ITIL®

ITIL® 4 AND ARTIFICIAL INTELLIGENCE

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GLOBAL BEST PRACTICE

Contents

1. Introduction

Artificial intelligence (AI) is an exciting and emerging field with a rapid pace of change and innovation. The intersection of AI with IT service management (ITSM) holds great potential to improve service management practices and drive significant innovation in the industry. This white paper highlights, the advancements of artificial intelligence, along with AI's current adoption in ITSM and its potential for the future.

2. What is artificial intelligence?

Artificial intelligence is a scientific field of study focusing on the development of computer systems that can execute functions traditionally performed exclusively by humans. Research areas include speech, sight, decision-making, interpretation, and even human-like motor tasks. Major innovations have developed in image recognition, machine vision, text to speech and speech to text, machine learning, natural language processing, robotics, and expert systems. The areas of scientific advancements most significant to ITSM are machine learning, natural language processing, and speech.

Artificial intelligence is not new. Research in the field of artificial intelligence began in the mid-1950s. The current explosion in this field is largely due to the lower cost of technology and data storage, improved processing speed, scalability using cloud services, and the availability of large masses of data collected via multiple channels, including social media and the internet.

Companies in many vertical markets are excited about the potential of artificial intelligence and are investing in new strategies in this rapidly evolving field. For example, artificial intelligence is being used in mobile devices such as cell phones and tablets, and common home devices. The intelligence of these ordinary devices is reflected in their ability to provide answers to questions and to help manage our lives more effectively. However, this intelligence is mostly limited to existing programmed responses to common questions or using the gathered data to provide relevant and useful information to consumers. Over time, these devices will continue to amass volumes of data that drive the learning process and new innovations in how artificial intelligence integrates into our daily lives.

3. Artificial intelligence and ITSM

From an ITSM perspective, the application of artificial intelligence to service management practices has great potential. Collecting data about our services, customer requirements, and end-user issues and solutions fuels the opportunity to develop systems that utilize artificial intelligence to drive improvements to service design, delivery, and support. Adding artificial intelligence into the ITSM domain allows service providers to use software to make data-driven judgements and decisions based on pattern recognition in the data collected across multiple channels and systems.

The potential for AI is significant, allowing the service provider to improve the customer experience, improve services in meaningful ways to the business, and shift the IT workforce from repetitive transactional work to innovative and creative work.

ITIL 4 supports organizations in developing an overall strategy for using artificial intelligence across the ITIL management practices. AI can drive major service provider advantages and benefits in all ITIL practices, particularly in the following: information security management, knowledge management, measurement and reporting, workforce and talent management, incident management, monitoring and event management, problem management, service design, service desk, service request management, and software development and management.

4. AI and reliable ITSM data

An important consideration in developing a strategy to leverage artificial intelligence in ITSM is the availability of data. Although IT services and service management practices focus on collecting data, the datasets may not have the veracity or quality needed to drive the predictive analysis required in artificial intelligence. The primary sources of data available include events from monitoring, incidents, requests, problems, known errors, workarounds, and changes. The data is collected either through monitoring systems or by using humans to enter information while working through transactional work with customers. The collection of data using humans is an error-prone process with a high degree of variability. Learning from an unreliable set of data requires the ability to filter meaningful information that can then be used to drive intelligence. Traditional methods of analysis require humans to spend significant time cleaning up datasets and running reports and analysis to glean relevant insights. Using computers, the analysis process is not only freeing up valuable time of resources but also can be an automated and repeatable process that improves or learns over time.

While many ITSM providers have a knowledge management strategy to capture and retain institutional knowledge, the knowledge database is often a source of unreliable, non-relevant, and out-of-date information. Significant efforts are applied to capturing knowledge from subject matter experts, but due to poor knowledge management practices, the knowledge is not maintained. Once the dataset is deemed unreliable by its users, it quickly stagnates and is unreliable to support decisions.

The service provider must place an emphasis across functional silos that knowledge is the core asset of the organization and therefore a priority. All service management practices must contribute to effective knowledge management to ensure that data is collected and maintained as a native activity within each practice. A focus on knowledge will drive the collection of data that can then be used in automation, service design, testing, predictive analysis, auto-recovery, self-service and other service management areas.

Another important consideration is the variety of data collected across the entire user experience. Artificial intelligence requires not just an isolated set of data but multiple data sources. For example, a user asks for help from a chatbot to resolve an issue with a laptop. The answer may be generated from prior incidents, requests, known errors, knowledge articles, and using information obtained from the laptop. Any device connected to the internet is a potential source of data that can be leveraged in ITSM artificial intelligence strategies. The efforts of the service provider must focus on collecting data across the entire value chain and include data from the customer experience and all service management practices.

5. Machine learning and ITSM

A significant area of importance in artificial intelligence are the advancements that have been made in machine learning. Machine learning focuses on feeding computer systems large quantities of data and information to help the computers to learn, act, and think like humans do autonomously.

Machine learning is an integral part of developing IT services and ITSM tools. However, successful machine learning requires a large amount of data. Traditional applications use knowledge gained about a process or business requirement to produce a specific, predictable outcome. Machine learning is where data about IT services and processes is used to learn from the collected data without pre-programming the outcome. Machine learning typically utilizes advanced statistical techniques and computing systems to improve ITSM tasks over time. With machine learning, the application can write additional programs to interpret input and predict outcomes. Advancements in machine learning are at the root of the current explosion of artificial intelligence.

From an ITSM perspective, machine learning is the ability of IT services and service management tools to learn from the data collected. From a value stream perspective, the organization does not just define the activities, workflows, controls, and procedures needed to achieve the business objectives, but can also learn from these and create new ones or improve existing outcomes without or with limited human intervention.

6. Internet of Things and ITSM

Internet of Things (IoT) is the use of technology that allows common devices to collect and share data over the internet. Data collected from smart devices is communicated both to the consumer and the product manufacturer or service provider using applications that are also stored on the devices. In addition, the intelligent devices often provide remote control capabilities.

From an ITSM perspective, smartphones, tablets, and other end user devices can be used to gather data about the end-to-end customer experience. The data can be very beneficial in improving IT services and better aligning those services with business expectations to create an improved value stream.

As the service provider designs new systems, it will become increasingly important for the components within the service to communicate and share meaningful information. The service management organization needs to design IT services that provide a high availability but also use gathered data from smart devices to identify required maintenance, recognize and remove problems proactively, and automate common requests.

7. High velocity IT and business agility

Changing demands within business markets require that IT organizations work with greater velocity in support of business agility. Agile software development practices provide an iterative approach to gathering requirements and producing business outcomes quicker with shorter development cycles. Agile methods can introduce significant risk especially with organizations that do not have mature service management practices. At the same time, mature service management practices can stifle agile takeup, and thus a balance is needed, underpinned by an organizational philosophy of continual improvement. Agile development is just one way in which IT organizations must react and adapt quickly to changing business needs.

Artificial intelligence has great potential to assist organizations in understanding and reacting to current service needs, and to help predict future needs. Rather than wait until humans can analyze data to discover patterns in behaviors within the value stream, AI can filter out relevant data, identify patterns, and proactively take actions to address identified needs or problems within the value stream.

8. Optimize and automate and artificial intelligence

To maximize the value of work performed by human resources, artificial intelligence can pave the way for successful optimization of IT services and service delivery models. Optimization of services helps the organization to automate predictable and documented work practices. The organization first focuses on capturing knowledge of how to perform repetitive tasks as thoroughly as possible. The captured knowledge is then automated within the service or service management tool, thus reducing the need for humans to perform the work.

In addition to optimizing the use of limited organizational resources, automation using artificial intelligence can learn from the automated processes and adapt as needed when new variables present themselves.

Across the organization and the service management practices, artificial intelligence can be used to identify opportunities to improve efficiencies, reduce costs, eliminate errors and waste, and improve overall value.

9. Artificial intelligence and the general management practices of ITIL 4

Of the ITIL 4 general management practices, ITSM organizations can make use of artificial intelligence to help manage security and knowledge, and to support decision making. These are just a few examples, and other practices can also potentially benefit hugely from AI.

With the introduction of artificial intelligence, organizations will also need to focus on developing appropriate analytical and knowledge management skills as existing resources transition from performing mostly transactional work to higher valued work within the service value chain.

9.1 INFORMATION SECURITY MANAGEMENT

Artificial intelligence can be used to assist with the prevention, detection, and correction of security related incidents within organizations. Integrating AI into information security management can improve the organizations ability to verify and predict potential threats and automate responses, thus reducing risks associated with poorly trained or unmotivated staff. As new services are designed, artificial intelligence should always be a consideration, as it can provide great benefits for the security management of that system. For example, imagine a service that can use internal sensors to understand and prevent security breaches based upon a comparison to normal conditions.

Information security management is critical to the business and management of business risk. Using AI to detect anomalies within ITSM data, identify vulnerabilities, and prioritize issues for staff intervention is only the beginning. Improving security is not just about using artificial intelligence in the detection of, and recovery from security related incidents; organizations must begin to build artificial intelligence into the entire value chain to predict, prevent, detect, and learn from security breaches.

> A software development company creates a software application using artificial intelligence that detects potential bugs and vulnerabilities, identifies the potential risk for a security breach, and automatically develops an effective protection against any potential threat.

9.2 KNOWLEDGE MANAGEMENT

Artificial intelligence requires data. Data is derived from service management practices, business services and processes, customer interactions, ITSM tools and monitoring systems, and many other data points across the value chain. Organizations must develop an overall knowledge management strategy that focuses on data collection throughout service management practices.

Structured datasets that reside in relational databases where the structure is well defined and understood are easily queried against using traditional reporting methods or business intelligence tools. With little effort, the organization can use this structured data to support business decisions. However, businesses are increasingly accumulating massive amounts of unstructured data in images, documents, audio, video, and other data files where traditional analytical methods are not as effective. Organizations can use machine learning and natural language processing to find patterns and derive insights from unstructured data where it was impossible to do so in the past.

Developing a successful knowledge management practice requires a shift in the focus of the organization to understand that the capture of knowledge is not something done as an added service management practice but is in fact embedded into every practice. To be successful, organizations must develop a knowledge sharing culture where knowledge is viewed as the core asset of the organization and critical for long-term survival.

Along with a well-defined knowledge management practice, artificial intelligence can be used to auto create knowledge articles from data, suggest articles for human intervention or use, and even suggest knowledge articles directly to customers through self-service. Organizations can use artificial intelligence to learn how to exploit existing knowledge and avoid knowledge gaps

> IBM's Watson uses natural language processing to analyze and gain insights from large volumes of unstructured data in many different vertical markets.

9.3 MEASUREMENT AND REPORTING

Artificial intelligence also has significant potential to enhance the measurement and reporting practice. Predictive analytics uses the data collected in ITSM value stream and applies traditional statistics and data modeling techniques along with machine learning and artificial intelligence. The main objective of predictive analytics is to understand the likelihood of future events. Predictive analytics can benefit across the value chain, helping the organization to make better management decisions, produce new insights about customers and services, and assist with better data analysis.

Customer data and predictive analytics are also key enablers of disruption within the business. Using artificial intelligence with a 360-degree view of the customer across all channels of support will help drive improvements in service delivery and support and provide insights for new innovative services.

> A service company uses predictive analytics to develop a model that identifies customers who are most likely to not renew at the end of their contract and devise a marketing plan that provides incentives most likely to retain those customers for an additional term.

9.4 WORKFORCE AND TALENT MANAGEMENT

Media coverage of artificial intelligence has increased in society, so has the fear that artificial intelligence will replace humans and eliminate jobs. While changes are possible and probable, ITSM leaders will need to focus on developing the existing workforce for a future where transactional activity is managed by machines and creative and knowledgeable staff are needed to drive innovation and deal with exceptions which are identified but not managed by artificial intelligence.

The adoption of artificial intelligence requires different skillsets in the workplace to properly build AI- driven systems and develop and maintain the data required to fuel AI systems. ITSM staff will need to program and refine the way that artificial intelligence works as well as ensure that the business processes and practices successfully interface with the artificial intelligence built into business services. Staff will shift their focus to value-drive activities across the value chain, including managing knowledge, assisting with the training of AI-driven systems, dealing with complex situations or situations not previously encountered, and using productivity gains to work on project-based work. AI can also support training, education and knowledge sharing among ITSM professionals, as well as identifying the correct resource for handling exceptions.

10. Artificial intelligence and the service management practices of ITIL 4

While there is significant potential to implement artificial intelligence across the general management practices of ITIL 4, many organizations are already benefitting from its use in their service management practices. Using machine learning and natural language processing, organizations can improve the management of events, requests, incidents, and problems, and improve the overall customer experience. Again, this is not an exhaustive list, and many other service management practices can also benefit from the use of artificial intelligence.

10.1 INCIDENT MANAGEMENT

The incident management practice primarily focuses on restoring service as quickly as possible. As organizations attempt to reduce costs, the incident management process is often a place where headcount is kept at minimum levels. With a lack of resources, organizations struggle to be proactive in meeting customer needs. In the early stages of adoption, artificial intelligence is most often used to improve incident categorization, issue prioritization, pattern recognition for commonly occurring incidents across services, auto resolution of incidents, and workforce optimization.

An organization that is in the early stages of artificial intelligence adoption should focus on ensuring that data collected in the incident management practice is structured consistently and maintained as it is used within the process. The focus on knowledge creation and maintenance will be instrumental in improving machine learning.

> Artificial intelligence can help to identify a resolution for a customer query by using natural language processing to understand the intent of the customer query and matching it to solutions stored in the knowledge base. In many cases, solutions can be automated, thus reducing the need for any human intervention.

10.2 MONITORING AND EVENT MANAGEMENT

The collection of data across value streams includes the monitoring of business services and business processes, as well as IT services and service management processes. Automated event correlation and filtering is improved through applying artificial intelligence and training the system with existing documented rules, workflows, and automated responses.

Artificial intelligence can also be used to:

- monitor systems and watch for previously unseen events
- use events which have already been resolved to determine the best approach to handle subsequent events
- drive the development of new automation of commonly occurring events.

The pattern recognition capabilities in artificial intelligence can be used to analyze data and identify trends in events that may indicate a more systemic issue not yet identified as an exception. Early detection and alerting of staff enables a more proactive approach to managing services. If we use human efforts to analyze the same data source, it is likely to require lengthy timeframes with little or limited success. Artificial intelligence is ideal for analyzing large data sets and identifying correlations within the data

While the primary goal of artificial intelligence integrated in to monitoring and event management is to be proactive in eliminating service disruptions, AI can also provide information that will help humans to identify and correct incidents and problems more effectively. Artificial intelligence can recognize patterns

that can be assessed for potential risk, and create, categorize, and prioritize incident tickets. This allows the use of resources on other areas of importance to be maximized

> Artificial intelligence is used to identify patterns in previous monitoring data to proactively balance workloads in real time and thus reduce any capacity related issues with a service.

10.3 PROBLEM MANAGEMENT

In addition to identifying patterns in events, artificial intelligence is also incredibly important when spotting trends in incidents and problems, repeat problems, corrective actions, and automatic recovery, and preventing future occurrences of systemic incidents and problems.

Through analysis of data and the use of machine learning, artificial intelligence can analyze patterns in incidents, identify potential areas for future problems and alert staff of these areas. Using a large dataset of previously documented incidents, problems, and resolutions, artificial intelligence and machine learning can help to ensure that problems are handled more efficiently and prioritized and categorized with less error. When appropriate, the system can also automate workarounds, perform preventative maintenance, apply fixes, and auto generate change tickets with risk assessment and impact analysis.

Problem management is one of the most labour-intensive practices to perform effectively, and the value of using artificial intelligence to perform these types of analysis is significant. Artificial intelligence can automate the analysis of data and augment the knowledge of ITSM professionals, while also troubleshooting more complex problems and reducing the time taken to identify the root case and resolution.

> An ITSM solution identifies and logs a recurring issue by studying patterns and anomalies in incident, problem, and event data. Based upon the insights gained through analysis, the ITSM solution identifies a potential fix and corrective action.

10.4 SERVICE DESK

Natural language processing combined with machine learning can also be used to enhance customer interactions. The systems can collect and analyze data across multiple channels, including social media and self-service, to gain insight into the customer, their work processes, and changing needs. Using human language interactions, the AI-driven systems can understand and interpret the spoken or written word and personalize experiences for customers.

Artificial intelligence is used to provide self-service knowledge directly to customers through systems such as chatbots. Using data captured in the incident management and request fulfillment processes, the chatbots can be programmed to handle previously defined workflows for the management of common issues. An area of importance is the use of natural language processing within a chatbot. If a customer poses a question that is not contained in the rules tables, the system can then try to understand the intent of the customer and provide an appropriate answer.

Natural language processing can be either text-based interactions using a chatbot or voice interactions like those used in many smart devices in the home. The natural language processing engine attempts to process customer questions by breaking the spoken or written text into its parts, and then comparing the text with registered responses to help understand the specific words and word sequences, and the intent of the customer.

The emerging field of self-service through AI-driven technology is a frequent entry point into the use of artificial intelligence in ITSM. The cost of entry is lower than many other forms of artificial intelligence, and

many high-tech firms provide free access to decision-based agents. The adoption cycle is also made easier due to the importance of knowledge captured and used in service desks as a means of shifting knowledge directly to the customer to avoid additional calls for services or support.

A higher education institution uses prior incidents and requests to develop a chatbot specifically for handling of all students issues during the onboarding process at the beginning of the school year for incoming freshman. The chatbot manages the entire process, keeps students connected with campus resources, and also proactively notifies students of all upcoming deadlines and any potential exceptions.

10.5 SERVICE REQUEST MANAGEMENT

Much like events, incidents, and problems, artificial intelligence can be used to automate commonly occurring service requests without the need for human intervention. Automation can reduce the burden on human resources and the costs associated with fulfilling service requests. Artificial intelligence can help with the process of automating new requests by learning from previously documented requests and creating new workflows based upon pattern recognitions identified in requests that have been fulfilled.

Artificial intelligence can also be used to analyze patterns in prior service requests to anticipate potential future requests, assist with reducing errors in the assignment of requests, and predictively manage requests to prevent service level agreement breaches. Most organizations have a significant volume of requests, and when artificial intelligence is used the organization can improve the overall customer experience, achieve significant cost reductions, improve processing times, and eliminate traditional delays.

A virtual agent is available 24x7 to handle basic service requests such as password resets, software or hardware requests, purchases, downloads, and the allocation of licenses.

11. The benefits of AI-driven ITSM practices

Using artificial intelligence to support automation can be highly valuable for service management professionals, and help to optimize the use of available resources. A service organization making use of artificial intelligence can receive major benefits, including improvements in practices and productivity, better utilization of resources, reductions in operational costs, and improved service levels. Artificial intelligence can also lead to business improvements in the customer experience, higher availability of business services, high productivity, lower costs, and increased business scalability and agility.

12. Focus on improving the value chain with artificial intelligence

The potential application of artificial intelligence in the ITIL 4 service management practices is vast, but it is important to focus on solving business problems rather than just technology. When using artificial intelligence, organizations should focus on improving the value stream, and not just the service management processes. The adoption of artificial intelligence will not always run smoothly, and organizations that begin this process earlier can expect to have failed attempts along the way. The goal is to use artificial intelligence to improve the ability of humans to manage service across the value chain.

Artificial intelligence is no longer an isolated domain of study but has grown into an interdisciplinary science crossing over into many different areas of research and design, including manufacturing, sales and marketing analytics, automation, healthcare, and automotive industries, to name just a few. The

ITSM industry is identifying ways to embed artificial intelligence not only into ITSM practices but also into business processes, driving disruption and innovation.

Dr. Ng of Stanford University said in 2016 that artificial intelligence is the new electricity. His statement indicates the potential of artificial intelligence but also the possible magnitude of its impact on our society. Artificial intelligence will continue to impact the evolution of service management for years to come.

13. About the author

Julie L. Mohr is a dynamic, engaging change agent who brings authenticity, integrity, and passion to practitioners worldwide. Through her books, articles, speaking, consulting, and teaching, her purpose is to spark change in the world with thought-provoking dialog and interaction. Julie has a B.S. degree in computer science from The Ohio State University, a MaED from the University of Phoenix, and is currently pursuing her Ph.D. in Management and Organizational Leadership in Information Systems & Technology from the University of Phoenix. Julie is a certified ITIL Expert and a Certified Governance IT Professional. Julie captivates audiences at conferences worldwide on topics of authentic leadership, business strategy, artificial intelligence, the disruption economy, knowledge management, organizational culture, and innovation.

14. About AXELOS

AXELOS is a joint venture company co-owned by the UK Government's Cabinet Office and Capita plc.

It is responsible for developing, enhancing, and promoting a number of best practice methodologies used globally by professionals working primarily in project, programme and portfolio management, IT service management and cyber resilience.

The methodologies, including ITIL®, PRINCE2®, PRINCE2 Agile®, MSP®, RESILIA®, and its newest addition AgileSHIFT® are adopted in more than 150 countries to improve employees' skills, knowledge, and competence in order to make both individuals and organisations work more effectively.

In addition to globally recognized qualifications, AXELOS equips professionals with a wide range of content, templates and toolkits through the CPD aligned My AXELOS and our online community of practitioners and experts.

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About this White Paper:

ITIL 4 supports the development of an overall strategy for using AI across ITIL practices, bringing advantages in: information security management, knowledge management and others.