Discharging Records Management Activities Using Artificial Intelligence at the Council for Scientific and Industrial Research, South Africa

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Abstract

Artificial intelligence (AI) has been highly dominant universally in the wake of the Fourth Industrial Revolution (4IR). 4IR has to do with the application of Internet of things (IoT), cloud computing, big data, blockchain technology, intelligent robotic machines, and AI for the management of records. AI can be used to perform records management activities faster than human intelligence (HI). The study sought to investigate how records management activities can be discharged using artificial intelligence (AI) at the Council for Scientific and Industrial Research (CSIR) in South Africa. The study investigated the state of records at CSIR and identified records management activities that can be managed through AI and intelligent robotic machine. Convergent mixed-methods research was conducted, and data were collected using interviews and questionnaires. Data were analysed thematically and statistically and presented in tables and figures. The study reveals that AI can be used to discharge records management functions at the CSIR throughout the life cycle of records, which includes the creation, digitisation, classification, storage, maintenance, and retrieval of records. The study proposed a framework that may assist the CSIR to use AI for records management in support of service delivery. It is hoped that the framework proposed may serve as a benchmark and guideline for the implementation of AI in archives and records management industry.

Keywords: Records Management, Artificial Intelligence, Robotic Management, Council For Scientific and Industrial Research(CSIR), South Africa

Introduction and Background of the Study

Artificial intelligence (AI)has become increasingly prevalent throughout the world as a result of the Fourth Industrial Revolution (4IR). 4IR refers to global changes that enable people to move in digital environments and online spaces, and to use interrelated technologies such as blockchain technology, big data, cloud computing, robotic machines, the Internet of things and the web of things to manage their lives (Atzori, Lera and Morabito, 2010; Liao, Deschamps, Loures and Ramos, 2017;

Manesh, Pellegrini, MarziandDabic, 2020; Bakogiannis, Mytiliuis, Doka and Goumas, 2020; Chung, 2021; Lund, 2021). Archivists and records management practitioners can apply disruptive technologies such as AI to overcome the challenges presented by archives and records management in South Africa (Modiba, Ngoepe and Ngulube, 2019). Disruptive innovations such as AIare affecting the archives and records management industry (Kim, 2020). The technologies that have become available as a result of 4IR offer solutions to problems experienced in the archives and records management sector (Prigg, 2017; Ahmat and Hanipah, 2018; Kim, 2020). The application of AI affects the whole library and information science industry, as robotic machines are used to perform library services. For example, a robot called Libby has been acquired by the library of the University of Pretoria to provide reference and information services to students (Mathibela, 2019). Institutions across the world consider using AI to perform several archives and records management functions that are presently performed by individuals. Such functions would include records classification, digitisation, storage and retrieval (Jarrahi, 2019). AI can ensure that records are safely stored in a cloud facility, protected by encrypted security codes and easy to retrieve(Liu, 2011).

Hence, this study investigates the records management activities that can be discharged through AI at CSIR. A framework is proposed on how AI can be applied to discharge the records management activities at CSIR. CSIR is an African research and innovation institution that its head office is in Pretoria, South Africa. CSIR receives enormous number of records from various institutions such as the Department of Science and Technology and Armscor in South Africa. CSIR generates records through research projects that are conducted across the world. Various intervention has been made to ensure that records are managed effectively at CSIR (Matroko, Mniki and Van Deventer, 2007; Van Deventer, 2011; CSIR, 2017; Modiba, 2021).

Problem Statement

The CSIR is making an effort to conduct its records management activities properly, yet it does not manage its records effectively and efficiently due to administrative and technical errors encountered by its records management practitioners. The CSIR records management activities need to be improved to ensure that the organisation provides high-quality services to users. Paper-based records are retrieved physically by visiting the registry or archives. Electronic records are maintained by the ICT division according to CSIR IT policies. Paper-based records are maintained manually (Van Deventer, 2011; EE Publishers, 2017). The CSIR ensures that the records are not exposed to sunlight and the temperature of the registry is controlled to protect records. However, these practices are not effective and efficient, and records management practitioners spend a lot of time performing administrative responsibilities related to records management (Matroko, et al. 2007; Van Deventer, 2011; Patterton, 2017). Hence, possible AI records management systems should be investigated as using AI for records management could help the CSIR to manage its records far more effectively and efficiently than is currently the case. AI can be used to perform and manage records effectively, and records management activities can be digitised robotically using automated classification algorithms. Records can then be placed in cloud storage that is embedded in robotic machines and the local server. Once the digitisation process has been completed and all records have been converted to a digital format, the CSIR will have easy access to all its records. Digital records can be retrieved from secure databases via devices such as laptop or desktop computers, tablets and cell phones. Hence, a framework is proposed for records management activities that can be performed using AI and robotic machines. The framework will give the CSIR clear guidelines on how AI can be used to perform its records management activities. This will assist the CSIR in managing its records effectively with the help of AI and robotic machines.

Purpose and Objectives of the Study

The purpose of the study was to investigate how records management activities at the CSIR could be performed using AI. The objectives of the study were to:

- determine the state of records management at the CSIR
- identify records management activities that can

be performed using AI at the CSIR

- propose a framework for the performance of records management activities at the CSIR using AI.

Literature Review

This section presents literature review for the study. The literature review is based on records management activities and AI usage to perform records management activities. Records creation is an activity of records management. Smith (2016) states that records are created every time when someone in an organisation writes an email or a report, drafts a brief, adds information to a spreadsheet, makes a film, a sound recording or transcripts, or takes a photograph. Records are created as part of corporate procedure and they must be properly administered to ensure that they can be examined, distributed, recycled and repurposed, and add value to the institution (Shepherd and Yeo, 2003; Ngoepe and Marutha, 2021). Records are created in both paper-based and electronic formats. According to Franks (2018), paper-based records can be created as soon as the first relevant documents are produced to ensure that all related documents are stored together without the risk of loss. Although the term "electronic records" is mainly understood to refer to information deposited in electronic systems, these records can include information in both analogue and digital formats (Asogwa, 2012). Electronic records normally include records created in an electronic format (born-digital records), but they can also be images of records in other setups (reborn-digital or born-analogue records) (Franks, 2018).

Records storage is another activity of records management. Records can be stored manually and electronically. Manual records include client records, staff files, business documents and classified information, and are usually kept in secure physical storage facilities. Such records storage facilities ensure that important information is safe and protected against data hacks and hard drive malfunctioning (Ngoepe and Marutha, 2019). Records should be stored to secure them against vandalism and loss. Paper records should be stored in a way that allows easy access to authorised staff

members yet offers enough security to prevent unauthorised access to information (Patel and Chotai, 2011). For example, protected filing shelves may be used (Cunningham and Montana, 2006). Electronic records require software such as EDRMS (Electronic Document and Records Management System) for their safekeeping and easy retrieval (Duranti, Eastwood and MacNei, 2002). EDRMS is a cohesive system created for the management of institutions' electronic records throughout the record life cycle, from creation to disposal (Patel and Chotai, 2011). The latest technology that is used for storing electronic records is cloud storage. Askhoj, Sugimoto and Nagamori (2011) define cloud storage as secure and easily accessible storage. It is proving to be an extraordinary platform for the safe storage of most organisational data (Franks, 2018).

Classification is the records management activity. Classification is the process of assigning records to one or more classes or categories based on certain criteria. This ensures that records can easily be retrieved and accessed (Duffus, 2016). In the records management sector, classification means that records are categorised based on the information they contain, and files are stored in an organised manner that allows quick retrieval and easy access as it narrows down the places where records may be found in an organisation (Duffus, 2016). Classification also includes giving records unique locator or reference numbers according to the specific rules of classification (Mokhtar and Yusof, 2017). The classification of records often takes into account the current structure and activities of the organisation and its branches. For example, an organisation's files may be arranged to reflect the work they record, which makes it easy to decide where records should be stored and also to locate them (Foscarini, 2009).

Records retrieval is a records management activity which has the ability to search for records by keywords and other features, such as dates and authors. It implies that the record has been indexed on all suitable fields, and that keywords have been selected based on its title and textual content (McLeod and Hare, 2005). Read and Ginn (2015) state that records retrieval is all about accessing the right records and making them available to the right people at the right time (McLeod and Hare, 2005). Franks (2018) defines records retrieval as finding or locating an available record in the organisation upon

the request of a user. For records to be retrieved, standards and procedures must be put in place that assist records management practitioners or researchers in locating those records (McLeod and Hare, 2005).

Preservation is the general protection of records against conservational risks or other physical damages (Duranti and Rogers, 2019). It includes a variety of activities that are aimed at maintaining materials in a usable state, whether in their original physical format or in any other usable format. Furthermore, it ensures that archivists and records management practitioners will be able to consult and use records in the future as those records will still be accessible and in a good condition (Kootshabe and Mnjama, 2014).

Preservation plays a role in the handling and storage of records. Iyishu and Nkanu (2013) state that preservation includes identifying impaired resources and treating or copying them to retain their value and ensure continued access to the information they contain. Records are preserved and archives are managed to prevent sources of information from disappearing. Papers and media materials are preserved (e.g., by protecting them against staining) to prevent a loss of information (Rhys-Lewis and Forde, 2013). According to Garaba (2015a), records disposal as a records management activity refers to the final stage of record management in which records are either destroyed or enduringly stored in an archival repository. Records disposal starts with a decision about the fate of records, namely whether they will be destroyed or archived (Harris and Schur, 2006). Institutions only hold records for as long as they are required; when the records are no longer required, they are disposed of in a suitable way, for example by transferring them to an archival repository (Rhys- Lewis and Forde, 2013).

However, records imaging is one of the records management activities that can be discharged via AI. Robotics companies like Ripcord have combined robotic scanners and AI-powered software to create robotic machines that can perform all records management activities, including classification and digitisation (Nichols, 2019). The activities that are performed by such robotic machines include removing staples and scanning records, mechanically converting scanned records into searchable text and uploading them to a cloud server (Ripcord Company, 2019; Demaitre, 2020). The robotic machine can scan all forms of records, from business cards to large architectural drawings. Ripcord has the capability to automate 80 percent of the records conversion process, which includes paper treatment, quickly removing staples and digital imaging (McKinsey Global Institute, 2017). The robotic machines collect loads of paper, pull out any staples and place one sheet at a time on a conveyor belt for rapid scanning of up to one sheet in a second (Jackson, 2011; Ripcord Company, 2019).

AI has the capacity to package and ship records (Demaitre, 2020). Upon receipt, the records are logged, allocated a unique barcode and tracked as they move through the digitisation process (McKinsey Global Institute, 2017; Ripcord Company, 2019). AI uses machine-learning algorithms to perform functions that would take many staff members many hours to complete. These tasks include records classification, removing staples from documents and scanning one piece of paper at a time. Robotic machines can complete such tasks fast, effectively and efficiently (Weckerk and McDonald, 2007; Ripcord Company, 2019). Robotic machines organise and prepare records for automated digitisation. They then digitise each record in full colour and create a fully accessible, high-resolution PDF file for each record (Demaitre, 2020). The next step is the classification of records, which is driven by enhanced machine learning. Records are then stored and made accessible to clients. Clients of the Ripcord Company, for example, can access their records on any device via Canopy, a sophisticated cloud-based record management platform (Ripcord Company, 2019; Petropoulos, Marcus, Moes and Bergamini, 2019). The CSIR could introduce AI in the way described above to store its records safely and cost-effectively, while ensuring that these records remain accessible and can easily be retrieved. AI-powered document management systems (DMSs) have incredible potential to streamline content and paper development workflow. Although no software application leaders have emerged during this study, software applications like Grammarly illustrate how AI can be used to pre-edit papers without human involvement (Bailey, 2019). This is one instance where the capability of an AI-powered DMS to read, understand and bring

shape to unshaped remarks could streamline a process (Parmenter, 2019).

Ripcord's Canopy allows records management practitioners to search and trace their records swiftly using keywords, Boolean searches and filtered searches (Ripcord Company, 2019). This means that the needle in the haystack is just a few keystrokes away – an organisation no longer needs a team of people to search through mountains of files to get the information it needs (Bowser, Sloan, Michelucci and Panwels, 2017; Ripcord Company, 2019). Records management practitioners can use computer programs to retrieve records from anywhere in the world. Records can then be downloaded, sent via email, printed and used by researchers (McKinsey Global Institute, 2017). Unlike ordinary electronic records management systems, Canopy is an embedded facility that is linked to robotic machines like the Ripcord robotic machine and allows for records to be searched using computer technology. Canopy has been designed in such a way that it cannot work on its own – it must be linked to a robotic machine (Ripcord Company, 2019).

Security is another activity of discharging records management activities with AI. The more files are stored in offices, file rooms and third-party storage facilities, the more difficult it becomes to adhere to security and compliance legislation (Reddy, Fox and Purohit, 2019; Iron Mountain, 2019a). Robotic machines such as those used by Ripcord also work with existing identity providers (IDPs) like Microsoft Active Directory, which has been developed for the Windows domain and integrates with most Microsoft Office and Server products. Robotic machines such as Ripcord Canopy's analytics and reporting dashboard allow records management practitioners to quickly recognise records prepared for disposal (Jackson, 2011; Ripcord Company, 2019). Parmenter (2019) states that security has become more problematic than ever, especially when it comes to sensitive documents in financial or healthcare services. An AI-powered DMS can offer excellent file protection at scale. AI can learn to recognise confidential and private identifiable information (PII) in files and then flag those files for different treatment (Bailey, 2019). Automated classification and processing can guarantee that no records are left at unsafe sites before they are actioned. Irregularity discovery can also be arranged to detect and flag possible fraudulent files (Parmenter, 2019; Lepak, 2019).

Document clustering is a unique form of data clustering. Data clustering is defined as the grouping of documents into subsets of similar texts called clusters (Tarczynski, 2011). Clustering algorithms are used in web search engines to arrange webpages into categories that users can then browse. Parmenter (2019) explains that the results of web searches have been based on the concept of using software to perform cluster analysis on a body of documents for quite some time. However, the application of AI to perform this function comes with a far higher level of complexity and precision. An AI-powered DMS can accurately cluster the files in a business's vast library according to different topics or hierarchies. This is especially helpful when themes and levels are not known. AI can also identify relationships between records in a broader context, make inferences, formulate hypotheses and identify similarities between files (Bailey, 2019).

Research Methodology

The research methodology used in this study was mixed-method research (MMR) with convergent design and parallel sampling methods. The study used ontological pluralism and pragmatism as epistemological perspectives. The convergent design was selected so that the researchers could simultaneously collect qualitative and quantitative data from participants, analyse the data independently and combine the responses during data interpretation. The study further used parallel sampling as sampling technique to collect both qualitative and quantitative data from the same population, but using different samples (Creswell and Creswell, 2018; Creswell and Plano-Clark, 2018). Records management practitioners and record managers were the population of this study. They provided information about their knowledge, expertise and expectations regarding the use of AI for records management. The population of this study consisted of eight (8) respondents, all of whom were employed by the CSIR. The respondents were one (1) portfolio manager, one (1) records manager, three (3) indexers, two (2) archives technicians and one (1) data

librarian.The portfolio manager and records manager contributed qualitative data to the study. Three (3) indexers, two (2) archives technicians and one (1) data librarian contributed quantitative data to the study. Data were collected in April 2021.

Findings of the Study
The CSIR's Current Records Management Activities

The study investigated the current state of records management at the CSIR to establish whether its records management activities could be performed using AI. The respondents were asked to state whether they agreed, were unsure or disagreed with statements about the current records management activities at the CSIR. Table 1 presents the findings. Two respondents (33%) agreed that the CSIR had

effective storage capacity, two (33%) were unsure and two disagreed. Four respondents (67%) agreed that the CSIR had effective retrieval capacity, one (17%) was unsure and one (17%) disagreed. Furthermore, five respondents (83%) agreed that the CSIR had effective records classification, one (17%) was unsure and none disagreed. Five respondents (83%) agreed that the CSIR had effective records access control and measurement, two (33%) were unsure and none disagreed. Three respondents (60%) agreed that the CSIR had reliable records movement tracking system, one (17%) was unsure and three (50%) disagreed. Four respondents (67%) agreed that the CSIR had records safety and security measures, three (50%) were unsure and one (17%) disagreed. Three respondents (50%) agreed that the CSIR had an effective disposal system, three (50%) were unsure and none disagreed.

Table 1: Rates of records management activities at CSIR (N=6)

RECORDS MANAGEMENT ACTIVITIES		AGREE	UNSURE	DISAGREE
CSIR have effective storage capacity	No	2	2	2
	%	33	33	33
CSIR have effective retrieval capacity	No	4	1	1
	%	67	17	17
CSIR have reliable records backup system	No	5	1	0
	%	83	17	0
CSIR have effective records classification system	No	5	1	0
	%	83	17	0
CSIR have effective records access control measures	No	5	2	0
	%	83	33	0
CISR have reliable records movement tracking system	No	3	1	3
	%	60	17	50
CSIR have records safety and security measures	No	4	3	1
	%	67	50	17
CSIR have effective disposal system	No	3	3	0
	%	50	50	0

NOTE: **No. = number**   % = **percentage**

Records Management Activities that may be Performed Using AI

The study established that AI can be used to perform some or all of the CSIR's records management activities. Respondents were asked about records management activities that could be performed using AI at the CSIR. Figure 1 presents the findings. As illustrated in the figure 1, three respondents (50%) indicated that AI could be used for records creation, six (100%) indicated that AI could be used for records retrieval and four (67%) indicated AI could be used for records classification. Four respondents (67%) indicated that AI could be used for records storage and four (67%) indicated that AI could be used for records maintenance. Five respondents (83%) indicated that AI could be used for records movement tracking and safety, while four (67%) indicated AI could be used for records disposal.
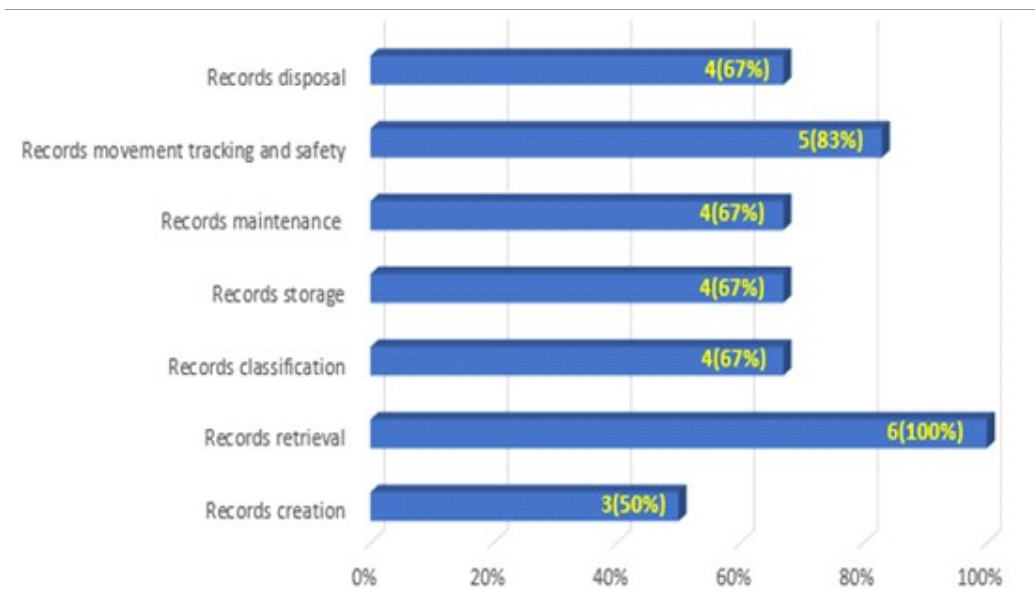

Figure 1: Records management activities performed using AI (N=6)

The questionnaire completed by respondents included an open-ended question about the records management activities that could be performed using AI at the CSIR. Respondents indicated that AI could be used for records creation, retrieval, maintenance, classification, storage, disposal, tracking and safety. The responses were as follows:

Respondent 1: "AI can be used for records creation."

Respondent 2:"AI can also be used for records retrieval."

Respondent 3:"AI can also be used to maintain records."

Respondent 4:"AI can also be used for records classification."

Respondent 5:"AI can be used for records storage."

Respondent 6: "AI can be used for records tracking and safety."

The interviewed participants were also asked about records management activities at CSIR that could be performed using AI. Participants indicated that the records management activities that could be performed using AI includes records creation, records maintenance, records retrieval and records disposal. They further stated that AI could be used to classify and digitise records, and to track the movement of records at the CSIR. The responses were as follows:

Participant 1:   "Records management activities such as records creation, records maintenance, records retrieval and disposal of records can be performed using AI at the CSIR."

Participant 2:   "AI can be used to classify, digitise and track the movement of records at the CSIR."

Discussion of the Results

This section discusses the findings of the study based on the objectives.

The CSIR's Current Records Management Activities

Records management activities include the creation, use, classification, storage, maintenance and disposal of records (Ambira, 2016). Organisations such as the CSIR require a reliable records management system to ensure that they perform their records management activities effectively. The majority of respondents (83%) agreed that the CSIR had an effective records classification system and effective records access control and measurement. The CSIR classifies records according to the CSIR file plan and prescribed archival procedures. Records are accessed both manually and electronically.

Four respondents (67%) agreed that the CSIR had effective record retrieval capacity and safety and security measures. It is easy for records management practitioners to retrieve records at the CSIR. Records are securely stored in the archives and a cloud storage facility. Three (50%) respondents agreed that CSIR had a reliable records movement tracking system and an effective disposal system. Users are required to complete a register with all the details of a record before they use it.

The CSIR uses a file plan and archival procedures to ensure that records are properly disposed of. Two respondents (33%) agreed that CSIR had effective storage capacity. Paper records are stored physically in the archives. Electronic records are stored in the electronic system and the cloud. One respondent (17%) disagreed that CSIR had effective retrieval capacity or had a reliable records movement tracking system. The CSIR uses different systems and users cannot identify which storage capacity works better. Without reliable storage capacity, it would not be easy to track the movement of files at the CSIR. Respondents further indicated that the storage space was too small. Although electronic records are effectively stored,

paper records are often misplaced. Some records seem to be missing as they have not been captured, but there is an effective electronic records management backup system. Most records are not captured in the system, but it is easy to retrieve records that have been captured on electronic records management system.

The CSIR uses an alpha-numeric classification system, which is an in-house classification system. It also uses a file plan classification system that has been approved by the National Archives of South Africa. Respondents indicated that only authorised staff had access to the archives. Security codes and passwords are required to access electronic records. Micro Focus Vibe tracks the movement of electronic records. The registry is equipped with climate control and a security system. Electronic records are secured by firewall applications. The disposal of records is guided by the CSIR file plan. Participants indicated that the records management system at the CSIR provided for the effective storage, retrieval, use, maintenance, and disposal of records at the CSIR, as well as for the effective creation, classification, and digitisation of records.

Records Management Activities that can be Performed Using AI

Ripcord's robotic machines can be used for automated classification and digitisation. They can even remove staples from documents that are to be digitised. They upload records to the cloud and facilitate quick and reliable access to records (Ripcord Company, 2019). This shows that AI has the capacity and ability to perform different records management activities. Although mostrecords management activities can be performed using AI, the CSIR must decide which records management activities it wants to entrust to AI. The quality of records management activities determines whether effective and efficient records management services can be rendered to users. All the respondents (100%) indicated that AI could be used for records retrieval. AI-empowered software and platforms such as Ripcord's Canopy track the movement of records and keep records safe by using encrypted passwords and security codes (Demaitre, 2020). The majority of respondents (83%) indicated that AI could be used for records movement tracking and safety. Four

respondents (67%) indicated that AI could be used for records classification, records storage, records maintenance and records disposal. Three respondents (50%) indicated that AI could be used for records creation. The respondents further specified that AI could be used for the following: records creation, records retrieval, records maintenance, records classification, records storage, and records tracking and safety. Participants also indicated that records management activities at the CSIR, such as records creation, records maintenance, records retrieval and the disposal of records, could be managed using AI. AI can be used to classify, digitise and track movement of records at CSIR. AI and robotic machines provide for the reliable storage of records in an embedded cloud storage facility and ensure that records can be retrieved anywhere as long as there is access to internet (Liu, 2011). AI can therefore be used for records retrieval.

AI and robotic machines make provision for the retrieval of records from a cloud storage facility or a server via devices such as laptop or desktop computers, cell phones and tablets. AI can also be used to classify records as it uses automated classification algorithms embedded in robotic machines. AI can be used for records maintenance. Machine learning algorithms enable robotic machines to detect records that need maintenance and to alert records management practitioners to maintenance requirements. AI-empowered programs and platforms embedded in computer technology have the ability to create electronic records and convert them into digital records using tools such as Ripcord's Canopy (Demaitre, 2020). AI can therefore be used to create records. Born digital records are created and transferred to digital archives using robotic machines. AI can also be used for records storage. Cloud storage facilities and servers provide big data technology that can be used to store records. AI can also be used for records disposal. Through machine learning embedded in robotic machines, records that are due for disposal can be flagged using machine learning algorithms.

Records with enduring value can then be transferred to digital archives for permanent storage.

Conclusion

In conclusion, AI can be used to manage the CSIR's records efficiently. AI and robotic machines can be used to perform the records management functions, including records creation, records maintenance, the digitisation of records, records retrieval, records storage and the disposal of records. The CSIR has reliable records movement tracking, records retrieval and disposal, and records classification systems. However, the management of the CSIR has concluded that although some records management activities are effective, most of them are not. Records management practitioners at the CSIR have indicated records are effectively disposed of, but management is of the view that the records disposal system is unreliable. AI and robotic machines can be used to improve the efficiency and effectivity of records management activities are at the CSIR.

Recommendations

This study recommends a framework for records management activities using AI and robotic machines. It is hoped that this framework will help the CSIR to perform it records management activities more successfully and timeously. Robotic machines can be used to digitise and classify records automatically, store them in the cloud and dispose of them at the right time.

Proposed Framework

This section presents the framework for records management activities using AI at the CSIR, as shown in Figure2 which llustrates the flow of records management using the AI and robotics model, the records life cycle model and the continuum model. These models are all known for their ability to deal with the application of AI and robotics machines, and the life cycle of manual and electronic records.
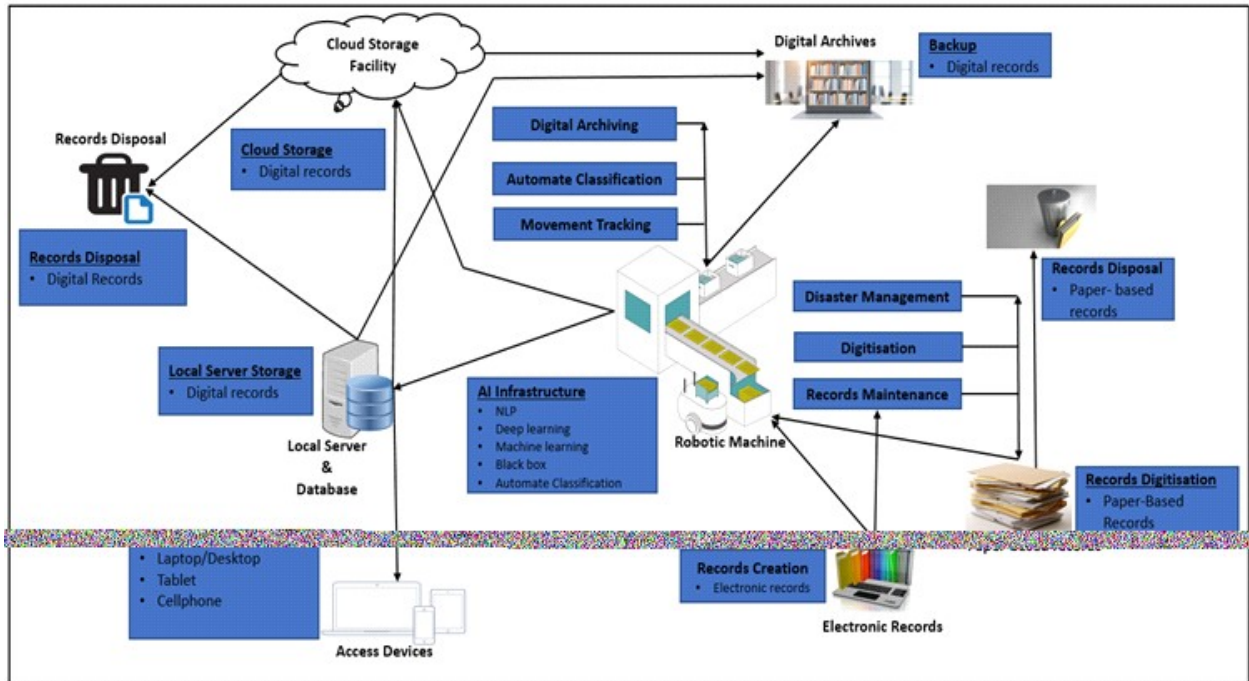
Figure 2: Framework for records management activities using AI

This proposed framework begins with the creation of records in an electronic format. The creation of electronic records is followed by the digitisation of paper-based records. However, before the digitisation process starts, records are checked for damage. Damaged paper-based records are fixed and those that cannot be fixed are disposed of immediately. Paper-based records that have reached their disposal period are also disposed of before the digitisation process starts. Following this, all the available paper-based records are digitised using an automated classification algorithms embedded in the robotic machine, and then converted to digital records. The robotic machine uses an automated classification algorithms to ensure that records are classified by subject. The creation of paper-based records is then discontinued, and records are only created in an electronic format. After the digitisation processes have been completed, all paper-based records are shredded. The CSIR henceforth only creates and maintains electronic records. Electronic records include both digitised and born-digital records (i.e., records that have been created electronically). Such records are then checked to ensure that they are error free before they are transferred through the embedded

robotic machines to a storage facility (a server or the cloud). Once all CSIR records have been converted to digital records using robotic machines, they are automatically classified according to specified criteria using the automated rules algorithms embedded in robotic machines. This will ensure that records with similar subjects are grouped together.

The robotic machines then use machine learning algorithms to track the movement of records. This will ensure that all records captured move from digitisation and transfer to the records retrieval stage. After records have been digitised or transferred and classified using automated classification algorithms, they will be stored in the cloud and on a local server. The CSIR will ensure that the digital records are protected and securely stored, whether in the cloud or on the local server. Records can be protected by using encrypted passwords and security codes to ensure that only authorised people have access to them. Robotic machines use deep learning algorithms and machine learning algorithms to detect when the lifespan of digital records will expire. Expired records are automatically deleted from the cloud and/or local servers. The disposal process is continued based on machine learning and neural network algorithms. Robotic machines do not need to be reprogrammed

to perform records management activities that have already been performed. They use the neural network algorithms to process new information on their own. Digital records with enduring value are transferred automatically from the cloud and the server to the digital archives for archiving purposes. The digital archives will be used as a backup for digital records produced and managed by the CSIR. It will only be possible to access and retrieve the CSIR's digital records using an NLP algorithms embedded in the robotic machines. Users will be able to retrieve digital records that are stored in the cloud, a local server, and the digital archives, depending on where the records are located when they are needed. Records management practitioners will use devices such as laptop or desktop computers, tablets, or cell phones to retrieve digital records. They can either search for a digital record using a subject, a Boolean search or any other strategy that will help them to retrieve the required record from a database in the cloud, on a server or in the digital archives. All records with similar subjects are then displayed on the screen of the user's device. A records management practitioner can then browse through the search results, choose the record needed and open it. The digital record can then be printed, emailed, or saved on the device.

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