Total autonomy may not be possible or desirable in smart machines

By 2020, smart machines will be a top five investment priority for more than 30% of CIOs, according to Gartner, Inc. With smart machines moving towards fully autonomous operation for the first time, balancing the need to exercise control versus the drive to realise benefits is crucial.

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Presenting Maverick research findings at Gartner Symposium/ITxpo in Australia today, Brian Prentice, research vice president at Gartner, said Google's self-driving car project is a perfect example of why pursuing full autonomy may be neither possible nor desirable in smart machines.

"Human beings are still required as the final point of redundancy in an autonomous vehicle, so a fully autonomous car requires a steering wheel should a driver be required to take control," said Prentice. "But putting a steering wheel in an autonomous car means a fully licensed, sober driver must always be in the car and prepared to take control if necessary. Not only does this destroy many of the stated benefits of autonomous vehicles, but it changes the role of the driver from actively controlling the car to passively monitoring it for potential failure."

According to Gartner, the 'Google steering wheel dilemma' is representative of a challenge all smart machine initiatives must face.

"Smart machines respond to their environment. But what is the environment that the smart machine is responding to? Environments that are largely uncontrollable are not amenable to smart machine projects because it is difficult, if not impossible, to model accurately," said Prentice. "The trick then is to figure out what is actually controllable and limit smart machines to that which can be accurately modelled and managed."

Prentice said that major unresolved problems in machine learning solutions, such as how to ensure learning data is fully representative and how to avoid "reward hacking", need to be addressed before any autonomous machine that continues to learn from its environment can be deployed as a mass-market solution to a real-world problem.

"The vision of the fully autonomous vehicle will not become reality, for any car manufacturer, in a time frame that doesn't fall into the realm of science fiction," said Prentice. "The failure of this vision will be set against the backdrop of advances in smaller, more pragmatic applications of machine learning in automobiles that will improve safety and driver experience."

Getting the most out of smart machines

According to Gartner, CIOs seeking to maximise the benefits of smart machine solutions must:

• Plan to deliver smart machine-enabled services that assist and are overseen by humans to achieve maximum benefit in the next three to five years, rather than those that are fully autonomous.

• At the beginning of any project aiming to make use of smart machine technologies, identify and analyse the constraints within the environment – in law and in public attitudes – that the eventual solution will face.

• Design any smart machine solution outward from constraints identified in the key areas of user experience, information asymmetry and the business model to hit the sweet spot for smart machine-enabled solutions, and maximise the benefit the technology will provide.

Gartner's Maverick research is designed to spark new, unconventional insights. It is unconstrained by Gartner's typical broad consensus-formation process to deliver breakthrough, innovative and disruptive ideas from the company's research incubator to help organisations get ahead of the mainstream and take advantage of trends and insights that could impact IT strategy and the wider organisation.

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