When one of the authors of this article began his professional journey in 1968, personal computers were nowhere in sight, a 10-key adding machine was the standard, and accountants literally hand-posted transactions to accounting journals. When someone told you to copy something, it meant writing it out longhand or using a typewriter. Analyzing government financial information was perilous at best, given the inability to readily correlate data and with limited assurance about its reliability and completeness. Audits seemingly took forever and were 100 percent labor intensive.

We’ve come so far; but where will the future take us? Today, we’re on the brink of another quantum leap in our profession that will revolutionize the art of the possible. This article will focus on the movement to intelligent automation, or the “March of Robots,” and the impact it will have on transforming all facets of financial and program management and auditing. We’ll demystify intelligent automation, discuss its importance and benefits, examine the intelligent automation spectrum, highlight its impact on auditing and provide perspectives on the way ahead.1

What is intelligent automation?

Put simply, it’s the automation of mission delivery and business processes by leveraging digital technologies to support tasks undertaken by knowledge workers. While not a cyborg walking around like in the Terminator, software robots, or “bots,” operate like humans, and their already potent capabilities — along with our understanding of how to harness them — continue to rapidly evolve.

What are the benefits?

Some readers may be thinking, “Are the authors talking about eliminating or materially downsizing the accountability profession and the importance of our role?” Absolutely not! Intelligent automation is the natural extension of past technological advances that are now commonplace in our daily lives and drive our ability to innovate. It’s certainly disruptive, but in a positive way. It will simplify what we do and how we do it. It can spur new jobs and enhance human skills and expertise.2
Who doesn’t want to replace mundane, repetitive tasks with higher-value analytic work, resulting in better accountability, transparency and citizen service? What about seamlessly closing the books in a matter of hours at year-end or knowing real-time throughout the year where entities stand financially by having reliable, useful information at our fingertips? The human element will remain critical. It was a breakthrough in 1997 when IBM’s Deep Blue supercomputer defeated legendary world chess champion Gary Kasparov. Another important breakthrough came when a chess player, paired with a supercomputer, consistently defeated a supercomputer playing alone. So view intelligent automation tools as another team member.

In a nutshell, intelligent automation tools can enhance:

**Productivity/Performance**, working 24/7, 365 days a year, performing tasks at digital speeds; doing more and doing it better, while appreciably driving down costs. Public-sector employment as a share of the population continues to decline, and government’s personnel footprint is expected to further shrink. It’s imperative we not keep doing the same thing the same way. We have to be leaner and smarter. The fiscal realities faced by all government levels won’t just go away, and without significant action, will be greatly exacerbated over time.

**Employee satisfaction**, allowing staff to focus on strategic initiatives that more profoundly impact the organization, resulting in greater job satisfaction. Expect to see substantial declines in routine backroom transaction processing and reconciliation activities, with a need for staff with broader and deeper analytical capabilities, such as data scientists.

**Recruiting**, addressing expectations of millennials for technology-rich environments. Technology is their world. In 2015, millennials became the largest generation in the U.S. workforce at 34 percent, a number expected to rise to 75 percent by 2025. 

**Scalability**, instantaneously responding at digital speeds to fluctuating and large workloads. These tools are noninvasive and can work with the existing legacy information technology (IT) infrastructure.

**Consistency/Predictability**, avoiding inconsistent decisions and judgments, such as what’s approved or not approved by a policy or rule. They’re configured to solve a problem the same way every time.

**Quality/Reliability**, by always doing what they’re told to do. Properly configured, mistakes and human error are essentially eliminated. Conversely, when not, a robot will fail at digital speeds.

**Auditability**, automatically keeping a complete, readily retrievable audit trail. A software log documents every action taken and the corresponding outcome.

**Citizen engagement**, appreciably improving citizens’ experience with government services through reduced wait times and more accurate and prompt assistance and responses. In 2016, public customer satisfaction with the quality of federal products and services rose to 68 percent from 63.9 percent in 2015, with local government satisfaction rising to 72.5 percent. Comparable national rates across all nongovernment sectors stood at 75.4 percent.

What is the intelligent automation spectrum?

Think in terms of three classes, with recognition that each will continue to evolve and others may emerge.

1. Robotic process automation (RPA)
2. Enhanced process automation
3. Cognitive automation

**RPA**: Found in almost all government organizations today, RPA automates very rudimentary processes and thinking tasks that are typically repetitive, involve multiple systems, and follow very
explicit steps. Research by the London School of Economics and Political Science identified a 650- to 800-percent return on investment in robotic technology for certain back-office tasks over three years.\textsuperscript{11}

An example is the development of a bot to perform a change of address or income-level update one time across disparate systems that include this information. Virtual bots (not actual robots) can behave like a human user, including logging on with credentials. Bots can bring quick-hitting benefits with nominal investment (sometimes in just a few weeks), followed by incremental benefits through additional automation. Organizations are introducing countless new bots, given the relative ease of development and implementation and their broad application across programs and operations.

**Enhanced process automation:** Additional capabilities derive from an ability to:

- Solve problems and perform work activities, often referred to as “out-of-the-box” knowledge;
- Understand natural language (natural language processing or NLP) and, thereby, interpret unstructured data, such as the unbounded wealth of information from the internet, emails and social media content; and
- Learn new knowledge by either observing how a human solves problems or by consuming additional data.

A differentiator is the ability to deal with high volumes of complex transactions requiring deeper analytic capabilities across structured and unstructured information. Formerly, data had to be structured (such as in a spreadsheet or database), and even then there could be challenges. With as much as 80 percent of the world’s data being unstructured,\textsuperscript{12} the ability to bring in information from any source in any format, such as from nonstandard systems and the internet, and for the tools to be able to learn new knowledge, are game changers for widespread program and back-office transformation.

**Cognitive automation:** The most advanced class, cognitive software mimics human activities, such as perceiving, inferring, gathering evidence, hypothesizing and reasoning. These solutions are taught versus being programmed. The solution would be taught an area of interest, or domain. It then continues to learn and solve problems within that domain, generally on its own. Cognitive systems ingest massive amounts of information on which to quickly formulate hypotheses that a human brain (or a hundred human brains) could never handle. Think of IBM’s Watson winning Jeopardy against its two greatest champions, or the Google car navigating city streets on its own.

Let’s look at a hypothetical cognitive automation before-and-after for a physician in a Department of Veterans Affairs hospital. Today, doctors examine the patient, medical records and test results; consider similar cases they have seen or read about; may consult with several peers; consider a relative handful of familiar treatment protocols; and recommend a patient treatment plan.

In the future, supported by cognitive tools, the doctor still examines the patient, but then submits the results, together with medical records and test results, to a cognitive medical consultant (CMC). The CMC references thousands of similar cases across the world; evaluates millions of test results; leverages all relevant available information, such as medical journal articles; considers all known and experimental treatment protocols; and develops a patient treatment plan. The doctor reviews the CMC’s plan, and applying technical knowledge, experience and intuition, recommends a treatment plan to the patient.
being transformed through RPA and enhanced process automation solutions, and cognitive solutions are right around the corner. We’ve only just begun, with unprecedented breakthroughs on the horizon.

Auditors will become more effective and efficient, delivering higher quality audits and greater value. We will see (1) dramatically increased audit coverage and consistency through centralized data routines, (2) much more time focused on higher-risk transactions and anomalies, and (3) greatly increasing capability to detect potential fraud, waste and abuse through the evaluation of 100 percent of an organization’s accounting and related-program records. Analysis will be more granular, with deeper insights into enterprise risks and greater nexus between financial and performance accountability, which are mainstays of the Government Performance and Results Act Modernization Act.

As audits are transformed from the traditional, manually intensive approach to ones that leverage intelligent automation, prepare for audits that will likely follow these four phases:

1. **Planning:** Auditors will evaluate the data architecture, identify targeted data sets and gain an understanding of the methods of extracting data from the organization’s records.

2. **Extraction:** The targeted data is replicated for analysis in the auditor’s secure environment. A variety of tests are performed by auditors supported by bots, to ensure the replicated data is intact and ready for analysis.

3. **Analysis:** A battery of automated data validation checks and analysis tools are performed against the data to identify errors, anomalies and potential breakdowns of the organization’s internal controls and data-integrity rules. Auditors will look at transactions in real time. Routine, manual audit processes are already possible. What if we could process super-data sets and apply evidence-based learning in the context of predictive analysis and hypothesis generation? What if we could reduce the cost in some financial processes by 40 to 75 percent, while improving speed, accuracy and control? What if the tools were noninvasive, meaning little or no change to existing IT architectures, and simple to operate with lower maintenance costs?

How will auditing be impacted?

Whereas basic technology enablers have systematically replaced the need to manually scour mountains of paper circa 1968, quantum technology leaps will revolutionize auditing in ways never before imagined. Auditors will have at their fingertips ever-more powerful analytic tools and cognitive technologies to analyze data sets that know no bounds and include financial and nonfinancial information. Auditors will look at transactions in real time. Routine, manual audit processes are already
4. Reporting: Auditors will be able to present findings and observations that don’t rely as heavily (or eventually at all) on projected results and samples, but speak to the total number of instances in which errors or anomalies were observed across all of the organization’s accounting and related-program records. In combination with visualization tools, intelligent automation can bring audit results to life. There will be deeper and more robust perspectives on program and operational risks, and insights across business operations and programs.16

What is the way ahead?

“OK, you’ve sold me; but how do we make this happen?” Through technology advances, our profession has already experienced dramatic changes that were unimaginable at their outset, and along the way, greatly expanded our knowledge, skills and abilities to remain relevant. Use the past as prologue in looking ahead. Have you ever heard anyone say they want to return to the era of the 10-key adding machine or documents copied by hand? The same will hold true decades from now when people look back at financial and program management circa 2018.

As our profession wrapped its arms around past changes, we’re confident it will again rise to the occasion. Choosing to adopt an intelligent automation model is the first step of the journey. Here are eight takeaways for the road ahead.

1. Challenge the myths

Terminology like artificial intelligence and robotic process automation can sound daunting. When segmented into three classes, the technologies and their practical applications in government are easier to understand and accept.

2. Here to help and streamline

A common misconception is that intelligent automation’s primary purpose is to reduce the workforce. Rather, automation is meant to streamline mundane, routine tasks to allow the workforce time to spend on more meaningful, strategic and rewarding tasks to enhance their ability to serve the public. Have meaningful conversations focused on opportunities by engaging staff at all levels to promote understanding and support.

3. Expanded services to hard-to-reach citizens

One of many benefits of technology like bots is the ability to more quickly communicate with all citizens; whether they’re in big cities or in rural areas, or face limitations that now make it difficult to otherwise communicate with their government.
4. New answers, unprecedented insights

Intelligent automation enables organizations to harness massive and disparate datasets to uncover previously undetectable patterns and solutions.

5. Prioritize governance and business-case processes

Before deploying intelligent automation, have a technology-integration plan and governance model in place. Disciplined processes make a difference.

6. Start small and move toward more sophisticated toolsets

Incremental change, such as first implementing RPA, can be relatively low cost, while offering new ways to improve performance and reduce back-office operational burden. RPA can often be accomplished within normal program and operational mission execution without distracting core IT resources from enterprise-wide endeavors.

7. Break down barriers that impede innovation

Guard against cultures that perpetuate the status quo and can tolerate only nominal change. Break down stovepipes and foster collaboration, open communication and accountability. This starts with top leadership, who must fully buy in and lead the charge.

8. Embrace intelligent automaton — understand it; get ahead of it as an early adopter

Those who don’t will be disadvantaged. Ignoring intelligent automation as a transformation driver invites adverse impacts on government’s ability to meet citizen needs and carry out vital missions.

Final thought

In the words of John F. Kennedy: “Change is the law of life. And those who look only at the past or present are certain to miss the future.”

Endnotes

4. Bank of America Merrill Lynch estimates that the global market for robots and artificial intelligence will reach $152.7 billion by 2020, with improved productivity gains of 30 percent in some industries. (See “Robotics Revolution – Global Robot and AI Primer,” Dec. 16, 2015.) Productivity gains of this magnitude in government backroom operations equate to significant cost savings.
17. President John F. Kennedy, Address in the Assembly Hall of the Paulskirche in Frankfurt, June 25, 1963.
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