GLOBAL PERSPECTIVES AND INSIGHTS

5G and the Fourth Industrial Revolution

Part II

The Institute of Internal Auditors | Global

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Introduction

In as little as two years, the next generation of mobile connectivity will be a reality and promises to be *the* quantum leap in the world of technology. The network — known as 5G — will provide significant opportunities to transform organizations across industries and geographies. It promises to virtually eliminate location constraints and leave organizations more robust, more integrated, and more productive. Business communications will be enhanced and connectivity tailored to every industry.

Will its introduction disrupt business? The short answer is yes. To be sure, it will have the power to redefine entire industries, as well as create new ones. But keeping disruption to a minimum for a smooth transition to 5G is possible, and it is paramount.

> "I am looking for a lot of people who have an infinite capacity to not know what can't be done."
>
> —Henry Ford, Founder
> Ford Motor Co.
> (1863-1947)

Internal audit can support a smooth transition and drive positive change by helping organizations navigate disruptive risks and manage all areas of risk effectively. However, internal audit itself will have to change to best position itself to focus on new opportunities to serve, and provide foresight into the emerging risks presented by 5G.

This audit focus examines 5G implications for organizations and internal audit, including anticipated changes to organizational culture, work environments, and business plans, as well as IT strategies and policies, such as cybersecurity, data management, and privacy. It also looks at what internal audit can do to prepare for the 5G launch by embracing and leveraging technology now.

Note: This is the second report in a two-part series. For more information, see the first report: "5G and the Fourth Industrial Revolution — Part I."[1]

Implications for Organizations

A disruption, a revolution, an opportunity — if all goes as planned, the *fifth generation* of wireless network technology will radically change the way organizations structure corporate networks and workplaces. It will radically change the way organizations deliver products and services, and change the way consumers consume. Simply, 5G is expected to provide organizations with the ability to rely *almost entirely* on mobile connectivity, which would bring about significant and disruptive changes.

Change the Culture, Change the Environment

In the predicted 5G world, organizations that respond efficiently to an environment of constant connectivity and instant information will be positioned to succeed. Therefore, organizations that hope to leverage 5G-powered changes should use this time to establish implementation and capitalization strategies.

They must consider the condition of their existing wired network infrastructure and whether converting to a fully wireless system would be cost effective. They also must consider the added pressure that such a conversion would place on IT teams to make sure business units are really ready to take advantage of the new technology.

For example, organizations can begin expanding internal processes to bridge current technical capabilities and those promised by 5G. The ability to execute a swift pivot is crucial to retaining relevance in the marketplace throughout and well into the transition.

Instead of retaining existing processes, such as establishing goals and identifying technical requirements, organizations must:

■ Compare and contrast current wireless capabilities and 5G wireless capabilities.

■ Conduct network readiness assessments that include determining the viability of synchronizing projects with the 5G rollout.

■ Anticipate the status of the 5G network by date of project completion.

■ Develop project plans that calculate potential impact on revenue, operations, and market.

Any plan to leverage 5G technology to its fullest should include strategic decisions on how to pursue and navigate as-yet-unwritten global standards for the new technology. One of the main challenges of digital transformation will be changes to organizational culture. It will be important for leaders to think strategically about the challenges and evolutions they will face when it comes to incorporating 5G technology into their organizations, and its success will depend largely on *how* leaders engage corporate culture.

Increasingly, stakeholders expect internal audit to have a perspective on culture, particularly in light of its holistic impact on the organization. Internal audit is well-positioned to ascertain whether risks arising from culture have been identified and addressed and, therefore, will be able to provide important insights on how the new technology will be accepted and utilized, and how it might change the culture.

A number of industry leaders have already started updating their IT strategies to handle the data speed and volume that will be driven by 5G-powered applications. With that start, management must be sure that organizations remain "people-centric" during the transition and consider *all* stakeholders, including customers and employees:

- **Discover and address where culture and strategy clash.** Understand where the culture is today, and then envision its ideal state. Ask: How is the current culture supporting organizational intentions? What needs to change?

- **Change listening tours.** Translate high aspirations for culture into day-to-day actions, and bring others on board by challenging and fostering a healthy debate and real feedback from across departments and across levels.

- **Identify the "critical few" behaviors that will shift culture.** Adopt the critical behaviors that matter most and will help to shift the culture.

- **Step into the "show me" age.** Show employees a commitment to evolving the organizational culture by doing something visible and concrete, and empowering employees to innovate around the new business paradigm to lower their inhibitions.

- **Commit to a culture that is continual and collaborative.** Prepare to persevere through obstacles.[2]

> "The emergence of 5G is a fulcrum in the evolution of mobile technology from a technology that had transformative impact on personal communications to a true general purpose technology (GPT) that promises to transform entire industries and economies."
>
> —IHS Economics and IHS Technology and Berkeley Research Group

Practical Applications for 5G

The 5G network has the ability to revolutionize familiar daily experiences of consumers and organizations alike. For example, the expanded bandwidth will provide more opportunities for faster streaming of entertainment and in-depth content by users. Manufacturers will be able to increase production using artificial intelligence (AI) and robotics process automation (RPA) without loss of quality or accuracy. Real-time delivery, tracking of goods will be an everyday occurrence. Driver-less automobiles, currently hamstrung because existing wireless systems can't keep up with their demand for large-volume, split-second data inputs, will be common.

While 5G is not yet commercially available, members of the Forbes Technology Council polled various industry leaders about what they expect from 5G:

■ **Older technology will become more mainstream.** For every big new wave in the technology field, the previous high-end technology becomes mainstream. This means that 5G will indirectly enable 4G to be widely adopted across the globe, and especially in developing countries.

■ **More face-to-face, real-time virtual interactions with customers.** There will be new ways to virtually meet with clients and prospects, and help distribute powerful, original video content for training employees and associates.

■ **Greater branch synergy.** Faster connectivity and lower latency will translate to increased productivity, increased reliability, and decreased attention to minor technical glitches, allowing for smoother remote interaction and increased focus on company priorities.

■ **More people will move to cloud-based software.** Faster internet speeds will lower the cost of innovation, e.g. more people will move from downloaded accounting software to cloud-based accounting.

■ **Better video conferences means a happier remote staff.** With expanded bandwidth and significant improvements in latency and multiple-input and multiple-output (MIMO) technologies, the quality of service in video conferences will improve.

■ **Changes in the way media is consumed.** Greater consumption of video, higher-quality image content, and increased complexity and sophistication in mobile applications will allow customers to ultimately be a part of a more immersive, interactive experience.

■ **Recruitment of the best talent, no matter where they live.** With 5G, employees can effectively work anywhere. This offers CEOs and senior management opportunities to hire the best talent, no matter where they are located, and to locate offices based on amenities and incentives offered by particular regions.

■ **Speed will help the push toward distributed AI.** Better integration of users with all systems, simply because the connections are so much faster, combined with intelligent agents such as voice command systems and the back-end databases will become more accurate and useful.

■ **A boon for the IoT industry.** The IoT is expected to connect 28 billion "things" to the internet, ranging from wearable devices to appliances and industrial equipment. This means easier, cheaper inroads to the IoT, and bodes well for enterprises throughout the various vertical markets that have wanted to take advantage of the IoT but hesitated because of cost and logistics.

    o Embedded chips will provide real-time information on where a package is at all times, providing manufacturers and retailers greater flexibility. Retailers can implement predictive shipping and

route packages en route. Assembly lines, shipping, and order management systems will communicate with one another to reduce the need for inventory planners.

o   Patient sensors will notify health care providers with patients' vitals, such as blood glucose levels and heart rhythms — in real time, all the time.

The long-term success of 5G depends on the use cases that help to improve quality of life or save money. However, there are challenges, such as security and the consequences of downtime and interruption, which could result in significant repercussions for an organization. Downtimes may result from low-performing backup and recovery programs, which in turn, may cause consumers to rethink continuing to pay for and place their trust in *connected things*.[3]

New Policies Will Unlock Doors for Deployment

The 5G economy will also introduce a new level of complexity to policymaking and regulation as new business models emerge and the old ways of delivering goods and services are either dramatically altered or abandoned completely.[4] This is true for public safety and public infrastructure; cybersecurity; privacy; health care; spectrum (bandwidth that can support 5G) licensing and permitting; and education, training, and development.

For example, many cities are striving to become *smart* by using data, sensors, and connected devices to improve government and quality-of-life services. Analytics and automation could help ease roadway congestion, deliver more effective health and safety inspections, and provide more transparency and information-sharing through real-time dashboards. Policy makers, 5G providers, industries, and internal auditors should collaborate to streamline policies and processes now to ensure a smooth transition to 5G.

The *race to win* 5G, particularly between the United States and China, is driving discussions and actions designed to provide competitive advantages. For example, the Federal Communications Commission (FCC) has taken steps to enact policies to streamline wireless infrastructure rollout and unlock spectrum at the federal level.

At the 2018 CTIA Race to 5G Summit, in Washington, D.C., industry leaders and policymakers discussed the dramatic impacts that 5G will have on industries, products, and people.[5] John Saw, CTO of Sprint Corp, commended the FCC for streamlining its environmental review and historic preservation rules for small cell wireless systems, saying it will, "allow small cells to be deployed more cheaply and quickly." But he added that the government also must streamline the process for issuing permits for wireless network infrastructure on federal lands and on public structures, and must address local fees for small cells, saying that "market-based pricing supported by localities is not reasonable."

Indeed, one of the biggest challenges with 5G will be less about the technology itself and more about building the infrastructure to operate it optimally. Across many jurisdictions, there are lengthy permitting processes, a lack of harmony in regulations, and a wide range in fees. The wireless industry offers that the FCC should work with local governments to improve access to government-owned infrastructure, such as utility poles and traffic lights to facilitate the siting of small cells across the country. Updating location rules to allow for access to public rights-of-way will greatly hasten the rollout of 5G technology.

Clearly, the benefits of 5G wireless technology will depend greatly on the deployment of 5G capabilities and infrastructure across the country. To reach the technology's full potential, governments will need to accelerate the deployment and adoption of 5G by streamlining permitting processes, minimizing red tape associated with 5G installation, expediting the buildout of 5G wireless infrastructure, and adopting cost-based pricing policies for fees they impose on carriers.[6]

Public sector and environmental, health, and safety (EHS) internal auditors will need to weigh these steps in support of 5G against growing public concern about 5G's impact on public health and property rights and values, as discussed in Part I of this series.

Implications for Internal Audit

The potential impact of 5G on internal audit is enormous. Chief audit executives (CAEs) will need to build new skills within their staff and possibly change the structure of their internal audit activity. The advent of 5G also increases the urgency for CAEs to grow and advance staff skills, including training existing staff to perform more analytical services; adopt new technology-driven processes; increase advisory services and strategic thinking; and develop stronger relationships with IT departments to help with their understanding of the new 5G world.

Leverage 5G Technology to Create Efficiencies

Greater understanding of 5G will enhance internal audit's ability to identify new threats and vulnerabilities that organizations face. This depth of understanding may support more sophisticated approaches to cybersecurity issues. For example, rather than dealing with separate cyber issues on a piecemeal basis, they may be encouraged to develop more comprehensive efficient and effective cybersecurity *strategies*. After all, stakeholders expect innovation in internal audit to positively impact their functions.

Indeed, innovation offers a clear return on the investment — improved effectiveness, efficiency, and agility. Enterprises in every industry are innovating, and that is driving the need for internal audit to do the same. But internal audit and senior management should be aware of the risks and dangers that organizations may face with innovation. For example, 5G will drive greater use of big data, and that will boost demand for data analytics. Additionally, big data comes with known risks that must be considered:

- Data security.
- Data privacy.
- Storage and management costs.
- Unreliable, invalid, insufficient, or irrelevant data.
- Unreliable, invalid, insufficient, or irrelevant analytic processes.[7]

Much larger amounts of data will be generated with 5G, and having *command* of that data will take precedence. Internal audit can leverage data to evaluate risks more thoroughly, improve the delivery of audits, and potentially increase the level of assurance provided to organizations in every industry. Therefore, internal audit should identify clear objectives for change, ownership, and accountability; align its data strategy with the overarching corporate strategy; and validate key performance indicators (KPIs) used to measure the success of the change and how the change impacts existing controls, processes, risks, and the culture and structure of the organization. It also will need to overcome any reluctance or resistance to technologies that support and enhance data analytics, such as AI and RPA.

Embrace New Technology to Cope

To do so, internal audit must be ready to embrace 5G — technology that may include AI and RPA — and employ it to execute audits engagements; enhance assurance services to organizations; give perspective on risks and controls while the organization undergoes transformation; and recognize emerging risks.
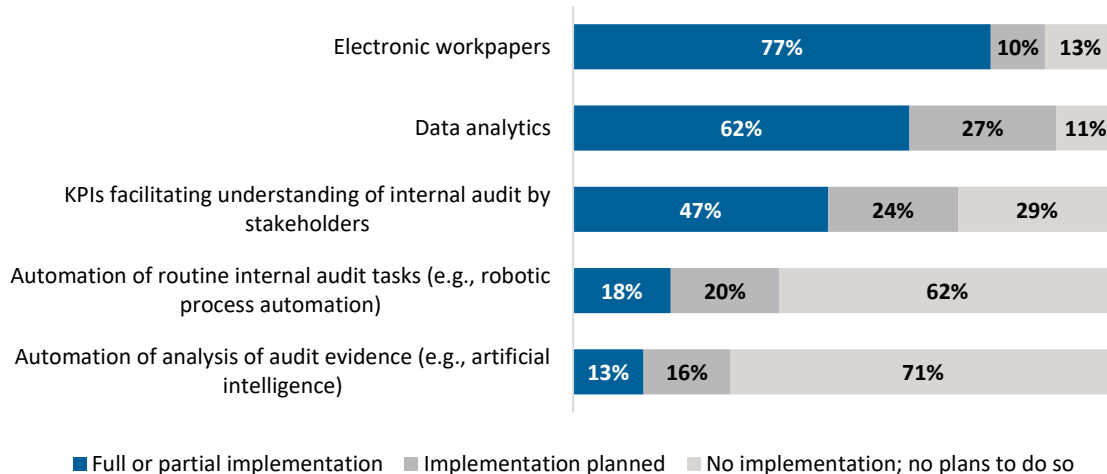
According to the results of the 2018 North American Pulse of Internal Audit, only one-third of CAEs strongly agree that their internal audit functions challenge their own status quos, and technology is the area of potential innovation that was the least often implemented.[8] Thus far, there has been very little adoption of automated routine audit tasks or automated analysis of audit evidence. Rather than accepting limitations, internal audit should anticipate the opportunities and advancements that 5G will steer. Consider *now* where the audit department currently stands, and where it wants to, and needs to be.

Audit Focus

IIA Standard 1230: Continuing Professional Development
Internal auditors must enhance their knowledge, skills, and other competencies through continuing professional development.

Internal Audit Implementation of Innovation

Category	Full or partial implementation	Implementation planned	No implementation; no plans to do so
Electronic workpapers	77%	10%	13%
Data analytics	62%	27%	11%
KPIs facilitating understanding of internal audit by stakeholders	47%	24%	29%
Automation of routine internal audit tasks (e.g., robotic process automation)	18%	20%	62%
Automation of analysis of audit evidence (e.g., artificial intelligence)	13%	16%	71%

■ Full or partial implementation   ■ Implementation planned   ■ No implementation; no plans to do so

Note: 2018 North American Pulse of Internal Audit survey, question 32: What best describes the degree to which your internal audit department has implemented each of the following? *n* = 636.

Pathways to embrace technology:

■ Recognize the need for self-assessment, and challenge how objectives are being accomplished.

■ Embrace technological advances.

■ Do not blame the failure of innovation on the lack of resources.

■ Develop and communicate the case for internal audit to actively pursue innovation.

Apply The IIA's AI Auditing Framework

Historically, internal audit has been reluctant to embrace progressive technology, but it must rethink its position, says Joseph Morgenstern, senior manager in IT and internal audit advisory services for EY. There are opportunities to leverage intelligent automation for monitoring controls, regulatory compliance, policies, and reporting activities, and help with greater coverage, time and cost savings, and on-demand visibility into department performance, according to Morgenstern.[9]

Internal auditors can leverage The IIA's AI Auditing Framework in providing AI-related advisory, assurance, or blended advisory/assurance services as appropriate to the organization. The Framework comprises three overarching components — AI Strategy, Governance, and the Human Factor:

- **AI strategy.** Clearly articulates the intended result of AI activities and should be developed collaboratively between the organization's business leaders and technology leaders. Both sets of leaders must be involved in managing the execution of the AI strategy.

- **Governance.** Structures, processes, and procedures implemented direct, manage, and monitor the AI activities of the organization. Governance structure and formality will vary based on the specific characteristics of the organization.

- **Human factor.** Addresses the risk of human error compromising the ability of AI to deliver the expected results, and includes ethics and the Black Box elements (the underlying algorithms, internal functions, or mechanisms that enable AI).

For more information about The IIA's AI Auditing Framework, see "Artificial Intelligence, Internal Audit's Role, and Introducing a New Framework."[10]

Other Resources for Coping in a 5G World

Richard Chambers, president and CEO of The IIA says, "There are many actions internal audit should be taking to cope in a zettabyte world." He recalls that one of the best calls to action for the profession was offered by Protiviti in its 2018 publication, "Analytics in Auditing Is a Game Changer." In it, Protiviti challenged internal audit to raise its game in embracing analytics, and offered 10 analytics action items for CAEs and internal audit:

1. Recognize that the demand for data analytics in internal auditing is growing across all organizations and industries, and that the trend is certain to continue.

2. Seek out opportunities to expand internal audit's knowledge of sophisticated data analytics capabilities so that the function has a more comprehensive and precise understanding of what is possible with analytics.

3. Recognize that resource constraints, along with business-as-usual workloads, can limit internal audit's ability to optimize its data analytics efforts.

4. Consider the use of champions to lead the analytics effort and, when appropriate, create a dedicated analytics function.

5. Explore avenues to expand internal audit's access to quality data, and implement protocols that govern the extraction of data used during the audit process.

6. Identify new data sources, both internal and external, that can enhance internal audit's view of risk across the organization.

7. Increase the use and reach of continuous auditing and monitoring to perform activities such as monitoring fraud indicators, key risk indicators (KRIs) in operational processes, and information used in the leadership team's strategic decision-making activities.

8. Leverage continuous auditing to develop real-time snapshots of the organization's risks and incorporate results into a risk-based audit approach that is adaptable and flexible enough to focus on the highest areas of risk at any point in time.

9. Seek ways to increase the level of input stakeholders provide when building and using continuous auditing tools and when determining what data should be monitored by these tools.

10. Implement steps to measure the success of data analytics efforts, and also consider the most effective ways to report success and value to management and other key stakeholders.[11]

Because of the launch of 5G and other technologies, organizations will constantly seek to improve their processes, operations, and strategies to stay competitive and to protect their data. Internal audit is vital to those improvements and has the ability to shape corporate strategies by providing value-added insight on business opportunities and business risks.

Thoughtful actions by CAEs will help internal auditors with the transformation from 4G to 5G. For their part, practitioners must be forward-thinking to provide assurance and apply digital technologies to their own work and anticipate the issues and risks associated with 5G. Further, it is imperative that internal audit anticipate stakeholders' moves (to the degree possible) toward new technology, strategies, and business models so they can be ready to provide valuable and visible assistance where needed and when needed.

Audit Focus

IIA Standard 2120: Risk Management

The internal audit activity must evaluate the effectiveness and contribute to the improvement of risk management processes.

2120.A1 – The internal audit activity must evaluate risk exposures relating to the organization's governance, operations, and information systems regarding the:

- Achievement of the organization's strategic objectives.

- Reliability and integrity of financial and operational information.

- Effectiveness and efficiency of operations and programs.

- Safeguarding of assets.

- Compliance with laws, regulations, policies, procedures, and contracts.

Closing Thoughts

The world is facing another giant step in the evolution of mobility innovation, and it will require very real change in the mindsets and actions of wireless providers, consumers, organizations, and internal auditors. The adoption of 5G will indeed cause an element of disruption, especially at its implementation. At a minimum, 5G will require an upgrade to an organization's IT structure, and a change in organizational strategy and culture. This in itself will prove challenging.

In a 5G world, the definition of "business as usual" will change *drastically* and become significantly more complex. As new business plans are developed that leverage this powerful new technology, internal audit's undertakings will become equally complex. Hence, internal audit needs to be cognizant of the time, attention, and changes needed to successfully adopt and work with the new technology, as well as recognize the additional risks that accompany the changes.

The rapid advance of technology in the 21st century has been the biggest driver of change for all aspects of organizations, including internal auditing. Indeed, the coming changes will pressure internal audit functions to become *proactive and forward-thinking,* and propel internal audit into a more strategic and supportive role. To achieve this, the profession's resistance to technology must change. As organizations leverage 5G and become more data-driven, internal audit will have no choice but to do so, as well. However, without embracing data analytics, robotics process automation, artificial intelligence, and other technologies the probability of internal audit effectively identifying, evaluating, and advising on risks in the age of 5G is low.

Glossary

5G — The fifth generation of wireless communications technology.

5G-NR (fifth generation new radio) — The global standard for a unified, more capable 5G wireless air interface.

artificial intelligence — The theory and development of computer systems able to perform tasks that normally require human intelligence.

internet of things (IoT) — A sensor network of billions of smart devices that connect people, systems, and other applications to collect and share data.

latency — The time it takes for a source to send a packet of data to a receiver.

network functions virtualization (NFV) — A network architecture concept that uses the technologies of IT virtualization to virtualize entire classes of network node functions into building blocks that may connect, or chain together, to create communication services.

network programmability — A set of tools to deploy, manage, and troubleshoot a network device.

network slicing — The ability to offer customized networks for specific uses and provide greater insight into network resource utilization.

network virtualization — The process of combining hardware and software network resources and network functionality into a single, software-based administrative entity – a virtual network.

robotics process automation — An application of technology, governed by business logic and structured inputs, aimed at automating business processes.

Notes

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11. "Analytics in Auditing Is a Game Changer" (Protiviti, 2018), PDF can be accessed at http://www.protiviti.com/sites/default/files/2018-internal-audit-capabilities-and-needs-survey-protiviti.pdf.