AI as an Autonomous System: Problems and Opportunities

by Martin Fiore and Tim Carone

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The concepts and applications we think of as “artificial intelligence” are increasing in popularity and complexity. Even the definition of the term is subject to argument among leaders in the field, but generally speaking, AI is research designed to develop algorithms inspired by human intelligence. Whatever you choose to call it, perhaps its most important role is constituting the “decision-making” function within an autonomous system, and in playing this part, it is transformative — a super app whose time has come in manufacturing, in business processes, in security networks, and much more.

To understand what constitutes an autonomous system, think no further than what it takes to be a thoughtful, analytical, and decisive human. In short, an autonomous system comprises the ability to acquire or create content, interpret and develop knowledge from this content, and make a decision and take action. In the case of an autonomous system, this might include a range of capabilities, such as using sensors to gather content (as in the “internet of things”), interpreting knowledge gathered (analytics), and making a decision and taking action (AI). We see these examples played out today in driverless cars, drones, fraud detection, automated farm operations, loan origination, and high-frequency financial trading systems.

For tax professionals and their clients, autonomous system capabilities come into focus as we consider how we gather and work with vast amounts of information. Autonomous systems have the ability to acquire, process, and act on large amounts of structured and unstructured data. Structured data are the type found in general ledgers and other financial databases. Unstructured data are everything else and constitute about 80 percent of the data available for use in tax strategies and reporting. So it stands to reason that employing some level of autonomous system assistance in tax compliance, reporting, and planning could be a logical, natural extension of these powerful new technology tools.

When we speak of routine, day-to-day steps and processes, this is in fact already happening — up to the point of higher levels of strategic decision-making. EY, for example, uses robotic process automation tools to deliver tax returns to its clients.

But to get to the next step with AI and autonomous systems, we need to perfect AI’s ability to make a decision in the appropriate time frame. The autonomous system uses its AI functionality to execute actions based on a decision loop that is in turn based on context. The critical timing required within a context varies widely. For instance, high-frequency stock trading loops average 100 microseconds. Driverless cars average a few milliseconds. Emergency room diagnostics can run from a few seconds to a few minutes. Other medical diagnostics might span a few hours to a few days, and agriculture a few weeks to a few months.
Autonomous System Decision Loop Problems

The risk from the use of an autonomous system arises from the unpredictability and potential irreversibility of deploying an optimization process more “intelligent” than the humans who specified its objectives. Our understanding of what the autonomous system is doing might be much slower than the autonomous system decision loop, which, in reality, is an optimization process. The autonomous system uses inbound data to improve its performance by comparing its output to the “ground truth.” That is why companies test driverless cars for years — it takes that long for the autonomous system algorithms to optimize performance by executing decisions in milliseconds to ensure the car drives on the right side of the yellow line and stops when there is an obstacle in front of it, such as another car or a red light.

So how does a company — or a tax practice — determine that its business processes governed by an autonomous system maintain fidelity to the regulatory, ethical, and quality frameworks within which it operates? The myriad business processes present in organizations are increasingly being governed by autonomous systems executing at a variety of rates. The tax aspects and other accounting considerations of these business processes must be relevant in the same time frames.

How will that happen? Should the accounting process be an autonomous system, and if so, how is its correctness guaranteed? How will a regulatory body determine if a company’s autonomous system is out of compliance? How is that measured and quantified? How will the regulatory body determine what needs to be remedied and to what end state? How does the company perform that remediation and determine if it’s successful? The challenge is further complicated because the aforementioned process typically takes months to do, and by the time the regulatory body makes its decisions, the autonomous system’s performance will have changed, perhaps significantly, relative to when the regulatory body made its measurements.

There is an added complexity. The autonomous system optimization process will demonstrate behaviors that could be called “ethical” or “unethical.” These behaviors will also be characterized in time frames far longer than the autonomous system’s performance time frame. The classic example is when a loan origination autonomous system was found to be denying loans to specific demographics. The autonomous system had no a priori rule; the behavior arose from input inherent to the optimization process. It was an outcome from the autonomous system process, yet we humans would call it unethical. The loan origination issue was years in the making and could take months or even a year to remedy. The expense of the remediation work and — perhaps more costly — the damage to the brand will be significant.

Shaking Up the Notion of Accountability

The basic problem is that until now, humans have always made the decisions. Technologies have always been in a support role. Now, fewer humans are making decisions, and an autonomous system can’t be asked, “Why did you make that decision?” The implications to this are seminal. First and foremost, we have to define exactly what an autonomous system is. Is it a machine, an employee, or a contractor? When business organizations are held accountable by regulatory bodies, it is because their employees or contractors make decisions as part of mission-critical processes.

Decisions have implications. One implication is that a company is out of compliance and must remedy a process or configuration. Can an autonomous system be identified as the source? How is it remedied? An autonomous system is formed from years of testing and optimization. It is not fixed simply by changing the rule set or modifying a configuration. The performance of an autonomous system cannot be known a priori, and there is no guarantee that the simple solution of starting over will achieve a desirable outcome. It might be remedied to perform “properly,” but there is no guarantee it will perform “perfectly.” It might again be out of compliance in the future.

On the Path to a Workable Solution

A potential solution would involve introducing “human augmentation” in which an autonomous system companion teams up with tax practitioners to deal with a mission-critical
autonomous system. Apple Inc.’s Siri and Microsoft Corp.’s Cortana have a long way to go since they are not autonomous systems, nor do they have much AI in them. The voice feature of each is only a presentation layer behind which operates a complex system to collect, process, and create outputs that are then verbalized for human consumption.

The increasing pervasiveness and complexity of the tax codes of states and nations make them a natural practice area for an autonomous system to be leveraged. Currently, autonomous systems are used to assist with tax compliance by some tax authorities, so there is a growing legacy there. Companies should expect that they will need to challenge these autonomous systems with their own versions in order to provide a level playing field. In the future, autonomous systems could be used in three key growth areas for tax and audit practice: (1) output and reporting from the autonomous system used by regulatory authorities; (2) development of tax strategies and reporting for companies, nonprofits, and high-net-worth trusts and individuals; and, in an ironic twist, (3) auditing of autonomous systems that are beginning to govern and execute mission-critical business processes.

Assessing Human Impact

There is pervasive public commentary on how autonomous systems — and technology innovation generally — will cause massive unemployment and job disruption. A recent article in *Fast Company* magazine estimated that nearly half of U.S. jobs will soon be affected in some way by automation.¹ But note the verb used — affected, not eliminated. Technological advancement will free up talented human workforces to focus on higher-level work, and further developments in AI and autonomous systems will represent an incredibly positive opportunity.

The challenge for professional services firms is to rapidly develop the skills and competencies needed to define autonomous system risks and articulate solutions for their clients. They also must develop the ability to implement these solutions that will necessarily have no legacy of previously being implemented. The situation is not that different from the mid-1990s when companies had to create a delivery capability for internet solutions when they had none. They drew on their previous experiences in strategy, architecture, testing, and operations, yet there was a significant circular impact as these basic capabilities fundamentally changed over time. These changes in turn provided new and innovative solutions. Some firms were able to adapt and flourish, and others did not — the same will be true of life with autonomous systems.

Many of the new jobs created out of this evolution will be driven by new “needs” — for competencies in analytics in addition to the technology, for example. Fundamental tax knowledge will remain essential, but it will no longer be sufficient for practitioners to be skilled in strategy development, process reengineering, enterprise and technical architecture, and corporate finance and associated technologies.

The yet-to-be-developed analytics necessary to support these areas because of the enhanced use of autonomous systems will force firms to fundamentally change job roles or add new ones. Computer science, engineering, project management, relationship building, and other skills and capabilities will become important requirements for the successful professional of the future. Similar to the beginning of the internet era, professional firms have an opportunity to lead clients rather than react to their requests for help, and they will need the right employees to make that happen.

Risks Defined

Operationally, the autonomous system companion for a particular professional services firm will evolve over time and be different from the autonomous system companion used by other professional services firms or different practices within a firm. The decisions made by the human half of the team will be reflected in the autonomous system companion evolution as the companion continually optimizes itself in the environment where it operates. Two autonomous system companions in use in two different companies being used by two separate sets of tax

and audit practitioners also will evolve differently and, over time, will be relevant only for their own company and nowhere else.

Surely there will be ethical issues in using autonomous system companions. Over time, the autonomous system companion’s outputs will change because its inputs are changing as it attempts to optimize its performance. The autonomous system’s output could be interpreted as a more creative approach or solution. If so, does the autonomous system companion remain compliant and within ethical guidelines? How do firms prove that the human augmentation solution is correct in its output and provides sustainable output for clients that will be relevant for years into the future?

The choice of partners will be even more important and strategic than during the internet era. A professional services firm could team up with multiple technology vendors, such as SAP and Oracle, as well as their competitors and invest resources to build competencies in many areas. This flexibility will be limited with autonomous systems because business “partners” will be required to provide technology and data, not just technology. It is the inclusion of data as part of a basic vendor offering that will reduce the size of the team to just a few members.

An Optimistic, Forward-Looking View

We believe the positives involved in the use of autonomous system companions in tax and audit practice will far outweigh currently perceived negatives. The negatives will be challenging because for the next decade autonomous system use will set precedents throughout global tax and audit practices. The professional service firm that is able to master and deploy a workable, high-performing human-augmented solution will have a distinct first-mover advantage. First-mover status is key in this case, since it will enable that particular firm to expand the augmented solution faster and make best use of leveraged data from those with whom it works.