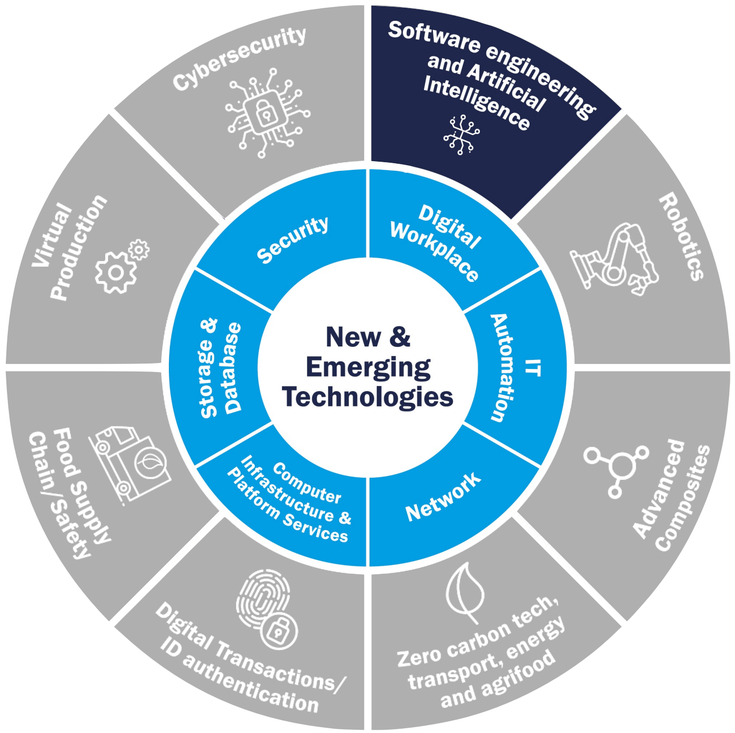

Sources	The Economist, Tech Radar	
Date	September 2020	
Potential scale of impact ★★★★	Certainty of outcome ★★★★	Impact horizon H1 H2 H3

Big, stable quantum computers would be useful devices. They could perform some calculations faster than any non-quantum machine - searching a database, precisely simulating complex chemical reactions to aid development of drugs, speeding up the analysis of optimisation problems for (eg) the transport industry (by finding efficient routes) and finance (by maximising profits given a set of constraints). Boston Consulting Group foresees quantum computers improving the operating income of their users by between $450bn and $850bn a year by 2050.

Unfortunately, big, stable quantum computers do not yet exist. But small unstable ones do. John Preskill, a quantum-computing researcher at the California Institute of Technology, dubs such machines nisqs—Noisy, Intermediate-Scale Quantum computers. A growing number of companies and investors are hopeful that nisqs themselves will be able to do useful work in the meantime. These firms are hunting for “quantum advantage” - a way in which even today’s limited machines might have an impact on their bottom lines.

The big question is what all this is leading up to. There is plenty of promise, but, as yet, no certainty. Finding algorithms that are both commercially useful and simple enough to work within a nisq machine’s limitations is not easy. A report published last year by America’s National Academy of Sciences reminded readers that no commercial applications are currently known to exist.

But developments are speeding up. A Cambridge University-led consortia - with a vision is make quantum computers as transparent and well known as RaspberryPi - has made an operating system available on a chip meaning that desktop QCs are a step closer. IBM has experimentally verified a new form of quantum advantage. Rigetti - a quantum start up in Berkeley, California - has announced the launch of the world's first multi-chip quantum processor which incorporates a proprietary modular architecture that solves some of the key scaling challenges.

Watch these spaces.

QUANTUM COMPUTING

The first commercially relevant applications of quantum computers may appear by 2024