International and Asian Digital Library Development: Past, Present, and Future

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NSF DLI1, DLI2, NSDL,
DG, ITR, IDM, CSS,
ICADL, JCDL
Outline

• Introduction
• Digital library development in the Asia Pacific
• Recent digital library development in North America
• Summary from NSF Chatham workshop
• Samples of Major DL Research in Asia Pacific
• Conclusions
Introduction
Introduction

• Digital libraries represent a form of information technology in which social impact matters as much as technological advancement.
• Over the past decade the development of digital library activities has been steadily increasing.
• International conferences in digital library have proliferated from their roots of ACM and IEEE Digital Conferences (and then the Joint Conference on Digital Libraries, JCDL) to the European version of ECDL (European Conference on Digital Libraries) and the Asian version of ICADL (International Conference of Asian Digital Libraries).
DLI Program Implementation History

Digital Libraries Initiative – Phase 1 (1994-98)
  Sponsors: NSF, DARPA, NASA
  76 Proposals, 6 Awards, $25M total

Digital Libraries Initiative – Phase 2 (1999-03)
  Sponsors: NSF, DARPA, NASA, NIH/NLM, NEH
  Partners: IMLS, Smithsonian Institution, NARA
  ~300 Proposals, 34 Awards, $48M total

International Digital Libraries Cooperative Research Initiative (1999-03)
  Sponsors: NSF, JISC, DFG
  ~60 Proposals, 16 Awards (6 with JISC, 4 with DFG), $6M NSF total

  More than 160 projects with education focus
<table>
<thead>
<tr>
<th>Year</th>
<th>Milestones</th>
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<tbody>
<tr>
<td>1994</td>
<td>• NSF Digital Library Initiative Phase 1 (DLI-1)</td>
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<tr>
<td></td>
<td>• The First Annual Conference on the Theory and Practice of Digital Libraries, College Station, Texas</td>
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<td>1995</td>
<td>• First IEEE Advances in Digital Libraries Conference, McLean, Virginia</td>
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<td>1996</td>
<td>• First ACM Conference on Digital Libraries, Bethesda, Maryland</td>
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<td>1997</td>
<td>• First European Conference on Research and Advanced Technology for Digital Libraries (ECDL), Pisa, Italy</td>
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<td>1998</td>
<td>• First International Conference on Asian Digital Libraries (ICADL 1998), Hong Kong, China</td>
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<td>1999</td>
<td>• President’s Information Technology Advisory Committee (PITAC) Report</td>
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<tr>
<td></td>
<td>• NSF Digital Library Initiative Phase 2 (DLI-2)</td>
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<td></td>
<td>• NSF National Science, Mathematics, Engineering, and Technology Digital Library (NSDL) Program</td>
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<tr>
<td></td>
<td>• ICADL 1999, Taipei, Taiwan</td>
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<td>2000</td>
<td>• ICADL 2000, Seoul, Korea</td>
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<td>2001</td>
<td>• ICADL 2001, Bangalore, India</td>
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<td></td>
<td>• First ACM/IEEE-CS Joint Conference on Digital Libraries (JCDL 2001), Roanoke, Virginia</td>
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<tr>
<td>2002</td>
<td>• ICADL 2002, Singapore</td>
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<td>2003</td>
<td>• ICADL 2003, Kuala Lumpur, Malaysia</td>
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<tr>
<td>2004</td>
<td>• JCDL 2004, Tucson, Arizona</td>
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<td></td>
<td>• ICADL 2004, Shanghai, China</td>
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</table>
Digital Library Development in Asia Pacific (An ICADL Analysis)
Overview of ICADL

- ICADL (International Conference of Asian Digital Libraries)

- Overview of ICADL
  - 80 participants in Hong Kong in 1998 (host: CS)
  - 150+ participants in Taipei, Taiwan in 1999 (host: LIS)
  - 300+ participants in Seoul, Korea in 2000 (host: CS)
  - 600+ participants in Bangalore, India in 2001 (host: LIS)
  - 400+ participants in Singapore in 2002 (host: LIS)
  - 350+ participants in Kuala Lumpur, Malaysia in 2003 (host: NLM)
  - 400+ participants in Shanghai, China (host: LIS)
  - 300+ participants in Bangkok, Thailand (host: LIS)
  - 300+ participants in Kyoto, Japan (host: LIS)

- The next (10th) ICADL 2007 is scheduled to be held in Hanoi, Vietnam (host: LIS)
Overview of ICADL

• Through a meta-analysis of the publications and content within ICADL over the past 6 years, we identified
  – the **countries and institutions** that have contributed and participated
  – the various **disciplines** involved
  – the **research focus** of each region can be ascertained.
## Summary on Participation of ICADL Conferences

<table>
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<tbody>
<tr>
<td># of Papers</td>
<td>23</td>
<td>18</td>
<td>37</td>
<td>34</td>
<td>54</td>
<td>71+</td>
<td>73</td>
<td>57</td>
<td>66</td>
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<tr>
<td># of Papers from Asia</td>
<td>18</td>
<td>14</td>
<td>26</td>
<td>25+</td>
<td>31+</td>
<td>53</td>
<td>54</td>
<td>40</td>
<td>49</td>
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<tr>
<td># of Countries (regions)</td>
<td>7</td>
<td>7</td>
<td>12</td>
<td>12</td>
<td>20</td>
<td>16</td>
<td>17</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td># of Countries from Asia</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>12</td>
<td>11</td>
<td>12</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td># of Institutions</td>
<td>17+</td>
<td>14+</td>
<td>31+</td>
<td>33+</td>
<td>55+</td>
<td>54+</td>
<td>61+</td>
<td>77+</td>
<td>83+</td>
</tr>
<tr>
<td># of Institutions from Asia</td>
<td>12+</td>
<td>10+</td>
<td>21+</td>
<td>22+</td>
<td>23+</td>
<td>39+</td>
<td>44+</td>
<td>50+</td>
<td>62+</td>
</tr>
<tr>
<td># of Academic Departments/Disciplines</td>
<td>6+</td>
<td>6+</td>
<td>8+</td>
<td>8+</td>
<td>11+</td>
<td>17+</td>
<td>18+</td>
<td>18+</td>
<td>22+</td>
</tr>
</tbody>
</table>
Summary on Participation of ICADL Conferences

• Countries/regions that participated in past ICADLs
  – Asia Pacific countries
    • Mainland China, Hong Kong, Taiwan, Singapore, Korea, India, Malaysia, Japan, Thailand, New Zealand, Australia, etc.
  – Other countries
    • USA, Canada, Germany, Greece, Portugal, Denmark, Bonn, Spain, UK, Amsterdam, Italy, Netherlands, etc.
Summary on Participation of ICADL Conferences

• Various departments that participated in past ICADLs
  – Information Science (Studies)
  – Library Science
  – Management Information Systems
  – Computer Science
  – Information, System, or Electrical Engineering
  – Others such as Communication, Education, Anthropology, Geography, Mathematics, Linguistics, and Medical Informatics
Increase of Papers Accepted in ICADL
Increase of Countries Represented in ICADL

- # of Countries
- # of Countries from Asia
Increase of Institutions Represented in ICADL
Increase of Academic Departments (Disciplines)
Topical Analysis in ICADL

• Digital library research is not restricted to only technical aspects; it involves social aspects as well.
• From a **technological perspective**, digital libraries are a set of electronic resources that are built to help create, search, and use information.
• From a **sociological perspective**, digital libraries are constructed by a community of users who use the system to better support their informational needs and applications. (Borgman, 1998)
Topical Analysis: Technical Aspect

• Content Building and Management
  – Digital library collections are often selected by existing library collections or development/archival criteria (Smith, 1998).
  – e.g.
    • **HelpfulMed**, developed at the University of Arizona, provides medical information not only from web pages but also from a variety of online medical databases (Chen, 2001).
    • The **Greenstone Digital Library Software** produced by the New Zealand Digital Library Project has been used to build many digital library collections all over the world (Witten, 2002).
Topical Analysis: Technical Aspect

- **Text Indexing and Retrieval**
  - Indexing is another rapidly growing topic of interest in digital libraries.
  - The ability to correctly index *Asian languages* becomes challenging due to the lack of explicit word boundaries inherent in the language (Yang et al., 1998).
  - e.g.
    - Yang et al. (1998) compared n-gram and mutual information-based indexing approaches for the Chinese.
    - Ong and Chen (1999) presented a Chinese phrase extraction algorithm using an updateable PAT-tree algorithm.
Topical Analysis: Technical Aspect

- Document Summarization and Categorization
  - Summarization offers a concise representation of a document and reduces its overall size and complexity.
  - e.g.
    - Summarization techniques have been developed for Asian languages such as Chinese (Yeh et al., 2002; Tang et al., 2000).
  - Text categorization is the process of assigning documents to one or more predefined categories based on their content.
  - e.g.
    - Heß and Drobnik (1999) proposed a clustering algorithm which analyzed hyperlinks of web pages.
    - Jones and Mahoui (2000) described a key phrase-based hierarchical categorization approach.
Topical Analysis: Technical Aspect

- Personalization and Visualization
  - Personalization provides the ability for users to create their own profiles based on their interests, behaviors, and activities.
  - e.g.
    - Chan et al. (2001) described a personalized categorization system in which a user could define his/her own category names.
    - Renda and Straccia (2002) presented a personalized collaborative digital library system where users could organize the information according to their own interests.
  - Information visualization is also necessary when designing a human-computer interface to effectively explore information.
  - e.g.
    - Yang and Kao (1999) considered a 2D presentation of hierarchical information structure called Core Trees.
Topical Analysis: Technical Aspect

• Interoperability
  – Interoperability in digital library concerns the need for and benefits of integrating distributed collections and systems.
  – Research in this area includes Metadata Encoding and Transmission Standard (METS), Open Archival Information System (OAIS), and Open Archives Initiative (OAI).
  – e.g.
    • Existing common metadata schemas such as Dublin Core and Resource Discovery Framework (RDF) were widely adopted in Asian digital library projects (Yang et al., 1998; Lo and Chen, 1999; Chen et al., 2001).
    • Several prototype systems based on OAI protocol were presented in past ICADL conferences (Boone and Pennington, 2001; Chen and Chen, 2002).
Topical Analysis: Technical Aspect

- Multimedia Digital Libraries
  - Multimedia collections can contain images, audio, and video representations.
  - Research areas involving the searching and browsing techniques of these content collections have increased.
  - e.g.
    - Cha and Chung (2000) introduced a system for lecture (audio) databases.
    - Rowe et al. (2001) described a 3D retrieval system for American ceramic vessels.
    - Bainbridge et al. (2002) evaluated different symbolic music matching strategies.
Topical Analysis: Social Aspect

• User Studies
  – User studies provide a glimpse into understanding the users’ behavioral patterns when seeking information.
  – e.g.
    • Liew et al. (2000) conducted an empirical evaluation to study the design of e-journals and how users interacted with them.

• Usage Log Analysis
  – This technique analyzes the use of terms, operators, and number of queries per search from usage logs to provide a better understanding of digital library usage, user information needs, and system effectiveness.
  – e.g.
    • Cunningham and Mahoui (2000) collected usage logs for two digital library systems and compared different searching behaviors.
Topical Analysis: Social Aspect

• Multicultural Issues
  – In Asian digital library applications, there are countless scenarios that involve creating and distributing locally produced information collections.
  – e.g.
    • INFLIBNT project aimed at creating a digital library of theses and dissertations from India (Vijayakumar and Murthy, 2001).
    • The Tsinghua University Architecture Digital Library developed a prototype system to provide rich, valuable resources for traditional Chinese architecture research and education (Xing et al., 2002).
Topical Analysis: Social Aspect

- **Asian Languages and Cross-lingual Issues**
  - A crucial feature of Asian digital libraries is the ability to work in various local languages.
  - **Chinese, Japanese, Korean, Indian, Malaysian, and Thai language processing techniques** have been reported.
  - e.g.
    - Wong and Li (1998) and Yang et al. (1998) both studied Chinese information retrieval and discussed issues related to Chinese language indexing techniques.
    - Theeramunkong et al. (2002) investigated using n-gram and HMM approaches for Thai OCR application.
Topical Analysis: Social Aspect

• Asian Languages and Cross-lingual Issues (cont’d)
  – Cross-lingual information retrieval between English and Asian languages has been more widely studied in ICADL conferences than in other western digital library conferences.
  – e.g.
    • Qin et al. (2003) presented an English-Chinese cross-lingual Web retrieval system in the business domain.
    • Sugimoto (2001) presented a multilingual document browsing tool and its metadata creation carried out at ULIS.
Other Related Conferences in Asia Pacific

• The 12th International Conference on New Information Technology
  – Held at Tsinghua University, Beijing, in May 2001
  – Chaired by Ching-chih Chen
  – Twelve International Conferences on New Information Technology (NIT) in various places, including Asian countries such as Thailand, Singapore, Hong Kong, Vietnam, and Taiwan.
  – Has helped to encourage international collaboration among information and library professionals.
Other Related Conferences in Asia Pacific

• The China Conference on Digital Library (CCDL), China
  – Held in Beijing in 2002 and 2004
  – Hosted by the National Library of China
  – More than 100 papers were published in the proceedings with participants from more than 140 digital libraries and information institutions. Largest DL exhibits (150+ exhibitors)

• The International Symposium on Digital Libraries (ISDL), Japan
  – Hosted by the University of Library and Information Science (ULIS) in Japan and attracted significant Asian and international participation

• The International Conference on Digital Libraries (ICDL), India
  – Held in New Delhi, India in 2004 and 2006
  – Hosted by TERI; Keynote address by President of India
  – Largest DL conference: 800+ participants
Selected Digital Library Development in North America
Overview of JCDL

- Joint IEEE-CS/ACM Conference on Digital Libraries (JCDL)
- The 4th JCDL was recently held in Tucson, Arizona on June 7-11, 2004.
  - Co-Chairs:
    - Hsinchun Chen, University of Arizona
    - Howard Wactlar, Carnegie Mellon University
    - Ching-chih Chen, Simmons College
# Summary on Participation of JCDL’04

<table>
<thead>
<tr>
<th>JCDL 2004 summary</th>
<th>Participation number</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td># of Papers</td>
<td>61</td>
<td>50 papers are from USA and 11 from other countries. 200+ submissions.</td>
</tr>
<tr>
<td># of Countries</td>
<td>12</td>
<td>Participating countries include: USA, Canada, the Netherlands, Portugal, the United Kingdom, Brazil, Australia, New Zealand, China, Taiwan, Japan, etc.</td>
</tr>
<tr>
<td># of Institutions / Disciplines</td>
<td>78</td>
<td>61 out of 78 are US institutions and 17 are institutions from other countries.</td>
</tr>
<tr>
<td># of Participants</td>
<td>450</td>
<td>Panels, paper sessions, tutorials, workshops</td>
</tr>
</tbody>
</table>
JCDL’04 Topical Analysis

• **Content Building and Management**
  – 6 papers addressed research in this area.
    • Dalal et al. showed their research on managing distributed collections on the Web.
    • Qin et al. studied a meta-search enhanced spider algorithm in domain-specific Web collection.

• **Text Indexing and Retrieval**
  – 5 papers addressed research in this area.
    • Yang and Li proposed a statistical approach to segment Chinese texts which deals with unknown Chinese terms.
    • Roussinov and Robles studied Web question answering system through automatically learned patterns.
JCDL’04 Topical Analysis

• Personalization and Visualization
  – 6 papers addressed research in this area
    • Marshall and Brush investigated the differences between personal and public annotations.
    • Shipman et al. studied creating personal digital libraries.

• Interchange and interoperability
  – 6 papers addressed research in this area
    • Petinot et al. used CiteSeer-API which ensure the interoperability of CiteSeer services with heterogeneous digital library systems.
    • Kochumman et al. reported their TEI-based format as an digital representation for information interchange.
JCDL’04 Topical Analysis

• Multimedia Digital Libraries
  – 5 papers addressed research in this area
    • Yang and Hauptmann proposed video grammar for locating named person in broadcast news video.
    • Wang et al. described their approach of automatic generation of semantic metadata describing spatial relations.

• Educational Aspects in Digital Libraries
  – 5 papers addressed research in this area
    • Pan et al. described their user evaluation of K-MODDL in an undergraduate class.
    • Bartolo et al. investigated MatML software application in assisting e-learning.
Transforming the Information Landscape: Research Directions for Digital Libraries

Report of the NSF Workshop on Research Directions for Digital Libraries*

Ronald L. Larsen
School of Information Sciences
University of Pittsburgh

*Knowledge Lost in Information, NSF Award No. IIS-0331314
Overview of NSF Digital Library Program

- Digital library research has become the most interdisciplinary area at NSF, including researchers from 35 different academic departments.
- The program has also engaged significant international partners, such as United Kingdom and Germany.
- The scope of information created and examined have moved well beyond text to include CT-scans of fossils, images of dolphin fins, and videos of human motion.
- This enables more sophisticated analysis in domains that range from archaeology and paleontology to physiology.
Sample Accomplishments

– The **Google search engine**, based upon ideas created and explored in the Stanford University database group.

– **LOCKSS** (“Lots of Copies Keep Stuff Safe”) at Stanford with an NSF SGER award.

– The **National Gallery of the Spoken Word** at Michigan State University

– **COPLINK: Google for COPS** at University of Arizona; deployed in 100+ police and intelligence agencies ➔ Dark Web (terrorists and terrorism)
Workshop Background

• DLI over, DLI2 winding down
• What is next?
  – Did we finish the job? Are we done?
• What have we learned?
  – What constitutes DL research?
  – Does it influence other disciplines?
• Should DL change from “Initiative” to “Program”?
Emerging U.S. Vision for DL’s

Next generation digital libraries will be:

• A confluence of resources, technology and infrastructure
• An intersection of national priorities and scientific goals
• A common testbed for all computer and information science research (sub)disciplines
• Federated resources serving individuals, institutions and governments simultaneously
• A progression from information to knowledge
Users

- **Cognitive Completion**
  - MS spell-checker for facts and knowledge
  - Task and user context sensitive
- **Do what I mean**
  - Find what I need
  - Be aware of what I know
- **Collaboration**
  - Identifying the collegial context
  - Providing contextual guidance
- **Managing personal libraries**
  - All that is seen and heard
  - Personal memory assistant
National priorities influence IT research agenda

Advances in Science and Engineering

Information

Technology

Research

Economic Prosperity and Vibrant Civil Society

National and Homeland Security

Digital Libraries form the Enabling Resources, Technology & Infrastructure
National priorities influence IT research agenda

• Advances in Science and Engineering
  – Advance the frontiers of science and engineering research and education
  – Examples include those that collect, disseminate, and analyze observational or experimental data, or data from models or simulations

• Economic Prosperity and Vibrant Civil Society
  – Human and socio-technical aspects of current and future distributed information
  – Topics include business, work, health, government, learning, and community, and their related policy implications.

• National and Homeland Security
  – Robust Information Technology to protect critical infrastructures and support the understanding of threats to national security
  – Examples include collaborative knowledge environments, knowledge discovery, medical informatics, information extraction and fusion, cross-linguality, spoken language and imagery, social network analysis
Recommendations

- $20M / year for new U.S. research
  - Search, context, extraction, ubiquity, productivity

- $40M / year for sustaining evolving resources in the U.S.
  - Acquisition, access, usage, stewardship, management

- Coordinate with Advanced Cyberinfrastructure Program
A proposed **digital library infrastructure program** provides sustainability of digital knowledge resources along five dimensions:

- Acquisition of new information resources
- Effective access mechanisms that span media type, mode, and language
- Facilities to leverage the utilization of humankind’s knowledge resources
- Assured stewardship over humanity’s scholarly and cultural legacy
- Efficient and accountable management of system, services and resources
Samples of Significant Digital Library Research in Asia Pacific: Capturing Cultural Heritage and Indigenous Knowledge
International Islamic Digital Library – Malaysia
International Islamic Digital Library – Malaysia

• **Focus**
  – To provide information on Islam and Muslims around the world
  – To act as a referral centre to direct information enquiries on Islam to the appropriate sources
  – To promote sharing and exchange of knowledge among scholars of Islam and those interested in it
  – To enable the world to understand Islam better

• **Partners**
  – National Library of Malaysia
  – Universiti Kebangsaan Malaysia (UKM)
  – Islamic Development Department Of Malaysia (JAKIM)
  – University Malaya (UM)
  – Multimedia Development Corporation (MDeC)
  – International Islamic University Malaysia (IIUM)
  – Institute of Islamic Understanding (IKIM)

[http://www.iidl.net](http://www.iidl.net)
International Islamic Digital Library – Malaysia

- **Contents**
  - Books,
  - Manuscripts,
  - Special collections,
  - Theses and articles,
  - Journals and conferences papers,
  - Pictures, audios and videos

- **Service**
  - Four languages: English, Arabic, Malay, and French
  - Category browse: Materials, subjects, and focus group
  - Search: Quick search and advanced search
  - Tools: Forum, date conversion and Zakat conversion
  - My IIDL page: To do list, favorite collections, saved search and bookmarks
  - Putrajaya Mosque Virtual Tour
  - 3D AlQuran Manuscript

http://www.iidl.net
International Islamic Digital Library – Malaysia

- **Impact**
  - Convergence of information on Islam - gateway of resources on Islam via a common interface
  - Powerful education tool - to inform, educate and provide reliable information on Islam
  - Preservation - collecting and preserving the wealth of tradition, heritage and a unique, complete way of life
  - Global accessibility - accessible to the global community through a common interface
  - Synergistic collaboration - galvanize meaningful cooperation among institutions, libraries and individuals at national, regional and international levels

http://www.iidl.net
Screenshots - Homepage
Screenshots - Search
Screenshot – 3D AlQuran Manuscript

Manuscript Illumination

These manuscripts are available for viewing:

- MSS 323
- MSS 3237
- MSS 3264
- MSS 1960
- MSS 3238
Technology Development for Indian Languages – India
Focus

- To develop information processing tools to facilitate human machine interaction in Indian languages and multi-lingual knowledge resources.
- To support R&D efforts in the area of information processing in Indian Languages and to support research on knowledge tools: representation, integration, compression and learning methodologies.
- To consolidate technologies thus developed for Indian languages and integrate these to develop innovative user products and services.
Technology Development for Indian Languages – India

- **Funding**
  - Ministry of Information Technology, India

- **Partners**
  - Indian Institute of Technology, Kanpur Hindi, Nepali
  - Indian Institute of Technology, Mumbai Marathi, Konkani
  - Indian Institute of Technology, Guwahati Assamese, Manipuri
Technology Development for Indian Languages – India

- Multi-lingual dictionaries,
- Thesauri,
- Educational software,
- Encyclopedia,
- Gyan-nidhi creative writing system,
- Translation support systems,
- OCR,
- Text-to-speech & speech recognition system,
- Pocket translator,
- Personal digital assistants,
- Reading machine for blinds & deaf,
- Portals,
- e-governance / e-commerce / e-skills.

http://www.tdil.mit.gov.in
Technology Development for Indian Languages – India

• Impact
  – In Indian Language Processing (ILP)
  – In Translation support systems
  – In Human-machine Interface Systems
  – Standard on Indian languages

http://www.tdil.mit.gov.in
China Digital Library – China
China Digital Library – China

- **Focus**
  - Strengthen and protect the cultural tradition and heritage
  - Enhance the usage and sharing of information resource
  - Serve the national projects and related researches

http://www.nlc.gov.cn
China Digital Library – China

- Funding
  - 10th “Five-year Project”
  - Ministry of Culture, China

- Partners
  - National Library of China
  - Tsinghua University
  - Peking University
  - China Academy of Science
  - China Academy of Social Science
  - etc. (more than 100 different types of libraries and partners)

http://www.nlc.gov.cn
China Digital Library

• Contents
  – Digital provincial history
  – Digital Xixia Dynasty ancient books
  – Digital Dunhuang cultural relic
  – Digital oracle inscriptions

• Service
  – Keyword search
  – Combine search
  – Shrink search
  – Map search

http://www.nlc.gov.cn
China Digital Library
China Digital Library

- Impact
  - Establishing a large Chinese information center of cultural heritage
  - Establishing communication center between China and other countries
  - Propelling the education and research in China
  - Developing the standard of digital library
  - Helping the protection and research on ancient books and materials

http://www.nlc.gov.cn
Digital Archives Program – Taiwan
Digital Archives Program – Taiwan

- **Focus**
  - Preserving cultural heritage and collections.
  - Strengthening culture heritage and guiding cultural development.
  - Popularizing knowledge and improving information sharing.
  - Enhancing education and life-long learning.
  - Invigorating cultural content and value-added industries.
  - Improving literacy, creativity and quality of life.
  - Promoting international cooperation and resource sharing.
Digital Archives Program – Taiwan

- **Funding**
  - $80M US Dollars

- **Partners**
  - Academia Historica
  - Academia Sinica
  - National Palace Museum
  - National Taiwan University
  - Council for Cultural Affairs
  - Central Library
  - Museum of History

http://www.ndap.org.tw
Digital Archives Program – Taiwan

- Content
  - 12 thematic groups for content:
    - Zoology
    - Botany
    - Geology
    - Anthropology
    - Archives
    - Artifacts
    - Calligraphy & Painting
    - Maps & Remote images
    - Stone & Bronze Rubbings
    - Rare Books
    - Archaeology
    - Journalism & Mass Media

- 6 working groups for technology:
  - Reference platform for digital archives
  - Naming and distributed searching
  - Formats of digital objects and archives
  - Digital archives services
  - Multimedia Digitization Process
  - Multilingual Information Process

http://www.ndap.org.tw
Digital Archives Program – Taiwan

http://www.ndap.org.tw
Digital Archives Program – Taiwan

Impact

- Popularizing Taiwan’s cultural holdings
- Encouraging knowledge sharing and value-added content production
- Promote the development of society, industry and economics

http://www.ndap.org.tw
Conclusions
Conclusions

• Digital library researchers in Asia Pacific are facing some challenges in common with researchers in the U.S., Europe, and other parts of the world.

• Research in Asia Pacific is uniquely positioned to help develop digital libraries of significant cultural heritage and indigenous knowledge and advance cross-cultural and cross-lingual digital library research.
DL Research After the First Decade –

Global Reach and Diverse Impact!
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