout 2021, from the achievement of our first Athena Swan Silver Award to the launch of the Staff Assembly.

**“Throughout 2022, we will go further to create the productive, respectful working environment our staff need to succeed.”**

Amongst many other key initiatives, we will continue to embed hybrid working in our workplace, allowing many colleagues to maximise their productivity and work-life balance, and introduce a career development framework. We will deliver on our Athena Swan and Positive Action plans to ensure we are a supportive workplace for all.

Although 2021 was challenging, it was rewarding in equal measure. As a leadership team, the WMG Executive is incredibly grateful to everyone at WMG for contributing to the successes in 2021 and we look forward to meeting the challenge of transforming careers, companies, and communities throughout 2022.

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# Introduction

Professor Robin Clark, Dean of WMG and Director of Education

I think we all hoped 2021 would be a different year to what transpired. The challenges and uncertainties presented to us as a department were numerous and constant. In writing this, as we embark on a new year; it feels a little like we have come full circle over the last 12 months and that we are going to have more to contend with throughout 2022.

In reflecting on 2021, the department performed very well. Despite the adverse environment in which we had to work, our core activities in both education and research continued and developed in a healthy way. Colleagues have risen to the challenges presented in innovative, thoughtful and professional ways to ensure the department has much to be excited about throughout 2022.

A key achievement in 2021 was the production of a written WMG Strategy. This is firmly aligned with the Warwick 2030 Strategy - Excellence with Purpose but focuses on the areas we operate in and how we can best contribute to the Warwick Vision. It has provided a focus for the work we do and is built around three key themes where we are having - and will continue to have - an impact: Sustainability, Digitalisation and Workforce Transformation. In identifying these themes, and presenting the associated Mission, Vision and Values, we are starting the process of transforming WMG to ensure it is robust, resilient and ready for the future. This will enable us to deliver solutions to industry and society most effectively, maximising our unique ability to work across the industry/academia interface, something that was so much part of our founder the late Professor Lord Kumar Bhattacharyya's thinking and approach.

Having this focus and building on the things we have learned over the last 12 months, we are ready to create the detailed plans throughout 2022 that will underpin our strategy. Progress is being made in many parts of what we do already and this Annual Report will present many of these achievements. As we look forward, we are committed to developing the 'right' environment in which people feel able to produce their very best work. In making this a reality, people grow, WMG develops and our clients see the value from the work undertaken.

**"We are starting the process of transforming WMG to ensure it is robust, resilient and ready for the future."**

Throughout 2022 we will continue to enhance our academic expertise in the understanding, development and teaching of engineering and manufacturing internationally. In November 2021, we received an extremely generous £1.5 million philanthropic gift from a University of Warwick alumnus, which will allow for the creation of a new role, entitled the Lord Bhattacharyya Chair in Education. The senior position will continue the late Professor Lord Bhattacharyya's legacy in education and will drive forward innovations in research-led teaching and scholarship.

As Government priorities become clearer and the world opens up, we will explore the opportunities presented regionally, nationally and internationally, but in a planned and focused way. Investing in existing relationships and developing new ones will be key as projects, in both research and education, require greater degrees of collaboration and mutual understanding.

In the words of Benjamin Franklin, American Polymath (1706-1790) **Out of adversity comes opportunity.**

We have seen the reality of this quote in WMG over the past 12 months and there is nothing to suggest that the next year should be any different.





## World Leading and Innovative Education

Professor Robin Clark, Dean of WMG and Director of Education

The challenges of the last year have been considerable for all involved in the education provision at WMG. What everyone hoped would be a short-lived blip in our approach to working with students has caused us to have to rethink many aspects of what we do and the challenges continue today.

Against a backdrop of redesigned delivery to move online and remote interaction with students, we continued to see education provide a solid contribution to the department through healthy student numbers; the welcoming of new client companies; and a range of successes that exemplify the passion and professionalism of the Education Team in providing a high-quality student experience.

It is easy to underestimate the complexity of developing different approaches to learning, yet the creativity of colleagues across the department in producing engaging materials and in ensuring support for our students in various forms has been commendable. The MOBIUS Maths Support Tool is one such example. 'Dealing with disruption' is the expression we hear quite often. In WMG, this has been addressed through high quality provision that was viewed positively by 72% of the respondents in the Term 1 student survey (University average of 66%). This is testament to the contribution the department has made to Warwick being named the Top University for Teaching Quality in the Times/Sunday Times Good University Guide 2022. It has also kept our commitment to active and authentic learning firmly on track. We saw around 1600 students across all levels graduate throughout 2021, having studied at least partly under the

most difficult of circumstances. Across all levels means Undergraduate/Postgraduate, Full Time/Part Time, in the UK/from our Overseas Centres and with close to 200 being Degree Apprentices. This diversity within the education portfolio is a strength that we intend to build on as we translate our new WMG Strategy into clear plans for the future.



**1600** students graduated, including **200** degree apprentices

A real highlight of 2021 was seeing the 33 students in the first cohort of our partnership with Dyson receive recognition at a Graduation Celebration in Malmesbury in September. Their achievements; the commitment of the combined teaching team from WMG and Dyson; and the realisation of the Dyson Institute of Engineering and Technology is testament to what can be achieved when knowledgeable, creative and committed partners work together.

Closer to home in June, we welcomed the then Skills Minister, Gillian Keegan MP, to open our Degree Apprenticeship Centre on campus. The event was an opportunity to not only showcase our new learning spaces, but also to discuss the opportunities possible in the work-based education area with a panel of local stakeholders from industry, government and education.

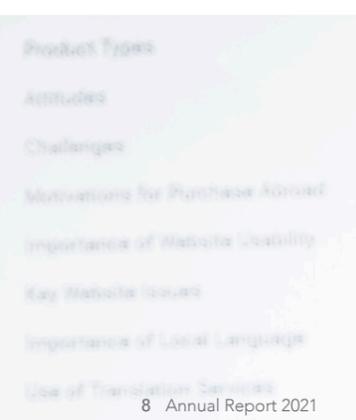
**"The creativity of colleagues across the department in producing engaging materials and in ensuring support for our students in various forms has been commendable."**

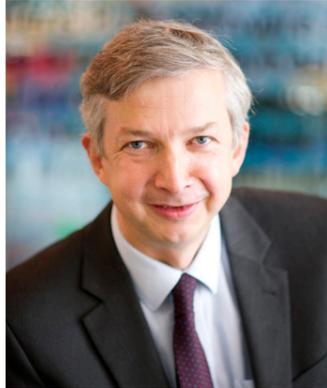
Our new Applied Professional Engineering Programme (Undergraduate) welcomed its first students in 2021, as did our Degree Apprenticeship in Sustainable Automotive Materials Engineering (Master's level). There are already new ideas in the pipeline for the coming years as we reflect on

our course portfolio and develop for the future, prioritising greater alignment with our research.

As we explore our contribution to the Global Skills Agenda, we have launched a National Electrification Skills Framework and Forum in conjunction with The Faraday Institution and the High Value Manufacturing Catapult. It is this thinking that will help us to realise our ambition to meet employer needs and transform workforces in the industries we engage with. Regionally, the opportunities afforded by the new University relationship with University College Birmingham are promising and overseas, in Hong Kong, our newly constituted WMG/VTC Task Force is a way to capitalise on an already well-established relationship, in order to demonstrate global impact in the skills arena. The launch of the WMG Skills Centre in January 2022 draws this all together.

Frustrating, yet exciting, must be the view of 2021. With much in motion, it provided a solid foundation on which to build in the coming years regardless of the uncertainty in the world around us.





## Excellent and Impactful Research

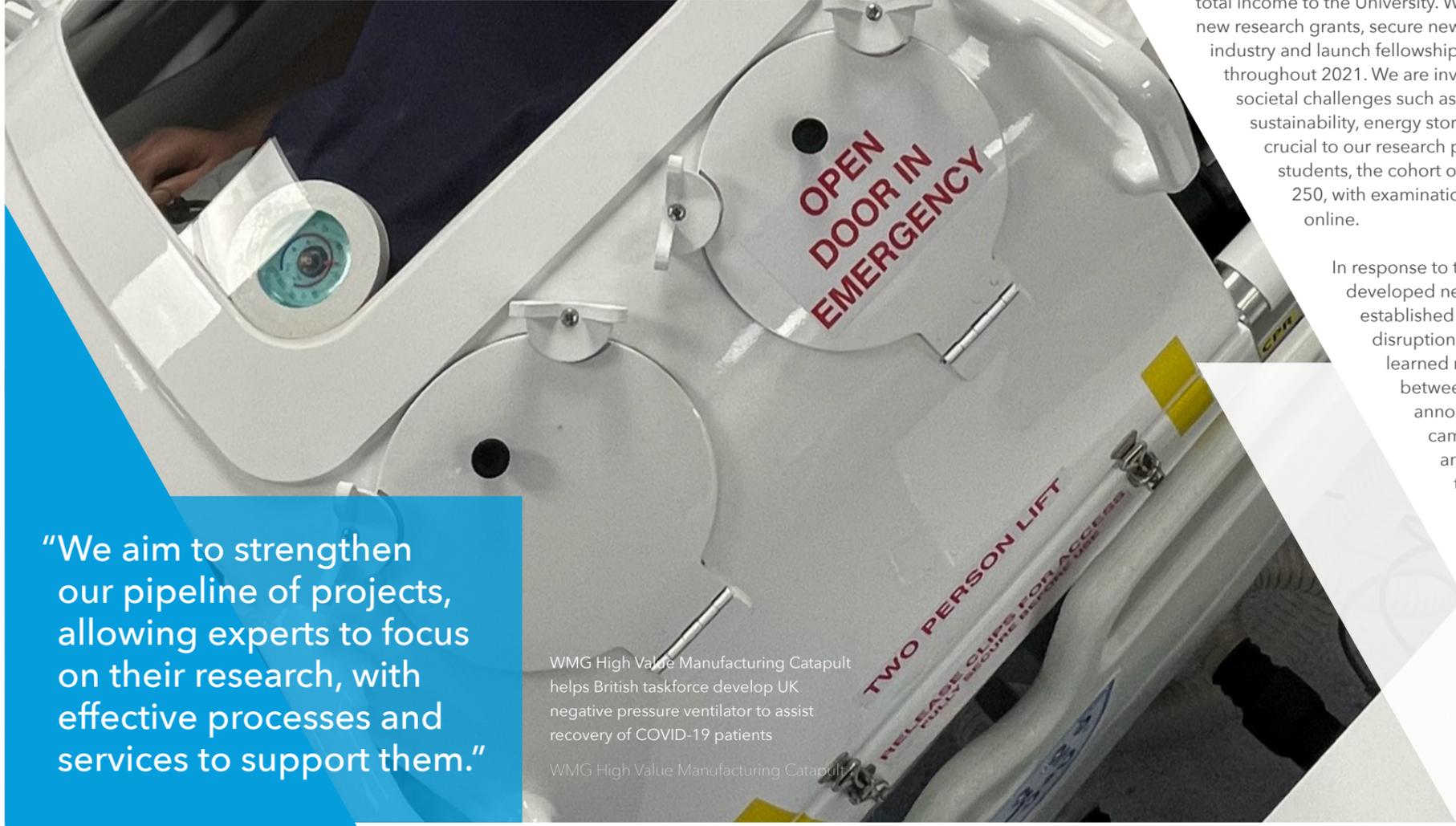
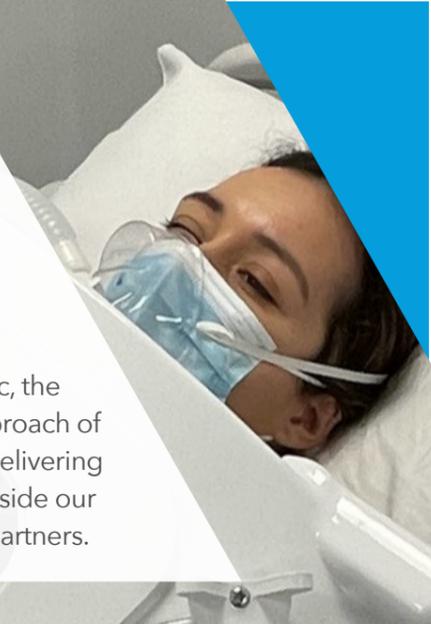
Professor Paul Jennings,  
Director of Research

Despite the challenges of the pandemic, the knowledge, expertise and rigorous approach of our teams enabled WMG to continue delivering excellent and impactful research, alongside our industrial, academic and government partners.

**“We aim to strengthen our pipeline of projects, allowing experts to focus on their research, with effective processes and services to support them.”**

WMG High Value Manufacturing Catapult helps British taskforce develop UK negative pressure ventilator to assist recovery of COVID-19 patients

WMG High Value Manufacturing Catapult



Since the initial lockdown, thanks to the dedication of our staff and students, our laboratories and facilities have been operating safely, supporting our usual broad range of research projects, from those based on fundamental science through to applied work with our industry partners. Many of our researchers continue to pursue their projects remotely, and have demonstrated resilience, creativity and resourcefulness to overcome the challenges associated with conducting research in this way.

WMG is organised around discipline strengths, but teams have also been working together on many interdisciplinary themes, underpinned by sustainability and digitalisation. They include: resilient and smart manufacturing; sustainable materials; energy transition - the shift from fossil fuels; safe, inclusive and convenient transportation; data, connectivity and immersive tools.

Our total research portfolio is supported by £58.3m total income to the University. WMG continued to win new research grants, secure new contracts direct from industry and launch fellowships across our areas of focus throughout 2021. We are involved in several major societal challenges such as the circular economy and sustainability, energy storage, and cyber security. Also, crucial to our research programme are our doctoral students, the cohort of which increased to around 250, with examinations successfully transferring online.

In response to the pandemic, we developed new ventilator technology, established tools to support disruption-resilient manufacturing, learned more on the connection between governmental policy announcements and cyber-crime campaigns, and designed anti-microbial poles for public transport. Our research has also been applied across many different sectors, for example in the arts through helping museums move exhibitions online and musicians rehearse

together remotely, but also in retail as we enabled tea to be kept on the shelves through our approach to supply chain strategy.

Furthermore, we've dedicated resource to thinking about ways we can be prepared for other potential widespread catastrophes and disruptions, exploring how the circular economy could help the world recover, and investigating how systems thinking could help us improve the national response to similar events in the future.



**£58.3m**  
total income to  
the University

More broadly, we continued to enhance battery technology, designed new track and glazing for urban Very Light Rail (VLR) and demonstrated a cooperative approach to vehicle autonomy. We also learned how to better use recycled paper in new products, created new materials for self-healing robots and extracted value from the husks of larvae. Significant research was also delivered across the digital healthcare sector, exemplified by our work to classify the diagnosis and characteristics of paediatric brain tumours to enable more efficient treatment. We also used AI to improve robot hand technology, made smart products more secure for consumers, and developed the first nanomaterial-enabled all polymer solar thermal cell. Furthermore, our research informs our education and skills programmes, and the national agenda too, through initiatives like the National Electrification Skills Framework.

Our REF (Research Excellence Framework) submission, joint with the School of Engineering, was completed in March 2021 and we are grateful for the many colleagues who supported us in collating and presenting evidence.

Looking forward, priority objectives are now highlighted in the new WMG Strategy, including the clarification of external messaging, measuring success, establishing targeted collaboration, improving processes, increasing doctorate numbers and strengthening our pipeline of projects. We also intend to invest more in proven areas and people, and build capability in new areas addressing future industry and societal needs.



## Transforming Industry and Wider Society

Professor David Greenwood, CEO of the High Value Manufacturing Catapult at WMG, and Director for Industrial Engagement.

The last year has given greater opportunity than ever for WMG to deliver against our mission: "To deliver the technologies, knowledge and people needed by the industries of today and the future". Brexit, the Covid-19 pandemic and the climate emergency have required industries to adapt faster than ever to a changing environment, and our research and education have delivered the innovation and skills they need to do so.

In the automotive sector, we continue to work with companies like Jaguar Land Rover, BMW and Nissan, as well as their major supply companies like Lear, as they seek to electrify their product ranges, digitalise their manufacturing plants, and build resilience into their supply chains. A particular highlight of 2021 was Lotus Engineering establishing their Advanced Technology Centre on our Wellesbourne Campus, and we now have a growing portfolio of research activities to support their ambitious plans for the future.

We continue to provide transport thought leadership in micromobility and light rail, as 2021 saw us host the first UK Micromobility conference, and the reveal of the Coventry Very Light Rail (VLR) system. In the area of electric motorcycles, we now have activities with TVS, Triumph, BSA and Norton, as well as companies in e-bikes, scooters and light goods vehicles.

Our activities in aerospace have "taken off" as we established relationships with leading companies like Rolls Royce and Vertical Aerospace. Last year we saw the first flight of the Rolls Royce "Spirit of Innovation" all-electric aircraft whose battery, the most power dense ever created for an aircraft, was developed by Electroflight with support from WMG. We hope to see this incredible aircraft go on to break world records in the near future.

The UK Battery Industrialisation Centre (UKBIC), a national facility originally conceived and delivered by WMG, was formally opened by the Prime Minister on 15th July, and will now go on to support the development of gigafactories and their supply chains around the UK.

We are also delighted to be supporting BritishVolt as they establish a major battery gigafactory in Blyth, and we hope for announcements in the near future regarding battery manufacturing in the West Midlands. In this sector we convened a national effort to define and deliver the 70,000

skilled people which this new industry will need in the next five years, having launched our National Electrification Skills Framework at Cenex LCV in September.



Helping RamFoam produce **55+ million** recyclable face shields

Our technical and business support for small and medium sized companies continues to deliver astounding results. One great example is RamFoam - a supplier of foam materials to automotive and aerospace industries. As their core markets were struck down by the Covid-19 pandemic, and with a little help from WMG, they pivoted into the manufacture of face masks for the NHS. In just five weeks they became one of the biggest suppliers of PPE to the NHS - making over three million recyclable face shields per week. Over 55 million have been made to date, and the company has created 500 jobs as a result. On an even larger scale, the WMG High Value Manufacturing Catapult was part of a consortium which delivered 13,437 ventilator systems to the NHS - making more ventilators in 12 weeks than would normally be made in 20 years.

There is every reason to believe we will continue to grow our industrial impact throughout 2022. Themes of electrification, digitalisation, sustainability, productivity and resilience are still at the top of the agenda in most boardrooms. As we deliver against our values of being customer focused, innovative and collaborative, and professional and respectful, we will become the trusted partners for companies large and small - transforming sectors, policies and society.

Prime Minister Boris Johnson with Jeff Pratt, Managing Director of UK Battery Industrialisation Centre, at the official opening of UKBIC



**"We will become the trusted partners for companies large and small - transforming sectors, policies and society."**



## Valuing People

Jane Coleman, Chief Operating Officer

Our staff and students faced many challenges during 2020/21, with frequent adaptations to meet the changing regulations and requirements, particularly in relation to on-campus working and teaching delivery. We have adopted hybrid working, which provides many colleagues with the flexibility to choose their work location and maximise both productivity and work-life balance.

Many of our colleagues contributed their time and expertise to the local community and even national initiatives during lockdowns. WMG was part of the Ventilator Challenge UK, working with a consortium to help produce a total of 13,437 Penlon ESO 2 and Smiths paraPAC ventilator devices for the NHS. WMG staff operated a quality control facility in an automotive parts warehouse in Solihull with colleagues from other High Value Manufacturing Catapult centres. Together they worked around the clock tirelessly inspecting over eight million parts.

A major highlight of last year was our Athena Swan Silver Award. The Athena charter is a framework to support and promote gender equality in Higher Education and research. Having secured Bronze awards in 2013 and 2016, we were delighted to receive recognition of the progress we have made, with initiatives such as the introduction of flexible working, increased support for academic promotions and new development opportunities for female staff. A network of recently volunteered Athena Champions will continue to drive forward further improvements and activities.

WMG is a diverse community, with staff from 49 countries and students from 64 countries. 29% of our staff have declared they are from a BAME background, compared to the University's average of 17%. Just under 4% of our staff have a declared disability, which we recognise is under-reported.

We also launched a Positive Action campaign in 2021, which will have workstreams focusing on staff recruitment, training and career development.

In April 2021, we introduced a new Staff Assembly, which has representatives from all staff categories and areas, as well as student representatives. The Assembly provides a forum for members of our community to raise items for discussion, and their feedback provides a more diverse range of voices to contribute to our organisational decision making.

Our second cohort of graduates completed WMG's two-year Graduate Development Programme, with a 100% success rate and 14 out of 15 having secured roles in WMG.

It is always difficult to single out individual achievements, as one of the key strengths of WMG is our focus on teamwork and collaboration. However, we would like to congratulate Professor Margaret Low on the award of her MBE for services to public engagement and widening participation. This well-deserved award recognises Margaret's work over 30 years in the areas of student volunteering, accessible IT education/skills development and outreach.



Students from **64 countries**

Staff from **49 countries**

Our key priorities throughout 2022 are to embed hybrid working, introduce a career development framework, achieve ISO 45001 for our health and safety system and practices, and to continue the activities in support of our Athena Swan and Positive Action plans.

"A major highlight of last year was our Athena Swan Silver Award."



WMG achieved total income in 20/21 of £114.4m

This consisted of:

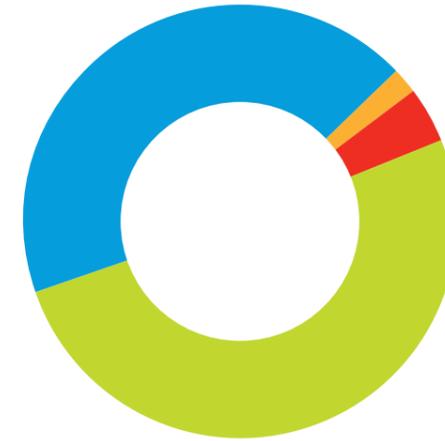
WMG Degree Apprenticeship Centre  
WMG, University of Warwick



## Financial Overview

Nicola Constant, Chief Financial Officer

The worldwide impact of Covid-19 on individual lives, on society and on the global economy will be remembered for decades to come. During the 2020/21 academic year the University shared, together with individuals and businesses across the country, the waves of uncertainty that the pandemic created.



- £49.3m teaching income
- £58.3m research income
- £4.8m government grant income
- £2.0m from other sources such as consultancy and equipment usage

Despite this unprecedented environment, the hard work, dedication and loyalty of our staff, students and partners has meant that WMG has remained in a strong financial position.

The strong financial performance in 2020/21 enabled us, in the latter part of the year, to invest across all facilities, which positioned us well for the 2021/22 academic year.

### Teaching

Meeting our student recruitment targets and achieving good retention rates is a key driver for our financial performance. Our strategy to deliver an outstanding learning experience for students using blended or online delivery meant that we surpassed our earlier cautious approach to the Financial Plan, and produced a similar result to previous years. The main source of teaching income is the full-time Master's programme, with further income from a range of undergraduate courses, degree apprenticeships and overseas programmes.

### Research

Despite the challenges, WMG continued the delivery of research activity, with only a small dip in research income against the Plan. New opportunities and industrial engagements with key companies during 2021 were also achieved, contributing towards our longer-term sustainability. Research income is underpinned by the c£20m High Value Manufacturing Catapult programme and c£40m of collaborative and direct contract research with a range of public funders and commercial partners.

### Forward Look

The outlook for 21/22 remains positive. Student recruitment is in-line with recent years and the research income pipeline remains strong. As payroll accounts for over 50% of WMG expenditure there will be increasing costs, partly due to the latest increases in USS employer pension contributions and recently announced National Insurance changes. However, WMG is well positioned to offset these by careful monitoring of departmental non-pay expenditure.



“Investment across all facilities positioned us well for the start of the 21/22 academic year.”

# 2021 Achievements

Take a look at some of WMG's key areas of success throughout 2021.

SUCCESS RATE

**100%**



Our second cohort of graduates undertaking the two-year Graduate Development Programme completed with a **100% success rate**. **14 out of 15 members** also secured roles in WMG.

STUDENTS GRADUATED

**1,600**



**1600 students graduated** across all levels, including **200 degree apprentices**.

RESEARCH GENERATED

**£58.3m**



Research generated a **total income of £58.3m** to the University.

TOTAL INCOME

**£114.4m**

WMG achieved a **total income in 20/21 of £114.4 million**.

**55+**  
**million**



Helped RamFoam produce **55+ million** recyclable face shields.

DYSON PARTNERSHIP

**33**

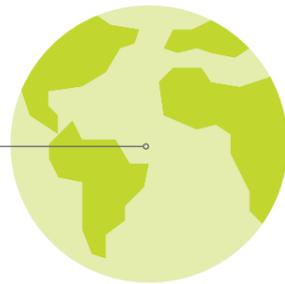


Students in the first cohort of our partnership with Dyson **received recognition** at their Graduation Celebration.

Professor Robin Clark - Dean of WMG and Director of Education, John Fox - Director of Midlands Future Mobility, Councillor Jim O'Boyle, Margot James - Executive Chair of WMG, and Andy Street - Mayor of the West Midlands.

STUDENTS FROM

**64 countries**



STAFF FROM

**49 countries**

NUMBER OF VENTILATORS PRODUCED

**13,437**

WMG produced **13,437 ventilator devices** for the NHS.





## Getting in touch



[warwick.ac.uk/wmg](http://warwick.ac.uk/wmg)



[@WMGwarwick](https://twitter.com/WMGwarwick)



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