

# **I-Views, a Storymaking Community of, by and for the Audience**

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Submitted to the Program in Media Arts and Sciences,  
School of Architecture and Planning,  
in partial fulfillment of the requirements for the degree of

**MASTER OF SCIENCE IN MEDIA TECHNOLOGY**  
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## **Abstract**

This thesis presents I-Views, a system that permits individuals to use published, communally owned media clips to author narratives by assembling clips, and to build communities of similar interests based on comparing these narratives. To facilitate sharing of on-line motion pictures and initiate conversations among storytellers/re-tellers and audiences, I-Views allows widely distributed groups of people to view, edit, compare, evaluate and discuss video material over the Internet. There are two types of tools: web-based video studio tools and virtual community building tools. The former allows the user to view, select, save, re-sequence and publish video clips; while the latter allows the user to initiate dialogues by matching common interests and assumptions and build virtual communities around stories. By offering shared authorship, tools and virtual environments, I-Views demonstrates new story forms such as "Sharable Documentary."

Currently, we are evaluating the prototype system using video footage documenting the Junior Summit '98, which is a cross-cultural, cross-geographical and multi-language project involving numerous people, including thousands of children, Junior Summit staff, sponsors, Media Lab faculty and students. Specifically, an international group of filmmakers including four junior filmmakers have contributed more than one hundred hours of footage shot. The current video database includes eighty streaming video clips selected from the footage shot.

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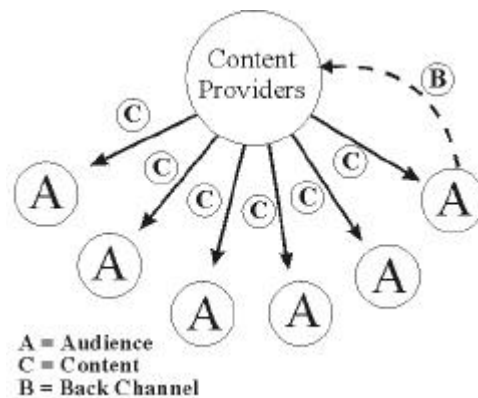
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# 1. Introduction

## Hypothesis

From the earliest civilization, stories have been perpetually shared and re-told. Unfortunately, recent story technologies-- movies, radio, TV-- offer little back channel for discussion and re-telling. In fact, these technologies separate the teller from the "mass" audience. Lacking an obvious back channel, it is very difficult for participants to comment on stories, present their own interpretations, or share their thoughts, experiences and impressions with other audience members. [Figure 1.1].



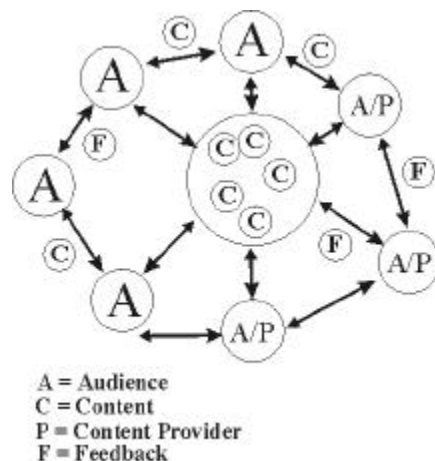
[Figure 1.1] Little Back Channel-based Broadcast Model

The decentralization of the Internet provides person to person communication as a primary feature. Can we create a system that presents motion picture media to distributed audience in a way that encourages the social use of the Internet's back channel? How can the distributed system fertilize the interactive channel such that audiences share motion picture stories and impressions? How can the audiences and storytellers or re-tellers initiate discussion? How can the system foster virtual communities or sub-communities around a video story? How are these communities self-organizing?

## I-Views Overview

This thesis presents I-Views, a story sharing community of, by and for the audience. To facilitate sharing on-line motion pictures and initiate conversations among storytellers/re-tellers and audiences, I-Views allows widely distributed groups of people to view, edit, compare, evaluate and discuss video material over the Internet. There are two types of tools: web-based video studio tools and virtual community building tools. The former allows the user to view, select, save, re-sequence and publish video clips; while the latter allows the user to initiate dialogues by matching common interests and assumptions and build virtual communities around stories. In the shared media environment, the distinction between the author and the audience is blurred. Through accessible interactive channels, the audiences are able to turn themselves to storytellers or re-tellers. They play a more active role, participating in the construction of storytelling and retelling than ever before.

[Figure 1.2] By offering shared authorship, tools and virtual environments, I-Views demonstrates new story forms such as "Sharable Documentary."



[Figure 1.2] Multi-Channel, Community-Based Communication Model

## Content Overview

Currently, we are evaluating the prototype system of I-Views using video footage documenting the Junior Summit '98, <sup>[1]</sup> which is a cross-cultural, cross-geographical and multi-language project

[1] "The Summit brings children from all corners of the globe into discussions about some of the world's most pressing issues. It involves the children in the design and creation of information technologies, and offers the children a platform to effect real change."  
<http://www.jrsummit.net>

involving numerous people, including thousands of children, Junior Summit staff, volunteers, sponsors, Media Lab faculty and students. The content reflects children's thinking: would culture, child labor, kids bank, telecommunications access and environmental responsibility. All children were encouraged to use their own languages when applying for the project. Through a six-month on-line forum and a one-week summit at the MIT Media Lab, children identified and addressed issues of particular interest to them. The children, who came to MIT, developed proposals and presented these to world leaders. The event suggested itself as an excellent subject for an on-going, long-term evolving documentary. Motion picture is good at conveying visual information, such as place, people and past situation or events that reflect diverse backgrounds and cultures. During the Junior Summit, an international group of filmmakers including four junior filmmakers contributed more than one hundred hours of video content about the Junior Summit. By sequencing multiple video clips, we convey a particular interpretation of events. By matching sequences, we help the participant initiate conversation with other Junior Summit members.

### **Overview of the Thesis**

Chapter 2 includes the discussion of the previous relevant research work and addresses how they inspire our research and what kinds of problems they haven't solved. Primarily, there are three kinds of research influencing us to form I-Views: *Society of Audience*, *Online Social Environments* and *Evolving Documentary Systems*.

Chapter 3 is the discussion of the research motivations, goals and design principles. We present four design principles on which we build the concepts, workflow, functions and interfaces. The four principles are: *Sharable Media*, *Community Sense*, *Accessibility* and *Self-organization*. The four principles are interconnected with each other, but offer different perspectives for conducting the development of I-Views.

Chapter 4 describes the structure and implementation of I-Views: client/server models and how they each work. We present seven modules on the client side, server side modules, comparison algorithms, net work architecture, data flow, streaming video server and meta information design. The I-Views content is discussed: we give an example of a piece of video clips and discuss how the

content was produced.

Chapter 5 has two parts: evaluation and future work. We have been testing I-Views both on-site and remotely. About ten children and four adults used the system. We have drawn conclusions about what works and what does not work in I-Views. Future work focuses on improving the current version of I-Views, meta information research and self-organizing video-based virtual community building.

Chapter 6 concludes with a presentation of what our hypothesis is, what have been accomplished and what we continue to work on.

## 2. Background and Context

### The Overview of Background and Context

No blueprint currently exists for Internet-based video storytelling models yet. The decentralization nature of the Internet brings tremendous opportunities to an audience to change its traditional role of listening and watching by building virtual communities around stories and extending story context. There are three areas of related research inspire us in the development of I-Views: *Society of Audience*, *On-line Social Environments* and *Evolving Documentary Systems*.

*Society of Audience*<sup>[1]</sup> is a metaphor that encompasses social constructs of story context. In this thesis, we discuss two areas of research: fairy tale and broadcast media fans. In particular, we are interested in the way in which audience members socialize and share interpretation.

Why are there so many versions of the tale of Snow White? Previous fairy tale research<sup>[2]</sup> shows that people create stories on three different levels: text, texture and context. The text is a basic story; the texture is a specific language of the story; context is any relevant personal, social, and other influences. Most current authoring tools and technology focus on helping authors create new stories on the text and texture levels, while technology and tools rarely address re-creation of stories on the contextual level. We would like to understand how audiences have varied the context of the Snow White tale as they have re-told this story in many cultures over a few hundred years. In turn, we want to build new tools for audiences to change, retell and share stories from their viewpoints satisfying their needs.

Broadcast media fans are people who find pleasure in talking about

[1] Society of Audience is one of six research categories in the Interactive Cinema Group at the MIT Media Lab. <http://ic.www.media.mit.edu>

[2] Stone, Kay. *Three Transformations of Snow*. p. 53. <http://www.scils.rutgers.edu/special/kay/snowwhitertext.html>

existing stories and changing them for others and themselves. Sharing video-based stories differs from other media-based stories, such as oral-based fairy stories. Understanding what and how media fans have done is useful for our research. In particular, we focus on how and why they record, collect, re-edit and share commercial TV shows to build their own video programs. To verify the value of social production of meaning and story re-telling, we refer to Professor Henry Jenkins' previous work and some examples in his book, *Textual Poachers*.<sup>[3]</sup>

Our current system is based on the Internet infrastructure. To build *On-line Social Environments*, we study two web communities: ICQ<sup>[4]</sup> and MP3.COM<sup>[5]</sup> and previous collaborative filtering project, Ringo. ICQ is growing dramatically and has attracted more than 33 millions subscribers in two years. From our research perspective, we would like to understand how two people can initiate conversions and how personal networks can be maintained on the Internet. MP3.COM is a democratic on-line music-publishing platform that offers a new perspective to bolstering both audiences and musicians. We focus on the on-line publishing tools which MP3.COM offers.

Our assumption is that I-Views -- a distributed storytelling system -- can work like a match maker, grouping very distributed participants together based on their interests. We study some previous collaborative filtering techniques and projects, such as Ringo.<sup>[6]</sup> Ringo is an on-line music recommendation system which has mechanisms to recycle word-of-mouth acknowledgement by matching common interests among users. We also compare Ringo with the comparison tool introduced in I-Views in chapter 4.

*Evolving Documentary Systems* inspires us to think of how to share authorship among authors, audiences and computers. We look at two projects, New Orleans: City in Transition<sup>[7]</sup> and Contour.<sup>[8]</sup> The former is the first interactive documentary. Contour designed by Michael Murtaugh has incorporated a spreading activation network algorithm that allows the system to suggest an understandable/continuous presentation of story of the "Big Dig" project currently taking place in Boston.

[3] Jenkins, Henry. *Textual Poachers*. Routledge, New York, 1992.

[4] ICQ is an Internet-based instant pager.  
<http://www.icq.com>

[5] MP3.COM the ultimate source for digital music downloaded from the Internet.  
<http://www.mp3.com>

[6] Maes, Pattie. Shardanand, Upendra. *Social Information Filtering: Algorithms for Automating "Word of Mouth."* CHI, 1995

[7] "This interactive documentary provides a case study of urban change before, during, and after the 1984 Louisiana World Exposition in New Orleans, Louisiana."  
<http://ic.www.media.mit.edu/>

[8] Contour is a narrative engine that "produces dynamic and responsive presentations from an extensible collection of keyword-annotated materials."  
Murtaugh, Michael. *The Automatist Storytelling system*. MIT Master Thesis, 1996



## Society of Audience

*"We should look for it in those layers which the centuries have built up around the few main legends of humanity. These layers constantly, if ever less faithfully, reproduce the form of that grain of truth around which we gather, and so carry it through the centuries. The true history of mankind is contained in fairy stories, they make it possible to guess, if not to discover, its meaning." Ivo Andric, the Bosnian Nobel Prize-winning novelist*<sup>[9]</sup>

## Fairy Tale

No one exactly knows how many different versions of the tale of Snow White exist in the world. In some early versions, it is Snow White's mother, rather than the stepmother who wants to kill Snow White; in other versions, the seven lusty knights save Snow White instead of the seven dwarfs. Professor Kay E. Vandergrift, the Associate Dean of School of Communication, Information and Library Studies in Rutgers University, has created an on-line hypertext Snow White<sup>[10]</sup> which allows the reader to contrast and compare textual changes from Grimm's version of Snow White to thirty-six other versions. There is a sentence from the Grimm's version: "It chanced that a King's son came into the wood, and went to the dwarfs' house, meaning to spend the night there. He saw the coffin upon the mountain-top, with little Snow-White lying within it, and he read the words that were written upon it in letters of gold." The user can click on the hypertext-linked sentence and read another page that contains the same scenario told in thirty-six different ways. For example, in Folktales of Greece, the same scenario is: "A good while after, a prince chanced to pass that way. And when he saw the chest, it pleased him so much that he asked the lads to let him have it. At first they would not give it to him, but after much persuasion they let him have it. But they warned him never to open it. And the Prince took the cheat and brought it to his palace. And one day he fell very ill and nearly died."<sup>[10]</sup>

Professor Vandergrift has also collected a variety of sets of illustrations for the same written story. On the right of this frame, there are three illustrations [Figure 2.1, 2.2, 2.3] telling the same plot of Snow White's arriving at the seven dwarfs' house from her site. The three illustrations reflect different illustrators'

[9] Andric, Ivo. *Conversations with Goya. Bridges. Signs.* Trans. By Celia Hawkesworth and Andrew Harvey. London: Menard Press with the School of Slavonic and East European Studies, University of London, p.16. 1992.

[10] Vandergrift, Kay. The web site has comprehensive content of Snow White. <http://www.scils.rutgers.edu/special/kay/snowwhitetext.html>

understandings in terms of images setting, color, mood, style and characteristics of different era. Russ MacMath offers the reader a perspective to look at illustrations of fairy story:<sup>[11]</sup>

*"Illustrations give insight and new life to folktales that otherwise might have stopped evolving once they had been recorded. Likewise, a comparative illustration study of a single folktale reveals that there is not a single, preserved, visual interpretation. The range of artistic styles overall reveals an encouraging willingness of illustrators to bring new ideas to bear on the conventions of folktale illustration."*

...

*"Their contribution to traditional folktales is to return them to the realm of living literature. They are the storytellers for our time."*

Snow White is not the only fairy tale which has been told and re-told in a widely variety of ways. "For nearly every tale, that are at least a dozen versions, in some cases, hundreds of extant variants."<sup>[12]</sup> I assume that this only counts those versions that are printed in books. If we were able to consider all different versions of oral fairy tales such as a version which grandmother tells her grandchildren, the total number is infinite. "Fairy tales are not written in granite. My own experience has shown that we continue to rewrite the tales as we reread them, even though the words on the page remain the same."<sup>[13]</sup>

The phenomenon of Snow White raises the question: how and why are the same stories told and re-told in different ways? Kay Stone explains<sup>[14]</sup>:

*"In recent years folklorists have attempted to clarify the vibrant relations between text, texture, and context, thus providing a useful framework in which to survey variations of Snow White. The text is the basic story of Snow White; its texture is the specific language (visualization in the case of film) of a particular story; context is any relevant personal, social, historical, and other influences. There might be countless oral texts of Snow White, each with its own texture and context. The storytelling event, or actual verbal composition of a story, is extremely sensitive to immediate contexts that might motivate changes in texture. Thus Snow White in oral tradition is multitextural and multicontextual. There is no single "original" or 'authentic' oral text. The story would never be told in precisely the same words even by the same person. A unique context for each telling produces different textures, and thus a variety of oral*



[Figure 2.1]Berlin: Verlag von Wilhelm Hertz, 1899. p. 150a.



[Figure 2.2] Snow White. Adapted from the Fairy Tales by the Brothers Grimm. Illus. by Bernadette Watts. Winchester, MA: Nord-Sud/Faber & Faber, 1983.



[Figure 2.3] The Rainbow Fairy Book: Classic Fairy Tales. Ed. by Andrew Lang. Illus. by Michael Hague. New York:

texts."

The framework provides a general research direction to which more details can be explored. There are three reasons which should be considered as follows:

1. The story of Snow White is extremely beautiful, charming and magical. The content is so memorable that children love to hear and re-tell the content. Many children read the story again and again and illustrate their favorite characters.
2. Re-telling or illustrating Snow White is transformable. It costs almost nothing to produce your own version of Snow White either orally or in writing. Many parents and grandparents tell their children Snow White based on their memory.
3. Many fairy tales are initially created anonymously and have been re-told over hundreds of years. People have the freedom to "bring their differing perspectives to bear on these works and interpret them in light of a number of personal, critical, and theoretical perspectives."<sup>[15]</sup>

The evolving rich text, texture and context of fairy tales continuously bring the reader new perceptions and new perspectives, which are "to be experienced, to be enjoyed, to be appreciated, to be loved. Each reader, in the process of experiencing a literary work, both brings meaning to and takes meaning from that work. Thus, the meaning made from having experienced that work is personal and idiosyncratic and is based on all the reader has known and experienced outside that work. Meaning is also communal in the understanding of the human condition as expressed in and communicated by the work."<sup>[16]</sup>

### **Broadcast Media Fans**

"Fandom does not prove that all audiences are active; it does, however, prove that not all audiences are passive."<sup>[17]</sup> Professor Jenkins's research of media fans provide a useful framework which shows what media fan are doing, how they are doing and why they did. Here, our focus is on story re-producing and social production of meaning.

In *Textual Poachers*, Professor Jenkins suggests ten ways employed

Books of Wonder/Morrow, 1993.

[11] MacMath, Russ. *Recasting Cinderella* pp. 33-34

[12] Tatar, Maria. *Hard Facts of the Grimms' Fairy Tales*  
<http://www.scils.rutgers.edu/special/kay/snowwhitertext.html>

[13] Tatar, Maria. *Off With Their Heads*.  
<http://www.scils.rutgers.edu/special/kay/snowwhitertext.html>

[14] Stone, Kay. *Three Transformations of Snow*. p. 53.  
<http://www.scils.rutgers.edu/special/kay/snowwhitertext.html>

[15] Vandergrift, Kay. *Snow White Criticism*.  
<http://www.scils.rutgers.edu/special/kay/snowwhitertext.html>

[16] Vandergrift, Kay. *Snow White Introduction*.  
<http://www.scils.rutgers.edu/special/kay/snowwhitertext.html>

[17] Jenkins, Henry. *Textual Poachers*. Routledge, New York, 1992. p.287

by media fan to rewrite a television show: Recontextualization, Expanding the Series Timeline, Refocalization, Moral Realignment, Genre Shifting, Cross Overs, Character Dislocation, Personalization, Emotional Intensification and Eroticization.<sup>[18]</sup>

[18] Jenkins, Henry. *Textual Poachers*. Routledge, New York, 1992. pp.162-177

For example:

Recontextualization: "write short vignettes ("missing scenes") which fill in the gaps in the broadcast material and provide additional explanations for the character's conduct."<sup>[18]</sup>

Refocalization: "while much of fan fiction still centers on the series protagonists, some writers shift attention away from the programs' central figures and onto secondary character, often women and minorities, who receive limited screen time."<sup>[18]</sup>

Cross Overs: "stories break down not only the boundaries between texts but also those between genres, suggesting how familiar characters might function in radically different environments."<sup>[18]</sup>

Personalization: "fan writers also work to efface the gap that separates the realm of their own experience and the fictional space of their favorite programs."<sup>[18]</sup>

[19] Bakhtin, Mikhail. *The Dialogic Imagination*. Austin: University of Texas Press, 1981, p. 293-294

To illustrate that fans reconstruct these borrowed materials, Professor Jenkins refers Mikhail Bahktin and video artist M. V. D.'s words:

*"Each word tasters of the context and contexts in which it has lived its socially charged life... The word in language is half someone else's. It becomes 'one's own' only when the speaker populates it with his own intention, ... Expropriating it, forcing it to submit to one's own intentions and accents, is a difficult and complicated process."*<sup>[19]</sup>

[20] Jenkins, Henry. *Textual Poachers*. Routledge, New York, 1992. p.225

*"Images pull out the words, emphasize the words, just as the words emphasize the pictures. If I've done a good job with a video, I can portray an emotion and I can hold that emotion throughout the song. I can bring a new level of depth to that emotion through my images and I can make you think about the program in a different way."*<sup>[20]</sup>

Fans collect, select, inflect, recirculate, amplify, parody, or recombine primary images and songs for re-creations. A California fan team claims that they have taped all of the episodes of their favorite serie and some of their members have 800 tapes because they've been recording since the '70s.<sup>[21]</sup> One fan made a five-minute show from a 30-hour collection. Sometimes, fans use borrowed material to make radically different stories. For example,

P.E.L takes use of the footage from *Blake's 7* to retell the children's story, *Peter Rabbit*.<sup>[21]</sup>

Community is an important part of fan culture. "The commercial narratives only become one's own when they take a form that can be shared with others, while the act of retelling, like the act of rereading, helps sustain the emotional immediacy that initially attracted the fan's interest."<sup>[21]</sup> Many fan artists had little experience before they entered the field. They attend various conventions, workshops, club meetings, exhibits, and even personal parties to see and learn how fan experts made their stories. With the expert's help and inspirations, beginners try their own hand. Some of them gain reputations within fan communities and become new experts. "The creation, exhibition, and exchange of videos creates the conditions for a communal artform, one contrasting with the commercial culture from which it is derived in its refusal to make a profit and its desire to share its products with others who will value them."<sup>[22]</sup> Within communities, fans learn from each other, exchange images, tapes and ideas, encourage other fans' works and are encouraged by others, etc. Within communities, their talents can be "discovered, nurtured, and promoted" by other fans, then they make new contributions to larger communities.

[21], [22] Jenkins, Henry. *Textual Poachers*. Routledge, New York, 1992. p. 229, p. 227, p.77, p. 287

Fans' fascination with programs, creation of building new legends, and frustration over broadcast-like media inspire us to design new generation of applications and media for much broader people such as families, friends, neighborhoods, underground artists, musicians and children.

## **On-line Social Environments**

The Internet has had tremendous impact on the ways in which people tell, retell, disseminate and share stories. The nature of decentralization of the Internet fertilizes potential that is further enhanced by the rapid growth of Internet itself. Our mission is to re-think the emerging media and invent new applications or systems specifically taking advantage of the nature of the new media.

To understand how people initialize dialogues, build and maintain sophisticated personal networks and virtual communities on the Internet, we present some observations about the extremely popular on-line communication application, ICQ. In just three years, ICQ

has become the world's largest internet communication network (more than 30 million subscribers now)<sup>[23]</sup> We have also been investigating an on-line music site, MP3.com, through which more than 10,000 artists have published their music and 200,000 visitors download music daily.<sup>[24]</sup>

[23] <http://www.icq.com/>

[24] <http://www.mp3.com/aboutus.html>

## ICQ

ICQ [Figure 2.4] is a peer-to-peer, on-line application that informs the user who's on-line at any time and enables the user to communicate with them. ICQ is continuously evolving. New features such as chat room, search tools, interest lists and translation functions have been developed. In our case study, we focus on how people initiate dialogues and maintain personal networks.

Basically, there are three ways through which people can start conversions on ICQ.

1. People such as friends or family members who already know each other can send out message and start to talk on ICQ.
2. Introduced by mutually known person, two strangers start a conversation.
3. Finding people through random chat rooms, interest lists, home pages, etc., people start to talk and develop a relationship.

In particular, the second and the third situations have more value for our research; we examine the functionality of ICQ tools.

In the second situation, ICQ allows the user to share his/her contact information with others as follows. [Figure 2.5]

The user is able to modify the contact information and add new information into previous contact database in minutes. Other information such as emails, files, URLs, home pages and interest groups can be easily shared too.<sup>[25]</sup> The powerful capability of sharing a variety of information speeds up building personal networks.

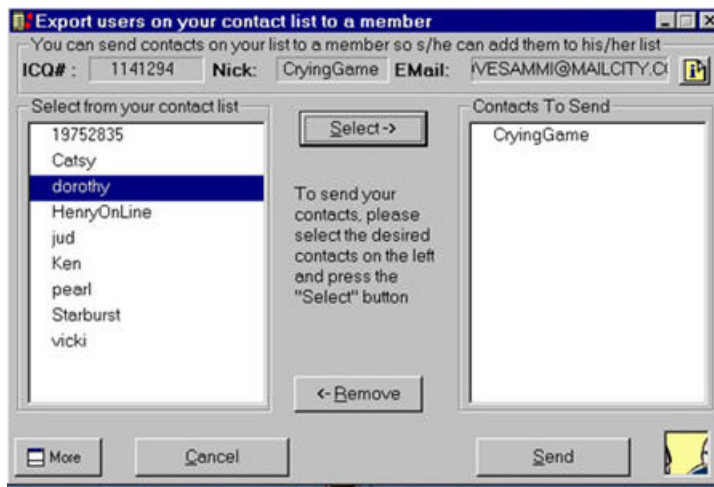


[Figure 2.4] Screen Shot of the Control Panel of ICQ

The third situation is much more complicated and has been solved less successfully since there are many ways such as random chat rooms, interest groups and message boards through which the user can try to find potential chatting partners or friends. We have interviewed a few ICQ users. They described their experience of

[25] <http://www.icq.com/>

how to find interesting people to talk to as follows. For their privacy, their real names are not listed.



[Figure 2.5] Contact Manager of ICQ

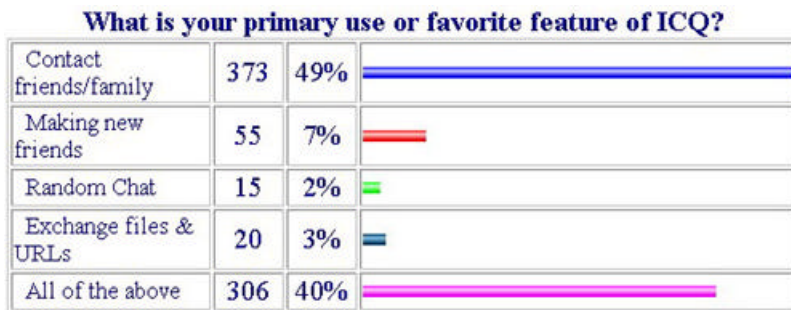
Susan is 57 years old with a master degree, has been on ICQ for two years and has about 67 people on her user list. She is usually on ICQ early in the morning from 4:30AM to 8:00AM.

*"You click on add/find users and then on the category you want (like over 50 or whatever) and then find user. Then you read what they say about that person (each person writes his/her own) Like mine says I have a dog named Sally! LOL. If there is one is interesting to you, you can either send that person a message or request chat with them. ... I always ask where they are from ... what they do for a living or their hobbies. Also, if they like to travel (as I love to travel) and where they have gone, etc. ... I often ask if they are married and have children. Most people love to talk about their family and their grandchildren, too. ... And I am attracted to people who are smart and educated and funny. ... Sometimes it is intuition ... I am not so interested in talking to kids all the time. I prefer someone about my age. It just depends. I have one friend on ICQ who is only about 25. He is very interested in the world and especially SE Asia and their cultures. ... I feel that some of these people have actually become close friends of mine. Not too many, just a few."*

To match common things such as age, interest, hobby, intelligence, education, etc is the approach Susan takes to find appropriate chatting partners. Sometimes, she is interested in something different, such as southeast Asia in this case. Besides the complicated static genre-based categories, ICQ also provides a

variety of keyword-based matching search tools. In later chapters, more matching techniques such as algorithms and presentation techniques are addressed.

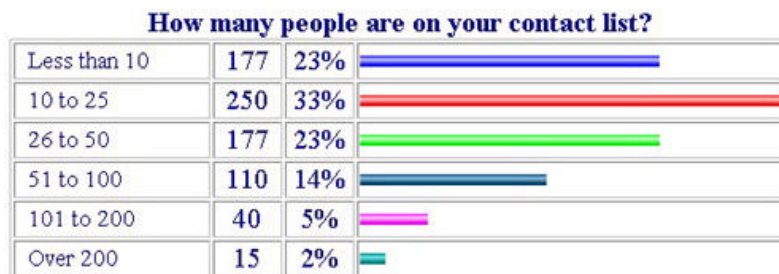
However, there is too much irrelevant information on ICQ and it is difficult to find interesting people to talk with unless the user is lucky or spends a lot of time researching. The effect of matching is inefficient. About half of ICQ users' say that primary use of ICQ is to contact friends and family. [Figure 2.6]



Copyright ©1999 Thomas Robert Pasawicz aka DiamondBack  
[Figure 2.6]

How to search relative information on the rapid-growing Internet is still an unsolved problem. The survey reflects a desire to foster stronger intercommunication for established communications such as family, friends and associations.

From the same survey, we can see about 80 percent of ICQ users maintain less than 50 people on their contact list. The number reflects that keeping personal connections smaller and more focused are communal needs. [Figure 2.7]



Pasawicz aka DiamondBack  
[Figure 2.7]



## MP3.COM

In this investigation, we focus on some problems MP3.COM has solved and something haven't. MP3.com provides easy-to-use music publishing platform for musicians.<sup>[26]</sup> It provides a five-click feature to publish music to their web sites: choosing a genre such as alternative, classical, etc., adding information such as the song title, credits, etc., uploading the song, uploading the album cover image, setting configurations such as copyrights, etc. I did a test and it took me about fifteen minutes to publish a piece of music. The extreme easiness of publishing music brings thousands of musicians to broadcast their art works through MP3.COM. However, they have many technology challenges such as classification, content presentation, personalization, community building, etc. I cite a few opinions from their message board, which describe the ontology problem and searching problem.

*"The Record companies always want you to fit neatly into a Genre package, that way they can say he/she is Country, Metal, Pop or what ever. ... I find myself getting bored because after a few songs, they all sound the same. ... MUSAK usually did it in groupings of 3 songs, then repeated again with the next group of 3. It is just plane boring and predictable."*<sup>[27]</sup>

*"It is clear to me that the main challenge that the internet faces is not access to information (i.e. anything reduced to conveyable binary code - music included), but efficiency in getting the information that is desired. It is already impossible for an individual to sort through all the free-music that is available on the internet..."*<sup>[28]</sup>

Centralized static categorizing methods are not able to satisfy the needs of both musicians and audiences. MP3.COM also lacks compelling tools for building communities among authors and audiences. The audience should be able to recycle other audiences' experiences for helping search music among communities.

### Collaborative Filtering

Ringo,<sup>[29]</sup> a collaborative filtering project designed by Professor Pattie Maes and her students at the MIT Media Lab, offers another solution for a search and suggestion. Collaborative filtering provides a way to recycle other people's experience and wisdom for

[26]  
<http://www.mp3.com/newartist/>

[27] OnePeaceBand, on the message board  
<http://www.mp3.com>

[28] Big Poo Generator, on the message board  
<http://www.mp3.com>

[29] Maes, Pattie. Shardanand, Upendra. Social Information Filtering: Algorithms for Automating "Word of Mouth." CHI, 1995

recommending valuable information.

Ringo encouraged users to input their opinions about music; from many interactions, it extracted meta information about the music itself. For example, Ringo gives a user a list of 125 artists, then asks the user to rank each piece one by one. Ringo creates a profile based on the answer and compares it with all other users' profiles in the system. When Ringo finds the best matches, it searches for music the user has not heard, then recommends the music.

The contributions of Ringo are as follows.

1. Ringo is able to recommend personalized information. Some of media information such as pictures, sounds, videos and physical items cannot be automatically analyzed, indexed and ranked with current technology. Ringo takes use of human's wisdom, matches similarities then recommends.
2. Content-based filtering methods falls short on evaluation quality. Since Ringo is based on human's experiences, evaluating quality becomes possible.

Based on collaborative filtering technology, many commercial online shopping companies are building recommendation features. From customers' viewpoints, these features still have some problems. "A less successful experiment, in my opinion, has been Amazon.com's use of 'intelligent agents' to suggest books to you based not on you or others have actually purchased, but on which books and author you say you like."<sup>[30]</sup> The main problems are as follows.

1. The process of metadata production (in Ringo's case, the production is to type ranking information and computer knows whether or not the user like a particular song) is tedious. The user has to rank numerous of terms such as artists, music, etc to inform their profile. Plus, if the user knows little about the samplers, recommendations are able to do nothing.
2. Most recommendation systems provide static comparison algorithms which don't allow the user to define or adjust what is similarity and what is difference. Similarity or difference has different meaning to different people.

Some metadata retrieval methods and dynamic comparison algorithms, which have been implemented in I-Views, are addressed in the later chapters.

[30] Seybold, Patricia.  
*Customers.com* Random  
House. p.129

## Evolving Documentary Systems

For the past twenty years, Glorianna Davenport, leader of the Interactive Cinema group at the MIT Media Lab, has researched the design of systems and the structure of content which can encourage authors, audiences and computers to share in the interpretations of video and multimedia stories. The research "reflects the longing of cinema to become something new, something more complex and more personal as if in conversation with an audience." [31] The research projects in the group can be described according to six categories: Society of Audience, Evolving Documentary, Everyone's Cinema, Tools for Tales, Contextual Browsing, and Transformational Environments. [30] I-Views can be identified by the first four descriptions. In particular, I-Views has been shaped as an extension of the Evolving Documentary.

Professor Davenport's project, "New Orleans: City in Transition 1983-87" [32] is the first Evolving Documentary which allowed students and researchers seamless, random access to three hours of video content as well as time lines, newspaper articles, filmmakers' notes and other relevant supporting documents through six videodisc players. The documentary is a cinematic case study of how the 1984 Louisiana World Exposition influenced the urban change in New Orleans from 1982 to 1986. The system provided video- and text-editing tools by which students were able to add their comments to the database. Students were able to contribute new information and interpretation to the database. This is a pioneer evolving documentary film, which wanted the audiences to be "film pilot, not passenger."

In 1995 and 1996, Michael Murtaugh, a student of Professor Davenport, developed a new presentation engine for the evolving documentary, Contour. Contour is a browsing space which uses thumbnails and thematic keywords to provide the viewer with context about how the system works and allow the user a format for easy intervention. The story engine, spreading activation algorithm, enables the system to select clips which match as closely as possible the collective impression of what has played out before. The problems that Contour tried to solve and the solutions it took are summarized as follows.

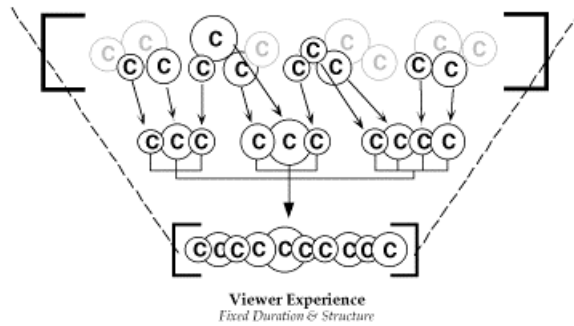
### 1. Evolving and Open-ended Architecture

[31] Interactive Cinema  
Home Page  
<http://ic.www.media.mit.edu/>

[32] Davenport, Glorianna.  
New Orleans in Transition,  
1983-1987: The Interactive  
Delivery of a Cinematic Case  
Study. *The international  
Congress for Design and  
planning Theory, Education  
Group Conference  
Proceedings*. 1987

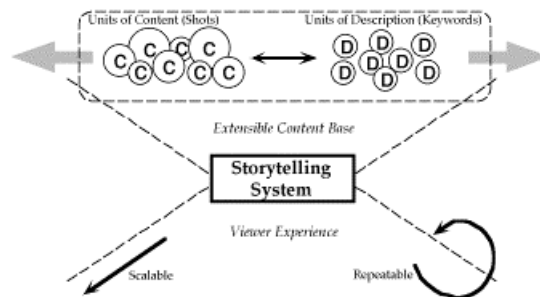
[Figure 2.8] [Figure 2.9]  
Murtaugh, Michael. *The  
Automatist Storytelling  
system*. MIT Master Thesis,  
1996 p.42

The nature of conventional broadcast media does not allow new relevant materials to be added to previously-made stories or old materials to be deleted from the story system unless the whole story is re-produced (re-edited.) Certain ongoing events such as wars, public works, politics are difficult to present based on the one-way broadcast infrastructure. The fixed and rigid construction of a story was described as follows [Figure 2.8]



[Figure 2.8] The process of making a documentary film

To design a new model for presenting open-ended evolving stories, Murtaugh took a decentralized approach: the author gathers and edits pieces of self-contained clips and annotates each clip with a few keywords; the author or multiple authors are able to add new material into Contour later. [Figure 2.9] There is no centralized director who conducts the storytelling. Every clip has certain autonomy and is able to negotiate with each other and make decision about which clips should be presented unless the audience gives explicit commands.



[Figure 2.9] The Hourglass-like Model of Evolving Documentary

## 2. Narrative Continuity Engine

To present meaningful thematic stories, each clip observes the activities of the others. As soon as a clip is selected by the

audience, the other clips match the associated keywords to see if there are any similarities. If there are, then they become active and are ready to be presented in the future. Stories are built up of revelations about the world - a certain person in a certain setting enters a particular situation. In order to maximize our ability to understand a progression with in a story, the storyteller will keep one axis stable while changing the emphasis of other axes. By example, we learn about the "green Monster," Boston's elevated roadway, from Nancy Caruso as she walks toward the North End. In payout mode, the system will follow this segment with another on the North End, the elevated roadway, or Nancy Caruso. The clip weights the descriptions, North End, Nancy Caruso, Boston Artery. If one of these descriptors has been more heavily weighted due to prior payout, the system will try to keep that descriptor in play. Otherwise it will select another segment described using all three descriptors. If there are none available, the system will choose a clip with two of the descriptors. If there are none available, the system will select a clip with one like descriptor.[Figure 2.10]



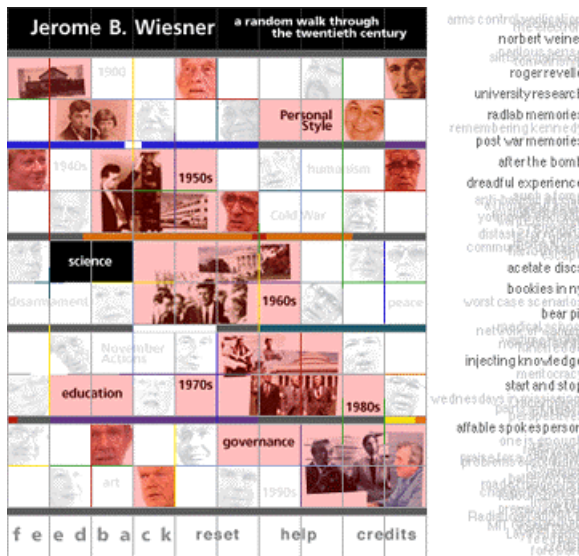
[Figure 2.10] A Screen Shot of Contour

### 3. Personalized and Steerable Presentation

Contour allows the audience to personalize the presentation. The audience is able to steer the payout by altering the context. If the audience wants to view the character "Nancy Caruso," s/he can click on the keyword of "Nancy Caruso," that keyword is assigned a maximum weight, making it the most active element of the story context. However, if the audience doesn't want to know anything about Nancy, s/he is able to

shift-click on the keyword to give it a negative value. Furthermore, the audience can choose a complex presentation of A AND B NOT C by clicking and shift-click the keywords. The flexible presentation method augment personal experience of interacting with Contour.

Murtaugh uses the same spreading activation network algorithm to create a web-based version of Contour, called Dexter. Dexter was developed in conjunction with the story Jerome B. Wiesner: A Random Walk through the Twentieth Century. The basic idea of Dexter is same as Contour, except its visual interface. To get more information, please read Murtaugh's thesis.



[Figure 2.11] A Screen Shot of Dexter

While Murtaugh's projects inspired me to create a new storytelling system, they also encouraged me to ask the questions: what alternatives exist for presenting a large number of pictures, what is the best approach to defining meta information (In Contour case, keywords are meta information,) how shall we design a compelling personalized tool for audiences to participate in storytelling, how can the system encourage the audience to share impressions and experiences with other audience members, how can these activities enhance a sense of community for those who have similar interest, etc. The questions challenged me to design a new story telling and sharing system, I-Views.

### 3. Motivation and Principle

What most motion picture applications on the net lack is the sense of community. If we could develop a vibrant community around a video story, we could begin to use the network for the social construction of meaning. Video is good at conveying place, people and past situations or events. It may be enriched by dialog or by interview. By sequencing multiple video clips, we convey a particular interpretation of events.

I-Views is a shared story environment in which widely distributed groups of people are able to view, edit, compare, discuss, evaluate and build community sense around video stories over the Internet. Currently, we are evaluating the prototype system using footage documenting the Junior Summit '98. The design of the system emerges from our profound belief that storytelling is a sociable activity. Stories need to be shared if they affect the cultural fabric. We discuss the motivations and goals of this research. Then, we present four design principles that represent our belief: *Shared Media, Community Sense, Accessibility* and *Self-organization*. Through the discussion of these principles, we try to draw a blueprint for designing and creating the next generation media for the new millennium. Lastly, we present the reason why we choose the Junior Summit '98 as the content in I-Views.

#### **Motivation**

Human beings are social animals. We share a large variety of information, such as news, stories, knowledge, experiences, impressions, emotions, etc. In this research, we focus on how a sharable media platform can initiate and enhance future story dialogues between audience members. The motivations are as follows.

1. The nature of digital content and the decentralized Internet

infrastructure provide an efficient means for people to gather and distribute digital content. This includes digital images, digital music and video. Most importantly, when digital devices become ubiquitous and broadband infrastructure is in place, the production and distribution of digital content will become more convenient and accessible than ever before. One of research motivations is to understand the emerging media and explore how to take advantage of the new media.

2. People share images with family and friends in daily life. Photo albums and shoeboxes are used as sharable media to share smiles, memories and emotions. People have the same needs to share digital audio and video over the Internet. More than sixty millions people have been using RealNetworks' Internet-based audio/video player, Real G2 player. <sup>[1]</sup> As mentioned in the previous case study of MP3.com, more than 10,000 musicians have contributed their music to the site and share their art works with more than 200,000 visitors daily. However, both media creators and users are not satisfied with the current cumbersome methods of exchanging digital media. We want to take a different approach, experimenting with new authoring tools and participation solutions.
3. By providing sharable media, we want to facilitate widely distributed people to establish virtual communities, where community members are able to build interconnections, learn, encourage, and collaborate with each other. The term "community members" has been applied in a large variety of contexts. It can be any clusters of people who have physically social connections such as family members, friends, classmates, and colleagues. It also can be groups of people associating on the basis of certain shared interests, or assumptions, such as on-line forum groups, media fan groups, etc. Different community members might share different content. For example, family members would like to share family pictures, wedding videos, birthday party videos, etc. On-line media fans might enjoy their favorite programs and characters together and share how to tell and retell stories, express joy and sadness. In this thesis, the Junior Summit '98 project, which involved about one thousand children from 139 countries, serves as a model of a distributed virtual community throughout this discussion.

[1]  
<http://www.real.com/company/index.html>



## Goal

This research is a long-term and evolving work. Currently, we have three research goals:

- Rethinking the roles of the author and the audience in sharable media environments. In these environments, the distinction between the author and the audience becomes blurred, while the audience plays a more active role in the construction of storytelling and retelling, the author imbues her segments with a unique perspective.
- Concentrating on Society of Audience, which "broadens our acknowledgement of 'audience' to admit the growth of the audience over time, the role of word-of-mouth gossip, public acknowledgement in the definition of a cultural talisman, and the act of self-organization as an essential feature of interpretation." [2]
- Outlining community-based models for sharing video/audio content over very decentralized media, such as the Internet. We design and experiment dynamical comparison tools which facilitates the grouping of audience members to initiate conversations, share visual content and impressions for creating community sense.

[2] Davenport, Glorianna.  
*Society of Audience*  
<http://smg.www.media.mit.edu/classes/VirtualSociety99/SocietyOfAudience.html>

The three goals reflect our belief that storytelling is sociable activity. We would like to understand how new media, such as the Internet, have impacts on the way that we tell/retell stories, the way that we communicate with each other. To achieve the three goals, we build prototypes, test them and learn from these experiments. The current prototype, I-Views is built up based on four principles.

## System Design Principle

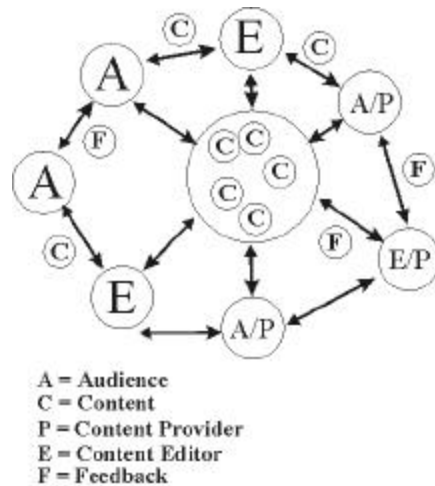
The concepts, workflow and functions of I-Views are built around four principles: *Sharable Media*, *Community Sense*, *Accessibility* and *Self-organization*. Through the four principles are strongly interconnected with each other, each principle offers a different perspective for guiding the development of I-Views in the past two years.

## Sharable Media

To design and offer sharable media, we have to address two issues: what the participant is able to share with others and how we can facilitate their activities of sharing stories, impression and experience.

In I-Views, the participants are able to share authorship, video contents and on-line tools, such as sequencing tool and comparison tools. The participants can save and edit their favorite video clips and publish their new sequences back to I-Views without applying for the permissions from the authors of these original clips. The sharable authorship offers each individual freedom to retell stories from different perspectives and assumptions. On the other hand, all re-told sequences record the original information about the sequences, such as who are the authors of original clips, when the clips are made, etc. In the early version of I-Views, we kept track of all hits of original clips and re-told sequences. So the authors of popular clips can earn their reputations from their great stories. However, authorship is a critical issue. We will thoroughly investigate online authorship in future work as well as relevant issues such as copyrights and online intellectual property. As for sharable tools, we provide simple and useful, on-line real time editing tools. So far, all video content exists on an I-Views video server. All participants share the same video database. The video sequencing process is actually linking the addresses of selected video clips. The process of sequencing addresses is executed in real time over the Internet.

To facilitate the participants to share stories, impression and experience, I-Views adopts a community-based dissemination model instead of broadcast or VOD (Video on Demand) models. In this model, [Figure 3.1] there are no centralized content providers or producers; each individual participant can play three types of roles: audience, content editor and content provider. The content provider is able to contribute original content, such as the four junior filmmakers who shot footage during the Junior Summit; the content editor is those who watch and re-edit original clips; the audience is able to watch stories or comment on other participants' work.



[Figure 3.1] Multi-Channel, Community-Based Communication Model

In such a community-based communication environment, allowing a participant to easily find other participants to share with his/her stories is extremely valuable. In this situation, I-Views acts as an intermediary or matchmaker. From the previous case study of ICQ, we know that matching common interests or assumptions is one approach to initiating conversations. I-Views adopts a similar idea, but builds on previous work and takes a smarter approach. In ICQ, there is no intelligent matchmaker and all matchmaking judgments are done by a human being. The matchmaking process is very time consuming and inefficient process. I-Views offers a comparison tool that is able to analyze the sequence that is made by the participant and compare the sequence to all other sequences in database. Then, I-Views presents the ten most-similar sequences to the participant. A user might watch some of the ten sequences and decide whether or not to initiate conversations. The comparison tool is a means for participants to match their common interests and foster new communications with others. We will detail the matchmaking methods and compare our tool to other related methods that were implemented in Ringo in later chapters.

### Community Sense

The concept of community sense is closely interrelated to the previous discussed concepts of sharable media and self-organization. The researches of virtual community have very comprehensive content and context. The research areas are from virtual identity from a psychoanalytic perspective (Turkle 1995)<sup>[3]</sup> to visualization of community (Donath 1996),<sup>[4]</sup> from virtual

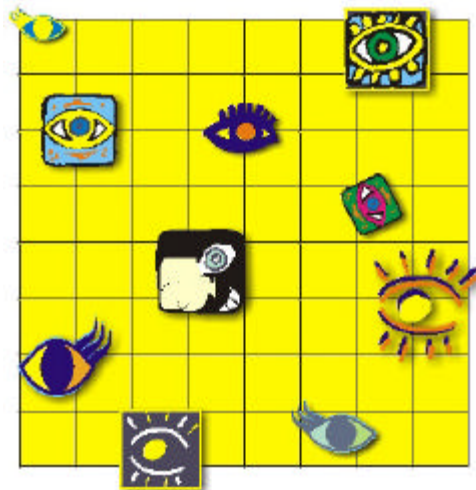
[3] Turkle, Sherry. *Life on the Screen: Identity in the Age of the Internet*. NY: Simon & Schuster. 1995

[4] Donath, Judith. *Inhabiting the virtual city: The design of social environments for electronic communities* MIT Ph.D. Thesis, 1996

reputation in MUDs (Reid 1994)<sup>[5]</sup> to virtual community structure (Wellma and Gulia 1996).<sup>[6]</sup> During the early research period, our focus was on visualization of virtual presence. Later, we focus on dynamically clustering participants together to build sub-community sense.

While we focused on the visualization of virtual presence, we addressed questions about how to present participants and their stories in novel ways. There were two approaches: participant-oriented and story-oriented visualization. In the concept version of I-Views, we adopted the participant-oriented method. However, in the current version, we are taking the story-oriented approach.

In an early concept version of I-Views, we planned to offer icons as means for participants to present their identities. We designed about fifty different icons as metaphors to represent each individual. [Figure 3.2] Some examples are as follows.



[Figure 3.2] Icon Design

The icons are different styles of eyes, which represent different viewpoints. The participant was supposed to choose an icon as her/his virtual identity. When he or she logged in to I-Views, other participants were able to see his /her icon. All stories that were retold by the participant were linked to his/her icon. If other participants want to see the participant's stories, they can click on the participant's icon to see a list of his/her stories. During implementation, however we did not implement the use of icons for identification. This approach was not taken for two reasons. The first reason is that most Junior Summit participants already know each other in real life while virtual icons play novel roles when two

[5] Reid, Elizabeth. *Cultural formations in text-based virtual realities*. Thesis, Dept. of English, University of Melbourne. 1994.

[6] Wellman, B. and Gulia, M. *Net surfers don't ride alone: virtual communities as communities*. Forthcoming in (P. Kollock and M. Smith, eds.) *Communities in Cyberspace*. Berkeley: University of California Press. 1996.

strangers talking to each other. Secondly, more than thousand participants might use I-Views at some future date, hundreds of icons were not able to represent all of them uniquely. If two participants choose the same icon, they will be confused. We might re-think the participant-oriented approach in later version of I-Views.

In the current version of I-Views, we take the second approach: story-oriented. The first frame of original video clip is used to represent the clip. The advantage of this approach is that participants can easily make sense of the clip. The disadvantage is that one thumbnail is not able to represent a whole sequence. We add new features to cover this disadvantage. The participant is able to click on the More Info button and a new window pops up. The window contains all information about the sequence, such as how many clips are in the sequence, who is the author of this sequence, when the sequence is built, etc. The story-oriented solution is not perfect. We will continue to work on the issue of visualization of virtual presence in later research.

There were about twenty small discussion topics and five task forces: Kidz Bank, Global Newspaper, Resource Bank, Documenting Your Life and Nation<sup>1</sup>. They also had a variety of experiences including formal discussions. We offer a dynamic comparison tool as a means of clustering participants who have similar interests. For example, many participants love playing with Lego and made fabulous toys. We want to offer useful means for these Lego fans to dynamically build sub-communities and exchange their ideas and experiences. As soon as a participant builds a sequence consisting of a few clips about Lego, he or she is able to use the sequence as a metric to find out the ten most similar sequences from database. The participant clicks on each sequence and watches it. If he or she finds any interesting sequences, he or she can start communications with the authors of these sequences. In this case, the comparison tool is not only a means to find proper people to talk to, but also a means for clustering a group of people together. However, we have figured out that the comparison tool is not powerful enough for participants to maintain their networks of contacts. We will design new tools for clustering and maintaining sub-communities in the future work.

To enhance the sense of community, we provide a popularity scale

by which the participant is able to know which sequence is popular. In the concept version of I-Views, we designed a dynamical popularity scale which shows the popular sequences based on the participant's preference and the popular author as well. However, this idea is not implemented in the current version of I-Views.

### **Accessibility**

To design an accessible on-line system, we have three sub principles: no requirement to download special software, explicit working processes and a neat user interface. To use I-Views, the participant only needs a browser, such as Internet Explorer 4.0 or Netscape 4.5 and a RealNetworks G2 Player. These two tools are necessary. There is no additional software that is needed to be downloaded. On the client side, there are seven major components: User Registration and Login, Watch Original Video Clips, Edit and Broadcast Video Clips, Compare Video Sequences, Find the Most Popular Sequences, Contribute Video Content and Search for Content. There are also some small components such as sending email, getting more information of sequences, viewing sequences, etc. Some of them were written in Java and the rest were implemented in Perl. We will explain all these components, network architecture and data flow in next chapter.

During the test of concept version of I-Views, we found that some users were confused by the new idea of sharable media. They did not know how to use these on-line tools in appropriate ways. In the current version, we present most functions in an easy to follow step by step process. Since I-Views is a process intensive system, these STEP buttons hint the participant to explore I-Views step by step as follows. [Figure 3.3]



**[Figure 3.3] Five Basic STEP Buttons**

For example, the participant needs to edit and broadcast a sequence (STEP One) before comparing the sequence to the all other sequences in video database (STEP Two)

To keep the user interface as neat as possible, we adopt a green-

yellow-orange color scheme and frame-based presentation. [Figure 3.4] There are three frames: top, middle and bottom. All applets are presented in the middle frame. The top frame contains the six steps and the bottom frame describes all relative information such as Junior Summit project, user instruction, contact information, etc. The top and bottom frames keep coherent in terms of layout and color scheme.

I-Views is written in Java and is a video intensive site. To enjoy I-Views, the participant needs a fast Internet connection such as a cable modem, a DSL, ISDN or T1 line. The bandwidth is a big barrier for most people experimenting with I-Views. We might try a “thin” version of I-Views in later research.



[Figure 3.4] The First Page of I-Views

### Self-organization

Self-organizing communities are of, by and for community members who associate on the basis of shared interests and assumptions. When the mainstream is composed of self-organizing communities, no one individual will be able to dominate a community. Self-organizing communities resist centralized control by an individual or by a small group of individuals. Every member

is able to contribute as well as consume information at any given time. Although many self-organizing virtual communities use various media, I-Views concentrates on video-based content.

In I-Views, most of the video content was contributed by the Junior Summit community members. Particularly, four junior filmmakers shot fabulous footage, which reflect children's thoughts, feeling and impressions. In the self-organizing virtual community, I-Views works as a supporter, which provides virtual space for storing video content, editing tool, and four utilities: popularity scale and contribution component, web-based email and keyword-based video search engine. Supported by these utilities, the participant is able to share personalized content and collaborate with other individuals.

Actually, in on-line communities, participants play different roles depending on their personalities and passions. During an interview with Susan, an ICQ user, she explains her observation of users:

*"Don't you think conversations depend a lot on how extroverted or shy you are? For example, my husband is shy and quiet. He would never even go on ICQ! A person needs to "draw him out" to get him into a conversation."*

From the live tests for I-Views, we found a similar phenomenon. Participants fall into three groups: observer, builder and leader. The observer is a relatively passive participant; s/he watches videos but doesn't use the edit tool or publish new sequences. The builder watches stories and makes stories for himself or herself or their friends. The leaders are extremely active builders. They not only tell stories, but also invite their friends and organize other participants. In ideal self-organizing communities, all participants should be able to find their virtual social positions. They should be able to switch their virtual social positions or play multiple roles.<sup>[6]</sup> In the current version of I-Views, we haven't provided different tools to different participants. In the future versions, we will design new concepts and tools that are able to satisfy observers, help tellers and fully support leaders.

There are many fundamental issues which we have not touched, such as incentive mechanisms, community vocabulary and evaluation mechanisms. We will discuss these issues in the chapter



of future directions.

### **Why the Junior Summit '98**

Junior Summit '98 brought over 1000 children from 54 countries around the globe into discussions about some of the world's most pressing issues, such as telecommunications access, environmental responsibility, individual privacy, child rights, and world peace. The summit involved the children in the design, creation and implementation of information technologies. More than 5000 children from 139 countries applied for the summit; more than 1000 children were selected to participate six month on-line forum; and 97 delegates presented their plans at the six day summit at MIT from 54 countries. The project started from December 1997 and ended to March 1999, including four phases: The Application Process, The Application Process, The Junior Summit at MIT and Local Action Projects. The current projects include Junior Journal, Resource Bank, Nation1, Kidzbank, Nurturing and Respecting Differences.

The distributed community of the Junior Summit'98 provided inspiration and materials for the I-Views Platform. It is a cross-cultural, cross-geographical and multi-language project involving numerous people, including thousands of children, Junior Summit staff, volunteers, sponsors, Media Lab faculty and students. The content reflects childrens thinking: children in the project discuss many issues, such as children's roles in digital age, which should be of interest to viewers using the interactive system. Through a six-month on-line forum and a one-week summit at the MIT Media Lab, children identified and addressed these issues, then reported their proposals to world leaders as well as brought the final statements back to their local communities. These materials provide an excellent subject for an on-going, long-term evolving documentary. We hope I-Views eventually help the participants deliver and disseminate video-based content and share their impressions, experiences and feelings within the virtual community.

[6] Turkle, Sherry. *Life on the Screen: Identity in the Age of the Internet*. NY: Simon & Schuster. 1995



## 4. Implementation

I-Views is an on-going project and has evolved weekly. In this chapter, we present the structure of current (July 1999) implementation of I-Views: client and server side modules, database modules, net work architecture and data flow. We also discuss a few techniques such as meta information design, comparison algorithms, etc.

### Modules on Client Side

As mentioned before, there are seven major components in client side:

- User Registration and Login
- Viewing Original Video Clips
- Editing and Broadcasting Video Clips
- Comparing Video Sequences
- Finding the Most Popular Sequences
- Contribution of Video Content
- Searching for Content

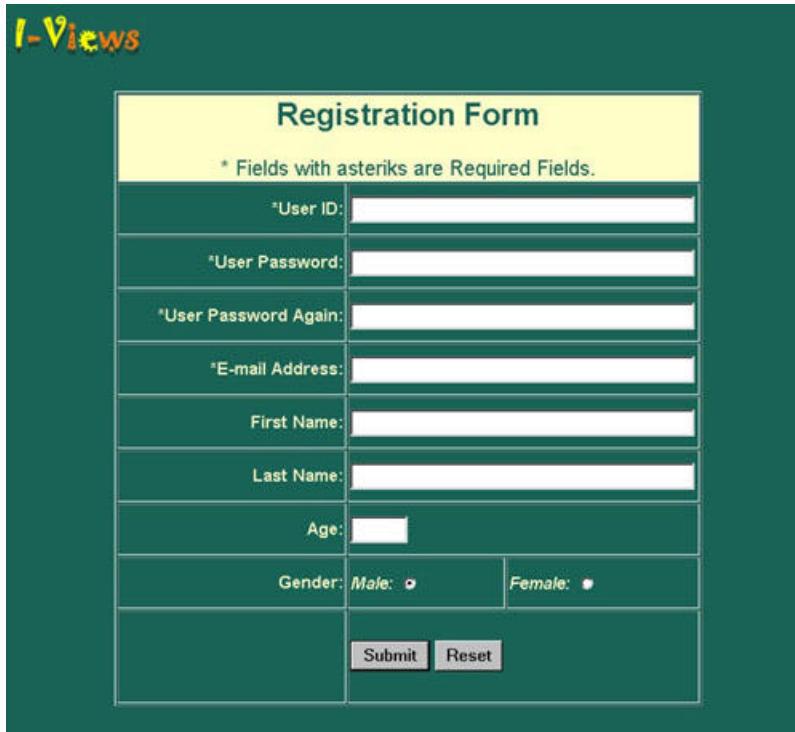
We define the seven components as follows.

#### User Registration and Login

In order to create a participant's profile, I-Views requires the new participant to register. The participant needs to provide a User ID, User Password and Email Address. S/he is also welcome to give us more information, such as age and gender. As soon as the registration is successful, the server sends a cookie to the browser that the participant is using. [Figure 4.1] In the old version of I-Views, the system keeps track of individual activities, such as which video clips are watched for how many times. In the current version, we didn't implement the function since we haven't figured

out how to use these data and they raise privacy concerns among participants.

After the participant logs into I-Views, there is a short instruction of how to use the system. He or she is able to click on the STEP ONE button and choose to view about eighty original video clips.

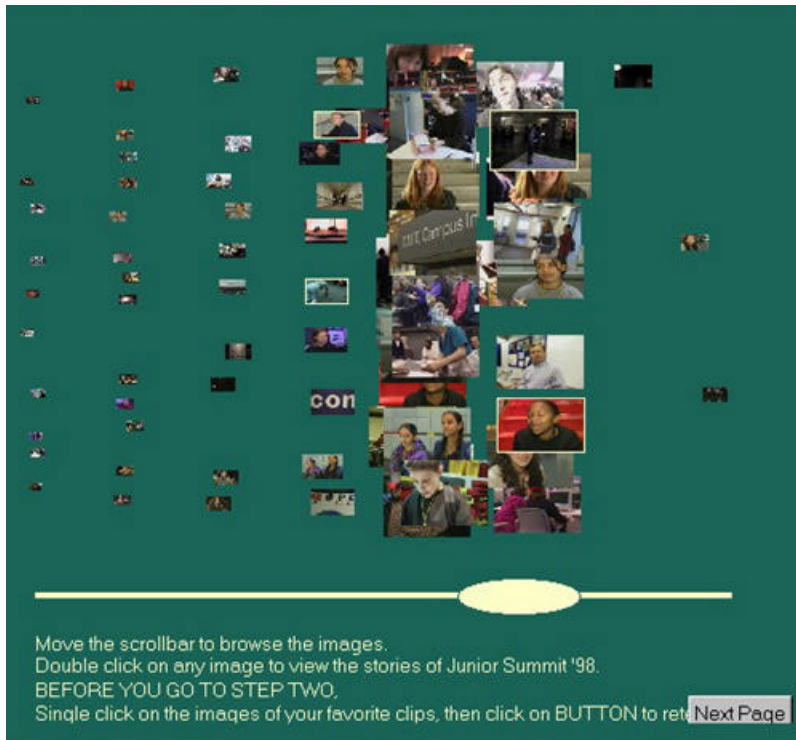


The image shows a registration form titled "I-Views Registration Form". The form is set against a dark green background. At the top left, the "I-Views" logo is displayed in yellow and orange. The form itself is a white-bordered box with a yellow header containing the title "Registration Form" and a note: "\* Fields with asteriks are Required Fields." Below this, there are several input fields: "\*User ID:", "\*User Password:", "\*User Password Again:", "\*E-mail Address:", "First Name:", "Last Name:", and "Age:". The "Age" field is a small text box. Below these is a "Gender:" section with radio buttons for "Male:" and "Female:". At the bottom of the form are two buttons: "Submit" and "Reset".

[Figure 4.1] Registration Form

### Viewing Original Video Clips

There are about eighty thumbnails on this applet. [Figure 4.2] Each thumbnail is linked to a video clip in the video database. The participant is able to move the yellow oval scroll bar to browse the images. The sizes and positions of the images changes based on the movement of the scroll bar. Initially, the presentation of images is random for the purpose of easily adding new images to the applet. Ideally, the scroll bar is used to scroll through related images together based on certain criteria, such as chronograph, subjects and characters. However, we haven't yet implemented those ideas. Some participants have complained that the interface design is confusing and that it is hard to find related images. From our live tests, we know the portions of the application which are not user friendly and we will try to design new concepts to present a large number of images in novel ways in future versions.



**[Figure 4.2] Viewing Applet for Browsing Thumbnails**

The participant can double-click on any thumbnail, and a G2 real audio player pops up and plays the associated video clip. [Figure 4.3] If the participant finds any of the clips interesting, he or she can one-click on the clips and save them into his or her personal archive. The selected images have a yellow thin outline around the images for ease of selection. After the participant selects his or her favorite images, he or she can click on the Next Page button and go to the editing page.

### **Edit and Broadcast Video Clips**

This applet is a simple on-line, real time sequencing tool, [Figure 4.4] which allows the participant to drag and drop images into the tool to edit video clips. It then allows for them to be broadcast. The participant can one-click on any image to view the associated video clip. If he or she likes it, he or she can drag it to an editing box. The participant can make a new sequence by inserting, deleting, and switching any clips. To preview the sequence, he or she clicks on the preview button and the G2 player pops up. The participant can modify the sequence to their satisfaction. To broadcast the sequence, a name would be given to the sequence and

broadcast button is clicked.



[Figure 4.3] A G2 Player Showing Video Clips



[Figure 4.4] The Editing Tool of I-Views

To offer the on-line real time sequencing tool, we adopted the SMIL language, which is the first standard directed at enabling web-based multimedia and one of the first XML-compliant languages. [1] SMIL is able to precisely synchronize the timing of

[1] "To enable simple authoring of TV-like multimedia presentations such as training courses on the Web, W3C has designed the Synchronized Multimedia Integration Language (SMIL)." <http://www.w3.org/AudioVideo/>

diverse media elements as well as the presentation of these elements through a SMIL-enabled player such as G2 player, which is also used in our environment. When the participant links some clips to make a sequence, the Java server and Perl scripts automatically generate SMIL tags and calls the G2 player. The G2 player is able to play these clips seamlessly one by one according to the tags. Because of the nature of SMIL language, we will be able to add more features such as fade in/out and trimming clips later. The simplicity is the beauty of this tool. We won't and cannot build a powerful editing system that can replace current PC-based editing systems such as Avid or Media 100.

### **Comparing Video Sequences**

After the participant broadcasts the sequences, he or she is able to view the sequence by clicking on the STEP TWO button. There are three columns on this page: Snapshot, Sequence Name, and Comparison. [Figure 4.4] To view the sequence that the participant produced, click on the associated snapshot and a G2 player plays the video clip. To find out more information about the sequence, click on the name of the sequence and a new window pops up. [Figure 4.5] The window presents the related information: the author, the clips are contained in the sequence, when the sequence is produced, etc. To share the sequence with friends, click on the Go button and a message window pops out. The participant can send out an email to his or her friends, who receives a URL link to that sequence. By clicking on the URL, the receiver is able to view the sequence via a G2 player.

As mentioned before, we provide a dynamic comparison tool for the participant to find other participants who have similar interests. Clicking on the Compare button, the participant is able to explore using a radar-like interface. The current whole web is like a virtual "desert," where individuals seldom have the means to know what other people are doing and exchange ideas. Based on this assumption, we have adopted radar as a metaphor in interface design and hope to provide useful means for very distributed participants to interact together.



[Figure 4.4] A Sequence List

**About this section:** This section shows more information about your sequence including the individual clips in the sequence. Click on any snapshot to view the videos of any individual clip. Click on the "Go" button to send email. The email will include a link to this sequence.

Send Email with a link to this sequence:

#### Sequence Information

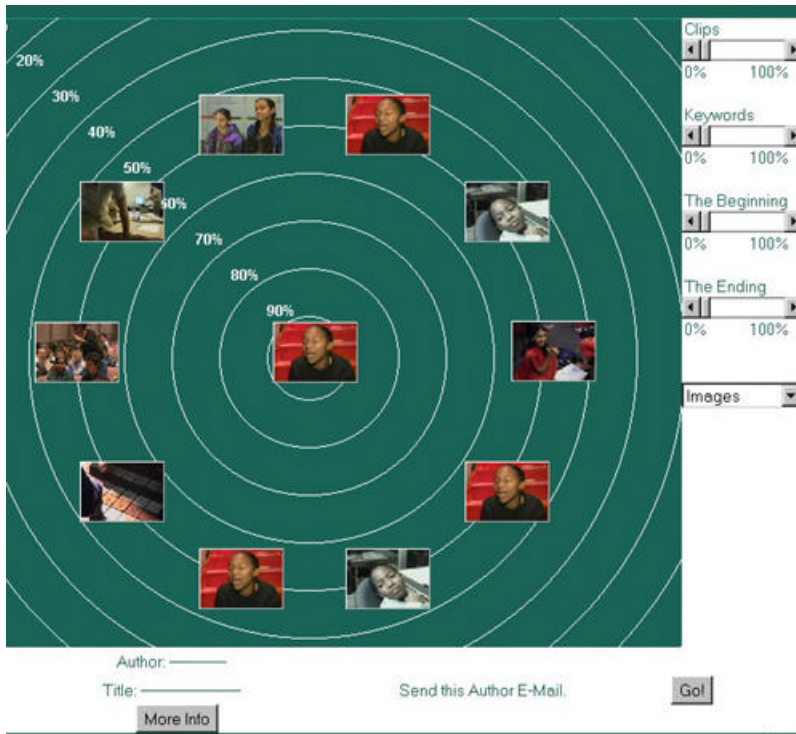
**Title:** sequence3  
**Author:** ppk  
**Creation Date (MM/DD/YY):** 04 / 07 / 1999  
**Creation Time:** 04:33.57  
**Duration:** 0:45

#### Individual Clips in Sequence

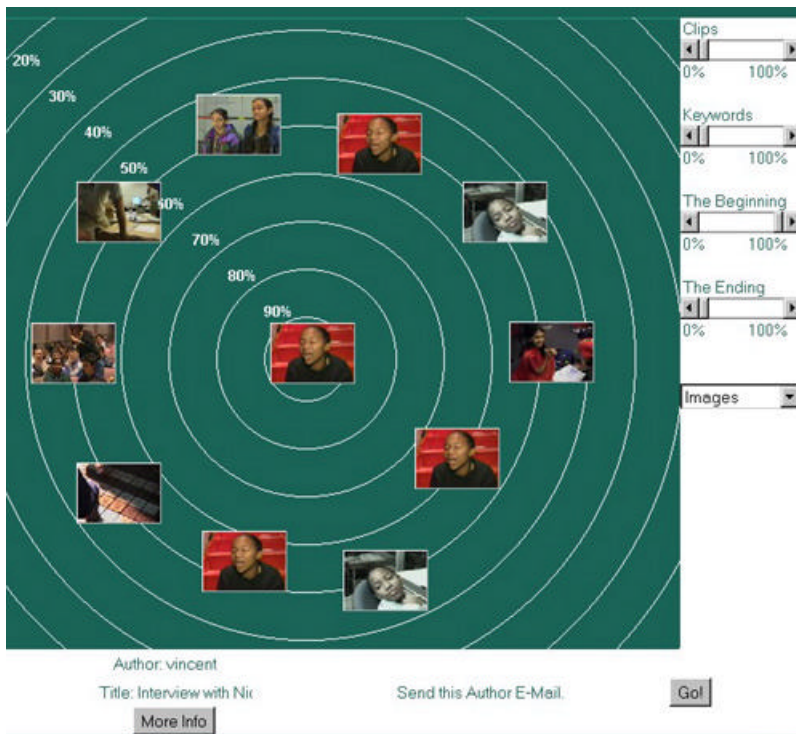
Snapshot	Video Name
	Different People
	Make Education Better

[Figure 4.5] A Sequence Information Window





[Figure 4.6] The Comparison Tool



[Figure 4.7] The Comparison Tool



[Figure 4.8] The Email Window

In the middle of the applet, there is the sequence that the participant selects as a metric for comparing to other sequences in the database. [Figure 4.6] Around the selected sequence, there are ten most similar sequences. On the right side of the applet, there are four criteria: Clips, Keywords, The Beginning, and The Ending. The criteria allow the participant to determine what it means to be similar. The distance between the selected sequence and a certain sequence hints how similar the two sequences are based on different criteria. For example, if the participant wants to find out which sequences have the same beginning as the selected sequence, he or she can move the scroll bar of The Beginning to the position of one hundred percent. [Figure 4.7] Three sequences that have the same beginning move closely to the center. Similarly, the participant can move the rest of scroll bars to change the criteria. Furthermore, the participant can use a combination of the four criteria. For example, the scroll bar of Keywords can be positioned to fifty percent, the scroll bar of The Beginning to one hundred percent. On the other hand, the participant can use the same tool to figure out which sequence is most different from the selected sequence by moving all scroll bars to the position of one hundred percent.

As the participant discovers sequences that he or she is interested in, s/he clicks on the sequence to learn who is the author and title of the sequence. In the example, [Figure 4.8] the author is Vincent

and the title is Interview with Nic. If a participant wants to initiate a dialog with Vincent, they can click on the Go button and to get a message window from which to send a message to Vincent. So far, email is the only means that we provide for participants to initiate dialogs. We are thinking of designing a synchronous communication system in future versions of I-Views.

### Comparison Algorithms

Here, we briefly introduce the algorithms that were used to implement the comparison scale in I-Views.

The comparison scale helps the participant find out which sequences are similar to the sequence that they selected as a metric. There are two factors determining how similar between two sequences: the subjective factor and the objective factor. The subjective factor is determined by the importance percentage of a criterion; the objective factor is determined by how many common clips or keywords between two sequences. The high level algorithm is as follows.

$$W = \sum_{j=0}^{n-1} ((1/n) \times (Sf_j \times Of_j))$$

Where  $W$  is the weight for measuring how similar between two sequences;  $n$  is the number of criteria (in I-Views' case, there are four criteria;)  $Sf$  is the percentage of subjective factor;  $Of$  is the percentage of objective factor.

For example, say we have a metric Sequence A which includes Clip 1, Clip 2 and Clip 3 and other two Sequences to be compared with: Sequence B including Clip 1, Clip 2 and Clip 5 and Sequence C including Clip 3, Clip 4, and Clip 6. Let's say that we only want to make the comparisons based on similar clips between two sequences. So we move the scroll bar of the Clips to one hundred percent. Now,  $n$  is 4 and  $Sf$  is 1. The weight of Sequence B is:

$$W = (1/4) \times (1 \times 0.667) = 0.1667$$

The weight of Sequence C is:

$$W = (1/4) \times (1 \times 0.333) = 0.0833$$

The weight of Sequence C is smaller than the weight of Sequence B, since there are two same clips between Sequence A and B while one same clip between Sequence A and C.

*Of* is a variable determined by different comparison criteria. Now, we discuss why the *Of* of Sequence B is 0.667 and the *Of* of Sequence C is 0.333. The basic idea of the sequence-based algorithm, that is, the matching of many common clips exist is quite straightforward. It is as follows.

The selected sequence A which has clips: A1, A2, A3,... Am compares to sequence B which has clips: B1, B2, B3, ... Bn  
Calculator T=0 at first.

Compare A1 with B1, B2, B?, if A1= B? then T=T+1,  
Compare A2 with B1, B2, B?, if A2= B? then T=T+1,  
...  
Compare Am with B1, B2, B?, if Am= B? then T=T+1,

Eventually, we know the value of T. The rank of Sequence B is T/Max(m, n). Here, we ignore orders of sequences.

Taking the above example, the number of Sequence B's *Of* is:

$$Of = 2 / \text{Max} (3,3) = 0.667$$

The number of Sequence C's *Of* is:

$$Of = 1 / \text{Max} (3,3) = 0.333$$

The keyword-based algorithm is the same as the one described above. However, the process of matching a similar beginning is a little different from the one above.

The selected sequence A which has clips: A1, A2, A3,... Am compares to sequence C which has clips: C1, C2, C3, ... Cn  
Calculator T=0 at first.

[2] Maes, Pattie. Shardanand, Upendra. *Social Information Filtering: Algorithms for Automating "Word of Mouth."* CHI, 1995

[3] Konstan, Joseph. Miller, Bradley. Maltz, David. Herlocker, Jonathan. Gordan, Lee. Riedl, John. *GroupLens: Applying Collaborative Filtering to Usenet News.* Communications of the ACM, March 1997

[4] Goldberg, David. Nichols David, Oki, Brian. Terry Douglas. *Using Collaborative Filtering to Weave an information Tapestry* Communications of the ACM, December 1992

If  $A1 = C1$  then  $T=T+1$ , otherwise Break,  
If  $A2 = C2$  then  $T=T+1$ , otherwise Break  
...

Finally, we find the value of  $T$ . The rank of Sequence  $R$  is  
 $T/\text{Max}(m, n)$

The algorithms of comparing the beginning and the ending are same. However, we have implemented these algorithms in slightly different ways, though the basic ideas are same.

The mechanism of the comparison algorithms looks similar to current collaborative filtering method. <sup>[2][3][4]</sup> However, there are a few significant differences in terms of user data retrieval, objectives, and procedures. We compare our algorithms to that used in Ringo and discuss the reasons why we took the current approach.

#### Data Retrieval

In Ringo, users have to vote which song is good or bad. The processes to retrieve users feedback are very time-consuming and subjective. I-Views takes a different approach. Participants watch clips, select and link some of them together using the editing tool and broadcasting tool. We assume that the clips they select make sense to themselves. Participants need not vote. Sometimes, a clip cannot simply be judged as good or bad. The process of retrieving participants' feedback is transparent in I-Views.

#### Objectives

The objective of Ringo is to make personalized recommendations. The users have expectation of getting accurate recommended results. Furthermore, because of the nature of the algorithm, the method cannot work well if the user base is not larger enough. In I-Views, the comparison tools offer a means for participants to find other people to initiate dialogs. Our focus is on matching people. The comparison tools also work even when there are very few participants using the system.

## Procedures

In Ringo, the procedure of recommendation is static and black-boxed. The user votes on a set of songs, then Ringo gives out a list. I-Views' comparison tools are dynamic. The participant can move the scroll bars to justify the criteria and define what is similarity. The movements of thumbnails react to the changes of scroll bars simultaneously. The participant is able to perceive the interconnection among these sequences.

We are still testing and improving our comparison algorithms and interface design. We believe that meaningful comparison tools can bring distributed participants closer together.

### **Find the Most Popular Sequences**

Besides the comparison scale, we also offer a popularity scale. [Figure 4.9] By clicking on STEP THREE button, the participant is able to see the applet. There are two parts: the filmstrip window and the information window. On the filmstrip window, the top sequence is the most popular sequence. Similarity is determined by statistical data. The applet shows the most popular ten sequences. On the information window, there is related information for any selected sequence: keywords, number of hits, the title of the sequence, etc. Static popularity scale is relatively simple to implement. However, providing community-oriented dynamic popularity scale is a challenge. Ranking interesting stories for a certain group of participants hasn't been explored in I-Views.

### **Contributing Video Content**

An ideal story-sharing platform has a decentralized architecture, where participants are able to contribute their own stories in efficient ways. I-Views offers a contribution component, [Figure 4.10] which allows the participants to send us the meta information of their stories. The layout is straightforward. The participant can type in information to each text field. However, we don't allow them to send the video or audio files to our database directly due to security concerns. The information that the participants provide is transferred to a database. I-Views team members will read the information and go to the participants' URLs to retrieve their video information. The current method is cumbersome

and we are working on a new method to allow participants to contribute their stories to I-Views.

### Searching for Content

In I-Views, we have only experimented on a simple key-based search engine.[Figure 4.11] We also offer a few filters: video type, keywords, and authors, in this search engine. Providing a video search engine is one of our research directions. We will discuss the ideas of meta-information based search engine techniques in later chapter.



[Figure 4.9] The Sequence Ranking Window

**I-Views** STEP 1 STEP 2 STEP 3 STEP 4 STEP 5 LOG OFF

**About this section:** Fill in the form to submit information about a video you would like to add to our collection. For the video and thumbnail locations, please input a URL so that we may retrieve and review your information before adding it to our database.

### Contribute Videos

All Fields are Required Fields.

Video Name:	<input type="text"/>
Duration:	<input type="text"/>
Thumbnail URL:	<input type="text"/>
Video URL:	<input type="text"/>
Author:	<input type="text"/>
who:	<input type="text"/>

{About I-Views} {Help} {Junior Summit '98} {Contact Us} {Download G2 Player}

[Figure 4.10] The Contribution Window

**I-Views** STEP 1 STEP 2 STEP 3 STEP 4 STEP 5 LOG OFF

### Search I-Views

search reset

Search by

Video Type    Keywords    Authors

Original Videos    Who    No Authors

**About this section:** The selected values from the menus above will be incorporated into your search. For example, an entry of "Media Lab" into the text box with the following menu selections: Sequences, Where, and No Authors will result in a search that matches the string "Media Lab" to all Where keywords associated with all Sequences in the I-Views database. However, if you select Sequences with no keywords or authors, then the search will match your words with the titles of any Sequence. If you have selected keywords and/or authors then the search engine will attempt to match for all three criteria and may return multiples of the same entry. Results will include links to the sequences. Click on any link to view the video sequence.

{About I-Views} {Help} {Junior Summit '98} {Contact Us} {Download G2 Player}

[Figure 4.11] The Video Search Window



## Modules on Server Side

I-Views is a multimedia-based multi-client/server system built on various computer languages and uses a variety of tools. We took a client-oriented approach in the design of server side modules. The design and implementation of server side modules are primarily based on the client side needs. We also considered the performance of communication and computation as certain limiting hardware and software resources exist. The whole system is built on freeware, such as Linux, Java, Perl, Apache, MySQL, etc.

Christina Chu played a very important role in building the whole architecture. For details on all of the modules, please read her AUP thesis. <sup>[5]</sup> Here, we discuss the outline of the system. To present the system's back-end, we start from network architecture, then describe different modules such as Applet-Servlet modules, Perl script modules and video server modules.

All modules and data exist on three machines:

wwwic.media.mit.edu, fellini.media.mit.edu and

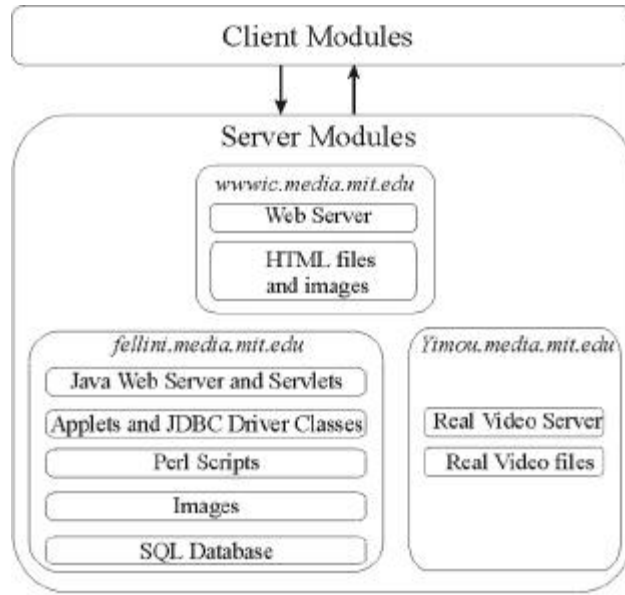
Yimou.media.mit.edu. On the three machines, there are four servers running simultaneously: Web Server, Java Server, Database Server and the Real Video Server [Figure 4.12]. The diagram shows the locations of all servers, contents, applet classes, Perl scripts, etc. Generally speaking, the IC web server is in charge of static HTML files and contains a mirror copy of the thumbnail images; Fellini contains Java Web server, Servlets, Applets, JDBC driver classes, Perl programs, MySQL Database, etc.; Yimou is the streaming video powerhouse.

The Applet-Servlet modules are presented as follows. [Figure 4.13]

On the left of the diagram, there is a Java Constants class, which contains all of the URLs and pathnames in Servlet codes. It is convenient for us to modify and upgrade the domain names or the locations of current modules. In the middle of the diagram, there are eight independent Servlet and Applet modules, which have different functionality. Registration Servlet handles new participants and transfer their registration information to database. Login Servlet deals with the participant who already has registered. If the participant logs in successfully, their browser is given a cookie which includes the participant's identification number.

[5] Chu, Christina *Technical Architecture and Implementation of I-Views: An online storytelling community*. Advanced Undergraduate Project Final Report. 1999

[6] <http://www.real.com/devzone/library/stream/index.html>

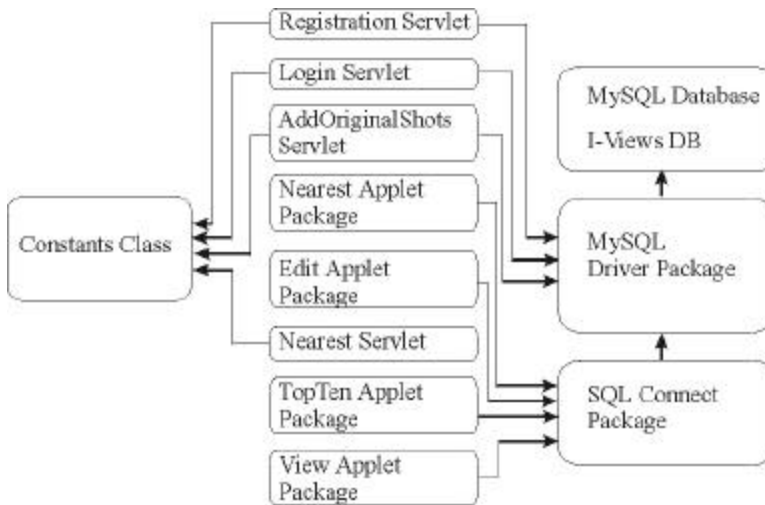


[Figure 4.12] Code Modules and Locations on Server Side

The View Applet package contains the View applets that allow the participant browser and watch the original video clips. The applets in the Edit Applet package deal with editing, previewing and broadcasting events. Nearest Servlet automatically generates the appropriate HTML tags, which has the Nearest applets in the Nearest Applet Package. The TopTen Applet package does the computation to find the most popular sequences based on hit rates.

On the right of this diagram are the database related modules. All applet codes are associated with the JDBC driver: MySQL Driver Package. The SQLConnect Package works as an interface to the MySQL Driver Package. I-Views database has two parts: IviewsDB and IviewsNew. IviewsNew is modeled after the IviewsDB and is used as the temporary database.

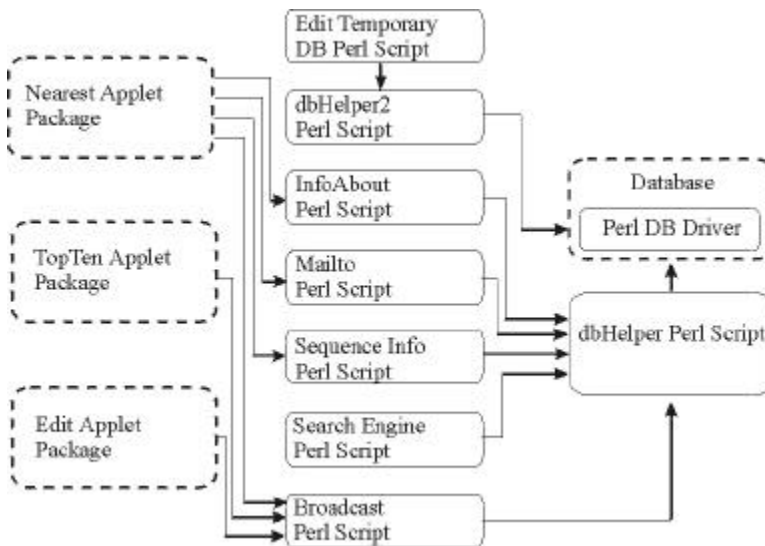
In I-Views, Perl scripts perform two types of jobs: generating the SMIL tags and processing supporting work such as searching keywords and sending email. [Figure 4.14] The Broadcast Perl scripts generate the SMIL file tags for sequencing video clips together, so G2 player is able to play video sequences seamlessly. The Nearest Applet Package, the TopTen Applet Package and the Edit Applet Package are associated with the scripts.



[Figure 4.13] Applet and Servlet Modules

The InfoAbout, Mailto, Sequence Info and Search Engine Perl scripts depend on the dbHelper Perl scripts that execute and extract information from the SQL queries. The dbHelper2 scripts handle temporary data transactions. The InfoAbout scripts deliver information of a certain sequence; the Mailto scripts offer web-based email feature; the Sequence Info scripts report the information of keywords; the Search Engine help the participant find certain video clips or sequences based on keywords.

[7]  
<http://www.darmstadt.gmd.de/mobile/MPEG7/index.html>

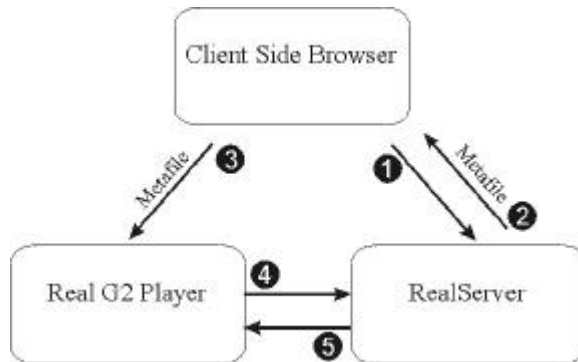


[Figure 4.14] PerlScript Modules

In I-Views, Real Video Server Modules are composed of three parts: client side browser, G2 RealPlayer and Real Video Server. To find out more about the details of streaming video system, please

visit the Real web site. [6]

Here, we briefly present an example of how Real Streaming Video System and I-Views work together. [Figure 4.15]



[Figure 4.15] Real Streaming Video Modules

For example, two video clips compose a sequence: F-logo1.rm and F-poster.rm and the address of the sequence is as follows.  
[http://mit.edu/cgi-bin/broadcast.pl?seq=F-logo1:F-poster:](http://mit.edu/cgi-bin/broadcast.pl?seq=F-logo1:F-poster)

A participant clicks on the link and the Broadcast Perl script generates a new SMIL file which contains the addresses of the two clips.

1. The SMIL file is sent to the RealServer by the browser.
2. RealServer creates a small metafile and sends it to the participant's Web browser according to the SMIL file.
3. The browser downloads the metafile and sends it to the participant's G2 RealPlayer. The metafile contains the addresses of the sequence mentioned in the link.
4. G2 RealPlayer reads the link in the metafile and requests the video clips directly from RealServer.
5. RealServer streams the video clips seamlessly to the G2 RealPlayer.

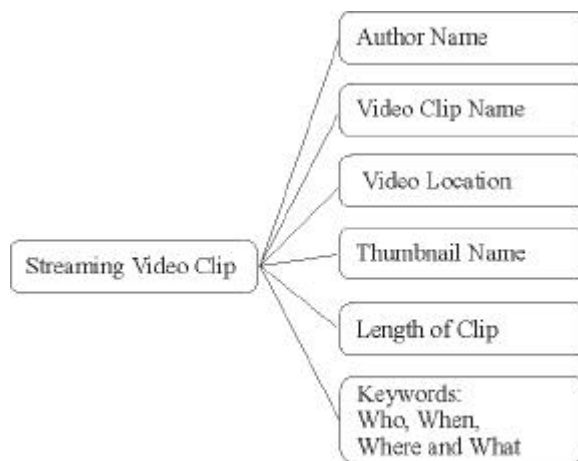
Finally, G2 RealPlayer plays the sequence that has the two clips: F-logo1.rm and F-poster.rm one by one. Since the computation of generating SMIL file is very little, the Editing Applets are able to offer real-time features.

### Meta Information Design

Meta information is a machine understandable information used to describe objects, documents, services, images, audio/video and so on. Meta information (MI) has been applied in a variety of

contexts. In I-Views research, our focus is on the meta information for annotating, categorizing and manipulating video based content.

In I-Views, there are two types of meta information: static MI and dynamic MI. Static MI is provided by content providers. In I-Views case, we digitized, edited and annotated the eighty clips. The MI include the authors name, video clip name, video location, thumbnail name, length of clip and keywords such as who, when, where and what. [Figure 4.16] In I-Views, the participant is able to search video content based on these MI. For example, to search all original video content happening at the MIT Media Lab, the participant can search for the keyword, Media Lab, then I-Views lists all the content in database.



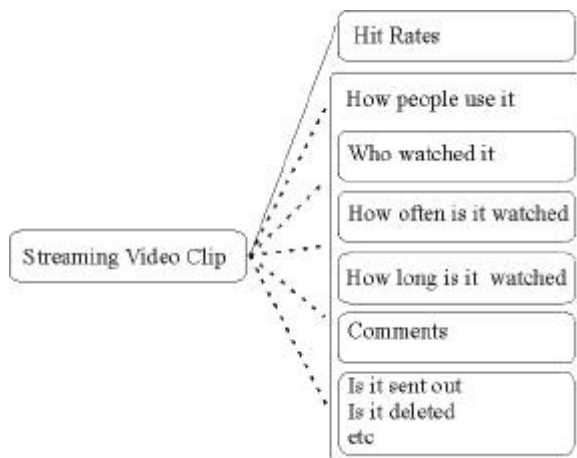
[Figure 4.16] Static Meta information Modules

We would like to invite the participants to co-produce MI with us. We coin the co-produced MI as dynamic MI. There are a few motivations why we want to do so. They are as follows.

1. Some important MI cannot be pre-produced by the content providers. For example, a reader is looking for a paper that has been referred for at least fifty times in high level academic magazines. Based on the current pre-production-based MI methods, there are no means to provide these important MI.
2. Most productions of MI are inefficient. For example, a book is written for teenagers. The author of the book should offer the MI that indicates that the book is for teenagers. The processes of providing MI are rigid and hierarchical. However, if there is a means that is able to know most of readers are teenagers and

automatically generate a piece of relevant MI which suggests the book is written for teenagers, the productions of MI can be much more efficient.

We need new means to observe, extract and refine these user-produced information and co-produce evolving meta information with the information users. There are basic two types of data that can be used for dynamic MI. The first type of data is structured data such as how many times the paper is referred. The other type of data is unstructured data such as the readers' comments. However, this kind of work has not been well designed and implemented. We are still experimenting with dynamic MI in our research. In I-Views, we designed mechanisms that are able to handle structured dynamic meta information such as hit rates. In the original version of I-Views, we record hit rates of both original clips and sequences. [Figure 4.17] The MI linked with a solid line has been implemented.) These MI can help participants to search popular stories. We will discuss more details of dynamic MI in future search.



[Figure 4.17] Dynamic Meta information Modules

## Content

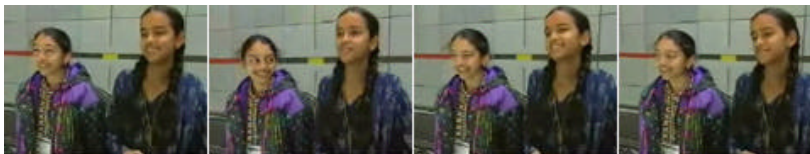
As mentioned before, I-Views is developed in conjunction with the stories of Junior Summit '98. We have presented the overview of this project and discussed why we chose Junior Summit '98 as the contents for I-Views. Here, we briefly introduce what kind of stories have been told in I-Views and how those stories been produced.

In current video database, there are 79 original video clips. The majority (65 pieces of clips) of clips are the stories that happened at the MIT Media Lab during the Summit. Some video contents are the interviews to junior delegates: where they are from, how they know other children, how they like Boston, Media Lab, what their impressions to the Summit, etc. Some video clips record their activities at Media Lab, such as playing Lego, making presentation, preparing the international fashion show, taking pictures together, visiting the computer museum, and so on. The rest of the clips tell the stories of how the MIT Media Lab organized the summit, the trip to Africa, setting up computers, etc. Here we give an example of two Indian girls sharing their first experience of being abroad. [Figure 4.17]

*It's the first time I am abroad.*

*Really?*

*It's the time I left our country and it's first time we took plane and everything is the first time. The first I boarded the plane and I was very scared. I told my mom I didn't want to take plane. She said that was OK. The first time the plane took off, I never had experience before. The plane went down. I didn't know what was going to happen...*



[Figure 4.17] Screen Shot of Interviewing with Two Indian Girls

Sixteen filmmakers contributed their video footage to I-Views. They are Nickelodeon, Professor Davenport, all the graduate students and some undergraduate students in the Interactive Cinema Group, three moderators and four junior summit delegates. We attach some thumbnails [Figure 4.18, 4.19] of these original clips as follows. Content evaluation will be conducted in a later chapter.



[Figure 4.18] Thumbnails of the Original Streaming Video Clips



[Figure 4.19] Thumbnails of the Original Streaming Video Clips



## **5. Evaluation and Future Work**

### **Evaluation Overview**

Version 1.0 of the I-Views System became fully operational in June. In our evaluation we engaged two small groups of users, a group of 8 Junior Summit delegates who used the system remotely and a group of Media Lab students and faculty. Our evaluation focused on two objectives:

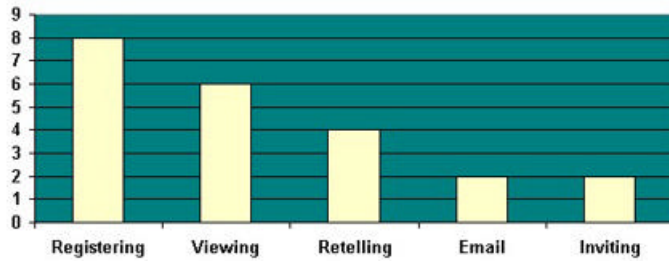
- Will users who are portrayed in a particular set of observational video content, engage with that content to the point of creating their own video sequences from the set, publishing their sequences to their friends and developing discussion communities around this material?
- Can we improve the workflow and interface design of I-Views? Should aspects of I-Views be redesigned to better accommodate the community building objective?

### **The Evaluation Participants and Methods**

#### **Group A:**

Our most interesting evaluation draws on observations about how a group of 8 Junior Summit delegates used the system remotely. This user group was critical to evaluating our main hypothesis, that people presented with a system in which they can share, re-edit and publish video will do so. All members of this group had participated in the six-month on-line forum and the one-week Media Lab Summit. They knew each other and worked together through a variety of projects, discussion groups and email lists. From June 12, 1999 to July 12, 1999, they volunteered to test I-Views. Eight of them successfully registered in I-Views and six of them were able to view video clips from I-Views. Four participants

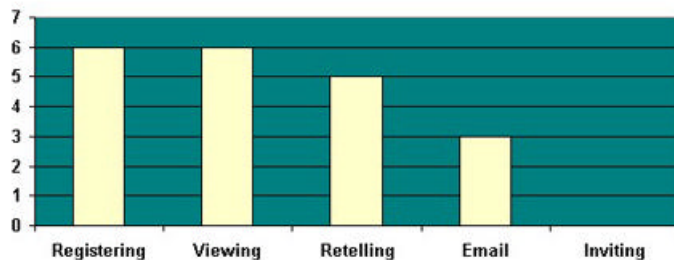
re-told stories and two of them sent out email and invited other people to join in I-Views. [Figure 5.1] We discuss the details later.



[Figure 5.1] Diagram of the Remote Tests

### Group B:

Our second group of users, while not engaged in building community, were selected to comment on the actual design of the systems at the MIT Media Lab. During the on-site evaluation processes at Media Lab, six participants were able to register in I-Views and watch video clips. Four of them tried to re-tell stories. Three of them tried the email function; none of them invited other people to watch or discuss their re-edited segments. Some participants were videotaped while using the system. [Figure 5.2]



[Figure 5.2] Diagram of the On-site Tests

Following hands on portion of the evaluation, we talked to participants to understand more fully their engagement with the system. Our evaluation results relate to four topics: accessibility, content, workflow and interface design and virtual community building.

### Accessibility

To engage with I-Views, the participant needs a fast Internet connection such as a cable modem, a DSL, ISDN or T1. The cost of Internet connection and low data rates are major two reasons

why they couldn't use I-Views.

*Sorry but I don't think I'll be able to use I-views as I'm not allowed to pay in order to download the G2 real player. I wish I could help. Konstantina*

The bandwidth is a big barrier for most people experimenting with I-Views.

### **Content**

The Junior Summit delegates loved watching the stories that are about themselves.

*I remember all of mine naturally--Legos, Introductions, Interview with Nicole McLaren, Interview with Hilary McQuaide, and choosing participants.(Vincent,13, Paris)*

*I really loved seeing the video clips. My favorites were of my special friends and, embarrassing, the ones of myself:)  
(Jacqueline, 10, Canada)*

Notwithstanding the delight of watching oneself, question remains as to whether the database as it currently exists provides enough depth to allow participants in I-Vies to discover a new understanding of what the Junior Summit was or could be. My supervisor, Glorianna Davenport, suggest that we take pleasure in stories that allow us to learn something new about ourselves or others. Like the documentary filmmaker/editor, the audience of an interactive documentary must want to be privy to what took place in the presence of the camera. Otherwise, how can this audience develop a new viewpoint let alone share it with others. The interactive documentary invites the audience to be a defective, a researcher as well as -- in the case of I-Views -- a member of a community of interest. Flat clips cannot be re-sequenced to tell novel stories. In the hopes of getting a broader diversity of footage, we have opened an FTP server and hope the Junior Summit delegates and their parents submit interesting footage to us.

Many sponsors have asked us whether or not I-Views can be served for different content for very distributed participants who might not know each other at all. From a technical perspective, it is possible.

The architecture of I-Views is designed for virtual communities. However, there are a lot of uncertainties in terms of content, system implementations, Internet bandwidth, etc. Some feedback shows such uncertainty.

*I have also tried to ask myself if I could have played this game if I hadn't known the people involved, if the sequences hadn't been about the Junior Summit experience at Cambridge....and I don't really know. I guess it would depend on the topic.  
(Vincent, 13, Paris)*

### **Workflow and Interface Design**

We have received many valuable comments on workflow, function design and interface design. Most people like the interface design and explicit workflow design. However, some users were confused by some parts of I-Views, particularly, the View applet and the comparison tool.

*Maybe because I was using a portable, but many were very small I'd no sooner locate one and view it and mark it then I'd lose the place where the next one for my sequence was. It was a lot like those memory games where you have to remember where the face down cards are in order to turn a pair over...As I said before, I didn't like those pictures moving around--kind of neat in the beginning to watch but very frustrating to work with. I would have preferred something more static and larger. I think that I would have then made many more sequences and sent them to people. (Vincent, 13, Paris)*

*Viewing page. It may be a good idea to let people know what the clips are about before they click on the thumbnail and wait a million years for the RealPlayer to begin and the clip to start. Maybe try popping up information as the mouse passes over the thumbnails. (Carmen, undergraduate student, MIT)*

As for the comparison tool which we designed for matching participants and building communities, we have found that adults and children hold very different viewpoints on it. Generally speaking, most adults, including sponsors, video/filmmakers, professors and students appreciate our approach to fostering virtual communities by means of matching common interests and

assumptions. However, many debates focus on our current implementation. Many people didn't fully understand the concept of comparison tool, particularly, during the first of use I-Views.

*It may have been fun to see how the pictures moved when the different criterion are given different weights, but I did not fully understand the concept behind the "nearest neighbor."*

*One way to improve the current system is to give a better description of what the section is all about. It is not informative to know that the applet is showing the ten "nearest neighbors" to my video sequence. (Carmen, undergraduate student, MIT)*

During the design stage, the I-Views team discussed two approaches to matching common interests: author-based and story-based approaches. Based on the first approach, I-Views matches similar storytellers in stead of matching similar stories. During the evaluation, Carman gave a similar idea.

*In fact, a better way of introducing my nearest neighbors should probably focus more on the authors than on the video sequences. Perhaps it is better to say, "These authors made clips that are similar to yours" rather than "These clips are similar to the clip you made." Communication and friendship is built around people. Don't ask the user to seek out the other author after viewing his work. Rather, bring the other author to the user. Perhaps even keep a profile/picture of all users for "introduction" purposes. Knowing what people are similar to me (expressed through their clips) rather what clips are similar to my clip is a better way to start communication... (Carmen, undergraduate student, MIT)*

We have found that children, particularly young children from 10 to 12-years old don't understand the comparison tool at all. We don't have conclusions about why they don't understand the comparison tool. We assume the reason is that the design of the tool is not compelling enough. However, we found that the old children from 13 to 16-year old children are more willing to re-tell stories and send out to their friends and family than the young children do. They also enjoy receiving the comments that their friends send back.

## Community Building

As for the community building, we have not seen any extraordinary activities. So far, some participants re-told many stories about two topics: Lego and the international fashion show. They shared their stories among themselves and their friends through email. We need efficient means for maintaining community networks and mass participants to use the system. Some people also commented that we should take different approaches to foster community and collaboration.

*In addition, a second way of communication can also be added to the system. Aside from having discussions about the finished product, get users to collaborate and/or help each other during the production process. For example, set up a competition. Divide people into groups and have them collaborate for the competition. There is no better way of getting to know other people than in a group environment with a common goal. Also, keep a log of what a particular user's subject is and what s/he has made. If another user decides to make a video with the same subject, introduce the users to each other such that if help is needed, one can contact the other for advice. (Carmen, undergraduate student, MIT)*

Through the live tests, we have also found something interesting: the different virtual roles of participants during the processes of building virtual communities. As we mentioned before, there are basic three types of participants: *observer*, *builder* and *leader*. Among fourteen testers, about four participants are *observers*, two of them are *builders* and two of them are *leaders*. We also have a few new users who were invited by the two *leaders*. These leaders play a key role in terms of self-organizing virtual community. For example, Vincent not only watched a lot of video clips, re-told stories with extreme patience, sent sequences to his moderator, Julia, and invited her to join the test of I-Views. When Julia had problem with using I-Views, he immediately sent email to us and tried to solve her problems. Since the leaders play extremely active roles in growing a community, we will in the next re-design focus on functionality to promote the leader role for building up and organizing sub-communities.

A big concern in I-Views is privacy. Some of people have

expressed their concerns on copyrights, authorship of shared content. It could become an issue of I-Views were used to share home movies or share politically sensitive information. We keep these concerns in mind.

## **Future Work**

Our future research focuses on improving the current version of I-Views, meta information research and self-organizing video-based virtual community building.

The I-Views is an ongoing project and many of its components have not been well implemented. Through the live tests, we know more about what works and what does not. From the content perspective, the next version should allow the participants contribute their own content in convenient ways. They also should be able to have control over their content. In this sense, I-Views is a little like Geocity.com.<sup>[1]</sup> However, Geocity.com primarily offers virtual space and simple web page design tool for static home page hosting. I-Views is more focused on Video-based content dissemination, communication and storytelling community building aspects of I-Views which require more intense research including the browser and the comparison tool. The participant is able to match storytellers or stories based on his or her comparative metrics. The four comparison criteria might be abstract objects. The current version of I-Views only offers four comparison criteria: clip, keyword, the beginning and the ending. In new version, the participant might be able to choose subject, character or location as comparison criteria for matching common interests. We continue to build I-Views, do live tests and improve it.

Meta information research is critical and long-term research. It is not only related to technique issues, but also to many literature, culture, and social issues. As mentioned before, we will focus on retrieving, extracting and refining the dynamic meta information, in particular, the unstructured dynamic meta information. Our basic approach is to co-produce useful meta information with content consumers. We need to recycle their experience and impressions on the content and re-build these important data back to the content. New standards, such as XML and potential MPEG-7 might provide new insights for the work.

[1] Geocity.com is a free home page hosting site.  
<http://www.geocity.com/>

Ultimately, we would like to understand how we can initiate a self-organizing video-based virtual communities. Self-organizing video-based virtual community consists of groups of individuals whose communication and collaboration takes place over the very distributed networks. The self-organizing communities are of, by and for community members who associate on the basis of shared interests and assumptions. Self-organizing communities are resistant to centralized control by an individual or by a small group of individuals. Every member is able to contribute as well as consume information at any given time. Although many self-organizing virtual communities use various media, our research will concentrate on video-based content.

In particular, we would like to focus the next phase of research on issues: community vocabulary and incentive mechanism from both sociological and technical perspectives.

#### Community Vocabulary:

Many self-organizing communities are drawn by the opportunity to share a sense of community with like-minded individuals, regardless of who they are, where they live, or their age. We will concentrate on technical issues: ontology for describing community vocabulary for accessing and manipulating video-based content, protocols for formulating criteria for communication among community members. Criteria in this sense will be widely agreed-upon practices that allow for reutilization of interactions among cooperating members. The criteria will allow for easier and less expensive communication among collaborators.

#### Incentive Mechanism:

More than 80 percent family videos have never been watched. Why? Except the low bandwidth of the current Internet connection, what is the primary barrier that prevents people from producing and broadcasting video-based content over the Internet? Will the community-oriented models catalyze people's passion to put more video-based content over the Internet? Incentive mechanism will be thought of and derived from both technical and sociological perspectives.

We will continue to explore new research directions. There are two of them in mind: Participatory Media and Constructive Media.



They are extremely valuable from educational perspectives. The current media really lacks of means to construct with and participate in. The new participatory media and constructive media would bring great opportunities for children to learn from each other. As Carmen mentioned in her evaluation to I-Views, we might investigate game mechanisms and bring some competition mechanisms into new media designs.



## 6. Conclusions

In this thesis we have examined a hypothesis: Can we design and implement a distributed system that presents motion picture media that simultaneously encourages the social use of back channel to build a sense of community. By taking an idea from the Society of Audience, On-line Social Environments and Evolving Documentary Systems, we have built I-Views, a prototype of *Sharable Documentary* that presents the stories of the global event, the Junior Summit '98. Specifically, there are two major contributions of this aspect of the work:

- A democratic sharable storytelling model which enables the very distributed participants to share authorship, tools, spaces, impressions and experiences around motion picture stories, such as the story of the Junior Summit '98, on the Internet.
- A dynamic similarity scale, a tool that matches common interests, facilitates the participants to initiate conversations and encourages the social use of back channel to build the sense of community.

To demonstrate the hypothesis, we have implemented the prototype, I-Views that has a web-based working system and an evolving documentary database.

- A working system: The I-Views architecture includes a *mySQL* database and three collaborating servers: Java, Web and streaming RealVideo. There are two user environments: the "Web-based Video Editing Studio" and the "Community-oriented Virtual Theater". The former allows the user to view, select, save, re-sequence and publish video clips; while the later allows the user to initiate dialogues by matching common interests and assumptions and build virtual communities around

stories.

- An Evolving Documentary database of sequences about the Junior Summit: The database includes eighty Realvideo format streaming video clips ranging in length from thirty seconds to two minutes. These clips have been selected from one hundred hours of footage shot by sixteen international filmmakers four of whom are junior filmmakers. Each clip is associated with four key words. These keyword-annotated clips are archived into a relational database.

Our hypothesis has been explored through the implementation of I-Views and on-site and remote tests and evaluation. In the *Sharable Documentary* environment, the participant do socially use the back channel to build the sense of community. In particular, we observe that there are basic three types of participants: *Observer*, *Builder* and *Leader*.

At a higher lever, we hope that the concept of *Sharable Documentary* will contribute to providing a new perspective for thinking of the storytelling, the roles of the author and the audience and the social construction of meaning. We advocate the democratic story environment where our talents share and are shared with each other; where we as beings inspire and are inspired by others in novel and efficient ways.

By Pengkai Pan  
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Cambridge, MA

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