Executive UPDATE
CUTTER CONSORTIUM
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DATA ANALYTICS & DIGITAL TECHNOLOGIES

AI & Machine Learning in the Enterprise, Part XII: The Most Viable Cases

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Cutter Consortium conducted a survey from early to mid-2018 on how organizations are adopting, or planning to adopt, artificial intelligence (AI) technologies. We also sought to identify important issues and other considerations organizations are encountering or foresee encountering in their efforts. In addition to analyzing survey data, I interviewed leaders and practitioners from different organizations implementing or working to implement AI applications. Their opinions and recommendations on using the technology add some depth and richness to the survey responses and will, we hope, contribute to AI decision making at your organization.

Part I of this *Executive Update* series focused on initial survey findings pertaining to the status of AI in the enterprise. Part II examined AI strategies, the chief AI officer, and budgeting. Part III covered the benefits and goals organizations hope to achieve with their AI initiatives. Part IV considered results concerning the various AI technologies organizations are interested in adopting. Part V, Part VI, and Part VII looked at findings pertaining to the industries and domains where organizations see AI having its most significant impact. Part VIII covered the biggest adoption challenges to organizations' efforts to utilize AI. Part IX focused on organizations' AI development platform preferences, including open source and commercial providers' development tools and AI-as-a-Service (AIaaS) platforms. Part X examined current AI application design and development trends as well as plans by organizations to utilize outside AI experts to train employees in AI development. Part XI looked at how responding organizations view the success of their application development efforts to date, including whether they are deriving any benefits from their deployed AI applications and whether such applications are changing how their organizations operate. Here in Part XII, we examine findings pertaining to the use cases that organizations view as most viable for applying AI. (For survey demographics, see the Appendix of Part III.)

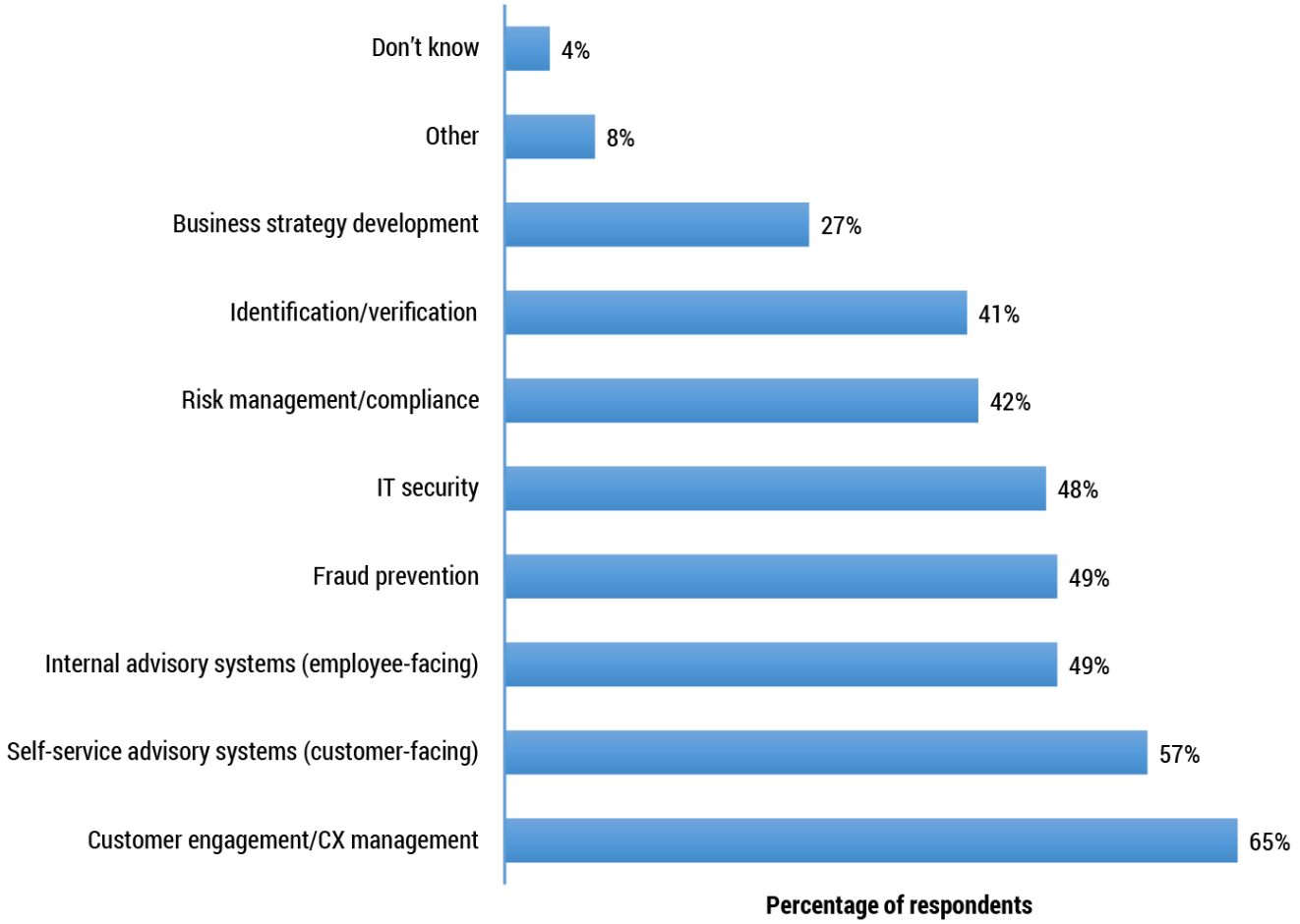

Figure 1 – Which use cases do you see as most viable for applying AI?

Most Viable Use Cases for Applying AI

Figure 1 shows the primary use cases that surveyed organizations view as most viable for applying AI in the enterprise.

Customer Engagement/CX Management

According to our survey, organizations view customer engagement/customer experience (CX) management as the most viable enterprise use case for AI. As a general trend around the use of AI in the enterprise, optimizing customer engagement/CX management will be the dominant domain for applying the technology over the next two to four years.

Organizational goals sought by using AI for customer engagement/CX management include achieving greater levels of automation for customer service operations, including encouraging customers to take a self-service approach to issue resolution and delivering innovative and unified experiences to the customer

across all digital channels — ranging from Web and mobile to chat, text, video chat, social media, and voice. Organizations will increasingly apply AI technologies, especially machine learning (ML) and natural language processing (NLP), to customer journey mapping, behavioral modeling, personalization, and other applications to allow for increasingly more detailed CX management (i.e., across all channels, properties, and lines of business). For more on AI and CX, see Part III.

Self-Service Advisory Systems

AI has a broad range of possible uses for building customer-facing advisory and help systems, including smartbots and digital assistants for mobile, voice, and chat-driven sales and customer self-service systems that offer advanced capabilities for understanding user wants and needs that go beyond standard keyword-based solutions.

Organizations are especially interested in using NLP and speech-enabled applications that can automate more mundane customer service tasks (e.g., "I lost my card, can you send me a new one?" or "I need to change my contact information."). For example, an increasing number of surveyed organizations plan to use natural language interactive voice response (IVR) systems — intelligent systems that can interpret and understand more comprehensive customer dialogues using NLP techniques.

Initially, the effect of such systems will be to free up customer service representatives (CSRs) to focus on more complex customer interactions. But as AI self-service customer applications get increasingly smarter and able to handle more and more complex interactions, we will see a reduction in the number of CSRs required to staff the contact center. Some organizations will develop their own AI-powered self-service advisory systems; however, many more indicate they will opt for commercial solutions. For more on AI and self-service advisory systems, see Part VI.

Internal Advisory Systems

End-user organizations are very interested in using AI applications for internal, employee-facing uses — everything from self-guiding systems to help workers with mundane tasks such as onboarding new employees to helping with managing and disseminating knowledge across the organization (e.g., assisting employees with finding experts within the organization working on projects similar to their own).

We are also seeing considerable developments around smart advisory systems intended to assist employees with complex corporate operations, such as accounting and compliance, product development, regulatory, and so forth. These smart applications are like the rules-based/knowledge-based expert systems that appeared back in the mid-1980s and 1990s — they typically assist humans in one particular application area or domain (e.g., accounting, scheduling, HR). The difference is that these new smart advisory systems employ neural nets and other ML techniques, or, increasingly, they utilize hybrid architectures combining both neural net and rules-based technologies, with the rules typically used to explain the basis of system findings or reasoning.

Some interviewees stressed that they are looking forward to upcoming developments that will combine customer-facing and internal AI systems to support the employee when dealing with customers, as explained by this enterprise architect at a leading healthcare provider:

> *We are interested in systems that will provide guidance to the employee, so that, for instance, if an agent was on the phone with a customer, you could do whatever you're trying to [do] in real time — as opposed to getting this information a day or week, etc., later. So they could troll back through all the interactions they had with the customer, and [the AI system] could do sentiment analysis and listen to the call to have an understanding of the issues the customer was having and provide that feedback in real time — separately on the screen, giving a heads up via whatever the technology they were using so as to be able to assist or augment the worker in offering better service. Right now, that seems a distance off, but people are investing money in these technologies and there's a driver in it to have an economic return for the organization, so you'd expect that investment will continue.*

Fraud Prevention, Risk Management, and Compliance

Fraud prevention, risk management, and compliance go hand in hand, so let's consider them together. These three areas are already leading domains for applying AI technologies in the enterprise. Moreover, they have become popular areas targeted by AI-based solutions providers (especially in banking and finance). This makes sense because the cost of fraud and noncompliance can result not only in fines and other penalties but also damage to a firm's reputation, suspension, missed business opportunities, and, in extreme cases, criminal prosecution.

Assessing risk is difficult, because evaluating the risk profile of a party or company seeking loans, banking, or other assistance goes beyond merely analyzing an individual's or company's financial documents; it is necessary to analyze the profiles of a company's officers to uncover factors indicative of potential risk. In short, risk assessment requires analyzing large volumes and manner of financial, regulatory, investment, and other data. Furthermore, it demands knowledge of the rules and regulations pertaining to risk assessment and regulatory practices, as well as how to apply them.

AI technologies such as NLP, cognitive, and text analysis excel at analyzing and summarizing large volumes of documents, which allows organizations to automate many of these processes, reduce errors, and accelerate response times to uncovered incidents. While knowledge-based systems are very good for encoding the rules for facilitating risk assessment and compliance, today's systems are also using hybrid architectures combining neural nets and rules (as mentioned above). For more on AI for fraud prevention, risk management, and compliance, see Part V.

IT Security

Organizations view IT security as the fifth most viable area for applying AI. This seems logical, as AI's role in IT security receives lots of publicity, and, for most organizations, security is a critical factor to overall IT operations. Additionally, IT security solutions providers have been incorporating AI technology into their offerings for at least a decade to enhance their capabilities. Chief use cases include applying ML, behavior modeling, and predictive analytics to enable real-time threat detection, automated analysis and learning (of attack techniques), and adaptive modeling capabilities to IT security environments.

Targeted security scenarios include advanced threat detection and analysis, interdiction of spear phishing attacks, endpoint protection, and virtual hacking. The goal is to provide full visibility into attack behaviors for a range of platforms, including cloud and data center environments, end users and endpoints, and Internet of Things devices. For a more detailed look at such AI security scenarios, see Part V.

Identification and Verification

Use cases for AI in identification and verification include enhanced facial recognition (e.g., iris, retina, earlobes), voice print recognition, and fingerprint applications used for accessing systems and devices (e.g., enterprise applications, smartphones/tablets, secure buildings/rooms, vehicles), as well as to support other various biometric identification and verification applications like "know your customer" (KYC), knowledge-based authentication, and document validation. For example, the latest generation of voice biometrics engines now employ deep learning neural networks to map voices directly to their unique voiceprint IDs.

AI is also playing a major role in the development of advanced multimodal techniques for biometric authentication and recognition, techniques that employ verification of more than one biometrics in order to facilitate increased security levels. Within the next five years, ID and verification systems will increasingly combine blockchain and AI technologies.

Business Strategy Development

Surveyed organizations currently view the use of AI to assist with business strategy development as one of the *least* applicable use cases for employing the technology. This makes sense because most AI applications today are still too inflexible and too narrowly focused — being only able to really give advice for one specific domain or application area (e.g., reviewing tissue slide samples for types/stages of cancer, troubleshooting a complex piece of equipment, answering routine customer service questions). However, as technology advances, corporate, government, and military leaders will increasingly turn to very advanced AI systems designed to help advise them on business development and strategic planning.

Such advanced AI systems will likely function in the form of assistants that can: (1) listen to and understand human discussions; (2) search massive amounts of data; (3) formulate decisions; and then (4) explain their findings and the reasons underlying their decision making by clearly speaking in a human language like

English or Chinese. In other words, these advanced AI advisory systems will function by carrying out a conversation with their user(s).

IBM's Project Debater application offers some insight into how such an advanced AI advisory system might function. Project Debater is an AI-based debating system designed to interact with users by first listening to a resolution or argument, determining what is being resolved (and whether it is being asked to defend or rebut the proposition), and then scanning its corpus to locate relevant information. The system then analyzes and uses this information to determine an appropriate response and assemble a persuasive argument or rebuttal in the form of a complete narrative, including using key points and evidence (e.g., expert quotes) to support its argument. Finally, it presents its case or rebuttal to humans in a conversational (spoken) manner in order to persuade them to accept its point of view for or against the argument.

IBM knows that people will not rely on advice from "black box" AI systems that cannot adequately explain how they arrived at a decision. Therefore, it is working on AI systems that can serve as assistants that can listen to human discussions and then explain a position in clearly argued human language. For more on AI and business strategy development, see Part III.

Other

Other use cases responding organizations reported include hiring and employee development, transport and asset management, predictive maintenance, and medical care and the military.

Conclusion

Our research identifies a number of important findings pertaining to the use cases that surveyed organizations consider most viable for applying AI in the enterprise, including the following:

- **Customer engagement and CX.** Responding organizations consider customer engagement/CX as the most viable enterprise use case for applying AI. Optimizing customer engagement and CX will become the dominant domain for applying the technology over the next two to four years.

- **Customer-facing self-service advisory systems.** Surveyed organizations are keenly interested in using AI to optimize customer-facing advisory and help systems. And there is lots of interest around using NLP and ML-powered smartbots and digital assistants in mobile, voice, and chat-driven sales and customer self-service apps that offer advanced capabilities for understanding user wants and needs.

- **Employee-facing internal advisory systems.** Responding organizations want to use AI in various employee-facing applications and scenarios, including self-guiding systems to help workers with routine tasks and for distributing and sharing expert knowledge across the organization. Expert advisory systems designed to assist humans in undertaking complex corporate operations (e.g., accounting, compliance, product development, regulatory) are of great interest, too.

- **Fraud prevention, risk assessment, and compliance.** These are already leading areas for applying AI technology in the enterprise, and they will remain primary use cases for enterprise AI in the foreseeable future. This is due, in part, to solutions providers offering a range of products employing NLP, cognitive, text analysis, and knowledge-based systems technologies targeting these domains.

- **IT security.** Surveyed organizations view IT security as the fifth most viable area for applying AI. Targeted areas for AI in security operations include advanced threat detection, spear phishing attacks, endpoint protection, and virtual hacking.

- **Identification and verification.** AI applications in identification and verification include enhanced facial recognition, voiceprint recognition, and fingerprint applications for accessing systems/devices and for supporting other biometrics ID and verification scenarios (e.g., KYC, knowledge-based authentication, document validation). Future ID and verification systems will combine AI and blockchain technologies.

- **Business strategy development.** Responding organizations view the use of AI to assist with business strategy development as one of the least applicable use cases for employing the technology. This is because most AI applications today are too inflexible and possess narrowly focused problem-solving capabilities. As the technology advances, corporate, government, and military leaders will increasingly turn to advanced AI systems that can listen to humans, interpret what they are saying, formulate a decision, and then respond (by speaking) in order to help advise with business strategy development and strategic planning scenarios.

Part XIII of this series will focus on survey findings pertaining to the hype around AI and the potential for the technology to lead to social and economic disruption.

About the Author

Curt Hall is a Senior Consultant with Cutter Consortium's Data Analytics & Digital Technologies and Business & Enterprise Architecture practices. He has extensive experience as an IT analyst covering technology trends, application development trends, markets, software, and services. Mr. Hall's expertise includes artificial intelligence (AI), cognitive systems, machine learning, conversational computing, and advanced analytics. He also focuses on the Internet of Things, including platforms, architectures, and use cases; big data platforms and use cases; blockchain for business; and business intelligence (BI), predictive modeling, and other analytic practices. Mr. Hall's research also includes mobile and social technologies in the enterprise as well as mobile BI and collaboration. He has conducted extensive research on how all these technologies are being applied to develop new advisory, decision support, customer engagement, and other enterprise applications.

Mr. Hall is a frequent contributor to Cutter Consortium's Data Analytics & Digital Technologies research deliverables as well as Cutter Business Technology Journal*. He served as Editor of numerous Cutter Consortium journals, including* Intelligent Software Strategies, Data Management Strategies, *and* Business Intelligence Advisor*. His study on the corporate use of data warehouses and the issues associated with data warehousing projects resulted in the in-depth Cutter Consortium research report* Corporate Use of Data Warehousing and Enterprise Analytic Technologies*. Mr. Hall also coauthored, with Cutter Consortium Senior Consultant Paul Harmon,* Intelligent Software Systems Development: An IS Manager's Guide *and contributed to James Martin and James Odell's* Object-Oriented Methods: Pragmatic Considerations*. His work has appeared in various technical journals and IT publications, including as a contributing author to* PricewaterhouseCoopers Technology Forecast Yearbooks*. He can be reached at chall@cutter.com.*