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digital services

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Benefits of Re-Engineering
Glencoe McGraw-Hill's
Interactive Tutor Self-Assessment CD-ROM
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Overview

This paper is an overview of how Roundbox Media would enable Glencoe/McGraw-Hill to best maximize returns on investments in software development for delivery of assessment content. The authors will introduce the advantages in using multimedia programming tools in order to develop a dynamic delivery engine that allows the client to both build new content, as well as repurpose existing data for end-user delivery. Through this dynamic engine, content would be type-cast, enabling a "templating" of question types for standardized delivery greatly increasing the ease with which new assessment software is generated, reducing the time and expense currently required. The final section is comprised of talking points and questions posed to better determine the scope and requirements of the undertaking.

Roundbox Media has, on a corporate level, enjoyed a long-term relationship with McGraw-Hill's CTB division developing and maintaining the I-Know assessment application. Additionally, one of their senior multimedia engineers, Ferris Thomas, has three plus years of experience as a multimedia developer creating CD and web applications for the former McGraw-Hill Education (CTC/New Media) division in Farmington, Connecticut.

Scope Possibilities & Timelines

The intended authoring tool for the application, Macromedia Director, has been designed for the quick generation of media-rich, stable, cross-platform applications. During his tenure with McGraw-Hill, Ferris worked on a number of CD and web-hybrid applications using both Director and Flash, so familiarity with the development process, capabilities, and limitations are not an issue. The length of time and resources required for the development of an assessment tool similar to the ones reviewed, however, relies heavily on the desired level of complexity.

The task, as it is understood, is to emulate the existing product's functionality; at the same time allowing it to easily be repurposed for other projects with only minimal programmatic involvement. That task itself should not pose too great an obstacle, requiring perhaps three months to develop.

Being tasked with generating companion tools for content generation, content management, and unique delivery methods would be more demanding of time—and therefore a larger commitment. The time and resource commitment is also tied to whatever systems and existing architectures the resulting application must fit into. Beyond this horizon, as well, lie possible further extensions of the project, such as eventually tying it to a central database and taking the assessment tool online for content delivery. Roundbox Media has proposed a number of different content publishing options later in this document.

Depending on timeline requirements and general business requirements a myriad of solutions may present itself. Often Roundbox Media will parallel task content authoring/management applications along with content delivery applications so as to minimize timelines. This is especially helpful when very strict and difficult deadlines present themselves. We have listed in this document general estimates of timelines depending on the type of solution selected.

At the end of this paper are a list of talking points that would need to be resolved for a more definitive answer on timelines and resources necessary for the completion of the project.

Advantages & Disadvantages

The current system as reviewed is adequate, but not widely portable. To re-purpose the technology each time for other testing applications comes at some expense. While costs for new product development will never be eradicated, the impact of such changes could be greatly reduced by introducing a less proprietary system running on a generic data type, such as XML.

It is assumed that under the current development system, content is gathered and delivered using a proprietary system. Odds are that this system is single-purposed, with development tools yielding specifically formatted content that, beyond the scope of a specific assessment CD, isn't terribly useful. If that same data (everything from the CD title, to chapter headings, assessment summaries, feedback, and question texts) were distilled down to a versatile system such as XML the client now not only has been given a tool with which to deliver an assessment CD that their clients are familiar with, but at the same time could then offer essentially the same content through other means, be them online via Flash, or perhaps to a hand-held device such as a Palm Pilot.

	Current System	Dynamic System
Creating single assessment CD	CD-ROM application is custom-built using provided data	Requires front-end and tool programming, as well as design of general templates first, then incorporation of provided content.
Scalability of project/application	Create each CD separately.	With the templates built, only actual content for each project need be created (providing all assessment question use the same templates or instructional strategy). Minimal changes would be required to "re-brand" the assessment engine.
Real-time synchronization with databases	Not applicable	A possible solution.
Maintenance	High maintenance. Adding new CDs to the catalog means creating of separate project files. Any changes in common structures has to be propagated to every file, requiring manual updates.	Low maintenance. New content is inserted into an already built system making editing and additions a breeze. A change to the delivery structure means updating only the template. Integration of new question types is possible through extension of the template set.
Development Requirements	Low. Requires HTML programming, graphics creation and (apparently) Visual Basic.	Moderate. Either Macromedia Director (Lingo) or Flash (Actionscript), and the ability to access or export from a database, but less overall administration and on-going programmer commitment once the dynamic delivery model is in place.
Delivery Method	Apparently PC-based	Supporting both PC and Macintosh computer platforms with a proven development system.

Content Generation and Incorporation

Roundbox Media is able to create an assessment engine that matches the functionality of the existing product, or extend it. The product, by design, however, would rely on external primitive data types delivered in an XML schema. The primary difference between the existing and proposed system being that to re-purpose the assessment engine, one basically needs to change the data and whatever external assets (such as images) are required. Even thematic elements such as border colors and splash screens could be dictated through the same data files that provide things like question text.

In review of the existing software, the questions appear to be of a limited number of standard types:

- Multiple choice
- Multiple choice with image
- Matching

These question types are severely limited. Roundbox Media feels we could provide many more item types than these including some interactive testing involving drag-n-drop, game based, etc. By architecting a system properly Roundbox Media could allow the application and possible content presentation methods to grow as new requirements become available. Similar solutions have been implemented for the CTB I-know application. In this application Roundbox Media can easily support CTB by implementing new content types and models with minimal effort because of good foresight and planning.

By setting standards for the data styles and information provided, the content developer would be able to easily develop new datasets for project creation. This could be handled a number of different ways:

Desktop Authoring and User Based Management (1-3 months)

During communications with the client Roundbox Media has found that the current system utilized by Glencoe to author content is a proprietary desktop based tool. Depending on Glencoe happiness with their current authoring system Roundbox Media can provide a couple different solutions.

Glencoe may feel the need for more power in their content authoring system. It may be that through the process of Information Architecture new opportunities to bring more powerful content than the authoring system currently supports is identified. However Glencoe may feel that the process of authors utilizing a desktop application provides the most effective method of content authoring/management. In this case Roundbox Media can create a similar desktop based authoring solution for Glencoe but provide the robust authoring features desired by the client. Glencoe authors would utilize this tool to develop content files containing XML documents and imagery that would drive the CD-Rom application.

Glencoe may feel that they have all the power they desire from their current authoring system. While Roundbox Media does not have any experience in the features or format of the current content authoring system we could work to reverse-engineer produced documents. Roundbox Media would provide Glencoe authors with a simple 'transformation' tool to take content produced by the current content authoring system and transform it into an XML document that could be utilized by the CD-Rom delivery system.

Web-Based/Central Database Authoring System (3-4 months)

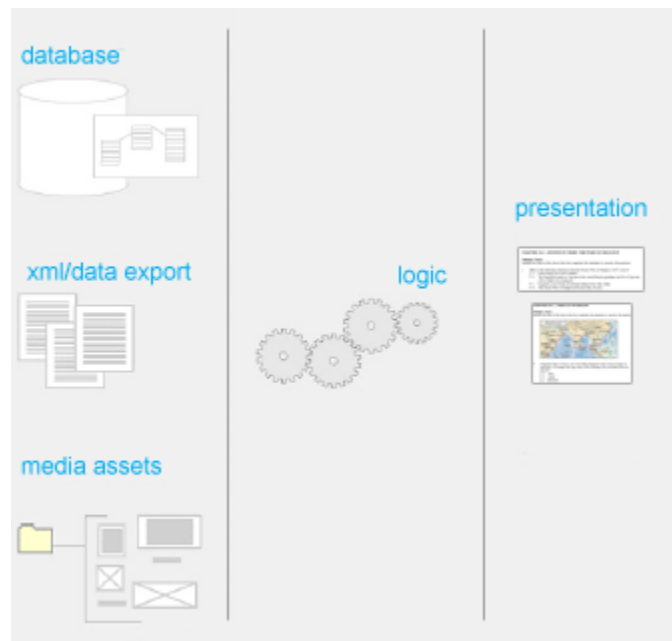
Roundbox Media routinely develops Web-Based content authoring/management systems for our educational clients. These systems provide some very specific benefits over desktop authoring systems.

The first benefit is that the client is capable of maintaining an overview of all content authoring projects and their status. This allows executive management, product management, and project managers to maintain a close relationship with the successes and issues surrounding the development of a specific set of content.

The second benefit is that this style of authoring system eliminates issues with content versioning between different authors/editors working on the same project. It easily allows users of the system to maintain the integrity of the content without the issues that can come from emailing different versions of content and thereby generating a large amount of confusion between authors and for the managers of a content project.

The third benefit is that content created by specific authors is no longer in danger of being lost when a resource leaves a project. Many times Roundbox Media has seen large amounts of valuable content lost when a particular author/editor leaves a project or even their company. By creating a central repository content is easily monitored and retained as an asset of the company.

Developing these types of central repositories can be an expensive process at the beginning outset of development. They provide a great return on investment of the life of the software however. Roundbox Media has developed content delivery applications (CD-Roms) before developing full web-based content authoring systems. This can provide the client the ability to see value with the delivery system before paying for support infrastructure. Intelligent planning can make these transitions as painless as possible.



Talking Points & Unknown Issues

I. Scope

1. Is the client seeking to recreate the existing application to function with existing content management and creation tools?
2. Would the developer be required to generate content management and creation tools (i.e. databases, assessment builders and file compression/encryption/delivery devices beyond the application itself)?
3. Possibility of Extension. The project is currently CD-ROM based. Is there any consideration towards taking any/all of the project to an online basis for content delivery?
4. Is the product networked, or installed on individual workstations? The current system seems to work on a single installation on a client's PC and/or workstation, with all files saved locally. If networking and/or file sharing is required, this will lengthen development time and/or requirements.

II. Current Status:

1. It is assumed that there is already some sort of structure in place for the generation of new assessments. Question data (and images, by assumption) is drawn from McGraw-Hill texts and materials, ordered, and in some way delivered for encapsulation into a CD-Rom assessment. Does the current system (assuming one exists) meet the client's needs? How could it be improved upon?
2. Is the content centrally located, or does its location and/or format vary from text to text and project to project?
3. How are graphical elements stored, handled, and retrieved?
4. At what level are decisions made as to the content of assessments? Throughout the creation and refining process, what format are the questions in? (Word Documents, Excel Spreadsheets, Databases—either online or off, etc).

III. Development Considerations

1. How important is the emulation of a new product with existing application? While functional similarities between the existing application and a newly developed one are attainable, visual duplication is not. Previous iterations of this program have (apparently) been built using Visual Basic or a similar authoring tool. While we would strive to emulate the original application as much as required, there are limitations present in both the old and proposed new methods of development that prevent this. An example: the Windows-styled menus.

These can be imitated to an extent using an extension of Director (an Xtra), but they cannot not be identical. Unlike VB or C++, Macromedia Director (on both the PC and the Mac) cannot natively utilize aspects of the O/S, such as windowing systems. However Macromedia Director offers a robust graphical delivery engine that is much more powerful than VB or C++ GUI interfaces. Roundbox Media can work with Glencoe to create a unique and powerful GUI model that brands the product as exciting and engaging as opposed to the static catalog of menu's provided by the Windows operating system. One example of the differences is given on the following page.



a menu created in Macromedia Director using the PopUp Xtra.
(Note: the PopUp xtra **has not** been ported to either Director MX or OSX.)