Technologies and Critical Issues involved in the Provision of Digital Information and Services

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Abstract
This paper discusses various issues involved in Planning and Implementing the Digital Services at Academic Libraries. It discusses the requirements in terms of infrastructure networking, security, storage and backup, policy for offering the healthy and efficient access to its users. It also highlights the need of competent skilled manpower. It gives an outlook into the different factors that are to be considered in design and development of Digital Services at Academic Libraries.

Keywords: Digital Services, Academic Libraries, Infrastructure, I.T. Policy.

Introduction
Digital Technologies have grown by leaps and bounds. With the ever burgeoning expansion in digital arena and its applications to the academic community, we are experiencing a change in the whole approach of a teacher and his students, there have been corresponding change with the work pattern of librarians and academic community.

Any academic library would like to offer basic digitisation services to its patrons. Library automation, OPAC, digital library services, providing digital formats to support the virtual classrooms, participating in academic chats, discussion groups, mailing lists are the most common services that are offered in any academic libraries.

Aiming towards zero downtime, high availability of digital network resources (24x7x365), easy access necessitates a proper planning in terms of its infrastructure, policies innovation to scale to a higher future needs and flexibility in accommodating changes, have become the need today.

This paper discusses the various issues involved in providing Digital information services in academic libraries. and analyses the factors that are to be considered in selecting server and client hardwares, operating systems, network connectivity, workflow, application packages and its compatible tools, handling common digital formats, skilled personnel, backup agents, etc.,

Need for a Road Map
Every academic library has to prepare a roadmap of its requirement and update the same periodically.

1. What are all the Digital Services it likes to offer :
   a. OPAC
   b. Online Databases
   c. Digital Library
   d. Reading Material uploading to E-Class
   e. Hosting a Mailing List, Discussion Forum
   f. Library Circulation, Accession, Reference, Classification, etc.,
      i. Books
      ii. Periodicals
      iii. Newspaper Clippings
      iv. Magazines
      v. Case Studies
      vi. Other documents

2. To whom the services are offered :
   a. Students/Professors belonging to that Particular University, other faculty members.
   b. Online Users
   c. Others

3. What could be the Number of Estimated Users
   a. Number of users who access the Campus-based resources from Remote places.
4. Defining the Workflow in managing the Digital Resources
5. What is the Back-up mechanism to be adopted
6. Budget Status and Recurring Expenditure
7. Availability of Skilled Professional Staff and continuous updation of skills
8. Security Issues with regard to Internet and Intranet Resources access
9. What are the tasks that could be Outsourced, its Financials
10. Well-Defined I.T Policy for Faculty, Students, Visitors, etc.,
11. Co-ordination from Parent organization, etc.,

Infrastructure – Hardware
Hardware is the fundamental equipment that needs to be in place to cater to any of the Digital Services. When deciding on the Hardware namely the Server, it is recommended that it possess the following features:

1. Diagnostics – Where the Server periodically runs a utility that allows the scanning of all its devices like RAM, HDD, Mother Board, NIC and generates a report. By receiving the Alert well before hand, the administrator can equip with the alternate solutions and achieve aero downtime.

2. Redundant Power Supply, Fans – These are bound to fail due to reasons like Electricity breakdowns, Heat generation and uptime like 730 days.

3. Rack Mount Servers – is recommended due to space constraint

4. Hard Disks – prone for wear and tear due to high uptime. Hardware Raid can be a solution in addition to SAN devices for optimum uptime environment.

5. Giga Port Ethernet Cards – Enables for Higher Speed of Transmission

6. Virtualisation of Servers is yet another technology that is being adopted in most of the places where there are different applications deployed on different Operating systems wherein the Server Hardware like Processors, Data Bus, HDD can be utilized to the optimum performance.

Network Components
The major component of any digital service is the networking devices and their access through defined access controls. Depending on the type of service - belonging to intranet or internet, the network is so designed that the application server is placed inside a server farm with LAN access defined. If the Server to be accessed on the WAN Link, ACLs are defined this can reach the Server through the managed switch in a secured manner.

Gateway Security - Unified Threat Management Switches or Equivalent Application packages.
The Servers that have the Applications like digital library, OPAC, library services, etc., needs to be protected from an external threats, Malicious attacks, viruses, SPAMs which can be achieved by installing an UTM Box (Unified Threat Management) or through installing and configuration required packages like Shorewall, Spamassassin, Clamav, etc.,

Managed Switches to achieve Performance, Healthy Access and End Point Security
It is recommended that the healthy access of information, network performance and end point security (isolating the infected laptops/clients, disabling the client engaged in undesirable activity) can be achieved through configuring managed switches to enable the safe ports for data transmission.

I.T. Policies
The Information Technology policy is well defined document with Dos and Don’ts at the University premises. Harassing or threatening use, attempts to defeat system security, unauthorized access or use, disguised use, distributing computer viruses, modification or removal of data or equipment, use of unauthorized devices, violating university data access policies, personal account responsibility, etc., are few of the issues that are be clearly laid down in order to establish and maintain a healthy access environment.

Application Packages for Digital Services
As discussed earlier, the digital services are achieved through an application software that is being installed on an operating system with required daemons that fetching the required resource to the users. The Application packages are recommended for open source environment which are tested and found to be stable and satisfactory. The present and proven technologies like Web2.0, RSS, RFID, etc are the features that are already present in these packages.

Defining Work Flow among the Library Professionals to maintain the Digital Services
Work Flow is yet another significant stage which enable the users with relevant information under each of the Subject communities on Digital Library, OPAC, Virtual Classrooms and library service packages.

Different privileges are to be decided by the Chief Librarian (Administrator) to allocate respective access to promote the upload of relevant materials, to reject the undesirable content posted to mailing lists, Digital Library, NewGenlib Services. This enforces complete security of the Database Access and also enables the users to obtain required information.

SSH Logins, Ftp Access, Moderator Access have to be clearly indicated before such privileges are opened to its users.
Information professionals also to be aware of the different File Formats to upload different content available on Digital formats like .docx, .pdf, .raw, .msg, wav, etc., The Compressing technologies like WinZip, Winrar to upload the compressed files.

**Backup Mechanism**

NAS or SAN devices are advisable to store the backup of the data on live digital services servers. The Backup mechanism should be so designed, that, the user does not loose data even during critical attacks and other breakdowns. The backup agent on the Backup Server (NAS or SAN) devices establishes contacts with the Servers at regular interval of time and backup up the defined directories. At the second phase, a copy of the Backed-up Data can also be stored on Tapes.

**Improving the Skill Set of Library Professionals**

It is a continuous process. Competent library professionals are most essential to maintain the Digital Services at the Academic Libraries. To operate the Application Servers, NAS and SAS devices, the server errors, minimum training is necessary to at least understand the reports that are generated from operating system and application packages. Constant updation of knowledge through mailing lists, self-education and participating in discussion groups widens one’s knowledge in serving its users.

**Scalability and Flexibility in Accommodating the Future Expansion**

The packages that are going to be deployed for use should have the feature for Scaling to a higher platform of Users, Standard Formats so that, it answers flexibility and enables easy migration.

**Conclusion**

The issues that were discussed are personal experience of the authors in maintaining the Digital Services at academic libraries. Few issues which are highlighted are the fundamental factors that need to be answered before the library decides to provide digital service.

Academic Libraries always have many deficiencies in successfully maintaining the services. They are dependent on parent organization for budget, technical support and sanctions. A competent and knowledgeable Library and Information professional can overcome such constraints by improving services offered at the Libraries, using his technical competence, skill and knowledge.

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<thead>
<tr>
<th>Sl. No.</th>
<th>Appropriate Digital Service - Application package</th>
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<tbody>
<tr>
<td>1.</td>
<td>Library Automation and OPAC Services <a href="http://www.verussolutions.biz">http://www.verussolutions.biz</a></td>
</tr>
<tr>
<td>2.</td>
<td>Digital Library Service <a href="http://www.dspace.org">http://www.dspace.org</a></td>
</tr>
<tr>
<td>4.</td>
<td>Online Databases that are subscribed by individual Universities or obtained through UGC Consortium- University Gateway IPNOs are to be provided to the Service Provider and appropriate Access Controls are to be defined at the University Gateway Services, such that the access is made available to all the LAN and Remote users.</td>
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