



**Aviation
Industry
CBT
Committee**

AICC

GUIDELINES and RECOMMENDATIONS

AGR 012
27 Feb 2008

VERSION
1.5

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TRAINING DEVELOPMENT CHECKLIST

Purpose:

To assist an airline training organization in identifying vital aspects of a quality CBT/Training program. The AICC (Aviation Industry CBT Committee) has published several documents that recommend standards and common components of a quality training program. This document has been prepared to assist airlines and training organizations in using AICC documents, helping to define quality CBT/Training materials. When looking at a CBT development project (or any training program), key elements of training must be contained in the program.

Use:

This document should be used to help an organization identify the components or elements that they need in their training program. It may be used to help define a Request for Proposal from a possible training developer. It may be used to validate existing training programs to ensure they meet the needs of the organization and the students. It may be used to help define the budget requirements for a proposed development project. You can use it as an attachment for a Request for Quote or Proposal.

To use the checklist, place a number in the "Priority" column. Use a scale of 1 to 5 to prioritize your requirement, with 1 being the highest and 5 the lowest. This will help you define the training system requirements and help you define your program around your budget. You may not need all items listed and can leave some of the fields blank. Refer to the full AICC documents for detailed information. Ensure your training developer complies with the referenced AICC documents. When using this document, you may want to refer to the AICC Glossary of Terms.

NOTE: Referenced AICC documents may be found on the AICC website at <http://www.aicc.org>.

*Caveats...
Review Cycle*

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Instructional Systems Design (ISD)

All training programs should start by using standard Instructional Systems Design (ISD) processes. These processes are used to define, design, and develop your training programs. This section should be used to help identify the ISD components that may be used in your training program. If you are building the training program within your organization, this can be used to ensure you follow the proper processes. If you are contracting with a training vendor, use this document to help you identify the components you need to see in the proposal and throughout the project. See AICC document CRS003 “Hierarchy of CBT Terms for AICC Publications” pertaining to hierarchical structures in courseware.

The results of using this checklist should be an outline for a Requirements Document, one that will help you create or define the major objective(s) and components for your training program.

Priority 1 – 5	Requirement	Notes
	Analysis	
	Terminal Objective - Overall Training Goal	Ultimate goal and purpose of the training program
	Define target audience	Student analysis – summary of roles, jobs, responsibilities, type and number of individuals to train
	Roles & Responsibilities	
	Experience Levels	
	Educational background	
	Identify job tasks that will be trained	Task analysis
	Objectives to cover tasks	Objective analysis -
	Test items to evaluate the objectives	Test Item analysis
	Define required types of media to teach objectives	Media analysis
	Identify schedule requirements	Top level course development schedule
	Define budget considerations/range	Financial review
	Define authoring system	Identify the course development tools and/or program
	Design	
	Define course structure	Hierarchical structure of the course
	Determine course delivery method	
	Learning Center distribution via LAN	



	CD-ROM distribution for laptop and/or home usage	
	Internet connected for distribution	
	Internet connected for course	
	Design CBT/media layout	
	Screen layout	Define appearance of various screens
	Introduction/setup screen	
	Instructional/Data screen	
	Test items screens	Various types of test items – multiple choice, short answer, matching, completion, etc.
	Summary screens	
	Menu screens	
	Student login screens	
	Feedback screens/messages	
	Use AICC compliant icons (see icon list)	See checklist and AGR009 Icon Standards
	Develop	
	Create course materials	Various components of the course created and stored in separate databases – defined as data elements
	Graphics	Graphics database
	Text	Text database
	Photos	Photo database
	Video	Video segment database
	Audio files	Audio clips database
	Simulation segments	Programs or code for simulations
	Program code	Sequence of materials and roadmap through the course
	Setup development schedule	
	Define review process	Who is responsible for acceptance of course materials
	Subject Matter Expert(s) – SME	Identify responsible individual who will be available throughout program
	Instructional Designer	Responsible for “instructional integrity” of course materials
	Program/Project Manager	Responsible for overall program development and schedule
	Set time for review process	Limit amount of time reviews are conducted (3 to 10 days)



	Evaluation	Establish some guidelines defining what makes a successful program
	Evaluate training materials against objectives	
	Evaluate students against objectives	
	Evaluate training materials for consistency & quality	



Hardware & Software Requirements:

AGR002 Courseware Delivery Stations: Hardware -

This document contains recommendations for the acquisition of Computer Based Training (CBT) student delivery systems, also referred to as the “platform.” The platform includes computer, monitor, operating system, and peripheral devices. This AGR contains both hardware-related recommendations and software-related recommendations. The objective of the recommendations is to enable you to assemble a training delivery system with the ability to deliver the widest range of aviation CBT courseware. The type and delivery method of the training course need to be considered when defining the delivery platform requirements.

Desktop Hardware Recommendations:

Priority 1 - 5	Requirement	Notes
	Pentium 4, 1GigHz MMX CPU or better	Latest model available
	Minimum 128Mbyte memory	More RAM may be required for running simulations & video segments
	20" Multi-sync Monitor	
	Minimum 1024x768 resolution with 32bit, 65Meg colors	
	Local Harddisk drive	50 Gbytes recommended (optional if networked workstations are used)
	MPC III 32 bit Audio system	
	MPC III CD-ROM	
	Network card compatible with LAN	If required
	High Speed back-up device	CD-RW, DVD RW, etc.
	Mouse or other pointing device	Trackball, touch screen, etc.
	Video Card – AGP 16Meg	More memory is recommended when displaying simulations
	DVD Player	
	Windows 2000/NT/XP	Operating system should match your requirements
	Internet Browser	Microsoft Internet Explorer recommended



Laptop Hardware Recommendations:

Priority 1 - 5	Requirement	Notes
	Pentium III 750MHZ MMX CPU or better	Latest model available
	Minimum 128Mbyte memory	More RAM may be required for running simulations & video segments
	Minimum 1024x768 resolution with 32-bit, 65Meg colors	
	Active Matrix monitor	
	Local Harddisk drive	30Gbyte or larger
	Integrated Audio	
	CD ROM/DVD	Available systems have DVD player with CD-ROM Writer in one unit
	Network card compatible with LAN	If required
	High Speed back-up device	CD-RW, ZIP Drive, etc. (optional)
	Mouse or other pointing device	Touchpad, eraser mouse, etc.
	Modem	Minimum 56 Kbaud or faster (DSL connection)
	DVD Player	(Optional per requirements)
	Windows 2000/NT/XP	Operating system should match your requirements
	Internet Browser	Microsoft Internet Explorer recommended
	LAN card	Consider wireless



Computer Managed Instruction (CMI)

AGR006 Computer Managed Instruction (File-Based)

AGR010 Computer Managed Instruction (Web-Based)

CMI systems (or similar systems referred to as Learning Management Systems -- LMS, or Training Management Systems -- TMS) manage courseware, students, and resources in a training environment. This document provides a list of CMI/LMS/TMS functions, so that you can decide which functions are important to your training organization. Once you decide on the needed functions, the list will enable a better evaluation of an LMS. Many of these functions also depend on content. For instance, an LMS cannot know a student's lesson score unless the lesson content reports it. So this checklist can also guide the selection (or development) of content features. In addition, there is a tutorial description of CMI functionality available.

We recommend that any CMI system be AICC compliant and properly tested through the AICC Independent Test Lab.

Priority 1 - 5	Requirement	Notes
	Supported standards. (AICC, SCORM, IEEE, IMS, etc)	Many features require both the content and the LMS to adhere to the same standards. If any student data reporting is important, than both the content (reporting the data) and the LMS (receiving the data) must support the same standard in order to work together.
	Component to develop course structures	
	Define lessons	
	Assign training objectives	
	Assign lessons from different courses	
	Define lesson hierarchies (group lessons into sequences)	
	Define and manage resources	Classrooms, equipment, instructors, etc.
	Schedule materials outside the CMI system	
	Testing component to report student test results	
	Use different types of tests	
	Relate test items to objectives	
	Define tests from pool of test items	
	Test item weighting & completion criteria	



	Test assignment – pretest, post-test, etc.	
	Collect test item data	Individual answers, latency, etc.
	Student rostering component to register students and enter demographic information	
	Register students in a course or courses	
	Batch enrollment for multiple students in one course or one student in multiple courses	
	Self-enrollment for students	
	Removal of students from completed courses	
	Create standard reports for day-to-day administrative information	
	Course roster	
	Current assignment of students in a course	
	Resource utilization	
	Student performance history	
	Course maps – graphical and descriptive	
	Student Assignment Management component	
	Administrator/Instructor functions for day-to-day operations	Change student grades, change required lessons, etc
	Define and manage assignable units (see glossary)	
	Change and reschedule offline events	Simulation time, classroom, etc.
	Sequence training events based on prerequisites and other rules.	
	Standard approach to start-up lessons	
	Methods to route students from one lesson to another	
	Content (assignable units) can be used if disconnected from the Web, and results provided to LMS.	
	Student logon functions – single point of access	
	Security of lesson materials	
	Data collection and management function	
	Collect and maintain student performance data	
	Lesson completions	
	Time on lesson	
	Pass/Fail status	



	Score	
	Status of student	
	Start/Complete dates	
	Allow review without changing status/score	
	Allow repeat of lesson to change status/score	
	Lesson transactions	
	Number of attempts	
	Objectives status or score	
	Record of student path taken through lesson	
	Record of each student transaction or activity in the lesson	
	Administrative information	
	Biographical Information	
	Demographical Information	
	Classroom	
	Instructor	
	Course completion data	
	Student preference information stored and passed on to each lesson (audio vs text, language, etc.)	
	Provide standard analyses on performance data	
	Lesson and course summary data	
	Test item responses	
	Student performance data	
	Meeting objectives	



What is a CMI system? What is an LMS?

Computer-Managed Instruction originated as a term in the 1970's that referred to using a computer to manage a group of students going through a computer based training course. Today, the concept has grown to have many definitions. In its broadest sense, it includes the following functions for students taking a course:

- 1) Rostering and storing student information.
- 2) Scheduling students and resources.
- 3) Computer acquisition and storage of student performance data.
- 4) Data analysis and presentation. After the data has been collected, it can be massaged by the computer, providing meaningful summaries for human interpretation.
- 5) And finally, the computer can make decisions based on its analysis of the student's performance. It can manage the student's learning. It makes decisions as to what material the student should cover next, what material is not necessary, and what remedial actions if any, should be taken.

Today, most student management systems are called Learning Management Systems or Training Management Systems. These systems perform the functions listed above, but in addition offer several of the following features:

- 1) Management of students through many courses
- 2) Management of students over the Web
- 3) Manage records of student training history
- 4) Track competencies, proficiencies and qualifications
- 5) Comprehensive management of offline resources such as simulators and classrooms
- 6) Comprehensive management of online content and assets
- 7) Course and content development tools



CBT Icons

AGR009 Icon Standards: User Interface

These guidelines help define the functions and appearance of the student/user interface to the CBT material and delivery systems. They are recommended to reduce confusion and frustration that can distract from the learning experience. Your CBT/Training course may not need or use all the listed icons below. These are listed as a reference point to help you ensure you have the necessary user interface components you need. Each icon's appearance, colors, location, size, and purpose should be defined and adhere to the standards recommended in AGR009.

Priority 1 - 5	Requirement	Notes
	Navigational Controls	
	Forward arrow - next	
	Back arrow - previous	
	Menu - course/lesson layout	
	Close - return to lesson from menu/glossary	
	Pause	
	Exit - exit lesson	
	Audiovisual Controls	
	Audio - On/Off	
	Audio Control - branch to control options	
	Video Control - branch to control options	
	Text - On/Off	
	Repeat - replay audio, video, animation, etc.	
	Student Support Options	
	Progress bar through a course	
	Help icon to give access to additional information	
	Options icon for additional CBT controls	
	Glossary icon to access list of relevant terms	
	Comments icon for students to give feedback	
	Additional controls	



What is a Learning Content Management System (LCMS)?

A Learning Content Management System (LCMS) is a software application designed to manage learning content repositories and workflows and provide tools for the design and development of training and performance support materials. The typical LCMS should contain the following components, which are explained in the following sections:

1. A Relational Database Management System (RDBMS) - or XML- based repository for storing and managing content objects and assets.
2. Tools for taxonomy and metadata creation and management.
3. Tools for assembling content objects into training or performance support materials.
4. Tools for the creation of assessments and testing.
5. Tools for creating navigation and instructional design templates.
6. Tools for managing workflow and review and approval processes.
7. Tools for publishing content, using defined standards and specifications, to multiple output formats
8. Version control
9. Reporting (standard and custom)
10. Administrative and user management tools.

Some LCMSs may also include the following functions:

1. Tools for creating storyboards.
2. Dynamic delivery of content and prescriptive learning.
3. Archiving

Component Definitions

Repository – a database that may be in a traditional relational structure or XML structure, which stores the assets and learning objects that are available for content assembly and reuse.

Taxonomy – a structural framework for organizing the objects in the repository. The taxonomy reflects the business organization and processes and facilitates the location and retrieval of content objects.

Metadata – information and keywords associated with the objects in the repository that help to identify, locate and retrieve them for content assembly and reuse.



Content Assembly – a set of tools for accessing assets and other course components to build ISD based content. Includes the ability to build and reuse templates for look and feel, navigation, and ISD structure.

Storyboard – visual tools for laying out the structure and content of a learning object. The storyboard can be used by the content assembly tools to assemble the final product.

Workflow – a set of tools for reviewing and approving content. The tools include project management functions as well as a notification system to provide members of the workflow team with a way to communicate work status, change requests, reviewer's comments, and approvals.

Publishing – tools for outputting content to standard online formats (AICC, SCORM) that can be used in an LMS or to multiple offline formats (e.g. print, mobile device, CD/DVD).

Administrative Tools – includes tools for managing roles and permissions in the LCMS, tools for managing system defaults, tools for reporting, and tools for archiving among other possible system management functions.

Dynamic Delivery – the LCMS may have its own web portal for content delivery. When the content is delivered dynamically changes made to the source objects in the repository are automatically updated in real time to the published learning content. Sequencing and other content flow rules may be applied.

Prescriptive Learning – learner performance and actions determine the composition of assignable units assembled for the individual. Assessments or other groupings of rules may be used to determine the appropriate composition of a course structure for each learner. Performance during the learning experience may determine the future sequence and objects presented to the learner (adaptive learning).



Learning Content Management System (LCMS)

Priority 1 - 5	Requirement	Notes
	Assessing the Current Environment	Use this section to assess the current state of your learning development environment and tools.
	Course Formats	What formats are courses and course materials currently in. This will help you understand what formats the LCMS must be able to handle.
	HTML	
	PowerPoint	
	Flash	
	Authorware	
	PDF	
	Captivate	
	Java/JavaScript	
	ASP	
	Instructor-led	
	Other (list in notes)	
	Courseware Characteristics	Behaviors and characteristics of the courseware that the LCMS must be able to duplicate or manage. You will list characteristics specific to your development environment in place of or in addition to these suggested areas.
	Use AICC packaging and communication	
	Use SCORM packaging and communication	
	Use SCORM sequencing	
	Database driven	
	Has bookmarking	
	Has external assessments (separate AU)	
	Has internal assessments (part of AU)	



	Use LMS assessment tool and engine	
	Use external assessment engine	
	Use ISD design model	
	Has navigation shell	
	Use development templates	
	SMEs actively participate in content development (require access to development tools)	
	Reuse or repurpose content objects	
	Reuse or repurpose basic assets (graphics, video, etc.)	
	Content resides on and is delivered from file server	
	Content resides on and is delivered from web server	
	Content delivered from CD/DVD	
	Use shared libraries for content objects and/or assets	
	Learning Management System	Think about how the LCMS and an existing or planned LMS must integrate or work together.
	Courses are delivered and tracked in an LMS	
	Course modules are launched from an LMS	
	Complete courses are launched in an LMS	
	Assessments are launched separately in an LMS	
	Have custom reports in an LMS	
	Have custom reports external to an LMS but accessing LMS data	
	System Integration	Consider other systems and applications in the enterprise that will share data with, be accessed by, or access the LCMS.
	<i>(add rows for each system)</i>	
	Development Tools Used	What tools and applications are currently used for content development? Determine what types of content the LCMS must be able to handle.



	Authorware	
	Flash	
	Dreamweaver	
	PowerPoint	
	Captivate	
	Others (list)	
	Media Types Used	Consider the types of media the LCMS must be able to handle.
	Embedded media	
	External linked media	
	Flash animation	
	Other animation (list)	
	Audio (note formats)	
	Graphics (note formats)	
	Smartgraphics	
	Text (note formats)	
	Video (note formats)	
	Other (list)	
	Location for Training Content	Consider where the content will have to be delivered and the various formats this may take.
	Classroom/lab	
	Back office computer	
	Specific computer profile (describe)	
	Mac and or PC	
	Home user computer	
	Other (list)	
	Number of authors who will require access to the LCMS	Consider how many active users will require access to the LCMS authoring environment. This may include contractors and offshore developers.
	Number of SMEs who will require access to the LCMS	Consider how many SMEs will be developing or modifying content and will require access to the LCMS.
	Total Disk Space Used to Store Content	Consider the current amount of storage required for all assets and course content. This will help to guide storage requirements for the LCMS repository.
	Courses and course modules	
	Assets (graphics, audio, text, video, etc.)	



	Assessing the LCMS Product	Questions and areas to investigate with the vendors of LCMS applications. Not all items may be requirements for your system.
	Content Creation	These are features and functions the LCMS should have to support the creation and management of content.
	Is the system browser based	
	User friendly user interface	Spend time examining the user interface for the LCMS. Is it intuitive? Is it easy to navigate and locate functions? Do functional modules integrate well? Does it provide the requisite flexibility for your application?
	Server based content repository	
	Repository is a relational database	
	Repository is an XML database	If the repository is a relational database, does the LCMS have the ability to integrate with and access objects stored in an XML database?
	WYSIWYG authoring	
	Supports any ISD model or philosophy	
	Supports reusable learning objects and methodologies	
	Template based	Are templates locked or can you freely modify them in development mode (or both)?
	Custom template creation	
	Learning objectives can be linked to content objects	
	Learning objectives can be linked to assessment questions	
	Storyboarding tools	
	AICC compliant	
	SCORM 1.2 compliant	
	SCORM 2004 compliant	Including support for simple sequencing
	Supports prescriptive learning	
	Supports adaptive learning	
	Able to import existing courses, content objects, and assets	
	Support for content types	Consider all the content types and formats you will need to support.
	Audio (list formats)	
	Video (list formats)	



	Graphics (list formats)	
	Animation (list types and formats)	
	HTML	
	XML	
	Java	
	JavaScript	
	Flash SWF	
	PowerPoint	
	MS Word	
	PDF	
	Others (list)	
	Preserves formatting of content types	
	WYSIWYG editing (including HTML)	
	Functional wizards	
	Global search and replace	
	Spell check (support for languages)	
	Tracking and change notification of linked data	
	Ability to link to external documents	
	Version control at all object levels	
	Archiving	
	Multiple output types from a single source (e.g. CBT, CD, print, PDA, instructor materials)	
	Create taxonomies	
	Create default metadata (enforced)	
	Create custom metadata	
	Support multiple metadata schemas and vocabularies	
	Support for digital rights management	
	Modification history and audit trail	
	Create surveys and opinion polls	
	Supports PENS specification	Package Exchange Notification Service for communicating published material availability to an LMS



	Email access within content objects	
	Download and offline play and synchronization	
	Publish To:	
	LMS (AICC and/or SCORM)	
	CD-ROM	
	Print	
	XML	
	Other (list)	
	Import From:	
	XML database	
	Microsoft applications	
	Adobe applications	
	HTML/DHTML	
	Java/JavaScript	
	Other (list)	
	Assessments	Consider how the LCMS handles the creation and management of assessments.
	Pre-/Post-testing (with prescription)	
	Randomization of questions	
	Randomization of distracters	
	Core questions (must be included)	
	Remediation to content	
	Remediation to retake assessment	
	Immediate feedback	
	Delayed feedback	
	Multiple question pools and grouping	
	Timed assessments	
	Control the number of retries	
	Review questions before submitting for scoring	
	Audit mode (scores do not go to LMS or database)	
	Supports QTI standard	Question and Test Interoperability standard



	Supports Question Types:	
	Multiple choice – single correct	
	Multiple choice – multiple correct	
	True/False	
	Drag and Drop	
	Matching	
	Single answer fill in the blank	
	Essay fill in the blank	
	Simulation	
	Other (list)	
	Collaboration and Workflow	Consider what tools are available for working in teams, for reviewing, and for approving work and changes.
	Track changes by user	
	Create workflows and workflow member groups	
	Approval process and flow	
	Distributed authoring	
	Check-in/Check-out	
	Commenting and notes	
	Visual object mark-up	
	Work offline (and synchronize)	
	Assign tasks and ownership	
	Simple and complex search	
	Version control (at all levels)	
	User roles, access rights, and permissions	
	Notifications (project management)	
	Reporting	Consider what type of data and work reports are available out of the box and what options are available for ad hoc and custom reporting and data access.
	Standard reports available (list)	For example: Assessment user statistics, assessment question statistics, assessment item analysis, content objects (filtered by metadata), content changes (audit trail), workflow (project management)
	Custom reports required (list)	
	Tools for creating ad hoc reports (query by example)	



	Add custom created reports to the standard reports list	
	Simple and advanced filtering for all reports	
	Company Credentials, Maintenance and Support	Consider the viability of the vendor and its policies and practices.
	Company in business for a minimum of X years	
	Provides references from established users/customers	
	Must have a minimum of X number of customers with similar implementations and applications	
	Global support	
	24/7 support	
	Phone support	
	Email support	
	Support via real-time online interaction	
	Developer support at the authoring level (beyond product support)	
	Annual maintenance no more than 20% of the purchase price	
	Maintenance agreement includes software updates	
	Infrastructure	Consider what infrastructure needs that LCMS will have to handle and support.
	Supports requisite Operating Systems and versions (list)	Include workstations and servers (file based and web)
	Supports requisite database systems and versions (list)	
	Supports requisite browsers (list)	
	Minimum workstation requirements	Describe the minimum requirements for CPU, RAM, storage on the developer and end user workstations
	Minimum server requirements	Describe the minimum CPU, RAM, and storage requirement for all servers (Repository, Application, Delivery)
	Integration with an LMS	Be sure your LMS is supported (or can be supported with customization via an API or other program interface at a reasonable cost).



	Integration with a Content Management System (CMS)	
	Open APIs for integrations	
	Single sign on support via Active Directory, LDAP, or other middleware	
	Support for proxy servers	
	Ability to control screen size and resolution on the end user workstation from the output content	
	Ability to output in formats to support multiple bandwidths	
	Unicode support	
	Languages/Localization	
	W3C Web Accessibility/Section 508 compliant	
	Third party access to LCMS via VPN (or other secure system)	



APPENDIX A
Acronyms

For a complete list of glossary terms and definitions, see AICC document CRS002.

AGR	AICC Guidelines & Recommendations	AICC	Aviation Industry CBT Committee
ITL	(AICC) Independent Test Lab	CMI	Computer Managed Instruction
LMS	Learning Management System	SCORM	Shareable Content Object Reference Model
CBT	Computer Based Training	IEEE	Institute of Electrical and Electronics Engineers
IMS	Instructional Management System Global Consortium	HRIS	Human Resources Information Solution
ERP	Enterprise Resource Planning	XML	Extensible Markup Language
PENS	Package Exchange Notification Services	LCMS	Learning Content Management System



Appendix B

13 Questions to Ask LMS (Learning Management Systems) Developers

Here are 11 of the most important questions you should be asking potential LMS vendors:

1. Does the LMS provide tools for creating and managing learning plans and job profiles, including multiple career-path options?
2. Can the system integrate with the e-conferencing technology we currently use?
3. What other collaboration technologies does the LMS offer?
4. Can the LMS vendor integrate the courseware we have created internally and/or currently license from content providers?
5. If we purchase new or additional off-the-shelf courseware, do we have to negotiate with each content provider separately, or can all our courseware be contracted through the LMS vendor?
6. Does the system have built-in content creation tools? Can other industry-standard authoring tools also be used?
7. Does the LMS support blended learning? Can it simultaneously manage synchronous and asynchronous e-learning, as well as classroom scheduling for students and instructors?
8. Is customization and integration with existing HRIS and ERP systems available?
9. What support, maintenance and version-update provisions are included in the contract?
10. Does the LMS offer data import/export capabilities in required formats (Excel, XML, etc.)?
11. If the system is being offered as a hosted solution, is there a path to take the LMS in-house at a later date, if desired?
12. Does your LM support CBT Package Exchange Notification Services (PENS) (AGR 011)?
13. Does your Authoring System support CBT Package Exchange Notification Services (PENS)?