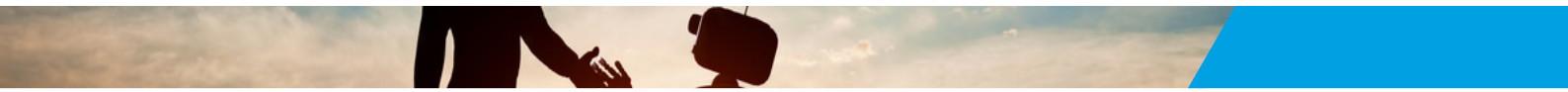
What Artificial Intelligence means for your business – right now

Content

INTRODUCTION

In their efforts to deploy and apply Artificial Intelligence (AI) in their organizations, many companies are facing certain challenges, lack of resources and skills being among the most significant ones. This white paper explains what AI is and explores how it can create value for your business right now, as well as the necessary steps to take, before any AI-based solution can be deployed. We will look at several use cases and success stories from different industries that show how AI is applied successfully today.

AI is expected to thrive in the enterprise in 2017 with transformative changes in how enterprise software is designed and uses data to produce better results for customers. As an enterprise architect, you need to start thinking now how your organization can benefit from using it. AI will offer capabilities like predictive analytics, thereby reshaping your decision-making process and ultimately improving the way you and your enterprise work.



THE STATE OF AI

Gartner defines AI as technology that appears to copy human performance typically by learning, drawing its own conclusions, appearing to understand complex content, engaging in natural dialogs with people, enhancing human cognitive performance or replacing people on execution of non-routine tasks.[1]

Based on this definition, AI is a very broad term that includes Machine Learning (ML). These terms are often used interchangeably, which creates a lot of confusion. Simply put, AI is the broader concept of machines that can perform tasks in a "smart" way, whereas ML is a current application of AI based on the idea that we should be able to give machines access to data and let them learn for themselves.

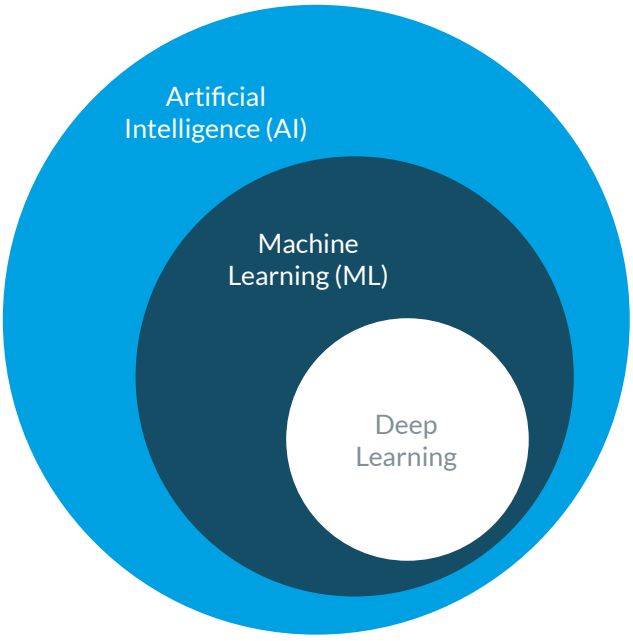


Figure 1: How Artificial Intelligence, Machine Learning and Deep Learning relate

When looking at the agenda of the big analyst and consulting firms, it seems ML took the place of big data as the "shiny new thing" in technology, and will be one of the biggest disruptors for big data analytics in 2017.

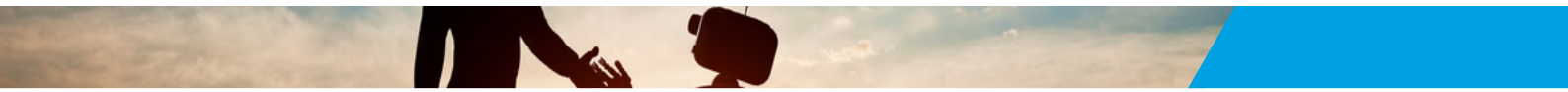
Despite the great interest generated around ML, there is a large gap between research and beneficial use cases of AI in the real world. Only a small number of companies have the resources to actually drive AI innovation and deliver it to the masses. A New Forrester Research survey, which polled 612 business and tech professionals to gauge the enterprise AI research scope, shows that 58 percent of the respondents said their organizations are researching AI, while only 12 percent use AI systems at work.
Experts see AI as an essential support tool for humans using technology in every aspect of life, especially in commercial applications.[2] A LeanIX survey about the state of AI 2017 comes to similar results. See the charts on the next page.

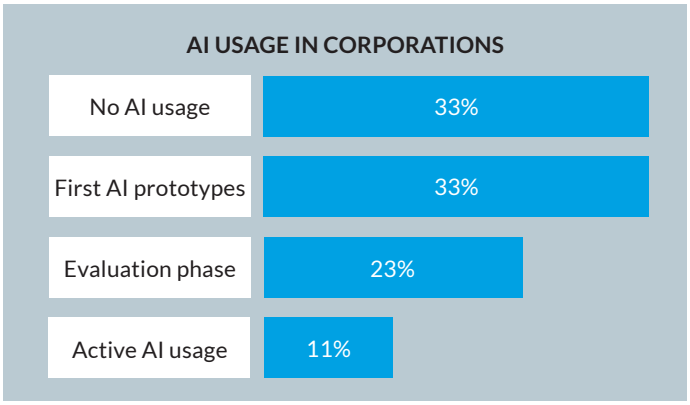
What makes AI valuable in business is its capability to process and analyze massive amounts of data faster than a human brain could. Based on courses of action that AI suggests, humans can eliminate possible consequences of each action and streamline the decision-making process.

AI is equally valued for its versatility in business areas ranging from cybersecurity, because of scale and growing complexity, to customer relationship management (CRM) by turning the CRM system into a self-updating system that stays on top of companies' relationship management, to finance by integrating AI into regular banking operations, such as mortgage loans.

In the future, intelligent apps will transform every existing software category with AI-enabled capabilities, from security tooling to enterprise applications such as marketing or ERP. Using AI, tech providers will focus on three areas — advanced analytics, AI-powered and increasingly autonomous business processes and AI-powered immersive, conversational and continuous interfaces.

1 Gartner: http://www.gartner.com/it-glossary/artificial-intelligence/
2 Forrester: https://go.forrester.com/wp-content/uploads/Forrester_Predictions_2017_-Artificial_Intelligence_Will_Drive_The_Insights_Revolution.pdf





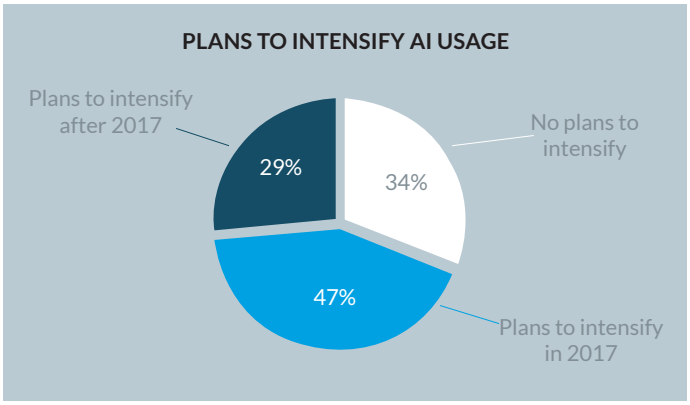


Figure 2: LeanIX Survey 2017: The state of AI in Corporations

HOW TO THINK ABOUT AI NOW

The specific pain points regarding AI use in enterprises are both the big gap between research and actual beneficial usage, and the lack of resources to drive and deliver AI innovation to the masses. Despite the growing interest in AI, only 12% of the business and tech professionals surveyed by Forrester Research use AI at work, while 58% of them are researching it. The LeanIX state of AI survey 2017 confirms that only around 11% of companies really apply AI today.

To benefit of the transformative value of AI today, it is important to understand that AI is composed of technology building blocks that, individually or combined, are advanced enough to add a degree of intelligence to applications that can lead to considerable business transformation.

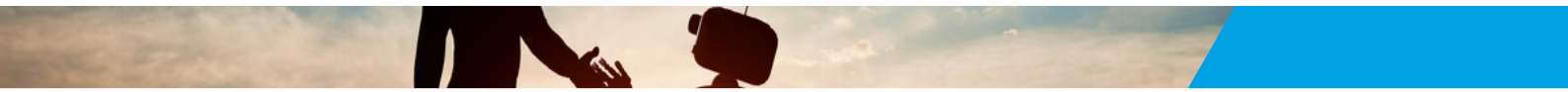
How AI improves business processes

In a world in which business decision makers are under pressure and must act fast, there's little time left to review, research and analyze every piece of information and understand all its implications. Systemized processes and ERP systems are crucial for basic business workflows.

However, AI can improve compliance effectiveness and reduce costs without sacrificing operational efficiency by automating the activities of human review, research and decision-making. In other words, AI empowers rather than replaces decision makers. Even though we may be far from a time when computers can reproduce the human intelligence needed for more refined business analysis and recommendations, almost all high-value work performed by humans is amplified by more complex tools. The increasingly intelligent suggestions made by technology are the foundation for the informed decisions humans make based on their own experience and intuition.

In the modern era there have been many advocates of a business process centric enterprise architecture. Regardless of the structures, business processes are designed by humans with relevant expertise and reflect their vision, knowledge and the organization's mission.

Technological progress, rapid information growth and the coming out of instant communication have broad implications on how an enterprise architects itself. To be successful, enterprises need to rethink every aspect of their business from the ground up. In the future, experts estimate that machines will assume a growing execution role and will assist humans in the design aspect with assembled intelligence that humans cannot collect on their own. However, humans will instruct the machines to assemble this intelligence and will continually monitor and fine-tune the process.



FIRST STEPS BEFORE APPLYING AI

With so many types of AI technologies, it can be difficult to figure out what is the best way to jump in when it comes to introducing AI into your organization. From the simpler cognitive technologies like an extension of traditional analytics, to the more complex ones such as deep learning networks and algorithms, individuals who are new to this may feel overwhelmed by the process of starting out.

Here are the first steps to follow in the process of AI implementation:

1. Get a grip on data

In a company, AI is an "enhancer" that depends on certain factors. Before any AI-based solutions can be effectively set up, all issues with data quality, ERP and business process improvement need to be addressed first.

The first step is to understand the most fundamental element for all AI technologies - data. Companies collect massive amounts of data, while decision makers have little ability to get insights from most of it. Data is useless without effective machines in place to transform it into something of value. That's the role that machine learning is starting to play. Today's systems can not only take in billions of data points and analyze them in minutes, they can also learn from the data and get better in time.

Apart from that, structured data (which is captured and stored in a database) represents only a small part of existing information. In reality, it has been estimated that 80% of digital data is unstructured.[3]

And more importantly, the quality of data leaves a lot to be desired. The key reasons for that are poor data definitions, inconsistent and sub-optimized business processes, and under-utilized core business applications like enterprise resource planning (ERP).

At the end of the day, data accuracy, completeness, relevance, consistency, reliability and accessibility are a big challenge for any organization.

Data Quality

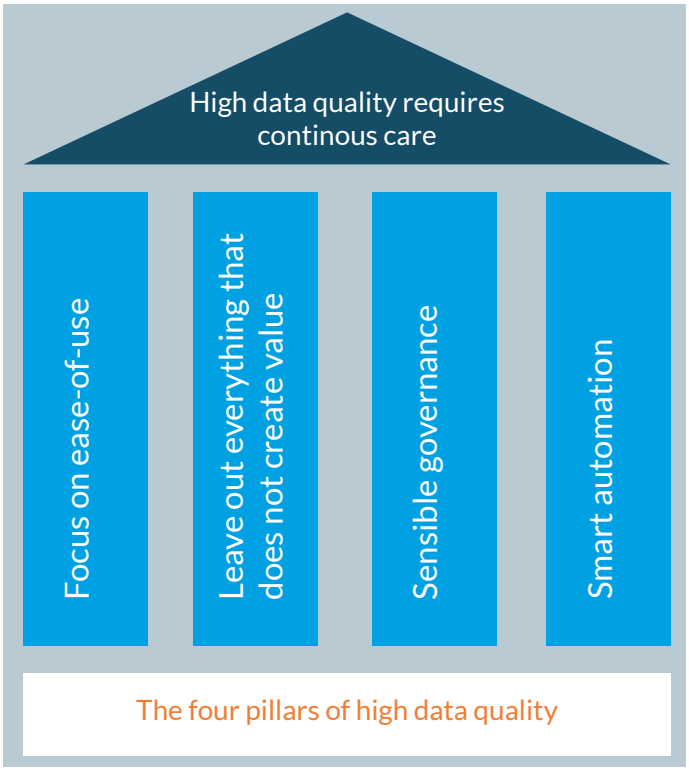


Figure 3: The four pillars of high data quality

To maintain a high level of data quality, an organization must focus on four key components:

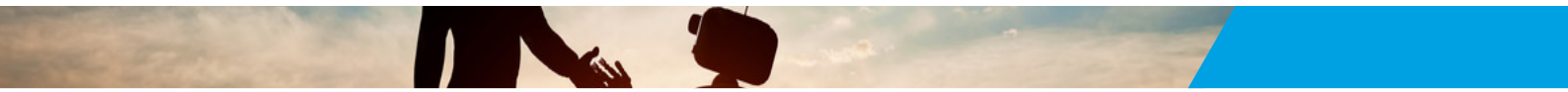
Focus on ease-of-use

This means that usability is mandatory for any data capturing tool. The easier to use it, the more people will embrace it in their daily work. This requires formulating and constantly improving certain KPIs based on: time needed for a new user to be comfortable using the tool, the amount of documentation required, and time needed to execute basic transactions.

Leave out everything that does not create value

Data initiatives often collect any information that might possibly help them in the future. Having a satisfying answer for anyone who would question the need of a data record is crucial. This way, people will maintain the data record instead of simply dropping it.

3 IBM: https://www.ibm.com/blogs/watson/2016/05/biggest-data-challenges-might-not-even-know/



Sensible governance

Governance is mandatory for having clear conventions established on which data to enter or the defined milestones to enter data, e.g. project gateways or definition of done in Scrum. Likewise, a lean quality management system, supported by an Enterprise Architecture platform helps the "gardeners" of the data to keep it regularly up-to-date.

Smart automation

Data available within companies ranges from business data, e.g. customer or product data, to project information and, particularly, operational information, such as tools used for development or operating, e.g. Docker.

Real-time data

AI technologies demand businesses to be "real-time", i.e. have the ability to perform transactions and run analytics at the same time. The Internet of Things (IoT) is increasing the urgency for enterprises to embrace real-time streaming analytics. Predictive analytics are based on AI technologies and are the core of these solutions. A survey by Narrative Science, a natural language-based analytics provider, revealed that many enterprises are taking advantage of machine learning and AI capabilities, but do not necessarily know it.

Only 38% reported using those capabilities to automate routine tasks, yet 88% said they used analytic tools that incorporated predictive analytics, automated written reporting and communications, and voice recognition and response.[4] LeanIX provides companies an easy framework to apply real-time data for the right context. The LeanIX Metrics Add-on allows to capture and analyze time-series data in the context of Enterprise Architecture, e.g. applications.

2. The key role of ERP systems

Upgrading or re-implementing core ERP systems is a business need. Companies must get ready for the AI transformation of ERP solutions by fixing their IT strategies and realizing the value of the AI and ERP integration. AI-based ERP solutions will impact the center of daily operations, like taking over humanly performed routine tasks in the end-to-end business process model – a change driven by a constant need to reduce operational costs.

While ERP solutions evolved over the last two decades, companies still have a hard time converting data into important information, decisions and actions - a challenge that continued to be present over the past five years through the growth of unstructured data, captured without a clear strategy of using it right.

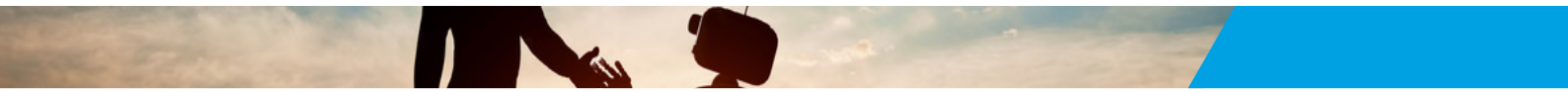
The tools to fix this situation are available and consist of a range of established solutions and technologies that include:

- ERP solutions that allow organizations to run cost-efficient and effective operations.
- Big data solutions to manage structured and unstructured data.
- Business analytics and Enterprise Architecture solutions to provide information with a user-friendly experience.
- Computing power that allows enterprise solutions to manage large data sets and complex algorithms.
- Internet of Things (IoT) technology to capture real-time performance information.
- In-memory database technologies to explore large data sets in real-time.

The major ERP software providers offer solutions that process transaction in-memory, making transactional data instantly accessible for analytics and subsequent transactions.

The two most common areas where AI is integrated with ERPs today, are customer service and maintenance management. There will be two examples discussed in the case study section.

4 The National Business Research Institute in conjunction with https://www.narrativescience.com/, Survey 2017



Preparing your business processes

The third key component for AI solutions is the consistent use of a simple, standardized and harmonized set of business processes, which is a challenge in itself.

Companies struggle to optimize their business processes because of a siloed behavior of functional disciplines, lines of businesses, and operating units. This requires a cross-functional integration to optimize business processes to an outstanding level, while many organizations are optimizing their verticals.

In a business scenario like the Accounts Payable (AP) process, for example, AI can be used in the form of supervised machine learning to scan invoices while a human indexer initially 'teaches' the tool where to find important data in a simple point-and click fashion, such as an invoice number, gross amount, etc. The tool then recognizes certain patterns and, after a handful of invoice examples per supplier, is able to find the respective data on its own, even if fields have moved on a page or the total amount moves to the next pages.

After a brief training period, the AI-enabled tool can perform the data extraction completely on its own. It only brings invoices to human attention in case it is not confident enough, be it for new suppliers, bad scan quality, hand-written content, etc. These issues can be directly corrected in the tool and the indexing team changes their role to that of a pure supervisor, saving a lot of time per invoice.

The tool is able to perform its recognition within seconds, even in case of required supervision, and it triggers a quick help request to its human colleague, as an exception from the regular fully automated process.

For now, the right solution for most business scenarios is a hybrid one: use automation and AI where it can be used best, like high volume, low creativity tasks, and add as much human power as required to deliver the most efficient yet flexible process that we can.

This means that identifying areas where combining humans and their specific expertise together with the artificial workforce, based on proper requirements gathering, can leverage the best results.

Automation should have a positive effect on workers whose repetitive tasks are taken over by machines. They will have gained a wealth of experience to perform higher value tasks with the technology freeing up time. This will improve their job satisfaction and positively impact the client experience.

SIX PROMISING COMMERCIAL AI USE CASES

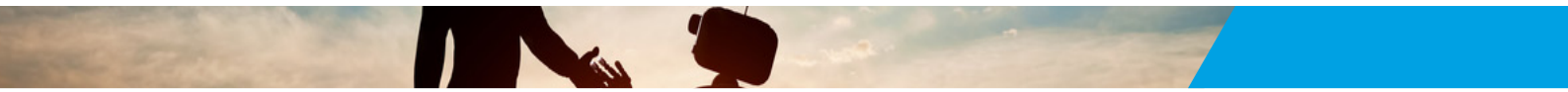
Intelligent Recommendations - Netflix

Netflix recommender system is predicated on the fact that humans are very bad at choosing between many options, quickly getting overwhelmed or making poor choices. Research suggests that a typical Netflix member loses interest after 60 to 90 seconds of choosing, having reviewed 10 to 20 titles (perhaps three in detail) on one or two screens. The recommender role is to make sure that on those two screens each member in Netflix's diverse pool will find something compelling to watch, and will understand why it might be of interest.

The main components of the recommender system contain a collection of different machine learning algorithms that define the Netflix experience. Most of them come together on the Netflix homepage.

Through machine learning, Netflix can access a large data set —what each member watches and when, the place on the Netflix screen where the customer found the video, recommendations customer didn't prefer, and the popularity of videos in the catalog.

Some of the algorithms being used include: video-to video similarity (Sims) which makes recommendations in the "Because You Watched" row; Top N ranker



algorithm which makes recommendations in the "Top Picks" row; Or "evidence" algorithms, which focus on what information to show a viewer about a movie (e.g. if it won an Oscar).

The goal of the Top N algorithm is to find the best few personalized recommendations in the entire catalog for each user, focusing only on the head of the ranking, an element that the Personalized Video Ranker (PVR) does not have since it is used to rank arbitrary subsets of the catalog.

The Top N ranker is optimized and evaluated using metrics and algorithms that look only at the head of the catalog ranking that the algorithm produces, rather than at the ranking for the entire catalog (like in the case of PVR). Otherwise the Top N ranker and PVR share similar attributes, for example, combining personalization with popularity, and identifying and incorporating viewing trends over different time windows ranging from a day to a year.

The recommendation system produces $1 billion a year in value from customer retention.

Expert decision support - CAD workstation

Machine learning is also used to compensate, in some cases, radiologists' oversight in interpreting mammograms. One study explored using computer-aided diagnosis (CAD) to review early mammograms of women who eventually developed breast cancer.

The CAD workstation detected 52% of the cancers a year before they were officially diagnosed.

With a CAD workstation, a laser scanner first transforms the mammography film into a detailed matrix of digital data. Microcalcifications show as tiny white spots, and masses appear as round or irregular shapes. The system's computer vision and AI algorithms scan the digital matrix, sift out background findings and normal soft tissue, and then highlight patterns that are likely to represent lesions. Areas interpreted as suspicious are flagged on the digital mammogram with arrows. After reviewing the mammograms and the computer output, a radiologist prepares a negative or positive report.

The results showed that CAD can serve as a second opinion for traditional screening mammograms.

Fraud detection - PayPal

To prevent money laundering, PayPal uses AI technology that is able to accurately detect possible fraud. Algorithms mine data from the customer's purchasing history— besides reviewing patterns of likely fraud stored in PayPal's databases—and can tell whether, any suspect transactions were only innocent actions of a globe-hopping pilot accessing an account from different countries.

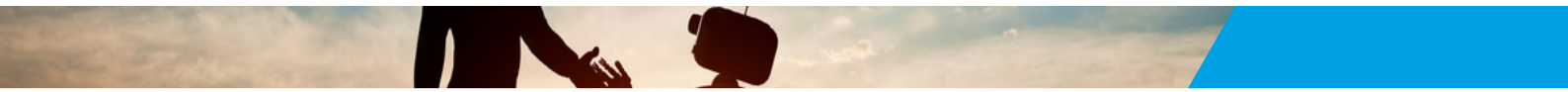
Fraud is always possible via theft of consumer data in breaches like "phishing" emails. That's why the payments giant relies on intensive, real-time analysis of transactions.

When patterns are discovered—like sudden strings of many small purchases at convenience stores that turn out to be fraud—they are turned into a "feature," or a rule that can be applied in real time to stop purchases that fit this profile. This way, PayPal can tell the difference between friends buying concert tickets together and a thief making similar purchases with a list of stolen accounts.

Artificial intelligence approaches have helped keep PayPal's fraud rate extremely low, at 0.32 percent of revenue.

Data security - Deep Instinct

An Israeli startup, Deep Instinct, has applied deep learning to spot malware. Deep learning involves training a network with many layers of simulated neurons using massive amounts of data. When fed a large number of examples, such a network will correctly identify new examples that seem different on a basic level. A deep learning system can, for example,



be trained to recognize a particular person's face using thousands of images, and then spot that person in new photos, even ones taken in poor lighting or from an odd angle.

Research shows that the best commercial antivirus can catch around 87 percent of all new threats several months after the software was last updated.

As a result of using deep learning, Deep Instinct's software was able to detect 20 percent more new malware than existing antivirus software.

Customer service support - Allstate Insurance

Given the complexity of recent advances in AI like cognitive computing, machine learning, and deep learning, companies need to be aware that it is possible to deploy simpler yet effective solutions without breaking the bank.

With fewer technical requirements and less time and money, they can get in a position of advantage on AI's future. Enter "AI Lite" systems, which can be smart about sorting and distributing information very fast.

This is what Allstate Business Insurance, a division of Allstate Insurance, used to develop a virtual assistant called ABIe (pronounced "Abby" for Allstate Business Insurance Expert) to answer questions from its 12,000 agents. Since the costs of expanding the call centers were prohibitive, ABIe saved unnecessary spending by using an avatar-driven interface that offers accurate answers to policy questions while streamlining the quote process.

Thanks to this tool, in three years the number of queries answered exploded from a few thousand a month to 100,000. A new version of ABIe will be answering queries directly from the customers.

However ABIe is not a 'one-size-fits-all' solution. It took Allstate Business almost a year to design and implement ABIe by putting together a team of experts who was responsible for figuring out the "taxonomy" of the words, phrases, and data that ABIe would need to answer all queries. Answers are pulled from a data warehouse, where all the knowledge relating to the company's products and processes has been organized.

The benefit of all these efforts is that by marrying the right data to the right vocabulary and terminology, a company's information capabilities will soar.

Maintenance optimization - MTR

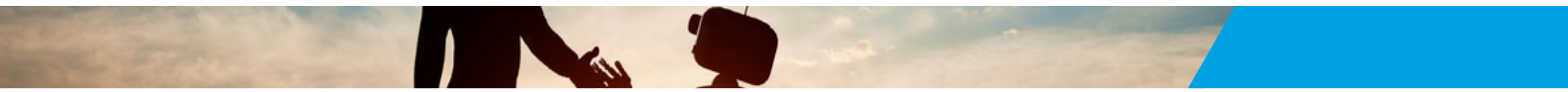
AI is also one of the reasons why Hong Kong has one of the world's best subway systems with a staggering on-time rate of 99.9%. Owned and run by MTR Corporation, it carries around 1.6 billion passengers per year, and it is by far the most popular transportation mode in Hong Kong. Although most tasks are performed by humans, they are scheduled and managed by AI.

The AI algorithm works with a simulated model of the entire system to find the best schedule for necessary nightly engineering works. From its all-wise view, it can spot chances to combine work and share resources that no human can.

The generated schedule is still subject to human approval. Urgent and unexpected repairs can be added manually – the system only reschedules less important tasks.

It also checks the maintenance it plans for compliance with local regulations. The team of experts encoded into machine readable language 200 rules that the engineers must follow when working at night, like keeping noise below a certain level in residential areas.

The AI techniques also make use of several innovative techniques, such as a non-intrusive XML rule-engine, intelligent self-healing coding, and combining heuristic search with a genetic algorithm. This is the first AI system to be deployed in Asia Pacific that uses such innovative techniques as well as a modern service-oriented architecture.



The AI solution saves MTR two days a week of squabbling over the repair schedule. And MTR's repair teams have 30 minutes longer to finish their night's work – a small time boost that saves MTR millions per year.

CONCLUSION

The lack of resources and the big gap between research and actual AI usage are the main factors that make many companies hold back when it comes to applying AI. However, the interest in AI is growing and there is a lot of room to reduce this gap with strong data definitions, systemized business processes and ERP systems.

Getting a grip on data, ensuring your ERP systems are powerful, and optimizing your business processes are the main steps to follow before implementing any AI-based solution. Data is at the foundation of the decision-making process. To maintain a high level of data quality you should focus on ease-of-use, leaving aside everything that does not add value, good governance and smart automation.

AI has been successfully used in many industries from healthcare to fraud detection to intelligent recommendation and data security. Given its wide versatility and applicability, there is no doubt 2017 will be a big year for AI with huge potential for organizations.

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