AbleLink Instructional Media Standard

Conceptual Overview

Version 1.0

Daniel K. Davies
Steven E. Stock
R. Brian Brown
Larry R. King
AbleLink Technologies, Inc.

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Introduction

Following ten years of research and development in the area of prompting technology, AbleLink Technologies has created an XML-based protocol for describing instructional media that creates a common"language" for prompting systems which can facilitate sharing of instructional content across organizations and across technology platforms. This *Conceptual Overview* provides a top-level description of this protocol, known as the AbleLink Instructional Media Standard (AIMS), its purpose, its uses, and information on how individuals and organizations can join the effort to promote successful utilization of prompting technology. AIMS is a standardized format for defining a set of related picture, audio, and video files used for presenting instructional content. The instructional content may be step-by-step task instructions for individuals with cognitive disabilities, detailed instructions for complicated tasks for individuals without disabilities, training tasks for new employees at a job site, or home health care instructions for family caregivers. The ways in which instructional media can be used for prompting is only limited by the imagination of the content developer. The AIMS protocol provides a common language for prompting technologies used to present the instructional prompts so that instructional content can be created once and then played on multiple systems and platforms and easily shared with other individuals or organizations. Just like a JPEG is a standardized image format and MP3 is a standardized audio file format, AIMS provides a standardized file format for "instructional media."

This technology was first created by AbleLink Technologies to provide a common prompting structure to allow sharing of tasks between its various desktop, Tablet PC, and PDA based prompting systems. However, in an effort to promote broader utilization of prompting technology, AbleLink has launched the AIMS initiative which makes this XML protocol freely available to individuals and organizations involved in creating instructional media and technology-based prompting systems. The AIMS standard will allow individuals to create and share instructional media content that can be used on multiple technology platforms (PC, Mac, Palm, Pocket PC, Tablet PC, Linux, etc.) rather than creating unique instances of the task for different software and hardware operating environments. This document provides an overview of AIMS, its purpose, and sample uses. Detailed information on AIMS is provided in a companion document, *AbleLink Instructional Media*

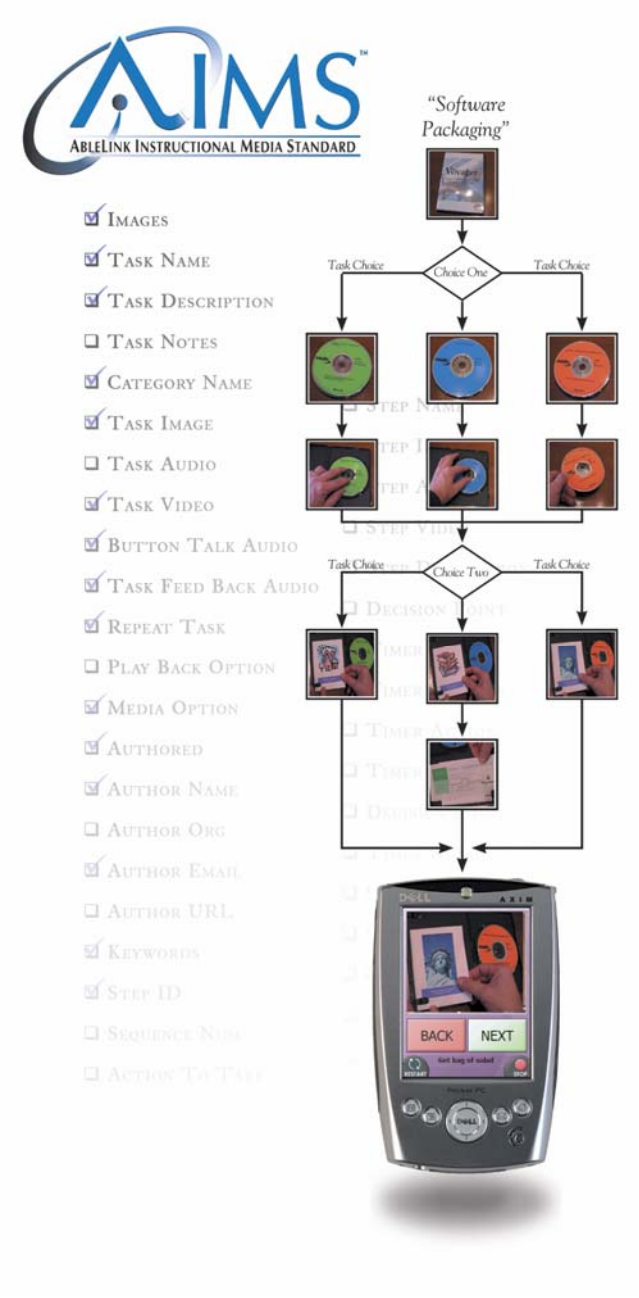
"The problem is until now, each manufacturer used a proprietary method for how these prompts were created, and how the associated audio-visual information was stored. The result was that caregivers and job coaches often got bogged down in the complexities of creating prompts, and couldn't share this information with other individuals or organizations. It is therefore significant that AbleLink has taken a leadership position in creating this standard that both simplifies the creation of tasks and promotes leveraging of this effort to other individuals."

Bill Coleman, Founder
Coleman Institute for Cognitive Disabilities

Standard - XML Specification, available online (www.aimsxml.com) for all registered AIMS developers.

What is Instructional Media for Prompting?

Instructional Media is a term which can have different meanings in different contexts. In the context of AIMS, instructional media is defined as the organized combination of electronic text, images, audio, and video for self-directed playback to allow the end user to follow step-by-step instructions for performing a desired activity. Instructional prompts may be generic instructions for use by many different individuals or highly personalized instructions using pictures, audio and video clips of the task depicting a familiar environment along with verbal instructions provided by a someone recognizable to the user.

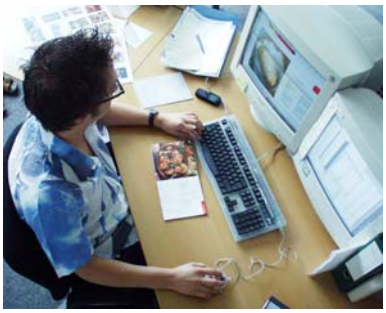


Traditionally prompting tasks (instructional media) for individuals with some types of cognitive disabilities have been created using picture cards so that when someone who could not remember how to accomplish the task needed a "prompt" he or she could refer to the picture cards instead of relying on another person to prompt them. With the advent of the AbleLink Instructional Media Standard (AIMS) there is now a way to present custom or generic combinations of electronic text, images, audio, and video to an individual on a variety of technology platforms/players using a single XML file and its associated media files. Specifically, AIMS includes several media and task specific elements. These elements are described in the XML file. Any AIMS compliant player can then read the XML file and present the step-by-step instructions to assist an individual in completing a task. Tasks may be as simple as a few sequential step-by-step audio instructions, or more involved containing many steps with audio, pictures and video as well as decision points and timers to help navigate through more complex tasks. The tasks can be completely personalized showing the individuals

actual living or work environment, or they can be generic instructions for cooking a meal or changing an ink cartridge in a printer.

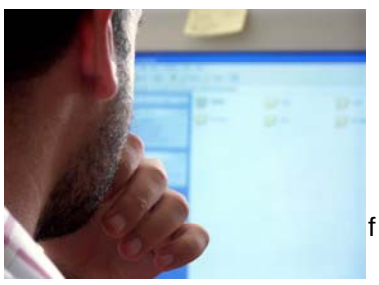
The AIMS User Community

The AIMS user community is composed primarily of three different groups; *Content Users*, *Content Developers*, and *Technology Developers*. These groups are not mutually exclusive as it is likely that, for example, an organization that is a *Technology Developer* may also be a *Content Developer*. All developers of instructional prompting content and all technology system developers have *Content Users* as the ultimate user of their work. They are the individuals for which all prompting content and devices are created. They may be individuals with or without disabilities using prompting instructions at home for independent living tasks, family care givers providing health care support to a family member, or new employees learning the tasks necessary for a new job in their native language. A *Content User* is anyone who uses instructional content either personally or to support another person to follow instructions, learn a new task, or remember how to perform a task.



Content Developers are individuals or organizations that are interested in creating reusable electronic instructional content to leverage their efforts across different end users. Instructional content created for re-use may represent common tasks which many different end users must learn, thus the task instructions are created once and delivered to multiple end users, possibly on different technology platforms. For example, a multi-state organization serving individuals with disabilities may have a set of training tasks created for how to fill out a time card correctly or to "punch in" at work. Once created these tasks are used over and over again on a desktop or palmtop computer as new individuals join the agency. *Content Developers* may also be commercial organizations that have created independent living tasks for cooking or cleaning which are offered for sale. Content created according to the AIMS standard will be able to be played on a much wider array of technology devices than previously possible, particularly as the number of AIMS compliant technology devices grows.

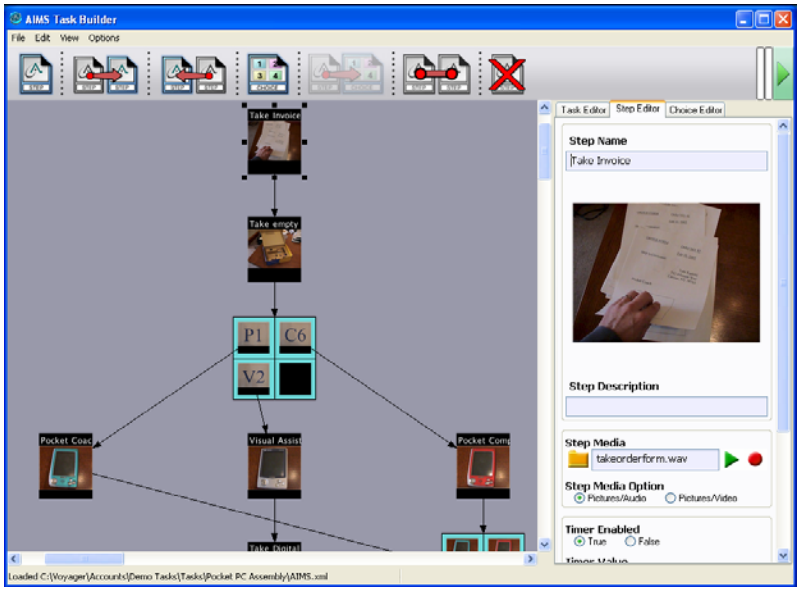
The individuals and organizations that are responsible for developing new AIMS compliant technology devices are the *Technology Developers*. These AIMS compliant, or *AIMS Ready*, devices are generally software applications operating on a desktop, notebook, tablet, or handheld computer that provide the interface for playing back instructional tasks. Initially, there are



very few *Technology Developers* due to the newness of the field of Cognitive Support Technologies and the previous lack of coordination efforts between those technology organizations that are developing prompting systems. However, this number is expected to grow as awareness of the value of prompting technologies grows and rehabilitation technology companies recognize the opportunity for marketing commercial instructional content and players of that content. *Technology Developers* can build devices that use, import or export AIMS content to provide more options to *Content Users* regarding the playback of content or to make players available on platforms which previously were not supported. Developers can join the AIMS effort and gain access to the detailed AIMS XML specification by completing a member agreement and abiding by the Royalty Free License which defines the AIMS usage requirements. There is no cost to an organization wishing to become an authorized AIMS *Technology Developer*. The AIMS website (www.aimsxml.com) maintains a current list of all authorized *Technology Developers* that either currently have devices available or are building devices that will be *AIMS Ready*.

Creating Instructional Media Content

The benefit of using a specifically defined XML structure to create, control and place each media and task element is that the XML can be created anywhere and can be used on a variety of technology platforms. Although anyone could write an application to construct and define what media and task elements go where in accordance with the AIMS structure, AbleLink has already created an application called AIMS Task Builder which is available freely to anyone interested in becoming a *Content Developer* and creating instructional media for use with an *AIMS Ready* prompting system.



AIMS Task Builder (pictured to the right) is designed to create instructional media content (e.g. task instructions, training scripts) for playback in any *AIMS Ready* desktop or handheld player. AIMS Task Builder is a cross-platform desktop software program that can operate on Windows, Macintosh or Linux operating systems and is provided free of charge by AbleLink Technologies to any registered AIMS *Content Developer*. Elements that comprise AIMS tasks may include custom images and symbols, custom audio prompts, custom audio feedback, video clips, custom text strings, an unlimited number of steps, decision points with multiple paths of instructional cues, multiple modes of playback, and custom timing to move from one step to the next. A minimal set of these capabilities is required for a task to be AIMS compliant, but additional optional capabilities can be provided which also conform to the AIMS standard. AIMS Task Builder is also available to companies and organizations who want to create pre-built instructional media for resale. Registration is

a simple process available online at www.aimsxml.com and allows access to the AIMS Task Builder application for free download.

AIMS Ready Technology Players

Instructional media can be "played back" on any technology platform designated as *AIMS Ready*. A technology device that can be identified as *AIMS Ready* is a device that can interpret the AIMS XML data and present the step-by-step prompting information to the end user. *Technology Developers* must build their systems in accordance with the AIMS members' agreement and usage requirements which details the specific set of capabilities that must be provided to be able to label their system as *AIMS Ready*. The objective is to provide an identification scheme for prompting systems whereby *Content Users* can be assured that a device labeled as *AIMS Ready* will be able to playback any and all AIMS content they have developed or purchased.

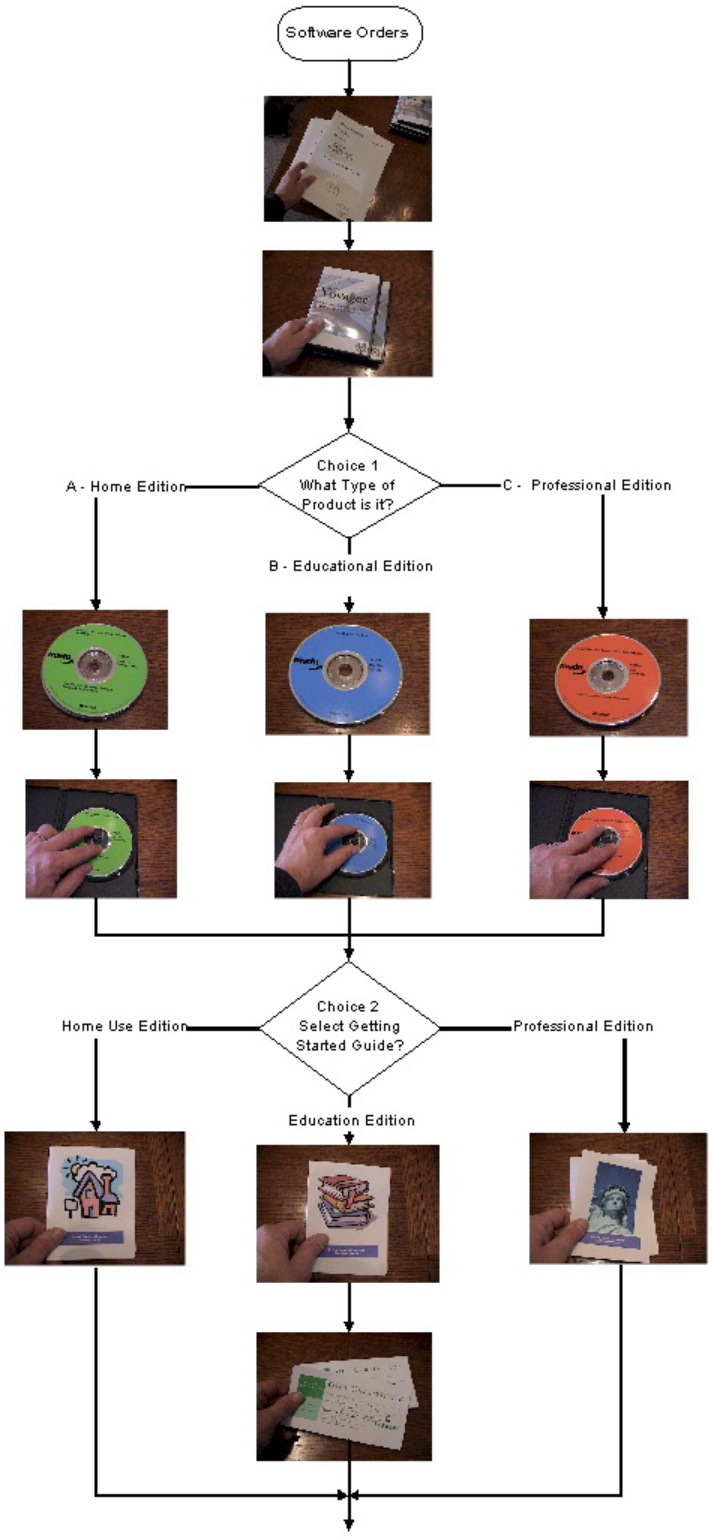
Initially, players are available for Windows based computers, Tablet PCs, and Pocket PCs. Other computing platforms like Macintosh, Linux, Unix, Palm, BeOS are all feasible mediums; and even more special purpose platforms, such as an Xbox or Playstation, could potentially be used to play back content. Any technology medium that can utilize XML has the potential to be an AIMS compliant platform.

AbleLink Technologies currently has developed three *AIMS Ready* handheld Pocket PC player applications (Pocket Coach, Visual Assistant, and Pocket Compass – *shown at left*), each with different capabilities but all in compliance with the AIMS XML standard. Additionally, AbleLink has two full featured *AIMS Ready* desktop and Tablet PC players for Windows; Visual Impact and HomeCare Assistant. One of the goals of releasing the AIMS standard (formerly proprietary to AbleLink) is to encourage more companies to create players and platforms for the market. Any organization or individual that has registered as an AIMS *Technology Developer* is free to build AIMS compatible players for any platform including Windows, Macintosh, Pocket PC, Linux, Palm, proprietary systems, etc. These players would then be able to use any AIMS compliant content that becomes available.

Practical Applications of AIMS

AIMS has been created to support and promote the emerging instructional multimedia prompting system industry. Computer based prompting systems have potential application to support individuals who, for many different reasons, have difficulty relying on traditional means of task performance strategies such as relying on one's own memory or using written lists. Initially promoted as a tool for independence among individuals with intellectual disabilities, the prompting support concept has potential application to support individuals with traumatic brain injuries, significant learning disabilities, seniors in varying stages of dementia, and even workers with language barriers. Research has also been conducted to demonstrate the effectiveness of *AIMS Ready* media players for supporting family members providing complex home health care services to loved ones.

Most research studies on the effectiveness of prompting systems have demonstrated their benefit as workplace supports. For example, the Decision Tree Diagram shown on the next page depicts an application of AIMS to support a software order fulfillment task. The Decision Point feature of the AIMS standard is highlighted in the task. The worker begins by obtaining an order form and locating the number on an invoice representing which type of order it is out of three different possibilities. An AIMS Decision Point is implemented to provide different instructions to address each of the three types of software orders. Additional Decision Points are utilized as a quality control checkpoint and to determine the shipping option.



Other common applications include supporting independent living tasks, such as completing one's morning work preparation routine or step-by-step instructions on various housekeeping tasks. One research project utilized an *AIMS Ready* player to support teeth brushing instruction and performance for individuals with intellectual disabilities, utilizing the AIMS Timer features to automatically step the user through a comprehensive tooth brushing routine. Academic applications may include presenting educational content, supporting hands-on instructional training and practice or for homework/schedule maintenance.

Although as of yet largely unexplored, there appears to be potential for a wide range of applications outside the disability arena. For example, interest has been expressed in the potential for prompting systems to support the hotel room cleaning services industry, which often involves high turnover and associated

training costs, room quota requirements and workers who use English as a second language or not at all. Existing *AIMS Ready* players are capable of providing training cost savings by their self-directed nature, can incorporate the AIMS Timer feature to help keep workers on schedule to meet prescribed room quotas, and can provide verbal instructions in any language. Wireless features of Pocket PC based players could further support the industry by sending information to the front desk as to when individual rooms were ready for the next guest. In summary, the practical application of AIMS is only beginning to emerge as students, teachers, parents, researchers, job coaches, employers and many others add to the pool of inventive applications for using instructional multimedia prompting technology.

XML Task Repository: A Library of Sharable Tasks

In 2005 a collaborative project was launched to develop a web-based task repository to facilitate sharing of instructional media created in accordance with the AIMS standard. Task categories will include, but not be limited to, Educational, Vocational, Independent Living, Recreation and Leisure, and Health Promotion. This project is being conducted by AbleLink Technologies in collaboration with the Beach Center on Disability at the University of Kansas and the Coleman Institute for Cognitive Disabilities through the University of Colorado's Rehabilitation Engineering Research Center on Advancing Cognitive Technologies*. This effort will result in an online task library which can be used to allow instructional tasks to be easily shared across individuals and organizations. *Content Users* will be able to search the online task library for tasks of interest to use as is or to serve as a template for a task that is needed for an individual user. For example, a teacher could search the library for a task for teaching coin values to a student with intellectual disabilities and then customize the task with personal audio messages for the particular student. In addition, *Content Developers* will be able to contribute tasks to the online library to facilitate re-use of tasks. To learn about the latest developments resulting from this effort, visit www.aimsxml.com and select the Library menu option.

* *The RERC on Advancing Cognitive Technologies is funded by the U.S. Department of Education under Grant #H133E040019. Additional funding provided by the Coleman Institute for Cognitive Disabilities, University of Colorado.*

AIMS XML Technical Specification

Detailed information on the AIMS XML specification is available to individuals or companies who register as a *Technology Developer* for the purpose of developing *AIMS Ready* applications compatible with the AIMS XML protocol. The following is a brief description of the AIMS XML protocol.

AIMS XML documents, for the sake of compatibility across multiple platforms, should be created as ASCII text. The naming convention for the documents is AIMS.xml

(uppercase AIMS, and lowercase xml). **The AIMS.xml file must reside in the same subdirectory as all of the task content.** The task content may consist of images, audio files, and video files and the format of these files will be specific to the prompting system. Adherence to broad multimedia file standards such as JPEG, BMP, WAV, MP3, AVI, or MOV is highly recommended.

AIMS XML documents are divided into three main sections. These sections are called **TASK**, **STEP**, and **CHOICE**. The **TASK** and **STEP** sections are both required to create a valid AIMS task, and the **CHOICE** section is optional for tasks that will contain branching or decision-related information. The AIMS XML is structured with the **TASK** section comprising the root level tag and elements, the **STEP** section being subordinate to the **TASK** section, and the **CHOICE** section being subordinate to the **STEP** section. The following provides a rudimentary illustration of the core elements within the AIMS.xml document:

```
<?xml version="1.0"?>
<TASK>
        task element
        task element
        task element
        <STEP>
                step element
                step element
        </STEP>
        <STEP>
                step element
                step element
                <CHOICE>
                        choice element
                        choice element
                </CHOICE>
                <CHOICE>
                        choice element
                        choice element
                </CHOICE>
        </STEP>
</TASK>
```

TASK Section

In essence, the AIMS.xml document describes a single task, and therefore, the <TASK> tag must reside at the root level of the document. Only one <TASK> section may exist in a valid AIMS.xml document. Information in the <TASK> section identifies the task, author, and defines top-level playback options. The AIMS XML specification details each XML tag and related values for each <TASK> element.

STEP Section

The <STEP> section will always reside within the <TASK> section. Although not required, placing the <STEP> elements directly beneath the <TASK> elements in the AIMS.xml file is the proper form. The first (topmost) <STEP> element listed is assumed to be the first step to play in the task. The <STEP> section contains the majority of the instructional prompting information within an AIMS task and contains all text, audio files, pictures and video files used for each step. In addition, optional advanced settings, such as timing features or expanded text for hearing impaired users, are contained in the <STEP> section. There is no limit to the number of steps that can exist within a task.

The AIMS XML specification details each XML tag and related values for each <STEP> element.

CHOICE Section

The <CHOICE> section will always reside within the <STEP> section. This section will only be valid for a specific step and will only be evaluated if the <decisionpoint> tag in the <STEP> section is set to the keyword Decision. Although not required, placing the <CHOICE> elements directly beneath the <STEP> elements in the <STEP> section is the proper form. There must always be a minimum of two <CHOICE> elements. The number of choices available is player dependent, but it is recommended that Pocket PC based players not contain more than four choices per decision point. A <CHOICE> can never be used as the last step within a task. The AIMS XML specification details each XML tag and related values for each <CHOICE> element.

Conclusion

The AIMS specification makes the best effort to maintain the broadest sense of flexibility for instructional media that can be used universally. This specification will continue to mature over time, while keeping forward- and backward-compatibility issues, performance issues, and platform issues in mind.

AbleLink Technologies is very interested in working with *Content Users*, *Content Developers* and *Technology Developers* to expand the capabilities offered by *AIMS Ready* prompting systems, while maintaining the focus on instructional media for prompting assistance. Please send your comments and suggestions to AbleLink at feedback@aimsxml.com or even better, join the AIMS Community and become an active participant in this effort.

For more information, please visit **http://www.aimsxml.com/**.