EXECUTIVE REPORT 2018

AGA®

The CFO Office of the Future

ACKNOWLEDGMENTS

AGA is proud to recognize our Corporate Partner Advisory Group's (CPAG) Financial Systems & Technology Committee for supporting this effort.

The mission of CPAG is to bring industry and government executives together to exchange information, support professional development, improve communications and understanding, solve issues and build partnership and trust, thereby enhancing AGA's focus on advancing government accountability. The committee supports the CPAG mission by providing an objective, industry-neutral and ethical forum to collaborate on issues of common interest to government and the private sector surrounding financial systems and technology.

Contributors

Kevin Greer, Vice President, CGI

Todd Barber, Vice President, TeraThink

Jim Levitan, Vice President, TeraThink

Jim Taylor, Managing Director, Grant Thornton LLP

Kerry Canfield, Director, CGI

Blake Carpenter, Senior Associate, Grant Thornton LLP

Lisa Zellers, Director, CGI

AGA

Ann Ebberts, CEO

Susan Fritzlen, COO

CPAG is a network of public accounting firms, major system integrators, IT companies, management consulting firms, financial services organizations and education and training companies that all have long-term commitments to supporting the financial management community and choose to partner with and help AGA in its mission.

AGA is *the* member organization for financial professionals in the government. We lead and encourage change that benefits our field and all citizens. Our networking events, professional certifications, publications and ongoing education help members build their skills and advance their careers.

TABLE OF CONTENTS

INTRODUCTION

Today's Chief Financial Officer (CFO) occupies a unique position at the intersection of finance, technology and strategy. The age of digital transformation increasingly impacts agencies as technology advances at a rapid pace. Since developing technology influences the CFO's tasks, the role of the CFO office will inevitably continue to evolve.

This topic has been addressed in several ways in recent publications. The U.S. Department of the Treasury Fiscal Service's report, *The Future of Federal Financial Management*,[1] covers the evolving role of the federal CFO in budget/accounting operations, controls and reporting, and data-driven decisions for improved performance. The 2018 *President's Management Agenda* (PMA) outlines three focus areas for reform — mission, service and stewardship,[2] while the *Cross-Agency Priority (CAP) Goals to implement the PMA: Information Technology Modernization, Data Accountability & Transparency, and the Workforce of the 21st Century* calls for updates in three key areas.

AGA conducted two recent surveys — one online and one among attendees of our 2018 Financial System Summit (FSS) — to gauge perceived relevance of various technologies and their respective states of adoption. Of the 324 respondents in total, 90% work in federal civilian agencies, 9% in DOD, and 1% in Intelligence agencies. When asked about the importance of modernizing systems to meet citizens' needs and enhance overall mission capabilities, more than 75% responded it is "very important," while 20% said "important."

Modernization of government services is not new. Agencies and CFOs have been prioritizing overhauls for years. For a decade or more, cloud, data analytics and process automation have trended because advancements keep these technologies at the forefront.

In this paper, we examine some of the most important trends in technology and how they impact the federal CFO. Many of these trends also affect chief financial officers, controllers, comptrollers, and the financial community at large in government entities across the country. Although these technologies have been more widely adopted in the private sector for numerous reasons, ranging from agility to less restrictive procurement rules, the move into the public sector should be welcomed for the potential to improve performance, minimize redundancies, lower cost, and increase staff productivity.

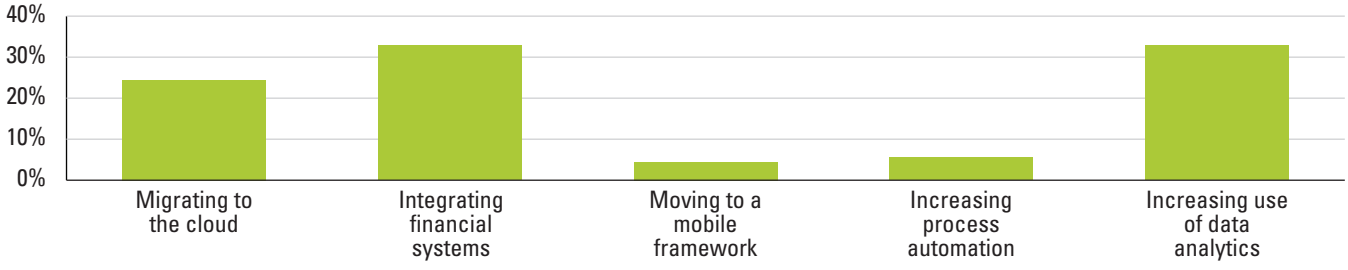
[1] https://fmvision.fiscal.treasury.gov/

[2] https://www.whitehouse.gov/wp-content/uploads/2018/03/Presidents-Management-Agenda.pdf

MODERNIZATION PRIORITIES

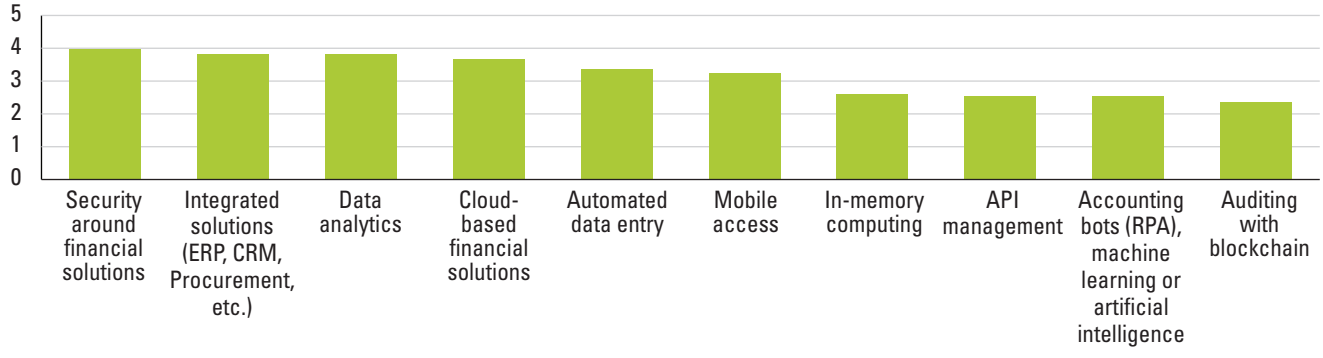
When asked for the top financial management modernization priority in the next three years, respondents tended to choose one of three major issues. The top two priorities cited, each with 30% of the tally, were: 1) increased use of data analytics; and 2) integrating financial systems. Just under 25% of respondents chose migrating to the cloud as the most pressing need.

What is the top financial management modernization priority in the next three years? *(Responses)*



The other two options offered in the top priorities survey were: 1) process automation; and 2) mobility. While these subjects scored much lower, the need for them was evident when participants were asked to prioritize financial management technologies. There, automated data entry and mobile access became priorities over in-memory computing, blockchain and application programming interface (API) management.

For each item below, rate from 1 to 5 the following financial management technologies you envision impacting your office, in order of implementation? *(Weighted Average)*



It is important to note that among the top ten financial management technologies that respondents envisioned impacting their office operations, security around financial solutions ranked first. It is not surprising that, as CFOs tackle all modernization efforts, security must be maintained and improved to manage potential risks to the critically important data supported within these systems. CFOs are clearly not willing to trade or compromise security for any of the identified advancements in technology.

In this paper, we will further break down modernization priorities and the tools that enable and support them. Since government leaders view creation of the modern workforce as critical to achieving PMA goals, our survey questions aimed to identify which of (and how) the following technologies will most likely impact the CFO office:

- Security
- Cloud Accounting
- Data Analytics
- In-Memory Computing
- Integrated Applications
- Process Automation
- API Management
- Mobility
- Auditing with Blockchain

SECURE APPLICATIONS

Security is top-of-mind within the CFO organization. Federal cybersecurity governance is encouraged and expected from both the U.S. Office of Management and Budget (OMB) and Chief Information Officer (CIO) communities, including continuous diagnostics monitoring (CDM) requirements, National Institute of Standards and Technology (NIST) security, and the Federal Risk and Authorization Management Program (FedRAMP) for the cloud.

The CFO office of both present and future must work very closely with the CIO (OCIO) and Chief Information Security Officer (CISO) offices to utilize technology to secure data, transactions, applications and systems. Because security reflects a small part of an overall agency IT budget, CFOs and CIOs should not make investment decisions in a vacuum. Instead they should plan their enterprise risk management (ERM) efforts and engage members of their technology teams in every investment discussion and decision in order to capitalize on limited investment dollars and ensure important security capabilities.

The CFO community cannot be expected to understand all details and implications of emerging and evolving technologies; however, CFOs should understand why it matters. This includes the role each new investment plays in closing the cyber-exposure gap and setting up agency posture for long-term success and resiliency. Data breaches, especially those focused on financial data, occur on a regular basis and can incur significant cost in recovery activities as well as reputation. It is, therefore, critical for those looking at cloud migration to, at a minimum, house financial data in FedRAMP cloud-based platforms with appropriate security measures. The CFO office must understand the risks of a potential cybersecurity attack and how to mitigate and manage them.

When looking to deploy new systems and solutions, CFOs need to understand how they could improve business processes and how they might introduce security risks. Developing technologies, such as blockchain (discussed later in the paper) and the Internet of Things (IOT), show promise by providing more efficient ways to conduct and manage business activities. But despite their inherent promise, security remains a foremost concern for CFOs considering them.

New technologies provide an unprecedented level of data access. Yet, simultaneously, they pose risks for intrusion, data destruction, disruption, theft, and exposure. CFOs must look beyond the protection of financial data to any information that can be extracted and manipulated by hackers.

CLOUD ACCOUNTING

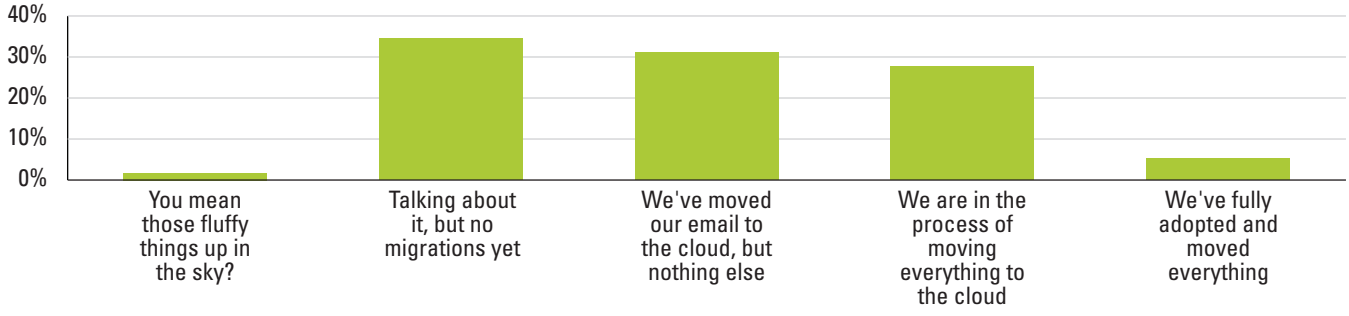
Migration of applications to the cloud has grown increasingly popular in government agencies. The trend is reaching government financial applications as cloud security becomes evermore robust. In the commercial arena, applications hosted in the cloud are processing everything from payroll and invoicing to taxes and benefit payments. Moreover, cloud accounting is now impacting government CFO offices. By moving an agency's accounting application to the cloud, the OCIO's workload, including infrastructure maintenance responsibilities, can shift to the cloud service provider.

Our survey results display an equal distribution of cloud adoption progress. Approximately 28 percent of those surveyed reported their agency was moving "everything" to the cloud, while some 34 percent indicated they were only beginning to talk about cloud migrations. Another 31 percent said only email applications had been moved thus far.

Cloud adoption continues to expand. In 2010, OMB released its *25 Point Implementation Plan to Reform Federal Information Technology Management*,[3] which requires agencies to adopt a "Cloud First" policy

[3] https://www.dhs.gov/sites/default/files/publications/digital-strategy/25-point-implementation-plan-to-reform-federal-it.pdf

How would you characterize your agency's cloud adoption? *(Responses)*



to increase cloud-based solutions wherever cost-effective. Additionally, OMB Memorandum M-17-22 requires agencies to streamline mission support functions by examining shared IT infrastructure to promote greater security and efficiency while maintaining or improving quality. Financial management solutions are not an exception, as the three predominate solution vendors (CGI, Oracle, and SAP) each have deployments in public cloud environments.

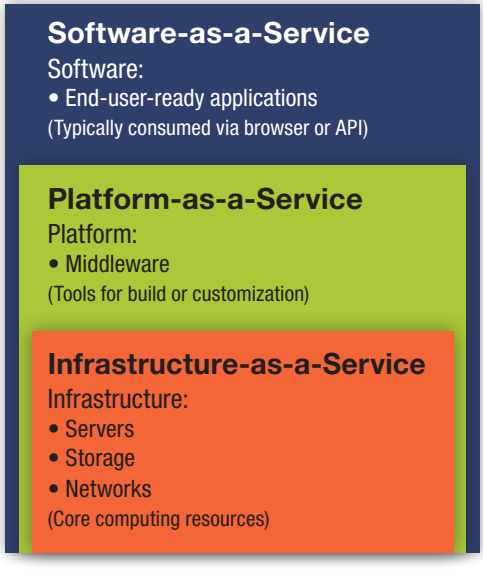
As the current administration promotes adoption of shared services, it is encouraging to find that more than 70 percent of survey respondents believe moving agency financial systems to the cloud is important.

The PMA CAP Goal 5 aims to improve quality and delivery of shared quality services. It also promotes establishment and implementation of modernized commercial core FM solutions, with a transition to common financial management solutions. This encourages agencies to make deliberate decisions on how much of the technology stack (infrastructure, platform, and software) to procure "as a service" (aaS), balancing risk and reward. Specifically, a focus of the administration is Software as a Service (SaaS) applications, which are wholly maintained at the software, platform and infrastructure levels by a service provider.

It is easier to consume innovation using a SaaS business model because it allows all users to leverage new functions and capabilities as soon as they become available. This eliminates or reduces upfront acquisition and implementation costs. It also heads-off upgrade costs for hardware and software as well as the resources required to implement and execute the upgrade. SaaS can prevent agencies from falling behind along the upgrade path, which often leads to large catch-up projects.

A shared environment makes security monitoring and patching throughout the technology stack easier to achieve. It can also save money. For example, most SaaS applications are pay-as-you-go, allowing CFO offices to reduce the cost of wasted or un-used licenses. Looking ahead, the PMA sets targets in 2019 for commercial technology solutions to cover payroll and time and attendance and, in 2010, for financial management (AP, AR, GL, and reporting).

To fully benefit from SaaS delivery models, some level of standardization is required, but not absolute. Agencies should discuss individual requirements with their providers to ensure they get the benefits of cloud and SaaS adoption while maintaining accountability for mission support.

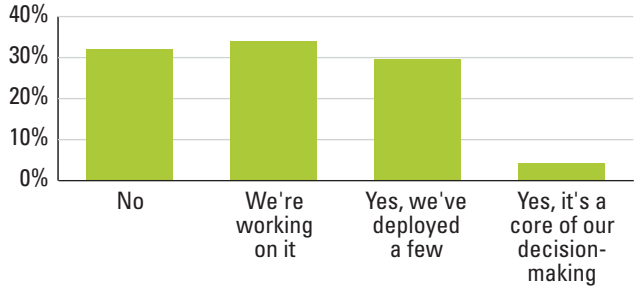


DATA ANALYTICS

Data analytics informs predictions and identifies trends, anomalies and similarities. Complementary to data analytics is data visualization, allowing results of an analysis to be quickly and visually digested. Data visualization can be a powerful tool for communicating relationships and insights from large amounts of data. With increased computing capacity offered by cloud solutions, the accessibility of advanced analytics and the ability to learn more about data relationships, anomalies, and outliers becomes more feasible.

These capabilities are demonstrating to financial managers that the vast amount of data and information managed across multiple financial systems needs to be harvested to inform agency decision-makers. Yet, when asked whether CFO and agency leadership have access to real-time dashboards and data visualizations, nearly one-third of survey respondents answered no.

Do your CFO and leadership have access to real-time dashboards and data visualizations? *(Responses)*



The concept of developing a culture of data-driven decision-making is only now being adopted by federal agencies. Yet, for centuries organizations have used data to make informed business decisions. Likewise, goals and objectives are well established for incorporating and improving data analysis and analytics into agency operations.

Today, as advances in data collection and storage technology accelerate the growth of big data, agencies note greater data availability and a need to report on activities ranging from Mars missions to pension insurance. Such advances have given rise to value-driven practices, such as Evidence-Based Decision-Making and Data-Driven Decision Management, that accelerate data governance practices and drive data quality standards. As a result, business units are being empowered with flexible data management tools to consolidate disparate data sets from CIOs, CFOs and Chief Technology Officers (CTOs) into a single environment for investigation.

Proper understanding of the data available to financial managers and the ability to resolve or work around systems limitations are key to effective data analytics. The process for implementing such a program can be summarized as follows:

Phase 1: Understand the Problem

Risk Questions:

- What are the risks we want to manage?
- Which risks have highest priority?
- How do we assess and prioritize actionable risks?

Solutions:

- Identify risk areas based on mission priorities.

Phase 2: Understand the Data Landscape

Data Questions:

- Does required data exist?
- Is the data complete, error-free and valid?
- Is the data analytic capability maturity level within the organization adequate for the intended effort?

Solutions:

- Determine which data is available and plan collection efforts for missing data.
- Perform data cleansing and error removal.
- Determine additional data analysis to be conducted without affecting project timelines.

Phase 3: Leverage Applied Analytics

Turn data into intelligence through multiple techniques and technologies

Process Example:

1. **Identify Data Standards**
   Identify elements of disparate data systems and adopt data standardization across the enterprise.
2. **Establish Data Architecture**
   Develop data architecture with a data repositories strategy to pull together data from multiple sources.
3. **Perform Statistical Analysis**
   Assess data sets using proven statistical analysis methods to identify past, existing, and future risks.
4. **Communicate Findings**
   Leverage data visualization best practices and technology to create dashboard tools for easily understandable and actionable intelligence for decision-making.

Successful development of data analytics programs revolves around the ability to harness financial data from the agency's financial systems to create meaningful outputs, including standard reports,

custom reports, ad-hoc queries, statistical analysis, plus real-time and/or interactive dashboards.

Investment in analytic technologies is far easier in today's market as open source software emerges as the tool of choice for most data scientists. Despite relatively heavy development time required to code in open source languages, the flexibility of such tools and the advent of online communities has driven adoption beyond the higher education community into the federal government. Whether directly complemented by business intelligence (BI) platforms that afford users a graphical user interface (GUI) for dynamic data visualizations, these advanced tools often cause CFOs who leverage analytics to ask "What happened?" rather than "What will happen?" Gone is the historical concept of 'dabbling' in analytics; we now test advanced analytics such as artificial intelligence (AI) without a clear goal or definition of success.

Current technology trends and rapid adoption provide access to massive amounts of data. Analytics and visualization can be leveraged to harness that data to become a powerful tool to inform decision-making. CFOs and other financial managers will be able to monitor the financial health of their agencies or organizations. For example, CFOs can monitor overall budget and obligation and disbursement rates, accounts receivables, and reimbursable agreements across an agency or department. Agency efforts can then shift from collecting and managing data to making evidence-based discoveries and offering strategic advice to mission leaders.

IN-MEMORY COMPUTING AND DATABASES

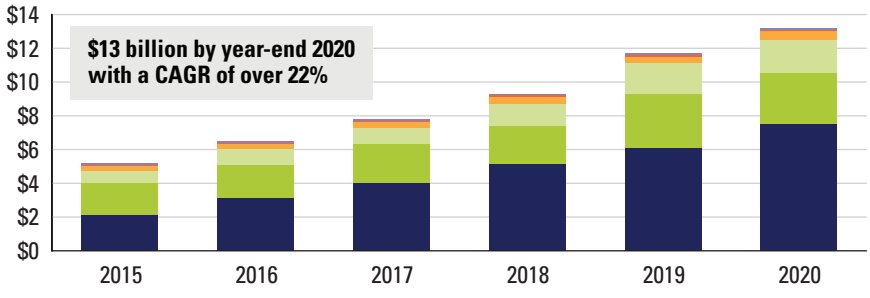
Until recently, retrieving data from a database required the server to read the data directly from disk. Older SAS hard drives had physical limitations based on how fast the drive could spin. Even newer SSD with data stored in memory has physical limitations. While these technologies still exist, the needs of Big Data analytics require newer methods with faster access to data.

In-Memory Computing (IMC) offers an enhanced method of access for performing on-premises. This technology caches data into memory at the RAM and CPU levels, providing faster access to the database as well as computations without the physical limitations of disk. This has resulted in significant improvement to data reads and a large reduction in network activity.

The use cases for IMC are growing every day. Although originally employed for data analytics, IMC provides solutions for today's data warehouse databases, which have grown exponentially. With IMC, data resides and computation efforts take place in memory. Moreover, IMC allows use cases to grow to numerous other applications, including data visualization, predictive analytics, and other BI applications.

More recently, IMC moved from analytical processor to transactional processor. This shift will transform hybrid transaction/analytical

The rapidly growing in-memory technology market *($ in billions)*



"Market Guide for In-Memory Computing Technologies" – *Gartner, 2015*

- In-Memory Application Servers
- High-Performance Message Infrastructure
- Event Stream Processing
- In-Memory Data Grids (standalone)
- In-Memory Analytics (visual data discovery)
- In-Memory DBMS

processing (HTAP), in which the transactional and analytical database will be one and the same. This technology evolution will eliminate nightly jobs to populate data warehouses; and it will enable execution of real-time reports in seconds. Additionally, by moving IMC to the transactional processor, existing enterprise resource programs (ERP) and customer relationship management (CRM) products will process data on a massive scale.

How will these changes impact CFO office operations? Several potential benefits await:

- Reports will run in milliseconds instead of seconds, minutes instead of hours, allowing employees to perform better analysis and what-if scenarios.
- Nightly interfaces will process significantly faster, allowing for improved data quality and faster error handling.
- User and customer acceptance and satisfaction will improve.
- Limitations of data models will disappear, allowing more business-focused rather than technical processes.
- Improved search capabilities will offer Google-like searches for financial transactions and master data.
- Analysts will have data mining and analysis capabilities that were not possible with standard databases.

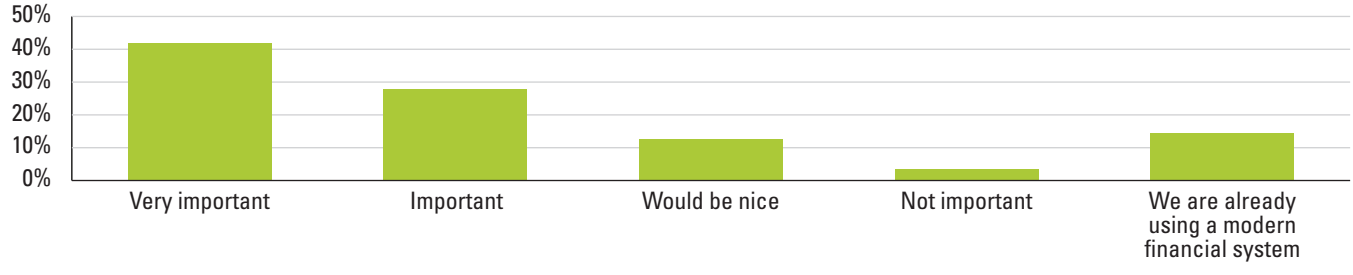
INTEGRATED APPLICATIONS

One of the most significant areas of cost savings that the CFO office can expect is in the integration of financial applications. Survey results support this conclusion, but only when data analytics coupled with integrated financial systems was the top answer given. When asked about the priority of migrating from legacy systems to a modern financial solution, 42 percent of respondents said it was "very important." Only 14 percent reported that their agencies had already moved to a modern financial system.

The desired environment of the future will feature further integrated applications across core back office and mission functions. In light of challenging budget realities, the ability to integrate legacy systems with newer technology and modernized systems will be a critical success factor. These administrative data support systems include core financials, human resources, acquisition and procurement, supply chain and logistics, and even customer relationship management (CRM).

Integration will be key to connecting more than one service; it will increase operational efficiency and accuracy while reducing manual or duplicative data processing. Modern ERP systems, which provide more streamlined processes that increase productivity, hold the potential to reduce redundant data and cut the number of disparate systems being maintained. ERPs, leveraged to their full potential, can provide real-time access to data from all areas of the organization (i.e., centralized or distributed offices.)

What is your priority to migrate from legacy to a modern financial solution? *(Responses)*



PROCESS AUTOMATION

Process automation tools streamline integration of multiple financial systems. They range from solutions on individual desktops with limited ability to accept different data feeds to solutions on enterprise servers that can perform multiple scheduled tasks and meet enterprise security criteria. These systems can be as simple as screen-scraping technology. Or they can be as intricate as optical character recognition (OCR), which captures data, supports complex processes to manipulate and exchange data across applications, triggers responses, documents audit trails, conducts calculations, and schedules downstream activities.

Robotics process automation (RPA) emulates the human execution of repetitive tasks through configurable business rules. Traditional process automation generally requires a lengthy project with significant development, whereas RPA enables business stakeholders to configure computer software robots to perform a variety of manual, repeatable processes. In RPA, programmers and analysts map out a process for the robot to follow between screens and data repositories, using the presentation layer or user interfaces. The robot contains logons and passwords for client servers, mainframes and websites needed to execute the process. With a little training, a well-defined process often can be completed and operational in weeks.

Processes most suited to RPA solutions generally contain structured data. They are rule-based, high in volume, and consistent in the sequence of events and user interfaces utilized. Many routine business processes in accounting and financial management are great targets for automation, such as staff on-boarding, accrual posting, budget planning, data consolidation across disparate systems, and accounts reconciliation. Manual processes that are good candidates for RPA have the following attributes:

- high volume transactions
- well-defined steps and rules with minimal exceptions
- steps and rules that rarely change
- structured data and readable electronic inputs
- high data quality and availability

Before embarking on a process automation effort, it is important to review current processes and ensure they are thoroughly documented, including task dependencies and sequences. All inefficiencies and inconsistencies in current processes must be identified, so they can be addressed ***prior*** to automation for maximum benefit.

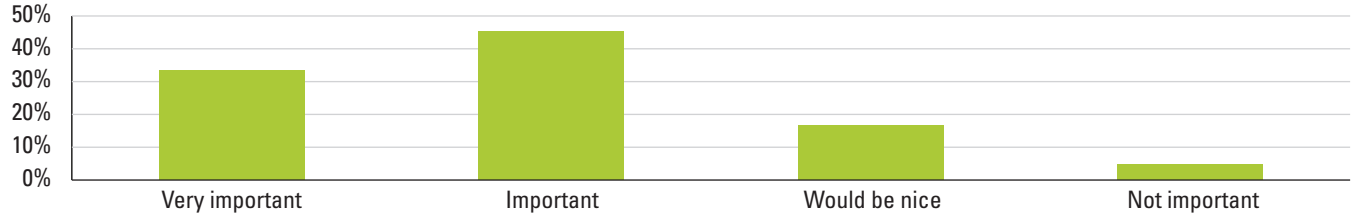
Although cost savings are often touted as one of the benefits of RPA, an organization assessing automation should focus on improving operational efficiencies and minimizing risk of errors. Automating mundane, repetitive tasks enables the workforce to attend to more creative and strategic activities. RPA may replicate what people do, but these robots have neither intuitional nor institutional knowledge. As an example, an account reconciliation robot can identify when data anomalies exist but cannot apply institutional knowledge or subject matter expertise to assess the cause. Human effort and skill will still be needed to assess causes, resolve discrepancies and make suggested process adjustments where needed. But research suggests that process automation of manual tasks is proven to increase employee engagement, morale, productivity, and regulatory compliance.

RPA promises to deliver greater efficiency to finance and accounting organizations by expediting transaction processing, reducing potential for manual errors, and strengthening the integration of an agency's financial and administrative systems, software applications, and external sources of information. All of the above result in improvements to the data that CFOs evaluate when they make management decisions and offer strategic input to the CXO community and agency leaders.

Expect the accountants of the future to be even more tech-savvy than they are today, as business stakeholders learn to use various automation tools. These will play an important role in creating automated rules and processes that support and enhance the timeliness, integrity and availability of agency data. As noted in the survey results, 84 percent of respondents clearly recognize the need to require specialization and specific services from agency financial professionals.

Benefit of Automation	Considerations
Cost Reduction	Primarily a result of labor reduction and increased production. Frequently those costs are reassigned to other efforts.
Increased Throughput	Automated processes do not need breaks and result in much more timely data to inform decision-making.
Error Reduction	Although automated processes do exactly what they are programmed to do, thorough testing is necessary to ensure accuracy of the process.
Improved Compliance	With ability to capture and log audit trails, RPA facilitates auditability.
No Emotion, Just Logic	Although utilizing artificial intelligence (AI) and machine learning eliminates emotion from decisions, it comes at the expense of creativity and judgment of right vs. wrong.

With more automated financial operations, how important will it be to require specialization and specific services from the financial office? *(Responses)*



RPA tools have evolved and will continue to develop over time. Already they enhance data analytics and handle automation of more complicated processes by incorporating AI or machine learning, both of which have advanced considerably. As software robots are developed with more complex code, they also become tools of AI. Progressing to the use of complex algorithms in certain applications will allow these robots to take on forms of machine learning. Some of the more promising AI applications use machine learning to iterate algorithms from a large collection of data. Over time, it improves accuracy and uncovers connections among data that humans may fail to notice.

As machine learning and AI are adopted, we will witness greater levels of productivity and efficacy. Across large volumes of data, AI insights and activities can drive efficiencies, deliver convenience, and support better decisions. Given data volumes across government, CFOs should expect substantial hardware and processing power, even if accessed in a cloud environment. As a result, AI and machine learning investments will likely focus on areas offering the biggest cost reduction opportunities, or those crucial to mission delivery.

Transactional accounting data is a promising starting point for developing new models because of its high quality and structure. However, the same data is also challenged because of complex and unintegrated legacy systems so many financial offices work with today. Despite the rush of many organizations to select RPA software and start a project, the process demands careful scrutiny. Learning about RPA suitability and functionality should be completed in conjunction with building a broader enterprise automation roadmap (EAR). This would require a hard look at the various automation technologies as well as an understanding of how the technologies work together.

Significant benefits await organizations that put in the effort to comprehend technologies like RPA, business process management (BPM) and AI. These innovations can be combined to execute an overall enterprise automation strategy, so agency leaders should collaborate. They need to share experiences and lessons learned to help other leaders who might also be attempting to leverage RPA.

CFOs and their executive counterparts will be paying close attention to the way process automation can be applied to improve operational efficiencies. When it comes to making government programs more effective, streamlined and sustainable, RPA tools will play a growing role in the future of both the CFO office and government operations in general.

API MANAGEMENT

Application programming interfaces (APIs) have been around for decades. API is a method of communicating with a system to provide specific functionality. APIs are "windows" into a system with a defined set of rules. For instance, Google Maps has an API that lets a user send a coordinate or an address, and it sends back a map. But not just an image. It sends a fully functioning map with interactions. Twitter has an API which allows the user to download tweets. Users can send it a hashtag, and it sends back a listing of all tweets that can be pulled into a database to perform sentiment analysis. Twilio has an API which allows the user to send a text message to someone. Grants.gov provides APIs to publish new opportunities and receive applications. And these are just a few of the millions of APIs available for consumption.

So, since APIs have been around for a long time, what has changed and why would a CFO need to know about them?

The newer RESTful APIs have grown in popularity, due to their increased simplicity and flexibility over previous API models. For the CFO, APIs simplify the way systems talk to each other by providing a layer that hides complexity. Integration between financial systems becomes more straightforward. Most of the current API management vendors provide standard connectors into legacy as well as modern on-premise and cloud systems to reduce development costs. Additionally, APIs reduce the costs of interfaces and conversions by providing a single set of reusable code for developers.

The simplicity of managing APIs has allowed for the significant increase in their use. In terms of the benefits of their management, APIs are:

- **Discoverable:** Prior to API Management, APIs were developed in a programming office and made available only to those who knew they existed. With API Management, APIs are published to a console which allows internal and external developers to leverage them.
- **Well Documented:** The published API provides a common language approach to inputs, expected outputs, allowed actions and sample test data.
- **Data Analytics:** With the API Management system, users can run analytics on the use of each API, the users who call the API, the performance metrics, and more.

From the standpoint of the CFO, implementing APIs and API Management into the financial system can have a significant impact on the ability to service customers, whether they are individual agencies or external stakeholders (taxpayers, vendors, etc.) With internal development, CFOs may want to employ published API's for creating documents in the system, such as commitments, obligations or invoices.

Moreover, methods to create master data or read information are possible. For external development, a decision could be made to create an API that allows an external grantee to call into a grants management system to read data about the status of an application. API Security facilitates it with the same (if not better) security layer utilized today in existing systems.

Most large commercial companies are already developing an API strategy, recognizing lower development, operations and maintenance costs. Making APIs available to internal and external developers allows the CFO office to provide better customer service while reducing cost.

MOBILITY

The advent of mobile technology and its rapid adoption has pushed the financial management function to evolve. Today, CFOs manage responsibilities "on the go" through cloud-based mobile applications that provide unprecedented access to data. As a result, the status of these applications has improved from add-on feature to integral part of the CFO office.

Some of the most popular areas of mobile adoption in the CFO office include mobile time and attendance, expense reporting, and reviewing and approving travel and financial reports. Now employees can enter information from the field on their mobile devices, and organizations can track total expenses as they happen, affording CFOs a real-time, more accurate picture of expenditures. CFOs are prioritizing the adoption of mobile functionality because it:

- **Provides real-time data:** With current applications, when an expense is approved, it is immediately recorded in the ERP and agency expenditures are updated;
- **Reduces human error:** The traditional expense report process entails collecting physical receipts, scanning them, and matching them with transactions. This process is cumbersome and error-prone. Statistics suggest approximately 19 percent of traditional expense reports contain error. In contrast, smartphone cameras allow ease of collection and capture of receipts, reduced errors and zero occurrence of lost receipts;
- **Reconciles P-card charges faster:** With real-time submission (versus delayed batch process), overall processing time can be reduced, employees can be reimbursed more quickly, and the CFO office gets a real-time view of agency expenditures;
- **Accessibility and flexibility:** Employees on travel can use mobile applications to instantly review and report before returning to the office. In an increasingly mobile world, being able to work effectively increases total productivity and employee morale.

The CFO office of the future needs to assess its processes and systems with an eye toward mobile devices as a primary tool to conduct business. Multiple financial processes, approvals, and reporting can be simplified with mobile accessibility to transform the user experience while also improving the accuracy and speed of transactional security.

AUDITING WITH BLOCKCHAIN

An emerging technology that CFOs should start tracking, due to its potential impact on the CFO office of the future, is blockchain. Best known through its use to implement bitcoin and other digital currencies, blockchain is an encrypted data structure that acts as a distributed ledger. It organizes and tracks time-stamped batches of records called blocks. Each block references the previous block using a cryptographic hash to form a chain.

Key requirements for blockchain adoption include:

- processes to validate users in the blockchain network and verify digital signatures of participants;
- standards for financial accounting and reporting to provide guidance on managing blockchain transactions;
- guidance on existing laws and regulations that would apply to the use of the technology;
- processes to audit cybersecurity and software so blockchain transactions have the necessary security and encryptions.

The core advantages of blockchain are its decentralization and cryptographic security, which together provide transparency and immutability. This means that even minor alterations of data within a block results in self-evident, visible changes, ensuring that unauthorized edits are easily detected and able to be repudiated.[4]

Blockchain enables currencies built on computer code to be programmed to help automate an entity's system of internal controls. Blockchain also provides assurance that management's objectives

[4] https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/blockchain-beyond-the-hype-what-is-the-strategic-business-value

are met and an audit can be passed. One such feature is multi-signature accounts, whereby funds can be deposited into an account which requires more than one valid private key to authorize spending. This feature can enforce segregation of duties by requiring two or more parties to approve a transaction before it can be accepted by the network as a valid transaction.

Another useful blockchain application is time-locking funds. Here, funding cannot be spent before a designated date and time has passed. This feature might be used to ensure compliance with the Anti-Deficiency Act and approved spend plans. For example, the budget office could apportion funds to an agency and cryptographically ensure that only one-fourth of the agency's annual appropriations can be spent in the first fiscal quarter of the year. After three months have elapsed, the time-lock on the next 25 percent of annual appropriations could be programmed to release for expenditure, and so on. As opposed to many of the internal control systems which have traditionally been implemented by CFO offices, a blockchain can cryptographically guarantee that laws, regulations, and agency policies are enforced by building in rules which prohibit the spending of funds in ways that violate established rules.

Finally, blockchain reduces the need for financial reconciliations, potentially saving governments and their auditors incalculable time, money, and headaches. Blockchain is designed to generate agreement among disparate actors without the need for a centralized party. If different computers on a blockchain network have conflicting views of the state of the ledger, defined processes will resolve those conflicts. Over time, a consensus about the agreed-upon state of the network emerges. Reducing reconciliations also diminishes the number of repeat reconciliations by auditors and oversight bodies. Furthermore, to the extent that accounts receivable or payable balances can be validated through review of blockchain data, time-consuming and costly audit procedures, such as third-party confirmations, decrease.

Blockchain is a fascinating new technology with potential to help the future CFO office automate internal controls, reduce reconciliations, and minimize the cost of financial audits. CFOs of tomorrow would be wise to take notice!

CONCLUSION

The CFO office is typically quick to adopt technology advances that improve the quality of the data overseen and managed. The advent of cloud computing, improved process automation and other promising technologies are making it easier to find the right answers and integrate disparate systems. When they are used in conjunction with the necessary security, these technologies can lead to:

- reduced operating costs;
- more timely access to higher quality data;
- increased customer service and satisfaction.

Advances in technology over the last several years provide CFOs with unprecedented access to data and enable more timely, informed decision-making. Increased monitoring capabilities through data visualization dashboards allows for accurate measurement of the organization's activities and their impact on the agency's mission. The CFO office of the future, without doubt, will utilize these technologies to streamline financial management and audit activities, release agency personnel to focus on mission-critical activities, and empower the CFO as a strategic partner across the C-suite in support of mission delivery.

www.agacgfm.org