Prof Phillip Morgan *BSc DipRes PhD PGCHE FHEA AFALT AFBPS* holds a Personal Chair (and is a Senior Professor) in Human Factors and Cognitive Science within the School of Psychology at Cardiff University. He is Director of the Human Factors Excellence Research Group (HuFEx) and Director of Research for the Centre for AI, Robotics and Human-Machine Systems (IROHMS). He is an international expert in Cyberpsychology, Transport Psychology, Humans in Automation and AI, Human-Machine Interface Design, Human-Computer Interaction, and Adaptive Cognition. He has been awarded >£25Million (UK) funding (>£14M direct) across >45 funded grants from e.g., Airbus, CREST, DHC-STC, ERDF, EPSRC, ESRC, GoS, HSSRC, IUK, MoD, NCSC, RAEng, SOS Alarm, and the Wellcome Trust, and has published >140 major papers, conference outputs, and significant reports for e.g. government and industry. Phil currently works on large-scale projects funded by Airbus, where he was seconded for 3.5-years (March 2019-August 2022), 80% FTE, as Technical Lead in Cyberpsychology and Human Factors and is Head of the Airbus Accelerator in Human-Centric Cyber Security (H2CS). Recently, Phil became Director of a new Airbus Centre of Excellence in Human-Centric Cyber Security at Cardiff University and is one of two Academic Leads for a Strategic Partnership between Airbus and Cardiff University.

Phil is UK PI on an ESRC-JST project (2020-24) (with collaborators at e.g., Universities of Kyoto and Osaka) on the Rule of Law in the Age of AI and autonomous systems with a key focus on blame assignment and trust in autonomous vehicles – exploring Human-Robot Interaction and Explainable AI (XAI) as core interventions. He also currently works as a senior academic on two HSSRC (UK MOD / Dstl / BAE Systems) projects examining HF guidelines for autonomous systems and robots (with QinetiQ & BMT Defence) and complex sociotechnical systems (with Trimetis). He also works on two projects funded by the NCSC focussed on interruptions effects on cyber security behaviours, as well as recently completing a project on XAI funded by Airbus Defence and Space.

Phil overseas the IROHMS Simulation Laboratory (250+sqm, > £700k invested over 3-years) based within the School of Psychology at Cardiff University that currently comprises five state-of the art zones: immersive dome; transport simulator; cognitive robotics; VR/AR; and a command and control centre.

Phil is also Visiting Professor at Luleå University of Technology - Psychology, Division of Health, Medicine & Rehabilitation, Sweden – where his key role is lead Human Factors collaborations between the Universities of Luleå and Cardiff (and others).

Phil played a key role on two large scale multi-partner Innovate UK funded autonomous vehicle projects: Venturer Autonomous Vehicles for UK Roads (2015-2018) and Flourish Trusted Secure Mobility for citizen population sectors who may benefit most from CAVs – including people with disabilities, cognitive impairments, sight/hearing impairments and so on. Phil was a Human Factors lead on both projects – focussing on e.g. handover, HMI design, HCI, trust, adoption, running participant workshops and so on.

Phil is particularly interested in collaborating on research projects focussed on human interaction with autonomous systems (e.g. self-driving vehicles) linked to the following topics: safety, trust, cyber security, privacy, adoption, blame, responsibility (law, moral, causal), regulation. Phil is also

very interested in collaborating on research projects focussed on human aspects of cyber security (e.g. risks, mitigating risks etc.) within multiple application areas, including self-driving vehicles. He is also interested in adaptive cognition and how this can be applied to optimise human-machine interaction and human-computer interaction.

Some expert areas (to April 2023)

Transport & Intelligent Mobility

Prof Morgan is an international expert on Transportation Human Factors with a thriving 10-year portfolio of research projects (>10 grants, >£13M funding) – including: Venturer Autonomous Vehicles for UK Roads – IUK – 2015-18 (focussed on Level 3 partially autonomous vehicles – e.g. human trust during/after handover as well as during complex interactions with other road users – drivers, pedestrians, cyclists); Flourish Trusted Secure Mobility – IUK – 20-16-19 (focussed on Levels 4 and 5 – e.g. design, testing, development & deployment of accessible, usable, functional, adaptable, safe, secure, and trusted human-machine interfaces for connected autonomous vehicles); and, Rule of Law in the Age of AI: Principles of Distributive Liability for Multi-Agent Societies - ESRC-JST (focussed on safety, trust, security, privacy, adoption, blame, responsibility (law, moral, causal), and regulation – e.g. in the event of 'hypothetical' incidents and accidents' – international collaboration with the Universities of Kyoto, Osaka and Doshisha (2020-23).

Example publications (noting also 5 manuscripts under review):

Wallbridge, C. D., Marcinkiewicz, V., Zhang, Q. and Morgan, P. 2022. Towards anthropomorphising autonomous vehicles: speech and embodiment on trust and blame after an accident. Presented at: Robot Trust for Symbiotic Societies (RTSS) at IROS 2022, Kyoto, Japan, 23-27 October 2022.

Zhang, Q. et al. 2022. Towards an integrated evaluation framework for XAI: an experimental study. Procedia Computer Science 207, pp. 3884-3893.

Zhang, Q., Wallbridge, C., Morgan, P. L. and Jones, D. M. 2022. Using simulation-software-generated animations to investigate attitudes towards autonomous vehicles accidents. Procedia Computer Science 207, pp. 3516-3525.

Parkin, J., Crawford, F., Flower, J., Alford, C., Morgan, P. and Parkhurst, G. 2022. Cyclist and pedestrian trust in automated vehicles: an on-road and simulator trial. International Journal of Sustainable Transportation.

Marcinkiewicz, V., Wallbridge, C. D., Zhang, Q. and Morgan, P. 2022. Integrating humanoid robots into simulation software generated animations to explore judgments on self-driving car Accidents. Presented at: IEEE Ro-Man 2022 Conference, Naples, Italy, 29 August - 2 September 2022.

Zhang, Q., Wallbridge, C. D., Jones, D. M. and Morgan, P. 2021. The blame game: double standards apply to autonomous vehicle accidents. Presented at: AHFE 2021 Virtual Conference on Human Aspects of Transportation, Virtual, 25-29 July 2021, Advances in Human Aspects of Transportation. Lecture Notes in Networks and Systems Springer, Cham pp. 308-314.

Stephenson, A. C., Eimontaite, I., Caleb-Solly, P., Morgan, P. L., Khatun, T., Davis, J. and Alford, C. 2020. Effects of an unexpected and expected event on older adults' autonomic arousal and eye fixations during autonomous driving. Frontiers in Psychology 11, article number: 571961.

Voinescu, A., Morgan, P. L., Alford, C. and Caleb-Solly, P. 2020. The utility of psychological measures in evaluating perceived usability of automated vehicle interfaces – a study with older adults. Transportation Research Part F: Traffic Psychology and Behaviour 72, pp. 244-263.

Whittle, C., Whitmarsh, L., Haggar, P., Morgan, P. and Parkhurst, G. 2019. User decision - making in transitions to electrified, autonomous, shared or reduced mobility. Transportation Research Part D: Transport and Environment 71, pp. 302-319.

Eimontaite, I., Voinescu, A., Alford, C., Caleb-Solly, P. and Morgan, P. 2019. The impact of different human-machine interface feedback modalities on older participants' user experience of CAVs in a simulator environment. Advances in Intelligent Systems and Computing 964, pp. 120-132.

Morgan, P. L., Voinescu, A., Alford, C. and Caleb-Solly, P. 2018. Exploring the usability of a connected autonomous vehicle human machine interface designed for older adults. Presented at: AHFE 2018: International Conference on Applied Human Factors and Ergonomics, Orlando, FL, USA, 21-25 July 2018AHFE 2018: Advances in Human Aspects of Transportation, Vol. 786. Advances in Intelligent Systems and Computing Springer Verlag pp. 591-603.

Voinescu, A., Morgan, P. L., Alford, C. and Caleb-Solly, P. 2018. Investigating older adults' preferences for functions within a human-machine interface designed for fully autonomous vehicles. Presented at: International Conference on Human Aspects of IT for the Aged Population, Las Vegas, NV, USa, 15-20 July 2018 Presented at Zhou, J. and Salvendy, G. eds.Human Aspects of IT for the Aged Population: Applications in Health, Assistance, and Entertainment, Vol. 10927. Lecture Notes in Computer Science Cham, Switzerland: Springer pp. 445-462.

Cyber Security

Prof Morgan has been leading on human-centric cyber security research for almost 10-years. Notable projects include Airbus Cyber Security and Human Factors (5 Airbus funded projects, 2 funded by ESRC and EPSRC, total value ~£1.5M) where following a 3.5 year major (80% FTE) industry secondment, he is now Director of a new and best-in-class Airbus and CU Centre of Excellence in Human-Centric Cyber Security (ACE-H2CS) and one of two Academic Leads for a Strategic Partnership between Airbus and CU. Whilst much of the research has been part-embargoed (until recently), Prof Morgan (and colleagues) can report that they have e.g. developed leading-edge tools that can account for up to 65% of factors (e.g. individual differences, organisational, technical) that lead to risky human cyber security behaviours, as well as methods (technical, training etc.) to mitigate human vulnerabilities and have conducted research into factors often beyond the control of individuals (including task interruption, distraction, workload, time pressure etc.) that can exacerbate risk taking behaviours in the context of cyber security. Other cyber security projects (e.g. NCSC funded 2019-present - with Dr Morey and colleagues) have involved examining the effects of multitasking (focussed on interruption and distraction) on cyber security work – particularly focussing on errors. Prof Morgan has also conducted research on cyber security and privacy vulnerabilities linked to smart IoT devices, especially those that need to be connected (funded by CREST).

Example publications:
Morgan, P. L., Collins, E. I., Spiliotopoulos, T., Greeno, D. J. and Jones, D. M. 2022. Reducing risk to security and privacy in the selection of trigger-action rules: Implicit vs. explicit priming for domestic smart devices. International Journal of Human-Computer Studies 168, article number: 102902.

Morgan, P. L., Asquith, P. M., Bishop, L., Raywood-Burke, G., Wedgbury, A. and Jones, K. 2020. A new hope: human-centric cybersecurity research embedded within organizations. Presented at: 22nd

International Conference on Human-Computer Interaction (HCII 2020), Virtual, 19-24 July2020HCI for Cybersecurity, Privacy and Trust: Second International Conference, HCI-CPT 2020, Held as Part of the 22nd HCI International Conference, HCII 2020, Copenhagen, Denmark, July 19–24, 2020, Proceedings. Lecture Notes in Computer Science/Information Systems and Applications, incl. Internet/Web, and HCI Springer, Cham pp. 206-216.

Williams, C., Hodgetts, H. M., Morey, C., Macken, B., Jones, D. M., Zhang, Q. and Morgan, P. L. 2020. Human error in information security: exploring the role of interruptions and multitasking in action slips. Presented at: 22nd International Conference on Human-Computer Interaction (HCII 2020), Virtual, 19-24 July 2020HCI International 2020, HCII 2020, Copenhagen, Denmark, July 19–24, 2020, Proceedings, Part III, Vol. 1226. Communications in Computer and Information Science Springer, Cham pp. 622-629.

Bishop, L. M., Morgan, P. L., Asquith, P. M., Raywood-Burke, G., Wedgbury, A. and Jones, K. 2020. Examining human individual differences in cyber security and possible implications for human-machine interface design. Presented at: 22nd International Conference on Human-Computer Interaction (HCII 2020), Virtual, 19-24 July 2020HCI for Cybersecurity, Privacy and Trust: Second International Conference, HCI-CPT 2020, Held as Part of the 22nd HCI International Conference, HCII 2020, Copenhagen, Denmark, July 19–24, 2020, Proceedings, Vol. 12210. Lecture Notes in Computer Science/ Information Systems and Applications, incl. Internet/Web, and HCI Springer, Cham pp. 51-66., (10.1007/978-3-030-50309-3_4)

Morgan, P. L., Soteriou, R., Williams, C. and Zhang, Q. 2019. Attempting to reduce susceptibility to fraudulent computer pop-ups using malevolence cue identification training. Presented at: AHFE 2019: International Conference on Applied Human Factors and Ergonomics, Washington, DC, USA, 24-28 July 2019 Presented at Ahram, T. and Karwowski, W. eds.Advances in Human Factors in Cybersecurity: Proceedings of the AHFE 2019 International Conference on Human Factors in Cybersecurity, July 24-28, 2019, Washington D.C., USA, Vol. 960. Springer Verlag pp. 3-15.

Morgan, P. L., Williams, E. J., Zook, N. A. and Christopher, G. 2019. Exploring older adult susceptibility to fraudulent computer pop-up interruptions. Presented at: AHFE 2018: International Conference on Applied Human Factors and Ergonomics, Orlando, FL, USA, 21-25 July 2018 Presented at Ahram, T. Z. and Nicholson, D. eds.Advances in Human Factors in Cybersecurity: Proceedings of the AHFE 2018 International Conference on Human Factors in Cybersecurity, July 21-25, 2018, Loews Sapphire Falls Resort at Universal Studios, Orlando, Florida, USA, Vol. 782. e Advances in Intelligent Systems and Computing Springer Verlag pp. 56-68.

Williams, E. J., Morgan, P. L. and Joinson, A. N. 2017. Press accept to update now: Individual differences in susceptibility to malevolent interruptions. Decision Support Systems 96, pp. 119-129.

Task Interruption and Distraction – with Applications to Defence, Cyber Security, Transport and Healthcare

PMs ESRC funded PhD (2001-2004, supervised by Prof Dylan M Jones OBE (services to military science) DSc) was in Cognitive Experimental Psychology – 'Now where was I? A cognitive experimental analysis of the effects of task interruption on goal-directed memory' – Prof Morgan established many of the disruptive effects of task interruption on goal directed memory – including characteristics such as interruption duration, complexity and frequency as will the role of (and based on the Memory for Goals model – Altmann, Trafton and colleagues (e.g. 2001, 2007) 'strengthening' (goals in memory) and 'priming' (e.g. cues in the environment) to mitigate some of the disruptive effects. Prof Morgan has continued to research this area over the past ~20-years with e.g. applications to defence (e.g. projects funded by DIFDTC, HSSRC – e.g. Distracting Effects of Low and

High Intensity Light and Sound - HSSRC), cyber security (e.g. projects funded by Airbus, NCSC), transport (e.g. projects funded by ESRC, EPSRC) and healthcare.

Example publications:

Stephenson, A. C., Eimontaite, I., Caleb-Solly, P., Morgan, P. L., Khatun, T., Davis, J. and Alford, C. 2020. Effects of an unexpected and expected event on older adults' autonomic arousal and eye fixations during autonomous driving. Frontiers in Psychology 11, article number: 571961.

Morgan, P., Macken, W., Toet, A., Bompas, A., Bray, M., Rushton, S. and Jones, D. 2020. Distraction for the eye and ear. Theoretical Issues in Ergonomics Science 21(6), pp. 633-657.

Williams, C., Morgan, P. L., Christopher, G., Zook, N. and Hoskins, R. 2019. The effects of clinical task interruptions on subsequent performance of a medication pre-administration task. Advances in Intelligent Systems and Computing 972, pp. 81-92.

Williams, E. J., Morgan, P. L. and Joinson, A. N. 2017. Press accept to update now: Individual differences in susceptibility to malevolent interruptions. Decision Support Systems 96, pp. 119-129.

Morgan, P., Patrick, J. and Tiley, L. 2013. Improving the effectiveness of an interruption lag by inducing a memory-based strategy. Acta Psychologica 142(1), pp. 87-96.

Morgan, P. and Patrick, J. 2012. Paying the price works: Increasing goal-state access cost improves problem solving and mitigates the effect of interruption. The Quarterly Journal of Experimental Psychology 66(1), pp. 160-178.

Morgan, P. L., Patrick, J., Waldron, S. M., King, S. L. and Patrick, T. 2009. Improving memory after interruption: Exploiting soft constraints and manipulating information access cost. Journal of Experimental Psychology: Applied 15(4), pp. 291-306.