SCSC Symposium 2020



In February 2020, the SCSC held its 28th annual 3-day Symposium at the Principal Hotel in York. The event was well-subscribed, with over 150 delegates attending from all over the world, including the UK, Europe, Asia, the US and as far as Australia. Key themes covered during the event were: Autonomy, Machine Learning and AI, Assurance, Security informed Safety, Human Factors and Data Safety. Paul Hampton reports on the key note speeches given during the event.

The Boeing 737 MAX Accidents

Dewi Daniels, from Software Safety Ltd, opened the event with a key note speech on the Boeing 737 Max crashes and the role the Manoeuvring Characteristics Augmentation System (MACS) played in the accidents. In the talk, he presented the history and evolution of the aircraft design and provided a detailed and informative description of the events surrounding both accidents, including extracts from the actual flight logs.

Dewi gave his personal perspective on many of the myths surrounding the accidents that have been reported in the news, such as causes being due to poor regulatory oversight and insufficient pilot training. In countering these myths, he illustrated, through a cockpit simulator video, how difficult it would have been for *any* pilot to save the aircraft, even when following the FAA published guidelines for dealing with uncommanded horizontal stabiliser rotation. Dewi concluded that one of the key contributors to the accidents was the misclassification of the safety dependency of the MCAS system.

Satellite Navigation

John Spriggs, from NATS, presented the history of Global Positioning Systems (GPS) and the challenges that surround the implementation of accurate GPS systems. For example, he explained how difficult it is to determine the position of the actual satellites and the errors that can be introduced from the Ionosphere and 'space weather' in the Troposphere.

Safety in Space

Emma Taylor from the Safety and Reliability Society (SaRS), described her experiences with the dangers of space debris and how the rapid expansion of commercial space based operations is accelerating the risks to space users. She explained that there are now millions of pieces of debris in orbit, each travelling at high velocities. She showed from experimental results, the damage even the smallest size of debris can do at a speed of 7kps, and the challenges posed with trying to recover debris at these velocities. She noted how increased space use is bounded, not by technical challenges, but by political and spectrum constraints.

Safety of the High Speed Rail Network (HS2)

Reuben McDonald, of High Speed Two (HS2) Ltd, described the safety challenges of the planned implementation of the High Speed Rail Network (HS2) linking (amongst others) London and Birmingham and providing improved services to 25 stations around the UK. He noted that the 15 year HS2 programme is an unprecedented engineering undertaking, requiring of the order of 300 under/over bridge works to deliver a service that will see 18 trains every hour travelling at speeds of up to 360kph. Reuben gave some examples of the safety challenges with HS2, such as assessing the risks of running the rail track in close proximity to an airport runway, and the cost benefit analysis when developing an ALARP case for metro-style platform barriers.

Safety of New Nuclear Builds

Alastair Crawford of EDF Energy, described the progress and plans for the build of the new multi-billion-pound nuclear reactors being built at Hinkley Point in Somerset, UK. He described the architecture of the EPR reactors highlighting the key safety concerns of: core, cooling and containment. He described many of the safety features being employed, such as backup generators and the lessons that have been learned from the Fukushima Daichi accident, such as, introducing flood resident doors.

Responsibility Sensitive Safety

The final key note speech was from Jack Weast, of Intel and MobileEye. Jack described the challenges of developing Autonomous Vehicle (AV) algorithms that are intended to keep the vehicle free from conflict with other road users and pedestrians. He noted that making the algorithms overly defensive would significantly limit the utility of the vehicle's operations. For example, it may stop so frequently to avoid perceived hazards that it causes intolerable congestion.

He described work that he and his team have been doing in the development of a more flexible algorithm that tries to emulate human driving behaviours, such as cautious but assertive driving. He noted that although the algorithms improve the utility performance of AVs, they are not sufficient to prevent collisions in cases where other road users act outside the boundaries of anticipated behaviours, such as, travelling at 70 mph in a 35 mph zone.

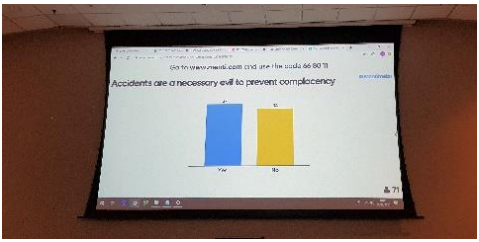
Jack stressed that the intention is to share the work his team have done and to engage with industry, academia and government bodies in an open, transparent and collaborative way to arrive at AV behaviours that are societally acceptable.



Delegates meet for refreshments and the tools and services exhibition

Interactive Voting

The 'question time' panel session was replaced this year with an interactive voting session chaired by Catherine Menon.



In this session, delegates voted electronically via a smart phone app on questions in the world of system safety, such as, "Would you be happy for an AI GP to treat your family?" and "Accidents are a necessary evil to prevent complacency". Full results can be found on the SCSC website: scsc.uk/re619.4:1

Social Events



During the symposium, delegates were invited on one of three social events. These comprised a tour of York Minster, a guided ghost-walk around York, and gin tasting including samples of 'Old Tom' and 'Grey Lady' provided by the local brewery York Gin.

Evening Banquet

Delegates attending the evening banquet were entertained to not one, but two, after-dinner speakers. Peter Ladkin gave some interesting insights into the emerging risks of Coronavirus and concluded with an amusing rendition of 'There was an old lady'!

Tim Kelly, the previous SCSC Director, provided an entertaining and thought provoking speech, which drew parallels between system safety and his new career, following his ordination in the Church of England. A full transcript of his speech is provided on page 46.