

RTM'S HD NEWS DIGITAL ARCHIVE: REVOLUTIONARY BROADCAST TECHNOLOGY TOWARDS EFFECTIVENESS - FUTURE DEMAND PART 2

ABSTRACT

This article looks into the continuation of Part 1 in which Ts. Ahmad Shafiq Mirza Bin Mansor narrated the proposed new 'HD News Digital Archive System' for the whole of Malaysia's coverage. In collaboration with Mardhiah Nasir, IPSB Technology & Sam Bogoch, axle ai, we dive deep into the development of the News Digital Archive or *Arkib Digital Berita* - ADiB system to manage media coverage, either in raw or edited versions allowing media material to be published further, on either TV, radio or social media platforms. Our aim is to address the requirements, areas of improvement and showcase the outcomes through the success of this project implementation.

INTRODUCTION

Established in June 2012, the RTM News Centre, along with the Digital Archive and the News Portal, was built in order to streamline the news and current affairs for the entire country [see <https://www.abu.org.my/2012/06/06/rtms-news-centre-opened-news-portal-and-digital-archives-launched/>].

As the national broadcaster of

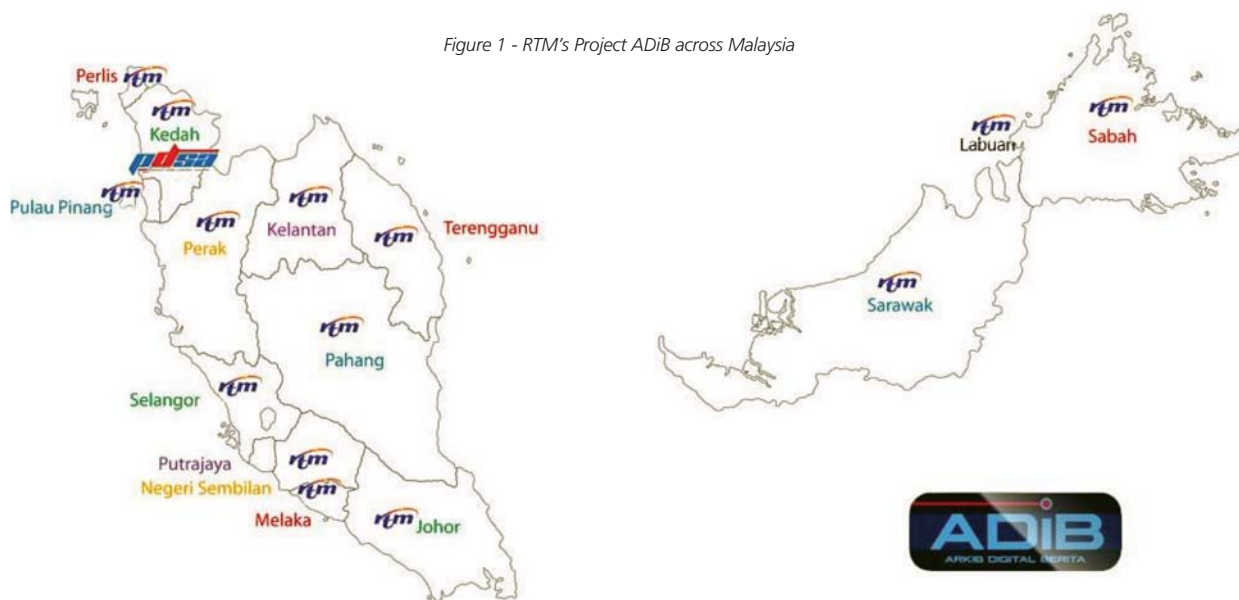
Malaysia, RTM relies on news content created daily by teams stationed in all fourteen states of Malaysia, but the current workflow creates a problem when RTM needs to reproduce content for other purposes, such as documentaries, analysis, or recaps.

The issue of limited available media footage is addressed by enhancing its Standard Operating Procedures

(SOP) and establishing a new system that allows for the effective storage and retrieval of raw footage. This will ensure that all media footage is easily traceable, reducing media double-handling and improving coverage quality.

Therefore, IPSB Technology with partners, axle ai and Arista, provided a solution using AI/ML to establish an SOP that would provide a

Figure 1 - RTM's Project ADiB across Malaysia



framework for efficient and effective media management, resulting in improved productivity and quality of news content.

1.0 PROPOSED SOLUTION

1.1 ARCHIVING, RETRIEVAL OF MEDIA AND MEDIA SHARING

Implementation of a powerful multi-site MAM platform with search engine and artificial intelligence capabilities. The simplicity of use and low-resolution proxy playback includes multiple features and user controls for commenting and approvals. Synchronising a holistic system accessible across all 14 states, allowing producers to access real-time content from credible sources.

1.2 MEDIA WORKFLOW INEFFICIENCY

Implementation of new workflows that eliminate the possibility of viruses, file corruption, and missing items during file exchange, and by establishing a system that allows for the storage and retrieval of raw footage to ensure that all media footage is easily traceable, reducing storage utilisation and unnecessary file duplication.

1.3 MEDIA SHARING & ARCHIVING REQUIREMENTS

Address data centre readiness, internal network stability and dependability, internet bandwidth, and change management while conducting an end-to-end workflow review to gain a deep understanding of past, current, and future media management requirements for news. This would ensure the infrastructure was ready to support rollout of a multi-site management platform.

1.4 SECONDARY BACKUP INFRASTRUCTURE

Providing access to secondary backup infrastructure in case of corruption or accidental removal or deletion. RTM would be able to improve its media management processes and ensure consistent long-term planning in line with the product life-cycle investment.

RTM Infrastructure Requirement Study

Workflow	Throughput	IOPS	Capacity	Stream Bandwidth
Digitisation	X	X	✓	X
Data Archiving	X	X	✓	✓
Post Production	✓	✓	✓	X
Graphical Editing	✓	✓	X	X
Video Rendering	✓	✓	✓	✓

Figure 2 - Results of RTM Infrastructure Requirement Study

2.0 IMPLEMENTATION OF ADIB VIA AN INTEGRATED SCALE-OUT INFRASTRUCTURE SOLUTION WITH IPSB'S ENTERPRISE MEDIA STORAGE AND ARCHIVING SYSTEM

Before applying the solutions to Project ADiB, IPSB Technology conducted a study to determine the appropriate update needed by RTM that would address the earlier-mentioned challenges.

The four infrastructure elements that were focused on include throughput (data transfer rate to and from storage media), Input/Output Per Second (IOPS), (measurement of performance of on-premise storage such as hard disks and storage area networks), capacity and stream bandwidth on five main workflows used by Project ADiB. It was apparent that areas which required an update were:

1. Digitisation (areas requiring solutions: throughput, IOPS, and stream bandwidth)
2. Data archiving (areas requiring solutions: throughput and IOPS)

3. Post-production (areas requiring solutions: stream bandwidth)
4. Graphical editing (areas requiring solutions: Capacity and stream bandwidth)

The best infrastructure approach was evaluated with consideration of RTM's geolocation and infrastructure capabilities and policies. RTM decided to move into a hybrid cloud infrastructure and thereby comply with government regulations and broadcasting standards.

Concerning storage, RTM opted for a combination of:

1. Conventional on-premise storage solutions that allow for complete local control
2. Communal data centres that can either be on-premise or co-location
3. Data centres that are pushed to the hybrid cloud allow specific storage spaces as required by broadcasters that enable content management instead of infrastructure management.

The hardware and network infrastructure must be designed

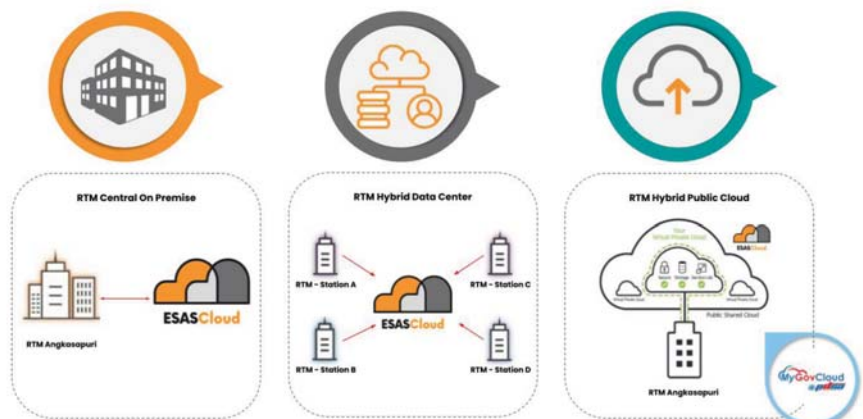


Figure 3 - Storage model options proposed by IPSB Technology

with active redundancy supported by Arista, especially during maintenance and systems backup. Additionally, the team was required to consider the security levels when incorporating a Multi-Layer Workflow execution. Apart from that, there must be an alternative workflow to ensure that the business continuity plan works without interruption to normal operations.

Below are the areas of improvement highlighted by RTM and how it was individually managed.

2.1 STANDARDISATION OF ARCHIVE MEDIA MATERIAL

In media storage management, there are two types of media format: high-resolution video and low-resolution video. The development of this system includes low-resolution storage in cloud media archiving, while high-resolution storage will remain on-premise.

Therefore, upon conclusion of the media house format for News Archive as stated in Part 1, IPSB

transcoded all media material using ADiB transcoder. The primary purpose of storing the low-resolution video in the cloud media archive is for speedier preview with nation-wide access, as this approach would not consume existing media mover bandwidth.

Hybrid cloud media archiving was also considered as an alternative workflow for any connectivity problems on the premises. Although the archived media storage in the cloud that can be used to recover on-premise storage will be in a low-resolution format, it is still acceptable quality for broadcast news content if required.

2.2 REDESIGN OF MEDIA WORKFLOW

RTM had previously been procuring more data storage or compressing the media formats, which caused data loss, making the original unsuitable for reproduction. To overcome this problem, the new system will focus more on media movement and filtering. At the same time, the media story will be

prioritised based on its creation date and time retrieval. During the media movement, the team will decide to re-prioritise the media, based on national interest, to be kept safe in RTM's archive storage.

On a daily basis, all 14 states will push the proxy to RTM private cloud, making it easy for users to browse archived material. Users are able to share material within 14 states using axle as a primary component and ADiB as a total solution.

The solution enables two types of search, Global and Local, both accessing the same media proxy for preview. The purpose of the design was based on the level of authorization, either to preview and download high-resolution or simple access to low-resolution footage. Global Search can preview the maximum amount of footage using the system's centralised Media Asset Management (MAM), while Local Search was designed for Production Asset Management (PAM).

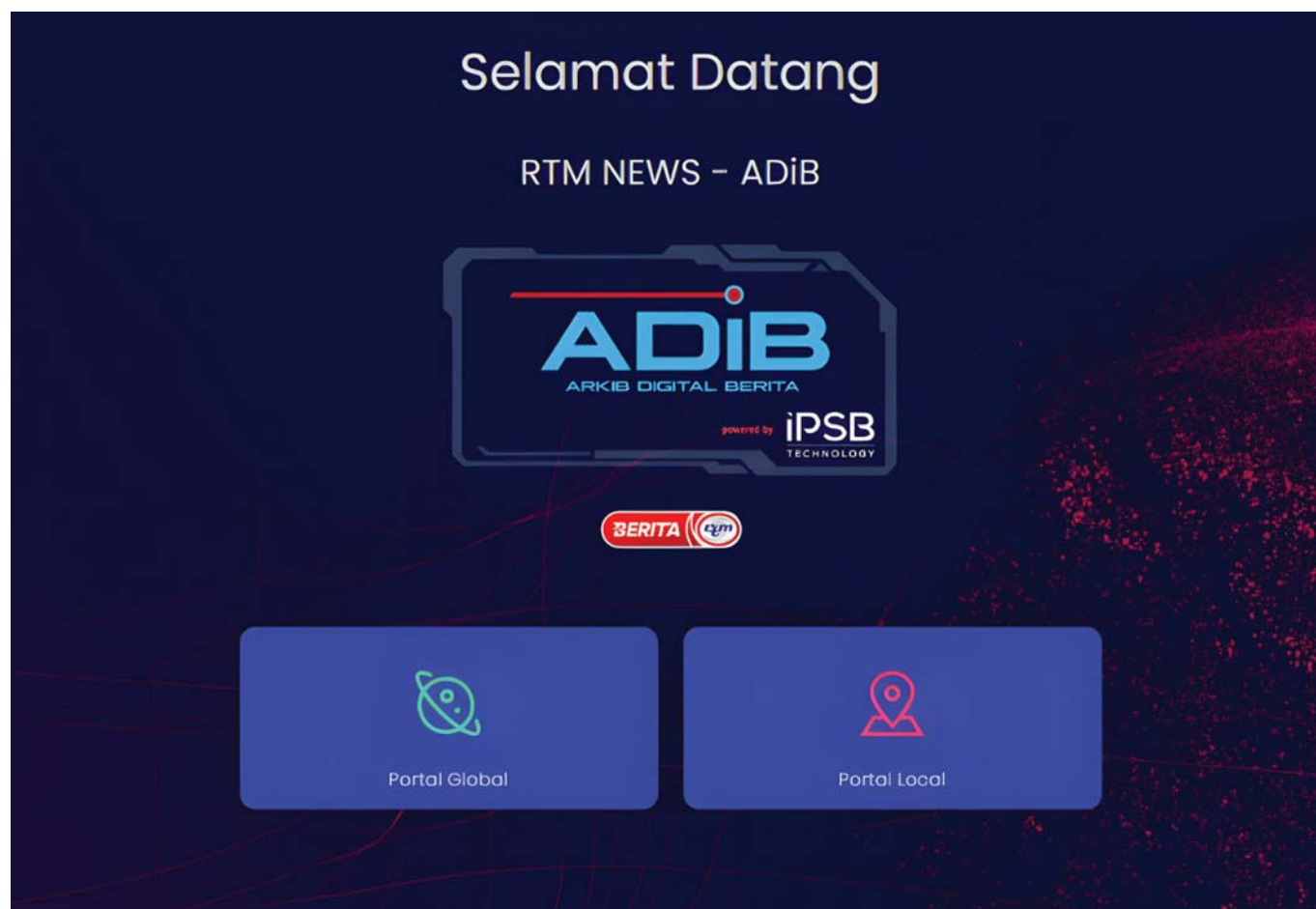


Figure 4: User Interface for ADiB shows both Global and Local Access for login



Figure 5: UI for Local Access based on the states

2.21 UTILISATION OF ADVANCED WORKFLOW AUTOMATION

A no-code media automation and customisable media workflow tool that works with any operating platform (Mac, PC, and Linux), Axle Connectr provided the best solution for media asset management for wide-area inter-connectivity, media exchange and federated search, saving time for RTM to focus on what it does best. IPSB Technology's Data Media Orchestrator with Axle Connectr focuses on four main areas:

1. Using a designer tool to **design automated workflows and process customization** hence, automate technical processes and alert the users when they need to take action
2. **Identify and respond to potential issues with real-time monitoring enabling** complete visibility into all media workflows and activity and fix issues by drilling down to the specific assets, systems, workflows, and even the data involved

3. **Orchestrate workflows in order to operate more efficiently** by orchestrating the key elements, technical processes, and manual tasks of live or post media production, publishing, and distribution workflows
4. **Integration with existing systems** which form part of the media supply-chain to transform existing applications and systems into a unified platform, allowing for shared data between systems, triggering timely actions, and reporting when completed

Connectr's advantages:

1. Rules-based processes triggered by events in axle (metadata changes) and other applications within RTM's system
2. The extendable Axle Connectr framework allows visual automation for various video toolsets
3. No re-configuration or re-ingestion required for existing storage lowering the deployment impact and shortening time to go-live

To ensure the system's effectiveness, media migration was part of the implementation from Digibeta to XDCAM to LTO to hard drive-based NAS storage. As existing media must be in a 'ready-to-use' state once the system is in place, the execution of media migration will be in the form of 'current-to-future' and 'current-to-past'. Using this method, the system will be able to retrieve any related media story from the past, according to current needs.

2.3 UTILISATION OF ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML) TECHNOLOGY

Axle ai media asset management was installed on premises at the headquarters of RTM in Angkasapuri, along with all 13 branches spread throughout Malaysia. While AI refers to the general ability of computers to emulate human processes, Machine Learning, a subset of AI, refers to the technologies and algorithms that enable systems to identify patterns, make decisions, and improve

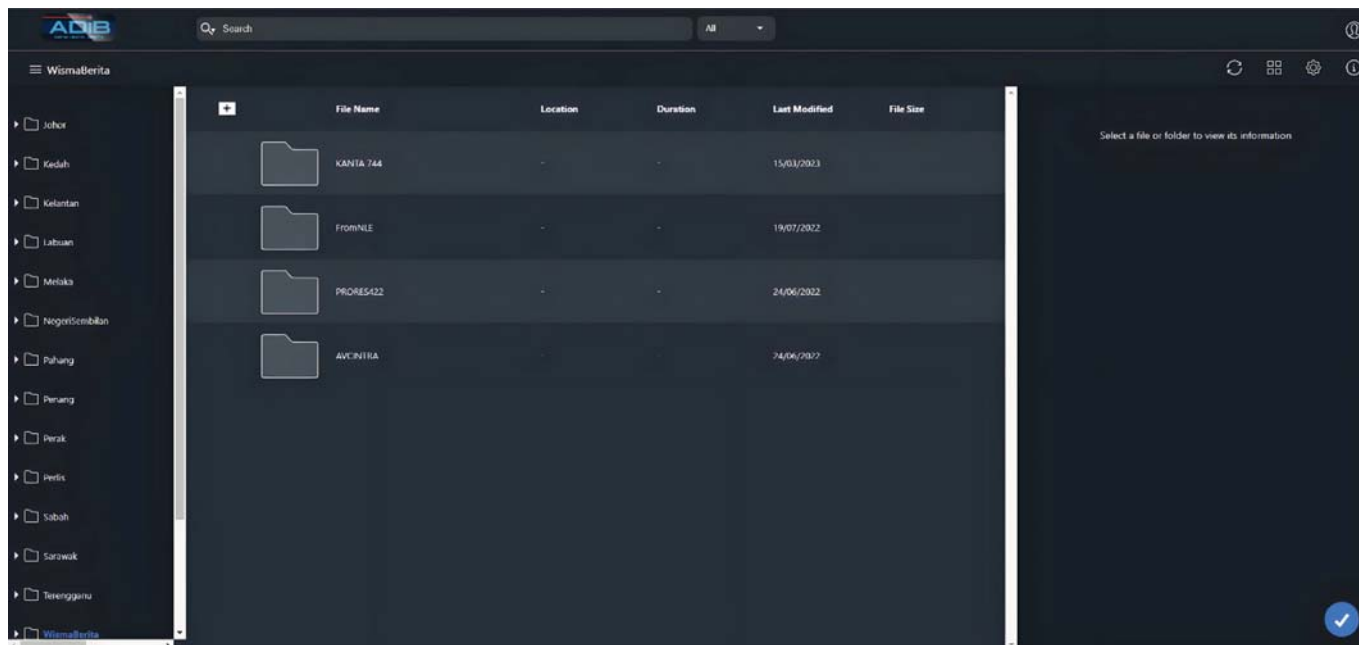


Figure 6: UI for Global Access

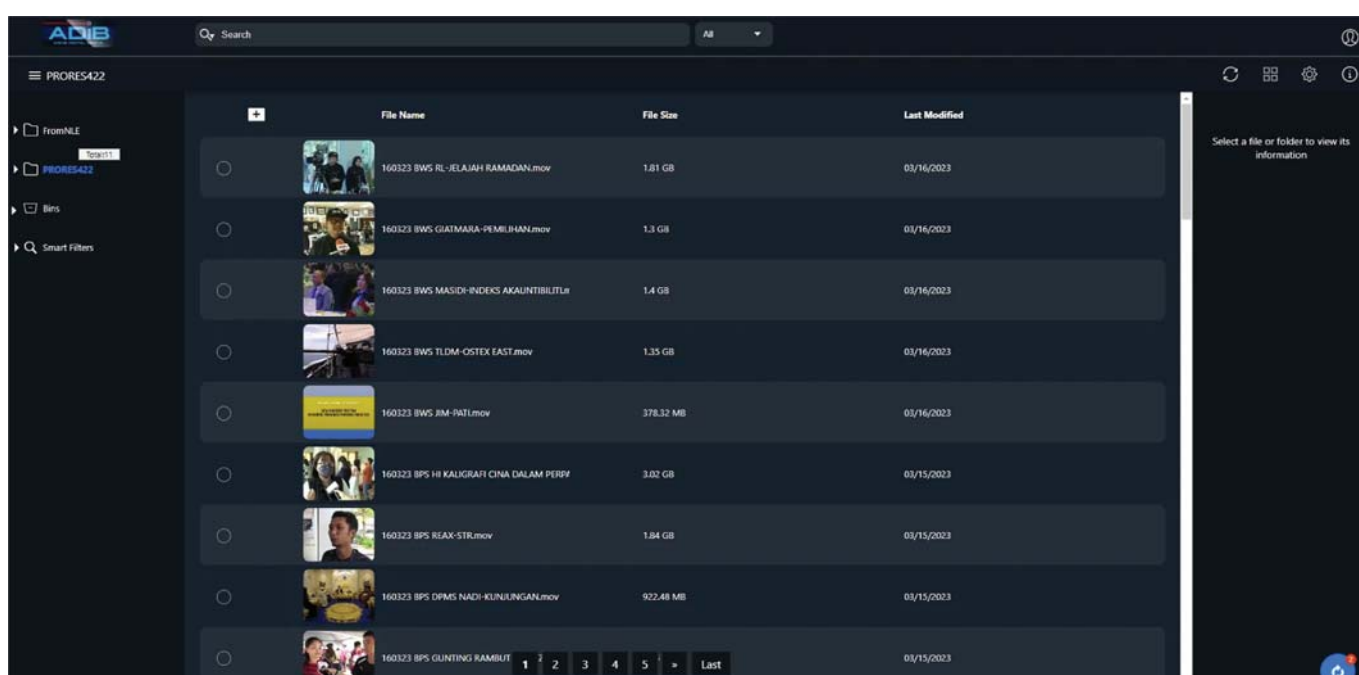


Figure 7: UI for Local Access

themselves through experience and data (see <https://ai.engineering.columbia.edu/ai-vs-machine-learning/>). Media management is more effective when information is extracted. The information shall be in the form of

- Audio to Text Transcription;
- Face Recognition; and
- Object (Tag) Recognition.

The installation enables all news stations to synchronise all relevant metadata, allowing easy access and download ability for editing and broadcasting.

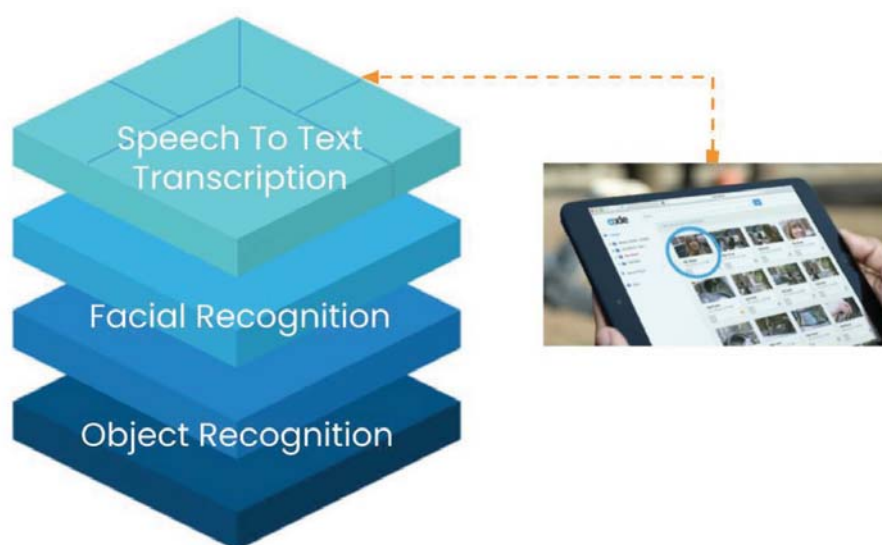


Figure 8 - ascribe.ai: how it works

As part of Axle.ai's offering, ascribe.ai is a leap forward for fast, accessible transcription. ascribe brings affordable transcription using Axle.ai's Speech cloud backend [see <https://ascribe.ai/>] which works by:

1. Providing AI-driven transcription and auto-tagging supporting both on-premise networks and cloud storage
2. Simple and user-friendly front-end media asset management tool allowing for file system cataloguing with multi-core transcoding of low-resolution media

Ascribe.ai auto-generates metadata for speech, facial, and object recognition. Supported for both on-premise and cloud networks, the AI automated tool is used to build the metadata required by and for RTM.

The form mentioned above is known

as a 'video analyser' and can assist media mover to be searchable at the required time. A more accurate process will provide additional metadata, such as face recognition or transcription audio.

Axle's AI/ML capabilities allows for:

Improved search capabilities: The ability to automatically tag media assets allows users to find and catalogue assets that are more relevant to RTM, such as 'sultan' 'perdana menteri' 'agong' etc which are important to the role of national news broadcaster. This reduces the error and time to find files that have been mislabelled.

Better decision-making: RTM can analyse the usage of media assets using AI and ML, and the data gathered can help make better decisions about content creation,

usage, and distribution. Instead of precisely following human-coded instructions, these algorithms self-adjust through trial and error to produce increasingly accurate prescriptions as more subject data is received.

Enhanced and more secure workflows: AI and ML can streamline RTM workflows and make them more efficient by automating repetitive tasks and providing more accurate tagging and categorisation. Media assets can be better protected, and access can be more precisely controlled.

2.4 CLOUD MEDIA ARCHIVING

The archiving solution was divided into three stages as previously mentioned in part 1. Based on the media moment workflow elaborated previously, the three stages are depicted as per diagram below:

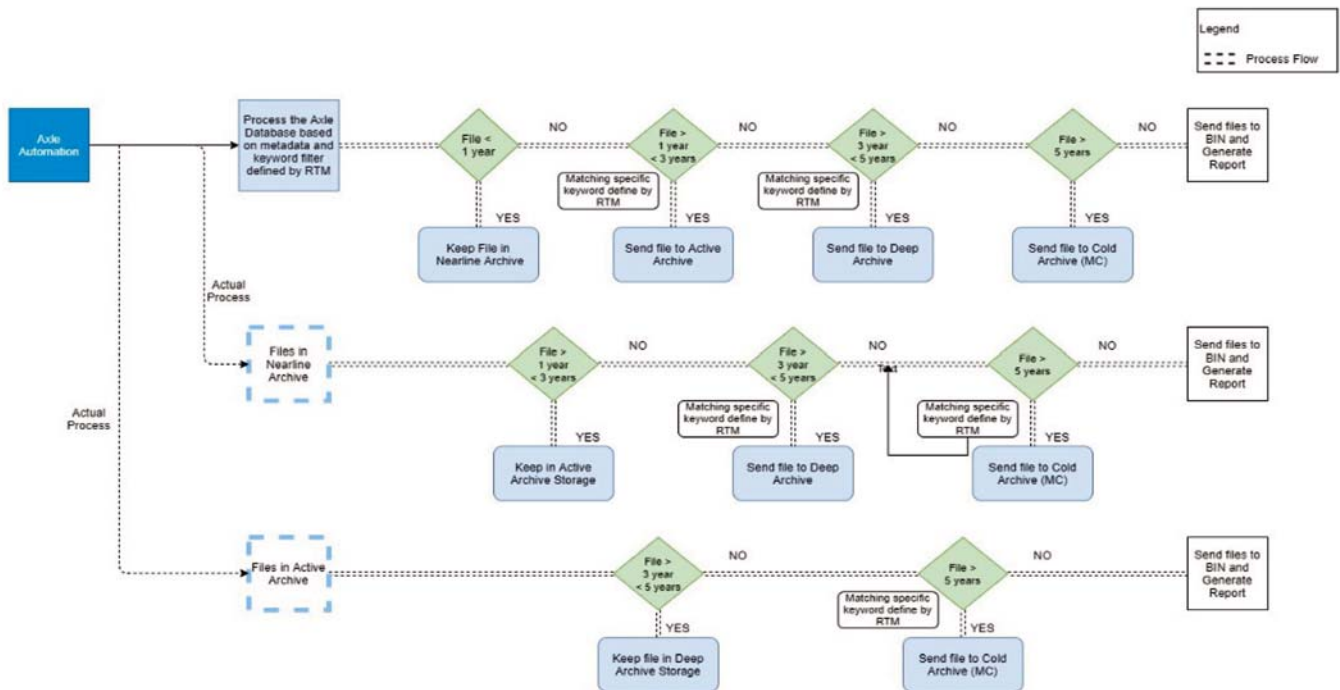


Figure 9 - Media Archiving Workflow

For optimum operation, the media movers needed to be automated. As an alternative workflow, the system required a selective overwrite and a manually triggered data mover. For optimum operation, the media movers are automated moving between the various stages of production to nearline archive, to deep and cold archive. With the policies enabled, content that does not adhere to it will have the option to be purged indefinitely

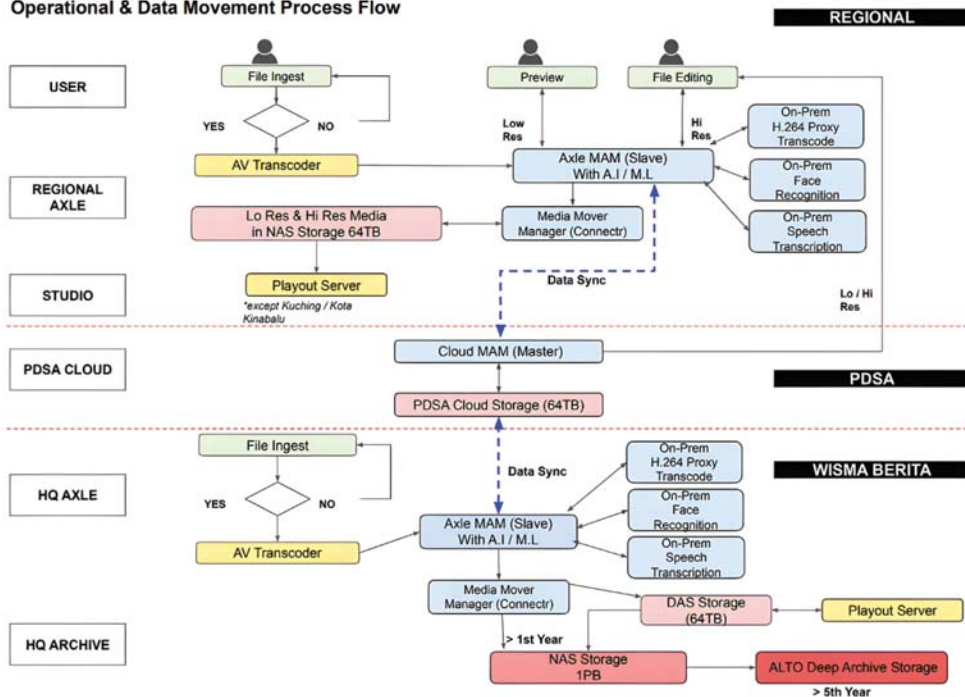
from the system subject to approval by librarians, who can monitor this via email notification. This allows for optimisation of capacity management for RTM executed seamlessly with Axle ai without so much human intervention, therefore optimising storage costs for each department.

Recovery Point Objective (RPO) measures how frequently users must send a media file over to the archive

cluster so that it contains all updated media. If a disaster should occur between these sent files, RTM can't afford to lose 5 minutes or even a days' worth of data updates. RPO represents how up-to-date the data recovered will be. In practice, the RPO indicates the amount of data (updated or created) that will be lost or needs to be re-entered after an outage.

Recovery Time Objective (RTO) is the amount of downtime a business

Operational & Data Movement Process Flow



can tolerate. In a high-frequency transaction environment, even seconds of unretrievable data represents thousands of dollars lost in revenue. RTO helps rectify how long it takes for the system to recover after disrupting the notification of business.

RTM's current allocation is at 64 TB for both Wisma Berita and PDSA. The system allows for future archiving options to be both on premise with option to move to cloud depending on RTM's preferred direction.

3.0 OUTCOMES OF RTM ADIB

News media material consumption is growing daily. Therefore, the management's decision 'to archive or not to archive' may greatly impact media material collection. This decision-making process is crucial to determine the media selection for future archives, as any purged material will not be retrievable. The newly adopted technologies have allowed for an effective media lifecycle approach to be implemented, reducing storage expansion and selectively determining high-value content.

There are six measurable, positive impacts to the overall update of RTM's Project ADiB High Definition (HD) News Digital Archiving System.

1. With this new system, the media movement workflow will be more seamless as a result of using workflow automation, AI and ML-oriented technology.
2. Optimised cost and operations due to centralised storage and media asset management throughout the agency's workflow processes.
3. Entirely accessible media pool, using search engines from any platform and system regardless of the geo-location
4. Reduced risk of human error and deployment of manual labour thereby optimizing manpower by implementing a Smart Archive Policy within the workflow.
5. Access to the data within all stations with media synchronisation and sharing.
6. Real-time news collaboration allows multiple people to edit and collaborate simultaneously, speeding-up production cycles.

AUTHORS:



Ahmad Shafiq Mirza Bin Mansor is a Professional Technologist recognised by the Malaysia Board of Technologies Malaysia (MBOT)

and a Graduate Engineer of the Board of Engineering (BEM) Malaysia since 2008. He commenced his professional career in 2005 at Telekom Malaysia Berhad and joined the Broadcast Department of Malaysia in 2007 in the Implementation Coordination Unit, Prime Minister's Department (ICU JPM). He was a Broadcast Engineer for four years and then in the TV Outside Broadcast Department for six years. Since 2017 Ahmad has been in service with Technical Facilities, News, and Current Affairs. Throughout his professional service, he has had a lot of exposure to the organisation of domestic and international events, especially Sports Events and International Conferences.



Mardhiah Nasir has a unique 12-year background in project management for both public sector and enterprise customers in South East Asia,

in-depth knowledge of Big Data Infrastructure & Digital Media, strategic planning, market analysis and business development which provides clients with innovative advantages. As the Executive Director and VP of Sales for IPSB, Mardhiah's mission is to empower clients with their digital transformation whereby she manages and engages with local and international clients to be ahead of the curve with the latest solutions, partners and technologies.



Sam Bogoch is the founder, in 2012, of axle ai, whose mission has always been to provide radically simple, affordable media search software

that works within standard web browsers and supports nearly any type of local and cloud storage. axle ai, the company that is making media smarter. The company has also rolled out integrations with the three major video editing platforms – Adobe Premiere Pro, Avid Media Composer and Apple Final Cut Pro X – representing a formidable Future of Work ecosystem for the video industry. ■