MARSH & McLENNAN INSIGHTS | NACD ELEVATE BOARD PERFORMANCE

EXECUTIVE SUMMARY

GOVERNING DIGITAL TRANSFORMATION AND EMERGING TECHNOLOGIES

A PRACTICAL GUIDE

AUTHORS

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INTRODUCTION

COMPETING IN THE DIGITAL ERA

A convergence of global trends over the last 20 years, including the boom in global data traffic, online users, connected objects, and access to cloud computing has laid the groundwork for the digital era. This era is predicted to bring tremendous value for business and societies alike. Armed with access to new technologies such as artificial intelligence (AI), blockchain, internet of things, and robotics process automation (RPA), traditional firms across industries are pursuing digital transformation to reimagine solutions to existing business challenges and create exponential value for their customers and partners.

Businesses globally have a right to be optimistic.[1] According to the World Economic Forum, the combined value of the digitalization already occurring in every industry could generate upwards of $100 trillion over the next six years. That's a massive increase, representing more than a doubling of the entire global gross domestic product (GDP) today.

However, traditional firms, regardless of size, recognize the potential for disruption from technology giants and digital startups and the resulting threat of value migration. Disruptors like Uber, Amazon, and Tesla have found ways to meet rising customer expectations, and in doing so have set the standards for what "good" looks like. These technology companies are signaling that they intend to insert themselves wherever they can remove friction, capture customer attention, drive out market inefficiencies, or strip away information to fuel their data and insight engines.

To compete in the digital era, traditional firms are increasingly asking more fundamental questions: How does our company stay relevant? How do we change our strategy to more effectively capture and retain customers' attention? How fast can we move? Does our company have time to shift from low-growth to high-growth businesses before disruptors steal our customers? Where do we have assets that can become the basis of information-powered new businesses?

But traditional firms face very different circumstances than new digital businesses. They have advantages—established brands, markets, know-how, customers, suppliers, organizations, and cash flow. However, they rely on decades-old approaches, legacy systems, deeply embedded processes and capabilities, and deliberate execution and decision-making cultures to deliver profitable core businesses. This makes competing on customer experience, speed, agility, and lower cost a major challenge. As a result, digital transformation is often a complex and costly endeavor.

1 Oliver Cann, "$100 Trillion by 2025: The Digital Dividend for Society and Business," World Economic Forum, Jan. 22, 2016.

BOARDS PLAY A CRITICAL ROLE IN GUIDING FIRMS TOWARD SUCCESSFUL TRANSFORMATION

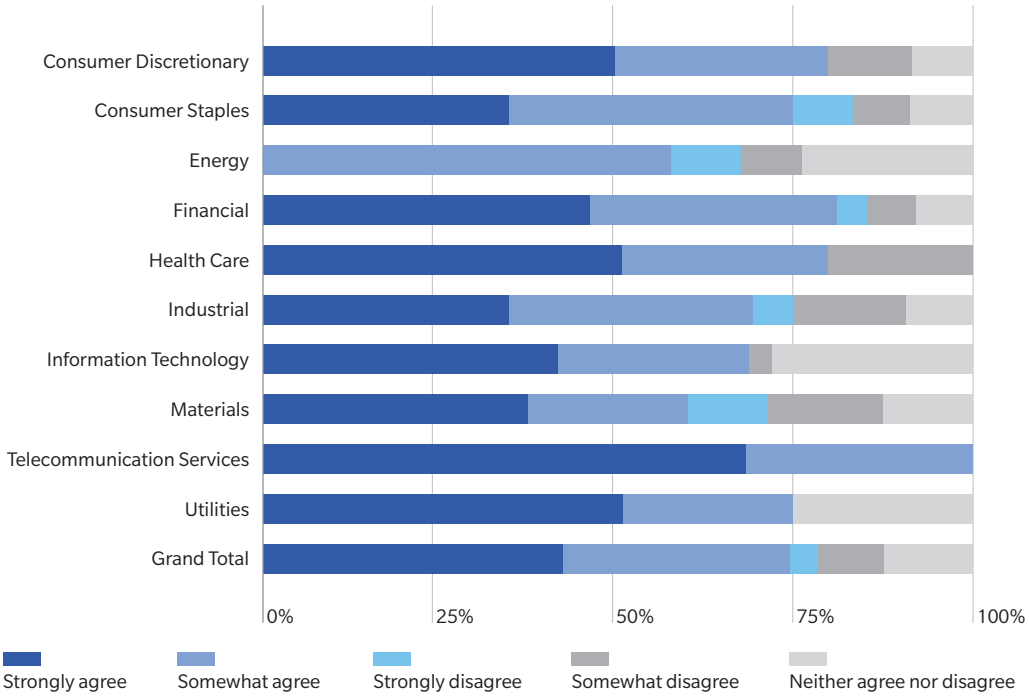
Across industries, directors recognize the near-term disruptive potential of new business models enabled by emerging technologies. As a result, boards are actively reassessing their oversight role in governing digital transformation initiatives, given that they play a critical role in guiding firms toward successful transformation to not only remain relevant but also thrive in the digital era.

According to the *Report of the NACD Blue Ribbon Commission on Adaptive Governance : Board Oversight of Disruptive Risks,* boards are eager to "find ways to tap into fresh, unconventional thinking to improve oversight of the risks and opportunities posed by disruptive forces and events, including... the seismic shifts in the way we live and work that are being accelerated by new and emerging technologies."[2]

Boards also realize that their current state of governance is no longer enough to fulfill their fiduciary duty to shareholders. Multiple challenges exist in enabling board readiness in this area, including but not limited to a lack of clarity on digital transformation and adequate metrics to track progress; challenges in separating hype from reality with emerging technologies; insufficient technology expertise; ingrained habits about board composition; and a prevailing and largely protective bias driven by recent attention to cyber and data privacy risk.

Exhibit 1: Boards across industries expect near-term disruption from emerging technologies

My company is vulnerable to the impact of disruption from emerging technologies within the next 12 months



Source: NACD 2019 Digital Governance Pulse Survey.

2 Report of the NACD Blue Ribbon Commission on Adaptive Governance (Arlington, VA: NACD, 2018).

INTRODUCING A PRACTICAL GUIDE TO GOVERNANCE OF DIGITAL TRANSFORMATION

To help boards address this challenge, this report introduces a flexible and practical guide to prepare directors to navigate the complexities of digital transformation and emerging technologies, and guide their organizations to become more digital and data-driven.

The guide outlined in this report has been created as a result of a partnership between the NACD and Marsh & McLennan Companies. The findings presented in this report draw from primary research conducted through interviews with company directors, as well as a survey of 200 NACD members on the opportunities and challenges they face in addressing digital transformation. Accounting for differences in digital maturity across companies and even industries, our research outlines five fundamental principles to advance board oversight of digital transformation and emerging technologies.

Principle 1: Approach emerging technology as a strategic imperative, not just an operational issue.

Principle 2: Develop collective, continuous technology-specific learning and development goals.

Principle 3: (Re)align board structure and composition to reflect the growing significance of technology as a driver of both growth and risk.

Principle 4: Demand frequent and forward-looking reporting on technology-related initiatives.

Principle 5: Periodically assess the organization's leadership, talent, and culture readiness for technological change.

In the following section, we break down each principle to help boards formulate and adopt a more cohesive oversight approach. The principles comprise oversight pitfalls, potential red flags, and detailed recommendations to enhance oversight. These principles are broadly applicable to and important for all directors, including those on the boards of public, private, and nonprofit organizations. Please access the report at www.nacdonline.org for a full discussion of each principle and their application.

PRINCIPLE 1

Approach emerging technology as a strategic imperative, not just an operational issue.

OVERSIGHT PITFALLS	RED FLAGS	RECOMMENDATIONS
1. Fixation on the technology, not the value to the customer	• Management presentations largely focused on technology adoption and deployment, much less on what business or customer problem it solves • Uneven board-level understanding on the impact of new disruptive technology on the business strategy	Focus oversight on customer needs and business model change.
2. Working with an incoherent vision	• Lack of a common vocabulary and shared digital vision • Excessive use of acronyms and technical jargon in management presentations	Ensure a common understanding with management about what "going digital" means.
3. Technology governance equals risk governance	• Majority of board-level technology discussions centered on preservation of corporate assets/value • A very risk-averse board mindset around emerging technologies	Ensure that critical technology-related risk and strategy reviews are integrated and happen at the full-board level.
4. Random acts of digital innovation	• Management and boardroom buzz about the promise of shiny, new technologies • Focus on realizing immediate returns and easy innovation wins	Assess whether management is building the necessary conditions to drive successful and ongoing digital transformation.
5. The existing capabilities trap	• Management either too eager or too reluctant to abandon existing capabilities or legacy business	Pressure-test management's rationale for abandoning or protecting core businesses and capabilities.

PRINCIPLE 2

Develop collective, continuous technology-specific learning and development goals.

OVERSIGHT PITFALLS	RED FLAGS	RECOMMENDATIONS
1. A board mindset that does not value continuous education or takes a one-size-fits-all approach to learning about technology	• Learning that focuses on only the hype technologies or technologies that have yet to showcase practical applications • A board approach to director learning about technology that is mostly reactive and ad hoc • Individual director learnings about technology that are rarely shared and used in the boardroom	Assess collective and individual technology knowledge and skills gaps to inform both learning objectives and ultimately future recruitment needs. Develop a multifaceted technology learning plan for both the full board and individual board members. Ensure directors present back new information to the full board to distribute their knowledge.

PRINCIPLE 3

(Re)align board structure and composition to reflect the growing significance of technology as a driver of both growth and risk.

OVERSIGHT PITFALLS	RED FLAGS	RECOMMENDATIONS
1. Limiting recruitment of digital directors solely to technology experts	• Search criteria for a digital director not clearly aligned with the future strategic needs of the business • Search criteria that fixates on specific technology know-how but doesn't include proven experience in commercializing new innovations • Relying entirely on a token digital director to oversee technology or challenge management's approach	Ensure the recruitment of a tech-savvy director focuses on both technical expertise and governance ability.
2. Fragmented board oversight of technology-related matters	• Audit committee that has become the "kitchen junk drawer" for all new risk areas • Committee charters that do not mention technology as an area of oversight	Carefully weigh the merits of establishing a dedicated board-level technology committee, an ad hoc committee, or a technology advisory board.

PRINCIPLE 4

Demand frequent and forward-looking reporting on technology-related initiatives.

OVERSIGHT PITFALLS	RED FLAGS	RECOMMENDATIONS
1. Reporting that is static, focused on the past and present	• Dashboards that focus on traditional, well-known risks and much less focus on the unknowns or how the nature of risk of disruption may change	Improve forward-looking visibility about technological disruptors in board-management discussions.
2. Too much information, too little insight	• Lengthy slide decks that feel disjointed and many data charts that are difficult to interpret	Collaborate with senior management to establish appropriate board reporting guidelines.
3. Fixation on short-term return on investment (ROI) metrics	• Focusing on only financial performance metrics • Pressure applied to constant reporting	Focus on early leading indicators of digital transformation success or failure.

PRINCIPLE 5

Periodically assess the organization's leadership, talent, and culture readiness for technological change.

OVERSIGHT PITFALLS	RED FLAGS	RECOMMENDATIONS
1. Failure to embed digital fluency and track record into the recruitment, succession planning, and evaluation of the chief executive officer (CEO) and the executive team	• Senior leadership beliefs about digital that are fixed, and limited curiosity to learn and be exposed to different perspectives • Senior leaders who delegate digital initiatives to middle management • The CEO spending limited time on understanding how new technologies can disrupt the business or industry	Ensure both C-suite evaluations and succession planning formally assess current performance and future ability as a digital leader.
2. Underestimating the importance of a change-ready culture that is open to innovation	• A misalignment of incentives throughout the organization • Organizational culture that values the status quo or actively resists change • Fixation on transforming process and structure, but little attention paid to the importance of culture	Ensure the company has an organizational culture that embraces change and promotes innovation and experimentation.
3. Talent oversight focused mostly on present needs and past problems	• Human capital strategies centered around how the business operates and creates value today and in the near-term future • Use of mostly lagging indicators in management presentations	Ask management for forward-looking assessments of talent, aligning these metrics with the broader company strategy.

CHARTING THE PATH TO EFFECTIVE DIGITAL TRANSFORMATION OVERSIGHT

Board members largely recognize the near-term disruptive potential of new business models enabled by emerging technologies. As a result, many are actively reassessing their oversight responsibilities in governing digital transformation initiatives and expect to play a critical role in guiding their firms to thrive in today's digital era.

This report introduces a flexible and practical guide, based on five foundational principles, to help directors navigate the complexities of digital transformation and advance oversight of this area. To succeed, boards won't need to become experts on every technology trend, but they will need to understand how new technologies can threaten existing business models or drive business model innovation. Those who rise to the challenge are likely to push their companies to reap the commercial benefits of these emerging technologies, while those who fail may doom their firms to obsolescence.

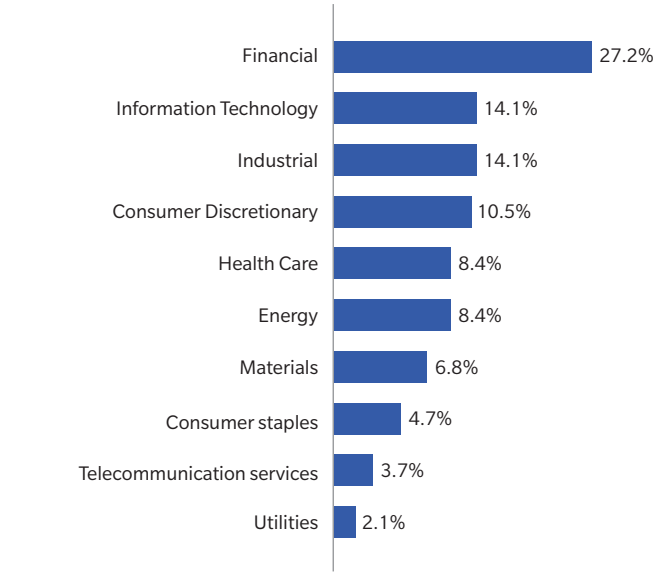
SUPPLEMENTAL MATERIALS

NACD 2019 DIGITAL GOVERNANCE PULSE SURVEY

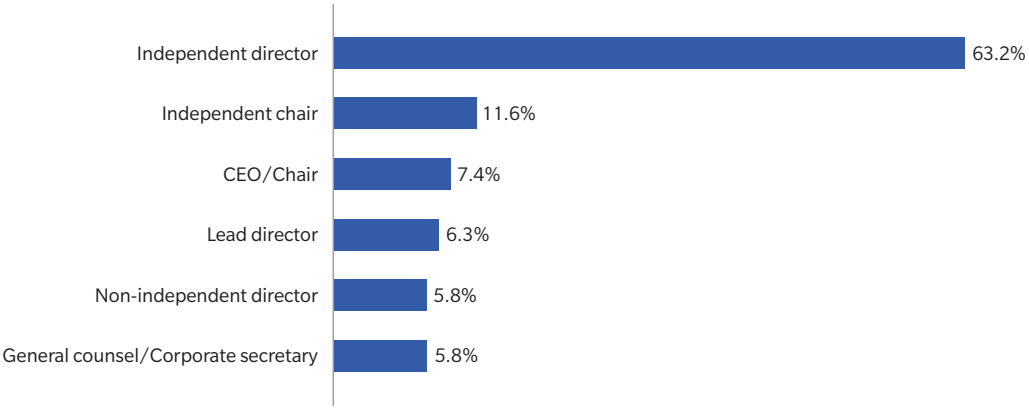
The *2019 Digital Governance Pulse Survey* is a joint survey between the NACD and Marsh & McLennan Companies. The survey aimed to collect data and insights from NACD members on the opportunities and challenges they face in addressing digital transformation.

Exhibit 2: Survey demographics

Industry N=192



Organizational roles N=192



FAST FACTS: ARTIFICIAL INTELLIGENCE (AI)

Demystifying AI

AI is the use of computers and algorithms to **simulate human intelligence.**

AI **amplifies cognitive abilities**, providing solutions to problems where the complexity is too great, the information is incomplete, or the details are too subtle and require expert training.

Learning from data—a computer version of life experience—is how AI evolves.

AI ENABLERS

Explosion of Data

The explosion of native and structured data has provided neural networks with the massive volume of training sets they need to function.

90 percent of global data was created in the last two years.

Smarter Algorithms

Maturation and increasing sophistication of algorithms to create innovative AI solutions.

Better tools and readily available data processors exist today to manipulate and analyze data, allowing more experimentation and greater collaboration.

Cheaper/Computing Resources

Cloud computing and storage provide cheap access to more storage and computing capacity.

Improved computer infrastructure such as advance graphical processing units (GPUs) have dramatically increased computers' processing power.

TYPES OF AI

SEE: Detect, identify, and understand the context of objects in pictures, videos, and real life. This includes the ability to translate or interpret text, written language, and symbols – Computer vision and Optical Character Recognition (OCR)

HEAR: Capture, catalog and interpret spoken commands as well as speech, sounds, and auditory signals within the ambient environment or from video – Speech Recognition and Virtual Assistants

COMMUNICATE: Send insights, directions, or responses verbally or in writing using natural language. This includes the ability to apply appropriate dialects or slang or mimic individual speech patterns – Natural Language Processing (NLP) and Written Chatbots

SENSE: Ingest diverse inputs such as environmental conditions or biometrics utilizing sensors and other devices often associated with the internet of things (IoT) – Supervised Learning for prediction and decisions

THINK: Apply machine learning and other analytic techniques to integrate, analyze and generate insight from input information and signals – Deep Learning for simple questions with complex answers and Supervised Learning

Example of Simplified Ai Model

1. Recognition (input to algorithm)
Examples:
Identify things in a picture or video
Translate speech verbatim

2. Comprehension
Examples:
Gain and apply insights based on context
Relate things to each other

3. Abstraction (output of algorithm)
Examples:
Evaluate and predict future performance
Post a positive or negative response

BENEFITS

Reduced manual tasks and likely a leaner workforce

Faster insights derived from data

Lower operating costs and more efficient operations

Enhanced product quality and customer experience

Higher productivity and more effective performance

Improved and more informed decision making

CHALLENGES

Governance issue over AI for safety, accountability, and transparency
There is a growing systemic risk due to the failure of these models further complicated by limited and unstandardized standards.

Rise of cyber threats/risks
Increasing surface area of attack is driven by the growth in pace of AI innovation, tech complexity, data sharing and interchange, and attack actors' sophistication i.e. social engineering on social media platforms.

Labor market disruption
The advent of AI puts a premium on high order value activities, deeming the skills that people have to potentially be irrelevant soon.

WHAT'S HOLDING AI PROGRESS BACK?

Ensuring that AI systems are trustworthy	Training current employees to work with AI systems	Managing convergence of AI with other technologies (e.g., IoT, drones)	Building buy-in due to existing stakeholders' mistrust and discomfort	Recruiting workers who are already trained to work with AI systems

AI APPLICATIONS

Most used AI solutions

Autonomous systems can be an automation performing a more complex task or an AI-augmented machine operating without human.

Agents use text or voice to communicate with users in natural language.

Decision automation uses AI to automate tasks or optimize business processes.

Smart products have AI embedded in them and are able to learn, hyper-personalize, and drive engagement with users.

Decision support/augmentation make recommendations, produce insights, provide personalization, and predict events.

Differentiated business value with AI (Industry examples)

Automotive

- **Improving transportation efficiency** with autonomous fleets for ride sharing
- **Enhancing driver experience** with semi-autonomous features, autonomous maintenance, and engine monitoring/predictive

Energy

- **Saving costs** with smart metering (real-time information on energy usage)
- **Minimizing business disruption** with predictive infrastructure maintenance
- **Increasing efficiency** of grid operation and storage

Telecommunications

- **Enhancing customer experiences** with virtual assistants, optimized networks and personalized services
- **Saving costs** with more accurate "churn risk" predictions, reducing false positives by 75x

Manufacturing

- **Saving costs** with on-demand production and optimization of supply chain and production
- **Minimizing business disruption** with enhanced monitoring and auto-correction of manufacturing processes
- I**ncreasing the value of work** by human-robot collaboration

Retail

- **Exceeding customer expectations** with personalized design and production
- **Increasing revenue** through optimized price, profitability, and anticipation of customer demand
- **Improved inventory and delivery management** with smart logistics operations

Financial Institutions

- **Enhancing banking client experiences** with personalized (or new) services and products
- **Increasing revenue** with more accurate microtargeting, segmentation, and marketing
- **Improving risk management** with more efficient fraud detection/anti-money laundering

Health Care

- **Improving diagnosis** in imaging and areas such as detecting small variations from the baseline
- **Earlier identification** of potential pandemics and tracking incidence of the disease to help prevent/contain spread
- **Relieving workforce shortage** and **reducing costs** with humanoid robot as an admin role/caregiver

FAST FACTS: ROBOTIC PROCESS AUTOMATION (RPA)

Demystifying RPA

RPA tools seek to mimic the role of the human while making the process more automatic, repeatable, faster, and less prone to error.

RPA automates strictly rule-based repetitive processes with structured data and deals with simpler types of tasks and processes.

RPA is a different means to the same end; it takes the robot out of the human—the often more productive way.

DRIVING VALUE WITH RPA

Application	What It Can Do
Data Assembly	RPA can automatically and routinely **stitch vast amounts of data** across fragmented systems.
Basic Analytics	RPA can **perform basic analytical tasks** on vast amounts of structured, and in some cases unstructured, data.
Automating Operations	RPA can **carry out repetitive daily operations automatically** to replace otherwise slow and error-prone labor-intensive processes. RPA can **assist with human-facing interaction automation** such as simple auto-email and chatbot deployment.
Automating Compliance Task	Repetitive manual tasks associated with compliance are ripe for allocation to an RPA system (e.g., the assembly and analysis of data makes for a clear, reliable and **automated account of all sources and destinations of payment).** More complex RPA systems can **trigger a response to compliance.**

EXAMPLES

Processes for RPA

Front office

Sales order management, competitor price monitoring, customer engagement automation, self-service catalog, progress checking

Middle office

Trend tracking, account/cash/fund administration, report generation, data verification/validation/handing, information delivery, time capture and processing

Back office

data management/entry, reconciliation, app integration, network/application monitoring, assembly process, assignment management

Business Outcomes

Frees management and workers to focus on higher-value tasks (e.g., business decisions and enhance stakeholders relationships).

Supports business growth without the equivalent expansion of back- and middle-office operations

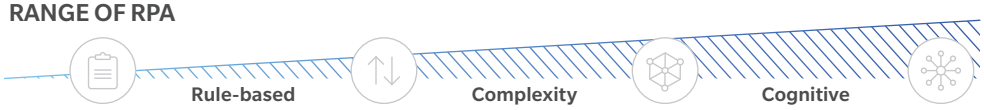
Cost-savings from leaner back- and middle-office team

Streamlines communications with dynamic and more accurate data and simplified processes

Improves transferability with more standardized and efficient documentation of processes

Enhances collaboration across front, middle, and back offices

RANGE OF RPA



	Rule-based	Complexity	Cognitive	Artificial Intelligence (AI)
Description	**Task bots** replicate and perform the complex process actions taken by humans at the presentation layer of any desktop-based application. Task bots are capable of executing multistep processes by leveraging structured data and by following prescribed processes.	**Meta bots** leverage API-level integrations to create repeatable, complex, system-to-system automations once and share them with task bots. When combined with task bots, meta bots are ideal for complex, multi-skill processes.	**IQ bots** learn and adapt over time, becoming independent but with fewer errors. IQ bots uniquely leverage unstructured data and are capable of making decisions based on accumulated learning and experience.	
Best for	Simple, repetitive, rules-based tasks that rely on structured data	Complex, multi-system dependent processes	Managing through fuzzy rules and using unstructured data	

On the simpler end of the spectrum, screen-scraping technologies can take data from websites or legacy applications, manipulate the data, and key into another system for use in other processes.

On the more complex end of the spectrum, robots can be combined with more unstructured data and algorithms to manage more complex tasks and become more independent and intelligent overtime. This approaches the characteristics of artificial intelligence.

BENEFITS

Cost-Savings

Replaces high-cost human labor by low-cost robots (up to 60%-80% cost-savings).

Virtual 24/7 workforce that emulates humans, repetitive processes

Non-invasive

Reduced investment requirement due to direct integration into existing infrastructure

No invasive actions to underlying systems

Optimized Analytics

Gives a complete mapping and detailed documentation of processes

Provides insights through high-quality data gathering, organization, and analytics

Easy to Implement

Typical implementation time for simple processes is measured in weeks

Rapid prototypic technique applicable

Faster ROI

Simple process automation that can have a positive ROI in less than three months

Effects of scale applicable from day 1 after launch

Improved Productivity and Quality

Guaranteed 24/7 availability of service and faster processing

Ensures processes are 100 percent compliant with regulations

CHALLENGES

Strategy and Approach

Many firms do not set a clear vision, governance, or performance objectives in using RPA to scale up their operations.

Misunderstood or overestimated RPA capabilities often result in any efficiency, savings, and productivity gains falling short of expectations.

System Integration Roadblocks

Many companies deal with the inherent challenge of ensuring that their applications can connect and share information—an expensive and time-consuming process that is often overlooked and circumvented with manual workarounds.

RPA can only provide a temporary relief to this.

Transition and Change Management

RPA programs and efforts are sometimes perceived as a loss of power and control.

This results in varying degrees of resistance from managers to give up their resources.

Managing Human Error

Human error in the initial short-term programming or in the medium-term adjustment of RPA can lead to catastrophic repercussions. A lack of sufficient knowledge from human to RPA is usually a cause for this.

Errors in one area of the program can trigger across other linked systems.

CRITICAL SUCCESS FACTORS FOR RPA IMPLEMENTATION

Pick the right processes.

Assess the tasks performed manually and require users to perform repeatedly

Identify and tackle organization constraints.

Address possible logistical/procedural/structural challenges to adopt RPA

Identify, assess, and test the data for any anomalies.

Identify internal/external data sources data cleansing requirements and initial testing with a subset of data

Pick the right RPA tools and test them.

Test multiple RPA tools to determine the best solutions the organizations needs

Engage and involve the right team at all phases.

Includes business leaders, operations analysts, project management, development and ongoing maintenance

Anticipate and address resistance as early as possible.

Determine tactics to establish RPA benefits and alleviate concerns of job loss

Document the process to establish proper-use protocols.

With adequate design documents, and solution design guides

FAST FACTS: INTERNET OF THINGS (IoT)

Demystifying IoT

IoT is a network of physical objects, through which data and information—condition, movement, and position—of the object are collected or exchanged, linkable to the internet.

IoT is machine-to-machine communication.

IoT is composed of three independent components: things with networked sensors, data stores, and analytics engines.

COMPONENTS IN AN IoT ECOSYSTEM

Hardware

IoT end devices within the IoT solution; chipsets or sensors add connectivity to non-connected devices.

Networks

Connect the IoT solution to the user; popular networking protocols include Wi-Fi/ethernet, cellular, mesh networks, bluetooth, 4G, and more.

Remotes

Smartphones, tablets, computers, smartwatches, and smart speakers; provide users with interface to interact with an IoT solution.

Platforms

The middleware, that transmits messages between devices and data storage. It includes analytics, data storage (i.e., cloud), and sometimes data communication and visualization.

Security Protocols

Device authentication, data encryption, secure device management—that ensure the IoT solution remains protected.

Source: BI Intelligence, 2019

IoT ENABLERS

Better, Faster, and Cheaper Devices

Costs of hardware procurement, and the sizes of components needed to implement many parts of digitization processes across different industrial sectors, have been steadily decreasing.

Increasing Network Access and Speed

Expanding wireless options and the advent of 5G will fuel IoT growth, enabling the expansion on IoT features, products, and quality (and risks).

IoT will account for one-fourth of the global 41 million 5G connections in 2024.

Expanding Commercial Implementations

With more balanced expectations of broader adoption, **more proof of concept pilots will be planned and executed**. This also extends beyond expected ROI for IoT that had often been tied to savings on utilities and maintenance bills.

Source: BI Intelligence, 2019

IoT APPLICATIONS

MOST-USED IoT SOLUTIONS

Remote and Real-time Monitoring

Controlled through an app, voice command, built-in computing systems, and even AI-powered observed patterns

Asset-tracking Systems

For visibility throughout supply chains and to enable better tracking of shipped goods

Wearables

Including personnel trackers and augmented reality headsets

Smart Facility Management

Including connected lightings and smart HVAC (heating, ventilation, and air conditioning)

BUSINESS OUTCOMES/VALUE

Smart Agriculture: Enabling farmers to monitor field conditions without physical presence and make strategic decisions for whole farm or a single plant/livestock

Smart Health Care: More collaboration among colleagues and with patients; cost-savings from more streamlined processes; improving quality of medical treatment with smarter diagnostic tools

Smart Cities: Enhancing security; reducing wastage with improved waste/water management; time-savings from optimized travel and transportation; Increasing awareness to infrastructure and traffic issues; minimizing disruption

IoT in Financial Services: Improved risk management with real-time data feedback; strengthening safety and security with simultaneous activities tracking; enhancing customer experience

Smart Manufacturing: Allowing more informed decision-making; cost-savings from reduced machine downtime/energy wastage; optimizing material usage and work processes; increasing productivity

BENEFITS

Possibility of Standardized Processes

Accelerated, simplified, and standardized processes with higher operations efficiency and lower risk of error; objects can be sensed and controlled remotely across existing infrastructure and improve communications.

Enrich Experience and Decision Making

For both internal workforce and external customers, enhanced through additional data created through the direct integration of the physical world into computer-based systems; real value of IoT-generated data is often derived when combined with other emerging tech (e.g., AI/RPA).

Long-term Cost-savings

Enables the use of an expansive infrastructure with very limited costs; technology computing limitations becomes redundant as IoT continues to be powered by the exponential growth in connected devices.

CHALLENGES

Governing Privacy Issues in A Networked System

The data collected by IoT devices is where both the value and privacy risk of IoT lie; this is further complicated by having to address evolving data privacy regulations across borders. Firms that combine IoT telemetry with customer data need to protect it or face trust issues with stakeholders.

Amplifying Cyber Threats

A deployment of IoT devices could exponentially increase the surface area of attacks. IoT devices that are secure by design could become an entry point for an attacker or tool to launch an attack (e.g., distributed denial-of-service attack).

Labor Market Disruption

The advent of IoT puts a premium on data analytical skills, such as of data scientists and digital strategists. While digital skills are in short supply, skills of existing non-IT workers also need to be redressed with relevant learning opportunities.

TOP 7 TRENDS

1. **Infonomics and data broking** to monetize the data collected by IoT products and services will increasingly become an IoT business outcome.

2. **Marrying the application** of AI to a wide range of IoT information (e.g., still images, videos, speech, network traffic activity, and sensor data to exploit AI in an IoT strategy).

3. **Blockchain's promising role in IoT** allows users to encrypt data at its source, protect it through its life cycle, manage access, and thus address data privacy concerns.

4. **IoT's shift from centralized and cloud to edge computing** architecture is underway. An edge architecture will eventually evolve into a more dynamic mesh that can enable more intelligent, flexible, and responsive IoT systems.

5. **Legislation or regulatory activity will continue to be driven** by security concerns—the most significant area of technical concern for organizations deploying IoT systems.

6. On the flipside, the **IoT security market is expected to expand**, with a CAGR of 27.8 percent (2018-2023). The deployment of software and hardware combinations can create more trusted and secure IoT systems.

7. **Evolving technologies to boost power of IoT** (e.g., new wireless network [5G] and silicon chip innovation [a new special-purpose chip]).

Source: Gartner, Global News Wire Marsh & McLennan Insights Analysis, 2019.

About The Authors

NACD

Friso van der Oord is director of research, responsible for all NACD content development. He focuses on creating actionable insights on key corporate governance challenges and emerging risks and on raising the leadership profile of boards in areas such as strategy setting and long-term value creation. Prior to joining NACD, he was the global head of research for the Audit and Risk Management practices at the Corporate Executive Board (CEB). He also was a senior director of CEB's Compliance and Ethics Leadership Council and worked for LRN where he ran the company's ethics & compliance solutions. He is a member of the International Professional Practices Framework Oversight Council of the Institute of Internal Auditors. He holds an MA in international relations from Johns Hopkins University's SAIS Program.

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MARSH & MCLENNAN INSIGHTS

Leslie Chacko is a managing director at Marsh & McLennan Companies and leads their Insights and Solutions agendas for digital, transformative technologies and cyber resilience. In his role, Leslie explores longer-term trends, hidden opportunities and unforeseen implications of game-changing technologies like artificial intelligence, blockchain, and the Internet of Things on corporations and society. Over the last 15 years, Leslie has advised clients in High Tech, Financial Services, Energy and Retail industries at the intersection of strategy, technology, and risk. Leslie is a frequent speaker on the topic of transformative technologies and has published many thought-provoking insights on digital literacy, cyber resilience, and implications of digital transformation for boards and corporate functions. He has contributed to insights for the Association for Financial Professionals, Harvard Business Review, National Association for Corporate Directors and the World Energy Council.

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