

Today's common beliefs about increasingly autonomous capabilities replay what has been observed in previous cycles of technology change. New capabilities trigger a much wider and more complex set of reverberations, including new forms of complexity and new risks. Risks associated with these complexities are ignored and downplayed, setting the stage for future automation surprises when advocates are surprised by negative unintended consequences that offset apparent benefits. Claims about the future effects that will follow from deployment of more autonomous capabilities are precarious and subject to well documented biases. This cycle of change is different in one major way: increasingly autonomous capabilities are needed to manage the *scale* of operations people seek to meet stakeholder pressures.

First, there are new risks that emerge as people in different roles search for advantage by deploying increasingly autonomous technologies at scale. These risks are measurable but require modifications to common practices for risk analysis and reliability engineering. Second, one can design for the new challenges and new complexities that are certain to arise during this period of technology change. There are new opportunities for innovations to tame and manage the growth in complexity that accompanies deploying autonomous technologies into today's interconnected world.

The risks of autonomy and design solutions will be covered including Doyle's Catch, the reification fallacy, creeping complexity, hijacking of apparent benefits, life cycle extensibility, the cascade race, the fundamental miscalibration limit, overcoming the brittleness of machines, and the low performance ceiling of today's autonomy architecture. Managing the reverberations from deploying increasingly autonomous capabilities at scale requires development and application of techniques in Resilience Engineering.