

All-Party Parliamentary Group on Artificial Intelligence

Evidence Meeting 7 – Next Steps

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John is a Professor of Software Engineering and a member of the High Integrity Systems Engineering Group (HISE) within the Department of Computer Science at the University of York. He was Head of Department from 2006 to 2012.

His primary research interests are in high integrity computer systems, especially in safety and security. His work has influenced industrial practice both directly and via standards. He has taught extensively at postgraduate level, including on continuing professional development courses for industry.

SUMMARY OF EVIDENCE

I have over thirty years' experience in research, education and consultancy on safety of complex computer-controlled systems. I currently run the Assuring Autonomy International Programme funded by the Lloyd's Register Foundation and the University of York. The Programme is addressing the global challenges in assuring the safety of robotics and autonomous systems (RAS). It is conducting research on the technical issues of safety of RAS using Artificial Intelligence (AI) and Machine Learning (ML), developing educational and training materials, supporting projects developing real-world demonstrators to address assurance and regulatory issues, and influencing the development of standards and regulations for safety of RAS.

What are the practical steps of setting international rules, norms and standards?

Rules, norms and standards tend to be domain specific, e.g. different in the maritime sector to aerospace or automotive.

At the technical level, e.g. assurance of ML, there is merit in developing domain independent norms and standards, and bodies such as the British Standards Institute (BSI) can form the bridge to international bodies, e.g. the International Organisation for Standardisation (ISO).

At the regulatory level, rules and norms must be developed in a domain specific way as, for example, the criteria for avoiding other vehicles (sense and avoid) are necessarily different to those at sea (although they are somewhat related). Further,

the bodies who have regulatory authority are different, and often international, so co-ordinating across domains would be very challenging, and probably of limited benefit.

Technology moves fast, and standardisation often moves slowly. Thus it is important to use mechanisms such as Publicly Available Specifications (PAS) to develop material quickly and to evolve it as the technology changes. Pragmatically: work locally; develop PAS or similar; influence globally. To do this requires support, as it is necessary to establish collaborations between organisations with different skills. The Regulators Pioneer Fund and the Industrial Strategy Challenge Fund are potentially important mechanisms for enabling this.

What is our vision of the new AI and data-driven world?

It will be a net benefit to society, if enough attention is given to safety and acceptability of the technology. AI in the workplace, and embedded in systems such as factory robots or healthcare assistants, can relieve people of boring and repetitive tasks, remove people from harms way, support the elderly and infirm in independent living, and so on. However, to achieve these benefits requires work on safety and regulation (see above) and on public acceptance of the technology.

The forms of AI that will be widely used will be problem-specific, not “general AI”. Systems will be good at particular tasks, e.g. driving cars, monitoring patients’ health, or machining complex 3D shapes, but not able to engage with humans at a “peer level”, e.g. to take part in the full range of human activities. If such “general AI” is possible, it is a long-way off.

Like previous technological revolutions, there will be a substantial change in the nature of work, and there may be some resistance to change, but it seems unlikely that the level of employment will drop dramatically. However, there is likely to be a need for “up-skilling” as RAS take on relatively mundane and repetitive tasks and also re-skilling as AI and RAS bring about changes to the role of humans, e.g. to monitoring autonomous vessels rather than piloting them.

What does it mean to be human in 2025 and 2052?

The same as now! The environment in which humans live and work will be richer due to the development of AI, including RAS. It is not realistic to believe that such systems will supplant humans, or make humans subservient. Well-defined (specific) AI and RAS, solving particular problems, will be supportive and assistive, if designed to be so. AI and RAS will be a force for good in helping humans to have fulfilling lives, but not alter what it means to be human.

Is the roadmap national or international?

International. Having international rules and norms is important economically, to avoid unnecessary costs in assurance, and obstacles to the uptake of technology. There are international bodies in many domains, e.g. the International Maritime Organisation (IMO), the overarching body for the marine sector. The UK can (and must) take a lead, but it is essential to influence the international community to avoid UK suppliers being disadvantaged by working to standards that are not harmonised across the globe.