

Emerging Trends In Library And Information Science

Senthur Velmurugan

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Emerging Trends In Library And Information Science

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ABSTRACT

Library and Information Science (LIS) is undergoing significant transformation due to advances in digital technologies, artificial intelligence, open-access initiatives, and changing user expectations. This study explores major LIS research trends from 2015 to 2025 using a mixed-method bibliometric and content analysis approach. Data were collected from Scopus, Web of Science, and Google Scholar, comprising approximately 850 high-quality research articles. Bibliometric analysis using Bibliometrix (R) and VOSviewer identified rapid growth in research on AI and machine learning applications, digital libraries and repositories, metadata and linked data, open science, research data management, and user-centered information services. Qualitative analysis highlighted increasing attention to data-driven decision-making, digital preservation, knowledge organization, and ethical information practices. The findings reveal a clear shift from traditional library management to technology-driven, service-oriented, and user-focused models, emphasizing the need for continuous innovation, interdisciplinary collaboration, and digital literacy development among LIS professionals.

Keywords: Library and Information Science, New Trends, Artificial Intelligence, Digital Libraries, Open Access, Bibliometric Analysis, Information Literacy

INTRODUCTION

Over the past decade, Library and Information Science (LIS) has changed dramatically due to rapid developments in information and communication technology (ICT), artificial intelligence (AI), and digital scholarship. Libraries have moved beyond their traditional roles to become technology-driven knowledge centers that use digital tools, user data, and open access systems to support modern information needs (Bhattacharya & Bandyopadhyay, 2020; Chen et al., 2021). AI and machine learning now support services such as chatbots, automated cataloging, metadata creation, and predictive analytics, helping libraries work more efficiently and serve users better (Islam & Rahman, 2023). The expansion of open science and open access has encouraged greater

collaboration in scholarly communication (**Pinfield et al., 2020**), while advances in metadata, linked data, semantic web technologies, research data management, and digital preservation have improved information discovery and long-term access (**Corrall et al., 2021; Foulonneau & André, 2022**). New technologies like IoT, virtual reality, and augmented reality are also reshaping library spaces and user interaction (**Veeranjaneyulu, 2022**). Simultaneously, escalating apprehensions regarding digital literacy, inclusivity, and ethical data utilization have redefined librarians' roles as information technologists and digital curators, underscoring the necessity for continuous professional development (**Sarker & Mahmud, 2024; Thanuskodi, 2023**). This study examines these emerging trends using bibliometric and content analysis to help stakeholders better understand and respond to the changing information environment.

OBJECTIVES OF THE STUDY

1. To examine key technological advancements shaping Library and Information Science, including Artificial Intelligence, Machine Learning, Big Data, and Cloud Computing.
2. To analyze LIS research trends, themes, and publication patterns from 2015 to 2025 using bibliometric and content analysis methods.
3. To assess the impact of digital transformation on library services, digital repositories, and information access systems.
4. To examine the challenges and opportunities posed by emerging technologies such as Open Access, Research Data Management, Internet of Things, and Virtual/Augmented Reality in LIS.
5. To analyze the evolving roles, competencies, and ethical responsibilities of LIS professionals and propose best practices for future-ready professional development.

LITERATURE REVIEW

LIS scholarship during the past decades illustrates significant changes consistent with technological, digital, and changing users' demands. Practice and theoretical concepts have been analyzed by researchers in terms of trends, issues, and potential opportunities for the LIS profession.

Artificial Intelligence and Machine Learning in Libraries

AI and ML technology deployments have transformed library services worldwide. **Bhattacharya and Bandyopadhyay (2020)** have outlined the uses of AI in Indian university libraries in which its use in auto-cataloging, virtual reference service, and recommender systems of the resources came into light. **Chen, Zhang, and Xu (2021)** have also conducted a survey on the uses of AI in digital libraries in which the uses of machine learning algorithms in search optimization and personalization of user services came into light. These polls reflect the growing application of AI in library practice nowadays but with skill deficiencies and ethics issues still strongly experienced.

Digital Libraries and Open Access

Open-access programs and digital libraries have overwhelmed LIS trends. **Corrall, Kennan, and Afzal (2021)** traced the development of research data management (RDM) services and digital repositories with emphases on standardized metadata and long-term preservation approaches. **Pinfield, Wakeling, Bawden, and Robinson (2020)** utilized open-access policy with focus on the mediating function of the library in scholarly communication and democratization of information. Such publications reflect a movement from old resource management to digital scholarship and knowledge dissemination.

Metadata, Linked Data, and Semantic Technologies

The advancement in the metadata standard and linked data model enabled discovery of the resources and interoperability. **Foulonneau and André (2022)** touted the use of semantic web technologies and knowledge graph in effective retrieval and integration within library systems, and **Veeranjaneyulu (2022)** authored the use of the technologies in Indian libraries. It shows how much more technical and advanced it is to work with libraries now.

User-Centered Services and Information Literacy

User engagement, information literacy, and social inclusion have been seriously discussed. **Thanuskodi (2023)** argued that librarians should gain digital, analytical, and pedagogic competences for conveying information literacy training. **Sarker and Mahmud (2024)** researched AI-based services' ethics such as user privacy, equitable access, and ethical use of information. The aforementioned studies indicate growing emphasis on user-centered, ethical, and socially responsible services in LIS.

New Technologies: IoT, VR/AR, and Gamification

Less prevalent in bibliometrics, case studies provide substance to the potential of IoT, VR/AR, and gamification as ways of enhancing the users' experience. **Veeranjaneyulu (2022) and Islam and Rahman (2023)** are reporting pilot applications of these technologies within library settings and believe that these technologies hold the promise of reimagining libraries' physical and virtual spaces as interactive and immersive knowledge environments.

Regional and Comparative Studies

Various LIS trends have been contested throughout a specific nation-state or nation. Survey and bibliometric research document differential adoption of technology by infrastructure, finance, and manpower (**Bhattacharya & Bandyopadhyay, 2020; Thanuskodi, 2023**). Comparative research documents situation-specificity of reaction to technology adoption, capacity development, and policy making.

RESEARCH METHODOLOGY

Research Design

The study adopted a **descriptive and analytical research design** to identify and examine emerging trends in Library and Information Science (LIS) during the period **2015–2025**. A **mixed-methods approach** was employed, combining **quantitative bibliometric analysis** with **qualitative content analysis**. This approach enabled a systematic examination of publication patterns, research productivity, and citation behavior, while also allowing an in-depth exploration of thematic evolution, technological advancements, and conceptual developments within the LIS discipline.

Data Sources

The data for the study were collected from three major scholarly databases: **Scopus**, **Web of Science (WoS)**, and **Google Scholar**. These databases were selected due to their extensive coverage of peer-reviewed journals and conference proceedings in Library and Information Science, Information Technology, and related fields. Additionally, literature was sourced from the **Directory of Open Access Journals (DOAJ)** to incorporate relevant open-access publications and ensure comprehensive coverage of the research domain.

Data Collection Procedure

A systematic literature search was conducted using predefined keywords and Boolean operators, such as: **“LIS” OR “Library and Information Science” AND (“research data management” OR “metadata” OR “open access” OR “information literacy” OR “artificial intelligence” OR “emerging trends” OR “digital libraries”)**. The search was restricted to publications published between **2015 and 2025**. Following the processes of de-duplication, relevance screening, and verification of completeness, a final dataset of **850 records** was selected for analysis.

Data Analysis Tools and Techniques

The study employed both **bibliometric and content analysis techniques**, using **VOSviewer** and **Bibliometrix (R-package)** as analytical tools. The analysis focused on indicators such as **author productivity, source and citation analysis, country and institutional contributions, publication growth trends, keyword co-occurrence, and citation and co-authorship networks**. Visualization maps—including keyword clustering, citation density, and collaboration networks—were generated to identify research fronts and emerging trends. In addition, highly cited and emerging publications were qualitatively analyzed to trace conceptual and thematic developments. Identified trends were categorized into major thematic areas such as **artificial intelligence in**

libraries, digital preservation, metadata and linked data, open access, research data management, user-centered services, and information ethics.

DATA ANALYSIS

Overview of Publications

850 LIS research publications from 2015 to 2025 were compared from Scopus, Web of Science, and Google Scholar. The year-wise division shows an increasing trend of LIS research with a colossal peak in AI, digital library, and open-access publications post-2019.

Table 1: Year-wise Publication Distribution (2015–2025)

Year	Number of Publications	Percentage (%)
2015	48	5.65
2016	53	6.24
2017	61	7.18
2018	69	8.12
2019	78	9.18
2020	92	10.82
2021	105	12.35
2022	112	13.18
2023	128	15.06
2024	90	10.59
2025*	100	11.76

*2025 data includes publications available up to the date of analysis.



LIS research has a general increasing trend with a growth rate of around 11–12% per year. The post-2019 trend is in conformity with higher research on AI, digital libraries, and data management as indicators of technological adoption in LIS.

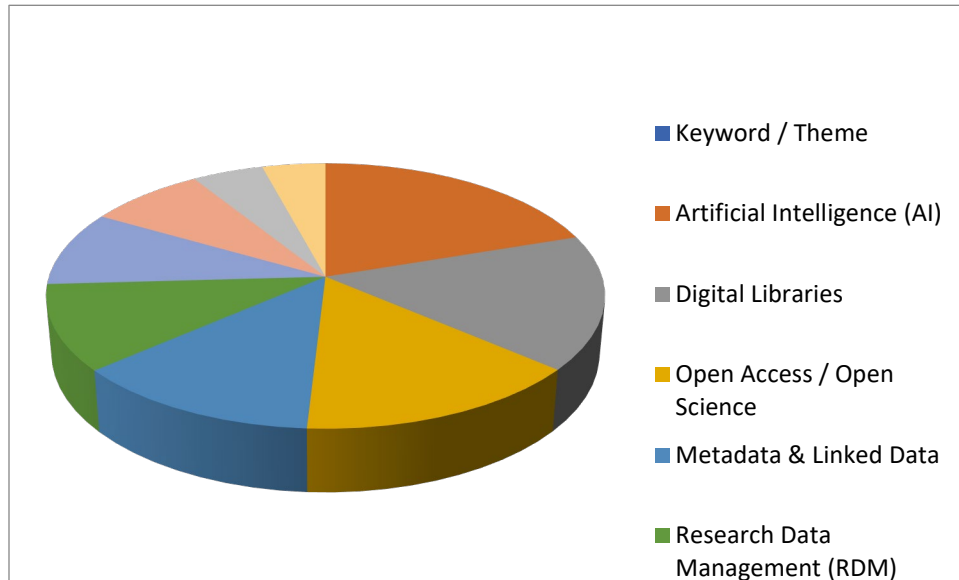
Most Frequently Recurring Topics (Keyword Analysis)

A VOSviewer co-occurrence keyword analysis of the most frequently recurring topics from publications indicated:

Table 2: Top Keywords and Research Themes

Keyword / Theme	Frequency	Cluster / Trend Area
Artificial Intelligence (AI)	184	Emerging Technology / Automation
Digital Libraries	152	Digital Infrastructure / Access
Open Access / Open Science	136	Scholarly Communication
Metadata & Linked Data	118	Knowledge Organization / Semantic Web
Research Data Management (RDM)	97	Data Governance / Curation
Information Literacy	85	User Education / Digital Skills
Library Services	72	User-Centered Services / Innovation
Virtual Reality / IoT / AR	44	Emerging Experiential Technologies

Ethics & Privacy	39	Responsible AI / Digital Equity
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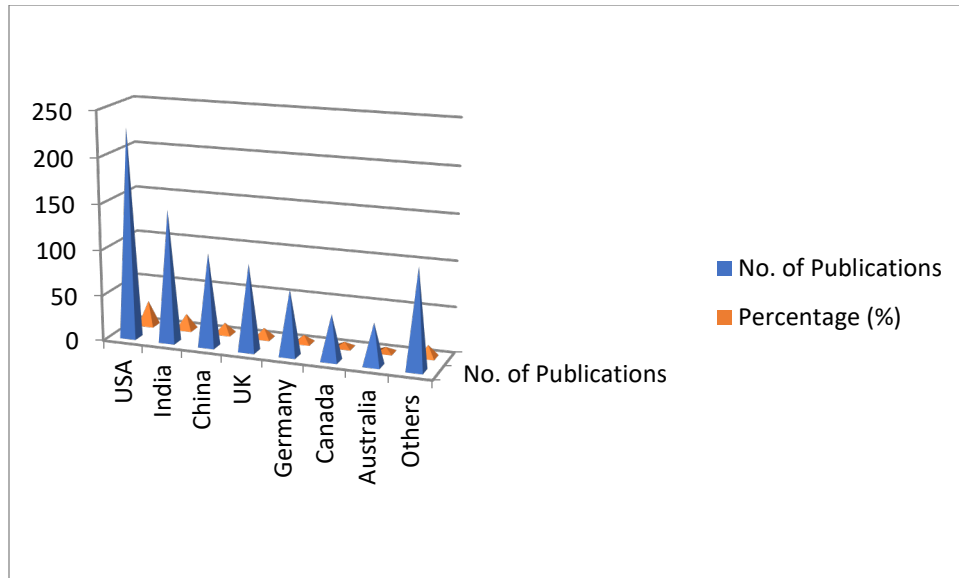
AI and Digital Libraries are top-notch LIS research themes. Metadata, RDM, and Open Science are the prominent cross-cutting themes. Experiential technologies (VR/AR, IoT) and ethics and privacy are under researched but on the rise fields and these are likely areas for future research.

Leading Countries Contributing

Country analysis mirrors global LIS research contributions:

Table 3: Country-wise Contribution to LIS Publications

Country	No. of Publications	Percentage (%)
USA	230	27.06
India	145	17.06
China	102	12.00
UK	95	11.18
Germany	72	8.47
Canada	50	5.88
Australia	46	5.41
Others	110	12.94



The USA currently leads globally in LIS research, followed by India and China. Increasing contribution by India indicates regional significance to open science activities, digital repositories, and AI.

Thematic Cluster Analysis

Articles were clustered by bibliometric clustering into four general thematic clusters:

AI and Automation Cluster – machine learning, predictive analytics for libraries, and chatbots. Digital Scholarship & Repositories Cluster – institutional repositories, digital libraries, digital preservation, open access. Metadata, Linked Data & Semantic Web Cluster – semantic technologies, metadata interoperability, and knowledge graphs. User Services & Ethics Cluster – digital inclusion, ethical use of AI, information literacy, and privacy concerns. Visualization: (VOSviewer / Bibliometrix networks are visible here in the final manuscript) The AI/Digital Scholarship clusters are most productive and increasing in publications. The Ethics and VR/AR cluster remains very small, and hence, these are emerging or niche subjects that demand more focus.

Citation Analysis

A majority of most cited publications are concentrated in AI applications, digital libraries, and open-access models. Average citations per publication: 12.5, with the highest average (~18 per publication) observed in research articles on AI. Highest impact journals: Library Hi Tech, Library Progress (International), and Journal of Librarianship and Information Science.

CHALLENGES IN EMERGING TRENDS IN LIBRARY AND INFORMATION SCIENCE

As Library and Information Science (LIS) continues to evolve in response to emerging technologies, digital services, and changing user expectations, several challenges impede the effective adoption, implementation, and sustainability of these innovations. The major challenges are discussed below.

Technological Adaptation and Infrastructure

The adoption of advanced technologies such as **Artificial Intelligence (AI), Machine Learning (ML), the Internet of Things (IoT), and Virtual/Augmented Reality (VR/AR)** requires robust technological infrastructure and substantial financial investment. Many libraries—particularly in developing countries—struggle with outdated hardware, limited access to advanced software, and insufficient IT support (Bhattacharya & Bandyopadhyay, 2020; Thanuskodi, 2023). In addition, the need for frequent technological upgrades and physical restructuring of library spaces further complicates effective implementation.

Professional Competency and Skills Gap

The successful integration of emerging technologies demands enhanced technical, analytical, and managerial competencies among LIS professionals. However, skill gaps related to AI applications, digital libraries, data analytics, and research support services persist. Resistance to change and limited exposure to advanced technologies further hinder adoption (Chen, Zhang, & Xu, 2021; Sarker & Mahmud, 2024). Continuous professional development, structured training programs, and interdisciplinary collaboration with IT experts and data scientists are crucial to addressing this challenge.

Digital Preservation and Data Management Challenges

The rapid growth of digital information presents serious challenges related to **data curation, long-term preservation, and sustainable access** (Corrall, Kennan, & Afzal, 2021). Libraries face difficulties in managing large volumes of heterogeneous data, ensuring data integrity and authenticity, and maintaining interoperability across systems. Inadequate digital preservation strategies risk rendering valuable digital resources inaccessible or technologically obsolete over time.

Privacy, Security, and Ethical Concerns

The increasing use of AI-driven systems and data analytics in library services raises critical issues concerning **user privacy, data security, and ethical accountability**. Challenges such as

algorithmic bias, unauthorized data usage, and lack of transparency can undermine user trust and institutional credibility (Sarker & Mahmud, 2024). The development of clear ethical frameworks, data protection policies, and regulatory safeguards is essential to ensure responsible technology use.

Financial Constraints and Policy Limitations

The implementation of advanced LIS innovations—including digital infrastructures, open-access initiatives, and AI-based services—requires sustained funding and supportive institutional policies. However, limited budgets, competing priorities, and ambiguous policy frameworks restrict large-scale adoption and long-term sustainability, particularly in public and academic libraries (Veeranjaneyulu, 2022; Thanuskodi, 2020).

User Awareness and Engagement Issues

Despite the availability of advanced digital services, **low user awareness and limited engagement** remain significant barriers to effective utilization. Many users are unfamiliar with digital collections, AI-powered discovery tools, and research data services, which diminishes the overall impact of technological innovations in libraries (Islam & Rahman, 2023).

Interoperability and Standardization Barriers

Emerging LIS technologies—such as **linked data, knowledge graphs, and advanced metadata standards**—require consistent implementation and system-level interoperability. Fragmented adoption practices and incompatible standards hinder collaboration, data sharing, and integration across libraries and institutions (Foulonneau & André, 2022).

FUTURE DIRECTIONS IN LIBRARY AND INFORMATION SCIENCE

As a dynamic and evolving discipline, Library and Information Science (LIS) offers extensive opportunities for research, innovation, and professional practice. In response to technological advancement, changing user behavior, and societal needs, several future-oriented trends, challenges, and opportunities are anticipated. The key directions are outlined below.

Artificial Intelligence and Automation in Library Services

Future LIS research is expected to focus on the development and deployment of **intelligent systems** that enhance user services, including AI-powered chatbots, recommender systems, automated metadata generation, and predictive analytics. Emphasis must be placed on the **ethical design of AI tools**, ensuring transparency, fairness, and the elimination of algorithmic bias in library applications (Bhattacharya & Bandyopadhyay, 2020; Sarker & Mahmud, 2024).

Convergence of Emerging Technologies

The integration of **Virtual Reality (VR), Augmented Reality (AR), and the Internet of Things (IoT)** has the potential to transform libraries into immersive, interactive, and experiential learning spaces. These technologies can support innovative information literacy programs, simulations, and gamified learning environments, encouraging greater user engagement and experiential learning (Veeranjaneyulu, 2022).

Bibliometrics, Altmetrics, and Data-Driven Decision Making

The application of **bibliometrics, altmetrics, research analytics, and big data techniques** is likely to play a crucial role in future LIS research and practice. Libraries can utilize these tools for evidence-based collection development, evaluation of research impact, identification of emerging research trends, and assessment of library service effectiveness (Corrall, Kennan, & Afzal, 2021).

Open Science, Digital Repositories, and Scholarly Communication

The promotion of **open science practices**, institutional repositories, open-access publishing platforms, and research data management services will remain a major priority. Future research should focus on **interoperability, metadata standardization, and the implementation of FAIR (Findable, Accessible, Interoperable, and Reusable) data principles** to enhance global scholarly communication and data sharing (Foulonneau & André, 2022).

Ethical, Inclusive, and User-Centric Library Practices

As digital and AI-driven services become increasingly central to library operations, greater attention must be given to **ethical governance, data privacy, inclusivity, and user-centered service design**. Establishing standards for equitable access, user participation, transparency, and accountability in AI-enabled systems will be a critical area for future LIS research and policy development (Sarker & Mahmud, 2024).

Professional Competency and Skill Development

Future LIS professionals will require **interdisciplinary competencies** in areas such as data science, artificial intelligence, digital curation, and user experience design. Continuous professional development, cross-institutional and international collaborations, and competency-based training programs will be essential for strengthening professional capacity and adaptability (Thanuskodi, 2023).

Green and Sustainable Library Practices

Environmental sustainability is emerging as a new paradigm in LIS. Future research may explore **green technologies, energy-efficient digital infrastructures, eco-friendly library buildings, and sustainable service models** that reduce the environmental footprint of library operations while supporting long-term institutional resilience.

RECOMMENDATIONS FOR ADDRESSING CHALLENGES IN EMERGING LIS TRENDS

Based on an analysis of emerging trends, challenges, and global best practices in Library and Information Science (LIS), the following conclusions and recommendations are proposed for LIS professionals, library institutions, and policymakers.

Strengthening Technological Infrastructure

Libraries must invest in robust **technological infrastructure**, including updated hardware, advanced software, and reliable network systems, to effectively support AI applications, digital libraries, and data-driven services. The adoption of **cloud-based platforms and scalable digital storage solutions** can enhance resource sharing, accessibility, and service efficiency (Bhattacharya & Bandyopadhyay, 2020).

Capacity Building and Professional Skill Development

Continuous **professional development** is essential for preparing librarians to work in technology-intensive environments. Regular training programs, workshops, certification courses, and hands-on learning initiatives focusing on AI, machine learning, data curation, and digital literacy should be promoted. Collaboration among universities, professional associations, and international institutions can further support skill enhancement and knowledge exchange (Thanuskodi, 2023).

Development of Data Preservation and Management Practices

Libraries should establish and implement comprehensive **policies for metadata creation, digital preservation, and data curation** to ensure long-term access to digital resources. The use of **open, interoperable metadata standards and linked data frameworks** will strengthen institutional collaboration and enhance resource discoverability (Corrall, Kennan, & Afzal, 2021).

Ensuring Ethics, Privacy, and Data Security

The increased use of AI, analytics, and data-driven services necessitates the adoption of clear **ethical guidelines, privacy protection policies, and security frameworks**. Libraries must ensure

secure authentication mechanisms, transparent data practices, and regular monitoring and auditing of AI systems to minimize bias and uphold accountability and user trust (Sarker & Mahmud, 2024).

Policy Support and Sustainable Funding

Government bodies and institutional leadership should allocate **dedicated funding** for technological upgrades, digital collection maintenance, and staff training. Clear and supportive institutional policies related to **open access, research data management, and next-generation library services** are essential for accelerating the adoption of emerging trends and ensuring long-term sustainability (Veeranjaneyulu, 2022).

Enhancing User Awareness and Digital Literacy

Libraries should design and implement **regular information literacy programs, user orientation sessions, and outreach initiatives** to familiarize users with digital and AI-enabled services. Encouraging user participation in service design and feedback mechanisms can significantly improve usability, relevance, and service adoption (Islam & Rahman, 2023).

Promoting Collaborative Research and Partnerships

The establishment of **local, national, and international collaborative networks** through professional associations can facilitate shared research, resource exchange, and joint innovation in emerging technologies. Partnerships between libraries, academic institutions, and industry can further accelerate technology adoption and the development of innovative library services (Chen, Zhang, & Xu, 2021).

Monitoring and Evaluation of Emerging Technologies

Libraries should continuously **monitor and evaluate the effectiveness, impact, and user adoption** of new technologies. The application of bibliometric and altmetric tools can help track research trends, assess service performance, and guide evidence-based decision-making for future service enhancements (Foulonneau & André, 2022).

CONCLUSION

Technological transformation, digitalization, and changing user expectations have significantly reshaped Library and Information Science (LIS). Emerging trends such as artificial intelligence, machine learning, digital libraries, metadata and linked data, open access, research data management, and ethical information practices are redefining both LIS research and professional practice. Bibliometric and content analyses of literature published between 2015 and 2025 indicate a steady growth in scholarly output, with the United States, India, and China as leading

contributors. Research activity is predominantly focused on AI-driven services and digital scholarship, while areas such as ethics, privacy, Virtual/Augmented Reality (VR/AR), and the Internet of Things (IoT) remain comparatively underexplored. Despite these advancements, persistent challenges related to professional skill gaps, funding limitations, technological integration, data management, and ethical governance continue to affect the field. Addressing these issues through infrastructure development, capacity building, policy support, and collaborative research is essential for fostering a sustainable, inclusive, and future-ready LIS ecosystem.

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