8-25-1995

A Multimedia Development Process

Robert P. Trueblood
The University of Alabama in HuntsvilleHuntsville

Vincent S. Lai
The University of Alabama in HuntsvilleHuntsville

Radha K. Mahapatra
The University of Alabama in HuntsvilleHuntsville

Stephen A. Floyd
The University of Alabama in HuntsvilleHuntsville

Follow this and additional works at: http://aisel.aisnet.org/amcis1995

A Multimedia Development Process

Robert P. Trueblood, Vincent S. Lai, Radha K. Mahapatra, and Stephen A. Floyd
Department of Management Information Systems and Management Science
The University of Alabama in HuntsvilleHuntsville, Alabama 35899

RESEARCH OBJECTIVES

One of the fastest growing usages of modern day computers is in the area of multimedia. More and more organizations are using multimedia for marketing products, educating employees, training clients, and developing operational guides. Within an organization these multimedia systems are growing in number and are becoming a valuable asset of the organization. Also there is a growing use outside organizations such as general education, entertainment, and public dissemination of information. Via computer networking, multimedia has created an alternate mode of communication by combining text, video, and audio. With this increased usage, the demand for more complex and sophisticated multimedia is escalating, and it is becoming a real challenge for developers to create sophisticated multimedia. To meet this challenge, a Multimedia Development Process (MDP) needs to be established. The Traditional System Development (TSD) process [4] is not completely applicable because of two important differences. First is the media richness of multimedia system, and second is the broadness and diversity of the audiences (or users) which extends beyond the traditional information system users. Similar concerns have been raised by Mahapatra and Courtney [1] , and Kjelldahl [5]. This paper describes our work in progress in producing an MDP.

Before examining the proposed MDP, one must recognize that good communications between the multimedia development team and the multimedia client must transpire and that good communications are very crucial to the success and usefulness of the developing multimedia. Mauldin [2] has emphasized the importance of communication in multimedia development process.

RESEARCH FRAMEWORK

The research goal is to develop a MDP. To accomplish this the planned research steps are: (1) to develop a MDP based on literature review and a comparison of multimedia systems with the TSD methodology, and (2) to evaluate the proposed MDP on information fed back from multimedia system developers in industry.

PROPOSED MDP

From a literature review [2,3,5,6,7,8] and a comparison with TSD methodology, a six phase MDP is proposed. The six MDP phases are outlined below and are briefly compared to the corresponding phases in TSD methodology. Table 1 list the major features of both.

The first phase is **multimedia analysis**. The main thrust of this phase is the multimedia subject identification and definition. The desired goal, expected outcome, and level of audience are identified and specified. The scope of the multimedia project is described, and the media (text, graphical images, video clips, and sound) sources are cited and experts (graphic artist, audio specialist, etc.) are named. A development team composed of a manager (or director), programmers, and experts is formed. A feasibility assessment is performed. Compared to traditional IS, multimedia has many media sources. This requires the participation of media experts in the MDP.

The second phase is **logical design**. The logical design is concerned with laying out the requirements of the multimedia system. This phase must answer the "what" question: what must the multimedia system do to satisfy user (client and audience) needs. This consists of storyboards (or screen-by-screen blueprints), navigational flow diagrams, and object-oriented diagrams, and user interface prototyping. Text, visuals and sound should have a balanced mixing with complementariness and should not be overbearing. Care must be taken to ensure that visuals conform to the context of the multimedia subject and that text, visuals, and sound are not redundant. That is, the text should not tell what is in the visual, and the sound should not be a reading of the displayed text. They should offer different but associated information. All three should be used in a way to complement each other in an integrated fashion. Most important is that multimedia must be designed at the knowledge level of the audience and must be germane to the audience domain. From the audience perspective the content of multimedia should be socially, ethically, and culturally appropriate. The navigation from screen to screen must be mapped out. The linkage in this mapping should have a logical flow and should not have unjustified random jumps. The project team and the client should review, modify, and agree upon the logical design and reassess the feasibility of the multimedia project with respect to the desired goal.

The logical design phase of multimedia focuses on integration of different media sources and components of the system. MDP places more emphasis on presentation rather than on data management. Navigational design requires the mapping out pathways through the multimedia system. Ease of navigation is critical to the success of the multimedia system. Navigational design is not required in TSD. Because of the breadth and diversity of the multimedia audiences, audience appropriateness (social, ethical, and cultural) is of major concern in MDP.

The third phase is **physical design**. The physical design focuses on the material aspects of the multimedia system. This phase must answer the "how" question: how will the multimedia system meet the user requirements. This consists of obtaining media materials, software and hardware selection, and design of program (or authoring) logic. The size of the multimedia system needs to be quantified (or estimated), for example, number of screens, volume of text, number of graphical images, length of video clips, duration of audio segments, and program code size. These measures can be used in the selection process of authoring or visual software packages and in estimating CD-ROM space. Digitized video clips and audio segments can consume vast amounts of space, so multiple CD-ROMs may be needed for complex and sophisticated multimedia systems.

Hardware and software for MIDI (Musical Instrument Digital Interface) may also be required. The power and speed of the CPU may become critical for display promptness and for audio-video synchronization. The client and the development team should review, modify, and agree upon the physical design and reassess the feasibility. In Multimedia, audio-video synchronization is affected by different hardware while in traditional IS it is not a major factor.

The fourth phase is **fabrication**. Fabrication, rather than coding, of the multimedia system is primarily concerned with combining or assembling the text, video, and audio together to form the multimedia system. Whether using an authoring software package or a visual programming language, care should be taken to ensure consistency in color schemes, location of text, images, command buttons, and pull-down menus on the screen. One should not clutter up the screen with icons and buttons. Using an authoring package can expedite fabrication. For larger, sophisticated multimedia systems, special consideration needs to be given to time-dependent data, storage techniques, and synchronization especially in the usage of multimedia databases[3]. Compared to TSD, multimedia development is more fabrication oriented rather than program development.

The fifth phase is **testing**. Testing multimedia is very crucial. The development team should test for correctness of the system with respect to the logical design to ensure that navigational mapping is followed and proper synchronization occurs. The client should test the system also to see if the goal and outcome are properly met. The system should also be tested by other experts on the subject matter for semantic correctness. An audience test (or field test) should also be performed and evaluated. The audience test should check for such things as boringness, tediousness, and uselessness.

The sixth phase is **utilization**. The multimedia system is given to the client for dissemination to the audience. A mechanism for audience feedback should be provided. As time moves on, the multimedia system will most likely need to be updated and improved. Different hardware and hardware changes may affect screen display rates and audio-video synchronization which may necessitate modifications of the multimedia system.

When difficulties occur at any given phase, it may be necessary to go back to one or more previous phases and make adjustments. Such adjustments need to be reviewed by the development team with the client, and the adjustments need to be agreed upon by both parties. Evaluation and reevaluation of the developing multimedia system by the project team and the client should occur throughout the MDP and should be scheduled on a regular bases.

EXPECTED OUTCOME

The major outcome of our research work is to provide information managers with guidelines for directing the development of multimedia applications. With the current growth in multimedia usage, the need for such guidelines will become more predominate.

We are in the process of evaluating the MDP model based on feedback from multimedia developers in local industry.

REFERENCES

1. Mahapatra, Radha K., and James F. Courtney, "Research Issues in Hypertext & Hypermedia for Business Applications," Database, Fall 1992, pp. 10-18.

2. Mauldin, Mary, "Developing Multimedia: A Method to the Madness," T H E Journal, Vol. 22, No. 7, Feb. 1995, pp.88-90.

3. IEEE Transactions on Knowledge and Data Engineering (special section on multimedia information systems), Vol. 5, No. 4, Aug. 1993.

4.Whitten, Jeffery L., Lonnie D. Bentley, and Victor M. Barlow, Systems Analysis and Design Methods, 3ed., Irwin Pub., Burr Ridge, Ill., 1994.

5.Kjelldahl, Lars, (ed.), Multimedia Systems, Interaction,and Applications, Springer-Verlag, New York, 1992.

6.Lundeberg, Anita, Tomoyuki Yamamoto, and Takashi Usuki, "SAL, A Hypermedia Prototype System", (in [5]), pp. 129-145.

7. McFarland, Ronald D., "Ten Design Points for the Human Interface to Instructional Multimedia," T H E. Journal, Vol. 22, No. 7, Feb. 1995, pp. 67-69.

8. Howles, Les, and Connie Pettengell, "Designing Instructional Multimedia Presentations: A Seven-Step Process," T H E Journal, Vol. 20, No. 11, June 1993, pp. 58-61.

TABLE 1. TRADITIONAL SYSTEM DEVELOPMENT VS MULTIMEDIA DEVELOPMENT

TRADITIONAL [4]	MULTIMEDIA

I. System Planning
  A. Study Business Mission
  B. Define an Information Architecture
  C. Evaluate Business Area(s)	

II. System Analysis
  A. Survey Project Feasibility
  B. Study and Analyze the Current System
  C. Define and Prioritize User Requirements
	I. Multimedia Analysis
	  A. Subject/Goal Identification
	  B. Audience Identification
	  C. Level of Audience
	  D. Media Sources
	  E. Media Expert Identification
	  F. Feasibility Assessment

III. System Design
  A. Select a Design Target
  B. Acquire Necessary Hardware and Software
  C. Design and Integrate the New System
	II. Logical Design
	  A. Storyboards
	  B. Object-Oriented Diagrams
	  C. Linkage and Navigational Flow
	  D. User Interface Prototyping
	  E. Balancing Text, Video, and Audio
	  F. Audience Appropriateness (socially, ethically, and
	    culturally)
	
	III. Physical Design
	  A. Obtain Media Materials
	  B. Obtain Hardware and Software
	  C. Quantification
	  D. Audio-Video Synchronization

IV. Systems Implementation
  A. Build and Test Networks and Databases
  B. Build and Test the Programs
  C. Install and Test New System
  D. Deliver the New System
	IV. Fabrication
	  A. Assemble Text, Video, and Audio
	  B. Consistency
	
	V. Testing
	  A. Correctness of Information
	  B. Navigational Correctness
	  C. Synchronization
	  D. Audience Testing

V. System Support
  A. Correct Errors
  B. Recover the System
  C. Assist the Users of the System
  D. Adapt the System to New Requirements
	VI. Utilization
	  A. Audience Feedback
	  B. Updating Hardware
	  C. Updating Media