# Use of XML Technology for E-resources Management within a Healthcare Enterprise
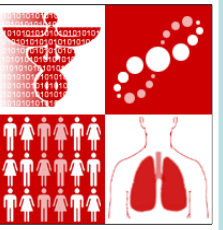
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## Introduction

Provision of access to electronic resources to clinicians is becoming increasingly important. At Intermountain Health Care (IHC), we have created a framework for librarians to manage access to e-resources at enterprise level rather than separately at individual hospital libraries. The new generation of clinicians is more likely to be efficient in computer search strategies. Studies among medical students and faculty have shown that electronic resources (e-resources) are preferred over paper. It is important to provide quick and seamless access to these e-resources (Fig. 1).
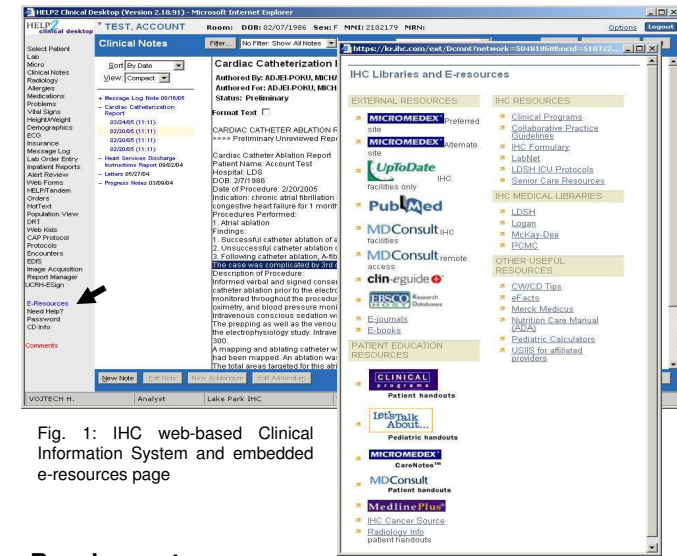


Fig. 1: IHC web-based Clinical Information System and embedded e-resources page

## Requirements

- create a single "e-resources page" with central storage and access
- enable maintenance of the "e-resources page" directly by librarians using a user friendly web-based authoring tool (Fig. 2)
- resulting "e-resources page" can be used in multiple environments (IHC clinical information system, library websites, employee portal) (Fig.1 and 6)
- applications that call the "e-resources page" should be able to provide the user identification (LDAP data) as a parameter. If not, an anonymous login is implied
- context-based content customization: the ability to present links to e-resources based on user's physical location, method of internet connection (Fig. 4) and users' role (Fig. 5)
- ability to track usage (Fig 4)

## Requirements (cont.)

- seamless user authentication for accessing chosen licensed e-resource
- ability to display announcements or news (e.g., reminders about new e-resources available) (Fig. 2)
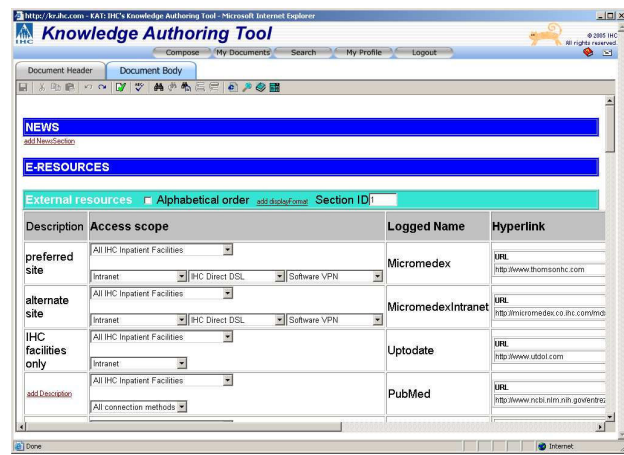


Fig. 2: Authoring environment where librarians manage the links



Fig. 3: E-resource page XML schema (top structures). Each page is com-posed of one or more NewsSections and EresourceSections. Numbers 0..∞ show cardinality.
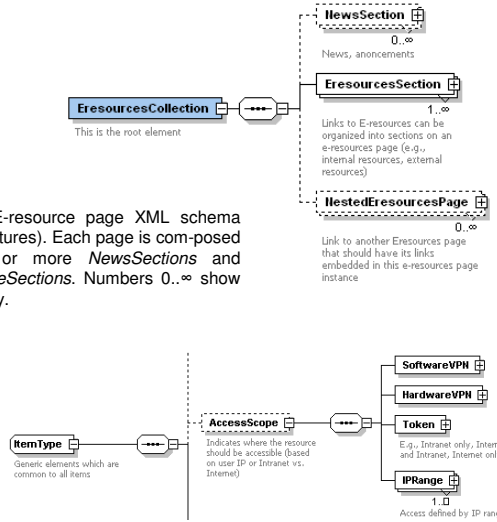


Fig. 4: XML structure for storing user authentication data specific for each e-resource.

## Implementation

We decided to use XML technology, motivated by the idea of "single source publishing". First, we have identified important characteristics of an e-resource and translated this information model into an XML schema. Secondly, we have created forms within our existing web-based knowledge authoring environment (Knowledge Authoring Tool) and instructed the librarians on how to use that environment. Thirdly, we used Extensible Stylesheet Language Transformation technology (XSLT) to generate the "e-resources page" as HTML – including the necessary components for usage tracking (Fig. 1 and 6).
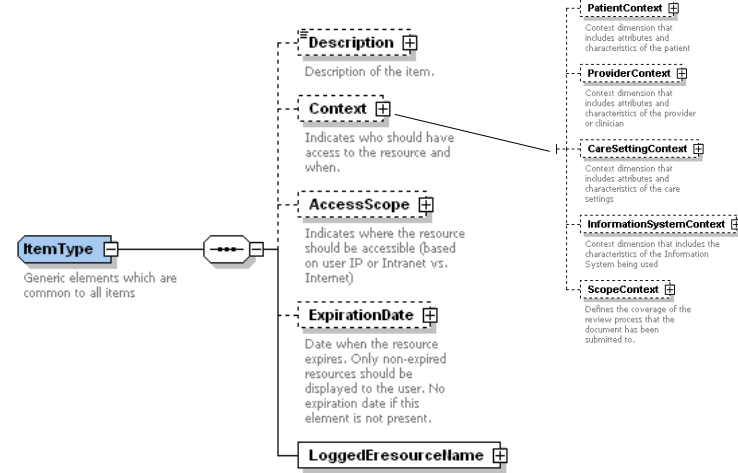


Fig. 5: generic XML schema for an item which is used for e-resources as well as news. E-resource item structure is enhanced yet with Hyperlink and EresourceLogo element (not shown). Dashed line boxes represent optional elements. Generic Context structure is shown on the right, enabling to tag item for specific type of user (physician, nurse). We have decided to reuse the same context structure from Infobutton framework used at IHC.

## Results

Developed framework has been in production use since November 2004. In August 2005 there were 30,614 e-resource sessions. The growing usage data support the numerous positive comments we have received from librarians and clinical users (Fig 7). Detailed usage tracking data (at the clinician level) facilitate better enterprise-wide license purchasing decisions (Fig. 8). We have succeeded in applying our existing Knowledge Repository (KR) and Knowledge Authoring Tool (KAT) infrastructure for managing yet another type of clinical knowledge.
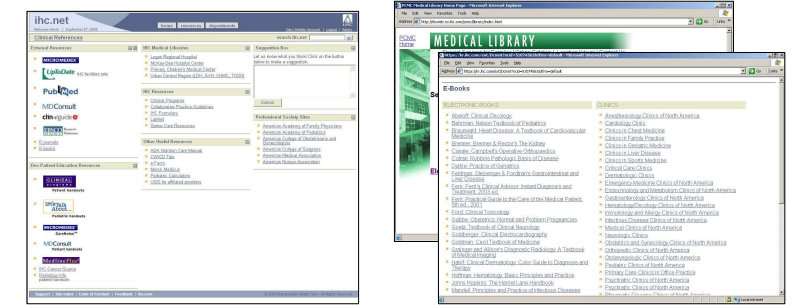


Fig. 6: Other implemented views of e-resource listing data (IHC employee portal and hospital library website)
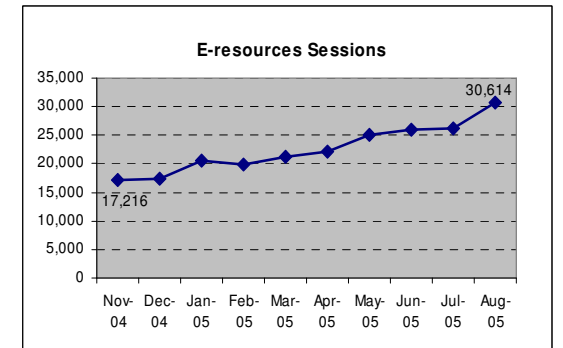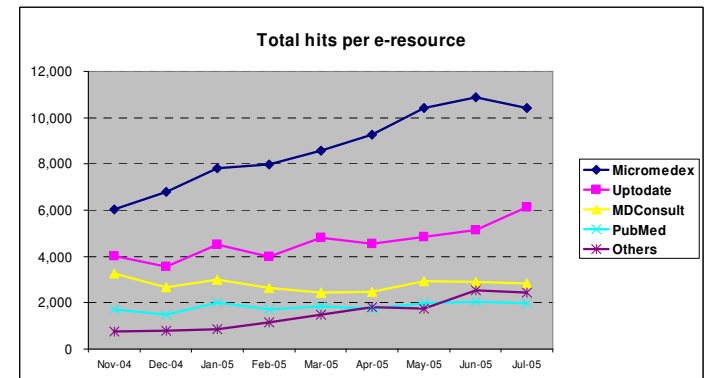


Fig. 7:Graph of usage of e-resource page



Fig. 8: Usage per e-resource