Innovative Partnerships

Virtuocity has the ambition to help more than just industry. “We are already in discussions with a number of city councils – including senior officers and elected members here in Leeds – to see how we can help them in the design, planning and construction of major city developments. In Leeds, for instance, we have the ability to simulate what a traffic-free City Square might look, feel and sound like to pedestrians, and simulate how the transition could be effected with the minimum of disruption,” Dr Thomasson said.

Since the IAA funding, the network of relationships with Arup’s city simulation teams has extended out from the Leeds office, to now include Manchester, Sheffield and London with whom a number of new opportunities are being developed.

Another collaborative venture with Arup is helping Transport for London reduce the number of fatalities and injuries to cyclists and pedestrians caused by buses and trucks turning left at junctions. This work, which currently involves a University of Leeds psychologist, could soon be exploiting the recently installed truck simulator.

Referring to the latest IAA project, Arup’s Tim Griggs said: “The six-month collaboration between our two organisations has already yielded a number of ideas and opportunities that support both Arup’s business goals and the University’s research objectives.” In addition, he believes the collaboration will also enable Arup to identify students with the skills and experience that may be attractive to the company in terms of future recruitment or research projects.

“We hope that this will be the latest in a series of innovative partnerships between our two organisations through which we can generate value and help shape a better world,” he said.

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Widening The Scope Of Virtuocity

Virtuocity builds on our international reputation in the field of simulation. It harnesses research talent from across a wide range of disciplines with industry leaders to create a fully immersive, virtual environment in which the design of future cities can be tried and tested.

Impact Acceleration Account

The world’s cities are growing at an unprecedented rate, resulting in increasingly complex “grand challenges” for designers, planners and government if our urban centres are to be economically, environmentally and socially sustainable. In the face of such complexity, new tools are required to plan and run our cities. A collaborative venture between global design and planning consultancy, Arup, and researchers at the Institute for Transport Studies (ITS) has been the catalyst for establishing Virtuocity – the University’s new Centre for City Simulation.

Arup understands that shaping a sustainable future – particularly in the urban environment – is one of the greatest challenges of the 21st century. “As a company we are rising to this challenge by investing in research and innovation,” says Anna. “But we also recognise that we can often make a bigger impact when we collaborate with likeminded partners – which is why we are working closely with the University of Leeds on the Virtuocity initiative.”

As a result of the IAA funding, the University has strengthened the link between its own research expertise and Arup’s R&D capability. This has already resulted in the building of an intelligent modelling tool incorporating Arup technologies. In addition, Arup has provided guidance on the procurement and installation of state-of-the-art Virtual Reality equipment, and lending it with Arup’s own 3D city models.

“Fast-tracking the translation of existing high-definition 3D city models into our driving simulator has been an important output from the project,” says Virtuocity’s Business Development Manager Dr Erik Thomasson. “It helps create a more immersive environment, but also the safety of drivers and other road users.”

“Here at Virtuocity we have Europe’s most advanced driving simulator,” says Professor Natasha Merat who leads the Human Factors and Safety Group which is investigating road users’ interactions with new and current transport systems and technologies in a bid to advance transport safety. “The technology is funded in part through the IAA in collaboration with Arup – and have recently installed one of the world’s most advanced truck driving simulators. This makes our simulation and research facilities among the most sophisticated and immersive in the world.”

“Virtuocity is a world-leading driving simulation facility. It is already being used by government agencies and companies to conduct research into vehicle and pedestrian safety. It is being used by the UK Highways Agency as an example of the power of the simulation. They want to keep Virtuocity as long as they can, because it has the most effective driver behaviour, to enhance the safety not only of their own staff working in a live traffic environment, but also the safety of drivers and other road users.”

Arup and Virtuocity are also leading the way in showing how immersive simulation technologies can shorten design time and reduce cost to industry, developers and the public sector.

It is already happening in the motor industry,” says Professor Romano. As part of a £10 million EPSRC funded collaboration with Jaguar Landrover, he and his colleague, Dr Gustav Markkuila, a former driver-modelling specialist with Volvo Group Trucks, are using simulation technologies to give engineers a more realistic perception of what a design might achieve.

“Jaguar Land Rover understand that by working with us they can develop tools that will deliver complex new vehicle programmes more quickly. It will also help save costs in product development by reducing the reliance on physical prototypes and have environmental benefits by limiting the number of prototypes that need to be driven and tested in the real world,” said Professor Romano.
“Virtuocity builds on our international reputation in the field of simulation. It harnesses research talent from across a wide range of disciplines with industry leaders to create a fully immersive, virtual environment in which the design of future cities can be tried and tested.”

Professor Richard Romano, who leads the Institute for Transport Studies (ITS) has been the catalyst for establishing Virtuocity – the University’s new Centre for City Simulation – is one of the greatest challenges in the 21st century. “As a company we are rising to the challenge of how this can be achieved,” says Arup’s senior transport modeller, Anna. “The IAA is an institutional award funded by the EPSRC and we consider it an important research and innovation opportunity,” says Anna. “It gives us the resources to deepen our relationship with Arup by funding two of their key people to work with us to stimulate ideas,” he said.

The IAA is an institutional award funded by EPSRC to help speed up the contribution that engineering and physical science research make towards new innovation, successful businesses and the economic returns that benefit UK PLC. In addition, Arup has provided guidance on the procurement and installation of state-of-the-art Virtuocity technology and equipment, and it is looking to expand the partnership to develop new tools to drastically reduce the time it takes to deliver interactive simulation, test and acquisition systems.

“Virtuocity is all about,” says Dr Thomasson, a researcher in the field of driving simulation, “this fully immersive approach is what really matters. Jaguar Land Rover understand that by working with us they can develop tools that will deliver complex new vehicle programmes more quickly. It will also help save costs in product development by reducing the reliance on physical prototypes and have environmental benefits by limiting the number of prototypes that need to be driven and tested in the real world,” says Professor Romano.

An aerospace engineer by training, Professor Romano came to Leeds from the United States where he was a leading researcher in the field of driving simulation, before establishing his own business, Realtime Technologies which develops advanced, intuitive simulation and real-time tools to drastically reduce the time it takes to deliver interactive simulation, test and acquisition systems.

“Here at Virtuocity we have Europe’s most advanced driving simulator,” says Professor Natasha Merat who leads the Human Factors and Safety Group which is investigating road users’ interactions with new and current transport systems and technologies in a bid to advance transport safety and road user readiness. “It is funded in part through the IAA in collaboration with Arup – and have recently installed one of the world’s most advanced driving simulators. This makes our simulation and research facilities among the most sophisticated and immersive in the world.”

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“We have a network of 21st century centres and we are working with 150 international partners,” says Professor Romano. “This combined experience will support policy makers to develop sustainable solutions to some of the most significant social, economic and technical challenges of our time.”
Account Case Study: Virtuocity

The world’s cities are growing at an unprecedented rate, resulting in increasingly complex ‘grand challenges’ for designers, planners and government if our urban centres are to be economically, environmentally and socially sustainable. In the face of such complexity, new tools are required to plan and run our cities. A collaborative venture between global design and planning consultancy, Arup, and researchers at the Institute for Transport Studies (ITS) has been pivotal to the success of the engagement. Professor Richard Romano, who leads the Institute’s new Centre for City Simulation, says ITS and Arup work together to plan and run our cities. A collaborative venture between us through the pooling of resources, ideas, clients and partners to create opportunities that otherwise would not be achievable.

“IAA money also enabled Arup to second a senior city modeler, Simon, to help widen the scope of Virtuocity. 3D city modeling and simulation allows us to build accurate digital representations of an entire city, granting greater precision to project planning. For more than buildings, this technology also reflects the realities of that environment,” said Simon.

Arup understands that shaping a sustainable future – particularly in the urban environment is one of the greatest challenges in the 21st century. “As a company we are rising to the challenge by investing in research and innovation,” says Anna. “But we also recognise that we can often make a bigger impact when we collaborate with like-minded partners – which is why we are working closely with the University of Leeds on the Virtuocity initiative.”

As a result of the IAA funding, the University has strengthened the link between its own research expertise and Arup’s R&D capability. This has already resulted in the building of an intelligent modelling tool incorporating Arup technologies. In addition, Arup has provided guidance on the procurement and installation of state-of-the-art Virtual Reality equipment, and led it with Arup’s own 3D city models.

“Fast-tracking the translation of existing high-definition 3D city models into our driving simulator has been an important output from the project,” says Virtuocity’s Business Development Manager Dr Erik Thomasson. “It helps create a more immersive experience and, therefore, a more marketable research facility for driving simulation projects.”

But the strength of Virtuocity is much more than its high-tech facilities. “Virtuocity’s strength is in collaboration. It brings industry experts and public sector decision makers into powerful partnerships with cutting edge researchers to transform the way we design and build urban environments in ways that are much more sustainable,” says Professor Romano. “This combined experience will support policy makers to develop sustainable solutions to some of the most significant social, economic and technical challenges of our time.”

Arup’s senior transport modeller, Anna Vickers, was funded to work alongside researchers at the ITS for up to three years on collaborative projects with Arup. These range from a focus on the design of smart cities, through to research on simulation and the impact of autonomous vehicles. “A former Master’s student with ITS, Anna says the relationship she built up has already led to productive work with a number of potential projects in the pipeline. “TheI AA has given Arup the opportunity to push our understanding of different risks in an unprecedented way.”

Widening The Scope Of Virtuocity

Professor Romano said that £50,000 of funding from the EPSRC Impact Acceleration Account (IAA) was critical to the success of the engagement project. “It gave us the resources to deepen our relationship with Arup by funding two of their key people to work with us to stimulate ideas,” he said.

Creating a virtual test environment will enable scenarios to be built and evaluated in a fast, controlled and affordable way and perhaps most importantly, will allow the risks that would be associated with implementing the wrong decisions in a real-world environment.

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Driving Simulation

An aerospace engineer by training, Professor Romano came to Leeds from the United States in 1999 with a leading researcher in the field of driving simulation, before establishing his own business RoadSim Technologies which develops advanced, intuitive simulation and real time tools to drastically reduce the time it takes to deliver interactive simulation, test and acquisition systems.

“Here at Virtuocity we have Europe’s most advanced driving simulator,” says Professor Natasha Merat who leads the Human Factors and Safety Group which is investigating road users’ interactions with new and current transport systems and technologies in a bid to advance transport safety. “The Virtuocity simulator – funded in part through the IAA in collaboration with Arup – and have recently installed one of the world’s most advanced human driven truck simulators. This makes our simulation and research facilities among the most sophisticated and immersive in the world.”

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“Virtuocity is all about,” says Dr Thomasson, “offering currently unanswerable questions with Highways England as another example of the power of the simulation. “They want to keep innovation at the highest level because it has the most effect on driver behaviour, to enhance the safety not only of their own staff working in a live traffic environment, but also the safety of drivers and other road users.”

Arup and Virtuocity are also leading the way in showing how immersive simulation technologies can shorten design time and reduce cost to industry, developers and the public sector.

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Arup’s Associate Director, Tim Griggs, who has been pivotal to the success of the venture agrees. “Virtuocity reinforces the collaboration between us through the pooling of resources, ideas, clients and partners to create opportunities that otherwise would not be achievable.”

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Another collaborative venture with Arup is helping Transport for London reduce the number of fatalities and injuries to cyclists and pedestrians caused by buses and trucks turning left at junctions. This work, which currently involves a University of Leeds psychologists, could soon be exploiting the recently installed truck simulator.

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