



INTELLIGENT AUTOMATION PRIMER

An overview of the journey to intelligent automation

EMERGING TECHNOLOGY COMMUNITY OF INTEREST Intelligent Automation Working Group

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Synopsis

The goal of this primer is to help readers understand how they can adopt various automation technologies to make their businesses more effective. The term Intelligent automation marries artificial intelligence—including natural language processing, machine learning, and machine vision—with automation to replicate and/or imitate human actions and reasoning to perform tasks.

Intelligent Automation (IA) offers great potential to help government maximize efficiencies, increase compliance, and liberate human workers to focus on higher value tasks.

This primer provides definitions, use cases, technologies, benefits, and impacts to government including succinct education on the topic for federal agencies. As the market for IA technologies matures, these terms and definitions may evolve. The use cases presented are from across the US Federal as well as state government agencies showing how those agencies are realizing the benefits of intelligent automation. The impacts to human workers are analyzed as well as impacts to working processes, networks, and systems.

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Advancing Government Through Education, Leadership, and Collaboration

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American Council for Technology-Industry Advisory Council (ACT-IAC)

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The ACT-IAC Emerging Technology Community of Interest (ET COI) mission is to provide an energetic, collaborative consortium comprised of leading practitioners in data science, technology, and research, engaged with industry, academia, and public officials and executives focused on emerging and leading technologies which transform public sector capabilities. The Intelligent Automation working group is part of Emerging Technology COI with goals to help agencies (1) Learn – educate federal agencies on intelligent automation; (2) Assess – help agencies assess problems that can be automated; and (3) Implement – provide a blueprint for full lifecycle implementation.

Disclaimer

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Introduction

The term **intelligent automation** marries **artificial intelligence**—including natural language processing, machine learning, and machine vision—with automation to replicate and/or imitate human actions and reasoning to perform tasks. Today, intelligent automation (IA) is changing the way business is done in nearly every sector of the economy. This primer explores how government agencies can automate manual activities – “the hand work” -- and shift workers to “the head work.” Intelligent automation will free workers to focus on tasks requiring their human strengths such as intelligence, reasoning, judgment, and empathy.

Enabled through key technologies (see “Definitions” section), IA allows government to enhance productivity and efficiencies, reduce operational risks, and improve customer experience. Each of the technologies offers a unique approach to automation and most build upon each other to deliver end-to-end automation.

IA offers great potential to help government maximize efficiencies and increase compliance. To achieve this, agencies must address governance in the areas of technical, infrastructure, operational, regulatory, and security. Focusing on each of these early in the IA journey will enable agencies to realize the benefits while maintaining a governance structure that delivers on the promises of IA.

The Office of Management and Budget (OMB) released a memo M-18-23 dated August 27, 2018 “*Shifting from Low-Value-work to High-Value work*” which emphasizes the need for introducing new IA technologies, such as RPA, to reduce repetitive administrative tasks.

Definitions

Since IA is new, it is important to provide definitions to introduce the technology and business terms. Terms used are defined further with examples.

The Intelligent Automation Journey

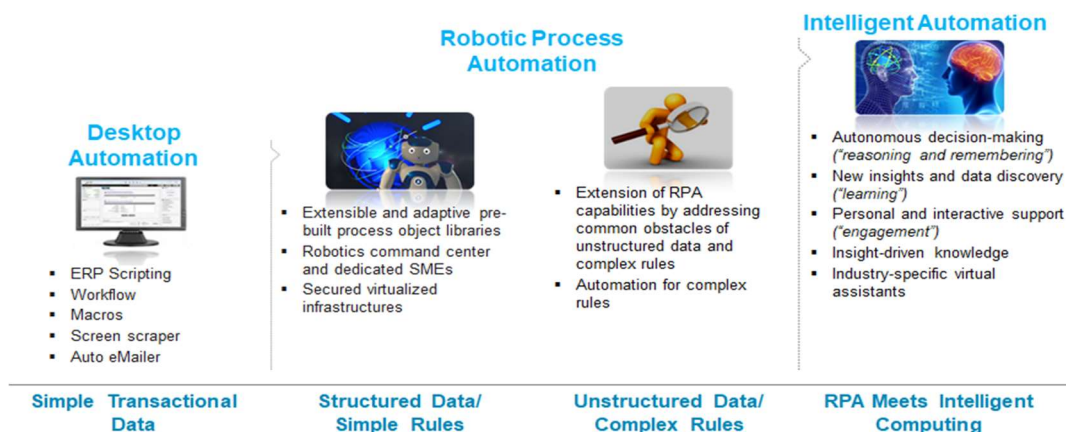


Figure 1: Agencies can commence their automation journey with increasing levels of capabilities to deliver cost savings, shorter cycle times, and increased productivity.

Desktop Automation

The technique, method, or system of operating or controlling a desktop process by automatic means, such as by workflows, scripting, and macros, therefore reducing human intervention through automatic transactions.

Robotic Process Automation (RPA)

RPA is a form of IA that uses simple rules for structured data. Some people use the term “Robotic Process Automation” or RPA for tools and techniques to automate a series of rules based human steps done on a computer or desktop (such as copying from one system and pasting into another system).

Robotic Process Automation/RPA is an automated tool that at its most fundamental, takes mundane tasks and automates them so that machines perform the task. It is distinguished from AI and Machine Learning because RPA deals with an automated business process at its core. There are increasing levels of sophistication based on the increasing use of AI and Machine Learning.

The robot has a user ID just like a person and can perform simple rules-based tasks using structured data such as accessing email and systems, performing calculations, creating documents and reports, and checking files. RPA can play many different roles. For example, at one large retailer, it is being used to reduce excess queue procedures affecting hundreds of high-risk accounts a day, freeing up 23 percent of full-time employee’s time to take on proactive account-management positions instead.

During past two decades, almost every major commercial firm has invested in low cost countries or worked with Business Process Outsourcing (BPO) firms to outsource their manual processes.

However, while this virtual labor source was much cheaper than the local talent, it was still costly and prone to errors. Manual processes slow down your organization, introduce manual errors due to fatigue and boredom while reducing client satisfaction, and lead to costly fixes. Irrespective of industry, everyone wants to minimize manual processes and leverage automation as appropriate.

Enhanced RPA

RPA can be taken a step further by addressing unstructured data using more complex, rules-based tasks with inconsistent data. Autonomic processes are designed to handle the predicted and unpredicted computing activities required to process structured and unstructured data from multiple and disparate sources using more involved rules. These processes are designed to be self-managing for users reducing the complexity of operations.

Intelligent Automation (IA)

IA—the combination of artificial intelligence and automation—is starting to change the way business is done in nearly every sector of the economy. IA systems sense and synthesize vast amounts of information and can automate entire processes or workflows, learning and adapting as they go. Applications range from the routine to the revolutionary: from collecting, analyzing, and making decisions about textual information to guiding autonomous vehicles and advanced robots. **Intelligent automation marries artificial intelligence—including natural language processing, machine learning, and machine vision—with automation.** This convergence of technologies produces automation capabilities that dramatically elevate business value and competitive advantages. Figure 1 shows the increasing levels of IA. It is already helping companies transcend conventional performance tradeoffs to achieve unprecedented levels of efficiency and quality.

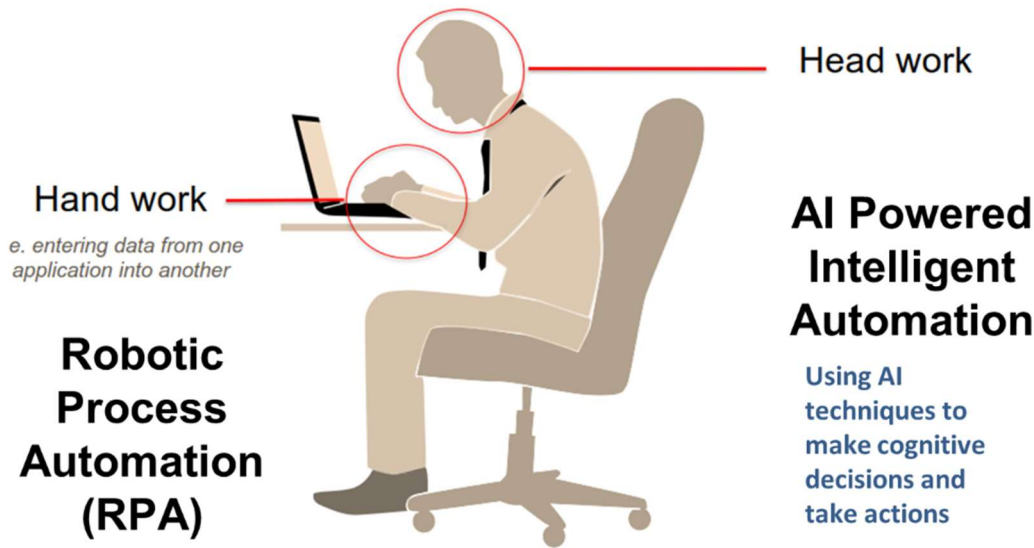


Figure 2: Intelligent Automation combines automation of hand work and head work (adapted from presentation by WorkFusion)

Below are definitions of the key topics and components that are the building blocks of intelligent automation.

Smart Workflow

Smart Workflow is a process-management software tool that integrates tasks performed by groups of humans and machines (e.g., by sitting on top of RPA to help manage the process). This allows users to initiate and track the status of an end-to-end process in real time; the software will manage handoffs between different groups, including between robots and human users, and provide statistical data on bottlenecks.

Chatbot or Virtual Assistant

A chatbot or Virtual Assistant is a computer program designed to stimulate conversation with human users, especially over the internet. Online shoppers often see chatbots offering recommendations of

additional items others have purchased when they have bought what you have in your online shopping cart.

In many instances, the terms chatbots and Virtual Assistants are used interchangeably. However, the distinction is largely based on the degree to which they engage the end user in solving the problem. A chatbot operates on what is called a single-turn exchange – the end user makes a statement (or asks a question), which is interpreted or recognized for its intent and then the intent is mapped to a specific task. For example, someone might say, “Hey Siri, call Bob mobile,” or “Alexa, turn on patio lights.” Virtual Assistants, on the other hand, may be thought of as a personal butler – someone who knows you deeply, is with you all the time, and is dedicated to just you and serving your needs. For this to happen, the Virtual Assistant needs to know a great deal of context about you and then use that context to interact with you. The more a Virtual Assistant interacts with you, the better it gets in responding to your needs.

Artificial Intelligence (AI)

Any discussion of Intelligent Automation will naturally include reference to Artificial Intelligence (AI). The English Oxford Living Dictionary gives this definition: “The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.”

Artificial Intelligence encompasses a range capabilities, some of which are described below. For further understanding of Artificial Intelligence, please refer to the ACT-IAC Artificial Intelligence Primer assembled by the Emerging Technology Community of Interest Artificial Intelligence Working Group.

Machine Learning

Machine learning is a subset of artificial intelligence in the field of computer science that often uses statistical techniques to give computers the ability to “learn” (i.e., progressively improve performance on a specific task) with data, without being explicitly programmed. Machine learning could be a game changer for insurers, for example, in the race to improve compliance, reduce cost structures, and gain a competitive advantage from new insights. A much simpler version of Machine Learning, advanced analytics has already been implemented extensively in leading HR groups to determine and assess key attributes in leaders and managers as to better predict behaviors, develop career paths, and plan leadership succession.

Unsupervised Learning

Unsupervised machine learning is the machine learning task of inferring a function that describes the structure of “unlabeled” data (i.e., data that has not been classified or categorized). Since the examples given to the learning algorithm are unlabeled, there is no straightforward way to evaluate the accuracy of the structure that is produced by the algorithm. In unsupervised learning, the

machine learning algorithm identifies patterns on its own. **Unsupervised learning is more commonly used for clustering, grouping problems.**

Supervised Learning

Supervised learning is the machine learning task of learning a function that maps an input to an output based on example input-output pairs. It infers a function from labeled training data consisting of a set of training examples. An example is the ability of an algorithm to learn photographs of cats and dogs that have been labeled as such and identifying cats from dogs with a certain amount of accuracy based on that learning.

Deep Learning

Deep learning (also known as deep structured learning or hierarchical learning) is part of a broader family of machine learning methods based on learning data representations, as opposed to task-specific algorithms. Learning can be supervised, semi-supervised or unsupervised.

Deep learning architectures such as deep neural networks, deep belief networks and recurrent neural networks have been applied to fields including computer vision, speech recognition, natural language processing, audio recognition, social network filtering, machine translation, bioinformatics, drug design and board game programs, where they have produced results comparable to and in some cases superior to human experts.

Natural Language Processing (NLP)

Natural language processing (NLP) is an area of computer science and artificial intelligence concerned with the interactions between computers and human (natural) languages, in particular how to program computers to process and analyze large amounts of natural language data. Challenges in natural language processing frequently involve speech recognition, natural language understanding, and natural language generation. NLP, Natural Language Understanding (NLU), and Natural Language Generation (NLG) are the building blocks of chat bots, virtual assistants on web sites, and call center robots.

Natural Language Generation (NLG)

Software engines that create seamless interactions between humans and technology by following rules to translate observations from data into prose. Broadcasters have been using natural language generation to draft stories about games in real time. Structured performance data can be piped into a natural language engine to write internal and external management reports automatically. NLG has been used by a major financial institution to replicate its weekly management reports.

Cognitive Agents

Technologies that combine machine learning and natural language generation to build a completely virtual workforce (or “agent”) that is capable of executing tasks, communicating, learning from data

sets, and even making decisions based on “emotion detection.” Cognitive agents can be used to support employees and customers over the phone or via chat, such as in employee service centers.

Computer Vision

Computer vision is what powers a barcode scanner’s ability to “see” a bunch of stripes in a Universal Product Code (UPC). It is also how Apple’s Face ID can tell whether a face its camera is looking at is yours. Whenever a machine processes raw visual input – such as a JPEG file or a camera feed – it is using computer vision to understand what it is seeing. It is easiest to think of computer vision as the part of the human brain that processes the information received by the eyes – not the eyes themselves. One of the most interesting uses of computer vision, from an AI standpoint, is image recognition, which gives a machine the ability to interpret the input received through computer vision and categorize what it “sees.”

Implementing Intelligent Automation

“Let’s take the robot out of the person” - Unknown

Intelligent automation can deliver significant business value such as faster cycle times, lower costs, better efficiencies, and higher customer satisfaction including operations beyond typical working hours. Take an example of a fictional organization where a customer service representative pulls data from 5 – 6 disparate systems to provide a “business as usual” service. With intelligent automation, robots can replace manual clicks (RPA), interpret text-heavy communications (NLP), make rule-based decisions that do not have to be preprogrammed (machine learning), offer customers suggestions (cognitive agents), and provide real-time tracking of handoffs between systems and people (smart workflows). Employees’ time will be liberated to focus on more complicated (higher tiers) of customer requirements.

Figure 3 illustrates the tradeoff between business value to an organization versus the complexity of implementing intelligent automation. Implementation complexity depends on domain (HR, finance, customer service, etc.) and the tools selected (RPA, natural language, machine learning algorithms, IT requirements, etc.)

Agencies must first evaluate the business benefits of automating a specific use case. Example Task XYZ conforms to a set of business rules and, if automated, will make the cycle 5X faster and save 10,000 person-hours. This benefit must then be balanced against the cost of implementing a solution and maintaining it.

Figure 3 identifies, in numerical order, the priorities to select suitable business cases for implementation. For instance the number 1 priority would be for use cases where the benefit is high and implementation complexity is lowest.

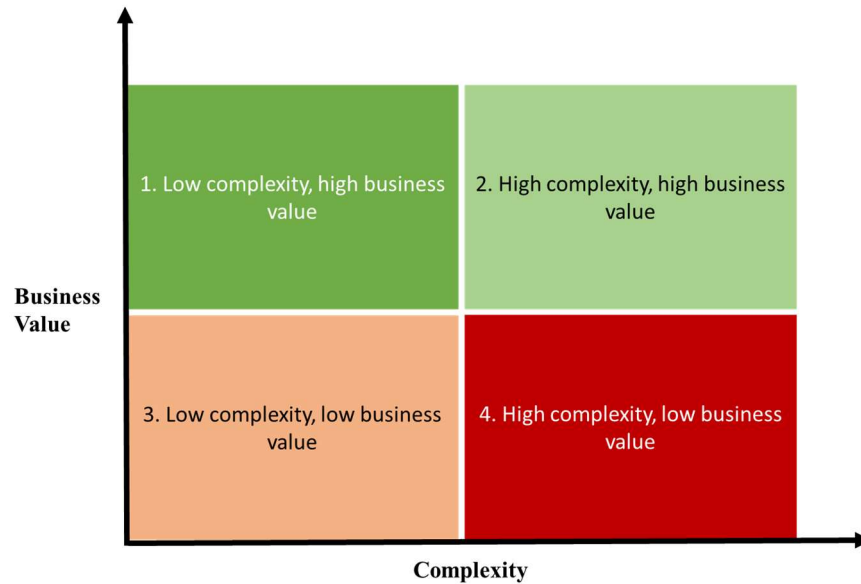


Figure 3: Intelligent Automation Business Value versus Complexity of Implementation to guide prioritization of projects

Intelligent automation amplifies business outcomes. Key to success with IA is to select correct scope, bring the right set of technologies and experts together, proper training, and managing expectations and change effectively. Following are some examples of areas and tasks where IA can have significant impact:

Simple, manual work

- A. Automation of data aggregation and data rekeying
- B. Automation of *“not-in-good-order”* checks for new applications or benefits

Back-end processes

- A. Full automation of policy maintenance and client data changes
- B. Automation of data feed into analytics-enhanced rules to facilitate *auto-decisions*
- C. Automation of *other small transactions* with lower but incremental impact

Front-end processes

- A. *Correspondence* creation and sending
- B. Multiple system information updates and benefits analysis

Current Landscape

There are many products available in the market that claims to be the best in all aspects of IA requirements and it can be very confusing as you start to select technologies. With the mission to demystify this confusion and uncover the truth to successful IA deployment, an industry research was

conducted by HFS Research. This study was based on interviews with clients and product partners across various key factors including:

- **Ability to execute** – product functionality, integration and support, security, and governance
- **Innovation capability** – flexibility and scalability and embedding intelligence
- **Voice of the customer** – products ability to drive business outcomes

There are at least 50 IA vendors globally and due diligence is needed to select the appropriate tool for an agency requirement.

Benefits to the Business of Government

The potential for transformational change for government via the use of IA is significant. Industry visionaries foresee significant changes to the way work is done enabling organizations to improve the speed in which services are delivered to the citizen, information is gathered and delivered to stakeholders, and workers are enabled to focus on more meaningful work. At the time this document is published, the most popular automation initiatives are within the CFO office. There is a natural affinity for this as early automation programs are most often directed toward cost savings use cases. As government becomes more sophisticated at using automation, the potential use and benefit to government will extend into all functional areas.

Drivers for automation are significantly different between government and industry. Rather than delivering returns to investors, government is focused on accomplishing mission goals, preparing for our national defense, or delivering services to citizens. Further motivation stems from budget and staff constraints and changing priorities as the balance of power shifts among elected officials. What IA offers government is the ability to respond more rapidly to changing priorities and the expectation that citizen-focused services will be able to offer capabilities similar to industry. Additionally, industry has been using IA longer than government, so government will benefit from the lessons learned and leverage the knowledge offered by the banking, retail, and telecommunications industries.

Many automation programs begin with RPA. RPA, while not intelligent, is often a stepping stone to the world of IA. RPA-generated data and processes can be leveraged by more complex IA automation such as machine learning can identify patterns in the data generated by RPA. As the sophistication of the agency's automation team increases, the complexity of the automations will increase. A frequent progression is RPA, Image Recognition, NLP, Machine Learning, and AI.

While the promise of a financial savings, increasingly rapid service delivery, and more efficient and informed decision making predict a bright future, there are many non-technical aspects that agencies must consider that will be discussed in the section entitled "Impact to the Government." The next section, entitled "Government Use Cases," describes how some agencies are realizing benefits from automation programs today.

Government Use Cases

IA can be applied to use cases from medical, financial, compliance reporting, procurement, and human resources. Currently, the most common projects are within Chief Financial Officer organizations. The high volume, rules-based tasks lend themselves to automation.

IA can provide dramatic improvements in completing highly repetitive tasks. Use cases that are ideally suited include those that are highly manual in nature, rules-based processes, and cross multiple systems that are often referred to as “swivel chair integration.” Use cases piloted by the government include GSA Schedule 70, call center automation, and medical instrument tracking.

When evaluating IA use cases, criteria to consider include:

- ☐ Will automation result in cost savings?
- ☐ Will automation result in improved customer service?
- ☐ Are the current process rules based with few exceptions?
- ☐ Are the tasks under consideration highly repetitive?
- ☐ Do the tasks require human interaction to take data from one system and input one or more other systems?
- ☐ Are workers performing the work often bored by the tasks?
- ☐ Are finding and retaining workers to fulfill the manual tasks difficult?

When evaluating potential IA use cases, other important considerations should include:

- ☐ Will the government need to work with employee unions?
- ☐ Will IT embrace the project and take over operations and maintenance?
- ☐ Has IT been included in the pilot and proof of concept phases?
- ☐ What will be the impact on the workforce? Will workers consider IA as a benefit to them, or do they consider IA a threat to their job?
- ☐ What software tools will be used to enable the automation? Will the project require support from resources other than subject matter experts, such as IT, Legal, or Union representation?

Potential use cases are varied and can encompass almost any functional area in government that meets the some or most of the criteria cited above and include:

- Help Desk
- Human Resources
- Audit and Control
- Procurement
- FOIA
- Compliance
- Finance and Accounting
- Inventory Control
- Security

Use Case Examples

RPA: GSA CFO Office Dashboard for FAS Inter-agency Billing Chargebacks

There are approximately 100 manual steps required to manage the data and workflow for the General Services Administration (GSA) Federal Acquisition Service (FAS) billing chargebacks by other agency trading partners. Chargebacks are rejected or disputed inter-agency billing. The GSA CFO Office created a central data store and dashboard to manage the workflow necessary to resolve the chargebacks.

- **The bot has reduced the process time from 3-5 hours to approximately 30 minutes, and the process can now be run daily instead of weekly. Labor time was reduced by 80 hours per month.**

RPA: GSA Intragovernmental Reporting

GSA's CFO Office performs 145 manual steps to produce intra-governmental financial reporting that meets OMB and Treasury requirements. It takes 11 people seven days to execute, analyze, and summarize over 25 monthly queries for 37 Intragovernmental trading partners. By implementing RPA, GSA will save 140 labor hours per month, reduce human error, and improve the timeliness of data exchange with trading partners. The time savings will enable GSA staff to focus on working with trading partners to resolve intragovernmental accounting differences, review and update out-of-date OCFO policies, and clean up known data integrity issues. GSA expects to implement a bot for this process in Q1 FY 2019. This is a use case that exists for most federal agencies.

- **GSA will save 140 labor hours per month, reduce human error, and improve the timeliness of data exchange with trading partners.**

RPA: GSA Monthly Eliminations

The GSA CFO Office executes data queries of GSA systems based on specific criteria for intra-fund and inter-fund activity for revenue, receivables, expenses, payables, prepaids and advances, and these are used to make adjusting entries. The process complies with reporting requirements to Treasury and OMB. The process is very laborious and time sensitive. A team of 5-6 people take 8-12 days to create approximately 455 reports. A bot, which is expected to be in operation in Q1 FY 2019, will save 160 hours each month for eight monthly reports, and 250 hours each quarter preparing the quarterly reports. The total labor time reduction for GSA is 2,288 hours per year. This automation project will enable staff to undertake higher-value accounting activities.

- **The bot is expected to be in operation in Q1 FY 2019 and will save 160 hours each month for eight monthly reports, and 250 hours each quarter preparing the quarterly reports. The total labor time reduction for GSA is 2,288 hours per year.**

RPA: NASA Shared Services uses RPA for Grants Management

The Grants Managers at the Stennis Space Center had been tracking the status of grants and then sending emails to delinquent grant recipients via a manual process of searching the Grants database for troubled grantees. Each Grant Manager would typically send 50-75 emails per day notifying grant recipients of their status. The RPA would run every night and would find the delinquent grant recipients, open a case in ServiceNow, and email the records to the Grants Manager. Every morning, the Grants Managers would arrive at work to find a list of troubled grantees which they would use to work on remediation plans with the grant recipient.

- **Within the six-week development and deployment process, NASA was able to determine that they saved a little less than \$50,000 per year on associated costs.**

IA: FDA Medical Device Tracking

The Food and Drug Administration uses IA to track surgical trays used in surgical procedures. For example, surgical trays that are used for hip replacements are prepared for surgery by a nurse technician and populated with all the parts that could possibly be necessary for a hip replacement. This includes the actual ball and socket joint and all the plates, pins, screws, etc. that the orthopedist may need during the surgery. Each of these parts has a unique serial number that must be recorded and attached to the patient's medical records. The nurse takes a digital image of the surgical tray once it is prepared. After surgery, another digital image is taken of the tray and the intelligent system identified the parts missing, tracks those parts and the corresponding serial number and assigns it to the patient's medical records, and creates a list of parts the nurse needs to add to the surgical tray for the next surgery.

- **The surgical team benefits from a more accurate and efficient tray preparation.**

Chatbot: Local City and County governments automating 311

The Maryland Department of Assessment and Taxation's website [businessexpress.maryland.gov] is designed to help small business owners and entrepreneurs start, manage, and grow their businesses in the state of Maryland. The website has implemented a chatbot to answer and guide entrepreneurs in achieving the above objectives. The chatbot is trained based on the most commonly asked questions by existing business owners and entrepreneurs and the content is updated in response to the performance of the automated chatbot. State officials said more than half of all state business documents are filed online, 40 percent outside of normal business hours. Having an automated assistant that is available 24x7 allows Marylanders to interact with the state anytime that convenient for them.

- **This application will improve the customer experience and citizen engagement.**

IA: State Department Uses Intelligent Automation to Improve Efficiency for Visa Applicants

The US State Department wanted to improve customer service and efficiency for visa applicants who have questions while in the application process. State uses intelligent automation that includes machine learning, natural language processing, and RPA to generate a response to the applicant's questions. Questions and answers are in English only. A government agent reviews the IA generated response and when necessary, adds additional information. The system learns from the new procedure so that the accuracy of responses can be improved. Program results have been measured by response accuracy.

- **95% accurate in India and at or above 82% in other countries.**

RPA: Bureau of Fiscal Services Uses RPA for Financial Management

The Bureau of Fiscal Service piloted RPA software on seven core financial management processes, each focused on an element in the data entry, reconciliation, and testing functions. Prior to automation, each process was entirely manual.

- **When in production, the Bureau Fiscal Service is estimating saving approximately 8,000 hours of manual work each year with just the seven pilot processes.**

RPA: State of Colorado Housing & Finance Authority (CHFA)

The State of Colorado Housing & Finance Authority wanted to improve responsiveness of paperwork processing to improve customer satisfaction, increase the use of electronic documents (versus paper), and enable lenders to save costs associated with loan paperwork. Utilizing RPAs, CHFA was able to decrease paperwork processing time, expedite summary and reporting functions, and gain greater value from existing software tools.

- **Processing for more than 30 Worksheets containing 100K line items went from three weeks to 30 minutes.**
- **Data entry for 35,000 rows of data went from three days to three minutes.**
- **Daily Reconciliations that previously took two hours each now take 30 minutes in total.**

IA: GSA Office of Government-Wide Policy Ensuring 508 Compliant RFP's

Only about 10% of Federal Request for Proposal (RFP) were compliant with Section 508 Accessibility Mandates, creating an enormous liability for potential lawsuits by disabled employees. To ensure 100% compliance with Section 508 mandates, GSA is building an intelligent system to help Contracting Officers determine if an RFP is compliant, and to assist with the necessary language to ensure compliance. The system utilizes RPA, Natural Language Processing, and Image Recognition to identify and remediate non-compliant RFPs.

- **The benefit to government will be fully 508 compliant RFP's and cost avoidance from potential lawsuits.**
- **Roll out of the system is expected in Q1 FY20.**

Governance

As organizations begin to implement IA, they need to establish governance to ensure that projects align with mission and strategic goals. Based on lessons learned from industry and Federal agencies at the forefront of automation, best practices are to develop an Executive Committee or a similar governing body, and a Center of Excellence or programmatic body to govern projects.

Executive Committee

At a minimum, the CFO, CIO, CHCO, and functional business organizations comprise the Executive Committee. Other CXO's may be necessary depending on the nature of the automation. The purpose and function of the Executive Committee is to provide strategic guidance, oversight, and executive level focus to ensure resources from across functional business units are allocated to the projects. The Executive Committee will establish the strategic direction and associated policies to provide consistency in IA implementation and ensure the projects align with strategic and mission goals. Without an Executive Committee, IA projects may flounder and ultimately fail due to lack of dedicated and necessary resources.

Another important function of the Executive Committee is review project plans and set policy for any potential functional conflicts as they arise. An example of a functional conflict might be an automation that changes the structure of data used by another part of the organization. Routine briefings from members of the Center of Excellence will enable the Executive Committee to resolve conflicts before the automation is deployed.

Center of Excellence (COE)

Industry best practices indicate that forming a Center of Excellence (COE) early in the IA project will yield great benefits at the time of full deployment. A Center of Excellence is necessary to provide consistency and to benefit from lessons learned from multiple implementations. Operational benefits are likely to include reduction in approval delays, security reviews, and to smoothly transition bot operation at full deployment.

Several roles are needed throughout the COE lifecycle, though not all roles have to be established immediately. Based on the size and complexity of the IA project, the COE may be scaled and paced accordingly. The roles and responsibilities of the COE include demand and capability planning, IA deployment and pipeline identification, prioritization, and selection. Participants should include an **Automation Leader/Program Manager** to function as an automation advocate and Program Manager. This person will represent IA across the enterprise and promote its contribution. A **Business Analyst** will evaluate the benefits of future automation projects and align potential projects

with the strategic direction provided by the Executive Committee. He or she will also monitor the performance of the automations and quantify the ongoing value to the enterprise of the automation. The **IA Developer** will configure the various IA tools and developing the automations. They will be a student of the available tools and understand how they will fit into the enterprise IA strategy. Depending on how many development tools are used, this may be one or more people. An **IA Custodian** will be responsible for monitoring performance of the automation tool and ensure that timely updates to source system are made as necessary. Finally, a **Subject Matter Expert** will be necessary for the process as it is automated. They will come from the business unit requesting the automation. This individual will change as different projects are undertaken.

Change Control is also an important function of the COE. As more and more automation projects are implemented, the possibility of one project impacting another will become more likely. Proper escalation procedures will need to be established so that when necessary, the Executive Committee can resolve conflicts at the strategic level, otherwise conflicts will be resolved by the COE.

While the promise of automation is great, procedures must be established for worse case scenarios. Who will be responsible if the bot fails? How quickly do they need to respond and what will happen if they are unavailable? Who understands the automated processes and can make recommendations for what to do if the enterprise must revert to a manual system while the bot is repaired? The COE will be responsible for establishing procedures, identifying and maintaining the Point of Contact list.

The COE will routinely brief the Executive Committee on the status of IA projects underway and planned so that the Executive Committee can provide the necessary policy and guidance to address potential operational conflicts as they arise.

Additional recommendations to establish the Center of Excellence will be included in the forthcoming ACT-IAC Intelligent Automation Playbook.

Impact to the Government

What does the shift to automation mean for the Government?

Improving efficiency and customer service is imperative for the government as they can and have faced lawsuits due to failure of meeting obligations. As an example, Federal agencies are required by law to produce public records that are appropriately requested through the Freedom of Information Act (FOIA). According to reports, many agencies routinely take months or years to fulfill record requests (Wilson, Holden, 2018).

Using intelligent automation tools would help agencies organize and retrieve specific information, automate redactions, speed up cycle times, and allow employees to focus on reviewing information

(Heckman, 2018). The goal is to help employees become more efficient and increase customer service by working smarter, not harder.

Impact to Human Workers

There is both excitement and uncertainty about building a digital workforce augmenting the human workforce. According to PricewaterhouseCoopers, IA and AI will help automate many government jobs, mostly clerical tasks using algorithms (Williams, 2018).

IA and AI can help reduce repetitive tasks and help workers focus on higher-level tasks thereby improving efficiency, quality, productivity, and customer service (McKendrick, 2018). The best method to introduce new technology into the workplace is by focusing on redesigning the roles of jobs being affected and reengineering business processes. IA and AI capabilities help improve values and service to customers, but employees also play a vital role. Employees can continuously improve machine learning, identify new opportunities, and become leaders in the workplace which AI cannot do (McKendrick, 2018).

A key example of where IA can be leveraged is with government contracting. Contracting officers spend most of their time on manual tasks which can easily be resolved by applying automation. Examples would include identifying contractual requirements, improving the contract processes especially with critical terms, managing yearly renewals, and monitoring vendor progress. In other words, automation would improve the whole contract cycle time greatly which would in turn reduce revenue and time loss. Improvement of the internal processes and reduction of manual labor would save taxpayers a substantial amount. "Governments can experience a reduction in revenue loss through automated enforcement of yearly contractual pricing increases" (Yama, 2018). Another issue is the inability to accurately monitor the competitive set-aside quotas for the fiscal year. Due to the inability to recognize the true capabilities for each group, there may be a loss of opportunities for small businesses and socioeconomically disadvantaged businesses, which results in the government missing out on obtaining the best value.

Impact on Network and Security

With new improvements and changes in our technology, new government regulations need to be complied along with updating policies to address new vulnerabilities. Without automation, a threat/corruption would reduce the amount of damage in a system. The corrupted action would happen once, whereas with an automated process, it could be replicated thousands or millions of times in a short span of time, which could easily bring down a network (Prudhomme, 2018).

A challenge is addressing security when moving towards automation without hindering innovation. A few things to consider when addressing security are intent-based network policies, encryption, and analytics use.

- Intent-based policies, for example, ensure networks can react appropriately to changing user demands and unexpected issues, but complete control is not relinquished, and policies can be changed if needed (Prudhomme, 2018). In addition, role-based access would need to be set up to ensure the appropriate personnel are the only ones authorized to make any changes.
- Encryption of sensitive information will always be a requirement regardless of the kind of technology being used. Ensure that data is protected and only authorized people have full control of the encryption security parameters associated with their critical data.
- Using analytics is critical to ensure that a network is protected from real-time attacks along with ensuring protection from any future attacks. Ensuring that networks can self-adjust to meet service level agreements (SLAs) and bandwidth requirements by increasing visibility to the network (Prudhomme, 2018).

While automation brings many positive benefits, security must also continue to improve to keep up with the changes. Unique requirements require unique security measures as there will not be a simple solution for all.

Impact on Operations Post Automation (resources – human, tools, and technology)

One of the first things noticed post automation is the effect on federal employees. Based on OPM's September 2017 Full-Time Permanent Age Distribution Report (OPM, 2017), 45% of employees will be retiring within the next 16 years. The transition alone can be problematic and chaotic as many roles will be left unfilled or filled with inexperienced employees. Automation will help with the transition as it will help remove lower level roles and allow the younger generation to become of a higher technical value.

Rather than replacing employees, technology augments human capabilities. Employees will need to be trained to help the government utilize the full benefits of automation. In order to start planning deployment, HR will need to be a part of the planning from the beginning. Roles will need to be redesigned in order to address new policies and procedures along with new skills. There will always be humans who manage IT due to having the responsibility of managing quality accuracy. With the help of automation, IT workers can dedicate more time to investigating anomalies and unusual or more serious threats and reduce risk (Smith, 2018).

Strategic Funding

Organizations are constantly under pressure to do with less. At the same time, the aging technology capabilities of many organizations has given birth to large scale transformation efforts. Funding these efforts remains a challenge. Leveraging RPA and IA to reduce spending on highly manual or poorly integrated processes creates budget efficiencies that can be applied to help fund strategic transformation spending in the same budget cycle.

Reducing Workforce Attrition Impact

Automation represents a means of capturing “tribal knowledge” of the current business processes for the organization. As the Federal workforce retires at a growing rate, instantiating the process knowledge of these workers through RPA reduces the impact of workforce attrition.

Recommendations and Next Steps

IA is an evolving technology and it is important to keep in mind that IA:

- Is not a silver bullet. Keep expectations real and manage them accordingly.
- Cannot automate everything. Assess and select use-case wisely.
- Technology is an enabler.
- Success requires IT-business collaboration.
- Products are still nascent. Do not short-change security and testing.
- Is not a one-time exercise. Change management and ongoing governance and the keys to continued success.
- Is not the Holy Grail. Business outcomes driven by integrated solutions are.
- Does not solve your data issues. Data-centric mindset is the key.
- Offers more than cost savings. Identify ways to measure success.

The ACT-IAC Intelligent Automation Working Group will release updates to the Intelligent Automation primer based on feedback from agencies and industry. Next steps include developing an ACT-IAC Intelligent Automation Playbook with instructions on identifying opportunities for automation, evaluating the feasibility, and business case as well as the steps to implement a solution. This playbook is currently planned for a late spring 2019 release.

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This white paper was written by a consortium of government and industry. The organizational affiliations of these contributors are included for information purposes only. The views expressed in this document do not necessarily represent the official views of the individuals and organizations that participated in its development.

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