

A ROOM FOR ROBOTS IN HOSPITALITY

Realistic uses for artificial intelligence are increasing, make way for machine-based assistance in accounting, marketing, customer service and more.



By Tanya Venegas and Amanda Belarmino

While the dawn of the 21st century may not have been ushered in by flying cars like the Jetsons, another part of that futuristic cartoon may be coming to a hotel near you, service robots like the Jetsons' maid Rosie. Robots, or bots as they are commonly called, are no longer exclusively the stuff of science fiction. Royal Caribbean has already debuted robot bartenders (*Shankman, 2014*), Aloft hotels is using a robot to make room deliveries (*Burnett, 2015*), and in Australia, Domino's DRU is autonomously delivering pizza (*Solomon, 2016*). In addition, a team at the University of California, Berkley is working on a robot that can replace room attendants (*Topolewski, 2017*).

Royal Caribbean Robot Bartender

Most individuals have probably interacted with a robot at some point in their lives, but maybe are unaware of their many uses. Robots have been used for decades to help in

manufacturing items like cars, computers, mobile phones and many other consumer electronics goods. The usage of robots is expanding well beyond manufacturing and many are starting to view the full potential of robots and robotics. Not only are robots completing basic tasks, such as vacuuming floors, they are starting to take on more complex and lifelike assignments. Robots are monitoring financial transactions, diagnosing illnesses, carrying out stock trades, screening job applicants, recommending products and making suggestions on what you should watch on television. This is all made possible with robotic process automation (RPA). RPA "is the use of a software robot or 'bot' that replicates the actions of a human to execute tasks across multiple computer systems. According to professional services organization Deloitte, a minute of work for a robot is equal to about 15 minutes of work for a human" (*Norfleet, 2017*). Not to mention that bots can work 24/7, increasing productivity even further.

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There are multiple uses for bots in the hospitality and tourism industry. For example, many hospitality businesses are using chatbots, “automated software that interacts with guests through SMS text or messaging apps” (McLaughlin, 2017), to answer customer questions and provide information. In the connected world we live in, customers do not want to have to wait for an answer to their questions, so AI chatbots can offer an avenue for instantaneous results. Other technologies at work in the hospitality industry which use advanced computing power and technologies include Hilton’s Connected Room and Marriott’s IoT Room. Hilton recently announced their Connected Room, which allows guests to control lighting and temperature from the Hilton Honors app. Marriott announced their IoT room which will enable guests to ask for a wakeup call, start their shower and control many other aspects of their room by simply speaking a command. In the near future,

travelers will be able to control their entire room while lounging in the comfort of their bed.

Marriott IoT Guestroom

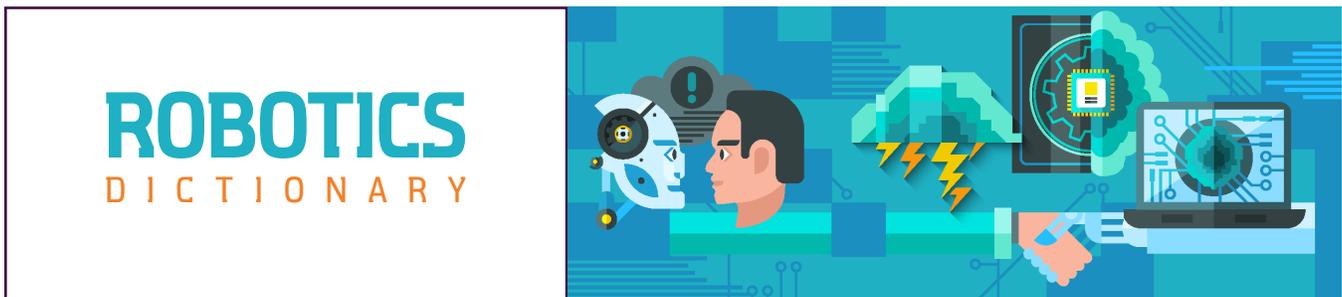
Hilton Connected Room

All Types of Robots

There are different levels of robotics, based on the amount of interaction from the human user, and these bots are typically grouped into four different levels. A Level 1 bot uses your history to generate results relevant to the current context, like your iPhone telling you how long it will take you to get home (Feytons, 2016). Level 2 bots are able to analyze information and produce something new, like IBM’s Watson Health that can assist medical professionals (Feytons, 2016). Watson Health was presented by Greg Land, global segment leader of travel related services at IBM, during a keynote session at the 2017 HFTP Annual Convention. He also highlighted ways IBM is

working with tourism destinations and other hospitality organizations to use AI to inform and attract travelers. At Level 3, bots are designed to assist you by offering suggestions based on information derived by accessing your calendar or searching past purchase behavior. Examples of Level 3 bots include digital assistants like the Amazon Echo or Google Home (Feytons, 2016). The fourth level of bots have an actual artificial intelligence that functions similarly to a human (Feytons, 2016).

Companies are starting to embrace the idea of artificial intelligence and the possibilities which can unfold with the usage of AI. According to a 2017 study by MIT and the Boston Consulting Group, 84 percent of the 3,000+ executives, managers and analysts interviewed believe that AI will allow their organization to obtain a sustainable competitive advantage. AI and automation can provide numerous performance benefits to organizations including: greater accuracy and accountability,



What is a robot?

“A device that automatically performs complicated, often repetitive tasks.” (www.merriam-webster.com).

What is AI?

“The ability of a computer or other machine to perform actions thought to require intelligence. Among these actions are logical deduction and inference, creativity, the ability to make decisions based on past experience or insufficient or conflicting information, and the ability to understand spoken language.” (*American Heritage Science Dictionary*)

What is machine-based learning?

“A branch of artificial intelligence in which a computer generates rules underlying or based on raw data that has been fed into it and progressively becomes better at analysis and decisions the more it is used.” (*Collins Dictionary; Ovaska-Few, 2017*)

What is a bot or Internet bot?

“An Internet bot, in its most generic sense, is software that performs an automated task over the Internet. More specifically, a bot is an automated application used to perform simple and repetitive tasks that would be time-consuming, mundane or impossible for a human to perform.” (*techopedia, 2017*)

analyze larger amounts of data, improve safety, reduce waste, and provide higher customer satisfaction (Norfleet, 2017; Manyika, et. al., 2017). That being said, less than 39 percent of the participants in the study indicated that they have an AI strategy in place and only one in five companies have incorporated AI in some offerings or processes (Ransbotham, et. al., 2017).

That brings us to an important question. Why haven't companies adopted AI? There are multiple reasons which were presented in the report *Reshaping Business with Artificial Intelligence: Closing the Gap between Ambition and Action* by MIT and the Boston Consulting Group. Some of the top reasons included: attracting, acquiring and developing the right AI talent; competing investment priorities; and unclear or no business case for artificial intelligence applications (Ransbotham, et. al., 2017). Also noted in the study was a lack of access to relevant data and security concerns resulting from AI adoption. Especially in this day and age when data breaches are prevalent and government entities are instituting new data protection regulations such as the General Data Protection Regulations (GDPR) in the European Union which becomes effective in May 2018.

For years organizations have struggled with organizing their data for business analytics purposes and AI requires companies to take their data to the next level. Problems companies in the hospitality and tourism industry often encounter include data ownership issues and having data fragmented across multiple systems. When it comes to AI, data is needed to train algorithms. Systems must be trained in handling multiple scenarios; including when things go right and especially what to do when things go wrong or the unexpected happens.

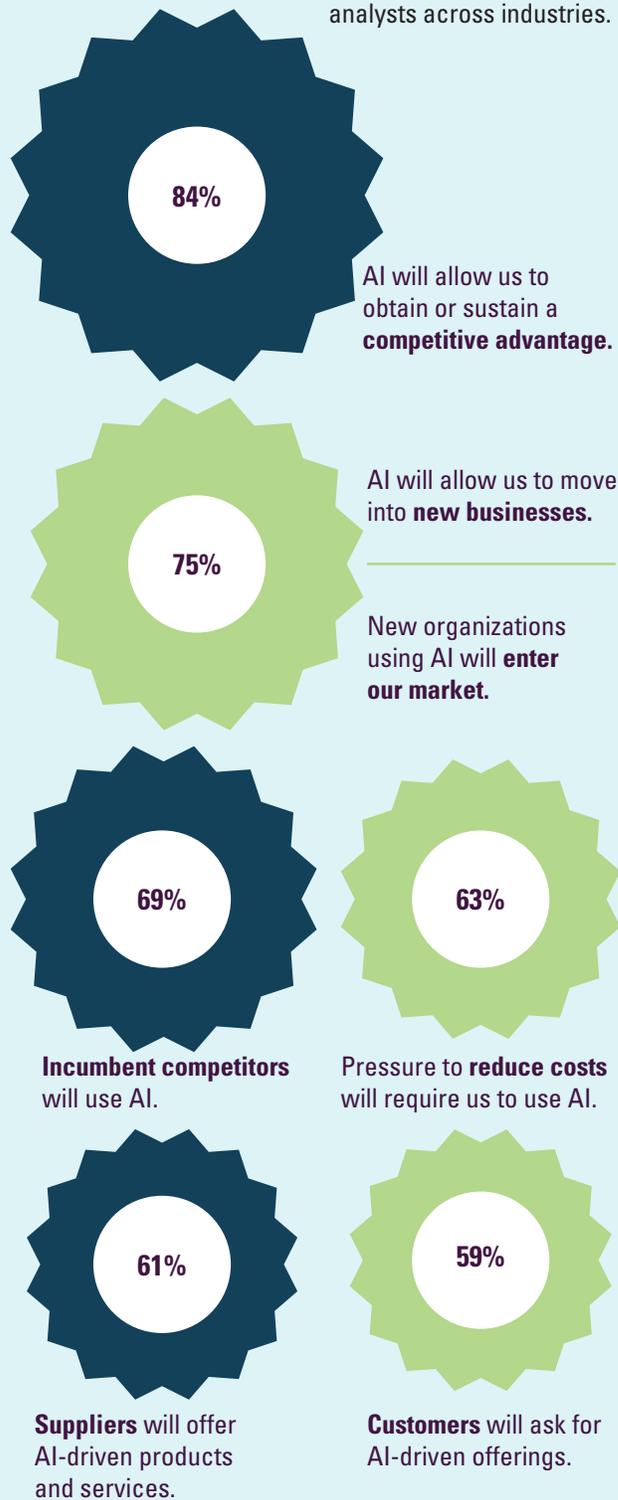
Necessary Safeguards

Increasing sophistication in technology and the emergence of robotics has created increased security risks. One concern is a robot's ability to mimic anyone's voice and create false recordings, which could be alleviated with technology to scan recordings to detect whether or not it is a human voice (Prakash, 2017). Malfunctions have to be dealt with as well (Prakash, 2017). On the other hand, some companies such as Walmart have found that using bots to help with online orders frees up their team members to focus on safety and security measures to prevent hacking (Pymnts, 2017).

In the accounting and finance arena, major concerns arise when it comes to the safety of customer data, money movement and ethical practices. AI systems must be safeguarded from cyber security threats, just like any other system. Make sure your organization is securing its systems by training employees on data security. Also, what about segregation of duties? That is something that is easily handled with bots. Each bot can be assigned separate tasks within the organization, just like individuals would be assigned different tasks. Each bot would

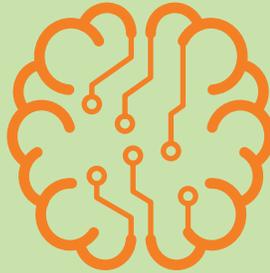
Reasons for Businesses to Adopt AI

Survey results from the report: "Reshaping Business with Artificial Intelligence" based on feedback from a global survey of more than 3,000 executives, managers and analysts across industries.



Source: MIT Sloan Management Review

Five Key Factors Influencing AI and Automation Adoption



1. Technical feasibility, since the technology has to be invented, integrated and adapted into solutions that automate specific activities.
2. The cost of developing and deploying solutions, which affects the business case for adoption.
3. Labor market dynamics, including the supply, demand and costs of human labor as an alternative to automation.
4. Economic benefits, which could include higher throughput and increased quality, as well as labor cost savings.
5. Regulatory and social acceptance can affect the rate of adoption even when deployment makes business sense.

Source: *A Future That Works: Automation, Employment, and Productivity*. McKinsey Global Institute (Manyika, et. al., 2017)

have its responsibilities and a separate login for each function. Since the tasks are being conducted by computers, there are very detailed logs being recorded throughout each step of the process. In addition, bots can be set up to detect any anomalies, which can then be checked and verified by management.

Current Bot Use in Hospitality

In a report by the McKinsey Global Institute, *A Future That Works: Automation, Employment, and Productivity*, it indicates there are many uses for robotics and AI in the accommodation and food services sector (2017). In fact, according to this study, over 73 percent of all the activities performed by workers in the accommodation and food services sector have the technical potential for automation. Wow, 73 percent seems like an astoundingly high percentage. The reasoning is that almost half of all the work in this sector involves repetitive physical activities in predictable environments and the operation of machinery including: preparing, cooking or serving food; cleaning food preparation areas; and preparing hot and cold beverages (Manyika, et. al., 2017).

If 73 percent of the work in the hospitality industry can be automated, why aren't companies clamoring to lay off workers and replace them with robots? Do the benefits of automation not outweigh the barriers? In the restaurant segment, especially in the quick service environment, benefits of automation include: enhanced demand prediction, food quality control, labor training efficiencies and opportunities for enhanced process management and decision making (Noone & Coulter, 2012). The primary barrier to automation implementation in this environment is cost. Individuals working in restaurants typically earn low wages and robots can be costly to implement and maintain. As long as employees are available to do the work, they are typically a less costly solution than to institute robotic automation in restaurant production. As the prices of robotics decreases, the scales will most likely tilt in favor of robotics implementation.

There are also uses of artificial intelligence in the hospitality industry which do not involve direct labor replacement and can assist operators in providing higher quality service. For example, voice-recognition

technologies have multiple applications. First of all, voice-recognition technology can be used to identify customers on the phone to save time verifying identity. Secondly, organizations can implement software in their call centers which can alert operators when customers are getting frustrated (Ransbotham et. al., 2017). As voice-recognition technology moves forward and gains accuracy, there are numerous possibilities and implications for the hospitality and tourism industries.

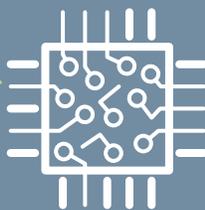
Bots in Accounting and Finance

While we still do not have full artificial intelligence, bots have begun to be integrated into modern accounting processes in a variety of ways. The most common use of bots in accounting has been responsive software that can handle more of the mundane tasks of the accounting department. In a study by the consulting firm Hackett Group, the adoption of this type of accounting software has decreased the number of back office accounting staff by 40 percent since 2004. The number of accounting staff declined from a median of 119 accounting employees to only 71 full-time staff members for every US\$1 billion in revenues (Monga, 2017). However, while these computer systems automate many of the redundant functions of accounting, they still cannot duplicate the type of judgement and sophisticated decision-making of human accountants (Tucker, 2017).

There are many accounting and finance applications which can be used in the travel and tourism industry. For example, airlines use technology to scan the inventory brought onto airplanes, reducing the need for accounting clerks to input the information by hand (Monga, 2015). Bots can also speed along the accounts payable process. Some companies are using bots to scan invoices in a PDF document attached to an e-mail, save the data into an Excel spreadsheet, log into a web system and en-

Uses of AI in Accounting

- Analyze leases
- Interpret contracts or deeds
- Process, collect and reconcile payments
- Inventory
- Audit bills
- Closing the books
- Send notices to delinquent customers
- Catch errors in financial statements
- Ensure the company is meeting regulatory filing requirements



ter the data to generate a report, and e-mail a “live” employee to indicate the process is complete (Norfleet, 2017). Organizations can work with their vendors to standardize invoices so that the bots can readily access the pertinent information which needs to be processed. One company had clerks working 3,200 hours per week tracking and paying for orders on thousands of goods. After implementing new accounting software with AI capabilities, these man hours were cut to a total of 400 hours per week (Monga, 2015).

Bots not only speed along processes, but also nearly remove the possibilities of data entry error which are prevalent with human input. Other benefits of using bots in the accounting department include: greater accuracy, accountability and defensibility by logging every step executed and data source used, allowing for larger amounts of information to be analyzed for audits and risk analysis, and predictive analytics instead of depending on a smaller sample size manually processed (Norfleet, 2017).

The uses of AI in the accounting and finance department are numerous. There are many data entry and basic analysis tasks which can be delegated to AI-based programs which will free up financial staff to analyze the data and make strategic decisions in a much quicker fashion. For example, these programs can digest large volumes of data, such as leases, in a short period of time (Ovaska-Few, 2017). At Deloitte, “auditors

access AI tools with natural language processing capabilities to interpret thousands of contracts or deeds. The technology can extract key terms and analyze that information to perform risk assessments or other functions” (Ovaska-Few, 2017).

Larger organizations which deal with vast amounts of data have been the first to embrace AI and software programs which use this technology. They are the trailblazers who are developing these futuristic systems. Also, organizations such as Deloitte and EY are working with clients to develop and deploy these technologies to organizations that do not have the technological capabilities to develop their own AI programs. At the insurance company TIAA, they have instituted an AI program and have developed an analytics center of excellence to oversee the bots working within their organization. The group at this specialized center is not intended to conduct all of the data analysis for the organization, but to provide expertise and guidance to others within the organization and assist with deployment throughout the company (Ransbotham, et. al., 2017). This is one example of organizational structure when it comes to implementing AI applications and each organization must determine what structure will be the right fit for their organization. The most important part, a strong IT and analytics team needs to be in place throughout the entire process from strategic planning to execution.

Embracing AI

How can I prepare myself and my workforce to best implement and use AI technologies? This is one of the most important questions managers must be asking themselves. According to the 2017 survey by MIT and the Boston Consulting Group, 84 percent of respondents indicated that existing workers will need to change their skill sets, 79 percent stated that workers’ current skill sets will need to be augmented and managers need to develop an intuitive understanding of AI (Ransbotham, et. al., 2017).

How can managers, current and future, prepare for the coming of artificial intelligence? Those currently in the industry can volunteer to work on special projects in their workplace, take online courses, and attend industry conferences and events such as the HFTP Annual Convention, HITEC and other industry events coordinated by organizations such as HFTP. To prepare future accounting leaders, accounting schools are providing training on SAP, Oracle and Microsoft systems in addition to training in bookkeeping (Monga, 2017). Therefore, those seeking accounting degrees will be well-versed in not only accounting, but also technology, a necessity today.

What to Ask When Preparing Data for AI Applications

- Who owns it?
- How do you get it?
- How good is it?
- Where is it kept?
- How secure is it?
- How do we analyze it?
- How can we take that analysis and turn it into intelligence that provides us with better business decisions?



(Sheedy, 2017)

Another possibility that seems a little farfetched; but, may be a reality in the near future, is implanting technology into our brains which will allow a brain-computer interface, resulting in human superintelligence. Then, humans and AI robots alike could learn instantaneously from each other via the cloud. For example, an individual in New York City with a specialized chip embedded in their brain could learn physics from a physicist in Berlin. Robots with AI capabilities could also be interconnected (Collins, 2017). It sounds like science fiction, but companies are exploring these possibilities and have already created brain-computer connections such as restoring hearing with cochlear implants that interface with auditory neurons.

Many workers have fears of AI taking over jobs and increased global unemployment levels. When the data is analyzed, it appears there is a shrinking workforce worldwide and artificial intelligence, robots and bots can help fill this gap and allow employees to take a more analytic approach to their work. It is surmised that staffing costs will begin to shrink as the workforce shrinks, but technology costs will continue to rise. There is no turning back and technology is an integral part of every business if they want to survive and thrive into the future.

Looking Toward the Future

Artificial intelligence is an area fraught with speculation, opportunities and utmost concern from many.

Skills for Embracing AI

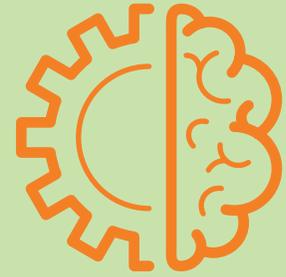
- Database knowledge
- IT skills
- Data analytics
- Data modeling
- Data governance
- Strategic thinking
- Business intelligence



Critical Areas Internal Audit Needs to Prepare For

1. **AI Governance** — Establish accountability and oversight.
2. **Data Quality** — Have a well-defined, coherent structure to data
3. **Human Factor** — AI relies on complex algorithms produced by humans.
4. **Measuring Performance** — AI is developed to achieve certain objectives.
5. **Reemphasize Cybersecurity** — Protect AI systems from hacking.
6. **Filling the Understanding Gap** — Analyze the potential impact associated with AI-related risks.
7. **Ethical Issues With AI** — AI causes us to refocus on ethics.

(Pelletier, 2017)



Movies have been made to glorify robots enabled with artificial intelligence, such as the ever-faithful C-3PO and R2D2 in the *Star Wars* movies. But, the dark side has also been unveiled in the cinema such as with HAL 9000, the creepy monotone speaking computer in *2001: A Space Odyssey*, “replicants” from the *Blade Runner* movies, or Arnold Schwarzenegger as *The Terminator*.

Those on the cutting-edge of AI believe that computers will be able to think and act like humans in the next 50 years and will be able to perform just about any task as well as or even better than humans. What does the future hold if people become obsolete and no longer useful? In an article titled the “Top 9 Ethical Issues In Artificial Intelligence” on

the *World Economic Forum* website, the first concern listed is unemployment. What happens after the end of jobs? Possibly, this will be an opportunity to travel the world with the added free time.

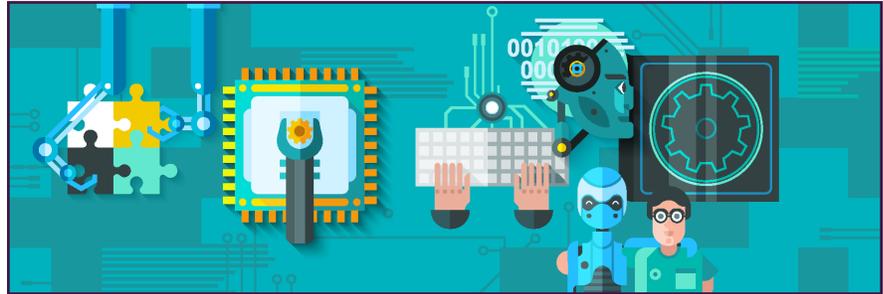
One thing is for sure, AI solutions have not matured to the point where they can garner widespread adoption. According to Snyder, the primary barriers to adoption of artificial intelligence include: “access to data to train algorithms, an understanding of benefits to their business, a shortage of talent, competing investment priorities, security concerns, and a lack of support among leaders” (2017). All of these concerns must be addressed quickly for companies to pursue AI solutions which will allow them to keep their competitive advantage. ■

“ Education systems will need to evolve.... improve basic skills in the STEM fields of science, technology, engineering and mathematics, and put a new emphasis on creativity, as well as on critical and systems thinking. For all, developing agility, resilience, and flexibility will be important at a time when everybody’s job is likely to change to some degree. Finally, automation will create an opportunity for those in work to make use of the innate human skills that machines have the hardest time replicating: logical thinking and problem solving, social and emotional capabilities, providing expertise, coaching and developing others, and creativity.”

Source: *A Future That Works: Automation, Employment and Productivity* (Manyika, et. al., 2017)

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9 ETHICAL ISSUES IN ARTIFICIAL INTELLIGENCE

1. **Unemployment.** What happens after the end of jobs?
2. **Inequality.** How do we distribute the wealth created by machines?
3. **Humanity.** How do machines affect our behavior and interaction?
4. **Artificial stupidity.** How can we guard against mistakes?
5. **Racist robots.** How do we eliminate AI bias?
6. **Security.** How do we keep AI safe from adversaries?
7. **Evil genies.** How do we protect against unintended consequences?
8. **Singularity.** How do we stay in control of a complex intelligent system?
9. **Robot rights.** How do we define the humane treatment of AI?

Source:
<https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence/>

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