

# Developing a Synchronous Web Seminar Application for Online Learning

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## ABSTRACT

Many higher education institutions are searching for cost effective tools for the delivery of a feature rich, synchronous online learning environment. While there are several commercially viable web conferencing products available to enhance the online education experience, they tend to be cost prohibitive and are constrained by software and network limitations. Some universities have invested heavily in products such as iLinc, Centra, and Horizon Wimba, but many academic institutions that would benefit from these products simply cannot afford them.

Rowan University is currently developing a synchronous, online web conferencing application that delivers all the features of similar commercial products without the exorbitant price tag. The Rowan Virtual Meeting (RVM) System is built on Macromedia Flash Communication Server technology; a programming platform that is operating system independent, requires very little overhead to run, and has a one-time cost associated with it that is nominal compared to the cost of the available commercial web conferencing products. Using the RVM system requires no more than a computer that has Macromedia Flash Player installed and an Internet connection. Both students and faculty can participate in a synchronous, media driven online experience using audio, video, slide shows, white boards, application sharing, and more. Rowan is currently beta testing the RVM application both on and off campus.

This paper will discuss the development, implementation, and the future direction of the Rowan Virtual Meeting system, and how it will be used synergistically with asynchronous applications such as WebCT and Blackboard to provide a more interactive online experience for students.

## Categories and Subject Descriptors

C.3 Special-Purpose and Application-Based Systems.

## General Terms

Performance, Design, Economics, Experimentation.

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## Keywords

Synchronous, Web, Virtual, Communication, Collaboration, Conferencing, Presentation.

## 1. INTRODUCTION

As communication becomes more global, corporations, institutions, organizations, and even individuals seek new and cost effective ways to reach out to each other. In our "digital millennium", users have many tools at their disposal to exchange ideas, such as cell phones, email, Internet web sites, streaming media, chat rooms, etc. The next logical step in this movement is to bring services such as voice, video, and data, into one compact tool that can provide real-time interaction and virtually close the gap between employer and employee, student and teacher, and even friends and relatives.

Audio/Video conferencing is by no means a new technology. However, what originally required a group of people to meet in a physical conference room, setup cameras, microphones, and expensive conferencing equipment, and connect via an ISDN line can now all be done simply via and Internet connection, software and a web camera at each users' personal computer. Commercial software companies that develop these software applications have dubbed their products as "Web Conferencing" or "Web Collaboration" software.

Some companies and institutions in the United States have already realized the advantages to using web conferencing software. It reduces travel time and cost, there is little overhead or special equipment required, and real-time, synchronous meetings and distance learning classes are now a reality. However, commercial web conferencing software comes with an extraordinarily large price tag. Organizations that plan on having a subscription to use commercial web conferencing solutions can expect to make an annual payment upwards of \$20,000 or more, and that's only for about 20 to 25 users at a time. In general, web conferencing software corporations have marketed their products with big business and government in mind. That leaves the average sized businesses and colleges with smaller pocket books struggling to find options and alternatives to these web conferencing products.

Rowan University is one of many colleges that considered the options when shopping for a web conferencing tool. As an alternative to buying into a commercial web conferencing software product, Rowan decided to build its own web conferencing software application: the Rowan Virtual Meeting (RVM) system. In this paper, the development of Rowan's synchronous, web seminar application is discussed concerning the University's need for a web conferencing tool, the decision to

build an application from scratch vs. buy a commercial product, the research and development of Rowan's software, and options for future implementation of the software.

## 2. THE NEED FOR A TOOL

Rowan University is on the threshold of sponsoring new and innovative online learning experiences for the Management Institute, Graduate School, College of Education, and other departments. With WebCT as the university's primary course management system, Rowan is interested in complementing these asynchronous sessions with a synchronous component. Formal student, faculty, and staff presentations; collaborative workgroups; virtual faculty office hours; and virtual meetings are just a few of the proposed uses of RVM. Content creation, support desk management, and recruiting are other areas of implementation under consideration.

Rowan University identified several key goals for adopting this new kind of classroom.

1. Center learning around the student. In the traditional classroom, time and distance are limiting factors in the learning process and learning is classroom-centered. In the online classroom, learning activities are decentralized without time and space as limitations.
2. Focus on the needs and strengths of students. Online learning can support multiple learning styles. As learning becomes more personalized, students will require the necessary skills and tools to engage and participate in this new kind of learning process.
3. Provide just-in-time and anywhere-anytime instruction. Online learning environments break the distance and time barriers by providing learning experiences outside the classroom -- anywhere and anytime. Accordingly, teachers can adjust topic presentation and explanations "just-in-time," when students need it the most.
4. Foster collaborative learning environments. Collaborative networks provide the sense of a learning community. Cooperative teams characteristically achieve at higher levels of thought and retain information longer than students who work individually [1].
5. Emphasize authentic learning experiences. Web-based online learning environments can provide authentic frameworks that bridge computer and classroom instruction. Authentic learning contexts provide active and engaging experiences, where the computer can help mediate course activities and shape the learning process [2].

A synchronous "face-to-face" Web collaboration tool will achieve these goals and provide more personable communications and be more engaging than an asynchronous solution alone, build a sense of community, and improve both motivation and retention [3].

## 3. BUY VS. BUILD

The upside of buying a synchronous Web collaboration product is that it would be faster and more convenient. Many products that currently exist on the market would fulfill most of Rowan's requirements. The downside of buying a synchronous Web collaboration product is the expense.

Most synchronous Web collaboration products provide a plethora of features: PowerPoint presentations, voice and text chat, interactive whiteboard, polling, application sharing, and video archiving. These products allow one or more moderators to conduct virtual meetings and presentations to participants anywhere with an Internet connection and a Web browser. They support scheduling, "floor" control, and other administrative features.

Despite these clear advantages, the cost of doing business with commercial web collaboration is often overwhelming, to say the least. The average "entry-level" cost of an enterprise solution starts at around \$75 per month per user for a 20-25 concurrent user license (not to mention the typical hidden setup fees and additional re-occurring costs). At around \$20,000 per year, the implementation of commercial off-the-shelf solutions seemed cost prohibitive with our current technology budget. Moreover, most universities are reluctant to pass these costs on to students who are already paying technology fees in addition to tuition.

The decision to build RVM was based almost exclusively on need and expense. However, Rowan supports a high percentage (about 35%) of Macintosh computers -- narrowing further the availability of commercial off-the-shelf solutions that are mostly Microsoft Windows centric. From further review, it became evident that most of these commercial products were not user friendly. They incorporated complex interfaces, required proprietary downloads to user clients, and were not seamlessly firewall accessible.

To act on the decision to build an in-house product, an RVM project team was designated to manage the project and get development underway. The team's motivation was clear: a cost effective, reasonable facsimile of the available commercial products.

## 4. RESEARCH & DEVELOPMENT

The RVM project team set out with a simple goal in mind: provide a web conferencing product that encompasses the core features of most commercial products while keeping the interface simple and intuitive. Using this as a guideline, the RVM project team began taking a survey of several industry leading web conferencing software products. Members of the team participated in live demonstrations of WebEx, Centra, Horizon Wimba, iLinc, Microsoft Live Meeting, and more. For each software surveyed, the team developed a list of features the product provided, and a list of pros and cons for each product. These lists were later compared and used as the basis for the features to be offered in the RVM product.

The project team's survey of commercial products did reveal a few very important issues that were common to just about every commercial web conferencing product: (1) most software ran on Microsoft Windows OS only, (2) most software required a download and installation greater than 1MB, and (3) most products required institutions to open ports on their firewall in order to connect via the internet. These issues posed a major problem, especially in the academic environment where many institutions use Mac and Linux as much as Windows, and time spent downloading and installing software often hinders the use of the product. The project team felt that it was necessary to tackle these issues as part of the RVM product by developing a true cross-platform software application that requires little or no proprietary software to download and install. Also, opening ports on the network firewall requires intervention from a network

technician, which typically needs to be scheduled in advance. This creates an obvious limitation that the RVM project team wanted to avoid.

After further research, the Macromedia Flash Communications Server development platform seemed to be the appropriate solution for the RVM project since it provides a standard set of development tools that allow programmers to design high-quality, interactive media based applications. Flash is a cross-platform standard that will work with most browsers, and since only the flash player software is needed on the client computer to run flash communications applications, there is no proprietary software to download or install. Finally, the use of Flash Communications Server as the point of connection means that a firewall port only needs to be open at the hosting server, and no where else. Hosting an RVM meeting will not require that a network technician be available.

The project team also tackled the issue of what core features to include in the RVM application. Based on comparisons between commercial software products, it was determined that the following would be the list of necessary features that would give RVM similar functionality to other industry applications, but would not go overboard.

1. Real-time audio and video
2. Text Chat Room
3. Power-Point Presentation slide show
4. Virtual Whiteboard with extensible drawing tools
5. Desktop application sharing
6. User feedback and polling

As with most of the commercial products, some features seemed superfluous, or in some cases, were duplicates of already available features. The RVM project team worked to eliminate confusion and provide simplistic, easy to use features that simply made sense. This is where the project guideline played a significant roll. Most commercial product interfaces are plagued by too many features which can cause confusion and often makes the product more difficult to use than it is worth; something the RVM project team referred to as “feature-itis.”

In an effort to cut down on design time, training time, and tech support time, the project team strived for an interface that was, at its root, simple and intuitive. Having narrowed the features to a core set of useful tools, the team set out to design the GUI such that users could login and begin using the software with little or no prior experience. It became imperative that the interface was easy to navigate, straight-forward, and could be understood by the novice and the expert alike. The project team considered human factors such as click count and aesthetic quality; icons and images needed to be clear, concise, and meaningful.

From here, the road map was marked and set. The RVM project had successfully determined the design implementation would follow. In the Fall of 2004, the RVM project team released a beta version of the RVM application to the technical support staff on campus and began a beta testing program. From here, plans were set in motion begin the implementation of the RVM on campus.

## 5. TESTING

The RVM project team decided upon a two branched approach to the software testing process: (1) release RVM for use by the technical support team and (2) initiate a beta testing program that is offered campus wide. Initially, accounts were created for the campus Instructional Technology support personnel for use in training and technical support. Ideally, the tech support team will become proficient in the use of the RVM software. In turn, they can provide support for the product as it is used by individuals on campus.

The second approach was to implement a beta testing program in the spring of 2005 where faculty and staff on the campus who are interested in using the RVM application either for meetings, training, or even for a distance learning class may become a participant in the program. To get the program off the ground, and due to limited support personnel resources, the RVM project team opted to offer beta testing accounts to computer savvy faculty and staff. The beta testing program grants users an account with full rights to the RVM system as well as provides them with a separate beta testing web space for follow on system information and support. Beta testers are offered a preliminary RVM training session where they learn how to make presentations and hold meetings via the RVM software. As part of the beta testing program, testers are encouraged to post feedback, both positive and negative, in the support & feedback bulletin board area of beta testing web site. This feedback information serves as a type of User Acceptance Testing (UAT) for the software.

Information obtained from user comments and software issues is currently being used to improve upon the software design and structure. The RVM project team can quickly learn from posted feedback the areas of the RVM system (including the supporting web space) that may need adjustments or improvements. Repeated problems or failure of a particular feature or component may reveal either an error in the software, a flaw in the design of a feature that makes the use of the application too complicated, or a need for additional user training. Several requests for a special feature may be taken into consideration to add that feature to the current or future revisions of the RVM software. UAT is currently playing a vital role in the future implementation of the RVM system and how well it is accepted by the general population of faculty and staff.

## 6. FUTURE IMPLEMENTATION

With an operational beta version of the RVM system on hand, the RVM project team can begin to make plans to move the software into production at Rowan University. As part of the implementation process, Rowan can expect to see this venture come full circle, where RVM is integrated with existing campus facilities to enrich the technical palette of tools available to the faculty and staff. Rowan intends to slowly begin to incorporate the RVM system with existing technologies on campus.

Courses held both on and off campus (correspondence classes) that utilize the RVM system will be able to take advantage of its synchronous features. Students can meet in real-time via RVM, and then follow up asynchronously via Rowan’s WebCT course management system. For off campus students, the classroom will be brought to them over the Internet in a virtual atmosphere. For on campus students, the RVM system can be utilized by the faculty and staff when space and facilities are limited, or when a

faculty member is not able to be present on campus for his or her course.

The RVM system can also assist in the administration aspects of the college. For example, Human Resources can hold campus wide seminars without having to fill an auditorium for multiple sessions to ensure that every employee on campus can attend. RVM will allow a session to be held that can accommodate all campus faculty and staff without anyone having to leave his or her desk. In a similar fashion, technical support staff can use this product to train groups or individuals, as well as provide live technical assistance without having to make an office visit. This is imperative at a university like Rowan where faculty, staff, and students are numerous, but technical help is extremely limited.

The RVM project team has high aspirations that the Rowan Virtual Meeting system will, in many ways, become an extension of the existing technological infrastructure. While RVM is not a replacement for any one system, it has the potential to become an excellent enhancement for many systems and applications.

## 7. CONCLUSION

Some institutions have invested a significant amount of time and capital in commercial web conferencing software. They have dedicated funds, personnel, and other resources into systems that afford little flexibility and often are more cumbersome than not. The web collaboration software market is still in its relative infancy, and it is reasonable to predict that over time, with an increase in demand, the cost for current commercial products will reduce. Until more affordable prices become a reality, the Rowan Virtual Meeting system can be considered a stepping stone or interim product that offers Rowan University many of the abilities and features of commercial web collaboration software.

Despite the fact that the RVM system has been built in-house and does not have the typical look and feel of a commercial product, it has been met with warm reviews and approached by many optimistic inquirers. The RVM project team has been able to successfully provide a synchronous web seminar application where in the past, simply due to budget restrictions and prohibitive costs, Rowan University would not have had an opportunity to enter the realm of web collaboration. The team hopes to continue the success of the RVM project, carry on with improvements upon the design and functionality of the RVM system, and see through the proposed steps of future implementation.

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