

Research Impact Case Study Template

Title of the case study: Understanding the Risk in Developing Autonomous Vehicles	
Details of staff conducting the underpinning research (names, job titles): Dr Finbarr Murphy, Head of Accounting and Finance, Dr Martin Mullins, Senior Lecturer in Risk Management, Kemmy Business School, University of Limerick and members of Lero, the Irish Software Research Centre.	
Underpinning research linked to UN Sustainable Development Goals	
Not relevant	Goal 1 No Poverty
Goal 2 Zero Hunger	Goal 3 Good Health and Well-being
Goal 4 Quality Education	Goal 5 Gender Equality
Goal 6 Clean Water and Sanitation	Goal 7 Affordable and Clean Energy
Goal 8 Decent Work and Economic Growth	Goal 9 Industry, Innovation, and Infrastructure
Goal 10 Reduced Inequalities	Goal 11 Sustainable Cities and Communities
Goal 12 Responsible Production and Consumption	Goal 13 Climate Action
Goal 14 Life Below Water	Goal 15 Life on Land
Goal 16 Peace, Justice, and Strong Institutions	Goal 17 Partnerships for the Goal

Summary of the impact

Autonomous vehicles (AVs)

1. Their work informs policy through the authors involvement in the European Commission expert group on future liability law (2019) which provides guidelines for testing autonomous vehicles. A year-long collaboration resulted in a public report². Following on from this, Dr. Murphy was invited to present his findings and be questioned by the European Parliament Legal Committee (JURI). Ultimately, this will result in EU legislation on civil liability for AI which will be directly influenced by the Emerging Risk Group's (ERG) research. Their deployment on our roads raises interesting legal, liability, and ethical questions. Dr Finbarr Murphy and Dr Martin Mullins, Kemmy Business School, University of Limerick and Lero the Irish Software Research Centre, have undertaken research in risk and liability that addresses these challenges.

Their research also contributes to the development of a novel teaching module, which is part of an MSc in Artificial Intelligence and other graduate programmes. The research has led to new underwriting processes. A campus spin-out company, Transgero, has been established to commercialise the work. Mullins and Murphy are

¹ Cloud-LSVA, VI-DAS and Adapt Fin-Tech Spoke

² Staudenmayer, D., Murphy, F. et al (2019) Liability for Artificial Intelligence and other emerging technologies. DG-Justice and Consumers, EU Commission. DOI: 10.2838/25362

developing ethical protocols to ensure fairness in the face of the applied ethical challenges posed by artificial intelligence.

Countries where the impact occurred: EU and specifically the countries listed below.

UK, Germany, Israel, China, Chile, Greece, USA, Luxembourg.

Beneficiaries: Autonomous vehicles R&D industry, national and international policymakers, the insurance industry, general public, automotive and insurance consumers, students. Some specific examples include;

Details of the impact

The Emerging Risk Group is a multi-disciplinary team of researchers at the Kemmy Business School,
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EU financial regulatory institution and has become concerned with digital ethics (i.e.

consortia in the field of emerging risk.⁴ It also works with the global insurance company AXA-XL in developing bespoke risk transfer solutions around AVs. The UL spin out creates machine learning tools that allow insurers to access the risk posed by emerging technologies, including semi-automated vehicles. The tools utilise hybrid qualitative and quantitative models to capture incomplete or even missing data into a software model that estimates risk with confidence intervals.

Sources to corroborate the impact

1. Policy Document, Connected and automated mobility in Europe <https://ec.europa.eu/digital-single-market/en/connected-and-automated-mobility-europe>
2. University of Limerick, Programme outline MSc in Artificial Intelligence, [Online] Available at <https://ece.ul.ie/lm719-master-of-artificial-intelligence/> [accessed 05.02.20]
3. AXA XL, testimonial, company.
4. Spin-out company established Transgero.eu
5. Agreement between Vicomtech and UL on Research Collaboration.

Underpinning research (500 words maximum)

The 21st century vision of the future posits the idea of automated and connected cars.⁵ However, it is not yet clear when there will be complete automation. For the next decade, the responsibility of driving will be shared by humans and machines (Ref 8). This makes questions of risk (what can happen), ethics (what should and shouldn't happen), and liability (who is responsible for what happens) much more complex. Society needs to confront this new set of risks and ethical questions from autonomous vehicles. For the first time, risk includes the ability of socially embedded forms of AI designed to make complex decisions: decisions that will engender tangible life and death consequences.

AI decision-making is inherently different to human decision-making processes. There are questions about how AI weighs decisions, how we are to mediate these decisions, and what such decisions mean in relation to others (Ref 3). Society, policy, and end-users need to fully understand the differences. There is a long tradition of utilitarian ethics in the West, whereby complex calculations are used to determine courses of action (Sen 1979)⁶. In life and death situations on the road, will we allow the cars

various actors understand them. This is particularly acute in terms of analysing the benefits and risks of AI decisions. Due to the potential safety benefits, autonomous vehicles are often presented as significant risk mitigation technologies: they reduce the risk of driving in comparison to human drivers. However, AV are not humans and do not learn as humans do. The AV's driving intelligence will lack certain decisional capacities. They are unable to annotate and categorise the driving environment in terms of human values and moral understanding. For example, unlike other humans, AVs are not capable of empathising with humans or their behaviour based on being human themselves (because they are not).

There is a need to scrutinise how autonomous vehicle decisional capacity is conceptually framed and how this, in turn, impacts a wider grasp of the technology in terms of risks and benefits. This groups research interrogates the significant shortcomings in the current framing of the debate, both in terms of safety discussions and in consideration of AI as a moral actor and offers several ways forward.

References to the research

1. Ryan, C., Murphy F. and Mullins M. (2019). "Semiautonomous Vehicle Risk Analysis: A Telematics-Based Anomaly Detection Approach",
2. Sheehan, B., Murphy, F., Mullins, M., and Ryan, C. (2019). "Connected and autonomous vehicles: A cyber-risk classification framework",
3. Cunneen, M., Mullins, M., Murphy, F., and Gaines, S. (2019). "Artificial Driving Intelligence and Moral Agency: Examining the Decision Ontology of Unavoidable Road Traffic Accidents through the Prism of the Trolley Dilemma", , 1-27
4. Murphy, F., Pütz, F., Mullins, M., Rohlf, T., Wrana, D., and Biermann, M. (2019) "The Impact of Autonomous Vehicle Technologies on Product Recall Risk", . DOI: 10.1080/00207543.2019.1566651
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