Chapter

Digital Convergence and Memory Information Systems in Developing the Performance of Galleries, Libraries, Archives, and Museums (GLAM)

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Abstract

This paper discusses university efforts in developing digital convergence and information systems to manage, compile, and disseminate institutional memory documentation in a digital format known as the acronym SIMEMORI (memory information system). The plan was developed within the framework of digital convergence toward galleries, libraries, archives, and museums (GLAM), which has become a world trend today. The GLAM knowledge collection needs to be managed systematically and standardized so that the academic community and users can realize superior organizational sustainability based on technology and culture. Working on the organization's collective memory is one of the foundations for developing university information organizations to maintain this memory through institutional digital convergence. The outcome of this digital convergence will increase educational activities and historical preservation, improve research performance, and guarantee the GLAM culture of quality and service innovation.

Keywords: digital convergence, institutional development, memory information systems, GLAM performance, Brawijaya University

1. Introduction

The highly growing development of digital technology has led society to an increasingly complex adaptation process. The complexity of adapting to the development is not only related to getting used to and accepting each of the latest digital devices but also requires strengthening individual competence and convergence among institutions. Strengthening the competency relates to digital literacy competencies [1, 2]. Digital literacy is a competency or ability to select and use digital devices, create digital content, present digital presentations, and be responsible for socializing various digital messages in society, primarily through library services [3–5]. Meanwhile, digital convergence through integration and collaboration between

institutions includes managing, compiling, and disseminating institutional collections in digital and online forms [6].

Digital convergence is a development and the latest trend in today's technology field. According to Vårheim [7], this development was popularized since the 1990s, which was marked by the widespread practice of digitalization by memory institutions, including libraries, archives, museums, and galleries. Digital convergence brings enormous change everywhere and continuously [8]. This condition is reinforced by Robinson's statement [9] that digital convergence has been a means of communication and interaction between institutions since the beginning and fosters cross-professional collaboration, such as librarians, archivists, and curators. Digital convergence carried out by memory institutions has now become an international trend and will continue to experience development. In this way, a collection of memory institutions is a source of knowledge, so systemic management and convergence are a must.

As one of the international trends, digital convergence has also penetrated the realm of higher education, especially the library, as an information management unit. University libraries in Indonesia, for example, have nuances of convergence between memory institutions, such as libraries and museums. The Libraries of the Indonesian Islamic University in Yogyakarta place the library building adjacent to the museum building. The Eleven March University Museum in Surakarta City, Central Java, is also attached to the library. In a broader scope, the Faculty of Administrative Sciences, Universitas Brawijaya, located in Malang City, East Java, has even developed a memory information system called SIMEMORI, which functions to manage, compile, and disseminate digital format institutional memory documentation that can be accessed online. The system carries the concept of convergence of collections of GLAM memory institutions (libraries, archives, museums, and galleries).

Digital convergence as an institutional development effort through strengthening the integrative management of institutional memory collections has yet to be widely implemented as far as the author's observation and tracing from the four institutions above. The practice of digital convergence, which represents governance and dissemination of a systemic and convergent collection of memory institutions, has been carried out by the Faculty of Administrative Sciences, Universitas Brawijaya, through its memory information system (SIMEMORI). The system has combined the management and service between collections of libraries, museums, and archives owned in one system. The development of interinstitutional digital convergence practices is in line with Cannon's statement [10] in his study, which revealed that through digital convergence, users expect a service output in the form of one access door, namely an integrative institutional interface between galleries, libraries, archives, and museum collections.

In reflecting on this reality, digital convergence practices carried out in one system are interesting to study. Moreover, a system capable of representing collections from memory institutions from GLAM (galleries, libraries, archives, and museums), such as SIMEMORI. Therefore, the reason that prompted the author to choose SIMEMORI, developed by the Faculty of Administrative Sciences, Universitas Brawijaya, is that this system can respond to user needs, as stated by Cannon above. Another reason is that this system won first place in the 2022 Universitas Brawijaya Public Service Award (UBPSA). This advantage cannot be separated from various essential factors. In the author's findings, SIMEMORI has a role model in governance, which includes acquisition, management, and services which are interesting to study—also, the participative aspect of the contributors, which is also interesting in this regard.

Increasing ease of access to knowledge for users of memory institutions is often cited as the reason for the need for convergence.

2. Theoretical framework

2.1 Digital convergence

Digital convergence combines digital technology components and features in voice, text, video, images, broadcasts, presentations, streaming media, global connectivity, and personalized services. The unification combines various electronic systems' features and capabilities into a simplified, converged, and computer-mediated communication system to enable individuals to interact, communicate, collaborate, and share information in new and different ways [11]. In addition, according to Strader [12], digital convergence is the result of efforts to link various previously unrelated technologies to become more closely integrated and even unite as these technologies develop. Thus, according to Vince [8], digital convergence revolutionizes how data is collected, stored, annotated, presented, and accessed. Besides having other benefits, such as cost efficiency, quality improvement, and access flexibility, digital convergence results can be stored in a flexible, accurate, and durable format that previous technologies could not.

2.2 Information system

An information system is a set of integrated software that works together with information technology to support individual, group, organizational, or societal goals. It is designed to collect, process, store, and distribute information [13]. Meanwhile, according to Alter [14], the information system is a set of integrated software that works together with information technology that is directed to support the goals of individuals, groups, organizations, or society. An information system can be understood as a system designed to collect, process, store, and distribute information to support the functions and objectives of the institution.

2.3 Digital information assets

Digital assets are valuable electronic information content stored digitally in various formats [15]. In addition, these assets are intended as meaningful collections of information and managed as a single entity so that they can be understood, shared, protected, and exploited effectively [16]. Meanwhile, according to Kamat [17], digital information assets are information assets that are digital in format, defined, stored in any way, not easy to replace without cost, expertise, time, resources, and their combinations, and are recognized as something of value to the organization. Therefore, digital information assets owned and managed by information institutions have a particular value, so they must be protected and used effectively and carefully.

2.4 Convergence of GLAM (galleries, libraries, archives, and museums)

Scholars have defined GLAM institutions as memory institutions and knowledge organizations [6, 18]. According to Davis and Howard [19], the core characteristics of GLAM institutions are digitization, collaboration, and convergence of many

issues and dynamics. Galleries, libraries, archives, and museums (GLAM) is not just a memory institution that collects and organizes knowledge objects. It also innovates with new things and improves means to enhance dissemination of the knowledge it collects [20]. In this regard, GLAM is an example of the oldest memory institution of a knowledge organization. It includes core processes, such as collecting, organizing, preserving, and providing access to knowledge objects, from which the process becomes a reference for other organizations that are managing their collections. Knowledge-based [21]. Furthermore, Hedstrom revealed that the GLAM institution collects and organizes books, documents, and objects and specializes based on country, language, scientific discipline, audience, classification system, and taxonomy to differentiate publications from manuscripts and separate documents with three-dimensional objects. According to Marcum [21], the advantages of GLAM convergence consist of cost savings, collection expansion, simplified access, wider user reach, and attractiveness (branding).

3. Method

This research uses a descriptive method with a qualitative approach. Research with a descriptive method is a study that seeks to explain research narratively, as it is so that the object of research is adequately exposed [22]. Meanwhile, qualitative research provides explanations and arguments in an interpretive and constructive manner to the data presented in a descriptive narrative manner. Interpretation of data through a constructivist paradigm will present arguments and critical analysis so that the research results are comprehensive and heuristic. In addition, the meaning that can be obtained can go beyond descriptive narratives so that new findings can be written in research conclusions [23].

The data collection technique used is interviews supported by observation. Interviews were conducted with three staff members of the Center of Information System and Public Relations assigned to manage SIMEMORI and two students as users. The number of informants is deliberately limited based on information needed for the paper. At the same time, the observation was carried out to make direct observations in the field and make observations through the SIMEMORI application. The informants can be seen in **Table 1**.

No.	Informant	Position
1	Info.MS-01	Staff SIMEMORI
2	Info.OM-02	Staff SIMEMORI
3	Info.MR-03	Staff SIMEMORI
4	Info.AM-04	Student (user)
5	Info.BG-05	Student (user)

Source: Researchers' data processing.

Table 1.
Demography of informants.

No.	Main aspect	Outcome
1.	Acquisition	Knowing the acquisition criteria, types of contributors, and formats
2.	Management	Knowing the process of management, media convergence, inventory, data entry/uploading, and maintenance
3.	Dissemination	Knowing the content dissemination process through the SIMEMORI application portal and related facilities

Source: Researchers' data processing.

Table 2.
Aspects of digital convergence in the SIMEMORI system.

The results of the interview as the primary research data are confirmed for validity through triangulation techniques in the form of source triangulation and technical triangulation. Source triangulation was carried out by comparing interviews with a number of informants to ensure data validity was achieved [22]. The subsequent validity is a triangulation of techniques through discussions of data obtained from interviews and observations to ensure the relevance of the two data. The relevant data will be cited as valid data and used as a source to explain the study's object. During the research, there was no conflicting data found in the results of interviews with informants; it just had its breadth, which showed variations in situations that occurred among informants.

The conceptual construction being analyzed includes three main things related to digital convergence carried out by SIMEMORI managers through acquisition, management, and dissemination activities. The three main things with each element analyzed can be seen in **Table 2**.

The last point in reviewing this method is the data analysis used on the results of the interviews obtained and field observations. The data analysis technique uses Miles & Huberman, consisting of three essential components: data reduction, data display, and data/research conclusions verification. The chart of data analysis techniques can be seen in **Figure 1**.

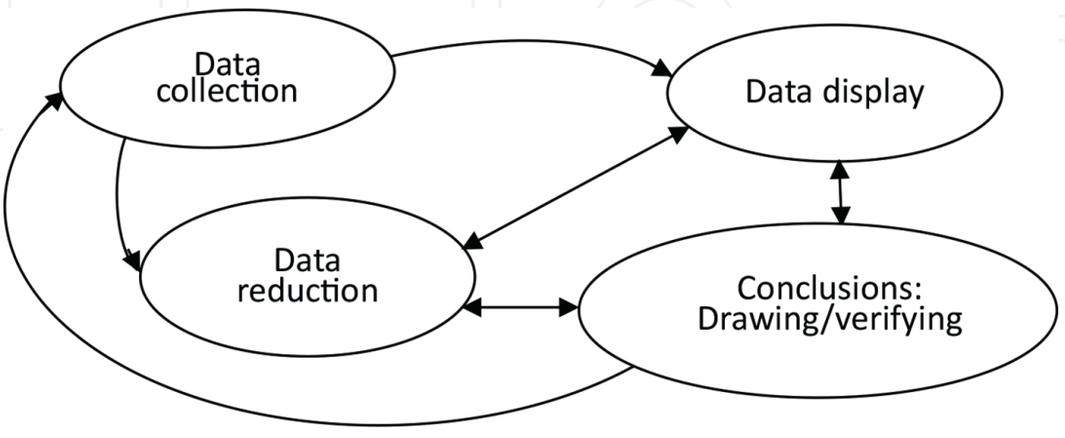

Figure 1.
Components of data analysis by Miles & Huberman. Source: Laugu [24].

4. Result and discussion

The results and discussion are seen in two important parts: a brief description of the place of research and findings accompanied by analysis. These two parts are presented in a narrative descriptive manner, especially in the first part. Meanwhile, the second part is presented descriptively to describe the empirical reality of the research object and analytically to explain the phenomenon more deeply and seek to find the implied meanings in collecting research results.

4.1 A glance at the SIMEMORI system

The Faculty of Administrative Sciences, Brawijaya University, Malang, Indonesia (from now on referred to as FIA UB) develops an information system that manages, compiles, and disseminates the use of digital format institutional memory known as the memory information system (SIMEMORI). The system carries the concept of convergence of the four memory institutions, such as libraries, archives, galleries, and museums, which has become a trend internationally, especially in higher education. This system has a vision as a university of administrative science memory that connects the academic community with history, arts and culture, and knowledge characterized by the Tri Dharma of higher education [25].

The system developed aims to enable academics and the public to understand organizational identity through institutional memory, vision and mission, past achievements, and documented past experiences. Through this system, academicians and related multi-stakeholders are expected to synergize in the future and sustain the organization through excellence, adaptation to technological changes, and organizational culture. The reason for the Faculty of Administrative Sciences, Universitas Brawijaya Malang, to develop the system is based on the vision and mission instruments of the university and faculty toward a world-class university (WCU), namely by having four critical units of higher education memory institutions, namely an archive center, library, gallery, and university museum, systemically managed. Another reason is that it aims to realize institutional memory management in convergent memory institutions as a means of education, history, research, preservation, and recreation with service fusion, either through product, service, or process innovation [25].

4.2 Findings dan analysis

The results of the study describe a number of findings which are summarized in 4 (four) terms, namely an overview of SIMEMORI, procurement, management, and dissemination/dissemination. Based on this, this study found several important phenomena that will be described in the following discussion.

4.2.1 SIMEMORI: initiation, realization, and appreciation

The presence of the memory information system (SIMEMORI), which is managed by the Center of Information System and Public Relations, Faculty of Administrative Sciences, and Universitas Brawijaya, is inseparable from a long process. As one of the oldest faculties in Universitas Brawijaya, the faculty, at the beginning of the initiation of this program, began to pay attention to the management of organizational collective memory in a systematic and standardized manner, mainly in document

fulfillment to increase accreditation from national to international. Another driving aspect is the effort to unify the types of collections from the GLAM memory institutions that they have systematically or can be combined to make it easier for academics and the general public to recognize the identity and legacy of the institution. Even though, in the beginning, they understood that the collections of memory institutions were different and challenging to assemble, upon further examination, they turned out to be related and had an almost inseparable relationship. In the development process, this effort received strong support from the leadership of the Faculty of Administrative Sciences. It was also inseparable from the Library Science Study Program, which is under the auspices of the faculty. In this regard, interviews with several informants can be seen, among others, as follows.

- *How did the SIMEMORI program get support from the institution?*

  "...the initial idea of this system is inseparable from the form of implementation of the concept of information governance (information governance initiatives) based on national and internal standards and regulations of UB...the effort was also made to support the initiation of good institutional governance, which is also a part of the memory resilience program initiated by the dean of FIA UB... (Info.MR-03)" and "... first we want every data or documents that we have can be well documented...also one day when it is needed without difficulty finding it such as the need for audits to accretion for example...that is where we then try to make it happen ...coincidentally at the dean level there is a memory retention program, so I think this is a good opportunity to realize institutional memory management ... (Info.MS-01)."

In line with the issues, the results of the following interviews have explained the synergy through the support of lecturers and students of the library science study program through learning and practicum activities carried out by students, especially the practice of documentation in digital format. From this, digital convergence practices full of research, preservation, and recreational values are increasingly peaking. Two of the many interview results related to this matter can be seen below.

- *How has the SIMEMORI program been implemented and developed into an expected system that supports GLAM?*

  "...in the beginning we had time to think about its future realization and it just so happened that we in this unit (Center of Information System and Public Relations) got a lot of input and collaboration with the Library Science Study Program so that with the theory and practice they have we can focus on system development this...a number of courses that students can use to deepen their technical skills, for example document management courses, information governance, archives and IT courses which provide recommendations regarding the applications used...finally, we can make this SIMEMORI system a reality and along with its development we have many parties contributed content...last year won an award in a public service innovation competition, the Universitas Brawijaya Public Service Award (UBPSA) 2022 which was held by the Bureaucratic Reform Team of Universitas Brawijaya...support and appreciation from various parties began to arrive and that was our spirit trigger to continue to improve it... (Info.MR-03)"... and "...through practicum courses, I can practice related to document management, both printed documents that are converted to digital as well as document management based on born-digital...I think this system

was built (SIMEMORI) as a tool that can accommodate everything such as product innovation and services that merge into one and also represents the GLAM collection...besides being a learning tool, this system can also be an interesting recreational tool... (Info.AM-04)."

The four interviews above illustrate that digital convergence must be distinct from the concept of information governance. This inseparability becomes a close relationship, especially in several essential factors. Information governance is the glue that drives convergence value and reduces risk in every aspect of it, such as data management, security and privacy, data integration and data quality, and master data management [26]. From the interview excerpt above, it can be understood that in realizing digital convergence, support and collaboration are needed significantly to strengthen institutional services and innovation, especially in institutional memory (GLAM) (**Figure 2**).

4.2.2 Acquisition

After the SIMEMORI system has been built, the step taken by the manager is to start entering data from each existing collection. In addition to determining the acquisition process, SIMEMORI content or collections are viewed from the type of collection, namely: Books & Periodicals, Born Digital, Documents, Mixed Media, Moving Images, Objects, Sound Recordings, Other, Still Images, Albums, Diaries & Scrapbooks, Education & Research, Arts & Culture, Maps, Plants & Architecture. The various types of collections become a reference in the acquisition process. In the author's findings, the acquisition of SIMEMORI collections or content is divided into

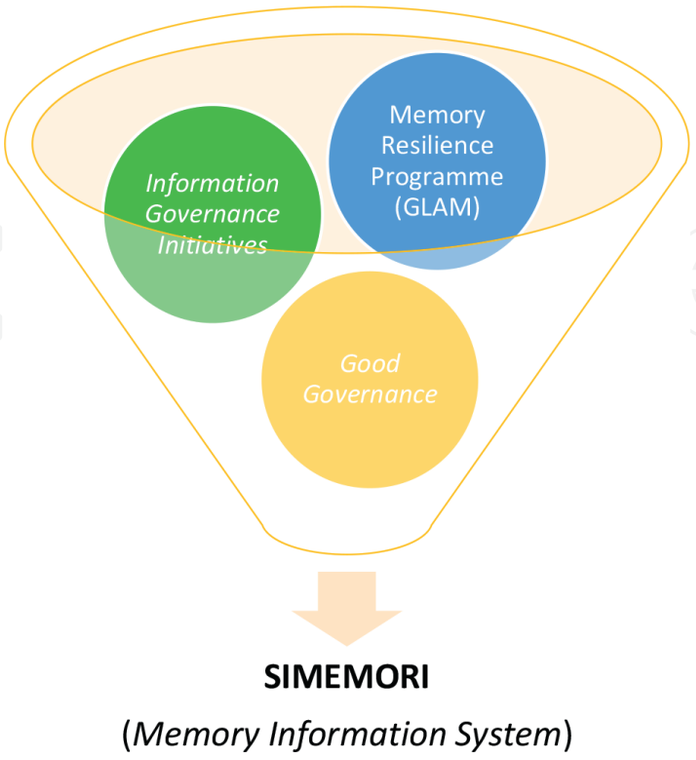

Figure 2.
Synergetic pillars of SIMEMORI. Source: Researchers' data processing.

two types: internal and external. An explanation of the two types of acquisition can be seen through the following interview results.

- *What are the collection criteria and types of SIMEMORI contributors?*

> *"...acquisition of this collection we focus on categories or criteria such as having content or institutional memory values, past achievements and past experiences that have historical value...the point is that we receive all recorded information related to the institutions within it and then process it...most of it is still in the form of printed or paper-based such as written documents or old school photos so that we transfer them to digital form so that they are easy to enter into the system...the results of the documentation or documents that we obtain initially come from internal sources, such as from the academic community, staff, especially administrative staff who manage documents or archives and then submit them here to be managed...apart from internally there are also external parties, such as alumni who donate the results of documentation during college and or retirees who have institutional documents of historical value (Info.OM-02)" ...so far, if we look at the collection procurement process that was carried out, it was strengthened by contributors such as alumni, retirees (lecturers & staff), FIA UB academic community or from UB community members as a whole who have a kind of good participatory value...in the SIMEMORI application itself we have make a menu that donors can use to upload documents to be donated...in that menu there is also a form related to the identity of the contributor, for example alumni, academics, etc. There is also a form for the contact number of the contributor at any time you can use to request additional information related to the donated document. There is a column filled in regarding the description of the document donated; for example, an incident description or the fantastic term now is captioned so that everything can be done quickly and in detail... (Info.MS-01)."*

Based on the interview excerpts above, it can be understood that the SIMEMORI content acquisition process is inseparable from a number of contributing parties, such as FIA UB's academic community, staff, alumni, retirees (lecturers & staff), and UB community members in general. In addition, each collection obtained must meet criteria such as load content or institutional memory value, especially historical and informative value, to support the learning and research process. To facilitate the procurement process, managers have embedded a menu that can be used for self-uploading on SIMEMORI, which donors can use to upload documents to be donated. The menu has been formulated according to the needs with no other purpose to facilitate the identification and management process. From this, the process of procuring the SIMEMORI collection is inseparable from a number of aspects, such as the existence of a shared awareness that fosters participatory value among contributors. In addition, the manager's creativity factor can accommodate contributors' efforts by providing a menu on the SIMEMORI system that makes it easy for them to contribute independently online.

4.2.3 Processing

The various collection formats that have been received are processed. In the author's observation, the initial stage of the processing is that the manager conducts an inventory to provide an identification number or Object ID for each collection. In addition, Object ID aims to determine the number of collections and identify the

acquisition. Example of an Object ID with the code "donatur_fia_01" explaining the source of the acquisition and collection serial number. After this stage is completed, the next step is to input bibliographic data which includes item name, collection type, donor name, collection condition, Object ID, collection genre, date/year of manufacture, and description/caption. After the data are filled in, the collection can be uploaded to the system. The capacity (file size) of documents in pdf, jpeg, jpg, png, tif, tiff, webp, and jfif formats is a maximum of 5 MB (Mega Bite). Meanwhile, files in multimedia formats such as MP3, MP4, and AVI are 20 MB (Mega Bite). This applies to document-type conversions (analog to digital). The process of transferring media documents carried out can be seen through the results of the following interviews.

- *How is the media transfer process carried out to support the availability of SIMEMORI content?*

> *"The process of document media convergence is carried out using scanning, photography or other digital conversions. The goal is that still physically based collections can be processed, uploaded, and served immediately...(Info.MS-02)."*

Another processing is carried out through routine checking of each collection that has been uploaded. this was done in the same way as the informant explained to ensure that all collections that have been uploaded can be accessed properly, can be read clearly, and minimize errors in providing information related to particular collections. Thus, the management process includes inventory, media convergence, and checking and repair. It is solely done to provide novelty in services. The most important thing is to maintain or maintain continuity of access.

4.2.4 Dissemination

According to the author's findings, the content dissemination process is generally carried out centrally through the SIMEMORI application portal. Even so, they also use social media as an alternative that is considered strategic to promote SIMEMORI to academicians, colleagues, and broadly to the public. Social media is an open secret whose existence is inseparable from people's social life. In addition, social media does not recognize the type and background of society. This media has penetrated all groups, from remote villages to urban centers, casual workers to professionals and executives, passive people to active people, and so on [27, 28]. Aside from being a means of disseminating or disseminating content, the management of SIMEMORI also hopes to increase the participation of academics and the public to contribute independently through the features (menus) that have been prepared. In addition to disseminating this information, involvement in the community in social adaptation efforts within the framework of new media technology is also in the form of educative, selective, and outreach. This form of participation can be described in the following interview results.

- *What are the efforts to disseminate the SIMEMORI collection to attract contributors' support?*

> *"...besides disseminating the SIMEMORI collection directly through the system, we also share URLs (Uniform Resource Locator) or SIMEMORI active links using social media, especially to students using WhatsApp to groups of lecturers or students,*

> *Instagram, Facebook and so on...because SIMEMORI is web-based, so usually we are assisted by the study program student association, so those who are actively posting... so far the results have been quite encouraging and those who have contributed more (Info.MR-03)"... and ..."regarding SIMEMORI I got the link which the lecturer shared with Class WhatsApp groups, and besides that, we can also get the same information through student association social media...it turns out that this system is very helpful and in my opinion this is interesting...so besides being able to donate documents, we can also enjoy various collections in the system (Info.BG- 05)."*

Based on the results of the interviews above, it can be concluded that the existence of social media platforms that move dynamically as a means of promotion and dissemination is expected to increase digital technology-based community participation such as self-uploading and active URL sharing of the memory institution collection management system that has been developed. All forms of involvement are social adaptation efforts to new conditions that must be accustomed to in their social practices. The influence of technology is very pervasive and even determines every action of society [29]. The participation of the academic community is also in the form of educational involvement and assistance. The presence of this participation has important qualifications, especially in facing the post-pandemic era through a participatory-technological tradition [30].

5. Conclusion

Digital convergence which represents efforts to manage collections of memory institutions, including libraries, archives, galleries, and museums, is one of the dynamic trends. Developments in digital convergence practices between memory institutions allow individuals to interact, communicate, collaborate, and share information in a variety of new, different ways. Digital convergence as an institutional development effort requires a service output as one access door for integrative institutional products. For this reason, efforts are needed through integration or collaboration between institutions, including managing, compiling, and disseminating digital format institutional collections online. At this point, the paper's conclusion can be seen in three aspects of SIMEMORI's governance that accumulate from the implications of digital convergence. These aspects are acquisition, management, and dissemination.

The SIMEMORI application, initiated by the Faculty of Administrative Sciences, University of Brawijaya, is inseparable from the initial stages or initiations. Awareness of the need to manage the organization's collective memory in a systematic and standardized manner and efforts to unify the types of collections from the four memory institutions in their GLAM in a systemic manner became the trigger for the birth of this system. This effort is inseparable from the concept of information governance (information governance initiatives), the initiation of good institutional governance, and the memory resilience program initiated by the dean of the faculty in 2022 ago. Acquisition of collections always prioritizes historical, educational, and research values for each item or document donated by donors. Several parties have contributed, including students, alumni, retirees (lecturers & staff), and UB community members.

Memory information system (SIMEMORI) content management is a process that is inseparable from digital convergence practices carried out by managers. Most of the donated document items go through a digitization process. An inventory stage follows

them to provide an identification number or Object ID for each collection. The goal is that collections can be processed, uploaded, and served immediately. Another stage is routine checking of each collection that has been uploaded as an integral part of the management process. The goal is to ensure that each collection that has been uploaded can be accessed properly, can be read clearly, and minimizes errors in providing information related to particular collections.

Likewise, the dissemination of collections is carried out centrally through the SIMEMORI application portal. It utilizes social media as an alternative which is considered a strategic promotional tool. Through these two ways, SIMEMORI managers hope to increase the participation of academics and the community to contribute independently as a form of educational involvement and assistance in institutional development.

Appendix

See **Tables A1** and **A2**.

No	Digital convergence [20]	Questions
1	Managing acquisition	1. What are the procurement criteria? 2. What types of documents (content) are processed? 3. Who contributed as contributors? 4. How to procure via the SIMEMORI application?
2	Compiling/processing	1. How is the document processing carried out? 2. What are the format and file size requirements of the document being processed? 3. What is the process of converting conventional document media to digital? 4. How are the monitoring and maintenance efforts carried out?
3	Disseminating	1. What is the document dissemination mechanism via SIMEMORI? 2. What is the dissemination process using social media? 3. What promotional tools are used? 4. How is the community's response to the existence of SIMEMORI?
4	A glance at the SIMEMORI system	1. What is the history or initial idea (initiation) of SIMEMORI? 2. How is the institutional support (leaders, academics, alumni)? 3. How was the preparation stage (system/application and content) carried out? 4. What is the description of the implementation of the initial stage?

Table A1.
Questionnaires.

No	Objects	Details
1	SIMEMORI	1. Staff/managers 2. Overview of SIMEMORI application 3. Types of contents 4. Promotion tools
2	Processed document formats	1. Printed collection 2. Digital collection 3. File size 4. Document types

No	Objects	Details
3	Media transfer tools	1. Types of tools used 2. Method/steps/process 3. Qualities/results (output formats) 4. Operator
4	Contributor & users	1. Students 2. Lecturers 3. Staff 4. Alumni

Table A2.
Observation.

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