DESIGNING IMAGING SOLUTIONS FOR AN ORGANIZATION

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Keywords: Document management, document capture, workflow.

Abstract: In a business climate where organizations are looking for ways to cut costs and increase productivity, document imaging systems are providing the most dramatic impact. Efficient management of all physical documents is crucial to the success of any organization business community where most (as high as 90%) of corporate information resides in paper documents. A process driven document management system is necessary that converts paper documents into electronic documents for easy filing, retrieval and storage. This paper defines the methodology of system implementation at one of our large financial clients.

1 INTRODUCTION

In current business scenario, it is important for every organization to develop systems to store historical information and utilize the information to gain their own market share (Sivalanka, P.N., Agarwal, R. 2003). Past transactions are captured on paper and some future transactions need paper proof. Storage space for these physical documents and saving them thru calamities like fire, hurricanes, earthquake etc, is a growing challenge.

Imaging solutions is a technological solution that enables digitization of paper. Prior to converting a document into an online form, the technical communicator should have an understanding of information design. Information design is concerned with the visualization of a document, though it encompasses many disciplines, including human factors, psychology, graphic design, interface design, and technical writing. JoAnn Hackos (Hackos, J.T. 1997) states, "Good information design begins with the design of a user-centered interface. Information designers recognize that the interface contains information that enables people to learn and perform actions and reach their goals".

There are multiple products available that convert a document into digitized form and there are other Solution providers bringing the suite of products to have end-to-end integrated products/solutions in the space of imaging solutions.

Imaging Solution is based on the following steps:

1. Document Capture
    a. Document Preparation & Scanning
    b. Forms Processing
    c. Indexing, Verification & release
2. Document Management
    a. Retrieval and Storage mechanism
    b. User Presentation and workflow engine

Implementation can be understood by grouping the project into following phases:

1. Requirements and Identification Phase
2. Design and Architecture Phase
3. Build and Customization Phase
4. Testing and Acceptance Phase

2 REQUIREMENTS AND IDENTIFICATION PHASE

Business and technical requirements are captured here and market is analysed to identify any COTS (Commercially Off the shelf) products and organize them to study their feasibility with requirements.

Current challenges faced in storage of paper are:

- Poor document sequencing
- Lack of physical space to store documents
- Complexity in accessing required document
- Shipping cost of paper in terms of additional paper and expenditure.

2.1 Business Requirements

Business requirements for imaging solution are captured in the categories of document capture and document management.

Common business requirements that need to be captured to develop the solution are:

- *Security for Document access* based on user profile.

N. Sivalanka P. (2006).
DESIGNING IMAGING SOLUTIONS FOR AN ORGANIZATION.
In *Proceedings of the Eighth International Conference on Enterprise Information Systems - DISI*, pages 277-281
DOI: 10.5220/0002488102770281

- *Faster response time and innovative retrieval methods* to access the digitized documents, stored in the document management system.

Other specialized imaging requirements are:

2.1.1 Efficient Methodology on Ordering the Documents

Stored paper need sequencing/ordering for easy retrieval. Some of the sequencing elements are (a) Department and source, (b) Separator sheets in between the file and (c) Print sequencing number.

Sequence (Index of document) identification emphasize the need for automation on labeling a document and giving it an identification, to be used later to retrieve or manage its contents.

2.1.2 Automated Fax Integration with Imaging System

Organizations have automated fax system built. While moving all documents/images into these systems, it is important to make sure the fax system is very well integrated into their imaging system. All the inbound faxes need to be integrated to receive the images and the system should be able to provide triggers that can initiate an outbound fax.

2.2 Technological Requirements

Capturing technical requirements is vital for success of imaging solution implementation as this implementation is purely technical in nature.

Some common non-functional requirements are

- Efficiency in document access
- Efficient security mechanism.
- Efficient storage – Database to store images and their indexes

Other specific non-functional requirements are:

2.2.1 Efficient Scanning

The back-bone of efficient document management system is the efficiency in the quality of the document scanning. Individual organizations, give importance to different factors like:

- High speed, High resolution in scanning
- High volume in scanning per module
- Batch/Online scanning and optimized scanning
- Image cleanup capabilities in scanning
- Automatic re-scanning capability if required

2.2.2 Efficient Workflow System

This workflow system need to define various pre-defined paths(set of states) for each of the document that comes into the system, which controls the way these documents are managed by various levels of users.

Enterprise should consider following key factors to proceed successfully with work management.

- plan long-term strategy work management infrastructure
- Target workflow-enabled applications and avoid long duration workflow application deployment.
- Anticipate support team and their impact on end users
- Evaluate vendors based on their:
  - Alignment around emerging standards
  - Integration capabilities
  - Market focus & ability to redesign product
  - Vision for enterprise work management
  - Availability of research and development (R&D) resources
- Buy knowledge and skills from vendors or system integrators during application deployment

2.2.3 Product Identification

There are multiple products in the market catering to few or all of the above systems. We need to define parts of the system that need to be using the products and parts of the system that need to be in-house developed. This initial classification helps us to come out with design and architecture of the system in the next phase of the project, and compare various products with application requirements.

3 DESIGN AND ARCHITECTURE PHASE

Design and architecture of the system are focussed as the same time. The need to design the system is based on various products that are compared and their architecture. Product list identified will go thru comparisons on various organization specific requirements and their own features. The requirements not available in products will be designed for custom development

3.1 Document Capture System

Once all the scanning requirements are captured, these requirements will be translated to get an architectural view of future system. Products are analyzed to ensure they meet most of the requirements identified.

Following picture shows a representation of key designing aspects of document capture system.

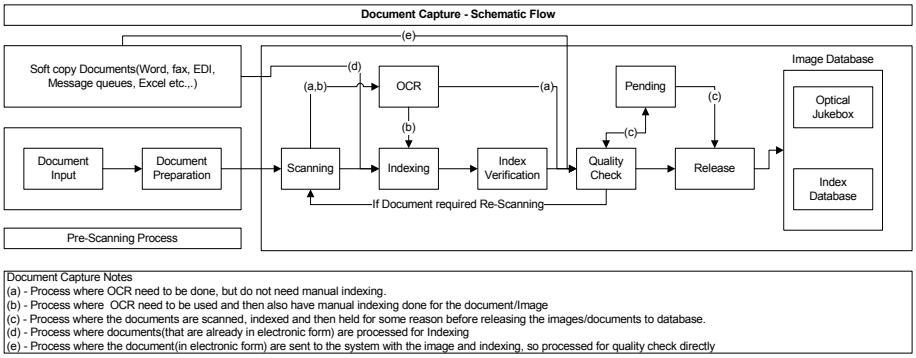

Figure 1: Schematic flow for Document Capture system.

3.1.1 Image/Index Verification

Once these images are transmitted from Scanning system or interface system (for file based and queue based), they are indexed. Index identification will be finalized during design of the system.

Some of the indexes that are used in this system are Barcodes, Optical character recognition, scan/index first, full/fixed fields or hybrid indexing.

Indexing standards (Moen, W.E. 2003) like, ANSI/AIIM TR40-199X, ANSI/NISO Z39.50 Protocol etc. are used by these systems.

3.2 Document Management System

Scanned images are stored in native format of TIFF or any proprietary format of a product. Any user interface tool accesses both image and index databases to extract and display these images. Typical layers in document management are:

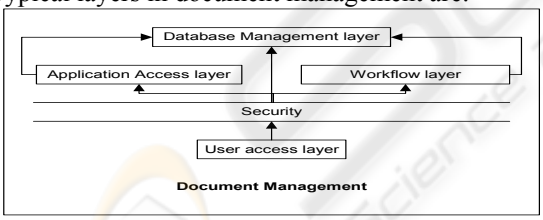

Figure 2: Layers in Document management system.

3.2.1 User Access and Security Layer

The need of user response and decisions of fat-client or thin-client decides the complexity in designing the User access layer and security layer enforces the image view/modify/add/delete rights.

Some of the retrieval methods to be considered are:

- Search, list and view documents from database
- Facility to add notes to Image/Document and store in the database
- Facility to fax the viewing document

3.2.2 Application Access Layer

Aspects of (a) Fax and E-mail integration with Imaging system, (b) Backup and recovery strategy and (c) Methods for retrieval of images, are captured to better design the user interface with the system.

Every organization has a built in automated Fax system. The workflow of the fax system integrated with imaging system need to be designed.

3.2.3 Workflow Layer

Workflow management system provides valuable capabilities across enterprise[8]. Some of the key factors that need to be considered along with exception handling are:

- *Central Process Management Capabilities* - the ability to coordinate and monitor work-in-process, re-prioritize work items and balance workloads for work activities.
- *Process Performance Feedback* - the ability to gather statistics regarding a business process (eg: Process cycle times, Queuing time, peak processing cycle, performance tuning etc.,).
- *Dynamic Process Change Flexibility* - the ability to dynamically alter the process flows as the needs of the business change.

3.2.4 Database Management Layer

Database layer (to store scanned images and indexes) though plays a vital role in execution, gets developed individually with each layer. The challenge is to ensure the design flows consistently for each layer and the interfaces to various layers are captured in detail.

The usage of stored data is individually handled in different layers. Optical/Magnetic juke boxes are ideal storage media for all the scanned images.

This layer consumes lesser time when products that provided end-to-end solutions are considered.

3.2.5 Product Evaluation

Post requirements and architectural decisions, we need to evaluate various products in the market in document scanning and document management and compare their features.

Typical elements that are analyzed while comparing document capture products are (a) quality of scanning, (b) ability to scan large volumes, (c) ability to remote scan, (d) ability to re-scan and (e) capability to index documents automatically.

Typical elements analyzed to compare workflow and document management products are (a) capability of index retrieval, (b) ability to define new workflows, (c) enhance metadata models of database, (d) security in workflow system and (e) scalability.

4 BUILD AND CUSTOMIZATION PHASE

The criticality of this phase would be derived from the decisions of the organization in design phase. Focus is on customization (of a single product or multiple products) as we implemented. Typical flow is as follows.

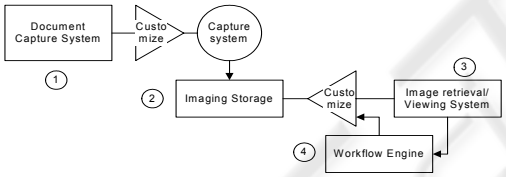

Figure 3: Sequence to customize components.

4.1 Product Customization Method

The gaps in product features and organization needs are documented and methodology is defined to customize the product. The workflow and interfaces for functionalities not supported by the product are custom-developed and integrated with the product.

4.2 Custom-Build Method

Document capture system would be implemented as a product due to its dependency on hardware for scanning, OCR etc. The other components can be custom built.

Image storage database is defined to store images as mostly blobs and indexes. Some products have their own internal database models and proprietary storage format. Interfaces to other custom built viewers are performed with the APIs.

Image Retrieval/Viewing system would be the front end application that would be developed taking into the consideration of various business users.

Workflow engine is built by defining various business rules from different business groups planning to use the system. These can be manually implemented or can be built in pre-defined workflow applications like MQ workflow engine etc.

5 TESTING AND ACCEPTANCE PHASE

Testing of imaging system would concentrate on the way the components are linked and the workflow that was defined for digitized documents.

Pilot applications chosen for testing will be scanned and metadata built along with index creation. They are tested with different requirements of business functions in the areas of integration in Fax, OCR search, workflow process and call center environments.

6 CHALLENGES FACED DURING IMPLEMENTATION

Key challenges we faced during implementation are

- Compatibility of products for integration and development of custom code using APIs.
- Performance issues due to need of re-indexing or re-creating metadata.
- Review of workflow process which changes very frequently.

7 CONCLUSION

Imaging solutions application implementation is concentrated in Requirements and design phase (Hackos, J. T. and Reddish, J. C. 1998). The development and testing phase play secondary role in the development cycle.

The amount of time saved using electronic retrieval system (Agarwal R., Bruno G. and Torchiano M., 2000) is enormous as it eliminates the man-hours spent filing, searching, retrieving, and re-filing paper documents. This “found time” can be reused for other productive tasks by Organization.

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