Cognitive Japan

Creating a blueprint for an AI-enabled Japan

IBM Institute for Business Value

In this report

An AI adoption roadmap identifying Japanese executives' strategic priorities in front-, middle- and back-office functions.

Examples of innovative organizations in Japan that are leveraging cognitive computing and AI technology solutions.

A step-by-step three-stage approach to pursuing AI and cognitive computing in your organization.

How IBM can help

Clients can realize the full potential of artificial intelligence (AI)/cognitive computing and analytics with expertise, solutions and capabilities needed to infuse cognitive into virtually every business decision and process; empower more rapid and certain action by capitalizing on many forms of data and insights; and develop a culture of trust and confidence through a proactive approach to security, governance and compliance. For more information about IBM Cognitive and Analytics offerings from IBM, visit **ibm.com**/gbs/cognitive. For more information about cognitive solutions and cloud platforms that support cognitive workloads, visit **ibm.com**/cognitive.

An AI future beckons

As data grows exponentially, many organizations leave valuable insights on the table. Cognitive computing and artificial intelligence (AI) technologies can interpret data and generate insights to motivate new growth and transform businesses. These technologies create pathways to new products, services and individualized experiences – and could enable solutions to some of Japan's challenges, including the declining labor force, an aging population, and stressed social and economic infrastructures. Based on insights from Japanese C-suite executives, this report identifies a small group of Japanese businesses that are investing aggressively in cognitive and AI, leading the way toward to a high-growth, high-efficiency future.

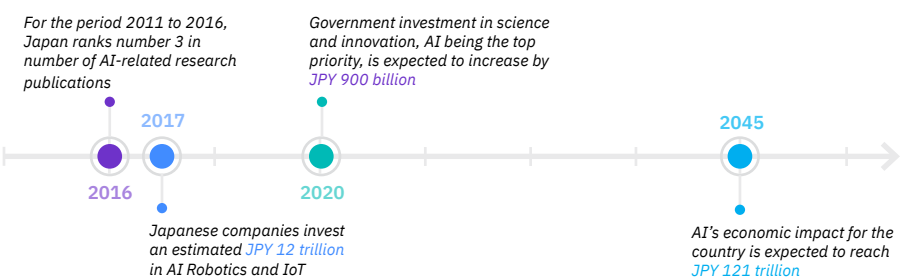
Introduction

Cognitive computing and AI are already impacting economies and industries, and this is only the beginning. Over the next 20 years, these and other technologies will fundamentally redefine how business is conducted. Some countries might view cognitive computing and AI technologies with ambivalence. However, Japan's unique combination of a shrinking labor force and an aging population presents unambiguous opportunities for AI technologies.

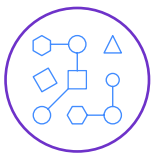
In light of the significant economic and societal opportunities, Japanese businesses are already investing heavily in cognitive computing. Japanese government investment in science and innovation, for which AI-related technologies are the top priority, is expected to increase by JPY 900 billion by 2020, and Japanese companies invested an estimated JPY 12 trillion in 2017.[1] In addition, Japan ranks third for the number of AI research publications for the years 2011 through 2016, following the United States and China.[2] The Japanese government forecasts that in 2045, AI's economic impact for the country will reach JPY 121 trillion (see Figure 1).[3]

Figure 1

Japan's cognitive and AI investments

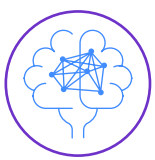


Sources: See endnotes 1, 2 and 3 in the Notes and sources section.



98%

of Japan's cognitive innovators* are realizing value from both structured and unstructured data compared to 61% of other Japan respondents



93%

of Japan's cognitive innovators* are already cultivating the skills needed to adopt cognitive computing compared to 57% of other Japan respondents

98%

of Japan's cognitive innovators* recognize the need to change employee roles as cognitive computing evolves compared to 74% of other Japan respondents

To understand the opportunities and imperatives associated with AI and cognitive computing, the IBM Institute for Business value in collaboration with Oxford Economics and other organizations surveyed more than 6,000 C-suite executives globally, including 605 from Japan's leading business, government and education institutions. This report draws on insights from the Japanese executives to identify trends and priorities specific to Japan. Among respondents, we identified a specific group of business leaders – the cognitive innovators – who rate highly on several specific AI-related metrics. We analyzed what this elite group of executives was doing differently from others in relation to cognitive computing and AI. (More detailed analysis of cognitive innovators from a global perspective is available in two other recent studies from the IBM Institute for Business Value: "Fast start in cognitive innovation" and "Accelerating enterprise reinvention.")[4]

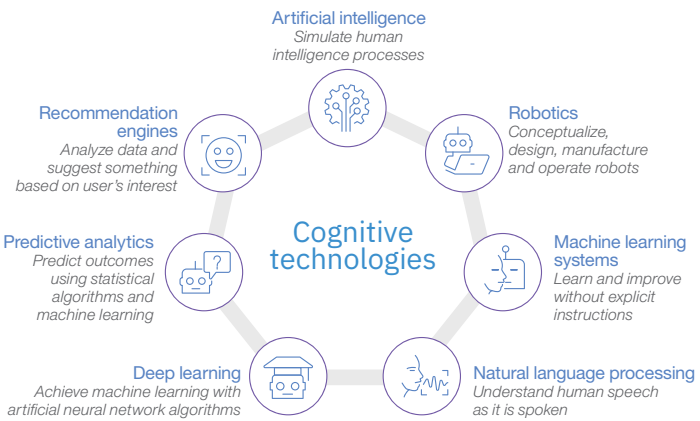
To create a practical blueprint for Japanese organizations to implement AI initiatives and investments effectively, we also conducted a deep dive analysis of how cognitive computing and AI impact enterprises at the business function level. Thirteen business functions were considered – from sales and marketing to finance and IT. Business function analysis enabled development of a comprehensive map prioritizing AI investments by function and subfunction in terms of those investments likely to have the biggest impact on business and the Japanese economy as a whole.[5]

*Survey respondent group cognitive innovators represents approximately 10 percent of executives surveyed across the full global sample (n=6,050) and reflects an elite group defined by a strategic approach to adopting cognitive technologies. For more details, see the *Research methodology* section on page 20.

Why are cognitive computing and AI so important?

AI and cognitive computing refer to next-generation information systems that understand, reason, learn and interact by continually building knowledge, understanding natural language, and reasoning and interacting more naturally with human beings than traditional programmable systems. Specific AI technologies, such as machine learning, deep learning and natural language processing, can be combined with predictive and descriptive analytics and complemented by robotics or other forms of automation. The resulting innovation may take many forms, such as deeper customer engagement, new forms of strategic innovation and dramatically expanded business transformation (see Figure 2).

Figure 2
A spectrum of cognitive technologies



Source: IBM Institute for Business Value analysis.

Japanese insurance company employs AI to channel customer voice

Mitsui Sumitomo Insurance Company has deployed a cognitive computing customer voice analysis system to help improve its call center interactions. The system continuously generates findings by extracting trends, patterns and correlations from millions of customer voices recorded during telephone conversations. The resulting insights arm operators with timely information and enable more proactive customer communication, helping increase productivity and responsiveness, enhance the customer experience and improve customer satisfaction.[8]

In an environment in which labor resources are limited, application of cognitive computing and AI can have powerful impacts. Available human expertise and labor can be augmented in profound ways, not only expanding output per person in absolute terms, but also increasing the scope and expanding the capabilities that individuals can achieve. With AI, previously unusable data and unattainable insights become not only possible, but commonplace.

According to the recent IBM Institute for Business Value report "Japan Ascending," 57 percent of Japanese executives surveyed identify difficulty obtaining the right talent as a challenge for their organizations.[6] In addition, 67 percent indicate Japan is experiencing major economic stagnation, 53 percent cite challenges created by a shrinking domestic market and 49 percent say that the status of women in the workplace generates economic constraints.[7] If embraced fully, AI and cognitive computing have the potential to address many of the constraints identified, overcoming Japan's structural challenges and propelling the nation toward a sustainable growth trajectory.

Defining Japan's cognitive innovators

As previously stated, we defined a specific subset of survey respondents that lead the pack in adopting cognitive computing technologies. Specifically, this elite group – the cognitive innovators – ranks highest among its peers across five dimensions:

1. Familiarity with cognitive computing technologies and concepts
2. Leadership in innovation
3. Recognition of the importance of cognitive computing capabilities to their organizations
4. Willingness of their industry to embrace cognitive computing
5. Demonstrable step indicating they have begun their cognitive journey.

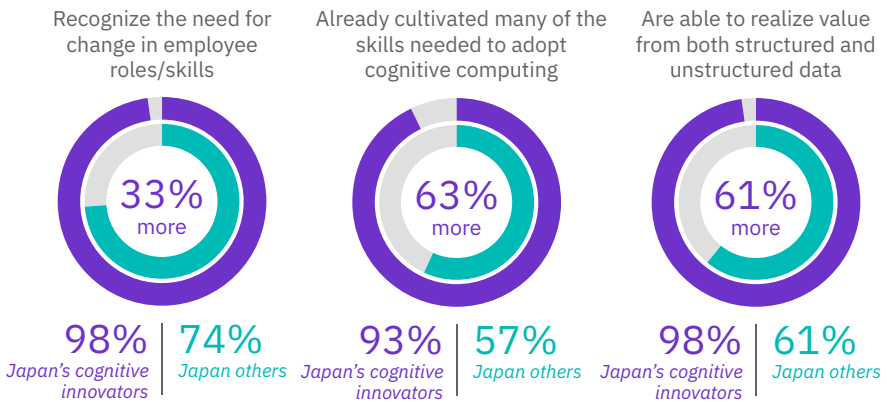
This group of cognitive innovators is relatively small, representing approximately 10 percent of all executives surveyed globally and 15 percent of Japanese executives. And cognitive innovators are disproportionately high business performers compared to their competitive peers. For example, 46 percent of Japan's cognitive innovators outperform their competition in terms of both revenue growth and operating efficiency, while only 15 percent of the remaining Japan respondents outperform peers.

Japan's cognitive innovators almost uniformly recognize the need for significant improvement in the skills of their employees and the roles played within their organizations to implement cognitive computing. Indeed, cognitive innovators have already cultivated many of the skills they need for adoption of cognitive computing and AI. They are therefore already able to realize more value from accessing and employing both structured and unstructured data (see Figure 3).

Japanese airline uses cognitive computing to enhance customer experience

Japan Airlines Company is using artificial intelligence and cognitive computing technology to help customers plan travel to Hawaii. The company improved the functions of its virtual assistant service, "Makana-chan," which now offers local information and recommendations for travel to Hawaii through chat conversations using natural language. In addition, the service analyzes users' social networking service (SNS) content to make personalized recommendations – even a planned capability that makes suggestions on what to pack for a trip.[9]

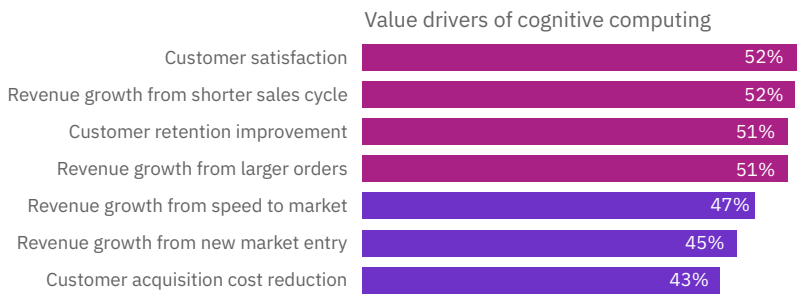
Figure 3
Japan's cognitive innovators do things differently



Source: IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016. IBM Institute for Business Value analysis.

Japan's cognitive innovators view cognitive computing and AI as a growth play. Indeed, they identify customer satisfaction, customer retention and revenue growth as the key rationale for embracing cognitive technologies and central to capturing new revenue and creating improved customer experiences (see Figure 4).

Figure 4
Key value drivers for Japan's cognitive innovators



Source: IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016.

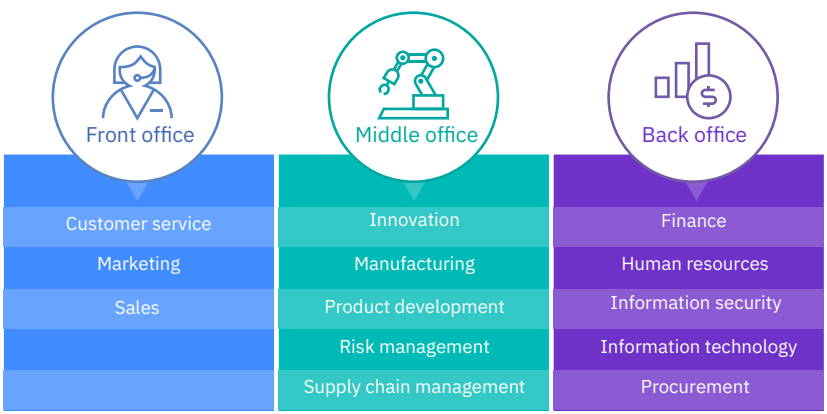
Mizuho Bank embraces cognitive analytics to better serve customers

Mizuho Bank is using real-time cognitive analytics to support contact center agents, helping them serve customers better and more efficiently. The cognitive computing solution enables Mizuho to analyze customer conversations using cloud-based natural language algorithms to rapidly formulate the best question path for agents to follow. Adjustments to algorithms are made in real time to constantly increase correlation accuracy, reducing the time needed to train new call center agents. Call times have fallen by more than 10 percent while customer satisfaction rates have improved.[10]

Creating a cognitive enterprise

AI and cognitive computing can transform business functions, promoting accelerated transformation and, indeed, reinvention across organizations. To explore the value of these new technologies, we assessed the impact of AI and cognitive computing on 13 key business functions. The functions were categorized as front, middle or back office to provide a clear roadmap from the evaluation of relative impact to business benefits and outcomes (see Figure 5).

Figure 5
The enterprise's key functions



Source: IBM Institute for Business Value analysis.

In the front office, AI systems enable deep customer engagement, through which the technology underpinning engagement recognizes, learns and constantly improves. By doing this, cognitive systems can help increase customer satisfaction and retention by enhancing, deepening and individualizing customer relationships. Employees are then freer to focus on higher-value activities around curation, creating highly personal or unexpected experiences.

In the middle office, AI helps empower employees by supporting faster, better, more data- and analysis-informed decision making. Human error will likely diminish when individuals are able to increase their focus on more creative exploits such as relationship building and innovation. And in the back office, AI can improve productivity by automating repetitive tasks, as well as promoting greater transparency and control of data, processes and actions.

Insurance company launches decision-making support system for claims assessment

A Japanese insurance company implemented a solution that estimates payment decisions in the hopes of reducing the decision-making challenges faced by its claims examination staff. As it moved from prototype to implementation, the solution incorporated data from over 5 million past cases as well as prototype tests. The company has extended the solution's cognitive computing capabilities to call center operations, taking advantage of the expertise gained from insurance claims.[11]

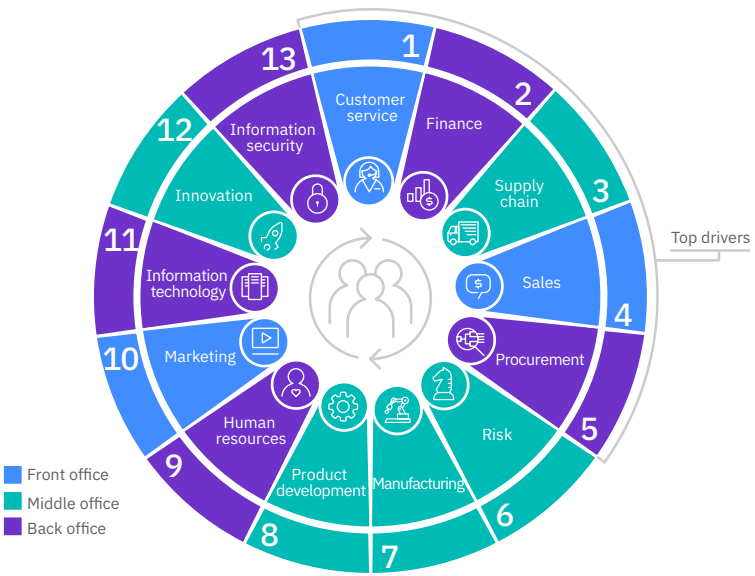
Japanese executives' cognitive enterprise priorities

Executives surveyed globally anticipate a 15 percent return on investment (ROI) from their cognitive computing initiatives.[12] And at the same time, according to a new IDC spending guide, global spending on cognitive computing platforms will climb from around USD 12 billion in 2017 to more than USD 57 billion by 2021.[13]

But to decompose the relative value of AI investments more specifically, we ranked functions across the enterprise based on the likely ROI anticipated by the Chief Executive Officers (CEOs) we surveyed. In a second-tier analysis, we established investment priorities within functions based on the likely ROI anticipated by the executives responsible for each respective function. For example, Chief Risk Officers prioritized AI investment for risk and compliance functions, Chief Marketing Officers prioritized AI investment for sales and marketing functions, Chief Innovation Officers for innovation functions, etc.

For cross-enterprise priorities, Japanese CEOs identified customer service as the highest priority function for AI investment. Interestingly, in the global equivalent of the Japan study, respondents rated customer service seventh in terms of priority. The Japanese executives surveyed rated finance second, supply chain third and the sales function fourth (see Figure 6). Following are more detailed insights for each of the functional areas based on our research.

Figure 6
Japanese CEOs ranked functional priorities across the enterprise



Source: IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016.

1. Customer service

Cognitive computing can help organizations connect with customers more deeply by better understanding what customers want through automation of vast amounts of information. With more insights, not only are organizations able to identify customer attitudes, needs and desires more effectively, they also can better anticipate and resolve issues to create even higher levels of customer satisfaction.

2. Finance

In the finance function, cognitive computing capabilities can help organizations mitigate risk, proactively prevent fraud, and accelerate and improve due-diligence processes for new suppliers. They can increase cash on hand by accelerating payment cycles and substantially improving decision making for regulatory compliance through natural language processing, machine learning and automated reporting.

3. Supply chain

AI and cognitive computing capabilities can help companies dramatically improve insights for decision making; enhance trust in the type, quantity and quality of goods purchased, delivered, received and invoiced; and reduce working capital needs to support commerce. They also can help logistics professionals better predict the likelihood of impacts on the supply chain, anticipate actions needed and more accurately predict potential issues.

4. Sales

Applied to sales, cognitive computing and AI can help organizations improve the efficiency of customer-facing services, expand customer account management capabilities, increase cross-sell and up-sell opportunities and – through richer contextual understanding – improve efficiency of lead management.

5. Procurement

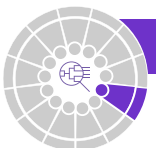
Cognitive computing capabilities can help organizations improve global sourcing and integration with suppliers, accelerate and enhance analysis, enable more effective automation of repetitive procurement tasks, and support more efficient returns and replacements activities.

6. Risk

By ingesting massive amounts of relevant data, including regulatory and company policy information, AI and cognitive computing solutions can help risk managers better assess different types of risks. Cognitive computing systems also can help organizations anticipate compliance gaps by mining ambiguous data to identify indicators of unknown risks that humans may miss.

7. Manufacturing

In manufacturing, cognitive computing capabilities can help unlock valuable insights from dark data – which is acquired through various computer network operations but not used in any manner to support decision making – in failure reports, as well as highly intelligent automation. They can integrate new sources of Internet of Things (IOT)-based sensor data and help improve the productivity of field engineers through access to real-time, more granular analyses and insights. And they can help organizations dramatically reduce production outages through better, more insightful analysis of equipment data.



Procurement leaders' cognitive priorities

- Procure-to-pay
- Risk management
- Returns and replacement

Risk leaders' cognitive priorities

- Risk operations
- Risk compliance management
- Risk reporting

Manufacturing leaders' cognitive priorities

- Logistics and distribution
- Raw material procurement
- Assembly

Product development leaders' cognitive priorities

- Innovation/idea generation
- Life-cycle management
- Prototype development and testing

Human reasources leaders' cognitive priorities

- Talent acquisition and onboarding
- International mobility
- HR service delivery

Marketing leaders' cognitive priorities

- Content creation
- Business decision making
- Marketing campaigns and promotions

8. Product development

Japanese executives are looking at cognitive computing technology to improve the potential for innovation and idea generation within the product development lifecycle. They also recognize the ability of cognitive computing technologies to improve prototype development and product testing at scale. For example, cognitive capabilities can help improve designs efficiently by dramatically compressing verification process times associated with design changes.

9. Human resources

Cognitive computing systems can help companies improve payroll and benefits administration efficiency, as well as workforce planning. Through advanced linguistics and machine learning capabilities, cognitive computing solutions also can help dramatically increase recruiting speed and accuracy by rapidly providing a 360-degree view of a potential candidate via social media and other channels.

10. Marketing

Cognitive computing systems can process vast quantities of data, helping organizations more accurately identify target audiences and leverage a variety of channels for campaigns. Better, faster, richer automation of research across multiple channels, including those channels with unstructured data, enables market researchers to spend more time on strategy and execution, as opposed to mechanical tasks and basic analysis.

11. Information technology

IT ranked as the highest priority among executives surveyed in the global sample. However, it rated eleventh among Japanese executives. Application of cognitive computing and AI can help promote accelerated solution design and improved amplification of employee expertise in IT. And it can support faster, more efficient planning, development and testing of enterprise software, as well as enable greater agility.

12. Innovation

Cognitive computing and AI solutions help organizations formulate hypotheses, identify and validate new ideas, accelerate and deepen scenario envisioning throughout incubation, and make unexpected associations. Specific activities might include sourcing existing patents, engaging entrepreneurs to build new products and services that better monetize enterprise assets, or drawing upon new investments for other geographies or parts of an industry.

13. Information security

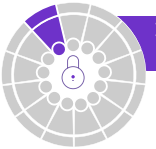
Cognitive computing can enable faster, more reliable detection of fraud or other activities within volumes of structured and unstructured data. It can potentially save thousands of staff-time hours, freeing personnel to focus on more business-critical initiatives by accelerating threat detection and reducing resolution time.

Information technology leaders' cognitive priorities

- Operations (location data, for example)
- IT architecture and engineering
- Application development

Innovation leaders' cognitive priorities

- Defining clear innovation strategy
- Enabling an environment of openness in the organization
- Exploration of innovative technologies



Information security leaders' cognitive priorities

- Detection
- Prevention
- Remediation

Japanese university enhances student advising through cognitive computing technology

Kanazawa Institute of Technology is leveraging a cognitive computing system to offer enhanced, more personalized student development services. The system uses natural language processing to gain insights about students and uses that information, as well as data about past students with similar traits, to offer personalized advice on skill development and growth. The solution also analyzes information from class evaluations and projects, allowing faculty members to analyze trends in students' descriptive content.[14]

A cognitive Japan

Organizations can embrace a three-phase approach to pursuing AI or cognitive computing: Envision, ideate and incubate a comprehensive digital strategy.

Phase 1: Envision the future

- Build an 18-to-24-month digital strategy with a clear set of initiatives that paves the way for smaller, more exploratory investments.
- Establish finite objectives and time frames.
- Draw from cross-functional resources, skill sets and complementary partner ecosystems.
- Define your enterprise or business unit reinvention case, KPIs and targets.
- Apply a targeted operating model and governance that support the strategy.
- Incorporate new ways of working based on cross-functional teaming.
- Prepare your organizational culture to adapt to a "fail fast" mentality.

Phase 2: Ideate

- Conduct thorough, periodic assessments of the market and target users.
- Apply this user-centric approach to educate the rest of the enterprise on new cognitive capabilities.
- Create common use cases and applications, and design basic standards and architectural considerations tailored to your organization.
- Assess market and user needs.
- Define future experiences, end-to-end processes and enabling capabilities that AI and cognitive computing can facilitate.

- Design your future business and technical architecture based on the impact of cognitive computing capabilities.
- Align individual initiative business cases with the broader reinvention case.

Phase 3: Incubate and scale

- Apply a use-case-centric approach founded on rapid exploration and prototyping.
- Pilot new capabilities in the market to address specific business challenges.
- Design and execute pilots with agility and with limited risk to existing customers and operations.
- Demonstrate value by measuring performance indicators of the pilots.
- Seek to promote reuse and extend across the enterprise.
- Use a lean governance model to periodically review progress and value.
- Build new skills.
- Use an iterative approach to prototyping, building, testing and launching new capabilities.
- Provide ongoing feedback on market receptivity, and use that input to make decisions to either terminate or scale cognitive computing initiatives.
- Monitor business case value realization and make adjustments.

Shimizu Corporation explores AI to power voice navigation solution

Shimizu Corporation, a Japanese construction and contracting company, is investigating a new high-precision indoor and outdoor voice navigation system that uses location information based on beacon signals, along with cognitive computing technology, to offer users guidance to their destinations. The solution can help individuals with visual impairments or physical disabilities explore the world, offering a more pleasant and seamless navigation experience.[15]

Key questions

- What are your strategic imperatives for investing in AI or cognitive computing?
- How will you use AI to transform your customers' experiences and which segments will you target?
- What new business and operating models can AI and cognitive computing support in your business?
- What new skills, capabilities and resources will be needed?

For more information
To learn more about this IBM Institute for Business Value study, please contact us at iibv@us.ibm.com. Follow @IBMIBV on Twitter, and for a full catalog of our research or to subscribe to our monthly newsletter, visit: **ibm.com**/iibv.

Access IBM Institute for Business Value executive reports on your mobile device by downloading the free "IBM IBV" apps for phone or tablet from your app store.

The right partner for a changing world
At IBM, we collaborate with our clients, bringing together business insight, advanced research and technology to give them a distinct advantage in today's rapidly changing environment.

IBM Institute for Business Value
The IBM Institute for Business Value (IBV), part of IBM Global Business Services, develops fact-based, strategic insights for senior business executives on critical public and private sector issues.

Authors

Brian Goehring is the Cognitive Lead for the IBM Institute for Business Value, where he brings nearly 20 years' experience in strategy consulting to support IBM cognitive clients and practice areas. He also holds a Certificate in Cognitive Studies from Princeton University. Brian can be reached by email at goehring@us.ibm.com and LinkedIn at www.linkedin.com/in/brian-c-goehring-9b5a453.

Anthony Marshall is Research Director for the IBM Institute for Business Value. Anthony is responsible for directing thought-leadership research on a variety of issues related to the public and private sectors. Anthony can be reached by email at anthony2@us.ibm.com, LinkedIn at bit.ly/AnthonyMarshall and Twitter @aejmarshall.

Itaru Suzuki is Partner for IBM Global Business Services, Japan. He has led cognitive and AI initiatives in Japan since 2014 and has managed the leading-edge AI technology solutions development and deployment. Itaru has more than 10 years of experience in big data and analytics consulting and implementation, especially data governance and data integration across industries and areas including banking, insurance, automobile, telecommunication and distribution. Itaru can be contacted by email at suzuki@jp.ibm.com and Linkedin at www.linkedin.com/in/itaru-suzuki-09706757/.

Related reports

Abercrombie, Cortnie, Rafi Ezry, Brian Goehring, Neil Isford, and Anthony Marshall. "Fast start in cognitive innovation: Top performers share how they are moving quickly." IBM Institute for Business Value. January 2017. **ibm.com**/business/value/cognitiveinnovation

Abercrombie, Cortnie, Rafi Ezry, Brian Goehring, Anthony Marshall, and Hiroyuki Nakayama. "Accelerating enterprise reinvention: How to build a cognitive organization." IBM Institute for Business Value. June 2017. **ibm.com/**business/value/accelentreinvent

Ikeda, Kazuaki, Anthony Marshall, and Shuma Okamura. "Japan ascending: Four steps to reignite growth and vitality in the Japanese economy." IBM Institute for Business Value. July 2016. **ibm.com/**business/value/japanascending

Research methodology

In cooperation with Oxford Economics, the IBM Institute for Business Value surveyed 6,050 global executives representing 18 industries, including leaders of government departments and educational institutions. Included in this global group of respondents were 600 Japanese C-suite executives and functional heads. Roles of responding executives globally included major C-suite members – CEOs, CMOs, CFOs, CIOs, COOs and CHROs – as well as heads of customer service, information security, innovation, manufacturing, risk, procurement, product development and sales.

Notes and sources

1 "Research brief: developments in artificial intelligence (AI) in Japan and implications for Australia." Australian Government Department of Education and Training. June 2017. https://internationaleducation.gov.au/International-network/japan/PolicyUpdates-Japan/Documents/AI%20in%20Japan%20research%20brief_07-2017.pdf; "R&D budgets in Japan soaring to record-breaking levels". Nikkei Asian Review. July 27, 2017. https://asia.nikkei.com/Business/Trends/R-D-budgets-in-Japan-soaring-to-record-breaking-levels

2 Baker, Simon. "Which countries and universities are leading on AI research?" Times Higher Education. May 22, 2017. https://www.timeshighereducation.com/data-bites/which-countries-and-universities-are-leading-ai-research

3 "Research brief: developments in artificial intelligence (AI) in Japan and implications for Australia." Australian Government Department of Education and Training. June 2017. https://internationaleducation.gov.au/International-network/japan/PolicyUpdates-Japan/Documents/AI%20in%20Japan%20research%20brief_07-2017.pdf

4 Abercrombie, Cortnie, Rafi Ezry, Brian Goehring, Neil Isford, and Anthony Marshall. "Fast start in cognitive innovation: Top performers share how they are moving quickly." Institute for Business Value. January 2017. https://www-935.ibm.com/services/us/gbs/thoughtleadership/cognitiveinnovation/; Abercrombie, Cortnie, Rafi Ezry, Brian Goehring, Anthony Marshall, and Hiroyuki Nakayama. "Accelerating enterprise reinvention: How to build a cognitive organization." Institute for Business Value. June 2017. https://www-935.ibm.com/services/us/gbs/thoughtleadership/accelentreinvent/

5 Following a two-step approach, we first ranked – or prioritized – a set of functional areas for AI investments in terms of likely return on investment or value created based on the insights of the Japanese Chief Executive Officers we surveyed. We then ranked specific activities within each of those functional areas based on the insights of the relevant leaders of those areas (for example, Chief Financial Officers for the finance function, Chief Human Resource Officers for the HR function, etc.).

6 Ikeda, Kazuaki, Anthony Marshall, and Shuma Okamura. “Japan Ascending: Four steps to reignite growth and vitality in the Japanese economy.” IBM Institute for Business Value. July 2016. https://www.ibm.com/business/value/japanascending

7 Ibid.

8 IBM Institute for Business Value analysis based on IBM case study.

9 “JAL × IBM: We propose Hawaii’s recommended spots by using the image recognition technology of IBM Watson.” IBM press release. December 5, 2017. https://www-03.ibm.com/press/jp/ja/pressrelease/53460.wss

10 IBM Institute for Business Value analysis based on IBM case study.

11 IBM Institute for Business Value analysis based on IBM case study.

12 Abercrombie, Cortnie, Rafi Ezry, Brian Goehring, Neil Isford, and Anthony Marshall. “Fast start in cognitive innovation: Top performers share how they are moving quickly.” Institute for Business Value. January 2017. https://www-935.ibm.com/services/us/gbs/thoughtleadership/cognitiveinnovation/

13 Shirer, Michael, and Marianne Daquila. “IDC Spending Guide Forecasts Worldwide Spending on Cognitive and Artificial Intelligence Systems to Reach $57.6 Billion in 2021.” IDC press release. September 25, 2017. https://www.idc.com/getdoc.jsp?containerId=prUS43095417

14 “School corporation Kanazawa Institute of Technology.” IBM website. August 6, 2017. https://www.ibm.com/jp-ja/case-studies/t584244c58236q49

15 “Demonstration experiment of highly accurate indoor/outdoor speech navigation system in Nihonbashi Muromachi area.” IBM press release. January 26, 2017. https://www-03.ibm.com/press/jp/ja/pressrelease/51490.wss

IBM Corporation
New Orchard Road
Armonk, NY 10504

Produced in the United States of America
June 2018

82015382USEN-00